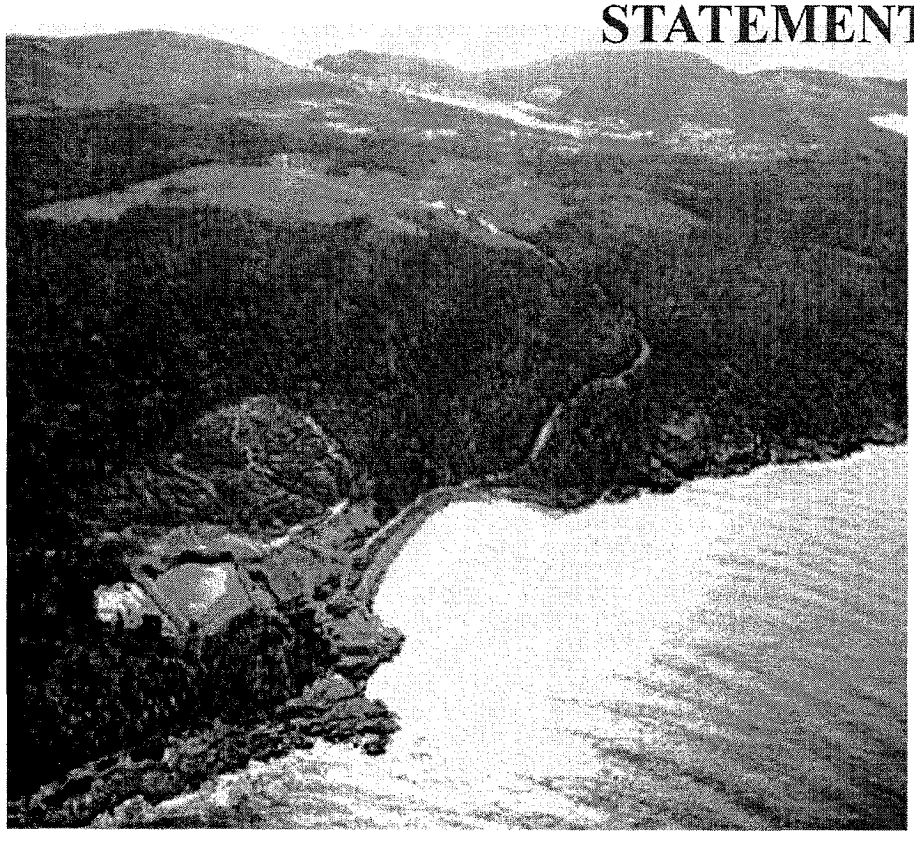
VOLUME I
PLAIN LANGUAGE SUMMARY

WHITES POINT QUARRY & MARINE TERMINAL

ENVIRONMENTAL IMPACT STATEMENT



BILCON OF NOVA SCOTIA

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March 31, 2006

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PLAIN LANGUAGE SUMMARY

1.0 Background

The Proponent, Bilcon of Nova Scotia Corporation (Bilcon), is proposing to construct and operate a basalt quarry, a crushing operation, and a ship loading terminal at Whites Point on Digby Neck (Map 1). Bilcon has leased 150 hectares of land and, at a production rate of 2 million tonnes per year, anticipates a quarry life of 50 years. Shipment of crushed product is anticipated to be approximately 40,000 tonnes per week, though this will vary with ship availability and weather conditions.

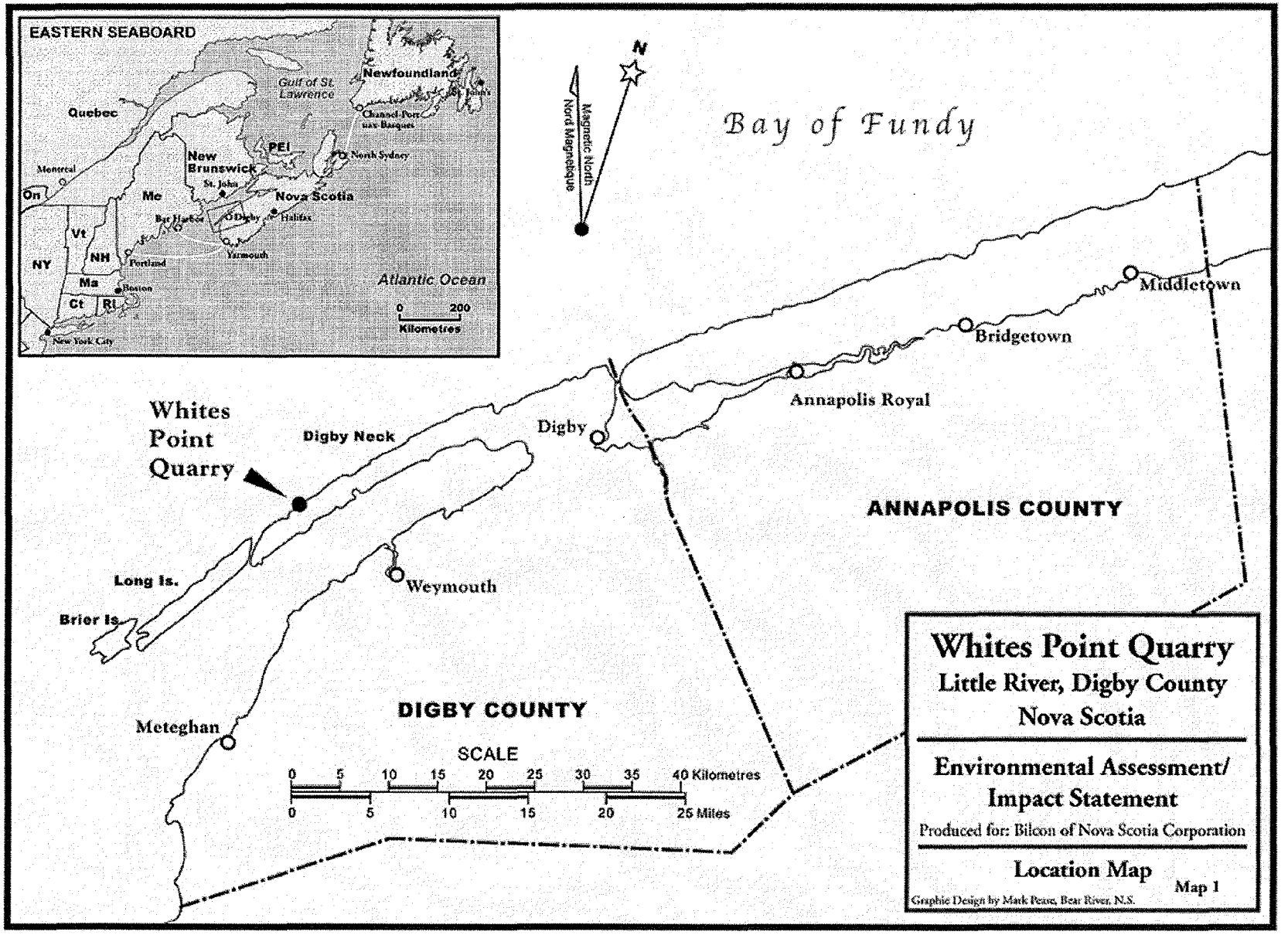
The quarry is anticipated to be operating at full capacity for 44 weeks of the year with a scheduled shut-down for maintenance and bad weather during the winter months. The quarry will directly employ 34 people working two shifts and Bilcon is committed to hiring and training local people. The quarry is expected to expand its operational footprint by 2.5 hectares during each year of operation and reclamation will be carried out on an incremental basis, rather than at the end of quarrying operations,

Land-based structures include rock crushers, screens, closed circuit wash plant, conveyors, environmental control structures and a load-out tunnel. Marine-based facilities will include berthing dolphins and mooring buoys and a quadrant loader capable of loading 5,000 tonnes per hour. The berthing dolphins and the quadrant loader will be supported on pipe piles anchored to the sea floor.

Bilcon will ship by common carrier the crushed rock and grits to New Jersey for use by its parent company, Clayton Concrete Block and Sand, in the manufacture of concrete and concrete block. Testing of the Whites Cove rock indicates that it will produce a high-quality crushed product meeting the standards required in New Jersey and New York.

All projects of this magnitude are required to undergo an environmental assessment to determine how the project could affect people, the environment, and the economy. The Environmental Impact Statement (EIS), of which this plain language summary is a part, is in itself a part of the environmental impact assessment which is a planning tool to identify and mitigate any significant environmental effects.

The EIS is a large, technical document which can be viewed at the places listed in Section 11.0 of this summary. This plain language summary is intended to give an overview to provide an understanding of the issues surrounding this project.


EASTERN SEABOARD
Quebec
Gulf of St. Lawrence
Newfoundland
St. John's
Channel-Port aux Basques
PEI
North Sydney
New Brunswick
St. John
Nova Scotia
Halifax
Digby
Yarmouth
Bar Harbor
Portland
Boston
Montreal
On
Me
Vt
NH
NY
Ma
Ct
RI
New York City
Atlantic Ocean
0 200
Kilometres
N
Magnetic North
Nord Magnetique
Bay of Fundy
Middletown
Bridgetown
Annapolis Royal
Digby
Digby Neck
Whites Point Quarry
ANNAPOLIS COUNTY
Long Is.
Brier Is.
Weymouth
Meteghan
DIGBY COUNTY
SCALE
0 5 10 15 20 25 30 35 40 Kilometres
0 5 10 15 20 25 Miles
Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/
Impact Statement
Produced for: Bilcon of Nova Scotia Corporation
Location Map
Map 1
Graphic Design by Mark Peace, Bear River, N.S.

2.0 The Proponent

The Proponent for this project is Bilcon of Nova Scotia Corporation, a Nova Scotia registered corporation. Bilcon is a subsidiary of Bilcon of Delaware which is owned by the principals of Clayton Concrete Block and Sand of New Jersey. Bilcon of Delaware is a non-operating holding company for the Clayton quarrying interests.

The Clayton group of companies has been operating in New Jersey for over fifty years and has been widely recognized for the excellence of its products and its outstanding community contributions. Clayton has received over two hundred citations for excellence of design and manufacturing and has made literally thousands of contributions to health, education, and other community causes. Clayton has been recognized in both Houses of the New Jersey Legislature as an outstanding corporate citizen and in 2004, was recognized by both Houses as the outstanding corporate citizen of the year in New Jersey.

Clayton employs over 850 staff at its various operations in New Jersey and has an enviable record with respect to employee relations, benefits, and occupational health and safety.

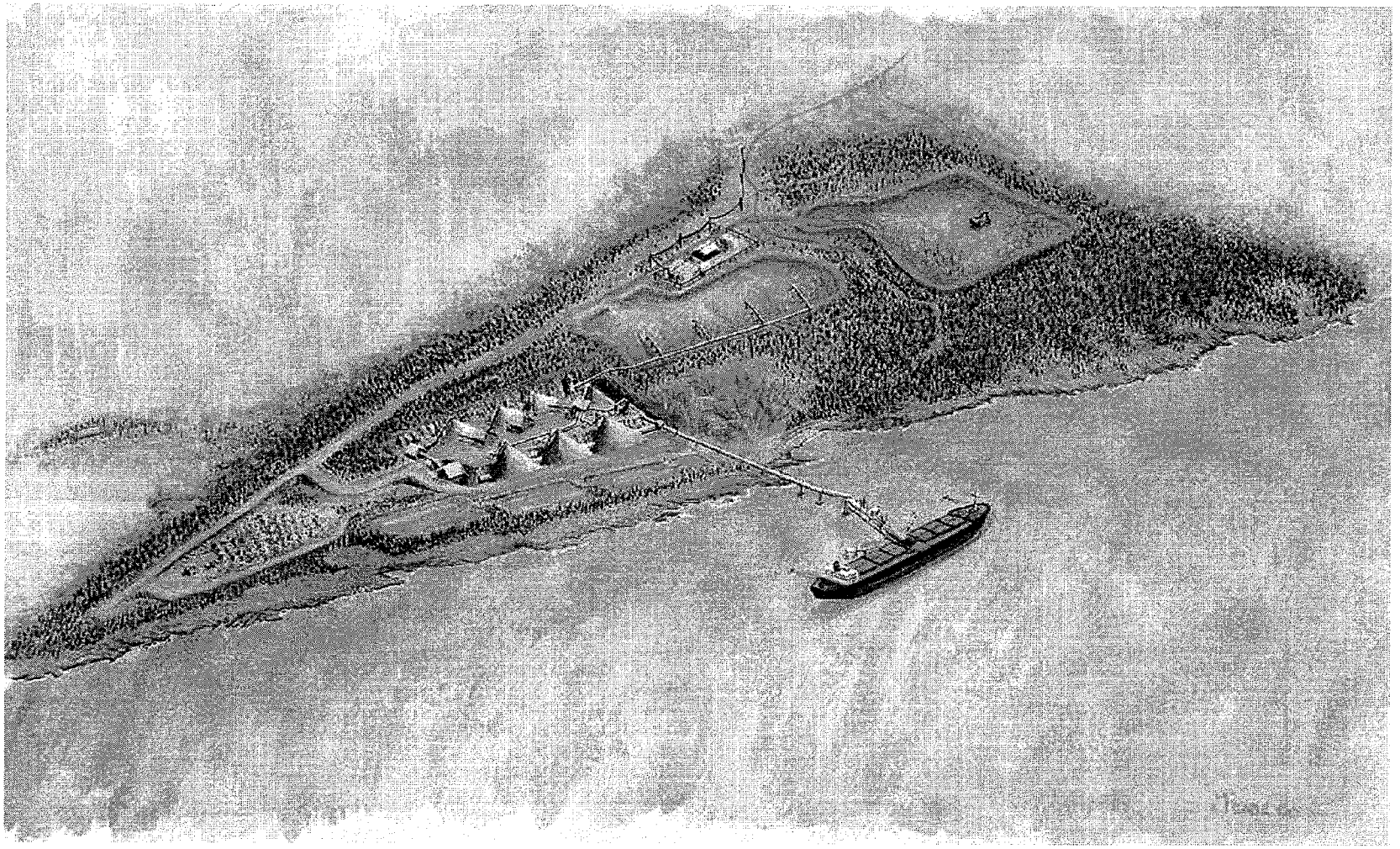
Clayton has the internal financial resources to construct and operate the Whites Point facility without government assistance for any aspect of the project and has not and will not make application for government assistance.

3.0 The Project Setting

The Whites Point Quarry and Marine Terminal is located on Digby Neck, Digby County, Nova Scotia. Digby Neck is a narrow, 30 km long peninsula extending between the Bay of Fundy and St. Mary's Bay and leads to two Islands - Long Island and Brier Island. The 2001 population of Digby Neck and Islands was 1,890. Land use on Digby Neck is primarily rural residential with the majority of the land forested. Small fishing villages exist on both the St. Mary's Bay and Bay of Fundy shores.

The proposed site for the quarry comprises approximately 380 acres with 2.6 kms of coastline along the Bay of Fundy. The land is in private ownership, forested, with no land or coastline developments. Soils are thin overlying the North Mountain Basalt. Existing topography slopes toward the Bay of Fundy with several intermittent water courses. The physical oceanography in this area of the outer Bay of Fundy is typical with basalt bedrock extending into the near shore waters. Lobster is fished seasonally in the near shore and is the most lucrative species landed on Digby Neck and Islands. Marine mammals, including the endangered North Atlantic right whale, frequent these outer Bay waters and whale watching is a seasonal tourism attraction.

Map 1 shows the general setting of the quarry on Digby Neck and the artist's rendering shows what the quarry might look like in its operational phase.



Artist's Rendering of the Whites Point Quarry and Marine Terminal
by
Mark Pease

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4.0 The Environmental Assessment Process for Whites Point Quarry and Marine Terminal

In early 2002, Nova Stone Exporters Inc. (Nova Stone), a Nova Scotia company, applied for and was granted a Permit for the operation of a less than 4 hectare quarry at Whites Point on Digby Neck. Subsequent to the granting of this Permit, Nova Stone joined with Bilcon of Nova Scotia, to form Global Quarry Products, with the purpose of expanding the Whites Point operation to increase production and add a marine terminal to ship the product.

To this end, Global Quarry Products made application for the installation of a marine terminal serving ships in excess of 25,000 Dead Weight Tonnes. This application under the Navigable Waters Protection Act triggered an assessment under the Canadian Environmental Assessment Act (CEAA). A meeting was held with Federal and Provincial regulators in January 2003, and it was determined that the Department of Fisheries and Oceans Canada was the Responsible Authority and that a Comprehensive Study would be required to assess the project. Global Quarry Products submitted a Project Description and commenced the preparation of a Comprehensive Study.

In June of 2003, Global Quarry Products was advised that the project had been referred to a Review Panel. A letter dated June 26, 2003, from the Honourable Robert Thibault, Minister of Fishers and Oceans Canada, to the Honourable David Anderson, Minister of Environment Canada, set out the reasons for the referral.

Due to the additional cost and extended time frame required for a review panel, Nova Stone withdrew from the Global Quarry Products partnership which was dissolved, leaving Bilcon of Nova Scotia Corporation as the sole Proponent.

Draft Guidelines for the Preparation of the Environmental Impact Statement for the Whites Point Quarry and Marine Terminal Project were distributed to the Proponent, the community, and stakeholders in November, 2004, and the Panel Members were announced in Nov 2004. The Panel conducted a series of Public Hearings on the Draft Guidelines in January, 2005, in Sandy Cove, Digby, Meteghan, and Wolfville. Following these hearings and consideration of the verbal and written presentations, the Panel issued the final Environmental Impact Statement Guidelines for the Whites Point Quarry and Marine Terminal project on March 31st, 2005.

Bilcon of Nova Scotia Corporation, as the sole Proponent, has prepared an EIS which was submitted to the panel in the spring of 2006. The preparation of the EIS involved extensive public consultation over a three and a half year period including a Community Liaison Committee, more than 107 different stakeholder consultations, open houses, an attitude survey, a quality of life survey, exit surveys and a store front operation. The EIS starts the process of assessment which will culminate with recommendations by the panel to the joint ministers, and a decision by the joint ministers. The process will involve public hearings and a review by the panel of the finding.

5.0 The Environmental Impact Statement

The EIS is an environmental assessment which determines the effect of the project on people, the environment, and the economy. It is a planning tool which assists the Proponent, regulators, and the community at large, understand the issues and the effects on the environment.

The preparation of the EIS commences with a consultation process with the community to collect information, to identify potential issues, and to identify community concerns. The community information collected, together with community traditional knowledge, is used by the Proponent in the design stages of the project.

All potential effects identified are assessed and mitigation plans are developed to lessen potential negative effects. In addition, monitoring plans are developed to ensure that the mitigation measures will have the desired effect. If changes are required to mitigation measures adaptive management measures are undertaken following consultation with the community and regulatory authorities.

Effects are assessed by determining whether the effect is negative, neutral or positive, the significance of the effect, the geographic reach of the effect, and the duration of the effect.

6.0 The Preparation of the EIS

Typically the preparation of an EIS is conducted by a major firm of scientists and engineers or a joint venture between two or more major firms. Bilcon adopted a somewhat different approach by engaging the leading scientists, engineers and firms specializing in the specific fields under study to provide the research necessary to conduct the analysis of each of the elements examined. Bilcon is of the opinion that the extensive research conducted for the EIS is of the highest quality.

In addition, Bilcon and its team of scientists and engineers made full use of the knowledge available in the regulatory agencies and, in particular, from DFO. Many meetings were held with DFO and other agencies to gather information and to ensure that the particular concerns of the regulators were addressed.

Based on the information collected from the community, traditional knowledge, scientific and engineering input, and the meetings with regulators, an extensive list of Valued Environmental Components (VECs) was established, and are set out in **Table 2** - Valued Environmental Components Impact Summary.

Each of these VECs was examined in detail to establish the effect in terms of size, geographic extent and duration, and methods of mitigation and monitoring were established.

In addition, the effect of the environment on the project such as weather extreme loading, and the potential effects of climate change and increased sea levels were examined.

7.0 Findings

For each of the Valued Environmental Components, the EIS examined the existing conditions, what effects the project would have, and the methods to reduce these effects if negative.

A review of the impacts, Table 2, shows that there are no significant negative effects provided that the mitigation measures are followed as set out for each of the environmental components. To the contrary, there are several important significant positive impacts.

There are, as expected, a number of neutral or insignificant negative environmental effects, even after mitigation, as there will always be whenever man imposes his will on nature. These insignificant negative effects will, however, not impact the health of the community nor the environment nor the economy.

The results of the analysis of the most important Valued Environmental Components, from the perspective of the community and regulators, are set out below:

Valued Environmental Component Impact Summary

Whites Point Quarry and Marine Terminal
Environmental Impact Statement

Table 2, Part 1

	Time		Type/Significance of Effect					Scale			
	Short Term	Long Term	Significant Positive	Insignificant Positive	Neutral	Insignificant Negative	Significant Negative	Local	Regional	Provincial	National/International
Physical Environment											
Climate - Greenhouse Gas		●				◐			R		
Geology - Basalt rock		●				◐		L			
Hydrogeology - Residential Well Water Yield		●			◐			L			
Hydrogeology - Residential Well Water Quality		●			◐			L			
Surficial Geology and Soils		●		◐				L			
Little River Watershed		●			◐				R		
On-site Surface Water Drainage - Wetlands		●			◐			L			
On-site Surface Water Drainage - Quality		●			◐			L			
Physical Oceanography - Turbidity	◔					◐		L			
Physical Oceanography - Tides and Currents		●				◐		L			
Air Quality - Particulate Emmissions		●			◐			L			
Noise and Vibration - Blasting		●			◐			L			
Noise and Vibration - Processing Plant		●			◐			L			
Noise and Vibration - Shiploading		●			◐			L			
Light - Night		●				◐		L			

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Valued Environmental Component Impact Summary

Whites Point Quarry and Marine Terminal
Environmental Impact Statement

Table 2, Part 2

	Time		Type/Significance of Effect					Scale			
	Short Term	Long Term	Significant Positive	Insignificant Positive	Neutral	Insignificant Negative	Significant Negative	Local	Regional	Provincial	National/International
Biological Environment											
Terrestrial Ecology - Habitat Alteration		◕				●		L			
Terrestrial Ecology - Habitat Diversity		◕		●				L			
Terrestrial Floral Species at Risk		◕	●							P	
Terrestrial Vertebrate Species at Risk		◕				●		L			
Terrestrial Odonata Species at Risk		◕		●				L			
Terrestrial Lepidoptera Species at Risk		◕				●		L			
Terrestrial Wetlands		◕		●				L			
Migratory Land Birds		◕				●		L			
Aquatic Ecology - Freshwater Fish Habitat		◕			●			L			
Aquatic Ecology - Marine Intertidal Habitat	◔					●		L			
Aquatic Ecology - Marine Intertidal Habitat		◕			●			L			
Aquatic Ecology - Marine Nearshore Habitat	◔					●		L			
Aquatic Ecology - Marine Nearshore Habitat		◕			●			L			
Marine Mammals and Waterbirds - Nearshore		◕				●		L			
Fish - Endangered (Inner Bay of Fundy Salmon)		◕			●						N

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Valued Environmental Component Impact Summary

Whites Point Quarry and Marine Terminal
Environmental Impact Statement

Table 2, Part 3

	Time		Type/Significance of Effect						Scale			
	Short Term	Long Term	Significant Positive	Insignificant Positive	Neutral	Insignificant Negative	Significant Negative		Local	Regional	Provincial	National/International
Fish - Threatened and Special Concern		●			●							N
Waterfowl - Special Concern		●			●							N
Marine Reptiles - Endangered		●			●							N
Blasting - Fish Habitat		●				●			L			
Blasting - American Lobster		●				●			L			
Blasting - Marine Mammals		●				●			L			
Blasting - Marine Mammals - Species at Risk		●				●						N
Blasting - Waterbirds		●				●			L			
Ship Interactions - North Atlantic Right Whale Conservation Area		●			●							N
Ship Interactions - North Atlantic Right Whale Nearshore		●				●						N
Ballast Water		●			●					R		
Noise and Vibration Marine		●				●			L			
Human Environment												
Heritage Resources - Marine Archaeology	◔				●				L			
Heritage Resources - Land Archaeology		●			●				L			

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Valued Environmental Component Impact Summary

Whites Point Quarry and Marine Terminal
Environmental Impact Statement

Table 2, Part 4

	Time		Type/Significance of Effect					Scale			
	Short Term	Long Term	Significant Positive	Insignificant Positive	Neutral	Insignificant Negative	Significant Negative	Local	Regional	Provincial	National/International
Heritage Resources - History		●				●		L			
Heritage Resources - Heritage Properties		●			●				R		
Aesthetics - Highway #217		●			●				R		
Aesthetics - Bay of Fundy		●				●			R		
Economy - Quarry Construction Employment	◔		●						R		
Economy - Quarry Construction GDP	◔			●						P	
Economy - Quarry Operation Employment		●	●						R		
Economy - Quarry Operation GDP		●		●						P	
Economy - Quarry Operation Tax Revenue		●		●						P	N
Economy - Quarry Operation Mun. Tax Revenue		●	●						R		
Economy - Fishery - Aquaculture		●			●				R		
Economy - Fishery - Intertidal		●			●				R		
Economy - Fishery - Nearshore		●				●		L			
Economy - Tourism		●				●			R		
Economy - Land Value		●				●		L			
Recreation		●			●			L			

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Valued Environmental Component Impact Summary

Whites Point Quarry and Marine Terminal
Environmental Impact Statement

Table 2, Part 5

	Time		Type/Significance of Effect					Scale			
	Short Term	Long Term	Significant Positive	Insignificant Positive	Neutral	Insignificant Negative	Significant Negative	Local	Regional	Provincial	National/International
Socio-Cultural - Quality of Life - Social Relations		●		●					R		
Socio-Cultural - Social Capital - Pre-project	◔					●			R		
Socio-Cultural - Social Capital - Life of Project		●		●					R		
Socio-Cultural - Commercial Patterns		●				●			R		
Socio-Cultural - Quality of Life - Environmental		●				●		L			
Community Infrastructure		●			●				R		
Community Institutional Capacity		●			●				R		
Education Training and Skills		●		●					R		
Transportation - Land - Construction	◔					●			R		
Transportation - Land - Operation		●			●				R		
Transportation - Marine - Construction and Operation	◔	●				●		L			
Human Health - Offsite Drinking Water Quality		●			●			L			
Human Health - Onsite Drinking Water Quality		●				●		L			
Human Health - Marine Contaminates		●			●			L			
Human Health - Land Contaminates		●			●			L			
Human Health - Country Foods		●			●			L			

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7.1 Groundwater Quantity and Quality

Background

The local community depends upon an adequate supply of clean groundwater for household use and for use in the local fish plants. Groundwater can also be an important supply mechanism to surface water streams and ponds. Both quantity and quality are important, and groundwater is protected by laws and regulations.

Concern has been expressed that quarrying activities could affect the quality and quantity of water in wells on properties adjacent to the quarry. In order to allay those concerns Bilcon conducted extensive on-site geological and hydrogeological research to identify the current location of the water table and the possible effects of quarrying.

In consultation with the adjacent property owners, twenty four wells were identified on properties adjacent to the project – seventeen drilled and seven dug.

Potential Effects

The lowering of the water table to the extent that well yields in drilled wells are seriously compromised would be a serious adverse effect as would the contamination of well water.

The research showed that the quarrying operations will not adversely affect the quantity or quality of the groundwater supply or the local wells for the following reasons:

- All the neighboring drilled wells were completed in the middle or lower basalt flow unit or in the deeper Blomidon Formation whereas the quarrying will only take place in the upper basalt flow unit. The dug wells are all in the surface till soils.
- The neighbouring wells are located hydraulically downgrade of the quarry and/ or on opposite sides of the groundwater divide that is near the crest of the North Mountain.
- The recharge and discharge areas for the quarry and the neighboring wells are located in different watersheds on opposite side of the groundwater divide.
- Quarrying will be carried out above the normal water table. Consequently mine dewatering and pumping will not be needed and there will be no groundwater withdrawal or drawdown.
- Studies by the U.S. Bureau of Mines, the Montana Bureau of Mines and Geology among others have shown that blasting does not affect groundwater quality or quantity in comparable mines.

- Construction aggregate operations have been used to enhance recharge via artificial surface recharge. Quarrying at Whites Point may enhance the local groundwater regime by increasing storm water retention and aquifer recharge.

- The quarry will not cause saltwater intrusion since quarrying will occur well above sea level and the freshwater/saltwater interface and no pumping will take place. In fact the quarry could be part of a long term, comprehensive strategy to protect the local water supply from salt water intrusion that could result from the unregulated pumping from the deep industrial wells in the area.

Figures 6A and 6B are cross sections showing the relationships between the existing wells, sea level, the water table and the ground surface. Map 12 identifies the location of the cross sections.

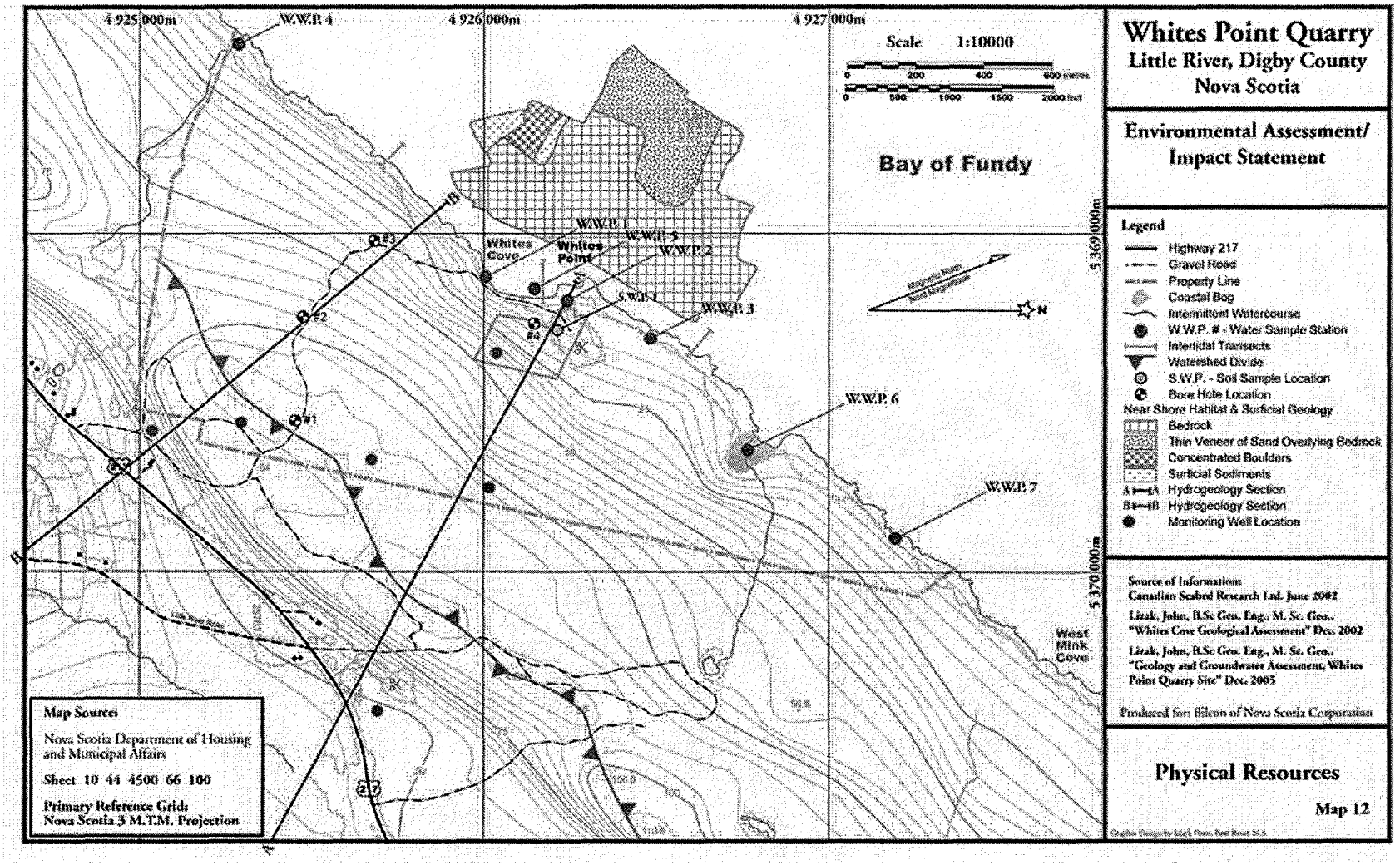
Managing Potential Effects

- Bilcon will carry out a pre-blast survey on the neighboring wells in accordance with the Nova Scotia Department of Environment and Labour guidelines to establish baseline data.

- Bilcon will monitor the groundwater level in the six new monitoring wells to determine whether quarry operations are affecting the groundwater table.

- Bilcon will invite two of the adjacent property owners with wells to sit on the re-established Community Liaison Committee. Results of the monitoring will be provided to the Committee on a regular basis.

- If a drilled well is proven to be affected by quarry operations Bilcon will drill a new well for the property owner at its own expense.


Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/
Impact Statement
Legend
Highway 217
Gravel Road
Property Line
Coastal Bog
Intermittent Watercourse
W.W.P. # - Water Sample Station
Intertidal Transects
Watershed Divide
S.W.P. - Soil Sample Location
Bore Hole Location
Near Shore Habitat & Surficial Geology
Bedrock
Thin Veneer of Sand Overlying Bedrock
Concentrated Boulders
Surficial Sediments
Hydrogeology Section
Hydrogeology Section
Monitoring Well Location
Source of Information:
Canadian Seabed Research Ltd. June 2002
Litak, John, B.Sc Geo. Eng., M. Sc. Geo., "Whites Cove Geological Assessment" Dec. 2002
Litak, John, B.Sc Geo. Eng., M. Sc. Geo., "Geology and Groundwater Assessment, Whites Point Quarry Site" Dec. 2005
Produced for: Bilcon of Nova Scotia Corporation
Physical Resources
Map 12
Scale 1:10000
0 200 400 600 metres
0 500 1000 1500 2000 feet
Bay of Fundy
4 925 000m
4 926 000m
4 927 000m
5 369 000m
5 370 000m
W.W.P. 4
W.W.P. 1
W.W.P. 5
W.W.P. 2
W.W.P. 3
W.W.P. 6
W.W.P. 7
S.W.P. 1
Whites Cove
Whites Point
West Mink Cove
N
Map Sources
Nova Scotia Department of Housing and Municipal Affairs
Sheet 10 44 4500 66 100
Primary Reference Grid:
Nova Scotia 3 M.T.M. Projection

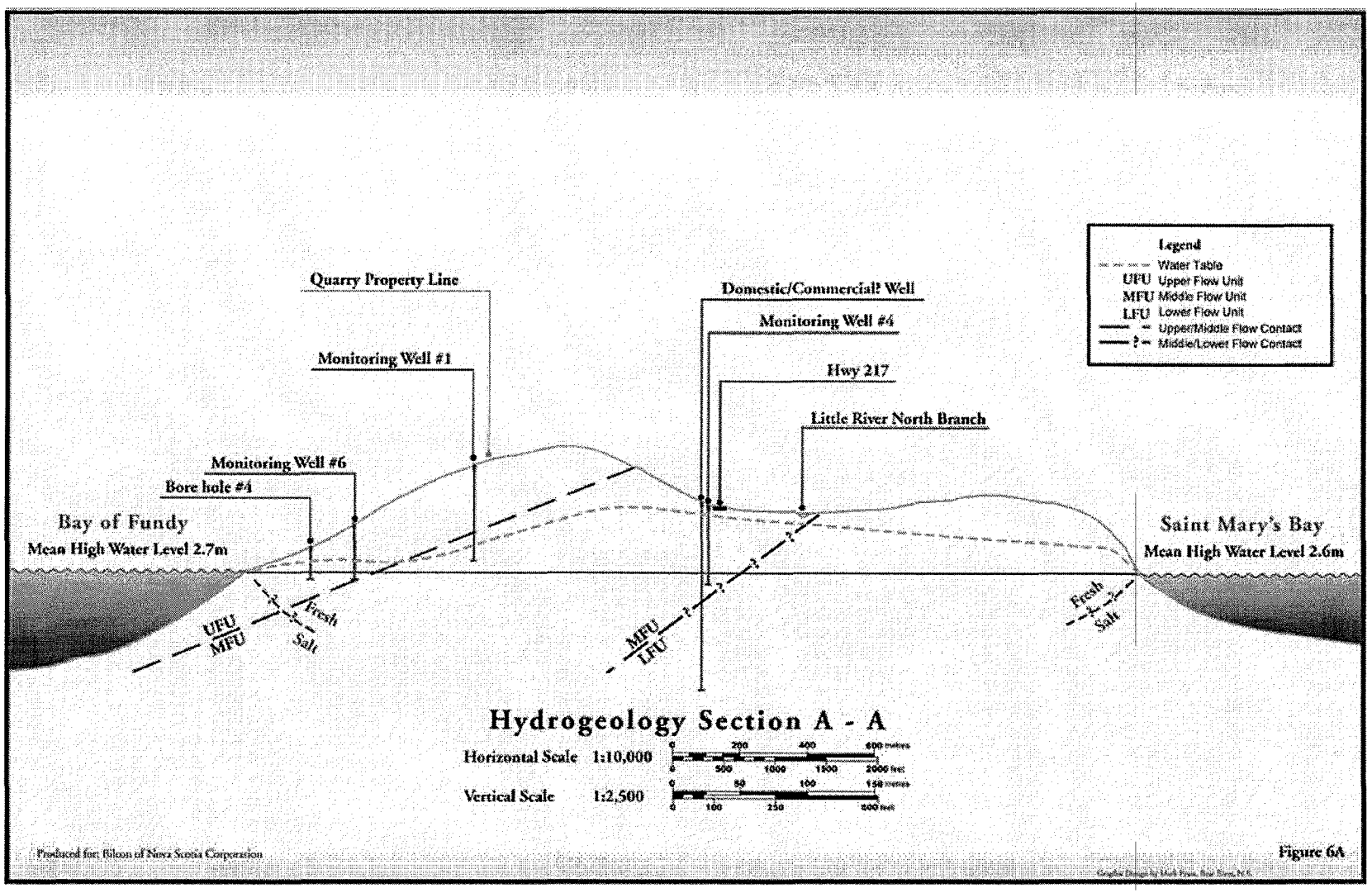

Legend
Water Table
UFU Upper Flow Unit
MFU Middle Flow Unit
LFU Lower Flow Unit
Upper/Middle Flow Contact
Middle/Lower Flow Contact
Quarry Property Line
Domestic/Commercial? Well
Monitoring Well #4
Monitoring Well #1
Hwy 217
Little River North Branch
Monitoring Well #6
Bore hole #4
Bay of Fundy
Mean High Water Level 2.7m
Saint Mary's Bay
Mean High Water Level 2.6m
UFU
MFU
Fresh
Salt
MFU
LFU
Fresh
Salt
Hydrogeology Section A - A
Horizontal Scale 1:10,000
Vertical Scale 1:2,500
Produced for: Bilcon of Nova Scotia Corporation

Figure 6A

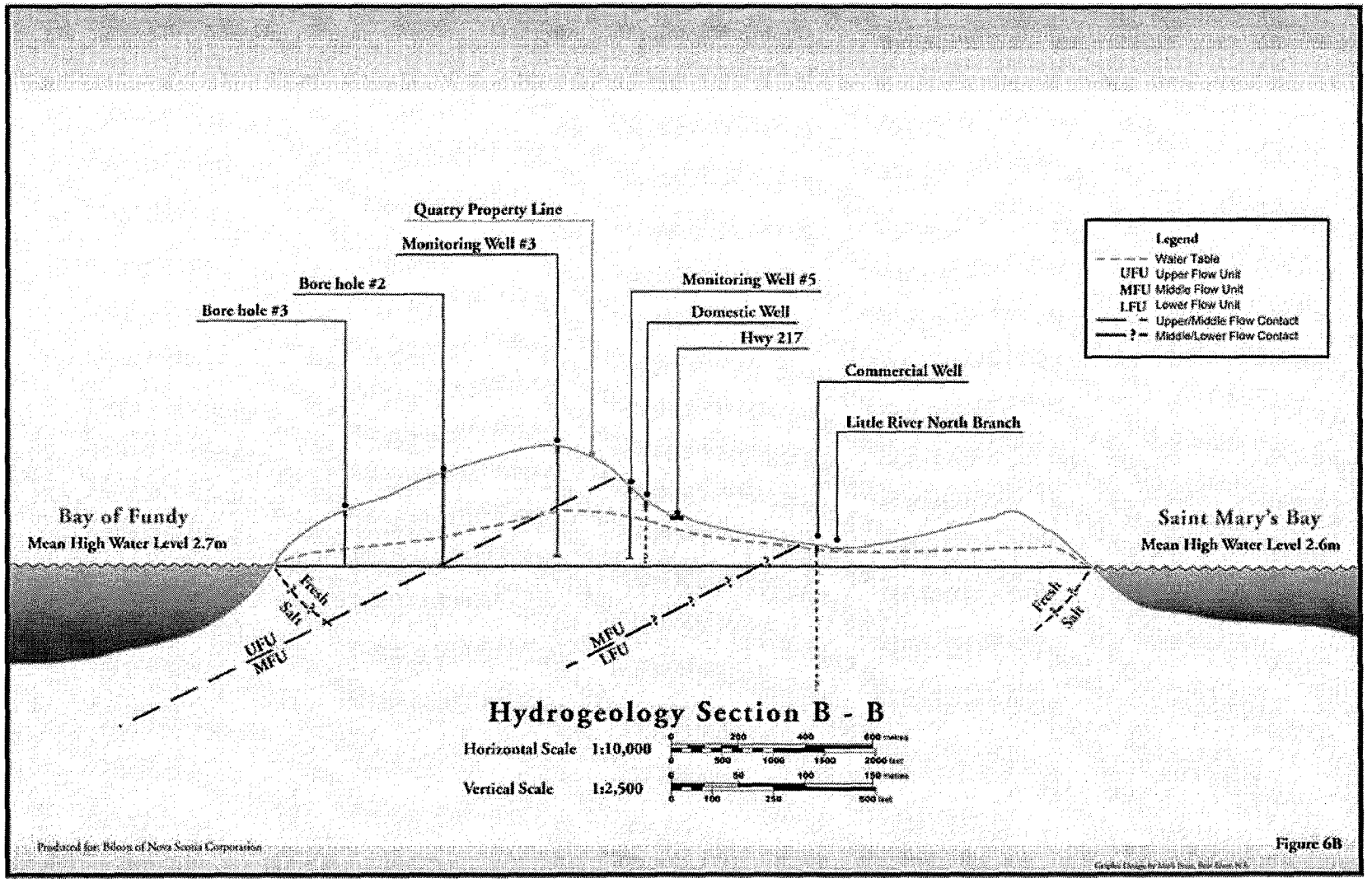

Quarry Property Line
Monitoring Well #3
Bore hole #2
Bore hole #3
Monitoring Well #5
Domestic Well
Hwy 217
Commercial Well
Little River North Branch
Legend
Water Table
UFU Upper Flow Unit
MFU Middle Flow Unit
LFU Lower Flow Unit
Upper/Middle Flow Contact
Middle/Lower Flow Contact
Bay of Fundy
Mean High Water Level 2.7m
Saint Mary's Bay
Mean High Water Level 2.6m
Fresh
Salt
UFU
MFU
MFU
LFU
Fresh
Salt
Hydrogeology Section B - B
Horizontal Scale 1:10,000
Vertical Scale 1:2,500
Produced for: Bilcon of Nova Scotia Corporation

Figure 6B

7.2 Air Quality

Background

Concerns have been raised over the effect of quarrying and processing operations on the quality of the air. Air quality is a very important aspect of the environment and Bilcon has incorporated significant design elements to ensure that air quality is not compromised.

Potential Effects

Dust can be generated on quarry haul roads and in the rock crushing operation. In addition the quarrying operation will require heavy mobile equipment, primarily diesel powered, for land operations and the arrival and departure of the bulk carrier once a week will briefly involve diesel powered emissions. Some increase in vehicular traffic, primarily private vehicles, will be generated by the quarry workforce and commercial vehicles delivering equipment and materials during quarry operations.

Managing Potential Effects

- Bilcon will control dust so that the standards set out in the Nova Scotia Department of Environment and Labour Pit and Quarry guidelines are met.
- Since all quarry products will be shipped by water no heavy trucks hauling rock will generate dust or diesel emissions in adjacent residential areas.
- The access road to the quarry from Highway #217 will be paved virtually eliminating dust from employee and delivery vehicles.
- The physical plant where crushing will take place has been located approximately 1000 metres from the nearest residence.
- Bilcon will enclose processing equipment wherever practical and use water sprays to eliminate dust from the conveyor belts.
- Bilcon will maintain forest cover in the preservation zones and in the buffer areas.
- Quarry haul roads will be sprayed as required with a dedicated vehicle.
- Heavy operational mobile equipment will be equipped with diesel engines meeting the U.S. Environmental Protection Agency Tier 3 emission standards and maintained on a regular basis.
- No brush from the clearing operation will be burnt thus eliminating emissions from open fires.
- Monitoring will be carried out as requested by the regulatory agencies.

Figure 7 shows the quarry in relation to land levels, the preservation zone and residences along Highway #217.

C0001-022

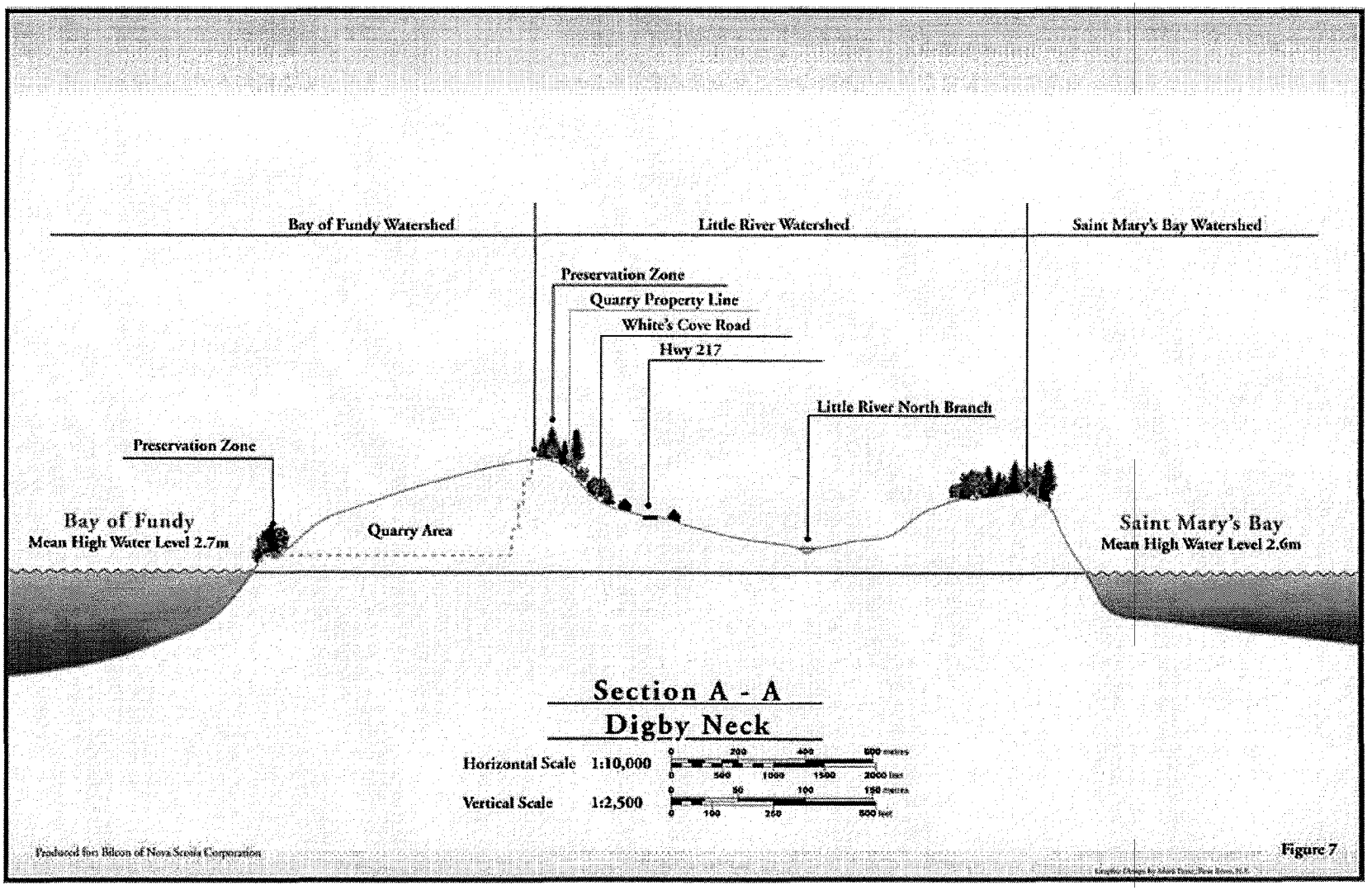


Figure 7

018062

7.3 Noise

Background

Excessive noise, particularly in rural areas, can have a negative effect on the residents' quality of life.

Concerns have been raised over the level of noise which will generated by the quarry construction and operation, by the blasting which will occur every two weeks during regular operation and by the shiploading operation which will occur once a week.

The Nova Scotia Department of Environment and Labour sets out limits in the Pit and Quarry Guidelines for noise levels at the quarry property line for daytime (65 dBA), evening (60 dBA) and night time (55dBA). Limits are also set out for air concussion at 128 dBA within 7 m of the nearest structure not located on site. These are the levels which Bilcon must not exceed.

Potential Effects

Excessive noise particularly in rural areas can have a negative effect on the residents' quality of life. The noise limits at the quarry property line are set to minimize these effects. For example the maximum noise at the property line of the quarry for night time operation is 55 dBA which is the equivalent of quiet conversation.

Managing potential effects

The quarry operation will create noise during construction, rock processing, blasting and shiploading. To reduce noise levels and to ensure that the standards set by the Department of Environment and Labour are met Bilcon will carry out the following measures:

- The processing plant has been located approximately 1000 metres from the nearest residence and approximately 60 metres below the crest of the North Mountain.
- Rubber lined truck boxes and screens will be used.
- Socket drilling will be used rather than pile driving in the construction of the marine terminal.
- The crushing plant will be enclosed wherever practical.
- Bilcon will employ alternate back up warning devices.
- The preservation zones will remain in a forested condition to provide greater sound absorption.
- Monitoring for operational noise will be conducted at the locations indicated and approved by the Department of Environment and Labour to ensure that the standards are not exceeded.
- Monitoring of all blasts will be conducted at three monitoring stations for concussion and ground vibration to ensure that the standards are not exceeded.

7.4 Land Wildlife and Plants

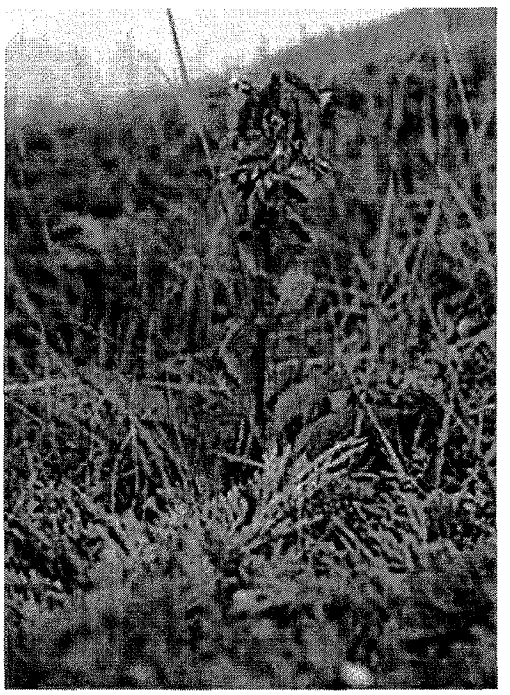
Background

The construction and operation of the quarry may change the type, quantity or quality of habitat at the Whites Point site. Society is now paying much more attention to the effect of human activities on wildlife and plants and particularly those at risk or endangered.

Potential Effects

The site consists of 380 acres with approximately 1.9 miles of shoreline on the Bay of Fundy. The property is almost entirely forested, dominated by coniferous species, with the exception of two coastal barrens south of Whites Cove and a bog north of the Cove. The majority of the site slopes towards the Bay of Fundy and is exposed to the north-west winds from the Bay.

A significant proportion of the coniferous species and in particular white spruce is diseased, dead or dying and approximately 60 acres on the site was recently clear cut. An area just to the east of the Cove was used as a source of material for the construction of Highway #217 in the early 1950's. No important freshwater wetlands or coastal wildlife habitats are located in or near the Whites Point site.



Glaucous Rattle-snake Root Photo by Ruth Newell

While approximately 80 acres of the site will be established as environmental preservation areas or buffer zones much of the site will be cleared, grubbed and quarried before reclamation. Habitats will therefore be disrupted for a period of time. In addition habitats can be affected by dust and noise.

In order to determine what wildlife and plants currently exist on the site consultants were commissioned to survey the sites' animals, birds, butterflies, dragonflies and plants and their location on the site in the latter case. Special attention was given to those species determined to be endangered, or at risk.

Managing Potential Effects

The survey noted above verified the existence of three provincially ranked plants at risk on the Whites Point site, the glaucous rattle-snake root, mountain sandwort and hemlock parsley. In order to protect these species the following steps will be taken.

A minimum 100' environmental preservation zone will be established along the coast line to protect the coastal rare plants identified. This zone of approximately 22 acres of general coastline will be expanded an additional 2.9 acres inland at the first headland south of Whites Cove, an additional 1.8 acres inland at the second headland south of Whites Cove and an additional 4.5 acres inland at the bog north of Whites Cove. This amounts to a minimum of 31.2 acres of coastline and associated habitats included in the environmental preservation zone.

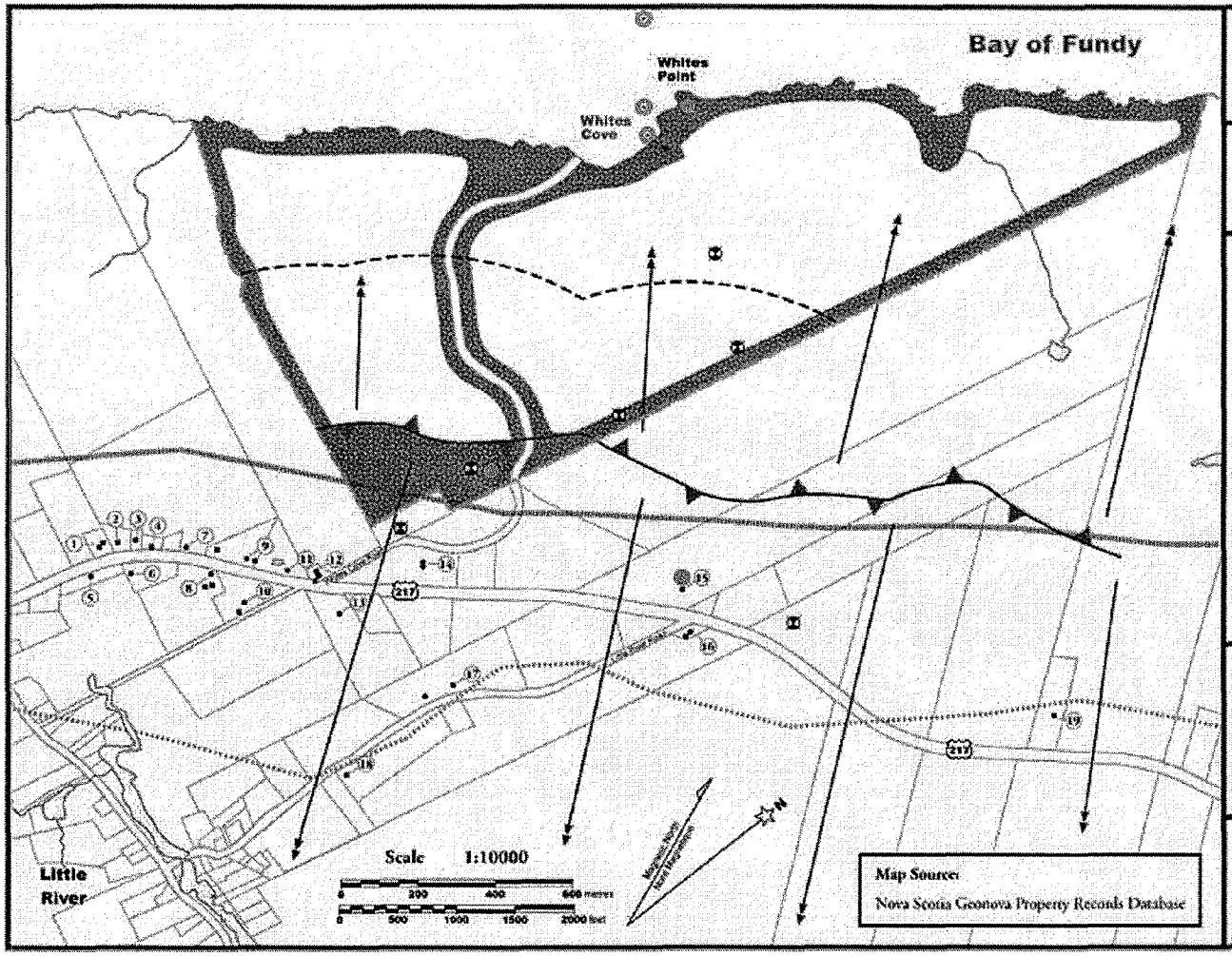
Mountain Sandwort - Photo by Ruth Newell

A 100' upland buffer zone including the portion of the upland bog is proposed for the perimeter of the property and an additional 21 acres of the Little River watershed hasbeen set aside for a total upland buffer zone of 47.7 acres. See Map 2 for the proposed preservation zones.

The total environmental preservation areas and buffer zones amount to 78.9 acres or 20% of the site.

The significant population of glaucous rattlesnake-root located on the first headland south of Whites Cove would be included in the preservation zone. Preservation of the bog area will not only include protection of the groups of mountain sandwort on either side of the bog but will also protect potential habitat for the Nelson's sharp-tailed sparrow, designated a species at risk in Nova Scotia.

C0001-026



Whites Point Quarry
Little River, Digby County
Nova Scotia

Environmental Assessment/ Impact Statement

Legend

- Property Line
- Intermittent Watercourse
- Surface/Groundwater Divide
- Inferred Groundwater Flow Direction
- Groundwater Monitoring Well
- Residence Reference Number
- Private Land
- 800 Meter Setback
- Proposed Blast Monitoring Location- Land
- Proposed Blast Monitoring Location- Water
- Environmental Preservation Zone
- Projected outcropping of geological contact between basalt upper flow unit and middle flow unit.
- Projected outcropping of geological contact between basalt middle flow unit and lower flow unit.

Source of Information:
Jaques Whitford Environment Ltd. - Hogg, Dwayne, M.Sc., P. Eng. and MacFarlane, David, M. Sc., P. Geo. " Preliminary Hydrological Assessment, Proposed Quarry, Whites Cove, Digby Neck, Nova Scotia" Dec. 2003

Prepared for: Bilcon of Nova Scotia Corporation

Property Map

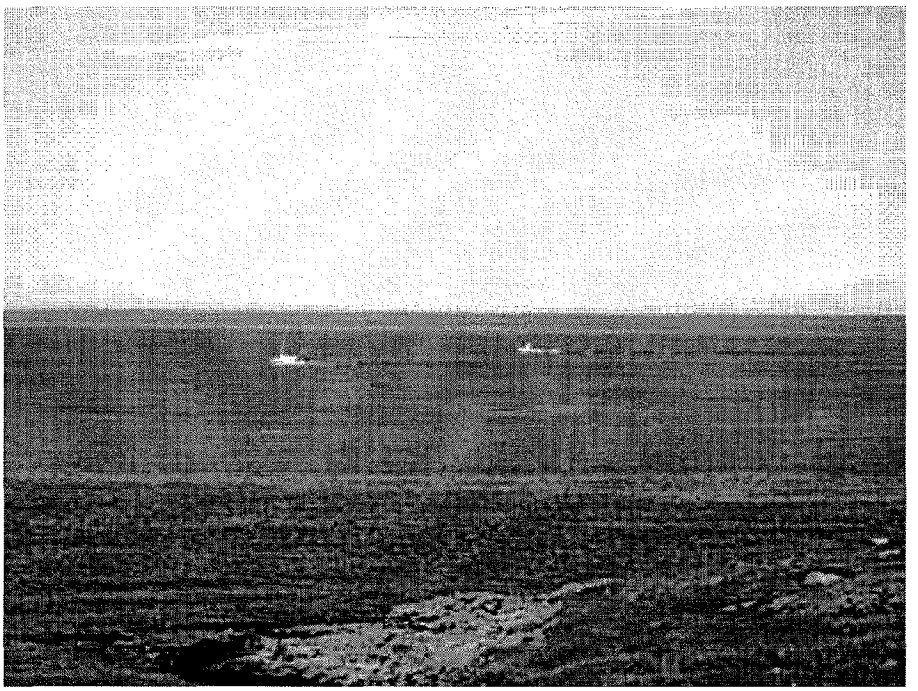
Map 2

Graphic Design by Mark Jones, Jone Rees N.S.

018066

- The groups of hemlock parsley and birds-eye primrose would be included in thegeneral preservation zone south of Whites Cove where these plants were found.
- No Federal or Provincial vertebrate species at risk (amphibian, mammal or breeding bird species) were identified on the site.
- No Federal or Provincial invertebrate species at risk (dragonflies, damselflies or butterflies) were identified on site at the time of investigations.
- To minimize the disruption of habitat, areas of the quarry will only be cleared and grubbed immediately ahead of quarrying and incremental reclamation will ensure that the disruption is for a short period of time.
- The clearing operation will be scheduled to minimize direct impacts on all bird species.These activities will take place during late fall through winter to avoid spring and fall migrations on Digby Neck and to avoid the most sensitive spring and summer nesting period for resident species.
- Minimal night lighting is proposed to reduce the collision hazard for night migrating birds.
- The new sediment ponds, comprising approximately 20 acres of surface water will create aquatic/wetland habitat.
- Known nesting areas of birds that are sometimes attracted to quarry areas such asKilldeer, Common Nighthawk or Spotted Sandpiper will be avoided, where possible, if found within active quarry areas until the young have fledged.
- All toxic substances used during operations (diesel fuel, gasoline, hydraulic fluid etc) will be stored appropriately and not be accessible to birds or other wildlife.
- Bilcon will monitor the rare plant populations and monitor for invasive species.Bilcon will conduct faunal surveys and breeding bird surveys every five years to document any change in species composition.
- Bilcon will conduct damselfly, dragonfly and butterfly surveys every five years to document any change in species composition.

7.5 Fishing



Background

The waters off Digby Neck and the Islands are important fishing grounds particularly for lobster. Fishing has been the most important mainstay of the Neck and Islands economy for the past two centuries. Concern has been expressed that the activities of the quarry and marine terminal could affect the fishery and hence adversely affect the local economy.

Potential Effects

- The construction of the marine terminal will destroy fish habitat.
- There is the potential for sediment to enter the Bay of Fundy from the quarry site.
- Blasting could affect both fish and spawning areas.
- Invasive species could be introduced by shipping activities.

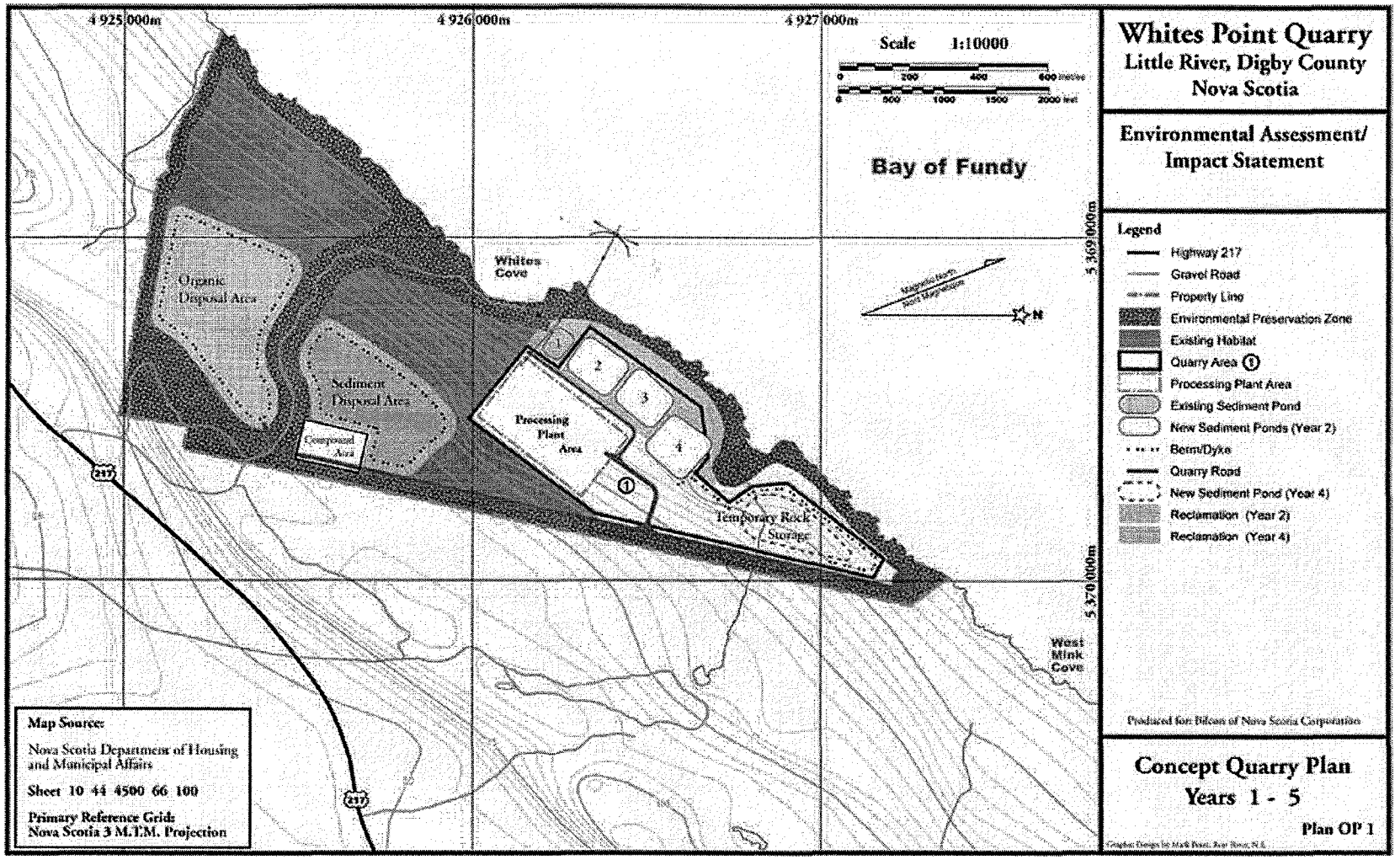
Managing Potential effects

Bilcon has selected a pipe pile construction technique (see Figures 2 and 3) for the marine terminal rather than a rock fill or sheet pile structure. This means that the area of fish habitat destroyed is very small. Bilcon is required under the Fisheries Act to provide compensation for the destroyed habitat to the extent of creating new habitat in the amount of three times the habitat destroyed. Bilcon has received approval in principle for the Fish Habitat Compensation Plan which involves installing fish shelters and creating habitat on the pipe piles themselves.

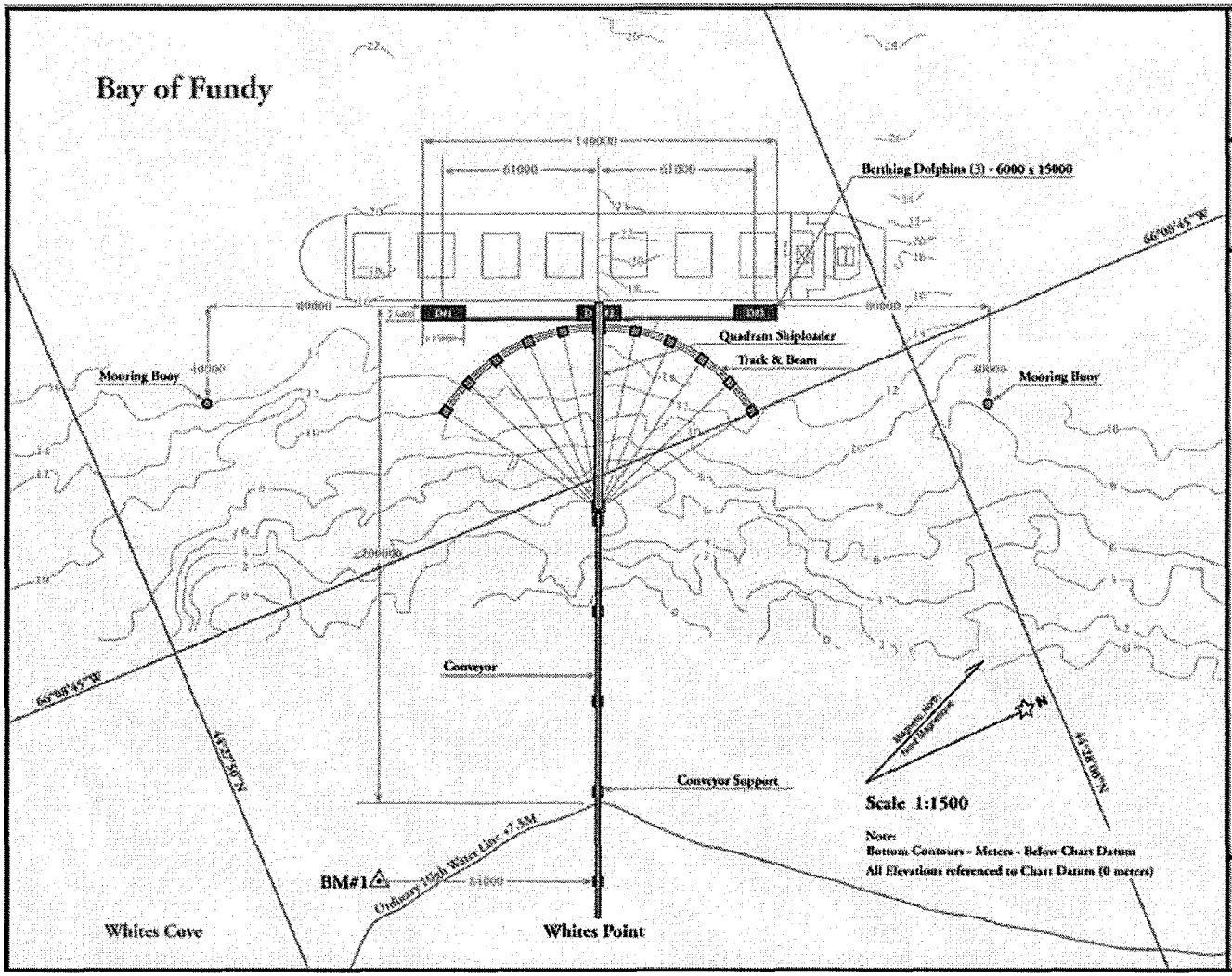
The Nova Scotia Department of Environment and Labour has guidelines which must not be exceeded for the discharge of sediment into the Bay of Fundy. Bilcon will meet these guidelines by constructing sediment retention ponds and filter dams through which all surface water must flow prior to entering the constructed wetlands and the Bay - see Plan OP-1 . Wash water containing sediment from the wash operation will be collected in the high rate thickener from which the sediment will be pumped to the dyked sediment storage area which is located at a considerable distance from the Bay. Sediment from the sediment retention ponds and from the high rate thickener will be mixed with the stored topsoil and used for reclamation.

Bilcon will generally conduct blasting on the site in accordance with the "Guidelines for Blasting in or Near Canadian Fisheries Waters". To provide further protection for the Inner Bay of Fundy Atlantic Salmon, an endangered species, a safety factor of three for separation distance will be used when conducting blasting when this species could be in the area. No blasting will be conducted in the water.

Bilcon will ensure that its shipper complies with the existing guidelines for the exchange of ballast water. Note that regulations with respect to ballast water are imminent.


Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/
Impact Statement
Legend
Highway 217
Gravel Road
Property Line
Environmental Preservation Zone
Existing Habitat
Quarry Area 1
Processing Plant Area
Existing Sediment Pond
New Sediment Ponds (Year 2)
Berm/Dyke
Quarry Road
New Sediment Pond (Year 4)
Reclamation (Year 2)
Reclamation (Year 4)
Produced for Bilcan of Nova Scotia Corporation
Concept Quarry Plan
Years 1 - 5
Plan OP 1
Scale 1:10000
Bay of Fundy
4 925 000m
4 926 000m
4 927 000m
5 369 000m
5 370 000m
Whites Cove
West Mink Cove
Organic Disposal Area
Sediment Disposal Area
Compound Area
Processing Plant Area
Temporary Rock Storage
1
2
3
4
217
N
Map Source:
Nova Scotia Department of Housing and Municipal Affairs
Sheet 10 44 4500 66 100
Primary Reference Grid:
Nova Scotia 3 M.T.M. Projection

C0001-031



Whites Point Quarry

Little River, Digby County
Nova Scotia

Environmental Assessment/ Impact Statement

Legend

BenchMark # 1 , Elevation 9.5M
44°27'85"N 66°08'66"W

D#1, D#2, D#3, - Berthing Dolphins

Produced for: Bilcon of Nova Scotia Corporation

Marine Terminal Plan

Figure 2

Graphic Design by Mark Dunn, Bear River, N.S.

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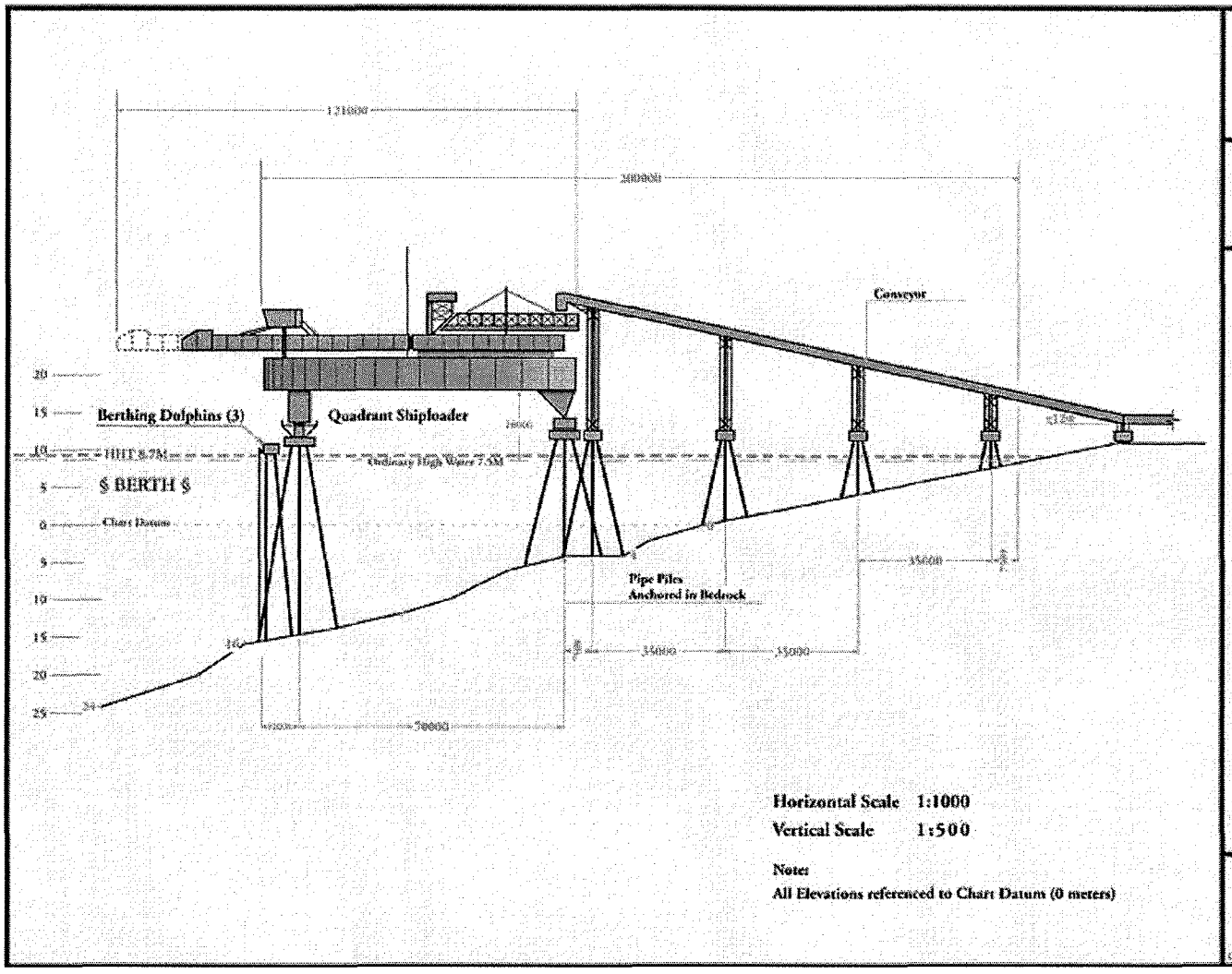


Whites Point Quarry

Little River, Digby County
Nova Scotia

Environmental Assessment/ Impact Statement

Produced for: Bilcon of Nova Scotia Corporation

Marine Terminal Elevation

Figure 3

Graphic Design by Mark Pratt, Bear River, N.S.

7.6 Marine Mammals

Background

The Bay of Fundy off shore Digby Neck and the Islands is frequented by sixteen species of marine mammals (whales, dolphins, porpoises and seals). These include the endangered North Atlantic Right Whale and the Blue Whale.

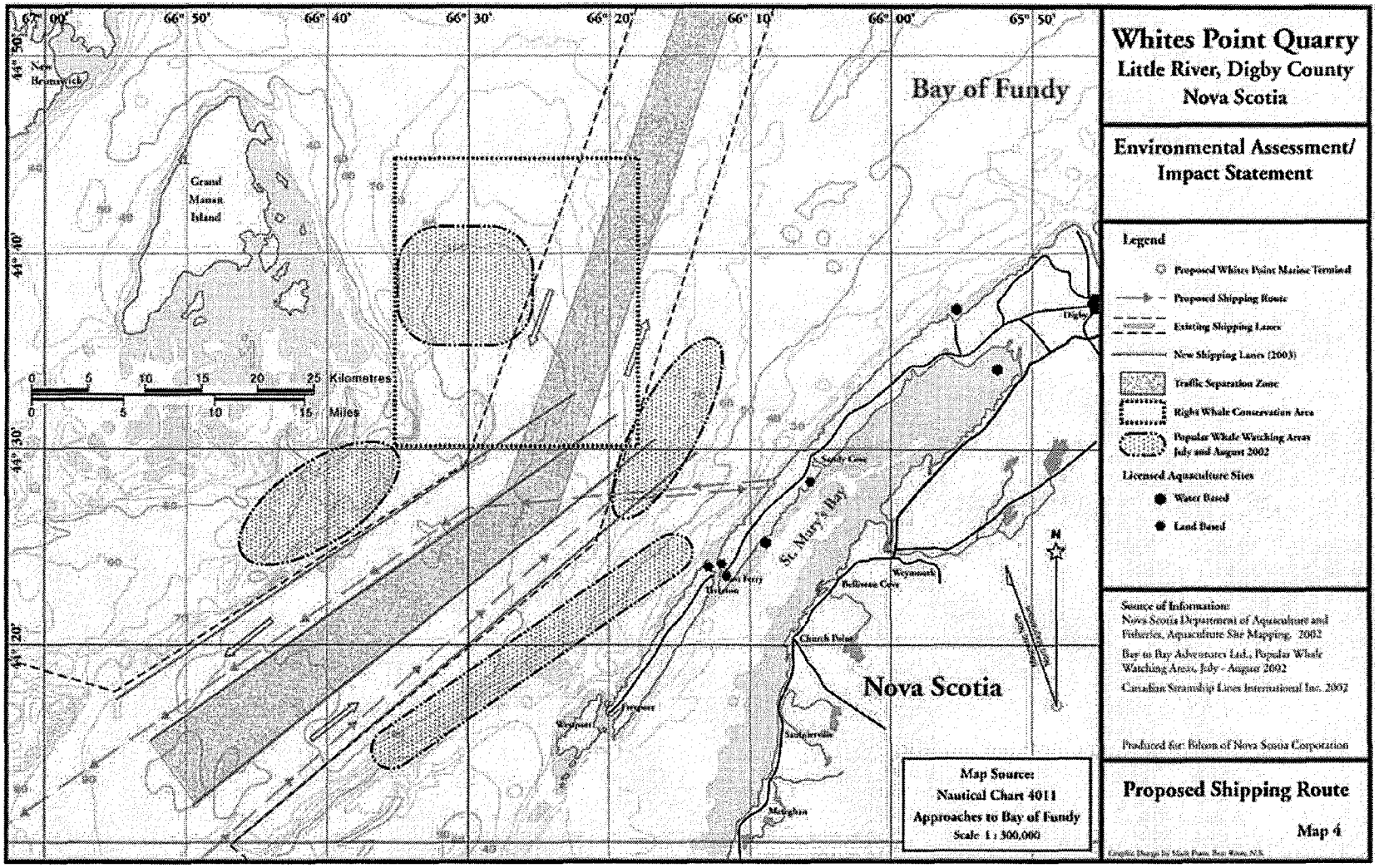
A whale watching industry has grown in the past decade which provides additional income to fishers and entrepreneurs on the Neck and Islands.

Potential Effects

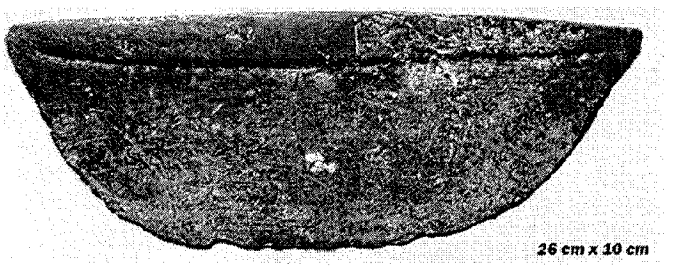
Concern has been expressed over the potential of ship strikes by the bulk carriers and the potential threat from blasting noise, which could affect the whales' hearing or affect behaviour.

Managing Potential Effects

- Ship traffic to the marine terminal at Whites Point will avoid the Bay of Fundy conservation area. (see Map 4).
- North Atlantic right whale sightings in the Whites Cove area will be communicated to the ships captain before the ship exits the inbound shipping lane (see Map 4) or leaves the marine terminal for the outbound shipping lanes.
- Bilcon is committed to cooperating with the North Atlantic Right Whale Recovery Team to improve the right whales' chances for recovery.
- Blasting will not be carried out if seals are present within 170 metres of the point of detonation or if whales, porpoises or dolphins are within 500 metres of detonations. If endangered marine mammal species such as right whales, blue whales or fin whales are sighted in the near-shore area of Whites Point the safety radius will be increased to 2500 metres.
- The speed of the ship between the shipping lane and the marine terminal will not exceed 12 knots and for much of the distance will be below 10 knots.


Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/
Impact Statement
Legend
Proposed Whites Point Marine Terminal
Proposed Shipping Route
Existing Shipping Lanes
New Shipping Lanes (2003)
Traffic Separation Zone
Right Whale Conservation Area
Popular Whale Watching Areas
July and August 2002
Licensed Aquaculture Sites
Water Based
Land Based
Source of Information:
Nova Scotia Department of Aquaculture and Fisheries, Aquaculture Site Mapping, 2002
Bay to Bay Adventures Ltd., Popular Whale Watching Areas, July - August 2002
Canadian Steamship Lines International Inc. 2002
Produced for: Bilcon of Nova Scotia Corporation
Proposed Shipping Route
Map 4
Bay of Fundy
Nova Scotia
St. Mary's Bay
Grand Manan Island
New Brunswick
Digby
Weymouth
Bear River
Church Point
Meteghan
Tiverton
Westport
Sandy Cove
Bellivean Cove
Map Source:
Nautical Chart 4011
Approaches to Bay of Fundy
Scale 1 : 300,000
0 5 10 15 20 25 Kilometres
0 5 10 15 Miles
N

7.7 Archaeology



Ulu - Photo by Gordon Fader

Background

The assessment of cultural and archaeological resources is an important component of an environmental assessment process.

Concern was expressed that cemeteries or graves could exist on the Whites Point site and it is known that an ulu, a very early tool, was found offshore at Sandy Cove.

Potential Effects

The clearing and grubbing operation on the quarry site could damage or destroy artifacts or disturb grave sites.

The installation of the pipe piles for the marine terminal could damage or destroy artifacts.

Managing Potential Effects

In order to determine what may exist on the quarry site an archaeological assessment was carried out under a permit issued by Nova Scotia Museums. This assessment found no evidence of land use at Whites Cove by aboriginal peoples.

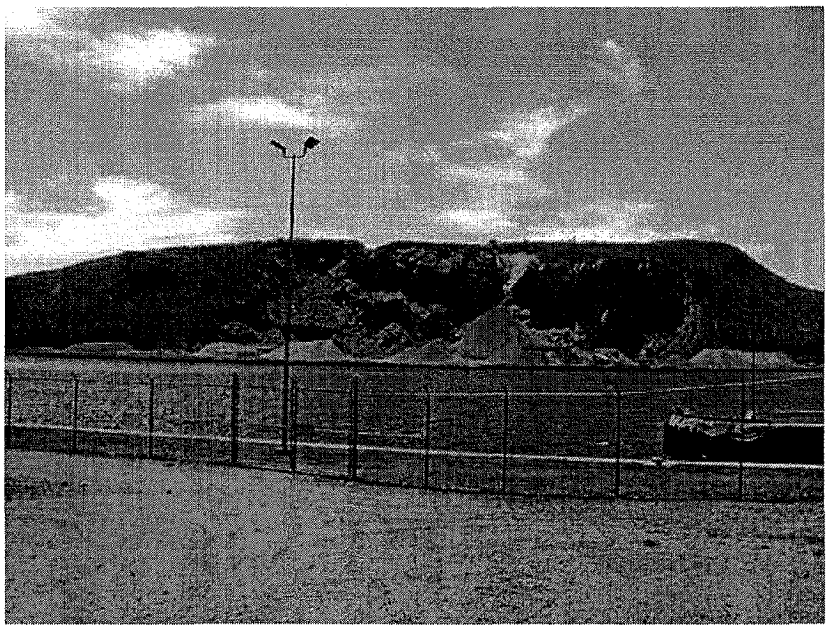
It is known, however, that several houses existed on the site in the late 19th century and the basement of one of these houses can still be observed. If Bilcon carries out work in the area of this basement further archaeological work will be carried out in this area and special precautions will be taken for a distance of 250 metres from the basement.

Bilcon staff will be trained in procedures to be adopted should any artifact or gravesite be observed anywhere on the site. Essentially all work will be stopped in the area until an assessment has taken place.

Special precautions and further investigation of the areas to be impacted by the piling for the marine terminal will be carried out by professional divers with archaeological experience under a permit from Nova Scotia Museums.

Only one shipwreck has been recorded in the Whites Cove area. In 1900 the Canadian government steamer Newfield ran aground in heavy fog. The vessel was later salvaged.

7.8 Tourism



View of Martin Marietta Quarry from the Nova Scotia Tourism Office - in Cape Breton

Background

Over the past twenty years a small but important tourism industry has grown on the Neck and Islands based on whale and bird watching. This industry contributes over $3 million dollars to the local economy. Tourism numbers were considerably down in 2004 and 2005 due in part to the high cost of gasoline and the rise in the Canadian dollar.

Potential Effects

Concern has been expressed that visible quarry activities could damage the industry.

Managing Potential Effects

The most important point is that no part of the quarry activity, apart from the access road, will be visible from Highway #217. In addition no trucks will be carrying crushed rock on Highway #217.

There is no evidence that quarry activities affect tourism even when the quarry is highly visible. For example the Auld's Cove quarry and marine terminal can be easily seen by every tourist entering Cape Breton with no recorded effect on the Cape Breton tourist industry. It should also be noted that the recently opened quarry on Long Island at Tiverton is highly visible to all tourists taking the Ferry from East Ferry on Digby Neck to Long Island. The Whites Point quarry is visible from the water but few whale watch boats frequent this area of the Bay. Bilcon has proposed tree plantings in the coastal preservation areas to at least partially obscure the view from the water.

7.9 Employment and the Economy

Background

Due to the recent severe decline in the groundfishery both the population and employment levels have declined on the Neck and Islands. Tourism has taken up a portion of the slack but has not been able to replace the jobs lost. The lobster industry has increased significantly over the past five years both in terms of catch size and value and this industry is now the mainstay of the Neck and Islands economy.

Potential Effects

The 34 staff at the quarry and marine terminal would have a significant positive effect on the local economy and the taxes paid to the Municipality of the District of Digby would also have a significant positive impact on tax revenues in the local area.

There is no evidence that the operation of the quarry will affect either the fishery or the tourism industry.

Concern has been expressed that Bilcon will hire staff already employed by local businesses.

Managing Potential Effects

- Bilcon has not received nor will apply for any government funding for the construction and operation of the project.
- Staff will be hired locally wherever possible and training will be provided by Bilcon at its expense.
- All staff will be paid industry competitive wages.
- Hiring preference will be given to women.
- Great care will be taken to ensure that staffing does not negatively affect local businesses.
- Bilcon will wherever possible procure supplies in the local area and generally support local business both during construction and operation of the facility.

7.10 Land Values

Background

Land values on the Neck and Islands have significantly increased over the past five years as they have Nova Scotia wide. There has been increased interest from foreign and out of province buyers looking for summer homes or retirement homes.

Potential Effects

Concern has been expressed that the construction and operation of the quarry and marine terminal will have a negative effect on land values on Digby Neck.

This understandable concern is not borne out by the recent activity in the real estate market on the Neck over the past three years as both the number of sales has risen significantly and prices have generally risen in line with those in the Digby area. All recent buyers would have been aware of the proposed project but it does not appear to have had a negative impact.

It is, however, possible that property values in the area immediately adjacent to the quarry could be negatively impacted.

Managing Potential Effects

To protect property owners in the area immediately adjacent to the quarry(within 800 metres of the active quarry) Bilcon proposes that an appraisal be carried out by a qualified real estate appraiser on those properties prior to construction and operation of the quarry to be followed up by an appraisal five years later. If property values have declined or not risen in line with the general market over the five year period Bilcon will compensate the property owners accordingly.

Bilcon will strictly adhere to the thresholds set out by the Department of Environment and Labour under the Pit and Quarry Guidelines for elements which could impact property values such as noise and dust.

7.11 Health

Background

The protection of health and community wellness is paramount when considering the effects of any human activity. Regulatory agencies at both the federal and provincial level have established parameters to ensure that the health of the public is not compromised by any of these activities.

The following definitions of health have been adopted in this EIS.

"health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity" (World Health Organization 1948), and "the extent to which an individual or a group is able to realize aspirations and to satisfy needs to cope with changes or cope with the environment" (World Health Organization 1984).

Three community health components were selected as health determinants:

1 Social and economic environmental components, e.g., demographics, population health, employment, income, education, and social status;

2 Physical environmental components, e.g., air, water, and soil quality' contaminants; noise vibration and light;

3 Individual factors, e.g., personal health and coping skills.

Concerns expressed by the public during scoping sessions or at Community Liaison Committee meetings, comments on the public registry, and on the Draft EIS Guidelines and by regulatory agencies, have been addressed in the EIS document. Physical environmental components have been addressed as VECs – air quality, noise and vibration, light, drinking water quality, marine contaminants, and country foods. Many of the issues concerning community wellness are addressed in the EIS under socio-cultural patterns. Quality of life components are addressed in the EIS and assess determinants such as social relations, social capital, commercial patterns, and environmental quality of life. The reader is encouraged to review these sections.

Potential Effects

The crushing of the basalt rock and general quarry activity produces dust which, if uncontrolled, could create health problems and affect country foods.

Quarrying of the rock and its processing produces noise which, if excessive, could create heath issues.

Potential contaminants, such as diesel fuel, gasoline and hydraulic fluids will be used and stored on site and these, and blasting residue, could potentially contaminate the water supply.

The quality of life could be affected if dust, noise, and contaminant issues are not addressed.

Managing Potential Effects

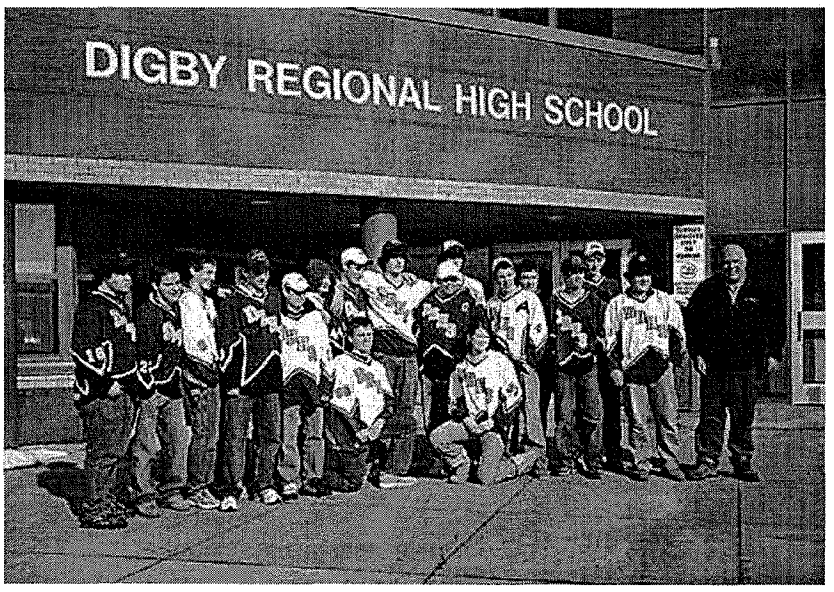
- Federal and provincial agencies, and sometimes both, have established regulatory thresholds for dust, noise, and contaminants to protect the health of the public and employees. The EIS sets out in detail the mitigation measures which will be adopted to ensure that these thresholds are not exceeded. Further, the EIS sets out the follow-up monitoring and reporting procedures to ensure that the mitigation measures are effective.

- Bilcon will employ a trained staff to carry out the monitoring and the results of the monitoring will be reported on a regular basis to the appropriate regulatory agencies and to the Community Liaison Committee (CLC). The CLC will have as members, people from the community most likely to be affected by dust, noise, and contaminant problems.

- It is recognized that there has been a disruption of the community's social cohesion during the pre-project planning phase of the project and during the environmental assessment / Panel Review phase as individuals with different objectives have interacted and discussed the potential effects of the project. However, since no significant adverse environmental effects were identified by the environmental assessment, the project activities (construction and operation) are not expected to have an adverse effect on social cohesion as it relates to social capital.

- Potential contaminants will be managed in accordance with the regulations. This means that storage will be in double walled tanks with specially designed containment devices.

7.12 Quality of Life



Bilcon supports community quality of life by sponsoring local interest groups

Background

Quality of life involves community health and wellbeing which includes physical, mental and social health not simply the absence of illness. There are many factors relevant to an assessment of the quality of life including: physical environment, social environment, income and social status, employment and working conditions, lifestyle, education, personal health practices, health services etc.

Concern has been expressed that the project could negatively affect the quality of life on Digby Neck.

Potential Impacts

Virtually all activities of a quarry and marine terminal could have a negative impact on the quality of life if they were not regulated by federal and provincial regulatory agencies and properly managed by the operator.

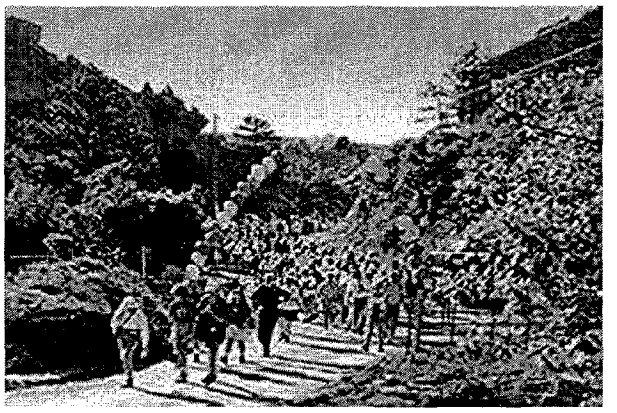
The purpose of this environmental impact statement is to identify potential impacts and to design management techniques which will ensure that quality of life and other valued environmental components are not adversely affected.

Managing Potential Effects

- Noise and air quality will be monitored so that regulatory thresholds are not exceeded.
- The public will be involved in the monitoring programs through participation in the Community Liaison Committee.
- The public will be encouraged to learn more about the operation through newsletters, open house and site tours.
- Bilcon will hire and train local people.
- A health and occupational safety plan for all employees will be developed and enforced.
- Bilcon will participate in community affairs and will be a good corporate citizen.
- Bilcon will improve its buffer properties with an ongoing silviculture program.
- Bilcon will compensate adjacent properties owners within 800 m of the quarry for loss of property value.
- Bilcon will compensate property owners for loss of wells due to quarry operations.
- Bilcon will work with the lobster fishers in Whites Cove to ensure that minimal interference with their activities takes place and will compensate for damage to fishing gear caused by ship movements.
- Bilcon will work with beach harvesters to provide good beach access.
- Bilcon will carry out all the commitments set out in the commitments table which is part of the Environmental Impact Statement.

Gate access for beach harvesters
Photo by David W. Kern

7.13 Reclamation



Colorado Mountain Reclamation Foundation
Pikeview Quarry 10th Annual Hike the Habitat

Background

The mining and quarrying industry has had a chequered history with respect to cleaning up mine sites after extraction is complete. In recent years regulatory agencies have demanded that sufficient money to fund the reclamation of a mine or quarry site be paid before the operation commences.

Potential Effects

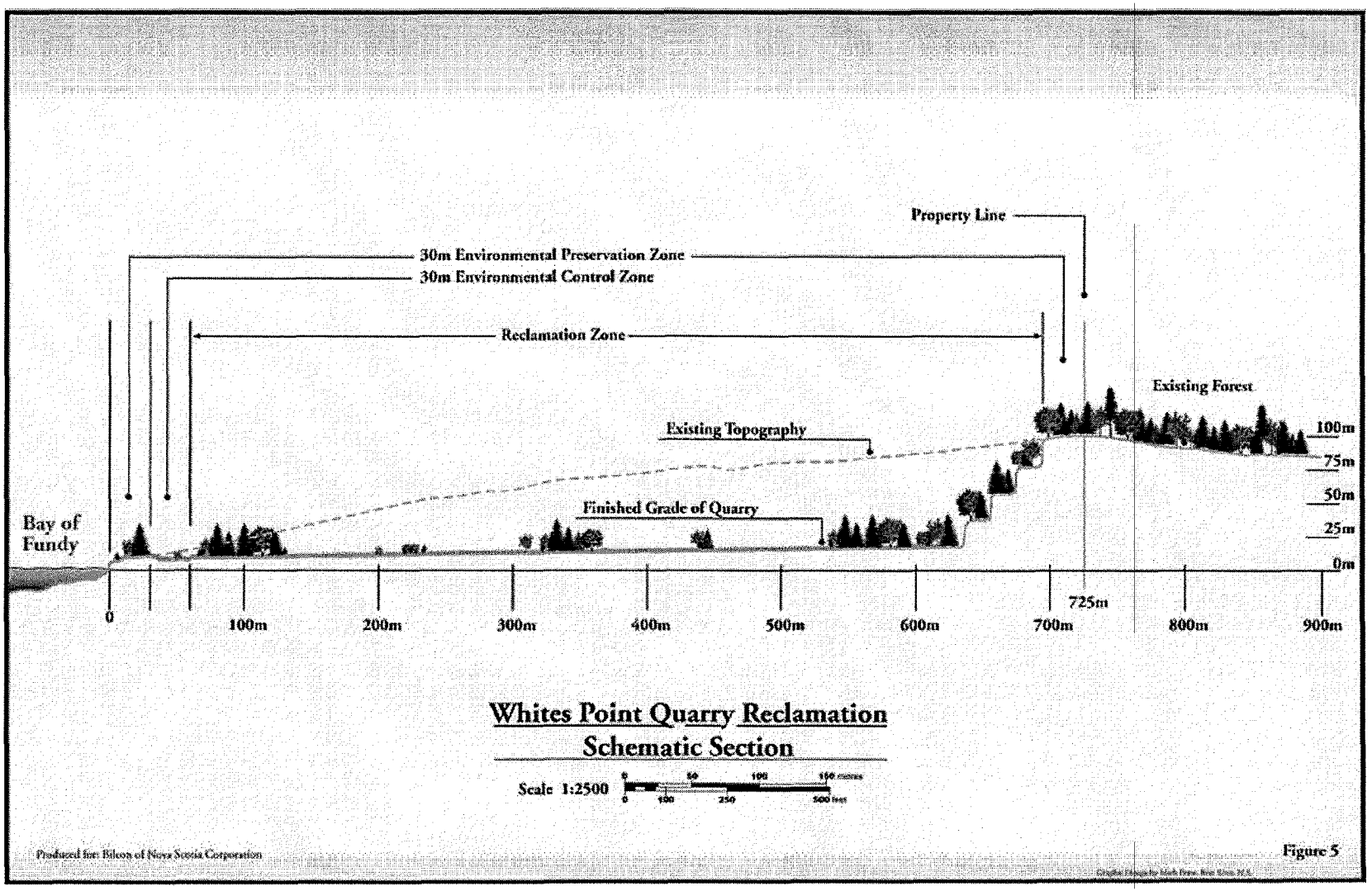
Concern has been expressed that the quarry site would not be cleaned up and a reclamation program carried out.

Managing Potential Effects

Bilcon will present a reclamation plan to the Nova Scotia Department of Environment and Labour for approval. This plan, when approved, will be costed and Bilcon will pay the cost of the reclamation program to the Department prior to construction. Then, if Bilcon does not carry out the reclamation program the government has the funds in hand to carry it out.

A schematic section of the quarry site after quarrying is shown on Figure 5 and the reclamation plan for year 50 is shown on Plan OP-8.

C0001-044



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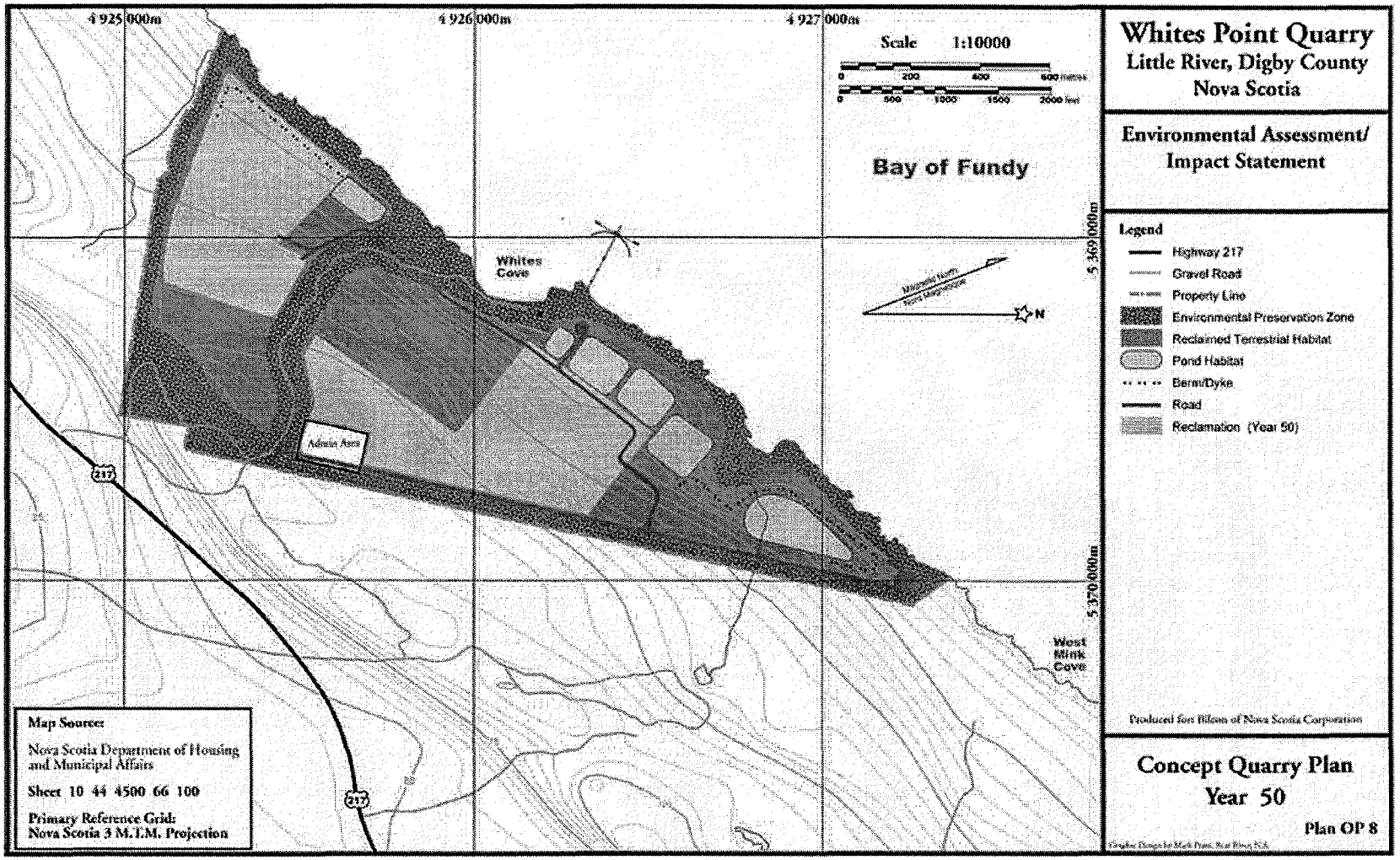

Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/
Impact Statement
Concept Quarry Plan
Year 50
Plan OP 8
Scale 1:10000
0 200 400 600 metres
0 500 1000 1500 2000 feet
Bay of Fundy
4 925 000m
4 926 000m
4 927 000m
5 369 000m
5 370 000m
Whites Cove
West Mink Cove
Admin Area
217
N
Legend
Highway 217
Gravel Road
Property Line
Environmental Preservation Zone
Reclaimed Terrestrial Habitat
Pond Habitat
Berm/Dyke
Road
Reclamation (Year 50)
Produced for Bilcon of Nova Scotia Corporation
Map Source:
Nova Scotia Department of Housing and Municipal Affairs
Sheet 10 44 4500 66 100
Primary Reference Grid:
Nova Scotia 3 M.T.M. Projection

8.0 Assessing Effects

Each Valued Environmental Component has been examined in the Environmental Impact Statement and the residual effect after managing the potential effect has been clearly established.

These effects are set out in Table 2 – Impact Summary.

A review of this table shows that provided all the management initiatives are followed there will be no significant negative effects. There will, however, be several significant positive effects. Readers are encouraged to examine each of the Valued Environmental Components in the Environmental Impact Statement.

9.0 The Continuing Process

The submission of the EIS is a major part of the environmental process. The next step is the distribution of the EIS document so that the public and other stakeholders can examine it and comment on it for a period of not less than 60 days. Comments made by the public or stakeholders are to be made in writing.

Comments received by the Panel will be passed on to Bilcon and the Proponent will provide a response to the Panel not later than 15 days following completion of the comment period.

Should the Panel identify deficiencies after reviewing the EIS and the comments received, the Panel may request further information from the Proponent. Once the Panel is satisfied that sufficient information has been provided, the Panel will arrange for public hearings and will schedule these hearings with a minimum of 30 days notice. These public hearings will be held in locations determined by the Panel within the area likely to be affected by the project or in any area reasonably close to the project.

The Panel will deliver its report to the Minister of Environment Canada, and the Minister of Environment and Labour, Nova Scotia, within 90 days of the close of the public hearings.

10.0 Future Consultation and Communications

Bilcon will re-establish the Community Liaison Committee and ensure that a clear line of communication and consultation is open throughout the life of the project.

11.0 Location of the EIS

The Panel will make hard copies of the EIS available for viewing at the following five locations:

Annapolis Royal Branch Library
Town Hall
285 St. George Street
Annapolis Royal, NS
(902) 532-2226

Isaiah W. Wilson Memorial Library
84 Warwick Street
Digby, NS
(902) 245-2163

Nova Scotia Environment and Labour Library
5151 Terminal Road, 5th floor
Halifax, NS
(902) 424-5300

Nova Scotia Environment and Labour
Yarmouth District Office Library
13 First Street
Yarmouth, NS
(902) 742-8985

Wolfville Memorial Library
21 Elm Avenue
Wolfville, NS
(902) 542-5760

12.0 Conclusions

As noted earlier, the purpose of the EIS document is to identify the potential effects of the project on people, the environment, and the economy. It further proposes mitigation measures to be taken to diminish or eliminate potential adverse effects and details monitoring procedures to verify the accuracy of the predictions.

The EIS demonstrates to the community that there are no significant harmful environmental effects and the following general conclusions can be drawn from the document:

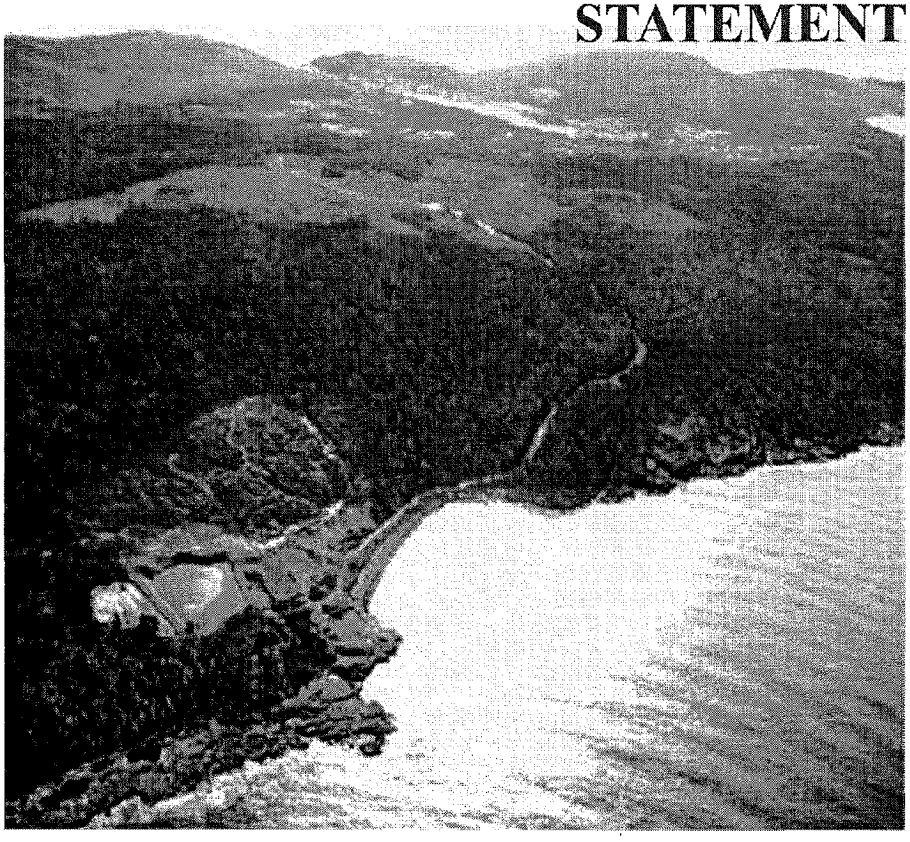
- The assessment is based on science carried out by highly qualified and experienced scientists and engineers rather than conjecture.
- The exaggerated perceptions of the risk of this project are not supported by the science.
- There are no significant negative environmental effects if the mitigation and compensation measures are followed.
- There are several significant positive effects of the project.
- The project will be undertaken by a Proponent who is well financed, experienced, and with an excellent safety, environmental, and community record.
- The project will be reclaimed incrementally, leaving a site landscaped for future development.
- The project will significantly improve the economy and economic diversification in the local area and will significantly contribute to the municipal tax base and to a lesser degree the provincial and federal tax bases.
- No government financial assistance has been sought for this project.

VOLUME II

EIS Guidelines Referenced to the EIS Document

WHITES POINT QUARRY & MARINE TERMINAL

ENVIRONMENTAL IMPACT STATEMENT



BILCON OF NOVA SCOTIA

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March 31, 2006

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EIS GUIDELINES	EIS DOCUMENT
3.0 PRINCIPLES	***EIS Section***
3.1 Use and Respect for Traditional and Community Environmental Knowledge Aboriginals Acadians African-Canadians Loyalists Existing communities	**3.1** **9.3.3** **Ref. Vol. IV** **Tab 23** **9.3.22** **Ref. Vol. VI** **Tab 33**
3.2 Public Involvement **How the Proponent has:** Continually and promptly provided project information to the public, especially to communities potentially most affected Expediently updated this information to reflect any changes Explained the environmental assessment process and results in a clear and direct manner to make all issues comprehensible to as broad an audience as possible	**8.2**
3.3 Sustainable Development **The factors the Panel will take into consideration which are directly pertinent to assuring sustainability and measures of sustainable development** The extent to which the project affects biological diversity The capability of renewal resources that are likely to be significantly affected by the project to meet the needs of present and future generations The preservation of ecosystem integrity, including the capability of natural systems to maintain their structure and functions and to support biological diversity Respect for the right of future generations to the sustainable use of renewable resources	**3.3**

3.0 PRINCIPLES	*EIS Section*
3.3 Sustainable Development - *continued*	
The Panel will evaluate the project's contribution to sustainability on the basis of: The extent to which the Project makes a positive overall contribution toward the attainment of ecological and community sustainability, at local and regional levels The effort made to enhance positive effects of the project on the physical, biological and human environment, as well as as mitigation of adverse effects How the planning, design and operation of the project will strengthen local and regional capacities and opportunities to achieve a sustainable future How monitoring, management and reporting systems will attempt to ensure continuous progress toward sustainability Appropriate indicators to determine whether this progress is being maintained	**3.3**
3.4 The Ecosystem Approach	**3.4**
The Panel will expect evaluations of the potential impacts of the project on: The interconnections betweent he physical, biological and human environment The links between terristrial, coastal zone and oceanic process The interchanges between the subsurface, surface and atmosphere The repercussion of the potential local impacts at the regional, national and global level	
3.5 The Precautionary Approach	**3.5**
The precautionary principle requires: That the onus of proof shall lie with the Proponent to show that a proposed action will not lead to serious or irreverisble environmental damage, especially with respect to overall environmental function and integrity, considering system tolerance and resilience Verifiable scientific research and high quality information Access to information, public participation and open and transparent decision making	

3.0 PRINCIPLES	*EIS Section*
3.5 The Precautionary Approach - *continued*	
The Proponent shall indicate how the project conforms to the precautionary principle at least in the following ways:	3.5
In designing and operating the project, priority has been given to strategies that avoid the creation of adverse impacts	
Control of deleterious outputs or other potentially damaging activity goes beyond current emmission standards where warranted by the potential environmental effects	
Contingency plans explicitly address worst case scenarios and include risk assessments and evalusations of the degree of uncertainty	
Monitoring programs are designed to ensure rapid response and corrections where adverse effects are detected	
Liability and insurance regimes are established that hold the Proponent and its contractors accountable for adverse effects and associated damages, and their limitation and control, throughout the life of the project including its decomissioning and rehabilitation	

4.0 CONTEXT OF THE REVIEW	*EIS Section*
4.1 Use of existing information	
The panel encourages the proponent to make use of existing information related to the environment affected by the project in preparing the EIS.	**9.0** **9.1** **9.2**
When that information is used to meet some of the EIS requirements, include it directly in the EIS or identify its source through: Cross referencing Direct citation or any other means that permits immediate access.	**9.3** **10.0** **8.2**
When relying on existing information, comment on its appropriateness and/or relevance over space and time with perceived limitations regarding the inferences or conclusions that have been drawn	**Ref. Vol. IV** **Tab 21** **Tab 22** **Tab 23**
The EIS must provide sufficient information to identify, describe and determine the significance of potential impacts on the environment that could arise from the project	
With the cooperation of appropriate parties, obtain and incorporate TK into the EIS	
4.2 EIS Format	
Present the EIS in the same general order as the guidelines	**4.2**
Describe The project The existing environment Potential impacts on the environment	**7.3** **9.1** **9.2** **9.3**
Explain the approach to: Managing Monitoring Mitigating potential impacts	 **9.2, 11.0** **9.2, 11.4** **9.3, 11.5**
Since some monitoring and mitigation measures will apply to multiple environmental components and multiple potential effects, treat them collectively	
Provide a table that cross-references the EIS guidelines with the location of the information in the EIS.	**Vol. II EIS**

4.0 CONTEXT OF THE REVIEW	*EIS Section*
4.2 EIS Format *(continued)*	
Provide sufficient detail to help readers locate information easily.	**Vol. IV EIS Master Table of Contents**
Include: References to appendices Supporting documents Cited materials	
Reference rather than repeat information presented in other sections of the EIS	
Include: A key subject index Glossary of technical terms and acronyms Detailed table of contents	**Vol. IV EIS Glossary Acronyms**
Provide supporting documentation in separate volumes including Background studies Technical documents	**Appx. Vols. I-IV**
Reference supporting documentation by: Volume Section Page In the text of the main EIS	**Ref. Vols. I-VI** **Text EIS**
Include a commitments table in order to summarize planned mitigation measures and stated company intentions	**Executive Summary**
This should be cross-referenced with environmental issues and/or potential impacts	**Vol. IV EIS**
Provide wherever useful to clarify the text: Charts Tables Diagrams Maps Perspective drawings that clearly convey what the developed project site would look like at various stages during its lifetime	**Vol. IV EIS Table of Contents Map Vol. III**

4.0 CONTEXT OF THE REVIEW	*EIS Section*
4.2 EIS Format *(continued)*	
Produce maps using a limited number of common scales in order to permit inter-comparison and overlay of mapped features	**Vol. II EIS**
Provide the EIS in both print and digital format according to digital format specifications provided by the Panel	**Vol. I-VI, EIS**
4.3 Expectations	
The Panel expects the Proponent to observe the intent of the Guidelines and to identify and describe all significant environmental effects likely to arise from the Project, including situations not explicitly identified in these Guidelines Biological Physical Human	
If the Proponent omits from the EIS any matters required in these Guidelines, then that omission must be clearly indicated so that the Panel, the Public and other interested parties will have an opportunity to comment on and respond to this judgement	
If the Panel disagrees with the Proponent's judgement, it may require the Proponent to provide additional information	
The Panel expects the Proponent to make use of environmental assessment guidance materials published by federal and provincial departments (see appendix 3) and to respect the principles identified by the Panel as guiding its evaluation	
The Panel expects the Proponent to employ properly qualified and knowledgeable professionals to conduct the assessment according to the highest standards in each subject area and Document the credentials of experts in an appendix	**Appx. Vol. I**
The EIs must support by providing all relevant references, any Analyses Interpretation of results Conclusions	

5.0 EXECUTIVE SUMMARY	*EIS Section*
Provide a plain language Executive Summary with a complete and concise overview of the EIS: Background on the Proponent Brief Project overview Project setting - physical, biological and human environments Key findings of the assessment	**Vol. I EIS**
Present the information in a general manner focusing on main issues: Maps Tables Figures	**Map Vol. III**

6.0 INTRODUCTION TO THE EIS	*EIS Section*
Provide an introductory chapter giving a brief overview of the context for the ER: Identify Proponent Describe the setting Discuss the assessment process Describe the regulatory environment Highlight the study strategy and methodology	**6.0** **6.01** **6.02** **6.03** **6.04** **6.05**
6.1 The Proponent	
Identify the ownership arrangements for various portions of the project: **Clarify the links between:** Bilcon of NS Global Quarry Products Nova Stone Exporters Inc. Clayton Block Company Bilcon of Delaware	**6.1**
Provide summary information on the nature of the management structure and organizational accountability: Design Construction Operation Modification Implementation of environmental mitigation measures and environmental monitoring Management of potential adverse environmental effects	**6.1.1**
Provide details on relevant corporate experience (Proponent and related companies) with similar large-scale operations in Canada and other countries with similar regulatory and social policy regimes Describe experience in operating other quarry or industrial operations Related transportation systems (including marine terminals)	**6.1.2**
Provide a record of the environmental performance and capability conducting this type of project: Proponent Management of the quarry site to date Indicate the environmental record of key subcontractors (e.g.. Shipping companies)	**6.1.2**

6.0 INTRODUCTION TO THE EIS	*EIS Section*
6.2 Project Overview and Purpose **Summarize the Project including:** Purpose Location Components and phases Workforce and equipment Associated activities Schedule Cost	**6.2**
6.3 The Project Setting **Provide an overview of the following setting which may affect or be affected by the project:** Geographic Ecological Social Cultural **Explain the interrelationships between the people and their communities and the environment:** Physical Biological **Provide a list and map of communities affected by the Project:** Indicate distance between those communities and specific Project components Identify proposed shipping routes to take aggregate to market	**6.3** **Map Vol. III**
6.4 The Environmental Impact Assessment Process and Approvals **Identify the planning context for the environmental assessment of the Project:** Discuss Government policies Regulations Land Use Plans The requirement for the environmental assessment under the CEAA and NSEE	**6.4**

6.0 INTRODUCTION TO THE EIS	*EIS Section*
6.4 The Environmental Impact Assessment Process and Approvals - *continued* **Summarize the main steps in the environmental assessment of the Project:** The establishment of the Panel The main approvals required to undertake the Project Explain the environmental assessment review process Describe the role of the EIS in the overall environmental assessment process	**6.4**
6.5 Regulatory Environment **Describe the existing regulatory environment:** Federal Provincial Municipal	**6.5**
Include requirements that apply to all phases of the Project and associated infrastructure: All permitting, licensing and regulatory requirements Any municipal planning and bylaw requirements Describe the guidelines and standards that apply **List each regulatory approval required in a table with the following details:** Activity requiring approval and when required Regulatory agency Name of approval or permit Associated legislation	**6.5** **6.5**
6.6 International Agreements **Describe the implications of International agreements, designations or action plans that may influence the project or its environmental effects:** NAFTA Kyoto protocol World Biosphere Reserve Gulf of Maine	**6.6** **6.6.1** **6.6.2** **6.6.3** **6.6.6**

6.0 INTRODUCTION TO THE EIS	*EIS Section*
6.7 Study Strategy and Methodology	
Outline the main steps carried out in conducting the environmental assessment	
Describe:	
Approach	**4.1, 4.2**
Strategy	**6.7**
Methodology	**6.7**

7.0 PROJECT DESCRIPTION	*EIS Section*
Provide specific and sufficient detail to clarify the nature of the project: Identify its potential effects **The Project description should, when read in combination with the description of the existing environments, allow the Panel to understand the selection of VEC's:** Interactions that may be caused on them by the Project Potential Impacts Describe environmental protection and monitoring strategies later in the EIS	**7.0**
7.1 Need for, Purpose of, and Alternatives to the Project **From the perspective of the Proponent, describe the need for and purpose of the project:** Explain the problem or opportunity that the Project is intending to solve or satisfy Clearly identify the fundamental rationale Identify the main function Explain who will benefit	**7.1**
Describe alternatives to the Project Include the "do nothing" scenario Discuss the reasons for selecting the Project as the preferred alternative Discuss the reasons for rejecting other alternatives Describe criteria used for assessing each alternative Identify the major beneficial and adverse effects of the alternatives considered	**7.1**
7.2 Alternative Means of Carrying out the Project **Identify technically and economically feasible ways that the Project can be carried out:** Identify the potential impacts associated with them **Describe alternative means of carrying out the Project including alternatives regarding:** Location Size of the quarry Use of existing marine infrastructure	**7.2** **7.2**

7.0 PROJECT DESCRIPTION	*EIS Section*
7.2 Alternative Means of Carrying out the Project *(continued)*	7.2
Quarrying methods	
Production rates	
Alternative means of transportation	
Describe criteria used to determine the technical and economic feasibility of the alternatives	7.2
Identify potential beneficial or adverse effects	
Consider options for the location of and timing for the Project:	7.2
Discuss how the environment influenced the choice of alternative means	
Include an analysis of alternative means of carrying out the Project:	7.2
In each phase	
In each component	
Provide reasons for selecting the proposed alternative means including:	7.2
Alternative sites of aggregate	
Extraction methods	
Recycling of materials	
Technologies for wastewater treatment	
Transportation modes and routes	
Ship loading methods	
Timing and scheduling	
Reclamation and decommissioning options	
Selection of mitigation measures	
Alternatives to marine transportation of the aggregate	
Identify the reasons for selecting the proposed Project including justification for rejecting alternates:	7.2
Provide an analysis to determine feasibility of alternatives:	7.2
Include any criteria and assumptions used	
Summarize and reference supporting studies used to establish criteria	
Discuss how traditional knowledge was considered	
Discuss how the public was involved in identifying and selecting alternative means	

7.0 PROJECT DESCRIPTION	*EIS Section*
7.3 The Project	
Summarize the Project:	
Character	7.3
Location	
Timeline	
Scale	
Describe all Project components and activities:	7.3
On land	
In the marine environment	
Describe by location and Project phase from site preparation to decommissioning and abandonment:	7.5
Permanent facilities	
Temporary facilities	
Address all phases and components in detail to predict potential environmental effects:	8.2, 5.0
Address public concerns about the project	7.10
Discuss the planned uses of the marine terminal and potential uses for the marine terminal other than for the Project during and after the decommissioning of the quarry	
Use to support the description:	**Map Vol. III**
Plans	"
Diagrams	"
Photographs	"
Maps	"
Elevations	"
Preliminary designs	
The scale and detail of the graphics should facilitate the understanding of project components as they affect the following environments:	
Physical	
Biological	
Human	

7.0 PROJECT DESCRIPTION	*EIS Section*
7.3 **The Project** - *continued*	
Indicate boundaries of the Project in relation to:	
Features such as other rights of way (e.g. rail lines, roads, shipping lanes)	**Map Vol. III**
Existing infrastructure	
Land uses	
Waste disposal areas	
Transportation systems and routes	
Important environmental features	
Structures	
Wells	
Identify key design features including:	
Safety features	**7.3**
Efficiency measures	**11.0**
	7.8
Describe any relationship of the proposed Project to a series of separate projects or to a larger project and consider:	
Alternatives	
Cumulative environmental effects	**7.1, 7.2**
Mitigation options	**10.0**
	9.1, 9.2, 9.3, &
Discuss the relationship of the Project to applicable policy plans at the following levels:	**11.5**
Local	
Regional	
Provincial	**9.3.9**
National	
Regional-scale management efforts	
Describe and identify the location of the major physical components of the quarry such as:	
Aggregate extraction and processing equipment	**Map Vol. III**
Loading facilities	**Figures**
Stockpiles	
Roadways	
Topsoil and overburden piles	**7.7**
Retention and settling ponds	**7.8**
Fuel and dangerous goods storage areas	
Administrative buildings	

7.0 PROJECT DESCRIPTION	*EIS Section*
7.3 The Project - *continued*	
Describe proposed distances from private property not owned or leased by the Proponent:	**Map Vol. III Map 2A**
Describe and identify the location of the major physical components related to the marine terminal:	**Map Vol. III Figures 1,2,3, &4**
Conveyors	
Ship loaders	
Berthing dolphins	
Mooring buoys	
Fuelling facilities	
Describe the properties and anticipated volumes of any product to be:	**7.0 - 9.1.2**
Produced	
Transported	
Disposed of during the operation of the proposed facilities	**7.5**
Describe relating to the Project:	
Phasing	**7.3**
Schedules	**Map Vol. III**
Hours of operation	**6.1.1**
Management plans	**11.0**
	9.1.9
Include for the above	**9.1.6**
Excavating	**9.2.9**
Drilling	**9.2.10**
Blasting	**9.2.11**
Sediment Control	**9.2.12**
Shipping (including ballast water control)	**9.2.14**
7.4 Land Requirements	
Describe the land requirements and arrangements for the Project and provide:	**7.4**
Maps showing dimensions	
Location of facility sites	**Map Vol. III**
Indicate any land use designations that may apply	

7.0 PROJECT DESCRIPTION	*EIS Section*
7.4 Land Requirements- *continued*	
Provide evidence of clear legal title to all lands within the footprint of the project: Or evidence of agreement with those who hold clear legal title to develop the project on these lands	7.4
Identify the implications of the private property held by others and the public right-of-way within the quarry site:	7.4
Identify any existing right-of-ways or legally entitled access: Include access from the water	7.4
Clarify the status of claims of fishing or fishermen's privileges on properties within the quarry:	7.4
7.5 Schedule and Boundaries	
For each project phase, describe in detail: (including a mining plan) The scheduling and relative timing and duration of major activities	7.5
The factors that influence scheduling or that could cause schedule changes	
Describe the boundaries for Project facilities and activities and the rationale for their delineation: Spatial Temporal Their change over time	8.4
7.6 Cost and Workforce	
For each Project phase, describe:	
Capital costs	7.6
Number of workers required by occupation and/or skill	7.6
Education requirements by occupation or skill	9.3.23
Training provided by employer	9.3.23
An estimate of the proportion of local and regional workers	9.3.23

7.0 PROJECT DESCRIPTION	*EIS Section*
7.7 Construction Phase	
Identify and describe all physical works and activities carried out during the construction phase by: Location Timing Frequency Duration	**7.7**
Describe: Types Amounts Schedule of materials Equipment Workers transported	**7.7**
Describe work required for site preparation and construction of quarry: Associated activities Techniques	
Explain the following (and others as appropriate):	
Drilling and Blasting	**9.1.9**
Handling procedures	**Appx. 9**
Frequency and size	**9.1.3**
Pre-blast surveys	**9.1.9**
Weather condition considerations	
Site Clearing (topsoil and overburden storage areas by):	
Location	**7.5**
Dimensions	**Plan OP 1-8**
Protective measures	
Describe:	
Site access roads (locations, gradient)	**7.7**
Public roadways	**7.7**
Sewage treatment and waste management systems	**7.8**
Dangerous goods storage areas	**7.8**
Watercourse crossings and diversions	**9.1.6**
Wetland alteration	**9.1.6**

7.0 PROJECT DESCRIPTION	*EIS Section*
7.7 Construction Phase - *continued*	
Location and type of structures (e.g. offices and warehouses)	**7.7**
Utilities	**7.7**
Identify structures and facilities associated with:	
Erosion and sedimentation control	**9.1.6**
Visual effect management (e.g. landscaping, screening mounds and plantings)	**7.10, 9.3**
Techniques for noise abatement during construction (on land and through water)	**9.1.9, 9.1.10**
Describe the physical components required for constructing the marine terminal and associated infrastructure:	**7.7.2**
Techniques to be used	
Describe the following: (and others as appropriate)	
Site preparation activities including any land based activities associated with the installation of marine infrastructure	**7.7.1, 7.7.2**
Describe the following: (and others as appropriate)	
Requirements for any drilling, blasting or dredging - *including*:	**9.1.9**
Handling and disposal procedures	**Appx.9**
Frequency and size	**9.1.3**
Pre-blast surveys	**9.2.9**
Weather condition considerations	**9.2.10**
Fishing-related activity considerations	**9.2.11**
Mechanisms for anchoring of pile support structures	**9.2.12**
Construction of concrete caps as dolphins	
Any use of rock fill or armour stone	
All structures and utilities	
Describe proposed construction schedules:	**7.7**
Days of the week	
Times of day	
Seasonal schedules	
Anticipated commencement and completion dates	
Describe clean-up and restoration of work areas:	**7.10**
Strategies for reducing risks	
Identify criteria selected to measure construction and clean-up success	

7.0 PROJECT DESCRIPTION	*EIS Section*
7.8 Operation and Maintenance Phase	
Describe the physical components required for Project operation and maintenance	
Associated activities and techniques	**7.8**
Explain the lifespan of the Project:	
Annual average rates	**7.0**
Maximum production rates	
Describe all drilling and blasting:	**Appx. 9**
Frequency	
Size	
Blast geometry	
Pre-blast surveys	
Weather condition considerations	
Equipment used for:	
Crushing	**7.8**
Screening	
Sorting	
Washing facilities	
Identify the location and nature of materials stockpiled:	**7.8**
Describe all water management:	
Detailed water budget	**Ref. Vol. V**
Effluents	**Tab 30**
Treatment	
Water recycling opportunities	**9.1.3**
Management of acid-generating rock	**9.1.2**
Management of ammonia from blasting activities	**7.8**
Sewage and solid waste management	**11.2**
All dangerous goods use and waste dangerous goods management	
Describe the Project's requirements for land transportation:	
Modes	**9.3.8**
Routes	
Load size and frequency	
Describe any goods other than aggregate likely to be carried in transportation vehicles and vessels	

7.0 PROJECT DESCRIPTION	*EIS Section*
7.8 Operation and Maintenance Phase - *continued*	
Describe goods (other than aggregate) likely to be carried in transportation vehicles and vessels:	
Describe the Project's requirements for marine transportation:	**9.3.8**
Routes	
Vessel size and type	
Frequency	
Duration of berthing	**11.1, 11.2**
Contingency plans for storms or extreme conditions	
Explain:	**9.2.14**
Ballast and bilge water management	**7.8**
Cargo loading and unloading practices and precautions	
Indicate whether the marine terminal will be used for purposes other than those associated with the Project:	**7.8**
Describe structures and facilities associated with environmental controls for:	**9.1.9, 10 &11**
Noise	**9.1.8**
Dust	**9.3.6**
Protection of views from both land and sea	
Discuss anticipated repair and maintenance activities that could result in interactions with the environment:	**7.8**
Replacement of Project components	
Maintenance dredging including disposal of dredged materials	
7.9 Modification	
Describe the management approach to the physical works or activities described above:	**7.9**
Conceptual plans	
Potential modifications (including expansion or discontinuation)	
Specify the conditions or potential risks which would necessitate modifications to the project	

7.0 PROJECT DESCRIPTION	*EIS Section*
7.10 Decommissioning and Reclamation Phase	
Describe the proposed approach to decommissioning Project facilities including the marine terminal: Conceptual plans Timing Nature of site clean-up and rehabilitation activities Reclaiming the site for future use	**7.10**
Detail plans for progressive reclamation of the quarry site as operations advance: Removing equipment and structures on land Removing equipment and structures in the marine environment Reclaiming exploration boreholes and test pits Proposed future uses of the property following decommissioning	**7.10** **Plan OP 1-8**
Specify as they pertain to the Project Components: Ownership Transfer Control Fiscal and legal responsibility for ensuring the integrity of decommissioned facilities	**6.1 Commitment Table**

8.0 IMPACT ASSESSMENT METHODOLOGY	*EIS Section*
8.1 Methods	
Explain and justify the methods used to predict potential impacts of the Project: On the VEC's On interactions among these components On any broader relationships with the physical, biological and human environements	**8.1** **3.4**
Describe linkages between Project-related effects: How impacts on the biological environment could affect the human environment	**9.3**
Explain how knowledge was used to describe the existing environment, evaluate potential impacts and reach conclusions: Scientific Engineering Traditional Other	**9.1** **9.2** **9.3** **Impact Summary Table 2**
Identify and justify any assumptions made:	**See each VEC**
Indicate the degree of certainty in the impact predictions: Determination of significance Identify measures used	 **8.0**
Document all models and studies so that to the extent possible: Analyses are transparent and reproducible Support analyses and conclusions with reference to appropriate literature Provide all relevant references	 **Ref. Vol. I-VI**
Identify which studies included the assistance of communities: Who was involved Specify &reference sources for any contributions based on traditional knowledge	 **Ref. Vol. IV** **Tab 21, 22, 23**
8.2 Public Participation	
Outline the engagement activities undertaken in respect of the environmental assessment: Identify and report on key issues raised Describe how those issues have been addressed	**8.2**

8.0 IMPACT ASSESSMENT METHODOLOGY	*EIS Section*
8.2 Public Participation - *continued*	
Describe methods used to identify, inform and solicit input to the assessment:	**8.2**
Outline the types of support provided by the Proponent to those involved in the public participation process: Communities Organizations Individuals	**8.2**
Identify and document the Writers of comments and input: Residents and organizations in affected communities Other organizations Resource users Government agencies	**5.0**
Document outcomes of public engagement: Additional information provided to those consulted Additional information provided by those consulted	**8.2**
Document the role of public engagement in identifying: VEC's Issues Impact prediction and mitigation Explain how the results of that engagement influenced the design of the Project	**9.0** **9.1** **9.2 / 9.3**
Describe the principles and methods of Project activities regarding: Obtaining information, obtaining input or otherwise engaging communities and groups Fisheries Tourism sectors Document, track and describe any issues raised by stakeholders that may	**8.2** **Ref Doc** **Vol IV** **Tabs 21, 22**
8.3 Selection of Valued Environmental Components	
For additional VEC's not identified at the public scoping sessions and the Panel describe methods by which VEC's were identified: The basis or justification for their selection Identify any indicators used in the assessment of impacts on VEC's and provide the basis for their selection	**8.3**

8.0 IMPACT ASSESSMENT METHODOLOGY	*EIS Section*
8.4 Boundaries	
8.4.1 Spatial Boundaries	
When determining appropriate spatial boundaries for the assessment of potential environmental effects, consider (but do not be limited to) the following criteria:	**8.4**
The physical extent (terrestrial and marine) of the proposed Project	**8.4.1**
Any offsite facilities or activities (such as shipping)	**8.4.1**
The extent of aquatic and terrestrial ecosystems and communities potentially affected by the Project	**8.4.1**
The extent of potential effects arising from noise, light and atmospheric emissions, liquid emissions	**9.1.9, 9.1.10, 9.1.11**
Land and ocean use for commercial, cultural, agricultural, recreational and aesthetic purposed by communities and Aboriginal peoples whose areas may be affected by the Project	**9.3.3**
The size, nature and location of past, present and reasonably foreseeable projects and activities that could interact with the items above	**10.0**
Define appropriate scales over which baseline descriptions and assessments of environmenta effects are presented: Ecosystem Local Regional National	**8.4.1**
The Proponent must provide sufficient detail to address the relevant environmental effects of the Project:	**EIS**
The EIS must contain a justification and rationale for all boundaries and scales chosen:	**8.4**
8.4.2 Temporal Boundaries	
When characterizing potential environmental effects of the Project consider: Historic and current baseline trends within the study region with sufficient completeness	**8.4.2**

8.0 IMPACT ASSESSMENT METHODOLOGY	*EIS Section*
8.4 Boundaries - ***continued***	
to permit evaluation of the effects on VEC's Include consideration of past projects and activities conducted by the Proponent and/or others	**6.1**
Consider a time frame that encompasses the onset of Project-related pre-construction planning: Site clearing Construction Operation Maintenance and modifications	**EIS**
Consider a time frame that encompasses: The proposed duration of the Project Eventual decommissioning Reclamation Abandonment	**EIS**
When assessing cumulative environmental effects, consider Project impacts combinedwith other projects: Past Present Reasonable foreseeable future	**10.0**
8.5 Application of the Precautionary Principle	
Identify elements of the assessment where application of a precautionaryprinciple approach warrants: Specific methods Specific evaluations	**8.5**
Discuss whether a potentially serious or possibly irreversible Project-related adverse impact can be avoided: Where adverse impacts cannot be avoided, describe ways to reduce environmental risk Include a discussion of Project design and available technology with reference to effectiveness and cost	**9.1** **9.2** **9.3** **Mitigation Table** **11.5**

9.0 DESCRIPTION OF EXISTING ENVIRONMENTS	*EIS Section*
8.5 Application of the Precautionary Principle - *continued*	
Provide baseline descriptions of these environments:	**9.0**
Biological	**9.1**
Human (socio-economic)	**9.2**
	9.3
Include elements that are valued by the public:	
Processes	
Interrelationships and interactions	"
Some measure of the inherent variability of elements and relationships	
Express the information over time scales appropriate to the identified VEC's	
Evaluate the quality, reliability and applicability of data used:	
Identify any data gaps, insufficiencies and uncertainties	"
Those that will need to be remedied for monitoring purposes	
Provide detail to allow determination and assessment of effects that might be potentially caused by the Project:	"
Adverse	
Beneficial	
Baseline data developed from recent data should reflect its true state of continuous change;It should include:	
Processes and interactions such as those specified in these Guidelines	"
Legislated or regulated by government; identified in the scoping process *or*	
Judged by the Proponent to be important.	
Indicate to whom specific concerns might be important along with reasons why they are considered so	
Take an ecosystem approach, integrate perspectives on ecosystem health and integrity drawn from:	
Scientific knowledge	"
Traditional knowledge	
Identify and justify the various indicators chose to define the ecosystem including:	
Measure of economies and social health and integrity	"
Relate these measures to Project monitoring, follow-up and mitigation	
Define the geographic area represented by ecosystems:	
Relate it to the broader regional environment and economy	

9.0 DESCRIPTION OF EXISTING ENVIRONMENTS	*EIS Section*
8.5 **Application of the Precautionary Principle** - *continued*	
Relate it to Digby Neck to: Critical habitats Bird and fish stocks The presence of particular species, including species at risk The economic dependence of the region on the fisheries and tourism	**9.1, 9.2, 9.3**
Provide information as to the health and importance of social and economic issues which broadly encompass and affect people and communities in the study area: Historical Current Projected information	"
Use a comprehensive and holistic approach that acknowledges any distinctiveness in: Economy Life style Social traditions Quality of life Critical requirements for their maintenance and enhancement	"
Consider the local economy in relation to the physical and biological environments: Status Health Persistence Vulnerability Resilience	"
Provide context-sensitive information in sufficient detail To address a range of public interests and concerns To assist in recognition of the varying significance of the potential impacts on communities throughout the region	"

9.0 DESCRIPTION OF EXISTING ENVIRONMENTS	*EIS Section*
9.1 Existing Physical Environment	
9.1.1 Terrain, Geology and Soils	
Describe the regional/area setting with reference to: Topography Geomorphology Bedrock geology Surficial geology	**9.1.2** **9.1.4**
Provide specific information for the Project site for the bedrock geology that includes: Geologic structures (e.g.) faults, joint patterns and frequency Bedrock type (lithology) Stratigraphy	**9.1.2**
Provide up-to-date geological maps and available core sample descriptions that delineate the distribution of basalt suitable for quarrying vs. possible waste material: Provide information on the bedrock's chemical and petrologic character and its acid producing/ consuming potential	**9.1.2** **Ref. Vol. V Tab 29**
Describe and provide maps of the surficial materials: Soils Glacial regolith	**Map Vol. III**
Characterize these materials by: Chemistry Particle size distribution Permeability Porosity Erosion risks	**9.1.2**
For the Project site provide slope/aspect maps:	**Map Vol.III**
Identify landscape processes & areas of possible occurrence of: landslides Mudflows Creep Slumping Debris flow	**9.1.2**

9.0 DESCRIPTION OF EXISTING ENVIRONMENTS	*EIS Section*
9.1 Existing Physical Environment - *continued*	
Identify fault zones and active seismic areas: Regional scale Local scale	**9.1.2**
Indicate any sites of special geoscientific interest within the Project area:	**9.1.2**
9.1.2 Physical Oceanography	
Describe local and regional oceanographic conditions using: Bathymetry (seabed topography) Shoreline character Intertidal zone dynamics	**9.1.7**
Provide information on the potential for sea ice formation: Distribution Movement	**9.1.7.1**
Assess the possible magnitude and frequency of extreme events involving the cumulative effects of: Storm surges Tides Meteorological conditions	**9.1.7.1**
9.1.2.1 Marine Sediment Quality and Quantity	
Describe marine sediments in the area affected by the Project, including an overview of the physical and biological processes related to : Sediment deposition Movement Quality	**9.1.7.1**

9.0 DESCRIPTION OF EXISTING ENVIRONMENTS	*EIS Section*
9.1.2.1 Marine Sediment Quality and Quantity - *continued*	
Include: Sediment type Particle size Spatial distribution Sediment thickness Vertical profiles (cores) Sediment chemistry Organic content & quality such as heavy metals, organochlorines & nutrients Mechanisms and rates of sediment transport in relation to water depths	**9.1.7.1**
Develop a conceptual/analytical model that describes the Debris Cycle on and around the site: Erosion Transportation Deposition of sediment	**9.1.7.1**
In marine areas that could be disturbed by the Project including areas to be dredged or used for dredge spoil disposal, characterize sediments in relation to parameters identified in: The Canadian Sediment Quality Guidelines for the Protection of Aquatic Life The *Canadian Environmental Protection Act* 1999 and; its Disposal at Sea regulations	**9.1.2** **9.2.3** **9.2.4**
9.1.2.2 Ocean Currents and Tides	
Describe for the Project site and adjacent areas affected by Project components (such as shipping): The Average and maximum current speeds and directions Wind and swell characteristics Fetch Tidal characteristics (range, period, seasonal variation) Coupling between wind and currents	**9.1.7.1**
For the marine terminal site provide information on: Net current flow Tidal component flows Wind-driven responses on a seasonal basis	**9.1.7.1**

9.0 DESCRIPTION OF EXISTING ENVIRONMENTS	*EIS Section*
9.1.2.3 Water Quality **Describe and quantify the water column characteristics and their spatial and temporal variability for the Project site and adjacent areas in terms of:** Temperature Salinity Suspended sediments Nutrient concentrations Optical transmissivity **Evaluate current levels and trends in any environmental contaminants:** Provide information on mixing and stratification of the water column: At different seasons Its impact on the above listed parameters	 **9.2.2** **9.2.3** **9.2.4** **Ref. Vol. III** **Tab 15**
9.1.3 Terrestrial Water Quality and Quantity **Describe terrestrial water quality and quantity in:** Surface water Groundwater Wetlands Pay particular attention to the interactions of the hydrologic components:	 **9.2.2**
9.1.3.1 Surface Water Provide a map delineating the watershed(s) and sub-watersheds within the quarry site and in the vicinity of the Project: **Within the watershed(s) identify and delineate all:** Recharge and discharge areas Ponds Lakes Wetlands	 **Map Vol. III** **Map 14** **Map 15**

9.0 DESCRIPTION OF EXISTING ENVIRONMENTS	*EIS Section*
9.1.3.1 Surface Water- *continued*	
Describe and quantify the hydrological conditions and water quantity and quality for all surface waters, including ephemeral streams, which may be potentially be affected by pit dewatering, water extraction, or diversion by:	**9.1.3**
Describing flow regimes	**9.2.2**
Seasonal flow patterns	**9.1.6**
Channel/bed/drainage basic morphology and stability	**9.1.2**
Sediment load-suspended and bedload	**9.1.6**
Providing estimates of normal (base and mean) flows and extreme (high and low) flows and water levels	**9.1.6**
Water chemistry and turbidity	
Identifying all freshwater streams whose groundwater supplies originate within the projected quarry area even though they may surface and flow outside the quarry site	**9.1.6**
In each watershed, identify locations of existing and planned water use in relation to proposed facilities:	
Domestic	
Municipal	**9.1.3**
Industrial	**9.1.5**
Camp	
For each area of water use that may be affected by the Project, identify:	
The quantity of use	**9.1.3**
Existing water quality	**7.8**
Seasonal or other temporal variation of water quality and use	
Identify existing sources of water quality impairment and their locations in relation to Project facilities:	**9.1.3**
	9.1.6
Include a consideration of relevant:	
Federal and provincial guidelines	
Criteria	**6.4**
Legislation applicable to water usage	

9.0 DESCRIPTION OF EXISTING ENVIRONMENTS	*EIS Section*
9.1.3.2 Groundwater	
Provide a map delineating the groundwater regime(s) within the vicinity of the Project area:	9.1.3
Identify and describe the hydrostratigraphic units in the region that could be affected by the Project: Depth and thickness of aquifers Their water quality Yield characteristics	**Map Vol.III** **Map 12** **Figure 6A, 6B**
Evaluate the current vulnerability of aquifers to contamination by: Atmospheric or surface water pollutants Saltwater intrusion Wells running dry through normal water withdrawal	9.1.3
Provide a pre-development well-water survey to establish baseline baseline well-water quality and quantity:	9.1.3.3
Include detail on all wells that might be impacted by quarry development: Type Depth Yield Number Location	9.1.3.1
Describe the characteristics of surface water and groundwater interactions: Physical features or mechanisms influencing recharge or discharge characteristics potentially affecting shallow and deep groundwater resources Groundwater contributions to stream base flows in the study area Different climatic and seasonal conditions	9.1.3
Synthesize the groundwater and surface water data to produce a conceptual/ analytical model of the hydrological cycle under and around the Project site:	9.1.3

9.0 DESCRIPTION OF EXISTING ENVIRONMENTS	*EIS Section*
9.1.3.3 Wetlands	
Identify the location, size and class of any wetland that may be affected by the Project: On-site Downstream	**9.2.1.1** **Map Vol. III**
Evaluate the above including: Their wildlife potential (including wildlife at risk) Groundwater recharge role and potential Their role in surface flow regulation (storm water retention and flood control)	**9.2.1**
Describe potential roles of the wetlands water treatment and their potential importance forpaleo-ecological studies:	
9.1.4 Climate	
Describe the existing or baseline climate conditions and climatic variability and trends including: The location of recording stations and length of record for any meteorological data presented Prevailing climatic conditions Seasonal variations Predominant winds - including directions and velocity Temperature and precipitation (snowfall, snow depth, rain, fog) Occurrence and frequency of storm and extreme weather events Spatial and temporal boundaries for the description of climate Any current or historical climate-related extreme events that may affect the Project including shipping and frequency of occurrence	**9.1.1** **Appx. Vol. III** **Tab 14** **Appx. Vol. IV** **Tab 46** **Tab 48**
In support of the baseline description define the 'current' climate normal (baseline) period reliedon by describing: How it was determined The variability/trends within the 'current' climate normal period Within the period of instrumental record	**9.1.1.1**
Discuss the contribution of traditional knowledge to the understanding of climate conditions and variability:	**Ref. Vol. IV** **Tab 23**
Present the description of baseline conditions in a manner that reflects climatic variability and facilitates subsequent discussion of how changes in climate could change the Project orparticular Project components	**9.1.1.1**

9.0 DESCRIPTION OF EXISTING ENVIRONMENTS	*EIS Section*
9.1.5 Air Quality	
Describe existing air quality in the area affected by the Project and define the spatial boundaries of the airshed(s) including a rationale for its delineation:	**9.1.8**
Provide: The location of recording stations Length of record for and air quality data presented	**Ref. Vol. V Tab 31**
For each airshed, identify: Current sources of emissions Seasonal variations Climatic conditions affecting air quality (wind direction and velocity) Assimilative capacity	**Ref. Vol. V Tab 31**
Characterize the existing air quality and precipitation chemistry in each airshed based onparameters identified in: National Provincial Or other relevant air quality standards and objectives	**Ref. Vol. V Tab 31**
Particularly emphasize information on substances that may be emitted due to the Project such as: Ambient dust levels in areas where quarry or loading activities may contribute to increased dust levels and decreased visibility	**Ref. Vol. V Tab 31**
9.1.6 Noise and Vibration	
Describe the existing ambient acoustical environment: At the Project site Offshore In any other areas where Project activities could be expected to have an environmental affect	**9.1.9** **9.1.10** **9.1.11** **Ref. Vol. V Tab 31**

9.0 DESCRIPTION OF EXISTING ENVIRONMENTS	*EIS Section*
9.1.6 Noise and Vibration - *continued*	
Provide the spatial boundaries of: Existing noise and vibration levels Locations of recording stations Length of record for any acoustic or vibration data presented.	**Ref. Vol. V** **Tab 31** **9.1.9** **9.1.10** **9.1.11**
At these sites describe existing sources of noise and vibration including : Duration Types of variation Timing Frequency Levels	**9.1.9** **9.1.10** **9.1.11** **Ref. Vol. V** **Tab 31**
Consider the effects of different meteorogical conditions on noise propagation:	
Provide information on any existing of the following with respect to noise and vibration levels: Standards Guidelines Objectives	**Ref. Vol. V** **Tab 31** **9.1.9** **9.1.10** **9.1.11**
9.1.7 Light	
Describe existing ambient levels at the Project site and any other areas where Project activities could have an environmental effect on light levels:	**9.1.12** **Ref. Vol. V** **Tab 31**
Describe night-time illumination levels during different weather conditions and seasons:	
9.2 Existing Biological Environment	
9.2.1 Species at Risk	**9.2** **9.2.0.1**
Identify all aquatic and terrestrial listed species (*found on the SARA List of Wildlife Species at Risk*)	**9.2.5** **9.2.6** **9.2.7**
Their critical habitat (if identified in a recovery strategy or action plan) found within the regional study area	**9.2.8** **9.2.13**

9.0 DESCRIPTION OF EXISTING ENVIRONMENTS	*EIS Section*
9.2.1 Species at Risk - *continued*	
Identify any additional species listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) found in the regional study area: Indicate when each species is expected to become listed under SARA	**9.2**
Consider all species listed as VEC's in the assessment : Endangered Threatened Rare Extirpated Of special concern	**9.2**
For all of the above mentioned species, provide information on: Seasonality Frequency Habitat (as defined in Section 2 of SARA) Critical habitat (if identified in a recovery strategy or action plan) Current ranking (e.g. endangered, threatened or species of special concern)	**9.2**
Useful resources pertaining to these topics include: Species specialists The primary scientific literature COSEWIC status reports Recovery strategies and action plans	**9.2** **9.2**
If a critical habitat has not yet been identified for a given species, this should be noted:	
Identify and consider all species listed under the NS Endangered Species Act as: Endangered Threatened Vulnerable	**9.2**
Identify species listed under the NS General Status of Wild Species including those designated as: Red Yellow	**9.2**

9.0 DESCRIPTION OF EXISTING ENVIRONMENTS	*EIS Section*
9.2.1 Species at Risk - *continued*	
To satisfy provincial requirements, include the required information as stated in the *Standards and Process Applied to Provincial Environmental Impact Assessments: Wild Species Priorities, Inventory and Mitigation Standards for Reporting* prepared by the NSDNR	**9.2**
Conduct appropriate surveys to identify the presence of floral and faunal species, include anyspecies at risk that might occur: Near the Project site Or throughout other areas that may be affected by the Project	**9.2**
Conduct surveys during appropriate times of the year: Identify the time(s) each study was conducted	**9.2**
Identify all federal, provincial and municipal protected/conservation areas in the vicinity of the Project: National migratory bird sanctuaries and wildlife management areas Provincial wilderness parks Sites of ecological significance Municipal water supply areas	**9.2**
Identify marine and fresh water fish and invertebrates occurring in any identified or receiving watercourses contiguous to the quarry site that might be impacted by the Project and its associated shipping activities including:	**9.2**
Harvested and non-harvested finfish (pelagic and demersal) ,shellfish and crustaceans Seasonal and life cycle movements and sensitive periods Habitat requirements for each life stage (e.g. spawning, rearing, nursing, feeding)	**9.2.3**
Description of any seasonal variation in the location, abundance and activities of aquatic species	**9.2.4**
Local and regional abundance, distribution and use of habitat types, including aquatic and riparian vegetation Migratory routes of appropriate species and the foods upon which they depend	**9.2.5**

9.0 DESCRIPTION OF EXISTING ENVIRONMENTS	*EIS Section*
9.2.2 Fish, Invertebrates and Habitat - *continued*	
Sensitive, important or at-risk species and/or habitat types	**9.2.5** **9.2.6**
Baseline contaminant concentrations in harvested species that may change as a result of the Project	**Appx. Tab 31**
Any known issues with respect to the health of harvested species (e.g. parasites, disease, condition)	**9.2**
Harvest pressures (subsistence, sport fishing and commercial harvesting) by species, season and geographic area	**9.2**
A listing of existing non-native species	**9.2**
Potentially invasive species that might be carried in the ballast water of ships that will service the Project (Consult appropriate agencies for current lists)	**9.2**
For species of concern, also describe: Specific location Population status Limits Size Sensitivity Limiting factors	**9.2**
In the course of describing aquatic species and habitats, consult with local fishermen and fishermen's associations to document traditional knowledge:	**Ref. Vol. IV Tab 23**
9.2.3 Birds and Bird Habitat	
Describe existing birds and bird habitat within the areas affected by the Project, including: Permanent bird species Migratory On land Shoreline Offshore Occurrence	**9.2.1** **9.2.7**

9.0 DESCRIPTION OF EXISTING ENVIRONMENTS	*EIS Section*
9.2.3 Birds and Bird Habitat - *continued*	
Abundance	
Distribution	**9.2.1**
Range	**9.2.7**
Seasonal movements	
Habitat requirements (breeding, moulting, staging, feeding)	
Sensitive periods	
Migratory routes that may exist within the quarry site, or in areas affected by the Project	
Habitat types including local and regional abundance and distribution	
Habitats or sites of special value or sensitivity including species use and timing	
For species of concern, describe:	
Specific location(s)	
Population status and trends (seasonal variability over multiple years)	
Limits and size	**9.2.7**
Critical habitat	
Sensitivity	
Limiting factors, status and trends	
9.2.4 Wildlife and Wildlife Habitat	
Describe existing wildlife resources within the areas affected by the Project with special attentionto the uniqueness of any organisms or:	**9.2.1**
The kind and degree of interaction that might exist with other regional ecosystems	
For any species of concern considered to be unique or integral to the regional ecosystem in relation to the Project facilities and activities, provide evidence of:	**9.2.1**
Abundance and distribution	
Seasonal movements	
Habitat requirements	
Sensitive periods	
A description of specific location(s)	
Population status and trends	
Limits and size	
Critical habitat	
Sensitivity and limiting factors	
Habitat types including local and regional abundance and distribution	
Habitat or sites of special value or sensitivity	
Species use and timing	
Migratory patterns, routes and timing	

9.0 DESCRIPTION OF EXISTING ENVIRONMENTS	*EIS Section*
9.2.5 Marine Mammals	
Identify existing marine mammal species and their habitat within the areas affected by the Project:	**9.2.4**
Actual species	**9.2.11**
Their abundance and distribution	**9.2.13**
Seasonal and life cycle movements	**9.2.8**
Sensitive periods	
Local and regional abundance	
Distribution and use of habitat types	
Habitat or sites of special value or sensitivity including species use and timing	
Known sensitive areas in terms of habitat type, species and timing of use	
Species of concern (e.g. Northern Right Whale)	
Describe:	
Distribution	
Population status	
Sensitivity to disturbance	
Factors that limit their distribution and population	
9.2.6 Vegetation	
Describe and map the existing vegetation on the Project site and in offshore waters:	**9.2.1**
Place the resulting information into a broader regional setting to provide a context for the Project, specific information required includes:	
Vegetation and vegetation assemblages	
Identification of species or assemblages that are rare, valued, protected or designated (e.g. vulnerable,threatened, endangered or extirpated	**9.2.1**
	Ref. Vol. I
For species of concern, describe :	**Tab 6**
Specific location	**Tab 7**
Population status	
Limits and size	
Sensitivity and limiting factors	
Baseline contaminant concentrations in harvested species or vegetation (e.g. berries) that may change as a result of the Project	
Potentially invasive species that might be carried in the ballast water of ships	
Current lists of these organisms are available from the National Botanical Services in Ottawa, ON	

9.0 DESCRIPTION OF EXISTING ENVIRONMENTS	*EIS Section*
9.3 Existing Human Environment	
9.3.1 Community Profile	
Describe the profile of the existing human environment in such a way that the potential impacts on the functioning and health of the human environment and the significance of the effects can be assessed including:	**9.3.7**
	9.3.9
Socio-economic conditions at the community level	**9.3.10**
Socio-economic conditions at the regional level (e.g. South West Nova Scotia)	**9.3.11**
	9.3.12
Employ social and economic indicators to help define the features of the human environment:	**9.3.13**
	9.3.14
Ensure these are relevant to:	**9.3.15**
The selected VEC's	**9.3.16**
Direct and indirect potential impacts	**9.3.17**
Affected communities	**9.3.18**
Concerns identified during public consultations	**9.3.19**
	9.3.20
Social and economic indicators should include:	**9.3.21**
Measures of demography	**9.3.22**
Employment	
Income	**Ref. Vol. IV**
Education and skills	**Tab 23**
Use of land (including water and shore lines)	
Resources	**Ref. Vol. VI**
Fishing	**Tab 34**
Tourism	
Quality of life	**Ref. Vol. VI**
Health	**Tab 32**
Where possible, provide social and economic information by:	
Age	
Occupation	
Community	
Describe the following affected by the Project:	
History	
Demography	
Economy	
Community characteristics	

9.0 DESCRIPTION OF EXISTING ENVIRONMENTS	*EIS Section*
9.3.1 Community Profile- *continued*	
Identify those likely to be affected: Residences Communities Workplaces	**see previous page**
Identify the various perspectives and aspirations for the future within the region:	**9.3.9**
Consider the relationship between the Project and the relevant community and regional: Social and economic development strategies Policies Plans	**9.3.9**
Obtain information on social and economic matters from sources that include: Existing literature Existing administrative and monitoring data held chiefly by responsible governments and agencies Social surveys Traditional knowledge	**9.3.9** **9.3.10** **9.3.11** **9.3.12** **9.2.13** **9.3.14** **9.3.15**
Ethical social research standards require that the last two can only be obtained with the consent and cooperation of local residents. Demonstrate that the Proponent has made best efforts either to obtain this information itself or to assist the appropriate Aboriginal or local organizations and persons to: Provide it for the inclusion in the EIS Or to present to directly to the Panel during the course of the review	**Ref. Vol. VI Tab 32** **Ref. Vol. IV Tab 23**
9.3.2 Demographics	
Provide a demographic profile(s) of the region affected by the Project include: Population and population trends by community Population and population trends by region	**9.3.7.1**
Identify in/out migration by: Community Region Factors that could contribute to migration patterns	**9.3.7.1** **Table CP-6** **Tble CP-7**

9.0 DESCRIPTION OF EXISTING ENVIRONMENTS	*EIS Section*
9.3.2 Demographics - *continued*	
Detail the number and map the location of residences within 4km of the quarry site:	**Map Vol.III Map 3A, 3B, 3C, 3D, 3E**
9.3.3 Economy	
Describe the economies and their performance: Local Regional	**9.3.9** **9.3.10** **9.3.11**
Indicate the contribution of various industries and economic activities to: Local economy Regional economy	**9.3.12** **9.3.13** **9.3.14** **9.3.15**
Indicate employment rates: Part-time Full-time Seasonal Self employment	**9.3.16** **9.3.7** **Ref. Vol. VI Tab 32**
By: Industry Occupation	**9.3.22**
Describe the current status of the main industries in the region: The factors that affect them	
Discuss current and projected land-based and marine-based enterprises and economic activities: Tourism Outfitting Agriculture Commercial harvesting Hunting Recreation Renewable resources Non-renewable resources	

9.0 DESCRIPTION OF EXISTING ENVIRONMENTS	*EIS Section*
9.3.3 Economy **Discuss local and regional economic development goals and objectives as identified in:** Public consultations: Community economic development plans and strategies Regional economic development plans and strategies Territorial economic development plans and strategies	**9.3.9**
9.3.3.1 Fisheries and Harvesting **Identify the geographical locations of regional freshwater and marine fishing operations:** Historical Current **Identify the seasonal variations of fishing activities for:** Commercial Recreational Aboriginal uses Current use of the area or its potential use for aquaculture **Describe fishing and harvesting activities in the area:** Current Historic **Describe types and values of fisheries including:** Lobster Scallops Crab Herring Mackerel Gaspereau Periwinkles Marine plant harvesting **Identify any fishing grounds and boats operating within 2km of the marine terminal:**	**9.3.10** **9.3.11** **9.3.12** **9.3.13** **Ref. Vol. VI Tab 32**

9.0 DESCRIPTION OF EXISTING ENVIRONMENTS	*EIS Section*
9.3.3.1 Fisheries and Harvesting- *continued* **Identify the potential for new fisheries or harvesting of resources (e.g. sea urchins, aquaculture)that may be affected by the Project:** **In the course of describing the fisheries and harvesting, consult with the following to document Traditional Knowledge:** Local fishermen Fishermen's associations	**Ref. Vol. IV Tab 23**
9.3.3.2 Tourism and Recreation **Discuss the location, level, and value of existing and planned tourism and recreational activities for the region that may be affected by the Project:** Hunting Fishing Hiking Bird watching Sea kayaking Whale watching Associated businesses **Identify the contribution of tourism to the regional economy:**	**9.3.14** **9.3.16** **9.3.14** **Ref. Vol. VI Tab 32**
9.3.4 Education, Training and Skills **Describe the education, skills and training levels that may be relevant to or affected by the Project:** **Identify programs available within the region that may be appropriate to workers employed by the Project:** Education Training Certification programs **Describe the timing and duration of education and skills development programs that would be required for Project-related employment:**	**9.3.23**

9.0 DESCRIPTION OF EXISTING ENVIRONMENTS	*EIS Section*
9.3.5 Land Use and Value	
Identify the history of land use(s) of the site:	**9.3.4**
Past	**9.3.15**
Current	
	9.1.16
Describe the land uses within the Project site and in other areas that may be affected by theProject development:	
Planned	
Existing	
	9.1.3
Identify and describe existing land based infrastructure likely to be affected by the Project:	
Wells	
Waste management areas	
	9.1.16
Identify any traditional activity areas or trails that may be affected by the Project:	
Describe land use and shoreline use patterns in the region affected by the Project:	
Historic	**9.1**
Current	**9.2**
Protected areas	**9.3**
Special harvesting sites	
Transportation corridors	
Recreational areas	
Ecologically important areas	
Critical wildlife habitats and movement areas	
	9.3.1
Identify:	**9.3.2**
Valued locations and their attributes	**9.3.5**
Lands and features of special interest or value, and their attributes	**9.3.15**
	Appx. 35
Describe property values in the area to be affected by the Project:	

9.0 DESCRIPTION OF EXISTING ENVIRONMENTS	*EIS Section*
9.3.5.1 Aboriginal Land and Resource Use	
Identify the lands and resources in the area affected by the Project of specific value to Aboriginal and current lands and resources for traditional purposes: Social Economic Cultural Spiritual	**9.3.3**
Uses may include: Camping Travel on traditional routes Hunting Fishing Trapping Planting Harvesting Collecting	
9.3.6 Heritage Resources	
Identify and describe features of importance in terrestrial and marine areas associated with the project: Historical Archaeological Paleontological Architectural Cultural	**9.3.1** **9.3.2** **Ref. Vol. VI** **Tab 33** **Tab 35** **Ref. Vol. III** **Tab 14**
Give particular attention to these cultural and historical resources: Aboriginal African-Canadian Acadian Traditional **Evaluate:** Culturally important sites Burial sites Sites with heritage resource potential that may be affected by the Project	**9.3.2** **9.3.4** **Ref. Vol. VI** **Tab 33** **Tab 35** **Ref. Doc. III** **Tab 14**

9.0 DESCRIPTION OF EXISTING ENVIRONMENTS	*EIS Section*
9.3.7 Human Health and Community Wellness **Assess the health and well-being of residents of the areas affected by the Project:** Physical Mental Social **Employ appropriate qualitative and quantitative indicators regarding elements of health (such as respiratory health) that may be affected by the project to create baseline data:** **Address issues of potential concern identified during Scoping sessions:** **Where data on people in the region allow, provide baseline data on the prevalence of contaminants expected to be produced by the Project that might impact human health**	**see previous page** **9.3.17** **9.3.18** **9.3.19** **9.3.20** **9.3.21** **Ref. Vol. VI Tab 34** **Ref. Vol. IV Concordance Table 5.0** **9.3.19** **9.3.20**
9.3.8 Socio-Cultural Patterns **Describe socio-cultural patterns and social organization in the communities in the areaaffected by the Project:** **Describe patterns of family and community life:** Community social organization The organization of work **Discuss perceptions people have about their quality of life and their sense of place:** **Describe social relations between:** Residents Among generations Between seasonal and year-round residents 9.3.9 Infrastructure and Institutional Capacity **Describe the infrastructure to indicate the baseline of existing services and their capacity to meet new needs:** Local Regional	 **9.3.22** **Ref. Vol. VI Tab 34** **Ref. Vol. IV Tab 23** **9.3.24**

9.0 DESCRIPTION OF EXISTING ENVIRONMENTS	*EIS Section*
9.3.9 Infrastructure and Institutional Capacity- *continued* **Describe the role of different orders of government in providing services that may be impacted by the Project:** Federal Provincial Local **Services:** Financing Public services Maintaining infrastructure **Discuss the status of:** Community institutions Local government institutions Organizations And their capacity to deal with the Project **Describe current levels of existing services to meet additional and new needs:** Social Health Community **Discuss the ability of emergency response services to address current demands:**	**9.3.24**
9.3.10 Transportation **Describe existing land-based and marine based transportation infrastructure and networks:**	**9.3.8**
9.3.10.1 Land Based **Describe the existing conditions of the proposed modes and routes of transportation that will be used throughout the Project development:** Provincial roads and highways Arterial highways On-site access roads	**9.3.8**

9.0 DESCRIPTION OF EXISTING ENVIRONMENTS	*EIS Section*
9.3.10.1 Land Based- *continued* **Include information on the existing types and volumes of traffic on roads near the site:** **Describe the areas through which trucks will travel (e.g residential or school areas):** **Discuss:** Volume of traffic Times Weights of trucks Other relevant details	**9.3.8**
9.3.10.2 Marine Based **Describe existing marine transportation in the shipping lanes and near shore area of the Bay of Fundy and in other areas to be affected by the proposed Project:** Patterns Volumes Types **Discuss current and historic risks of:** Collisions Accidents Spills **Explain how current (and expected) vessel traffic is managed in the vicinity of the proposed marine terminal:** Recreational boating Shipping Fishing Commercial and passenger traffic **Focus on navigation safety and avoidance of collisions with marine mammals:** **Describe mechanisms in place to deal with marine emergencies:**	**9.3.8** **11.2** **9.3.8** **9.2.13** **11.2**

9.0 DESCRIPTION OF EXISTING ENVIRONMENTS	*EIS Section*
9.3.11 Other Undertakings in the Area	
Indicate undertakings or developments in the area to be affected by the proposed quarryand the marine terminal: Type Size Location Other relevant information Current Historic	**9.3.25**
Identify proposals for other undertakings in the area that may affect cumulative impactsfrom the Project:	**10.0**

10.0 ENVIRONMENTAL IMPACT ANALYSIS	*EIS Section*
This section of the EIS must assess potential impacts of the Project on the selected VEC's over the lifespan of the project: Physical environment Biological environment Human environment **For each VEC, or its indicator, provide sufficient information to allow the Panel to understand the nature of the potential effects:** How the Proponent's conclusions were reached **The assessment must provide a clear, traceable path of information from the baseline conditions through the identification of:** Potential impacts Monitoring Mitigation Residual impacts Determination of significance of effects **When appropriate, consider how natural variation or events might affect Project impact** **With regard to the physical and biological effects, consider:** Environmental sensitivity Trends Natural variation The capacity of natural systems to recover from potential Project impacts **Describe the effects of the Project on the capacity of renewal resources to meet the needs of** The present The future **When considering local impacts on the human environment, have due regard for the attitudesand perceptions of local residents, and how they are grounded in:** Culture Social organization Historical experience	**EIS General**

10.0 ENVIRONMENTAL IMPACT ANALYSIS	*EIS Section*
The Proponent shall, to the best of its ability, indicate how direct or indirect Project impacts might enhance and/or impair current activities in the community as well as future economic planning: Social Cultural Economic **Consider possible reactions to Project-related effects and the capacity of the following to respond:** People Communities Institutions **Discuss the range of changes that may be induced:** **The assessment must recognize not only the complexity and inter-connectedness of all parts that comprise a single environmental entity (e.g. the physical environment) but also the broader,even more complex inter-connectedness between these components:** Physical Biological Human **Awareness of this multi-layered, multi-dimensional inter-connectedness will offer guidance for:** Monitoring and mitigation Determining significant effects Identifying residual effects (in later sections of the EIS) **The assessment must identify the capacity of renewable resources that are likely to be significantly affected by the Project to meet the needs of the present and those of the future:**	**EIS General**

10.0 ENVIRONMENTAL IMPACT ANALYSIS	*EIS Section*
10.1 Physical Environment Impact Analysis	
10.1.1 Terrain, Geology and Soils	
Describe and evaluate the potential impacts of the Project on the topography of the site and theconsequent changes in slope and soil stability:	9.1.2
Assess the effects of the quarry activities and quarry faces on erosion: Including erosion of overland low-angle sloping terrain and working surfaces	9.1.2
Evaluate the chemical interaction, including acid producing and consuming potential of newlyexposed stockpiles with precipitation and surface waters: Bedrock Crushed rock Waste-rock	9.1.2.1
Provide information on the potential impacts of: On-site waste rock Soil disposal Product stock piling Settling ponds The disposal of solid washing residue	9.1.2 7.8
Appraise the possible influence blasting on local and regional seismic activity:	9.1.2.1
Provide information on measures taken to preserve/document of sites of special geoscientific interest:	9.1.2
10.1.2 Physical Oceanography	
Provide an assessment of the potential impacts of disturbances and modifications during the marineterminal construction, quarry construction and production phases: Seabed morphology Shoreline character Intertidal zone dynamics	9.1.7 9.2.3 9.2.4
Evaluate the effect of the marine terminal on: Sea ice Its distribution and movement	7.2.1

10.0 ENVIRONMENTAL IMPACT ANALYSIS	*EIS Section*
10.1.2 Physical Oceanography - *continued*	
Assess the impact of extreme climatic events, possibly involving the cumulative effects on the structural integrity of the marine terminal and loading operations: Storm surges Tides Meteorological conditions	**9.1.1** **9.1.7.1**
10.1.2.1 Marine Sediment Quality and Quantity	
Describe and evaluate the potential impacts of the Project on: Sediment influx due to terrestrial surface disturbance during the construction and operational phases Aggregate washing operations Sediment redistribution during the construction of the marine terminal and its interaction with tides and currents	**7.7** **9.1.6**
Changes in sediment character and chemistry due to accidental or uncontrolled releases of solids fromaggregate washing or releases of: Fuels Heavy metals Organochlorines Nutrients	**9.1.4** **7.8**
In disturbed marine and intertidal areas, characterize sediments in relation to parameters identified in: the Canadian Sediment Quality Guidelines for the Protection of Aquatic Life the *Canadian Environmental Protections Act,* 1999 its *Disposal at Sea Regulations*	**9.1.7.1**
10.1.2.2. Ocean Currents and Tides	
Evaluate how currents and tides may be affected due to the construction or operation of the marine terminal:	**9.1.7** **9.2.3.3**
Explain how the following will be impacted by such changes in tides and currents: Nearshore navigation The marine ecology Harvesting	**9.1.7**

10.0 ENVIRONMENTAL IMPACT ANALYSIS	*EIS Section*
10.1.2.2. Ocean Currents and Tides - *continued*	
For the marine terminal site, provide information on changes in: Net current flow Tidal component flows Wind-driven responses on a seasonal basis	**9.1.7**
10.1.2.3 Water Quality	
Describe and evaluate potential impact on the marine water column, including consideration of changes in the following during construction and operational phases: Temperature Salinity Nutrient concentration Suspended sediments Changes in these parameters due to intentional releases of washing water	**9.2.2**
Changes in these parameters and water chemistry due to accidental or uncontrolled releases from: Aggregate washing Fuel oils Heavy metals Organochlorines Nutrients	**9.2.2**
Impact of construction and loading operations on seasonal mixing and stratification of the water column and its impact on the above listed parameters and pollutant dilution:	**9.2.4**
10.1.3 Terrestrial Water Quality and Quantity	
Describe and evaluate the potential effects of the Project on terrestrial water quality and quantity in: Surface water Ground water Wetlands	**9.1.3**
Pay particular attention to the effects on the interaction of these hydrologic components:	**9.1.6**

10.0 ENVIRONMENTAL IMPACT ANALYSIS	*EIS Section*
10.1.3.1 Surface Water	**9.1.3**
Assess the potential impacts of Project-related changes in: Topography Terrain Soil cover	**9.1.6**
On: Surface drainage patterns Recharge areas Other hydrologic components	"
Evaluate changes in seasonal flow patterns (including extreme high & low flows) of: Streams Channel/bed/drainage basis morphology and stability	"
Resulting from: Surface/groundwater withdrawal Pit dewatering Diversion Topographic alteration Evaluate the alteration of sediment load (suspended and bedload) of streams and their destinations :	
Appraise the impact of seepage and/or accidental atmospheric or aqueous releases on: Water chemistry Turbidity	"
Evaluate effects on every freshwater stream whose groundwater supply originates within the quarry site even though the stream may surface and flow outside the property:	"

10.0 ENVIRONMENTAL IMPACT ANALYSIS	*EIS Section*
10.1.3.2 Groundwater	
Describe and evaluate the potential impacts of the Project on groundwater quantity and qualitythrough alteration to the groundwater regimes & neighbouring regimes by Project-related changes in: Topography Terrain Soil cover	**9.1.3** **9.1.6**
Assess groundwater quality changes arising from: Sedimentation Chemicals Leaching Use of explosives Fuel spills Quarry dewatering	"
Provide information on anticipated changes in yield characteristics of aquifers due to: Project-related groundwater withdrawal Topographic and terrain changes	"
Evaluate the potential effects on the existing and future off-site wells by repeated blasting operations Stability Yields Chemical characteristics	"
Assess any alteration of aquifer vulnerability to contamination by atmospheric or surface waterpollutants as a result of Project activities:	"
Evaluate the potential of: Saltwater intrusion Wells running dry through Project-related groundwater withdrawal Alterations to the groundwater regimes	
Assess changes in recharge or discharge characteristics affecting: Shallow and deep groundwater resources Groundwater contributions to stream base flows under varying climatic conditions	"

10.0 ENVIRONMENTAL IMPACT ANALYSIS	*EIS Section*
10.1.3.3 Wetlands	
Assess the potential impacts of the Project on any wetland on-site or downstream: Size Viability Habitat potential	**9.2.1** **Map Vol. III**
Evaluate the effects on: Contributions of impacted wetlands Groundwater recharge potential Surface flow regulation (stormwater retention, flood control) Changes in their potential role in water treatment	 "
Assess the value of the wetlands for paleo-ecological studies:	
10.1.4 Climate	
Describe and evaluate the potential impacts of the Project on climate by identifying: Sources of greenhouse gas emissions (carbon dioxide, methane, nitrous oxide, halocarbons) Quantities Frequencies	**9.1.1**
By: On-site activities Land-based transportation related to Project activities Marine based transportation related to Project activities On an annual basis Over the lifespan of the Project	 " "
Assess the relative size of the potential GHG emissions from the Project from a regional perspective:	"
Evaluate how changes in climate could affect the Project or particular Project components:	"

10.0 ENVIRONMENTAL IMPACT ANALYSIS	*EIS Section*
10.1.5 Air Quality	
Identify the Project activities and components which would be sources of air emissions:	**9.1.8 Ref. Vol. V Tab 31**
For each emission of concern, provide estimates including: Quantity Timing Duration	
For normal operational conditions and upsets, provide air quality parameters that could be affected by these emissions: Dust Particulates Sulphur oxides Nitrogen oxides Methane Carbon dioxide Carbon monoxide Volatile organic compounds Formaldehyde Ground-level ozone Odour Acid deposition	"
Provide geographic dispersal patterns for emissions (concentrations and elevations) from the Project site and their variability with climatic conditions:	"
Provide an assessment of the potential health impacts related to Project emissions to : Humans Wildlife Vegetation (short-term and over Project lifespan)	**9.3.18** **9.3.19** **9.3.20** **9.3.21**
Consider how aerosols and particulate emissions affect the frequency and intensity of: Fog Ice fog Related impact on day and night visibility	**9.1.8**

10.0 ENVIRONMENTAL IMPACT ANALYSIS	*EIS Section*
10.1.5 Air Quality- ***continued***	**9.1.8**
Discuss relevant air quality standards or guidelines: Provincial Federal	
Include their purpose and use in relation to Project phases:	
10.1.6 Noise and Vibration	
Describe and evaluate the effects of Project-generated noise and vibration levels by identifying sources and types of variation in Project-related noise and vibration levels, particularly during blasting. Provide information on: Duration Frequency	**9.1.9** **9.1.10** **9.1.11**
Provide information on levels of noise and vibrations in: The atmosphere Subsurface Marine water column	**9.1.9** **9.1.10** **9.1.11** **9.1.15**
Assess the effects of weather and terrain (including seabed morphology) on: Noise and vibration in the atmosphere Subsurface The marine environment (water column and seafloor)	"
Provide an assessment of effects of acoustic and vibrational disturbances on: Fish Marine mammals Wildlife Birds	"
Evaluate how such disturbances affect: Individuals/communities and their harvest Commercial and recreational activities - including tourism	"
Provide an assessment of the potential health impacts related to Project-induced changes in noise and vibration levels: Sleep disturbance Annoyance	**9.1.9** **9.1.10** **9.1.11** **9.3.17**

10.0 ENVIRONMENTAL IMPACT ANALYSIS	*EIS Section*
10.1.6 Noise and Vibration - *continued*	
Describe the proximity of the Project to sensitive receptors:	**9.1.9**
Residences	**9.1.10**
Workplaces	**9.1.11**
Fishing grounds	
Camps	**Ref. Vol. V**
Schools	**Tab 31**
Recreational areas	
Hospitals	
	9.1.9
Discuss relevant provincial or federal noise standards or guidelines, as appropriate, including their purpose and use in relation to the Project phases:	**9.1.10** **9.1.11**
10.1.7 Light	
Identify sources and types of variation in Project-related night-time light levels by providing information on light emissions:	**9.1.12** **Ref. Vol. V**
Duration	**Tab 31**
Frequency	
Levels	
Provide an assessment of effects of night-time light levels on:	
Fish	"
Marine mammals	
Wildlife	
Migratory birds	
Evaluate how such disturbances impact on:	"
Individuals/communities and their harvest	
Commercial and recreational activities- including tourism	
10.2 Biological Environment Impact Analysis	
10.2.1 Species at Risk	**9.2**
	9.2.01
Consider any change the Project might cause to the following as defined in subsection 2 (1) of SARA:	**9.2.5**
	9.2.6
A listed species	**9.2.7**
Its critical habitat	**9.2.8**
Individual residences	**9.2.13**

10.0 ENVIRONMENTAL IMPACT ANALYSIS	*EIS Section*
10.2.1 Species at Risk **Take account of SARA requirements. Describe and evaluate potential Project effects on species identified in the Act:**	
Discuss potential Project impacts on species of concern in relation to : Applicable legislation Policy Management plans Recovery strategies Action plan Land use planning initiatives	 **9.2** **9.2.01** **9.2.5** **9.2.6** **9.2.7** **9.2.8** **9.2.13**
10.2.2 Fish, Invertebrates and Habitat	
Describe and evaluate potential Project impacts on VEC's related to: Fish Invertebrates And their habitats	 **9..2** **9.2.3**
Consider disruption of sensitive life stages or habitat: Spawning and incubation Rearing Refugia Over wintering Loss of seabed habitat Known sensitive or important sites and/or habitats Introduction of non-native species Disruption of food resources Changes to water quality or quantity Distribution or abundance Contaminant levels in harvested species that could be changed by the Project Fish health and condition Blockages to movement Blasting Dredging or disposal of sediments Underwater noise associated with Project activities Water withdrawal How Project-related changes in harvest pressures could impact the resource Document any streams with fish habitats	**9.2.4** **9.2.5** **Ref. Vol. II** **Tab 8** **Tab 9** **Tab 10** **Tab 11** **Tab 12** **9.2.9** **9.2.10** **9.2.11** **9.1.6**

10.0 ENVIRONMENTAL IMPACT ANALYSIS	*EIS Section*
10.2.2 Fish, Invertebrates and Habitat- *continued* **Specifically, discuss the duration and geographic extent (distance downstream impacts can be anticipated) of potential impacts in relation to how fish and invertebrate population and harvest activities could be affected:**	
10.2.3 Birds and Bird Habitat **Describe and evaluate the potential impacts of the Project on VEC's related to birds and bird habitat including a consideration of:** *Disruption of sensitive life stages or habitat e.g.* Nesting Rearing Staging Moulting Migrating *Direct and indirect alteration of habitat e.g.* Location of Project facilities Habitat quality Footprint Sensitive or important areas or habitat Visual or auditory disturbance, including habitat avoidance in relation to Project facilities, activities and light disturbance Bird distribution or abundance Bird health and condition	**9.2.1** **Ref. Vol. I** **Tab 2** **Tab 3**
10.2.4 Wildlife and Wildlife Habitat **Describe and evaluate the potential impacts of the Project on VEC's related to wildlife or wildlife habitat including a consideration of:** Direct or indirect alteration of habitat (including its physical extent) Visual or auditory disturbance, including habitat avoidance in relation to Project facilities or activities Disruption of sensitive life stages or habitat Wildlife movement patterns, home ranges, distribution or abundance Sensitive or important areas or habitat	**9.2.1** **Ref. Vol. I** **Tab 1**

10.0 ENVIRONMENTAL IMPACT ANALYSIS	*EIS Section*
10.2.4 Wildlife and Wildlife Habitat - *continued* Population cycles Predatory-prey relationships Wildlife health and condition **Specifically, discuss the duration and geographic extent (e.g. distance of noise-related disturbance) of potential impacts in relation to how wildlife populations could be affected:**	**9.2.1**
10.2.5 Marine Mammals **Describe and evaluate the potential impacts of the Project on VEC's related to marine mammalsand their habitat, including a consideration of:** Disruption of sensitive life stages or habitat Disruption of feeding activities Distribution of abundance Contaminant levels in species that could be changed by the Project Marine mammal health and condition Sensitive or important areas or habitat Migratory patterns Potential for interaction between marine mammals and ships **In particular, describe and evaluate the potential effects of:** Dredging Spills Accidents Disposal of sediments Project-related increases in ambient underwater noise on marine mammals	**9.2.4** **9.2.13** **9.2.11** **9.2.15** **11.2**
10.2.6 Vegetation **Describe and evaluate the potential impacts of the Project on vegetation on land and in the water including a consideration of:** Alteration or loss of species, or vegetation assemblages that are rare, valued protected or designated sensitive or important areas or habitat Sensitive or important areas	**9.2.1**

10.0 ENVIRONMENTAL IMPACT ANALYSIS	*EIS Section*
10.2.6 Vegetation - *continued*	
Introduction of non-native species Re-establishment of vegetation (including replanting plans) Vegetation control	**Ref. Vol. I** **Tab 6** **Tab 7**
10.3 Human Environment Impact Analysis	
10.3.1 Community Profile	**9.3.7**
Describe and evaluate the beneficial and adverse effects of the Project on those VEC's selected for the human environment, explaining the rationale used:	**Ref. Vol. VI** **Tab 34**
Identify changes to the environment induced by the Project: Human Physical Biological How people and communities could adapt to these changes	**Ref. Vol. VI** **Tab 32**
Describe and evaluate changes to conditions that may occur as a result of Project-related impacts to the biological and physical environments: Health Social Economic	"
Identify and take into account the particular needs, interests and values of various segments of the local population and consider how the Project may affect them: Youth Seniors Fishers	"
In assessing the effects of the Project on fishing and tourism activities, give particular attention to the comparative adverse and beneficial effects: Social systems Economic systems Human health	**9.3.10** **9.3.11** **9.3.12** **9.3.13** **9.3.14**

10.0 ENVIRONMENTAL IMPACT ANALYSIS	*EIS Section*
10.3.2 Demographics and Mobility	
Describe and evaluate the potential impacts of the Project on demographics and mobility, include: Age distribution Residence patterns In/out migration	9.3.7
10.3.3 Economy	
Describe and evaluate the potential effects of the Project (by Project phase) on the economy: Local Regional Provincial National	9.3.9 9.3.10 9.3.11 9.3.12 9.3.13 9.3.14
Estimate employment and income for each year of : Construction Operation	9.3.15 9.3.23
Indicate: Numbers Length of employment Form of employment (full-time, part-time, seasonal) Skills category	
Estimate the proportion of participation: Regional Local Aboriginal	
Discuss the extent to which skills of the available workers match the job requirement: Describe the level of interest in Project-related work Hiring practices Policies Preliminary arrangements already made for labour Indicate if these provisions will apply to any sub-contractors	

10.0 ENVIRONMENTAL IMPACT ANALYSIS	*EIS Section*
10.3.3 Economy - *continued*	
Identify any impacts Project employment may have on the local economy:	**9.3.9** **9.3.10**
Include any effects on the cost of living	**9.3.11**
Viability of other industries	**9.3.12** **9.3.13**
Identify spin-off economic activity from wages and purchases related to the proposed Project:	**9.3.14**
Local	**9.3.15**
Regional	**9.3.23**
Consider how Project-related impacts may affect harvested resources or harvest activities and thereby affect household economies and the sustainability of traditional economic activities:	"
Discuss the effect of the Project on land values in the region: Identify constraints that could affect economic benefits or opportunities	"
Describe consistency of the Project with goals and objectives identified in economic plans and strategies: Provincial Regional Community	"
10.3.3.1 Fishing and Harvesting	
Identify the predicted effects on the fisheries and/or loss of access to particular fishing grounds due to the Project:	**9.2.2**
Construction phase	**9.2.3**
Operation of the marine terminal	**9.2.4**
Navigational restrictions during berthing	
Escape of sediments from retention ponds	
Contaminated bilge water	
Invasive organisms in ballast water	
Discuss potential damage to fishing gear or vessels: Plans for monitoring and mitigation of those effects	**11.8 Commitment Table**

10.0 ENVIRONMENTAL IMPACT ANALYSIS	*EIS Section*
10.3.3.1 Fishing and Harvesting	
Consider ways in which the Project may help or undermine efforts to restore the health of marine ecosystems to enhanced the fisheries:	**9.2.2**
Discuss potential impacts of the Project on fishing and harvesting, include a consideration of changes in: Harvester access Travel patterns Costs Disturbance of harvest patterns Loss or alteration of high-value harvest areas	**9.2.3** **9.2.4**
Changes in response to changes in: Light Noise Dust Silt Harvest level The abundance and distribution of harvested resources	**9.1.9** **9.1.10** **9.1.11** **9.1.12**
Describe consequent impacts on the well-being and income of harvesters from potential losses:	
Discuss potential competition between harvesters within and between communities as a result of: Loss from the land or marine sites due to the Project Alteration Displacement	
Consider changes in the quality of harvested species (e.g. contamination) that would adversely affect their consumption or sale:	**9.2.2** **9.2.3** **9.2.4**
Identify the quantity of forest products that would be harvested as a result of the Project: Commercial Non-commercial	

10.0 ENVIRONMENTAL IMPACT ANALYSIS	*EIS Section*
10.3.3.2 Tourism and Recreation	
Describe and evaluate the predicted effects the Project will have on current and projected tourism and recreation activities and opportunities within the region and in the province: Whale-watching Bird-watching Kayaking Coastal trail development Tourism-related businesses	**9.3.14** **9.3.16**
Discuss the effect of the Project on the regional strategy of sustainable development through ecotourism:	**9.3.14**
Discuss the effects of the quarry operation on landscape aesthetics and views from: Land Water	**9.3.6**
Describe consequent impacts on the well-being and income of communities from the potential loss of tourism opportunities: Local Regional	**9.3.14** **Ref. Vol. VI** **Tab 32**
10.3.4 Education, Training and Skills	
Discuss the education and training programs required for Project-related employment in relation to the Project schedule: Each phase Local training opportunities Regional training opportunities Timing and duration of programs	**9.3.23**
Which skills and experience gained in the Project could be applied to other available projects or sectors:	"
Describe any education programs the Proponent would provide or sponsor:	"

10.0 ENVIRONMENTAL IMPACT ANALYSIS	*EIS Section*
10.3.4 Education, Training and Skills - *continued*	
Discuss which types of programs could be completed in time to qualify for Project-related employment:	
Construction phase	
Operation phase	
And which could not	
Identify when training would have to start in order to be complete when jobs would be available:	
10.3.5 Land Use and Value	
Describe and evaluate the predicted effects that the proposed Project will have on land and water use:	**9.3.15**
Existing	
Planned	
Changes in aesthetics and/or economic, education and recreational opportunities caused by:	**9.3.6**
Construction	**9.3.9**
Operation	**9.3.16**
Modification	**9.3.23**
Of the Project in terms of:	
Increased noise levels	**9.1.8**
Lowered air and water quality	**9.1.9**
Alteration of visual and topographic characteristics of the area	**9.1.10**
	9.1.11
Describe and evaluate the potential effects on existing structures caused by activities associated with the Project:	**9.3.6**
	9.1.9
Building foundations	**9.1.3**
Wells	
Discuss temporary and permanent restrictions on land use and water-based activities during:	
Construction	**9.3.16**
Operation	

10.0 ENVIRONMENTAL IMPACT ANALYSIS	*EIS Section*
10.3.5 Land Use and Value - *continued*	
Assess effects of the Project on land values during operation: On-site Local Regional	**9.3.15**
After decommissioning: On-site Local Regional	
Describe and evaluate how the Project could affect the Bay of Fundy as an important conservation site and world biosphere reserve:	**6.6**
10.3.5.1 Aboriginal Land and Resource Use	
Describe and evaluate the effects on traditional and Aboriginal land and resource use from:Construction activities The presence of the quarry and marine terminal And associated activities After decommissioning And abandonment	**9.3.3**
10.3.6 Heritage Resources	
Describe and evaluate the potential impacts of the Project on physical and cultural Heritage: Historic Archaeological Paleontological Trails and traditional use sites Valued locations and their attributes	**9.3.1** **9.3.2** **Ref. Vol. VI** **Tab 33** **Tab 35** **Ref. Vol. III** **Tab 14**
Describe proposed measures to: Preserve Protect Recover Document these resources	**9.3.1** **9.3.2**

10.0 ENVIRONMENTAL IMPACT ANALYSIS	*EIS Section*
10.3.6 Heritage Resources - *continued*	
Discuss the effects that site grubbing and clearing may already have had on potential heritage resources and identify measures taken to minimize adverse impacts:	
10.3.7 Human Health and Community Wellness	
Describe and evaluate the potential effects of the Project on: Human health Community wellness	**9.3.17** **9.3.18** **9.3.19** **9.3.20**
Consider effects on health and well-being: Physical Mental Social	**9.3.21** **9.3.22**
Address issues of concern about potential changes in the quality of life as a result of the Project:	**Ref. Vol. VI Tab 34**
Describe and evaluate potential effects on measures of health (such as respiratory health) that may be affected by the Project:	**9.1.8** **11.3** **11.2**
Consider how Project-related changes in the quality of food may affect health and community wellness. Characterize possible sources of: Contaminants Exposure pathways Consumption patterns that may generate health impacts	
Describe and evaluate potential health impacts that may arise from changes : in water quality and quantity	
Describe and evaluate the effects of the Project on the health and safety of: Project workers Those working in the areas affected by the Project Including the possible effects of any accidents or spills	

10.0 ENVIRONMENTAL IMPACT ANALYSIS	*EIS Section*
10.3.7 Human Health and Community Wellness - *continued*	
Consider any potential effects of air emissions associated with the Project on human receptors within the region: Health effects of dust Nitrogen oxides Volatile organic compounds Carbon monoxide Dioxins/furans Metals	**9.1.8**
Describe and evaluate any potential effects of Project-related noise or blast-generated materials on human receptors within the region:	**9.1.9** **9.1.10** **9.1.11**
10.3.8 Social and Cultural Patterns	
Describe and evaluate the potential impacts of the Project on: Social patterns Cultural patterns Social organization Consider effects on traditional lifestyles, values and culture	**9.3.22** **Ref. Vol. VI** **Tab 34**
Consider any effects on patterns of family and community life: Household organization Community organization Organization of work	"
Consider implications of the Project on resident's perceptions of: Quality of life Sense of place	"
Describe and evaluate potential impacts on social relations: Between residents Among generations Between seasonal and full-time residents Among those who are employed and unemployed Among those who support and oppose the Project	"

10.0 ENVIRONMENTAL IMPACT ANALYSIS	*EIS Section*
10.3.8 Social and Cultural Patterns - *continued* **Describe and evaluate how Project-related impacts on harvested resources or economic activities such as tourism may affect social and cultural patterns:**	**9.3.22** **Ref. Vol. VI** **Tab 34**
10.3.9 Infrastructure and Institutional Capacity **Describe and evaluate the potential impacts of the Project on:** Infrastructure Institutional capacity	**9.3.24**
Discuss any temporary and permanent changes to: Infrastructure and services The capacity of institutions and organizations to deliver those services	"
Describe measures proposed to reduce the financial burden caused by the Project on: Infrastructure and institutional capacity To enhance local and regional resources	"
Estimate incremental costs to Government resulting from the Project: Municipal Provincial Federal	"
10.3.10 Transportation **Describe and evaluate the potential effects of the Project on transportation:** Land-based Marine	**9.3.8**
10.3.10.1 Land Based **Discuss the predicted effects on local and regional traffic volumes and road conditions including:** Provincial highways Arterial highways On-site access roads that will be used throughout the Project	**9.3.8**

10.0 ENVIRONMENTAL IMPACT ANALYSIS	*EIS Section*
10.3.10.1 Land Based - *continued*	
Include information on the potential effects on the areas through which trucks will travel: Residential School areas	**9.3.8**
Address concerns related to the transportation of explosives:	
10.3.10.2 Marine Based	
Discuss the predicted effects of increased ship traffic on existing marine transportation in: The Bay of Fundy Whites Cove	**9.3.8**
Assess the risk of potential conflicts including navigation restrictions between: Marine traffic and Project-related construction vessels Conflicts between marine traffic and aggregate carriers	 "
Indicate effects associated with all components of the Project: Vessel type Size Route Schedule Number	 "
Discuss the risks of disruption of marine traffic through accidents associated with: The loading and transport of aggregate Groundings Fuel spills Collisions with whales	**11.2**
Consider potential interference with navigation and fishing activities due to the presence of: Berthing dolphins Mooring buoys Dredged material disposal sites	

10.0 ENVIRONMENTAL IMPACT ANALYSIS	*EIS Section*
10.3.11 Other Undertakings in the Area **Describe and evaluate the predicted effects that the proposed Project may have on other undertakings in the:** Region Province	**9.3.25**
10.4 Summary Table of Impacts **Develop a table that summarizes the identified potential effects of the Project on all components and relationships in the environment:**	**Table 2 Executive Summary 9.4**

10.0 ENVIRONMENTAL IMPACT ANALYSIS	*EIS Section*
Identify and assess the cumulative adverse and beneficial environmental effects of the Project in combination with projects or activities in the Bay of Fundy region: Past Present Reasonably foreseeable future	**10.0** **Cumulative Impact Table**
Explain and justify the approach and methodologies used to identify and assess cumulative impacts:	"
Identify the VEC's or their indicators, on which the cumulative impacts assessment is focused: Including the rationale for their selection	"
Present spatial and temporal boundaries for the cumulative impact assessment for each VEC selected:	"
Emphasize VEC's with special environmental sensitivities or where significant risks are involved:	"
Identify the sources of potential cumulative impacts:	"
Specify other projects or activities that have been or will be carried out that could produce impacts on each selected VEC: Within the boundaries defined Whose impacts would act in combination with the residual impacts of the Project	"
Evaluate the likelihood of development by the Proponent or others that may appear feasible because of the proximity of the Project's infrastructure: Quarry operations Aggregate operations	"
Limit assessment to cumulative impacts on the environments that are likely and for which measurable or detectable residual impacts are predicted: Physical Biological Human	"

11.0 CUMULATIVE IMPACTS	*EIS Section*
11.0 Cumulative Impacts - *continued*	10.0
A reasonable degree of certainty should exist that proposed projects and activities will actually proceed for them to be included. Projects that are conceptual in nature or limited as to available information may be insufficiently developed to contribute to this assessment in a meaningful manner. In either case, provide a rationale for inclusion or exclusion:	"
Analyse the total cumulative effect on a VEC over the life of the Project recognizing the incremental contribution of all projects and activities in addition to the Project:	"
Include different forms of impacts: Synergistic Additive Induced Spatial Temporal	"
Identify: Impact pathways Trends	"
The impact assessment must consider how a Project-specific effect, or suite of Project-specific effects would interact with potential impacts on VEC's that are not necessarily the result of one project:	"
Make clear the contribution of the Project to a total potential cumulative effect:	"
Place potential cumulative Project impacts in an appropriate regional context to understand the aspirations of people and communities in the region: Regional plans Community conservation plans Species recovery plans Management plans Objectives and/or guidelines	"

11.0 CUMULATIVE IMPACTS	*EIS Section*
11.0 Cumulative Impacts - ***continued***	
When assessing cumulative environmental impacts, identify any changes in: Environmental effect predictions Changes in assessing their significance The effectiveness of proposed mitigation and compensation measures Any response to such changes Any implications for monitoring and follow-up programs	**10.0**
Prepare a summary table of cumulative impacts:	**10.0**

12.0 ENVIRONMENTAL MANAGEMENT	*EIS Section*
Describe the approach to environmental management, outline strategies for: Monitoring Mitigation Follow-up Compensation for all VEC's	**11.0** **11.1** **11.4** **11.5** **11.8**
Describe and evaluate residual effects and their significance:	
12.1 Management Criteria	
Describe plans for environmental management through the Project to: Identify strategies to avoid or reduce adverse effects Maximize beneficial effects	**11.1**
Identify commitments for: Monitoring Follow-up Mitigation Compensation	**Commitment Table** **11.4** **11.5** **11.8**
Identify and describe proposed environmental monitoring programs in terms of Compliance Inspection; activities, procedures and programs undertaken to: Confirm the implementation of approved design standards Mitigation Conditions of approval Company commitments including proposed mitigation	**11.4**
Monitoring: Programs to track conditions or issues during the Project lifespan Or at certain times	**11.4**
Follow-up: A program to verify the accuracy of impact predictions Determine the effectiveness of mitigation measures	**11.4**

12.0 ENVIRONMENTAL MANAGEMENT	*EIS Section*
12.1 Management Criteria - *continued*	
Detail should be adequate to allow an understanding of the purpose of the programs: How issues, subjects or indicators would be selected How the programs would function Who would be responsible for their implementation How reporting would take place	**11.0**
Identify any regulatory requirement relevant to monitoring as well as: Corporate management plans Programs Policies Quality assurance/quality control measures	**11.4**
Describe how the results of the programs would be used to refine or modify the design and implementation of: Management plans Mitigation measures Project operations	**11.0** **11.4** **11.5**
Include the process by which programs would be developed: The timing of program development and updating The method(s) by which adequacy and effectiveness of the programs would be evaluated and tracked	**11.0**
Discuss how programs would be managed over the lifespan of the Project:	"
If adaptive management is proposed, explain: How it will operate The role of the public in the process	"
Identify who would be involved during the preparation and management of the programs: Agencies Boards Regulators Independent researchers	"

12.0 ENVIRONMENTAL MANAGEMENT	*EIS Section*
12.1 Management Criteria - *continued*	
Identify any opportunities for: Partnerships Coordination Participation	**11.0**
Discuss the ways in which people would be involved in the design and implementation of the Programs: Holders of traditional knowledge Area residents	"
Discuss how monitoring and follow-up results would be communicated back to: The communities Public involvement in program refinement (if refinement is required)	"
12.2 Accidents and Malfunctions	**11.2**
Identify and discuss, the potential accidents or malfunctions that may occur as a result of the Project: For each phase For each activity	
Include consideration of risks such as: Spills of hazardous materials on land Spills of hazardous materials in water Explosion and/or fire Use of explosives and timing of blasts Transportation accidents Destruction of fishing gear Collision with marine mammals Release of invasive or hazardous species through ballast water	"

12.0 ENVIRONMENTAL MANAGEMENT	*EIS Section*
12.2 Accidents and Malfunctions - *continued*	
Describe and evaluate the potential impacts of Project-related accidents and malfunctions on the environment, including: Impacts on the regional economy Social or cultural elements of the environment and human health	**11.2** "
Evaluate worst-case scenarios:	
Focus particular attention on sensitive components of the environment that could be affected in the event of an accident or malfunction and that could make the consequences major or worse: Proximity of communities Ecosystems of particular value	"
Where potentially significant impacts could occur as a result of an accident or malfunction, assess the probability of such an occurrence, taking into account: Weather External events that present contributing factors	"
Identify the contingency and/or response measures that would be in place should an accident occur:	"
Describe company programs over the lifespan of the Project, by phase: Facility monitoring Emergency preparedness Environmental management	"
Describe plans for managing the risks associated with the Project: Uncontrolled releases of substances	"
Provide sufficient detail to explain: The scope of the programs How they work How they are developed The link to any regulatory requirements The expected components of these programs	"

12.0 ENVIRONMENTAL MANAGEMENT	*EIS Section*
12.3 Environmental Protection	
Describe the Proponent's planning for environmental protection to avoid or manage potentially adverse effects of the Project on VEC's:	**11.3**
Discuss the environmental management system(s) proposed to guide the protection plan that the Proponent will develop:	"
Consider how the results of the following may guide creation of and revisions to, the environmental protection plan during the Project: The environmental review process Project monitoring Public Consultations	"
Present a draft environmental protection program that includes measures to control, minimize and mitigate any contaminants that may be released or generated by the Project:	"
Contaminants such as: Heavy metals Suspended solids Hydrocarbons Dust Dioxins Carbon monoxide Oxygen demanding materials Organic contaminants	"
Describe plans to control air emissions (including greenhouse gases) from the Project:	"
Describe plans to manage technology/human/wildlife interactions: On-site Adjacent areas In affected marine environments	"
Address hazards presented by the Project:	"
Describe plans for ongoing site management and rehabilitation during the life of the Project:	"

12.0 ENVIRONMENTAL MANAGEMENT	*EIS Section*
12.3 Environmental Protection - *continued*	
Describe any plans, programs and policies relevant to the design and implementation of standard mitigation practices or monitoring programs that would be followed during the lifespan of the Project:	**11.3**
Explain, relating to the programs: Purpose Scope Function	”
Describe: Who would be responsible for their implementation How reporting would take place	”
Describe how the results of the programs would be used to refine or modify : The design and implementation of management plans Mitigation measures Project operations	”
Describe the process by which the programs would be: Developed Approved Enforced Timing of development and updating Methods by which adequacy and effectiveness of the programs would be evaluated and tracked	”
Identify any regulatory requirements relevant to: Monitoring Corporate management plans, programs, policies Quality assurance/control measures	”
12.4 Monitoring	
Provide data to ensure that: Regulatory requirements are met Sustainable development objectives are advanced Adverse environmental effects are avoided or minimized	**11.4** **9.1** **9.2** **9.3** **10.0**

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12.0 ENVIRONMENTAL MANAGEMENT	*EIS Section*
12.4 Monitoring - *continued*	
Describe the proposed approach for monitoring each of the VEC's identified:	11.4
Justify all decisions regarding: Criteria Indicators	"
Describe the monitoring programs to detect effects for all phases of the Project, on: Physical environment Biological environment Human environment	"
Describe: Timing Frequency Methods Agents responsible for monitoring	"
Where it may not be possible to specify the details of a component of a monitoring program, explain why, when and how the program will be defined: When it will be reviewed by public and regulatory agencies	"
Include a framework for compliance and monitoring of all effects throughout the life of the Project, Including eventual abandonment:	"
Provide information on: All proposed monitoring activities A framework for taking action to respond to monitoring results	"
Describe how the results of monitoring programs will be used to refine or modify the design and implementation of environmental protection and management plans:	"
Describe: Strategies for enforcement Penalties for non-compliance Mitigation measures	"

12.0 ENVIRONMENTAL MANAGEMENT	*EIS Section*
12.4 Monitoring - *continued*	
Identify the role of the following in the monitoring process: Community members Government agencies	11.4
Indicate the level and indicators to be used in proposed monitoring programs: Community Regional Species Ecosystem	"
Describe the criteria used in selecting subjects and indicators, (including the role played by ecological risk monitoring):	"
Identify: Specific regulatory requirements for monitoring Approaches Methods Consultants to be used to analyze monitoring data	"
Describe reporting and response mechanisms, including: Criteria for initiating a response Procedures to be followed Reasons for selecting these criteria	"
Describe how monitoring results will be integrated with other aspects of the Project including: Adjustments for operating procedures Refinement of mitigation measures	"
Describe procedures to assess the effectiveness of: Monitoring programs Mitigation measures Recovery programs for areas disturbed by the Project	"
Describe sources of funding for all monitoring programs:	"
Describe quality assurance and quality control measures to be applied to monitoring programs:	"

12.0 ENVIRONMENTAL MANAGEMENT	*EIS Section*
12.4 Monitoring - *continued*	
Provide a table showing all VEC's and impacts to indicate where and how monitoring is proposed to manage effects and cumulative effects:	**11.4**
Indicate any regulatory regimes that apply	"
12.5 Mitigation Measures	
Describe proposed measures to mitigate any adverse effects and to enhance beneficial effects over the lifespan of the Project that have been identified in the: Environmental Impact Analysis Cumulative Impact Analysis	**11.5** **9.1** **9.2** **9.3**
Place the highest priority on impact avoidance (e.g. pollution prevention): Impact minimization opportunities may be required when avoidance is not possible; this is less desirable Compensation should be recognized as a last resort that depends on the acceptability of predicted effects	"
Evaluate the effectiveness of mitigation measures by demonstrating how they contribute positively to sustainable development objectives:	"
Identify protection goals and possible mitigation measures for each VEC based on criteria including: Government policies Regulations Standards	"
For specific VEC's, identify any relevant: Objectives Policies Guidelines Timing restrictions proposed to be followed when carrying out the Project	"

12.0 ENVIRONMENTAL MANAGEMENT	*EIS Section*
12.5 Mitigation Measures - *continued*	
Describe proposed measures to mitigate adverse impacts of the Project on the environment:	**11.5**
Physical	**9.1**
Biological	**9.2**
Human (ecosystems and communities)	**9.3**
Identify measures used to create or enhance beneficial impacts identified over the lifespan of the Project:	"
Identify trigger points when an adverse effect will result in:	
Remedial action	
Mitigation	
Cessation of activity	"
Indicate which mitigative measures are:	
Proven	
Experimental	"
Provide an analysis that supports any statements regarding the effectiveness of proposed mitigation measures:	"
Outline proposed rehabilitation and revegetation procedures for the Project site, including details on:	
Any plans for landform design and reconstruction to return the site to a stable and functional configuration	"
Erosion controls	
Specifically address the stabilization of settling ponds to a safe, permanent state	
Indicate which measures mitigate or enhance the impact over the lifespan of the Project:	"
Identify the implications of policies suggesting 'no net loss of wetlands' and consider the potential for wetlands restoration on the site:	

12.0 ENVIRONMENTAL MANAGEMENT	*EIS Section*
12.5 Mitigation Measures - *continued*	
Identify relevant policies, management plans or other measures to protect or enhance habitat for:	**11.5**
Fish	**9.1**
Invertebrates	**9.2**
Birds	**9.3**
Marine mammals	
Other wildlife	
Include:	
Timing restrictions	
Regulations	"
Describe the proposed methods for mitigating effects on the existing transportation infrastructure:	"
Describe measures to reduce GHG emissions from the Project through:	
Energy efficiency and reduction measures	
The use of alternative energy sources	"
Describe any initiatives taken to register with the Voluntary Challenge and Registry Program as part of a commitment to reduce emission of GHG:	"
Identify technologies to be used to minimize and to indicate the effectiveness of:	
Gaseous emissions	
Liquid emissions	"
Solid emissions	
Identify and describe:	
Policies	"
Guidelines	
Applicable code of practice and/or best management practices that are proposed to be followed with respect to Project activities	
Identify proposed methods to mitigate changes to the Project caused by the environment:	"

12.0 ENVIRONMENTAL MANAGEMENT	*EIS Section*
12.5 Mitigation Measures - *continued*	
Provide a commitments table that summarizes planned mitigation measures and stated companyintentions in relationship to identified effects:	11.5
Where agreements with the federal or provincial governments will be relied upon as mitigative measures, provide the following information: The impacts which will be mitigated A general description of the mitigation measures The parties to the agreement An overview of implementation Monitoring plans for any such agreement	"
With respect to mitigation measures to reduce of offset adverse effects on the way of life and well-being of individuals, families and communities most directly affected by the Project, indicate how mitigation would address impacts experienced by residents by: Age group Occupation	"
Describe how Aboriginal and community organizations will be involved in the development,application and ongoing evaluation of these measures:	9.3.3
Describe criteria for evaluating the success of mitigation or reclamation measures: Indicate when and how this evaluation would be conducted	7.10
12.6 Follow-up Program	
Develop plans for a formal follow-up program pursuant to the *Canadian Environmental Assessment Act* to verify the accuracy of the environmental assessment and the effectiveness of the mitigation measures taken:	11.6
If the process identifies adverse environmental effects, then the Proponent shall: Adjust existing mitigation measures Or develop new mitigation or compensation measures	"
Identify the need for a follow-up program: Its objectives Main components	"

12.0 ENVIRONMENTAL MANAGEMENT	*EIS Section*
12.6 Follow-up Program - *continued*	
Describe how it will be structureds, including enforcement and penalties for non-compliance:	11.6
Explain which monitoring activities would support the follow-up program by providing relevant information and describing the roles played by: The Proponent Regulatory agencies Community members Independent researchers and others	"
Discuss the sources of funding for the programs and describe: Management Reporting schedules	"
Describe how the follow-up programs would verify any predictions of significant adverse effects on: Physical Biological Human environment The effectiveness of related mitigation	"
Discuss how the programs could identify or measure how the Project advances the objectives of sustainability and maximizes beneficial impacts in the areas affected by the Project:	"
12.7 Residual Impacts	
To assist in the characterization of each residual effect, describe: Direction (i.e. adverse, beneficial, neutral) Magnitude Geographic extent Timing and duration Frequency Reversibility Other social and economic features or implications Additional descriptors may be used, if explained and supported	11.7

12.0 ENVIRONMENTAL MANAGEMENT	*EIS Section*
12.7 Residual Impacts - *continued* **Identify and evaluate significant residual Project-related impacts on any of the VEC's including:** Physical environment Biological environment Human environment Ecosystems Communities And the interrelationships between them **This assessment must provide an explicit, traceable link for each VEC between potential impacts and measures of significance:** **Describe and document:** How significance was determined (i.e. the process carried out or the methods used) The basis for determining significance Documentation for existing thresholds (e.g. stakeholder input, traditional knowledge, standards, guidelines or quantitative risk assessment) **Where professional opinion or experience is the basis for determination of significance, identify the individuals involved along with the assumptions they used to form their opinions:** **Both process and criteria for significance can vary among the VEC's. Therefore, describe specific methods where appropriate.** **Discussion of residual impacts and significance should indicate how the Project might contribute to sustainable development in the area affected by the Project:**	**11.7**
12.8 Compensation **Describe any plans to offer compensation or community benefits to enhance the beneficial effects of the Project:**	**11.8**

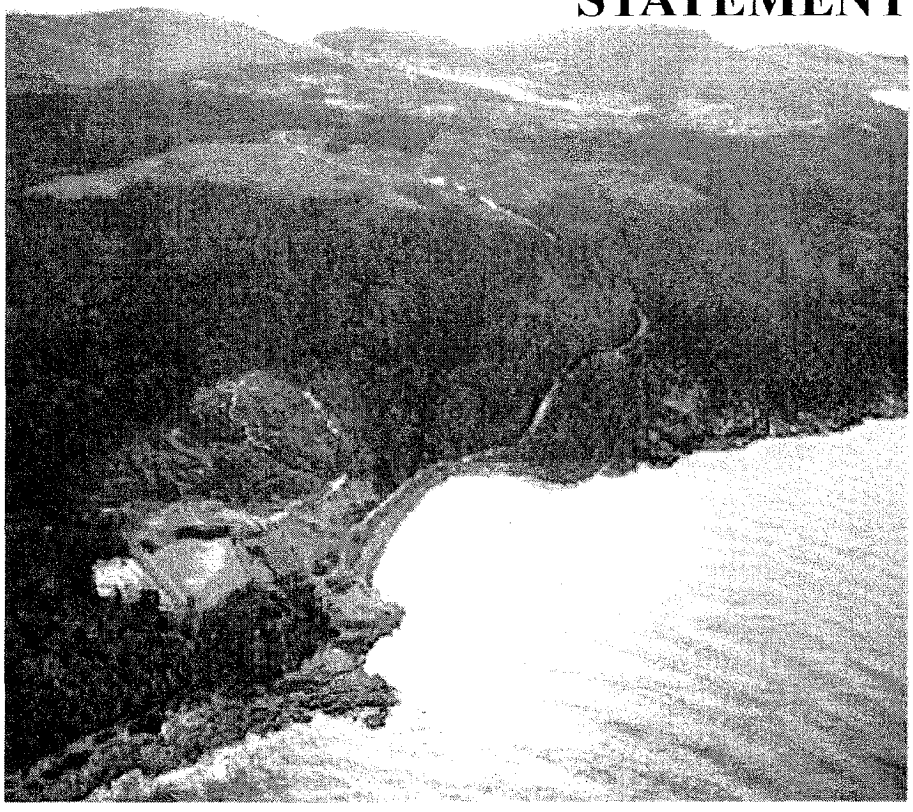
12.0 ENVIRONMENTAL MANAGEMENT	*EIS Section*
12.8 Compensation - *continued*	
Describe any plans for compensation that would be part of proposed mitigation to address negative or adverse impacts from the Project:	**11.8**
Describe mechanisms to be put in place to finance proposed compensation plans:	"
Describe plans to compensate the following for losses or damages that may occur as a result of the effects of the Project: Resource users Property owners Communities	"
Refer, where appropriate to specific requirements under legislation Subsection 35.2 of the *Fisheries Act*	"
Discuss compensation terms and conditions relating to mitigation measures that would be necessary to address the full range of community concerns about potential adverse environmental effects due to the Project:	"
Describe consultation activities with communities to discuss mitigation and compensation plans:	"

13.0 EIS ATTACHMENTS	*EIS Section*
Reference Documents	**Vols. I-VI**
Describe consultation activities with communities to discuss mitigation and compensation plans:	
Appendices	**Vols. I-IV**

VOLUME III
MAPS

WHITES POINT QUARRY & MARINE TERMINAL

ENVIRONMENTAL IMPACT STATEMENT



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March 31, 2006

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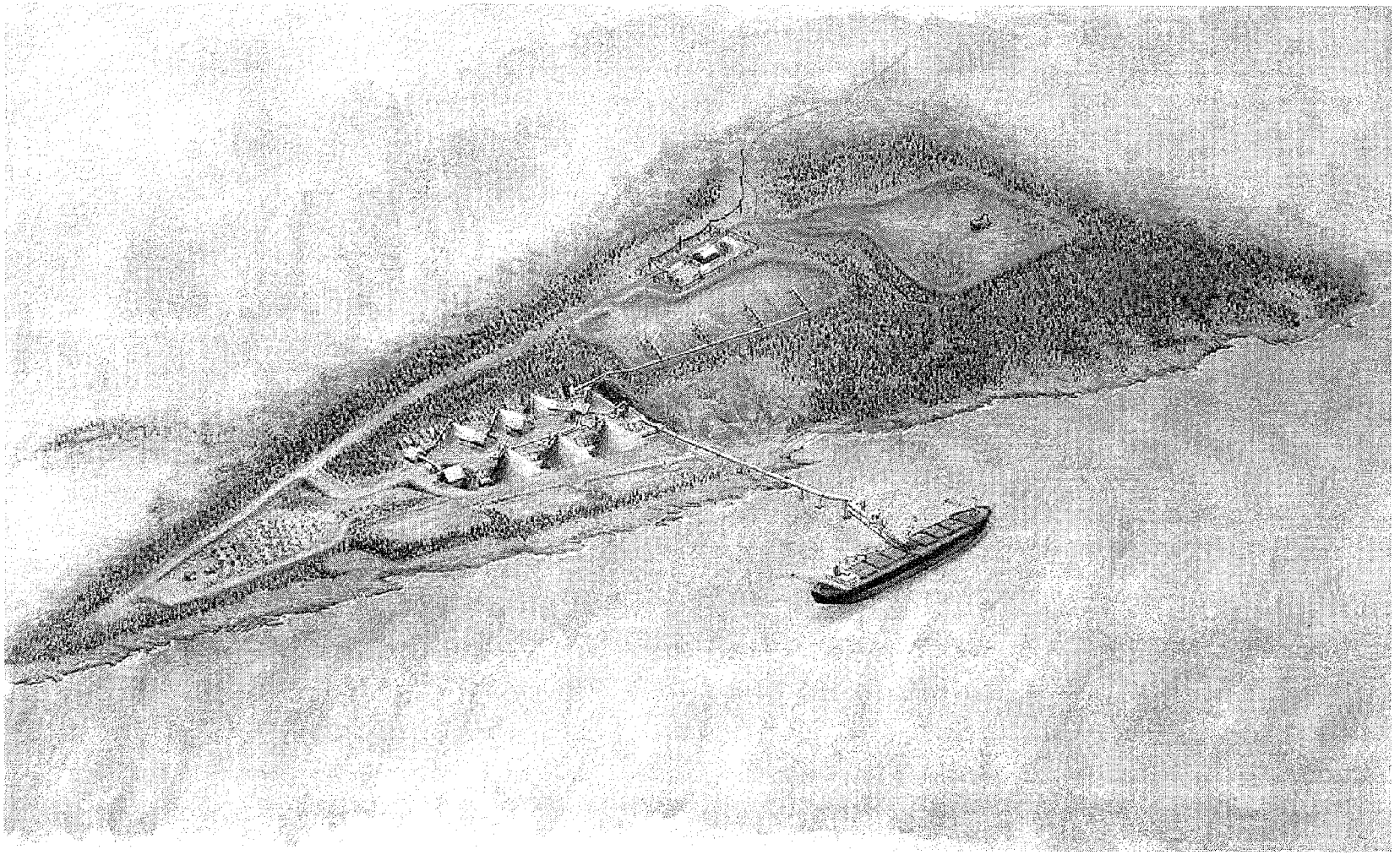

Artist's Rendering of the Whites Point Quarry and Marine Terminal
by
Mark Pease

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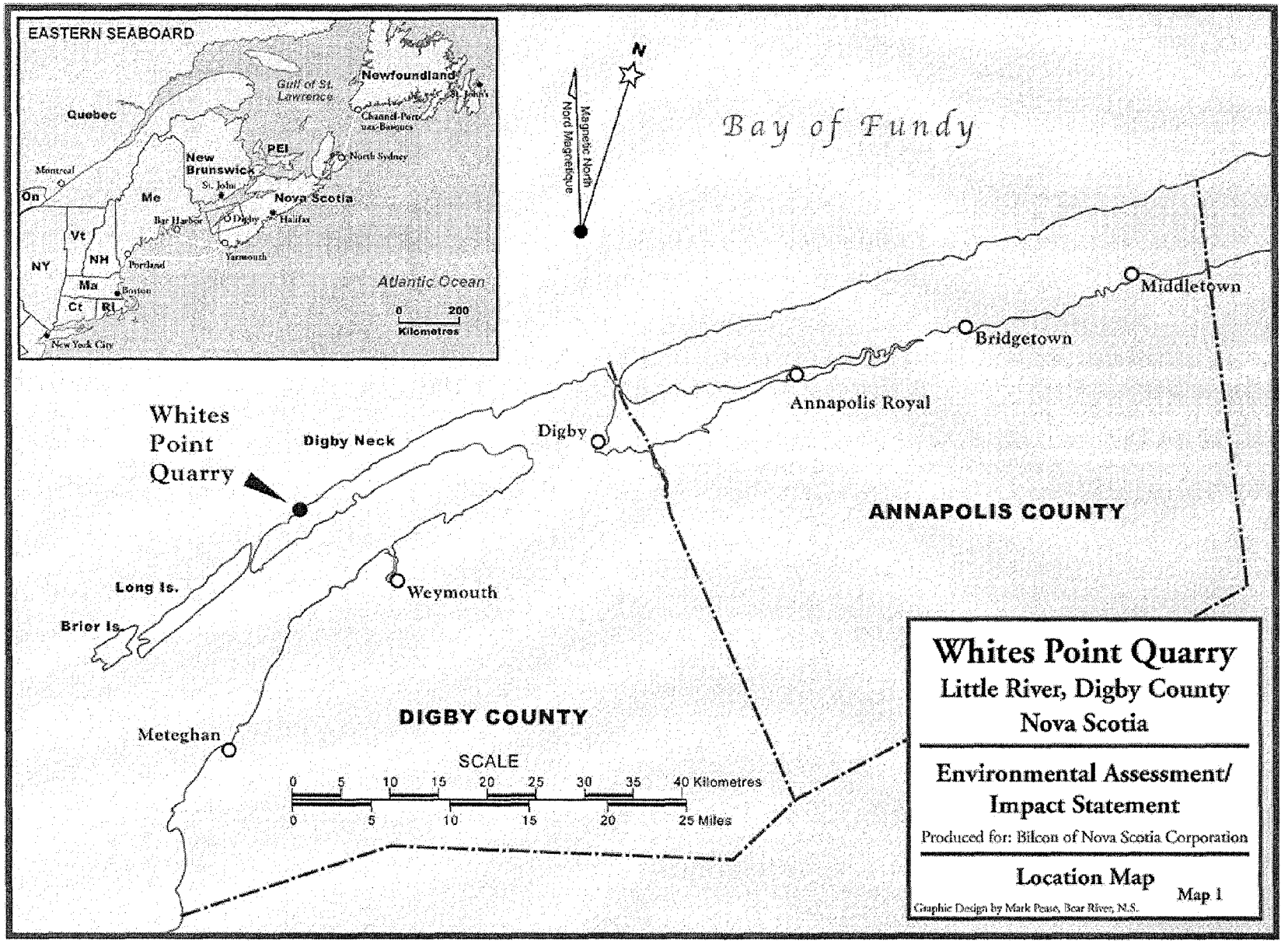

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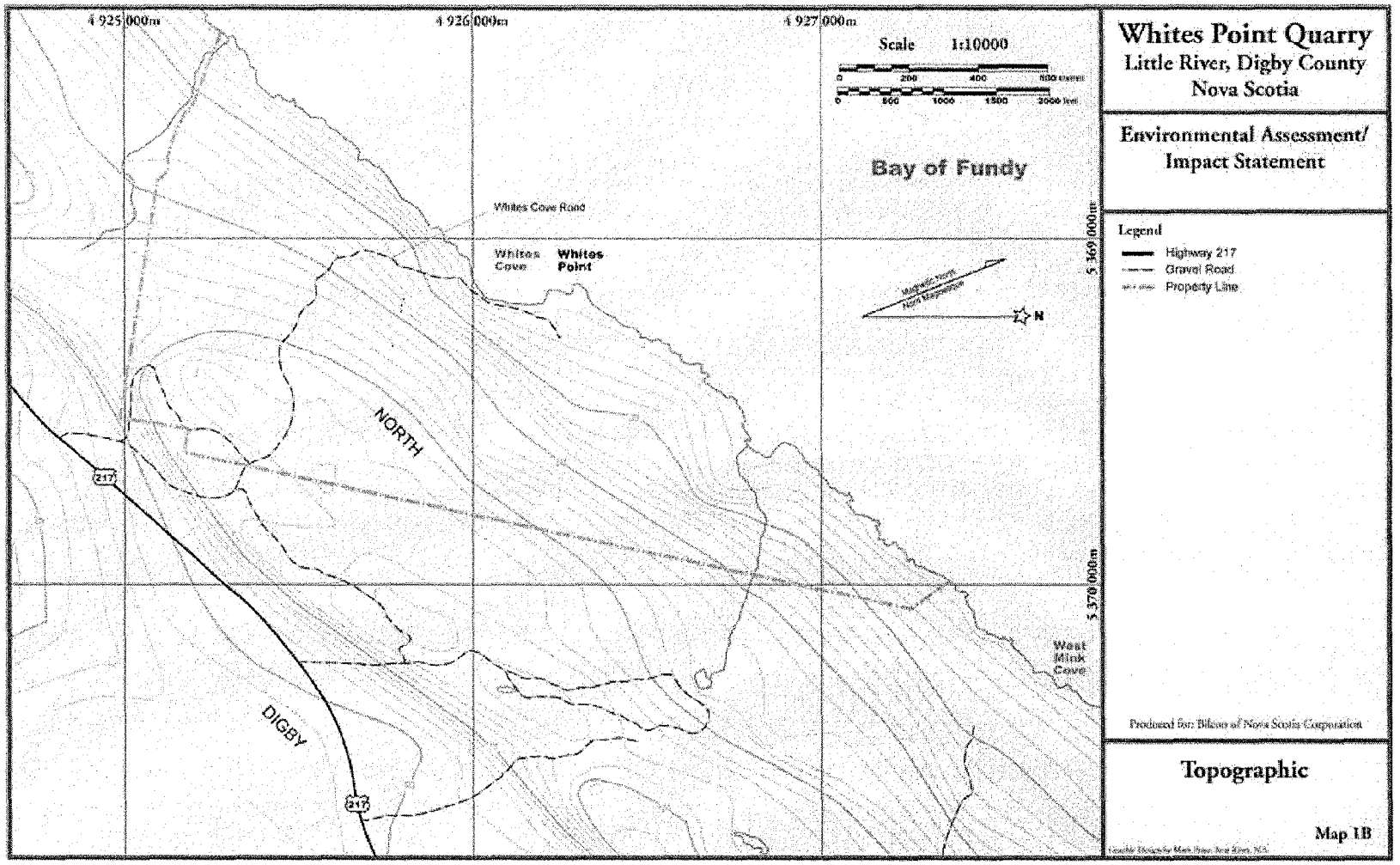

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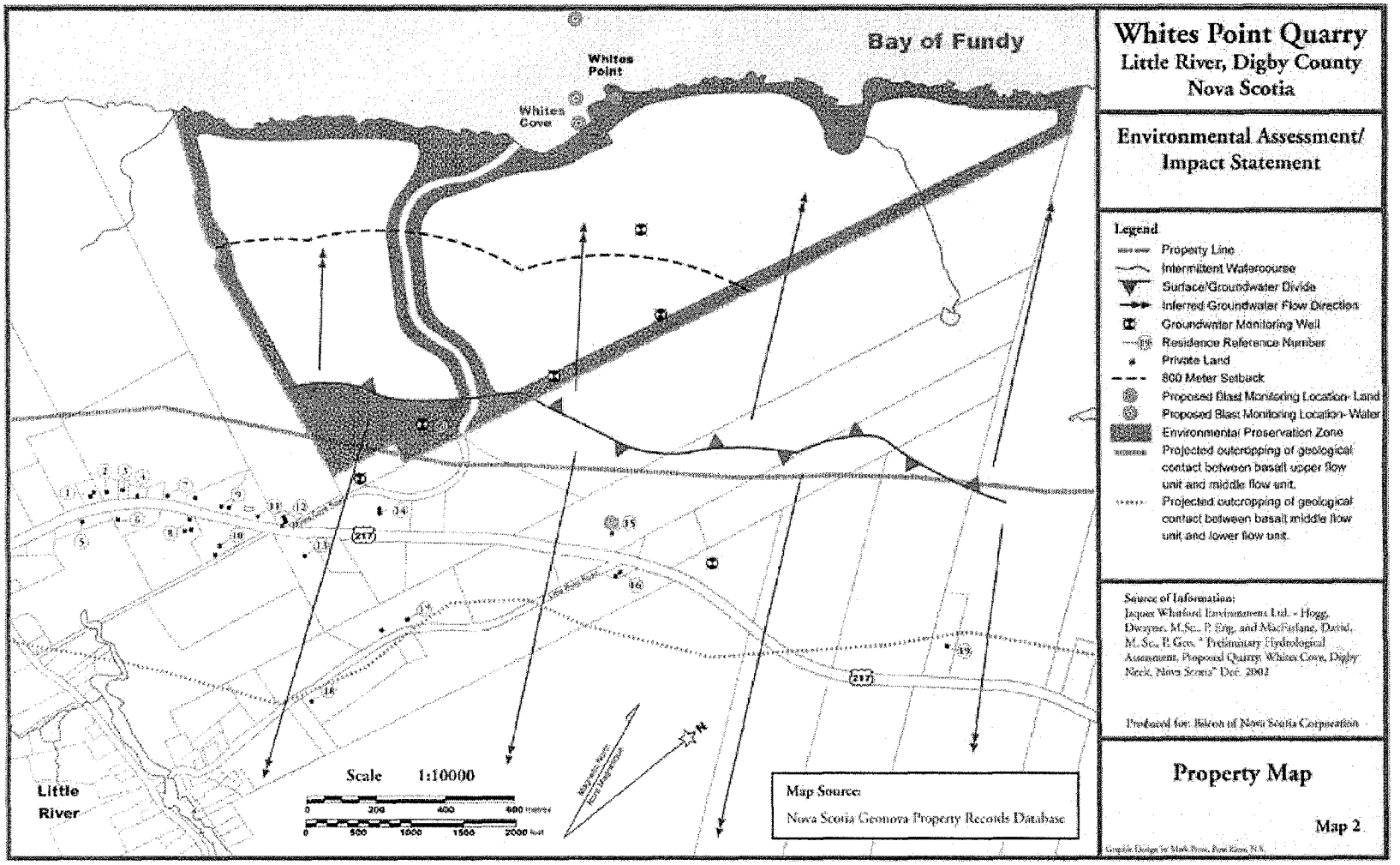
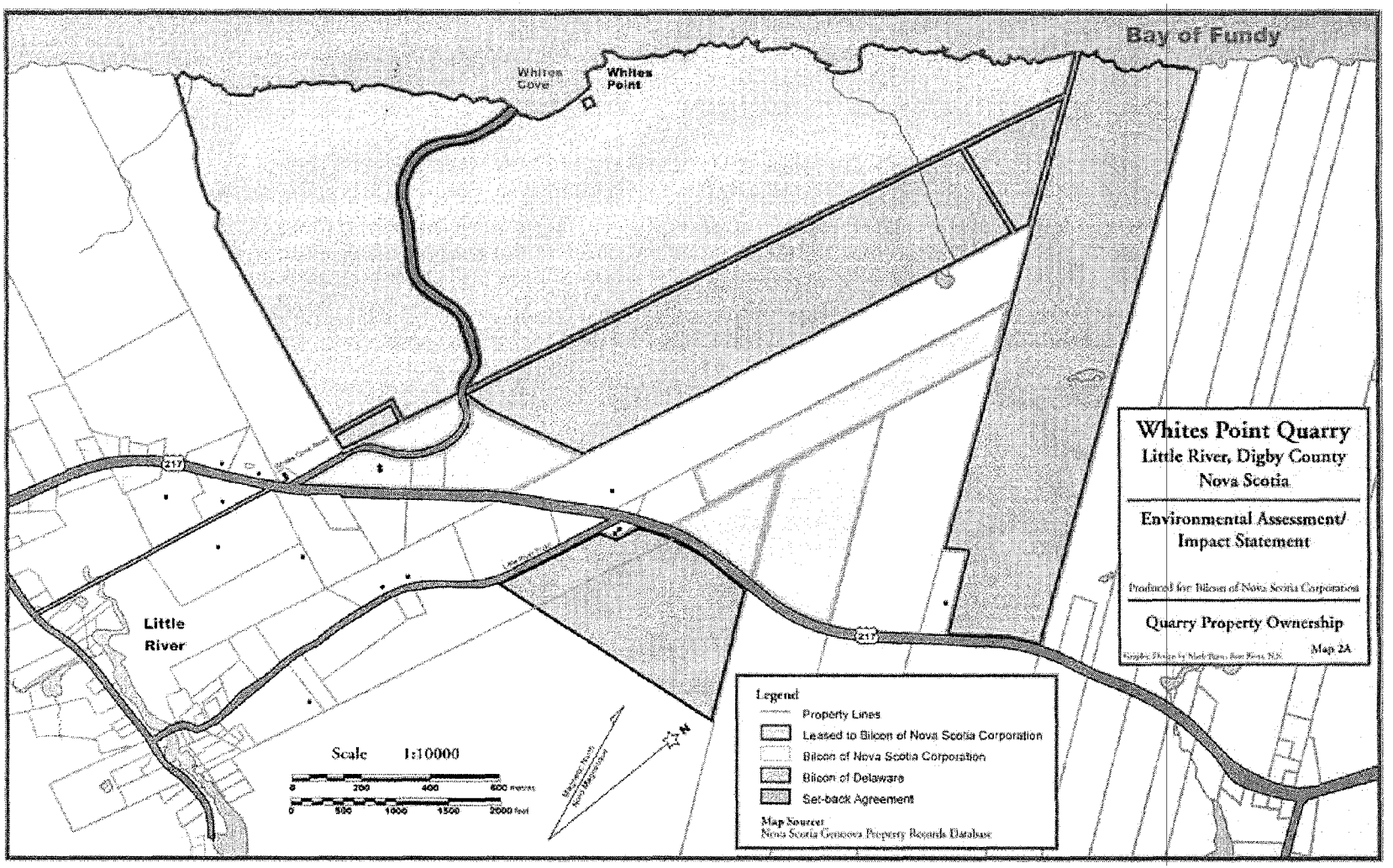
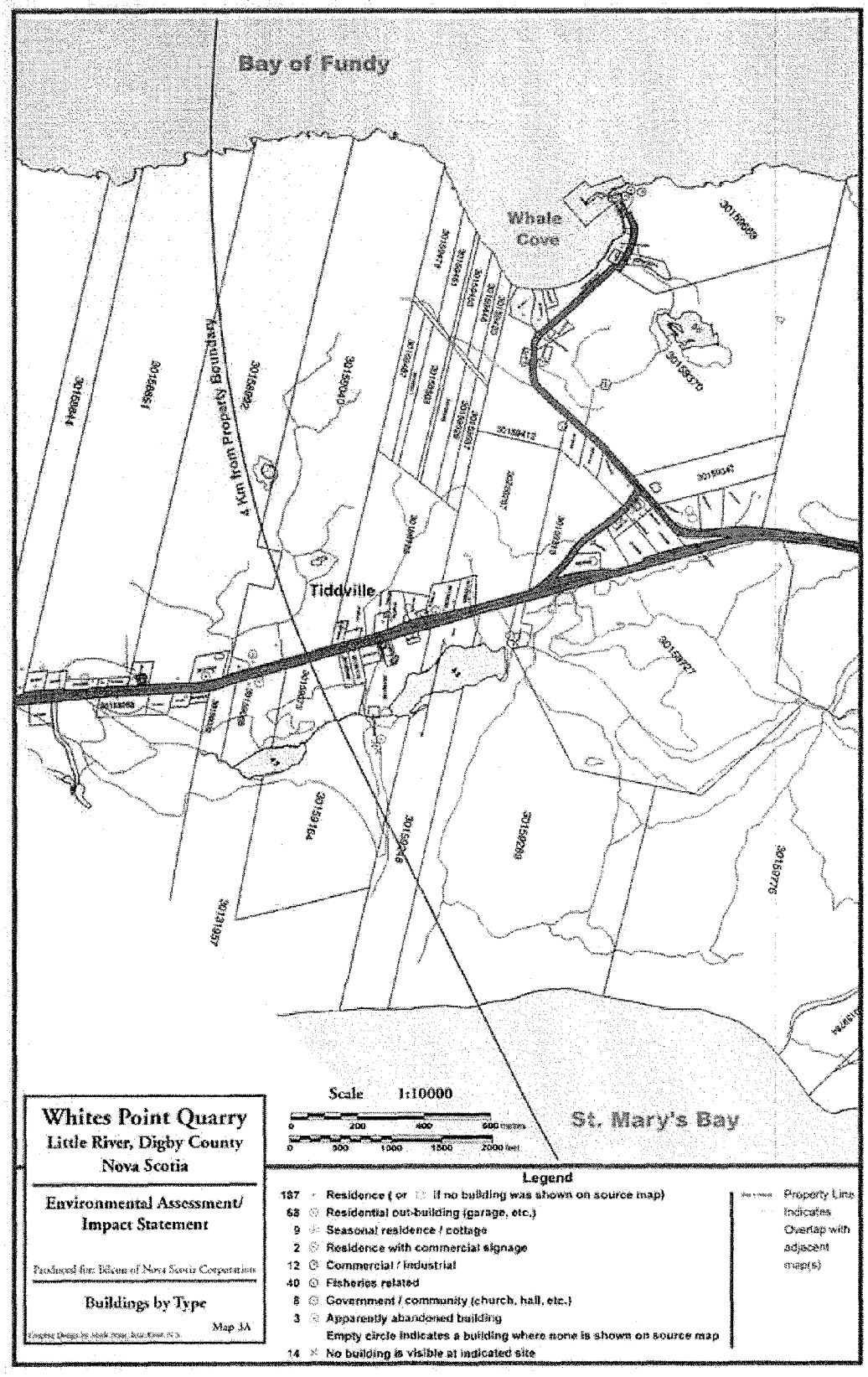


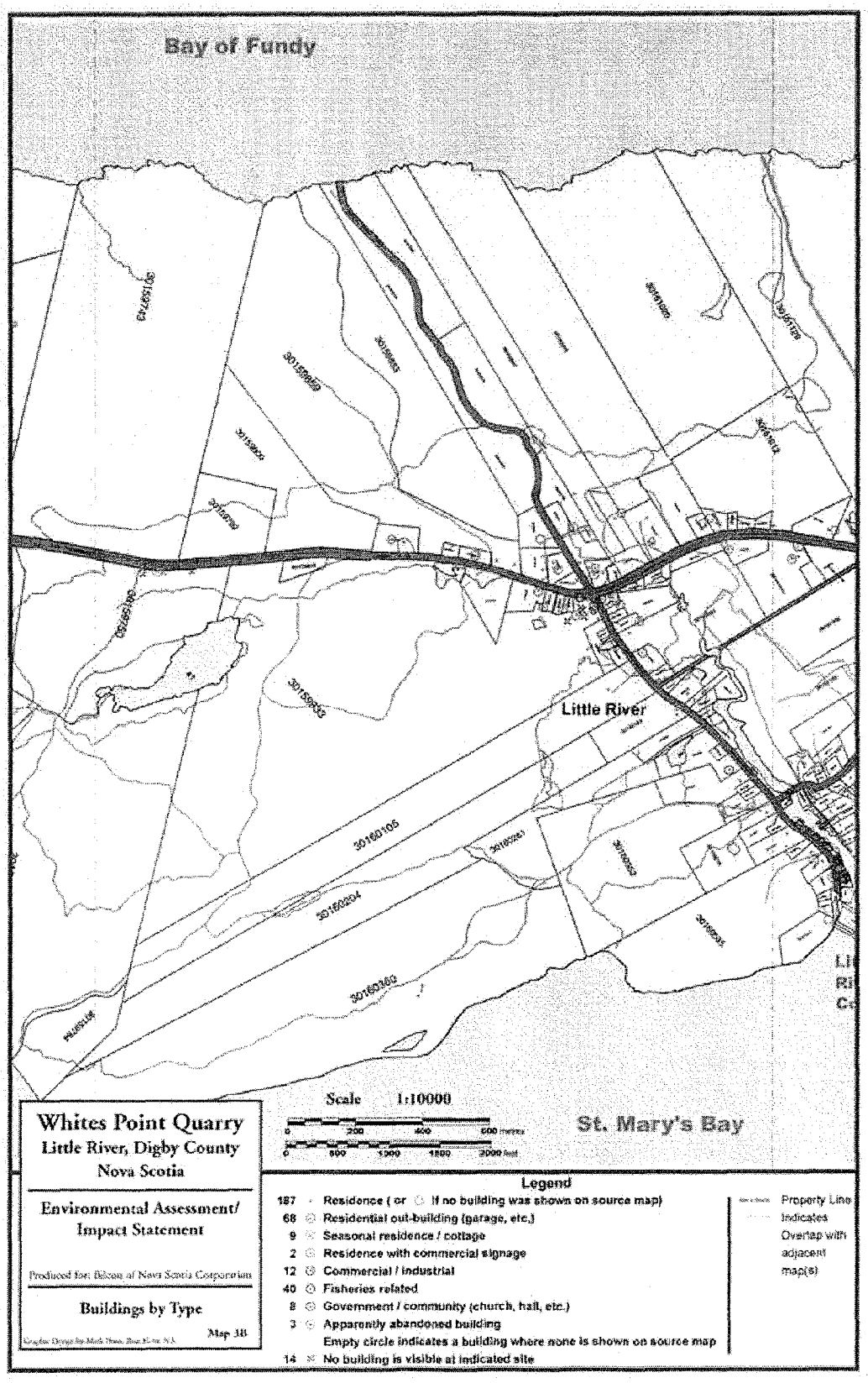
0181194

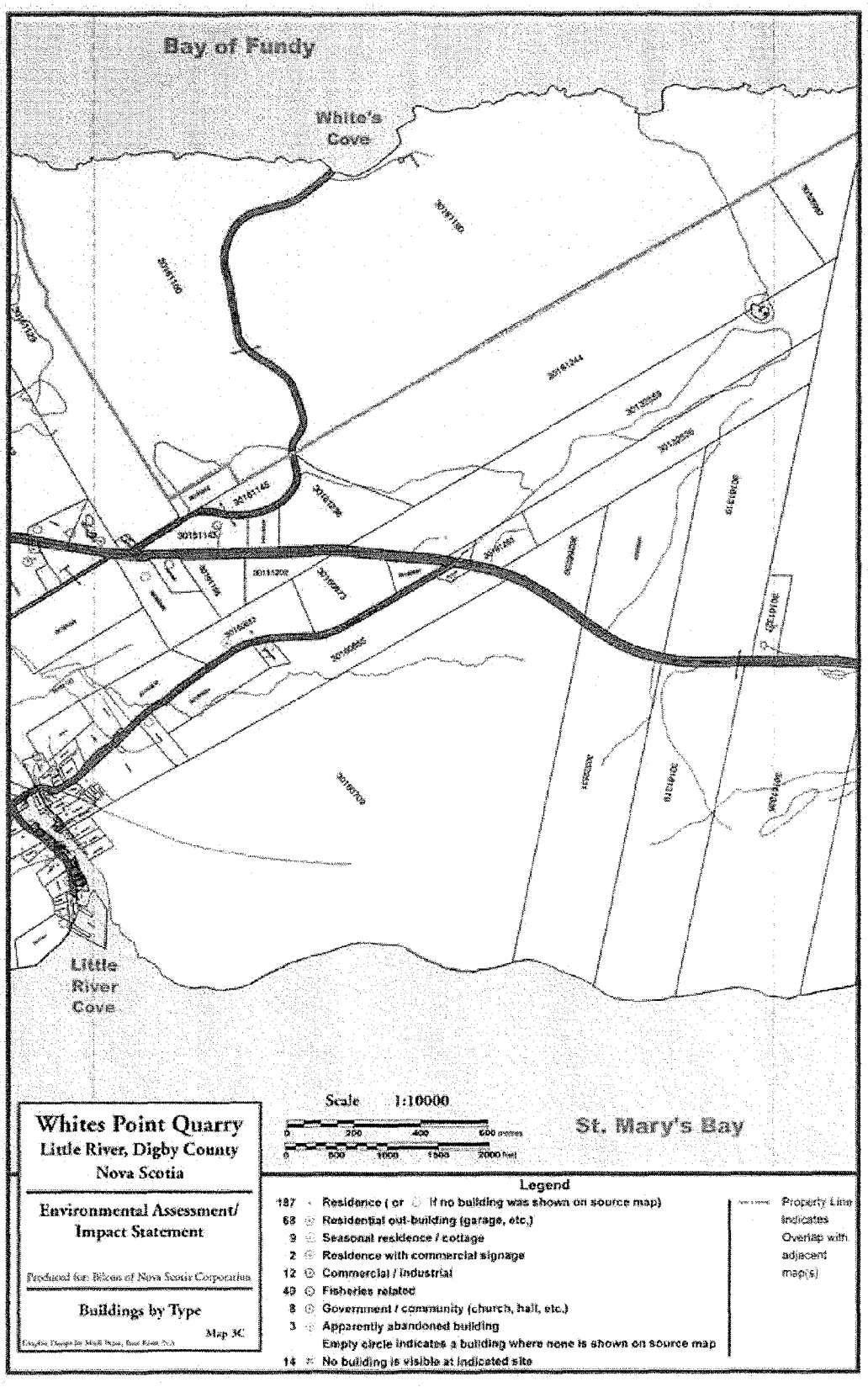
C0001-155

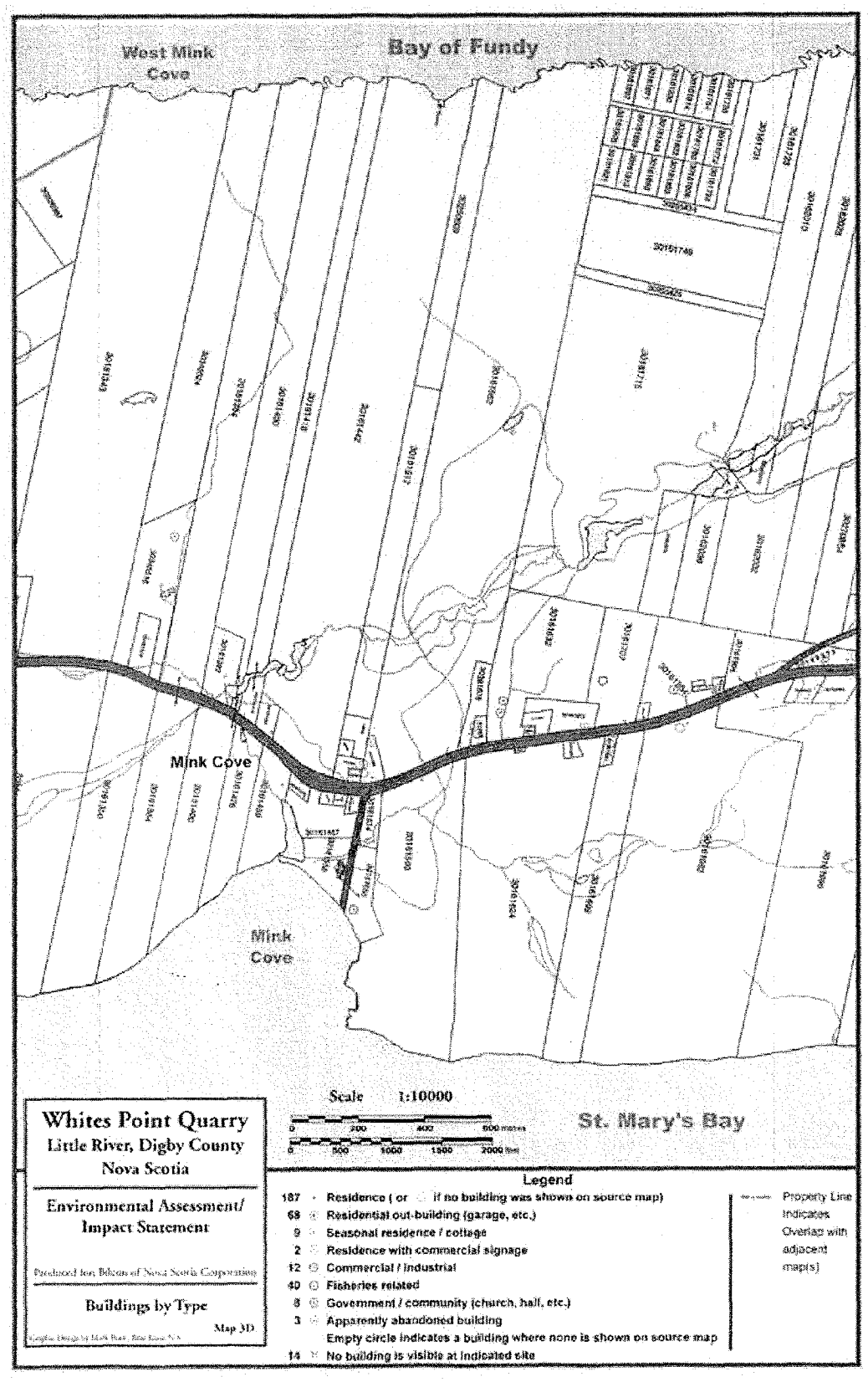


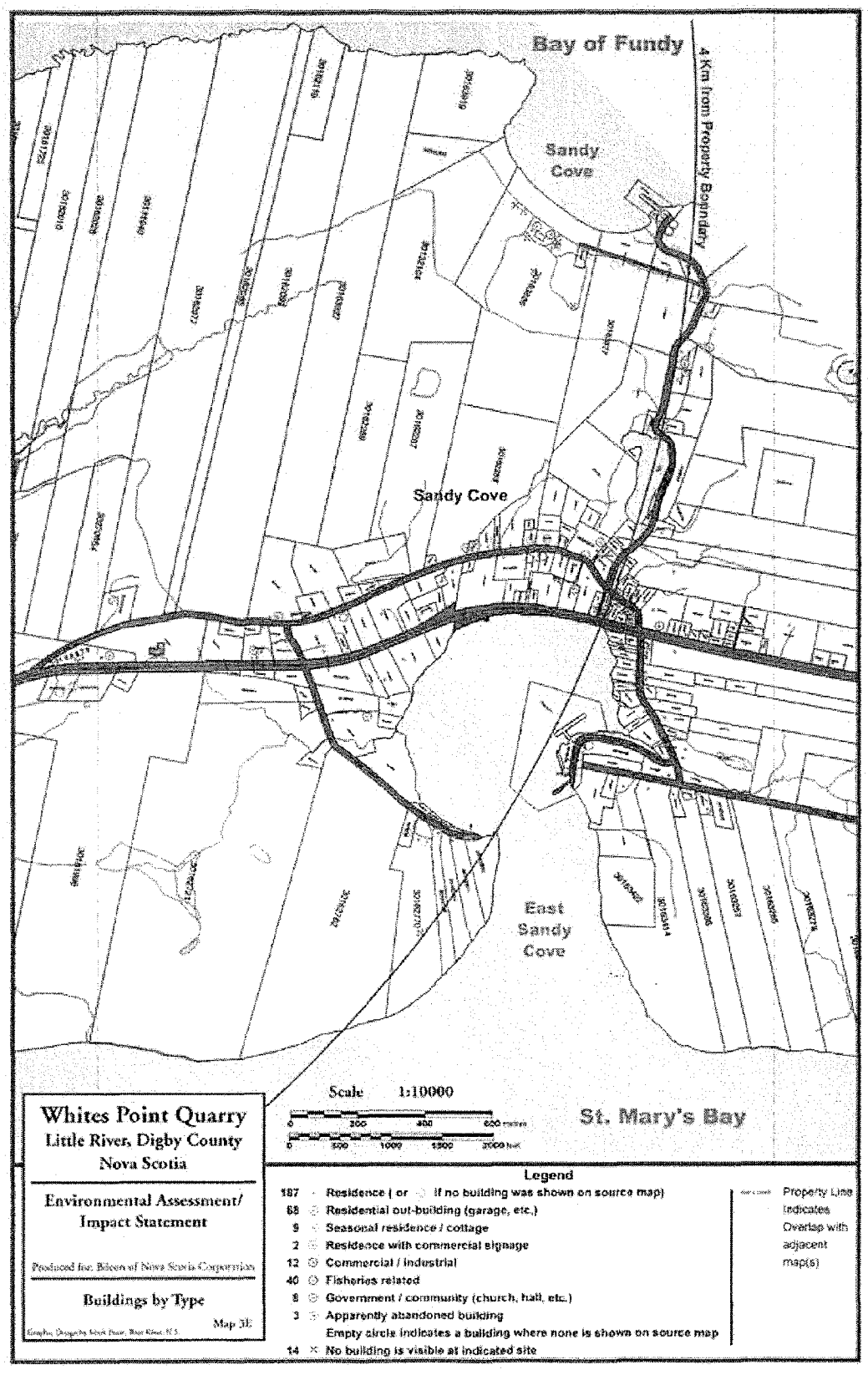
0181195

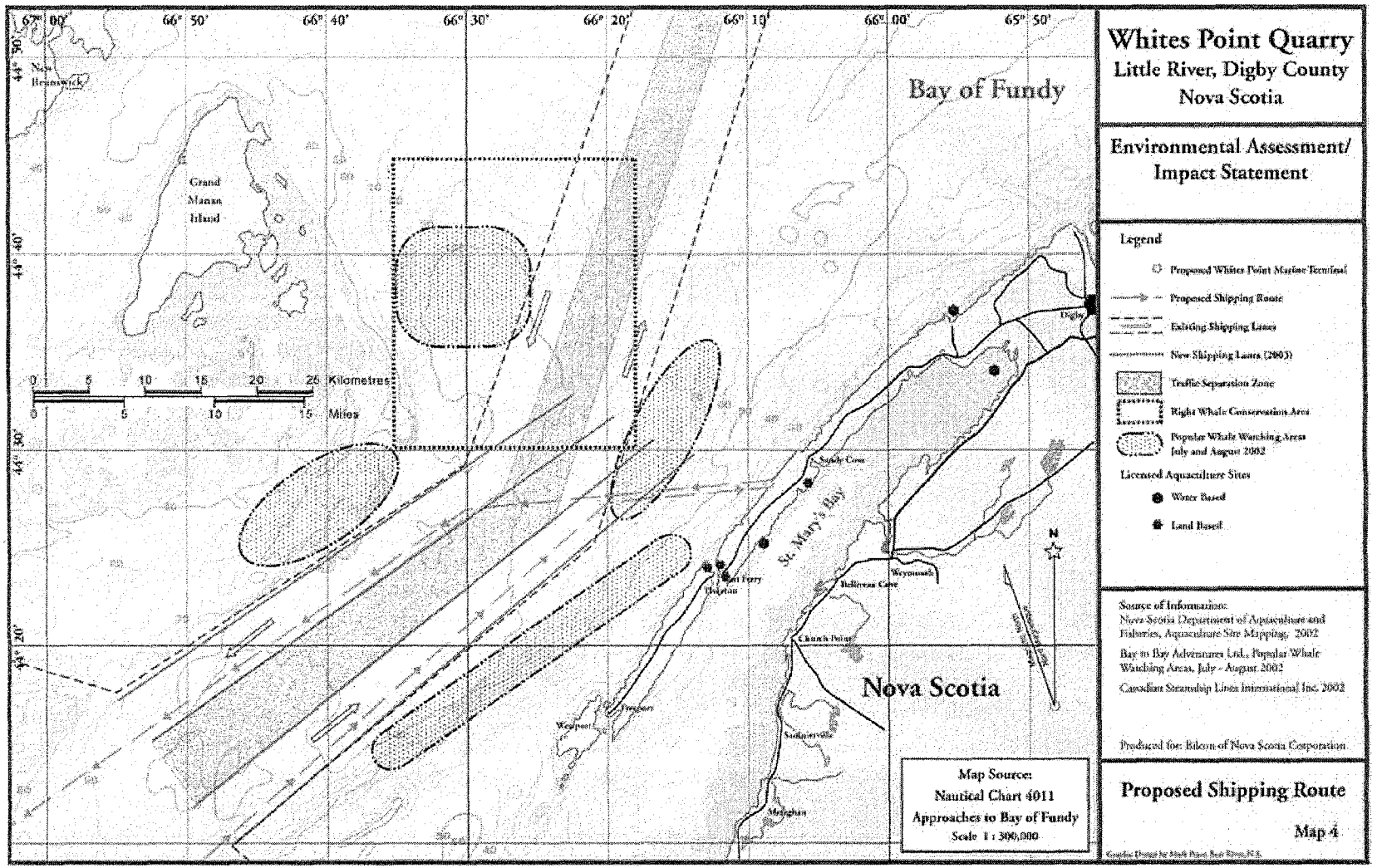

Bay of Fundy
Whale Cove
4 Km from Property Boundary
Tiddville
St. Mary's Bay
Scale 1:10000
0 200 400 600 metres
0 500 1000 1500 2000 feet
Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/
Impact Statement
Prepared for: Telcon of Nova Scotia Corporation
Buildings by Type
Map 3A
Legend
187 Residence (or if no building was shown on source map)
68 Residential out-building (garage, etc.)
9 Seasonal residence / cottage
2 Residence with commercial signage
12 Commercial / Industrial
40 Fisheries related
8 Government / community (church, hall, etc.)
3 Apparently abandoned building
Empty circle indicates a building where none is shown on source map
14 No building is visible at indicated site
Property Line
Indicates
Overlap with
adjacent
map(s)

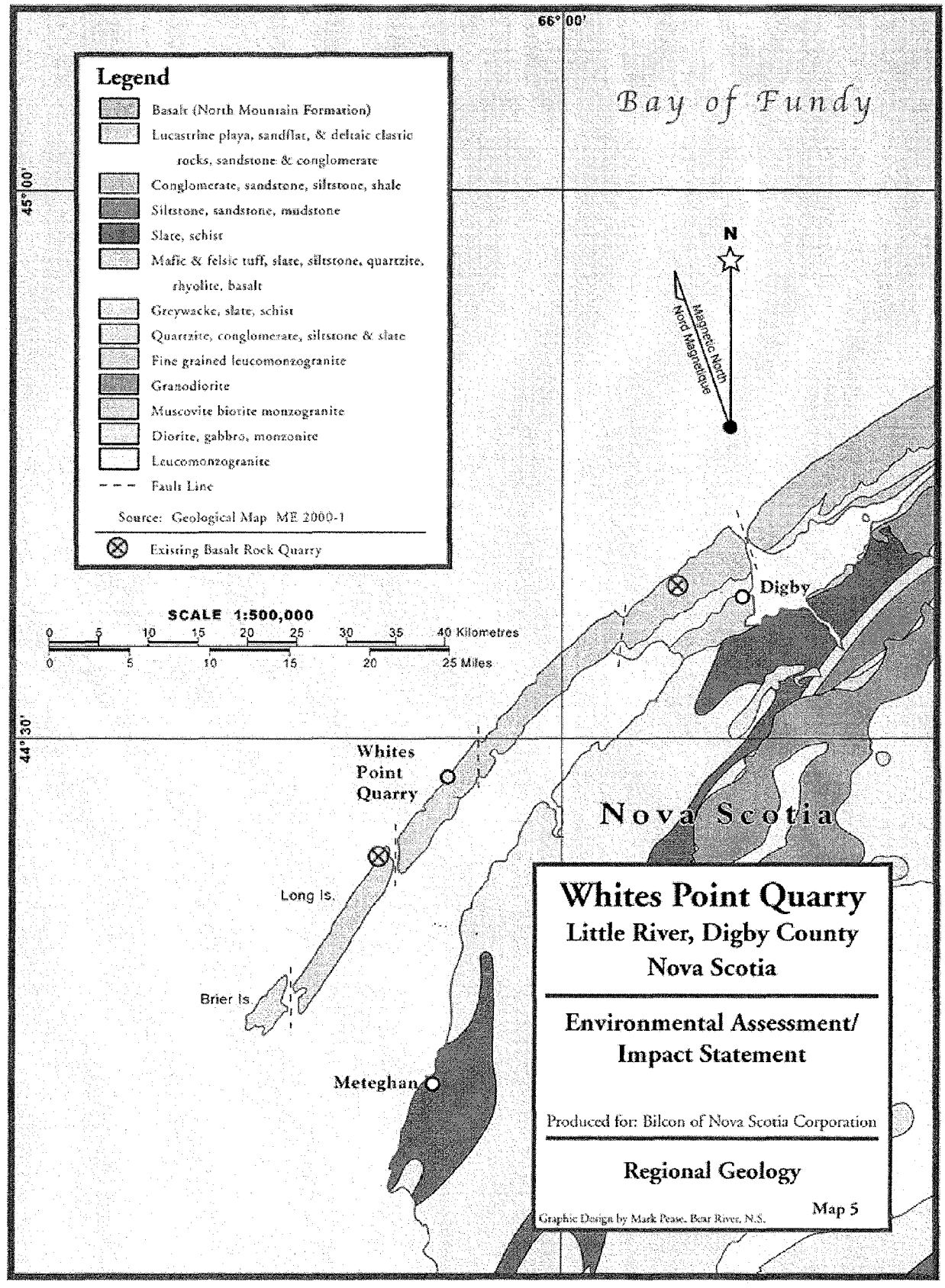

Bay of Fundy
Little River
St. Mary's Bay
Scale 1:10000
Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/
Impact Statement
Produced for: Bitcon of Nova Scotia Corporation
Buildings by Type
Map 3B
Legend
187 Residence (or If no building was shown on source map)
68 Residential out-building (garage, etc.)
9 Seasonal residence / cottage
2 Residence with commercial signage
12 Commercial / Industrial
40 Fisheries related
8 Government / community (church, hall, etc.)
3 Apparently abandoned building
Empty circle indicates a building where none is shown on source map
14 No building is visible at indicated site
Property Line
Indicates
Overlap with
adjacent
map(s)

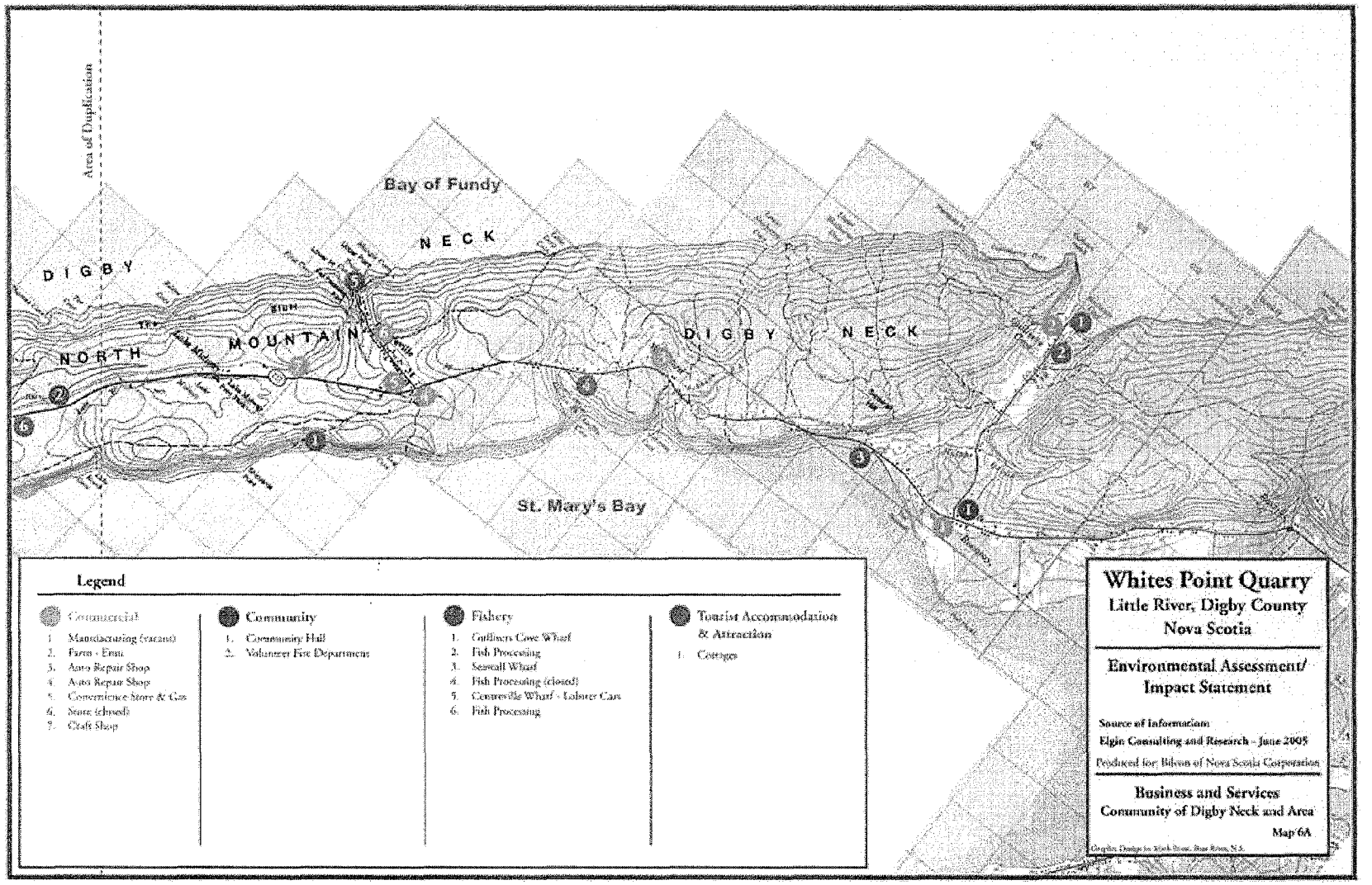

Bay of Fundy
White's Cove
Little River Cove
St. Mary's Bay
Scale 1:10000
0 200 400 600 metres
0 500 1000 1500 2000 feet
Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/ Impact Statement
Produced for: Bilcon of Nova Scotia Corporation
Buildings by Type
Map 3C
Legend
187 Residence (or ◯ if no building was shown on source map)
68 Residential out-building (garage, etc.)
9 Seasonal residence / cottage
2 Residence with commercial signage
12 Commercial / Industrial
49 Fisheries related
8 Government / community (church, hall, etc.)
3 Apparently abandoned building
Empty circle indicates a building where none is shown on source map
14 No building is visible at indicated site
Property Line indicates Overlap with adjacent map(s)


West Mink Cove
Bay of Fundy
Mink Cove
Mink Cove
St. Mary's Bay
Scale 1:10000
0 200 400 600 metres
0 500 1000 1500 2000 feet
Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/
Impact Statement
Produced for Bilcon of Nova Scotia Corporation
Buildings by Type
Map 3D
Legend
187 Residence (or if no building was shown on source map)
68 Residential out-building (garage, etc.)
9 Seasonal residence / cottage
2 Residence with commercial signage
12 Commercial / Industrial
40 Fisheries related
8 Government / community (church, hall, etc.)
3 Apparently abandoned building
Empty circle indicates a building where none is shown on source map
14 No building is visible at indicated site
Property Line
Indicates
Overlap with
adjacent
map(s)

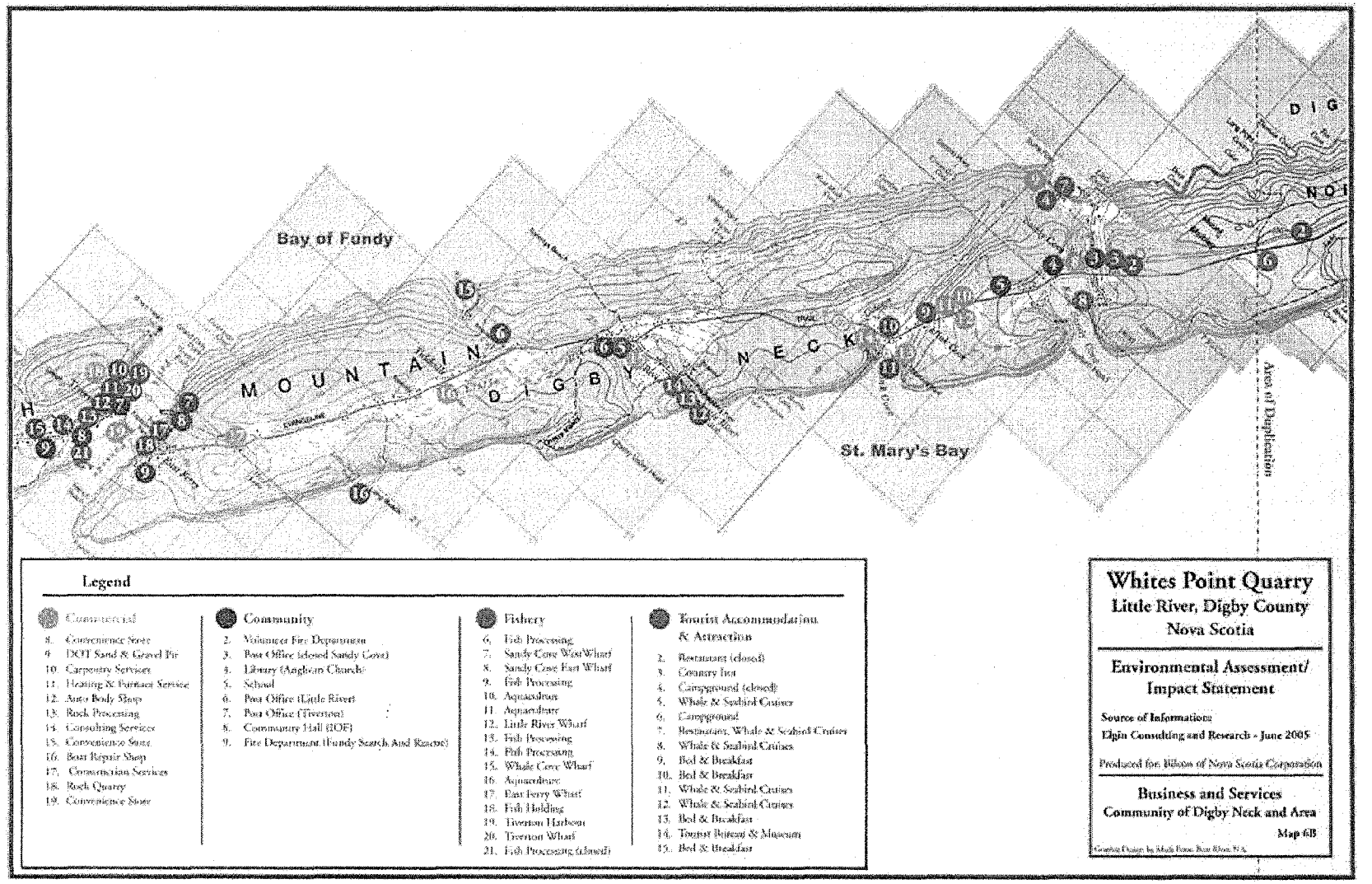

Bay of Fundy
4 Km from Property Boundary
Sandy Cove
Sandy Cove
East Sandy Cove
St. Mary's Bay
Scale 1:10000
0 200 400 600 metres
0 500 1000 1500 2000 feet
Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/ Impact Statement
Produced for: Bilcon of Nova Scotia Corporation
Buildings by Type
Map 3E
Legend
187 Residence (or if no building was shown on source map)
68 Residential out-building (garage, etc.)
9 Seasonal residence / cottage
2 Residence with commercial signage
12 Commercial / industrial
40 Fisheries related
8 Government / community (church, hall, etc.)
3 Apparently abandoned building
Empty circle indicates a building where none is shown on source map
14 No building is visible at indicated site
Property Line Indicates Overlap with adjacent map(s)


Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/
Impact Statement
Legend
Proposed Whites Point Marine Terminal
Proposed Shipping Route
Existing Shipping Lanes
New Shipping Lanes (2003)
Traffic Separation Zone
Right Whale Conservation Area
Popular Whale Watching Areas
July and August 2002
Licensed Aquaculture Sites
Water Based
Land Based
Source of Information:
Nova Scotia Department of Aquaculture and Fisheries, Aquaculture Site Mapping, 2002
Bay to Bay Adventures Ltd., Popular Whale Watching Areas, July - August 2002
Canadian Steamship Lines International Inc. 2002
Produced for: Bilcon of Nova Scotia Corporation
Proposed Shipping Route
Map 4
Bay of Fundy
Nova Scotia
Grand Manan Island
New Brunswick
St. Mary's Bay
Digby
Map Source:
Nautical Chart 4011
Approaches to Bay of Fundy
Scale 1 : 300,000
Kilometres
Miles
N

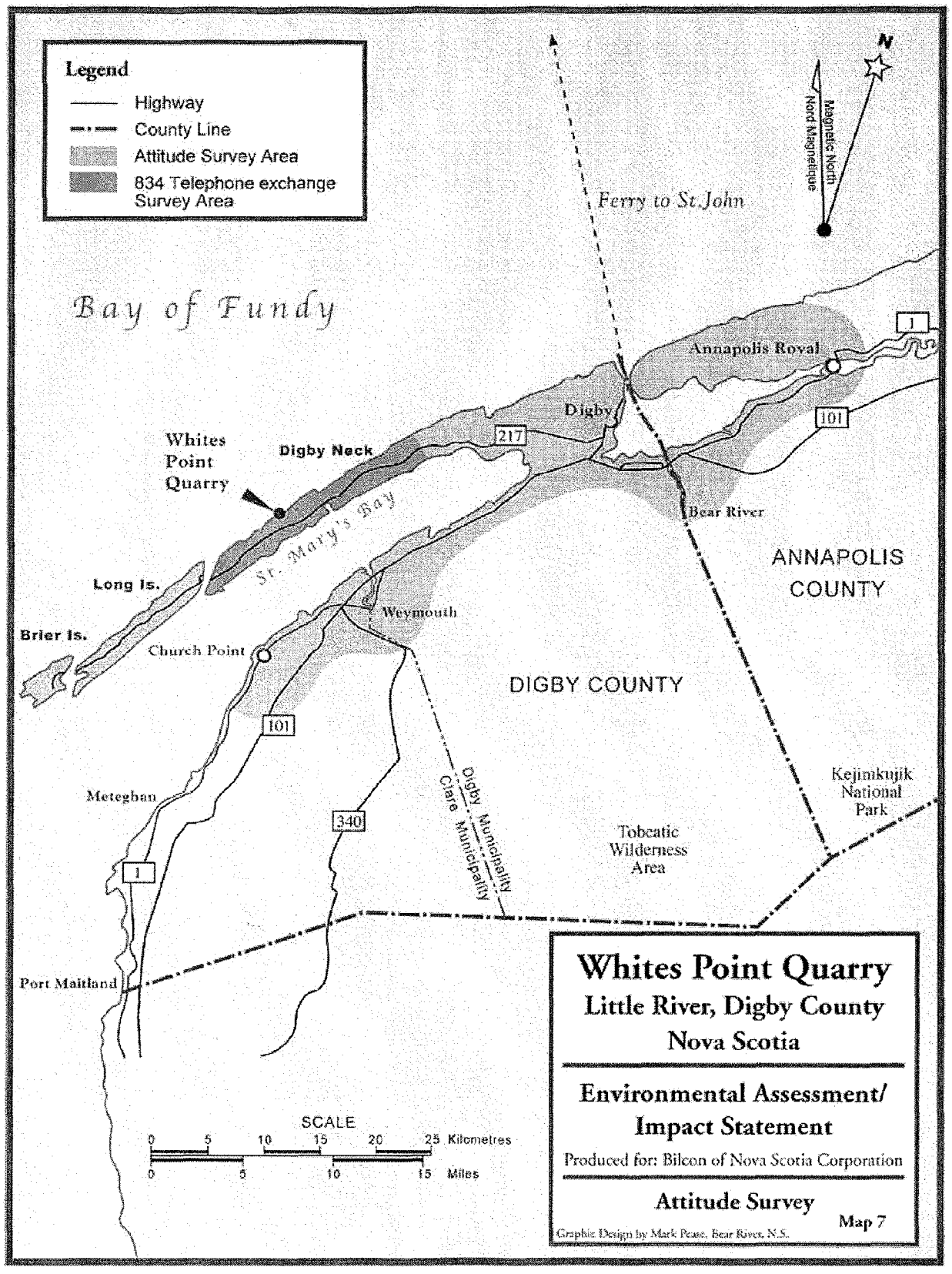

66° 00'
45° 00'
44° 30'
Bay of Fundy
Legend
Basalt (North Mountain Formation)
Lucastrine playa, sandflat, & deltaic clastic rocks, sandstone & conglomerate
Conglomerate, sandstone, siltstone, shale
Siltstone, sandstone, mudstone
Slate, schist
Mafic & felsic tuff, slate, siltstone, quartzite, rhyolite, basalt
Greywacke, slate, schist
Quartzite, conglomerate, siltstone & slate
Fine grained leucomonzogranite
Granodiorite
Muscovite biotite monzogranite
Diorite, gabbro, monzonite
Leucomonzogranite
Faults Line
Source: Geological Map ME 2000-1
Existing Basalt Rock Quarry
N
Magnetic North
Nord Magnetique
SCALE 1:500,000
0 5 10 15 20 25 30 35 40 Kilometres
0 5 10 15 20 25 Miles
Digby
Whites Point Quarry
Nova Scotia
Long Is.
Brier Is.
Meteghan
Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/ Impact Statement
Produced for: Bilcon of Nova Scotia Corporation
Regional Geology
Map 5
Graphic Design by Mark Pease, Bear River, N.S.

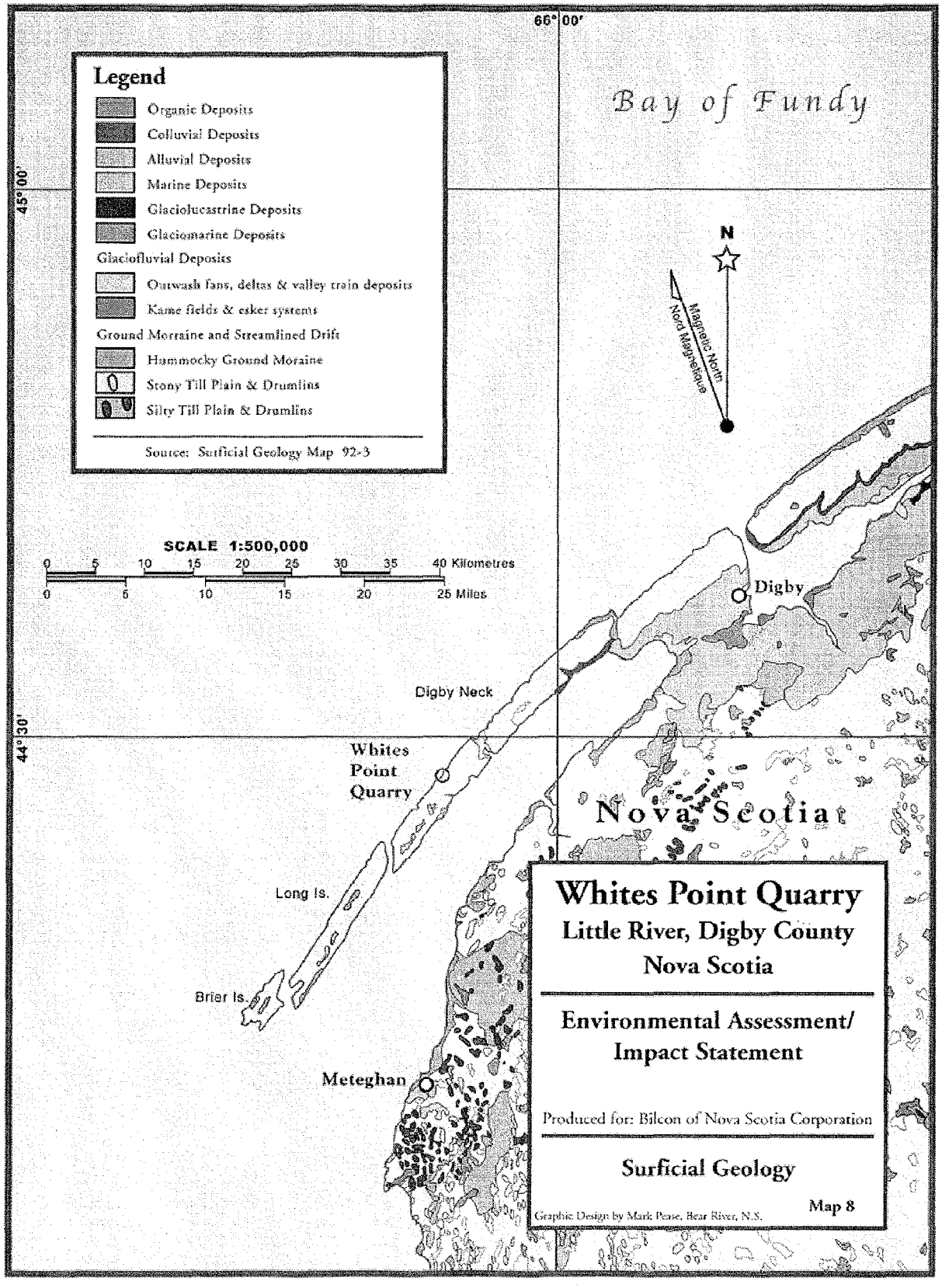

Area of Duplication
Bay of Fundy
NECK
DIGBY
NORTH
MOUNTAIN
DIGBY
NECK
St. Mary's Bay
Legend
Commercial
1. Manufacturing (vacant)
2. Farm - Farm
3. Auto Repair Shop
4. Auto Repair Shop
5. Convenience Store & Gas
6. Store (closed)
7. Craft Shop
Community
1. Community Hall
2. Volunteer Fire Department
Fishery
1. Gulliners Cove Wharf
2. Fish Processing
3. Seawall Wharf
4. Fish Processing (closed)
5. Centreville Wharf - Lobster Cars
6. Fish Processing
Tourist Accommodation & Attraction
1. Cottages
Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/ Impact Statement
Source of Information:
Elgin Consulting and Research - June 2005
Produced for: Bilson of Nova Scotia Corporation
Business and Services
Community of Digby Neck and Area
Map 6A

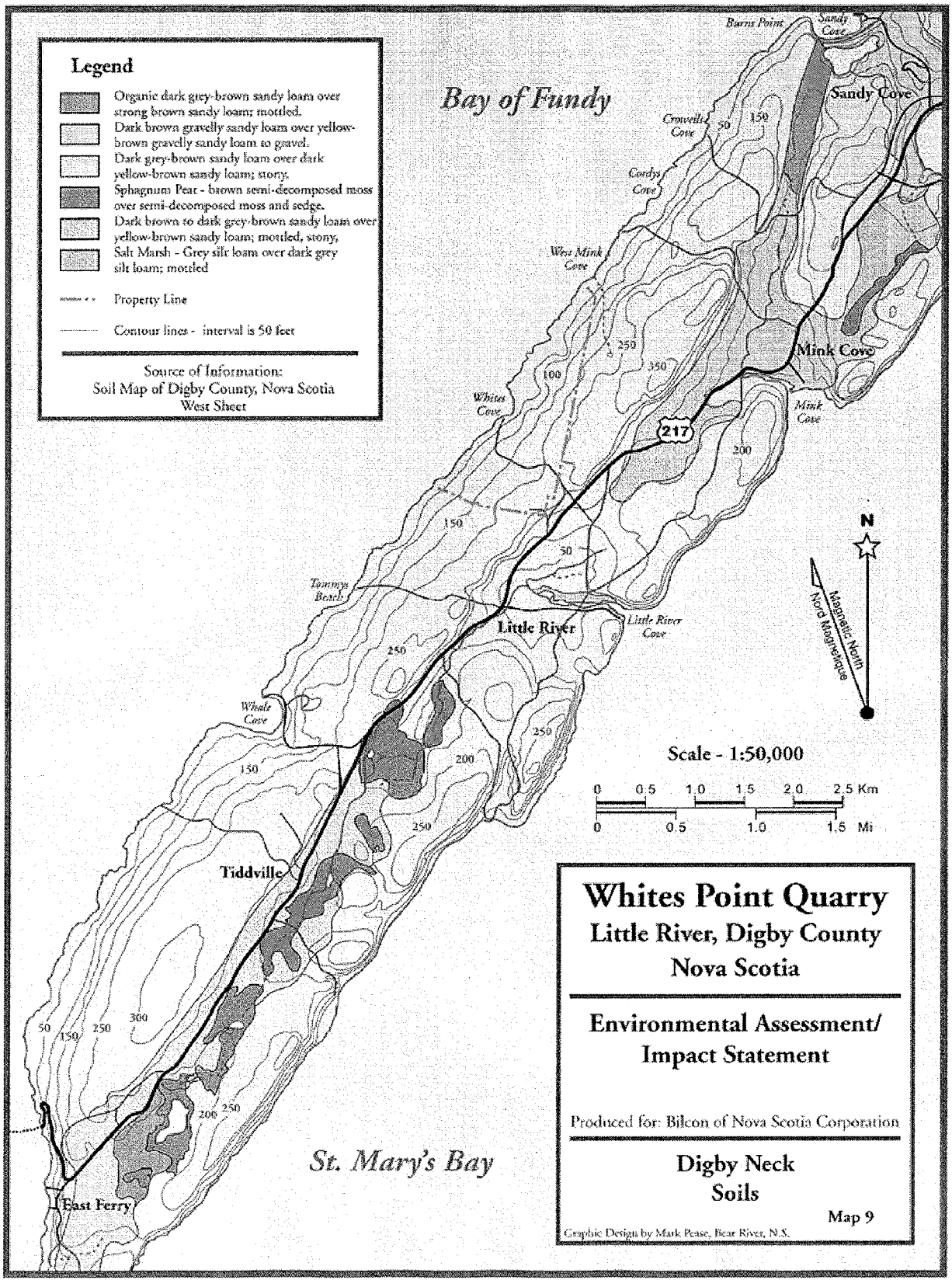
018203

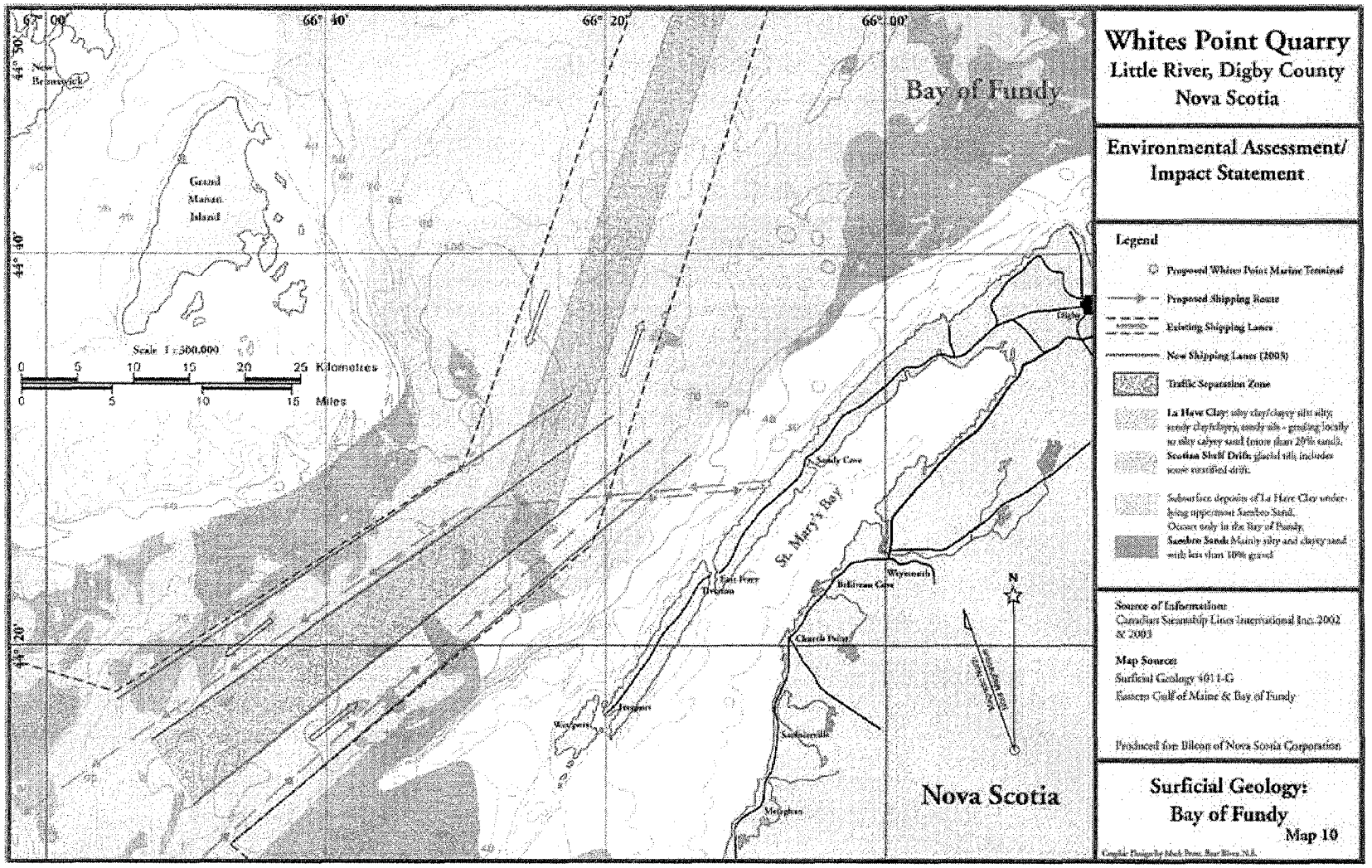

Bay of Fundy
MOUNTAIN
DIGBY
NECK
St. Mary's Bay
Area of Duplication
Legend
Commercial
8. Convenience Store
9. DOT Sand & Gravel Pit
10. Carpentry Services
11. Heating & Furnace Service
12. Auto Body Shop
13. Rock Processing
14. Consulting Services
15. Convenience Store
16. Boat Repair Shop
17. Construction Services
18. Rock Quarry
19. Convenience Store
Community
2. Volunteer Fire Department
3. Post Office (closed Sandy Cove)
4. Library (Anglican Church)
5. School
6. Post Office (Little River)
7. Post Office (Tiverton)
8. Community Hall (IOF)
9. Fire Department (Bundy Search And Rescue)
Fishery
6. Fish Processing
7. Sandy Cove West Wharf
8. Sandy Cove East Wharf
9. Fish Processing
10. Aquaculture
11. Aquaculture
12. Little River Wharf
13. Fish Processing
14. Fish Processing
15. Whale Cove Wharf
16. Aquaculture
17. East Ferry Wharf
18. Fish Holding
19. Tiverton Harbour
20. Tiverton Wharf
21. Fish Processing (closed)
Tourist Accommodation & Attraction
2. Restaurant (closed)
3. Country Inn
4. Campground (closed)
5. Whale & Seabird Cruises
6. Campground
7. Restaurant, Whale & Seabird Cruises
8. Whale & Seabird Cruises
9. Bed & Breakfast
10. Bed & Breakfast
11. Whale & Seabird Cruises
12. Whale & Seabird Cruises
13. Bed & Breakfast
14. Tourist Bureau & Museum
15. Bed & Breakfast
Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/
Impact Statement
Source of Information:
Elpin Consulting and Research - June 2005
Produced for: Wilson of Nova Scotia Corporation
Business and Services
Community of Digby Neck and Area
Map 6B

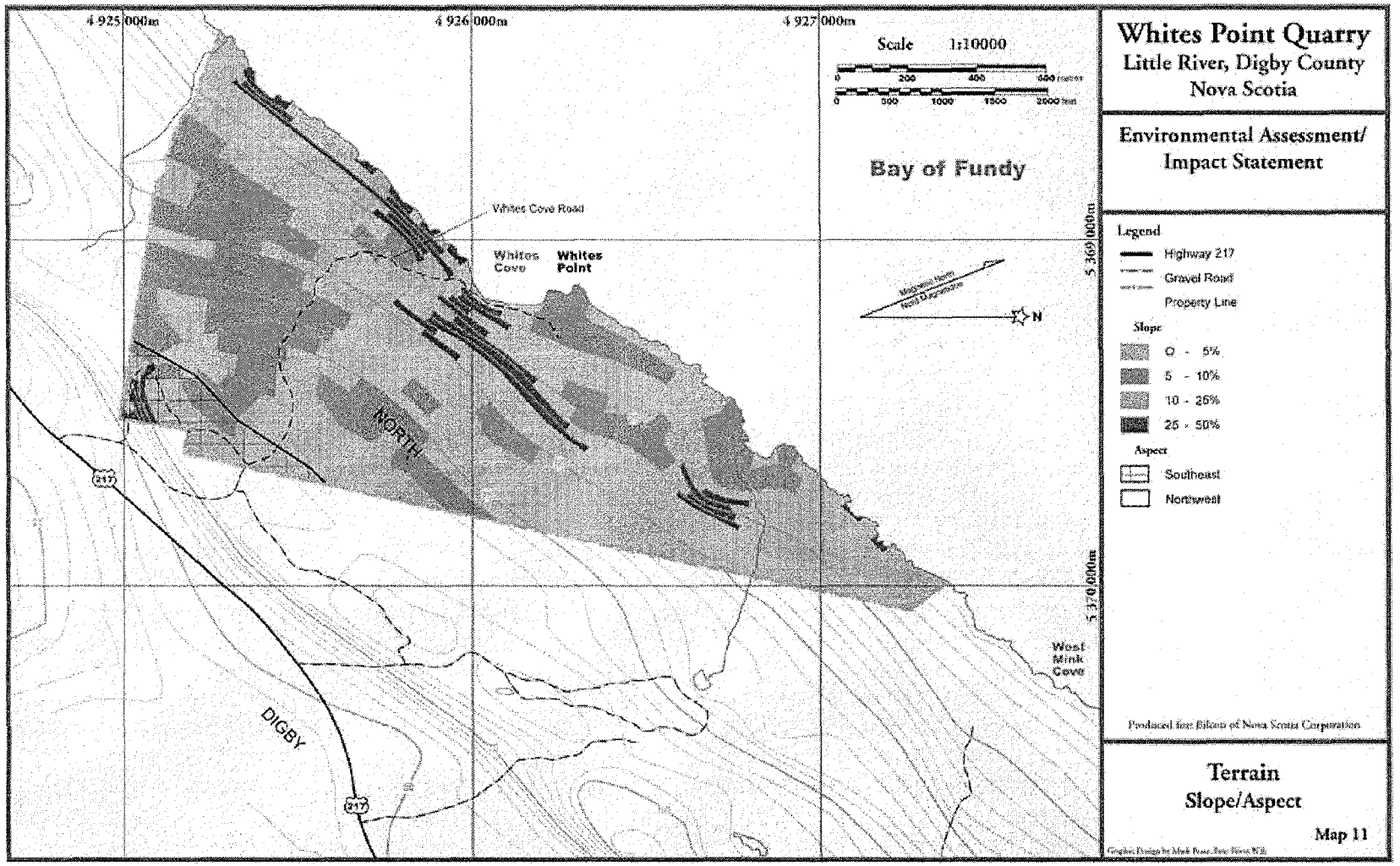
018204


Legend
Highway
County Line
Attitude Survey Area
834 Telephone exchange Survey Area
Ferry to St.John
Magnetic North
Nord Magnetique
N
Bay of Fundy
Annapolis Royal
1
Digby
101
217
Whites Point Quarry
Digby Neck
St. Mary's Bay
Bear River
ANNAPOLIS COUNTY
Long Is.
Brier Is.
Weymouth
Church Point
DIGBY COUNTY
101
Metegban
340
Digby Municipality
Clare Municipality
Kejimkujik National Park
Tobeatic Wilderness Area
1
Port Maitland
SCALE
0 5 10 15 20 25 Kilometres
0 5 10 15 Miles
Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/ Impact Statement
Produced for: Bilcon of Nova Scotia Corporation
Attitude Survey
Map 7
Graphic Design by Mark Pease, Bear River, N.S.


66° 00'
45° 00'
44° 30'
Bay of Fundy
Legend
Organic Deposits
Colluvial Deposits
Alluvial Deposits
Marine Deposits
Glaciolucastrine Deposits
Glaciomarine Deposits
Glaciofluvial Deposits
Outwash fans, deltas & valley train deposits
Kame fields & esker systems
Ground Morraine and Streamlined Drift
Hammocky Ground Moraine
Stony Till Plain & Drumlins
Silty Till Plain & Drumlins
Source: Surficial Geology Map 92-3
N
Magnetic North
Nord Magnetique
SCALE 1:500,000
0 5 10 15 20 25 30 35 40 Kilometres
0 5 10 15 20 25 Miles
Digby
Digby Neck
Whites Point Quarry
Nova Scotia
Long Is.
Brier Is.
Meteghan
Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/ Impact Statement
Produced for: Bilcon of Nova Scotia Corporation
Surficial Geology
Map 8
Graphic Design by Mark Pease, Bear River, N.S.


Legend
Organic dark grey-brown sandy loam over strong brown sandy loam; mottled.
Dark brown gravelly sandy loam over yellow-brown gravelly sandy loam to gravel.
Dark grey-brown sandy loam over dark yellow-brown sandy loam; stony.
Sphagnum Peat - brown semi-decomposed moss over semi-decomposed moss and sedge.
Dark brown to dark grey-brown sandy loam over yellow-brown sandy loam; mottled, stony.
Salt Marsh - Grey silt loam over dark grey silt loam; mottled
Property Line
Contour lines - interval is 50 feet
Source of Information:
Soil Map of Digby County, Nova Scotia
West Sheet
Bay of Fundy
St. Mary's Bay
Burns Point
Sandy Cove
Crowell's Cove
Cordys Cove
West Mink Cove
Mink Cove
Whites Cove
Tommys Beach
Little River
Little River Cove
Whale Cove
Tiddville
East Ferry
217
N
Magnetic North
Nord Magnetique
Scale - 1:50,000
0 0.5 1.0 1.5 2.0 2.5 Km
0 0.5 1.0 1.5 Mi
Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/
Impact Statement
Produced for: Bilcon of Nova Scotia Corporation
Digby Neck
Soils
Map 9
Graphic Design by Mark Pease, Bear River, N.S.

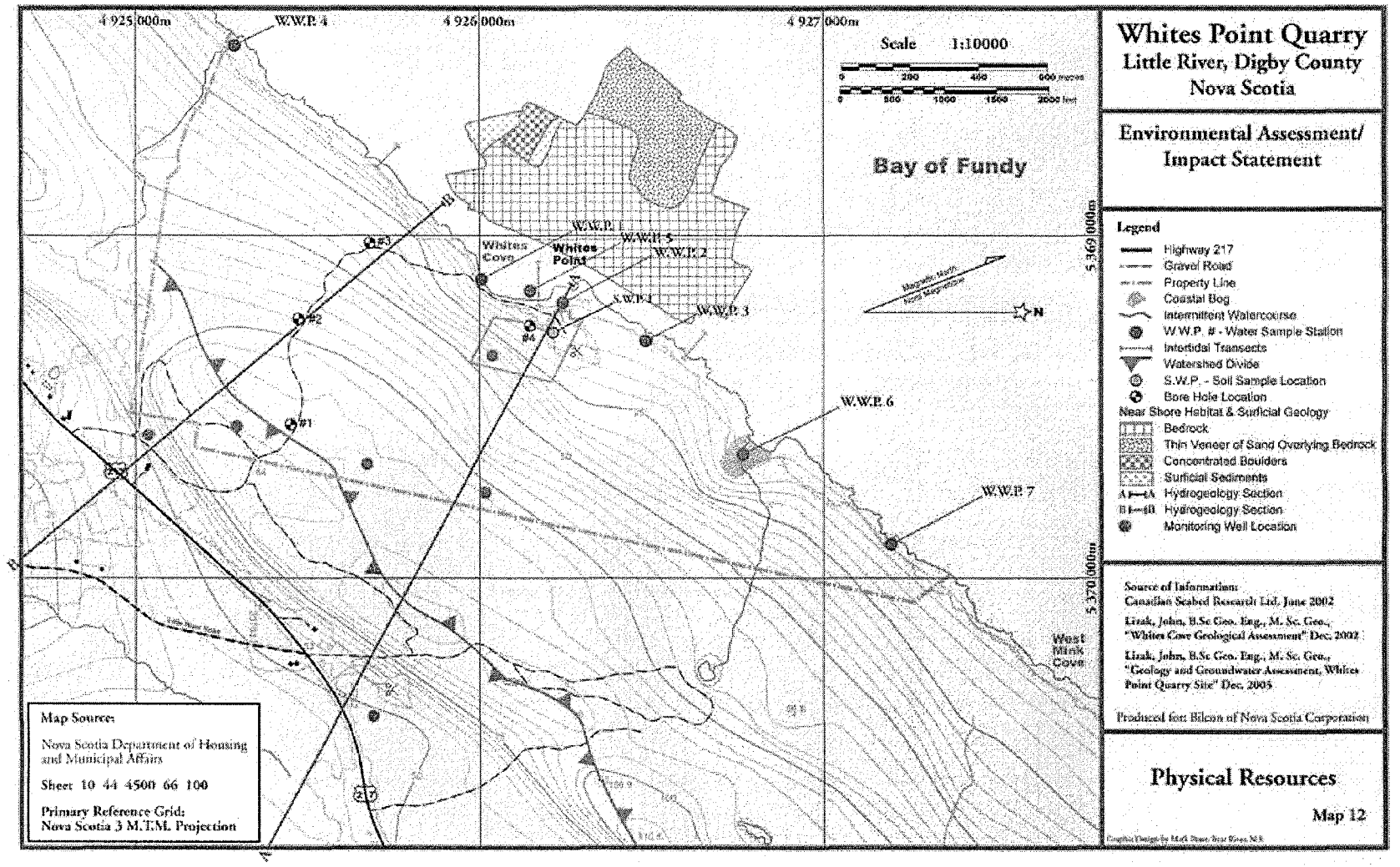

Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/
Impact Statement
Legend
Proposed Whites Point Marine Terminal
Proposed Shipping Route
Existing Shipping Lanes
New Shipping Lanes (2003)
Traffic Separation Zone
La Have Clay: silty clay/clayey silt; silty; sandy clay/clayey, sandy silt - grading locally to silty clayey sand (more than 20% sand).
Scotian Shelf Drift: glacial till; includes some stratified drift.
Subsurface deposits of La Have Clay underlying uppermost Sambro Sand. Occurs only in the Bay of Fundy.
Sambro Sand: Mainly silty and clayey sand with less than 10% gravel
Source of Information:
Canadian Steamship Lines International Inc. 2002 & 2003
Map Source:
Surficial Geology 4011-G
Eastern Gulf of Maine & Bay of Fundy
Produced for Bilcon of Nova Scotia Corporation
Surficial Geology:
Bay of Fundy
Map 10
Graphic Design by Mack Press, Bear River, N.S.
Bay of Fundy
Nova Scotia
Grand Manan Island
New Brunswick
St. Mary's Bay
Digby
Sandy Cove
Tiverton
Westport
Freeport
Bellivean Cove
Weymouth
Church Point
Meteghan
Scale 1 : 500,000
Kilometres
Miles
66° 00'
66° 40'
66° 20'
66° 00'
44° 50'
44° 40'
44° 20'
N



018209

C0001-169

C0001-170



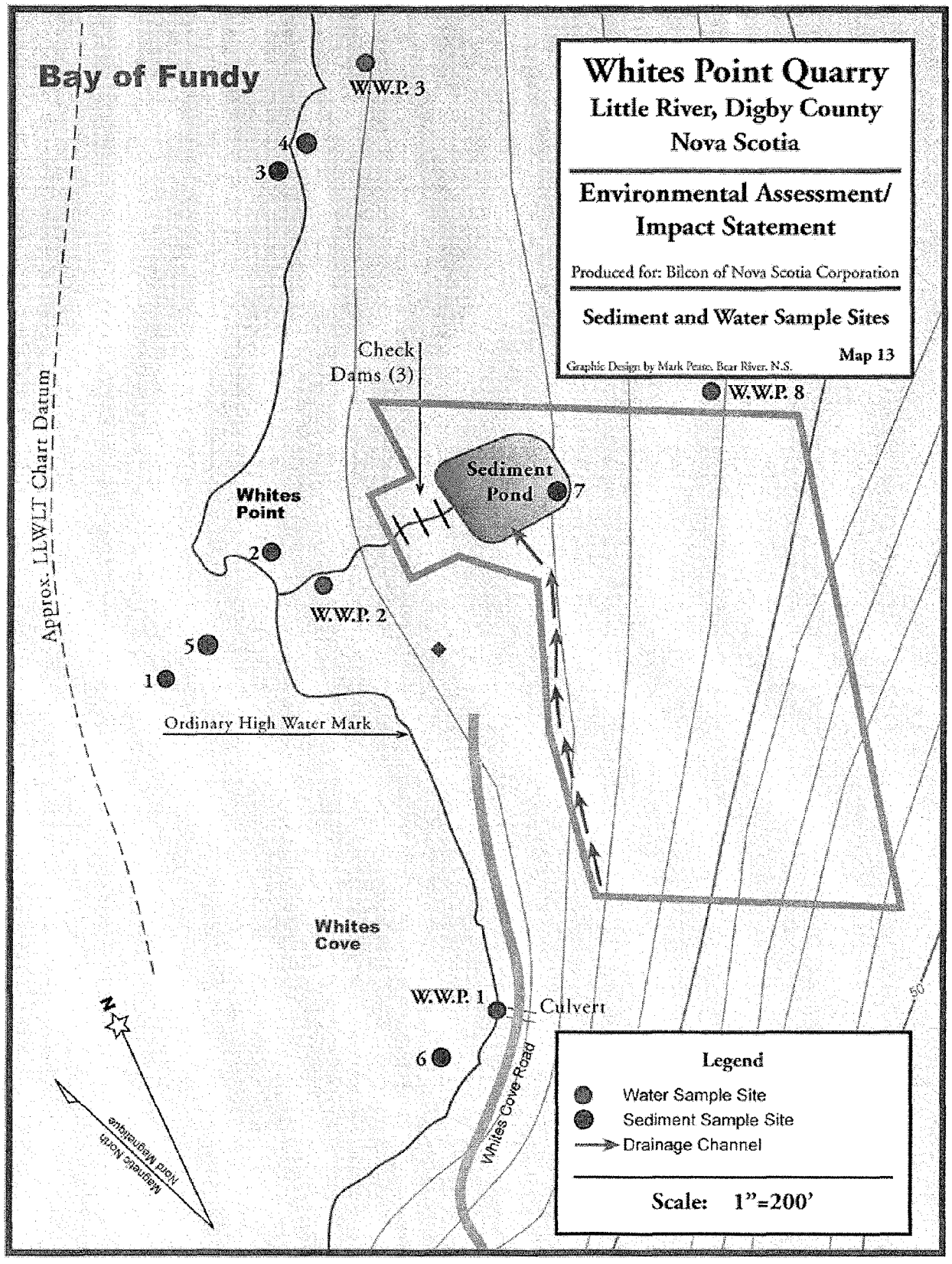
Whites Point Quarry
Little River, Digby County
Nova Scotia

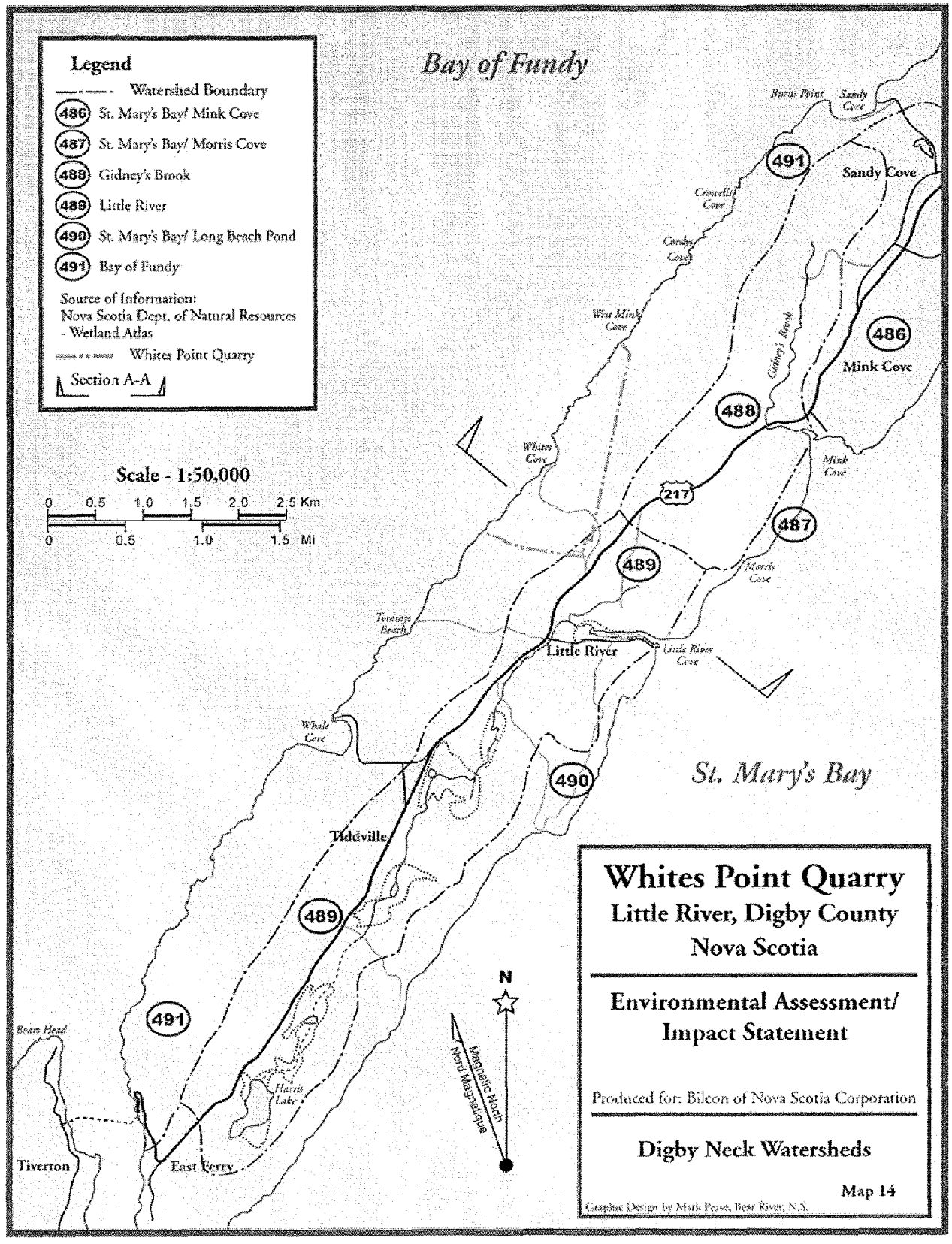
Environmental Assessment/ Impact Statement

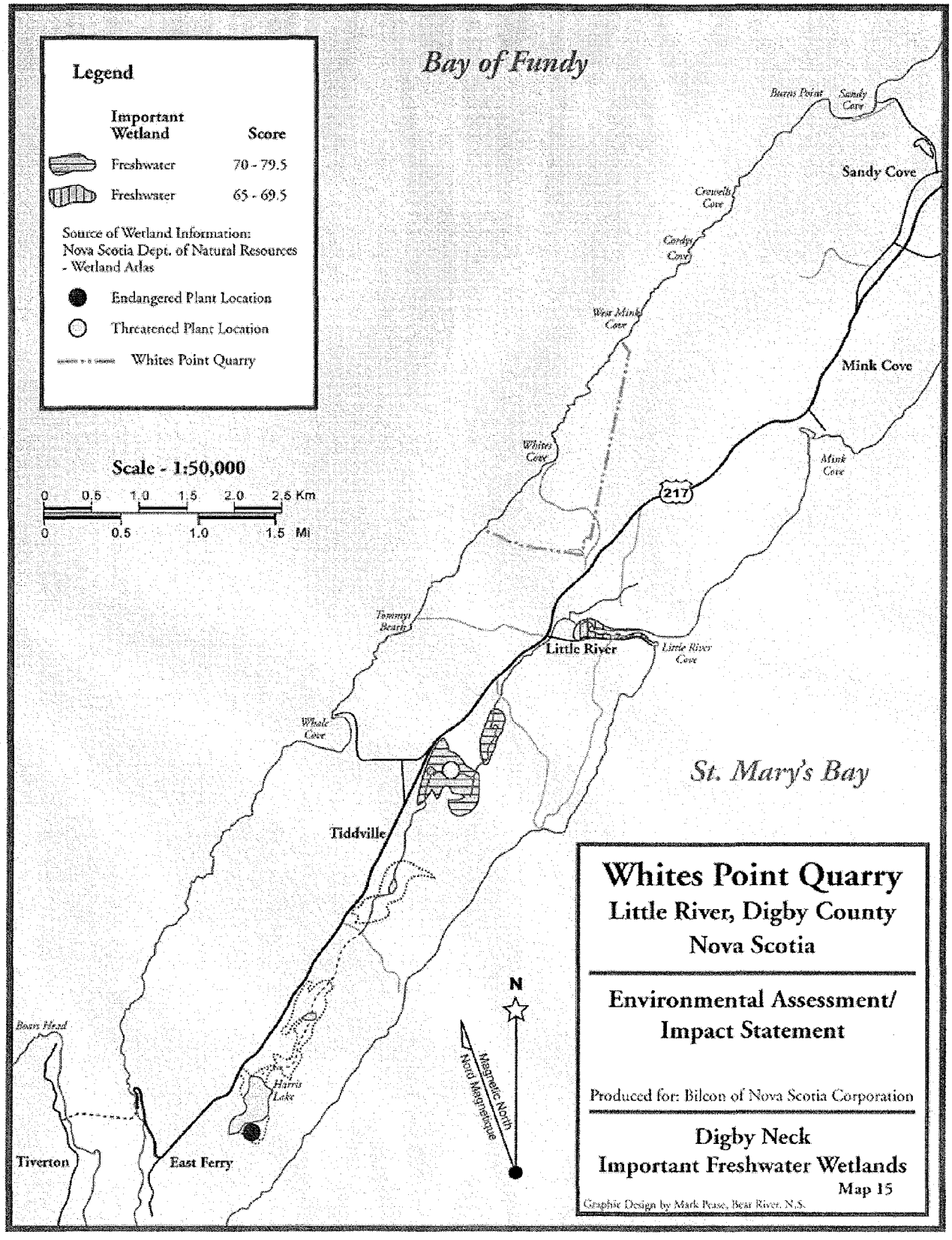
Physical Resources

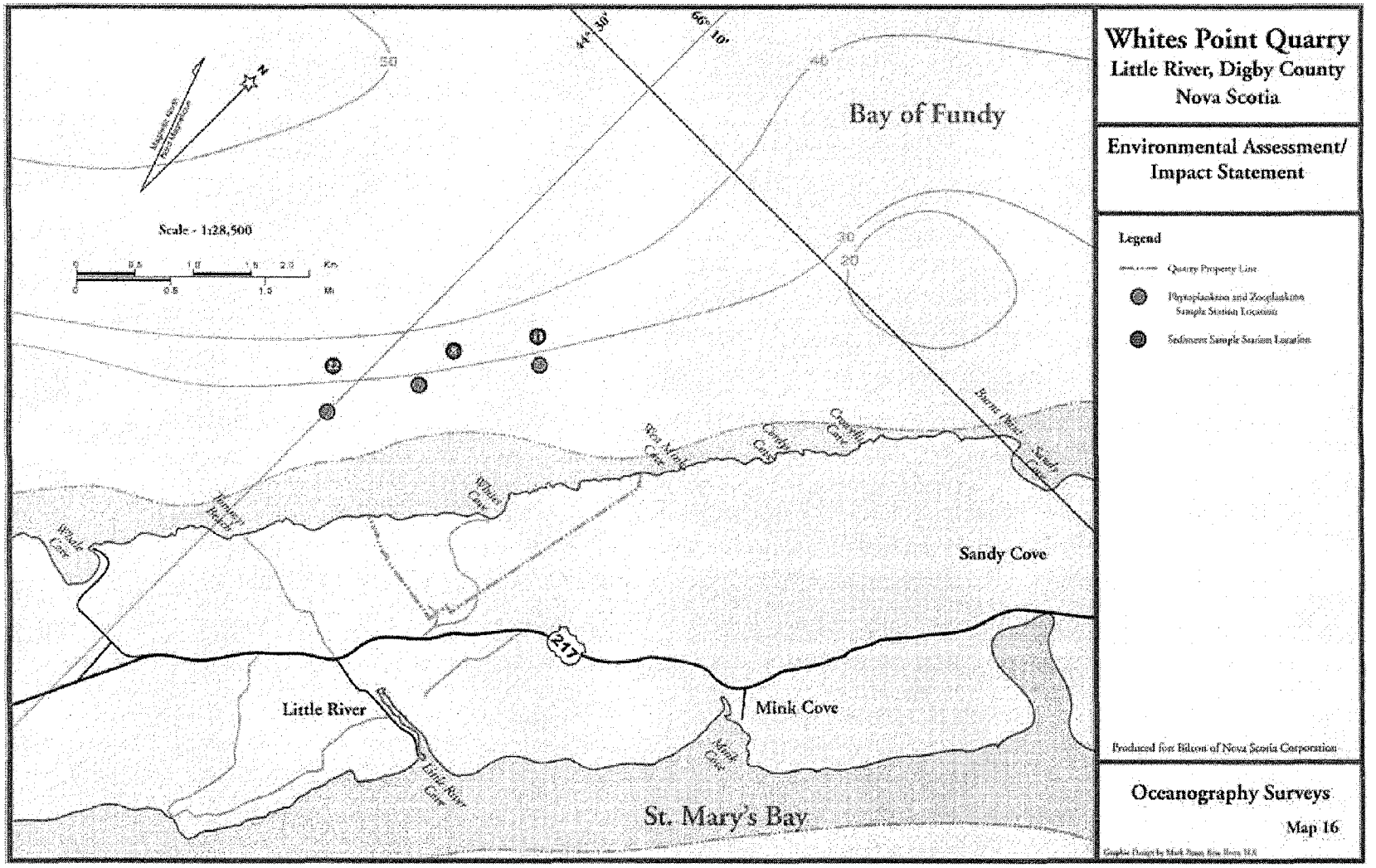
Map 12

018210


Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/
Impact Statement
Produced for: Bilcon of Nova Scotia Corporation
Sediment and Water Sample Sites
Map 13
Graphic Design by Mark Petro, Bear River, N.S.
Bay of Fundy
W.W.P. 3
4
3
Check
Dams (3)
W.W.P. 8
Sediment
Pond
7
Whites
Point
2
W.W.P. 2
5
1
Ordinary High Water Mark
Approx. LLWLT Chart Datum
Whites
Cove
W.W.P. 1
Culvert
6
Whites Cove Road
N
Magnetic North
Nord Magnétique
Legend
Water Sample Site
Sediment Sample Site
Drainage Channel
Scale: 1"=200'

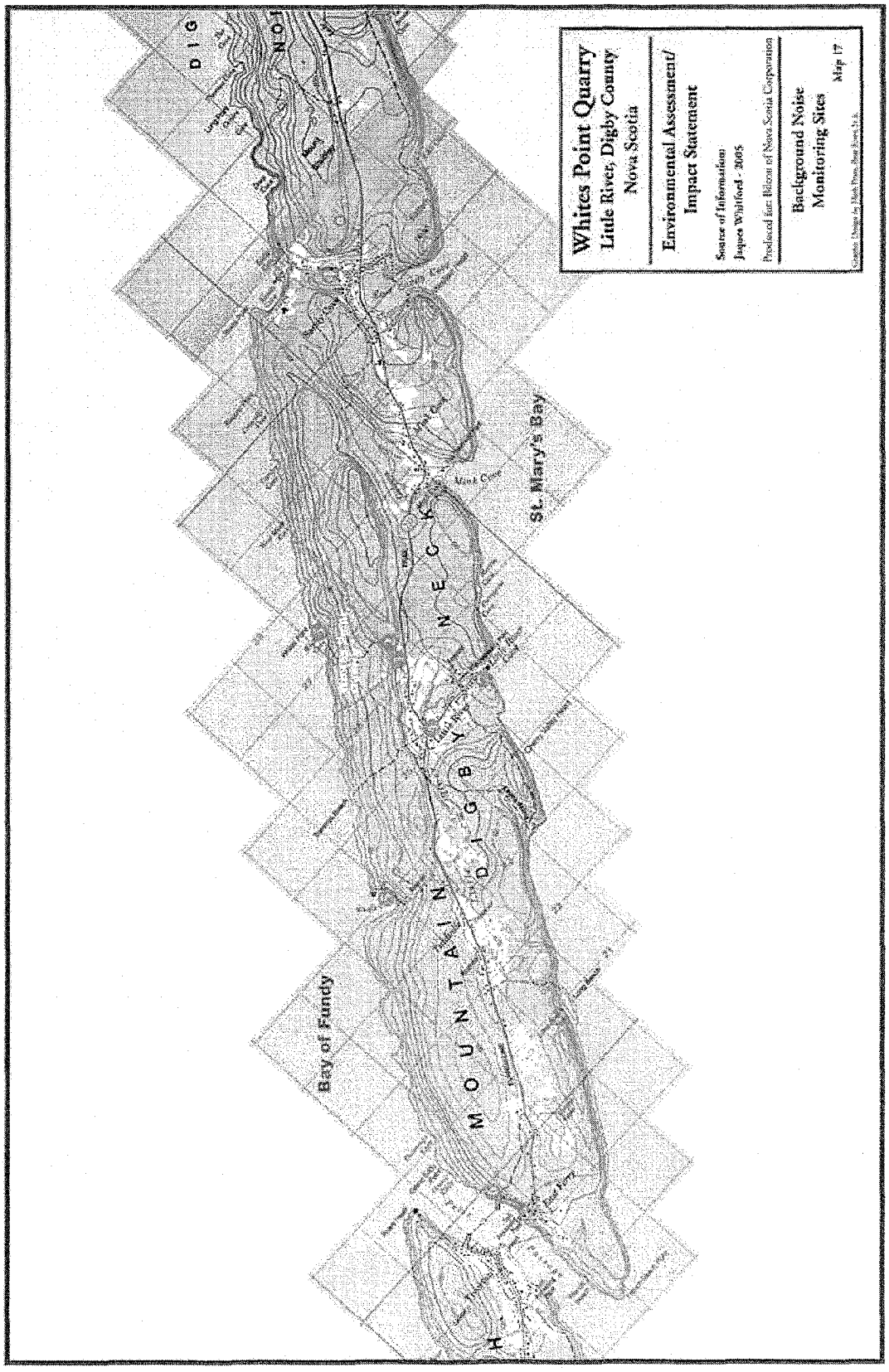

Legend
Watershed Boundary
486 St. Mary's Bay/ Mink Cove
487 St. Mary's Bay/ Morris Cove
488 Gidney's Brook
489 Little River
490 St. Mary's Bay/ Long Beach Pond
491 Bay of Fundy
Source of Information:
Nova Scotia Dept. of Natural Resources - Wetland Atlas
Whites Point Quarry
Section A-A
Scale - 1:50,000
0 0.5 1.0 1.5 2.0 2.5 Km
0 0.5 1.0 1.5 Mi
Bay of Fundy
St. Mary's Bay
Burns Point
Sandy Cove
Crowell's Cove
Gerdys Cove
West Mink Cove
Gidney's Brook
Mink Cove
Whites Cove
Morris Cove
Tommys Beach
Little River
Little River Cove
Whale Cove
Tiddville
Harris Lake
Boars Head
Tiverton
East Ferry
217
N
Magnetic North
Nord Magnetique
Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/
Impact Statement
Produced for: Bilcon of Nova Scotia Corporation
Digby Neck Watersheds
Map 14
Graphic Design by Mark Pease, Bear River, N.S.

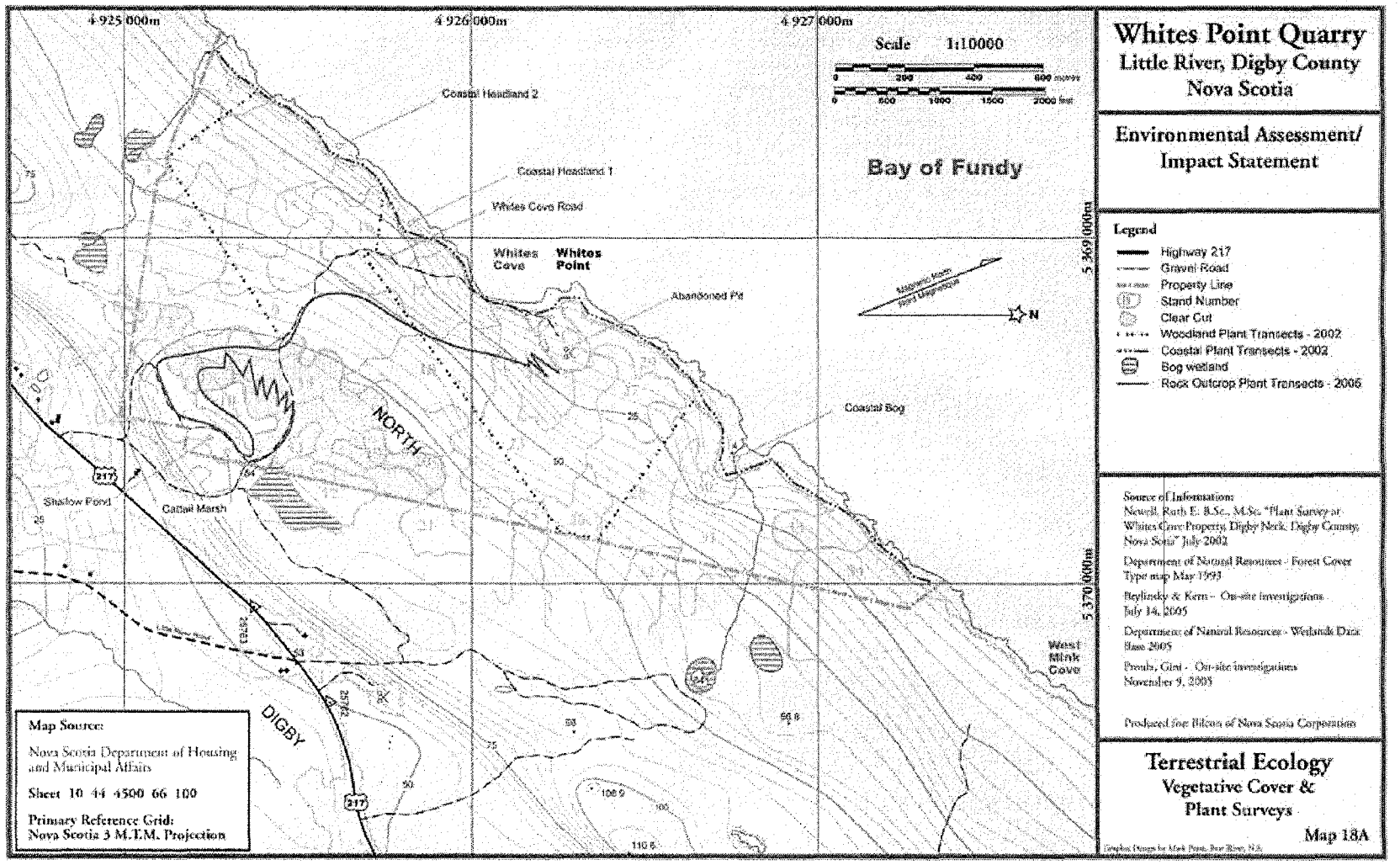

Legend
Important Wetland
Score
Freshwater 70 - 79.5
Freshwater 65 - 69.5
Source of Wetland Information: Nova Scotia Dept. of Natural Resources - Wetland Atlas
Endangered Plant Location
Threatened Plant Location
Whites Point Quarry
Scale - 1:50,000
0 0.5 1.0 1.5 2.0 2.5 Km
0 0.5 1.0 1.5 Mi
Bay of Fundy
Burns Point
Sandy Cove
Sandy Cove
Crowells Cove
Cordy Cove
West Mink Cove
Mink Cove
Mink Cove
Whites Cove
217
Tommys Beach
Little River
Little River Cove
Whale Cove
St. Mary's Bay
Tiddville
Burn Head
Harris Lake
Tiverton
East Ferry
N
Magnetic North
Nord Magnetique
Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/
Impact Statement
Produced for: Bilcon of Nova Scotia Corporation
Digby Neck
Important Freshwater Wetlands
Map 15
Graphic Design by Mark Pease, Bear River, N.S.

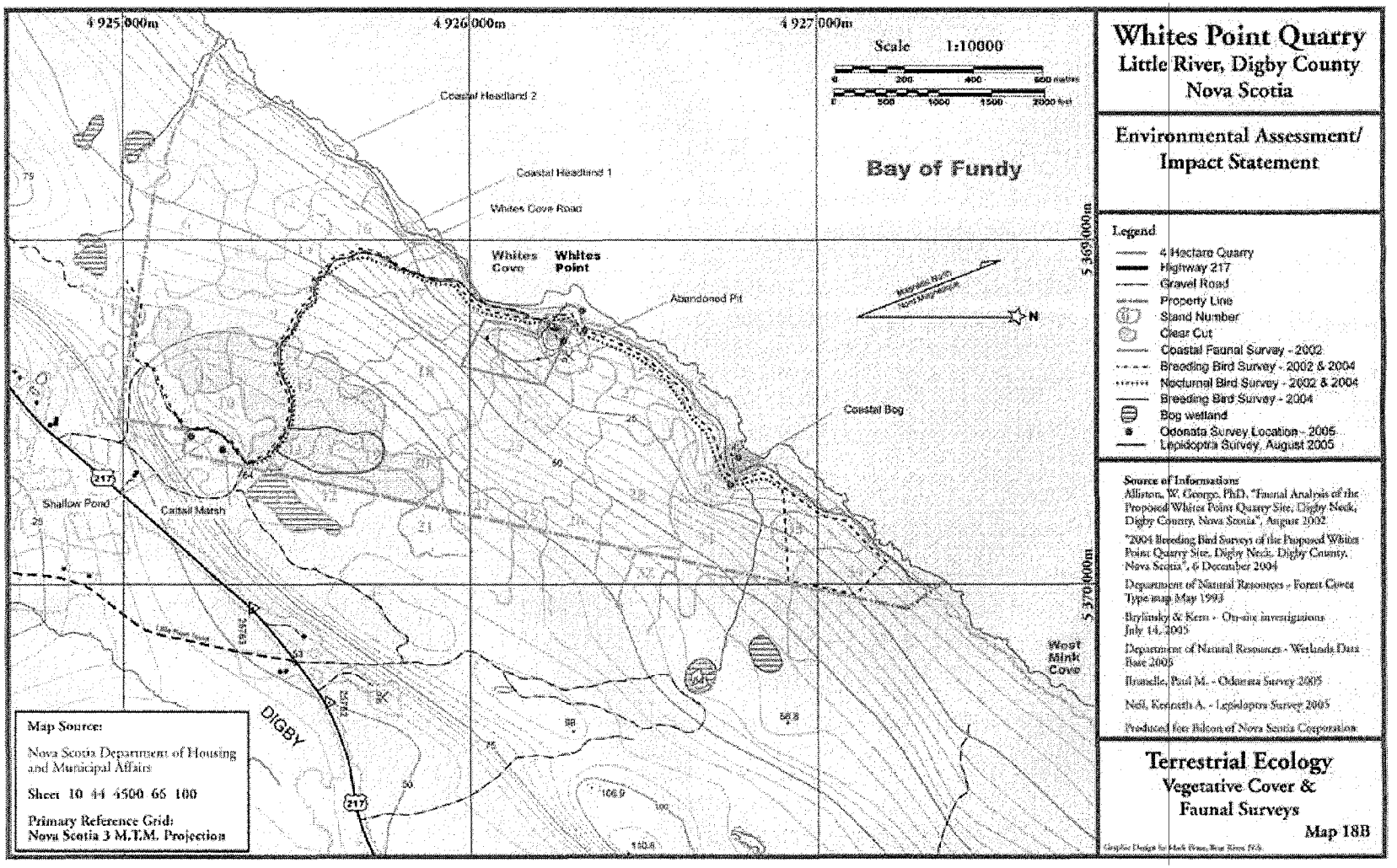


018214

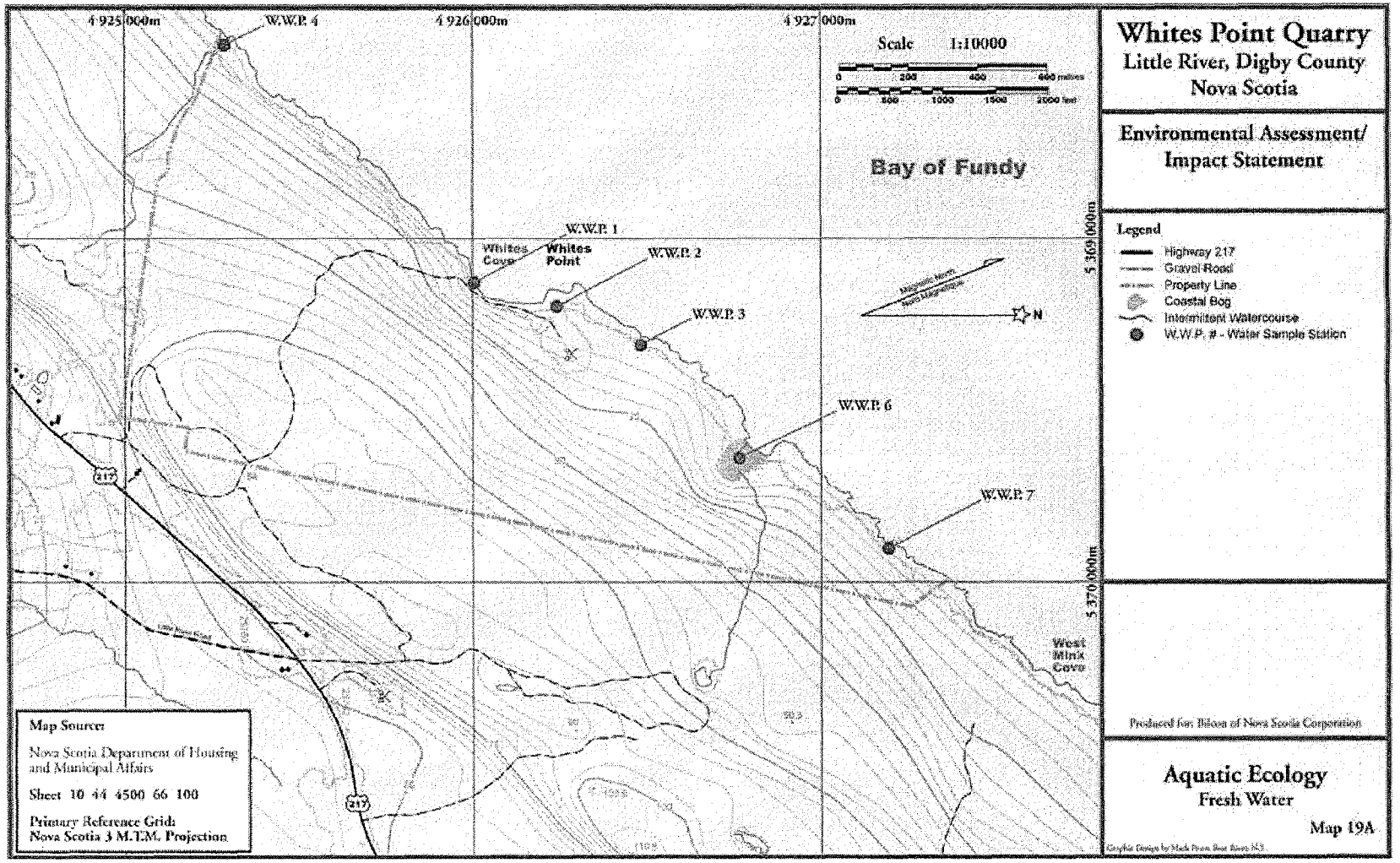
C0001-174


Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/
Impact Statement
Source of Information:
Jacques Whitford - 2005
Produced for: Bilcon of Nova Scotia Corporation
Background Noise
Monitoring Sites
Map 17
Bay of Fundy
St. Mary's Bay
MOUNTAIN
DIGBY
NECK
DIGBY
NECK

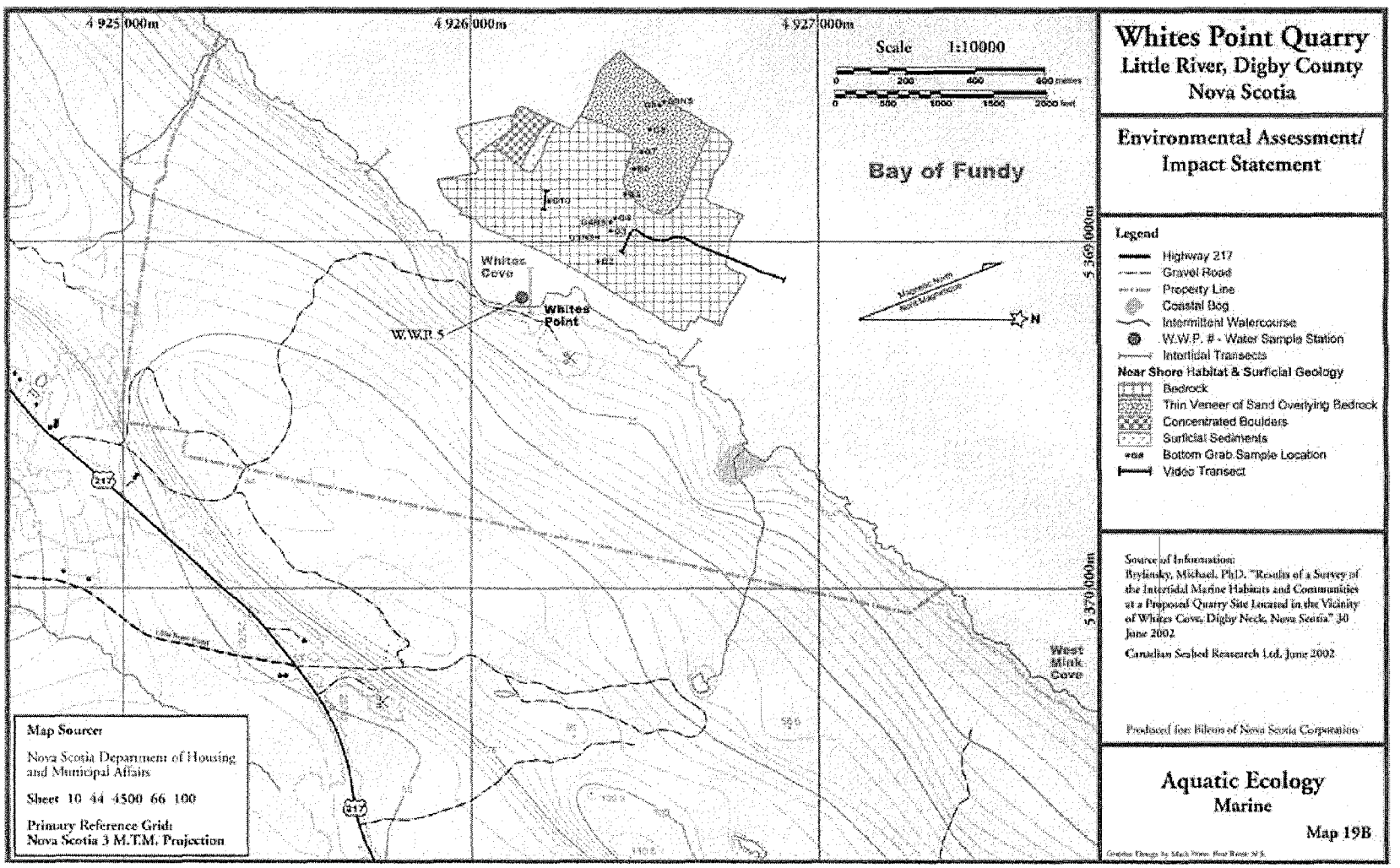

Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/
Impact Statement
Scale 1:10000
Bay of Fundy
Coastal Headland 2
Coastal Headland 1
Whites Cove Road
Whites Cove
Whites Point
Abandoned Pit
Coastal Bog
NORTH
Shadow Pond
Cattail Marsh
DIGBY
West Mink Cove
4 925 000m
4 926 000m
4 927 000m
5 369 000m
5 370 000m
Legend
Highway 217
Gravel Road
Property Line
Stand Number
Clear Cut
Woodland Plant Transects - 2002
Coastal Plant Transects - 2002
Bog wetland
Rock Outcrop Plant Transects - 2005
Source of Information:
Newell, Ruth E. B.Sc., M.Sc. "Plant Survey at Whites Cove Property, Digby Neck, Digby County, Nova Scotia" July 2002
Department of Natural Resources - Forest Cover Type map May 1993
Beylinsky & Kern - On-site investigations July 14, 2005
Department of Natural Resources - Wetlands Data Base 2005
Proulx, Gini - On-site investigations November 9, 2005
Produced for Bilcon of Nova Scotia Corporation
Map Source:
Nova Scotia Department of Housing and Municipal Affairs
Sheet 10 44 4500 66 100
Primary Reference Grid:
Nova Scotia 3 M.T.M. Projection
Terrestrial Ecology
Vegetative Cover &
Plant Surveys
Map 18A

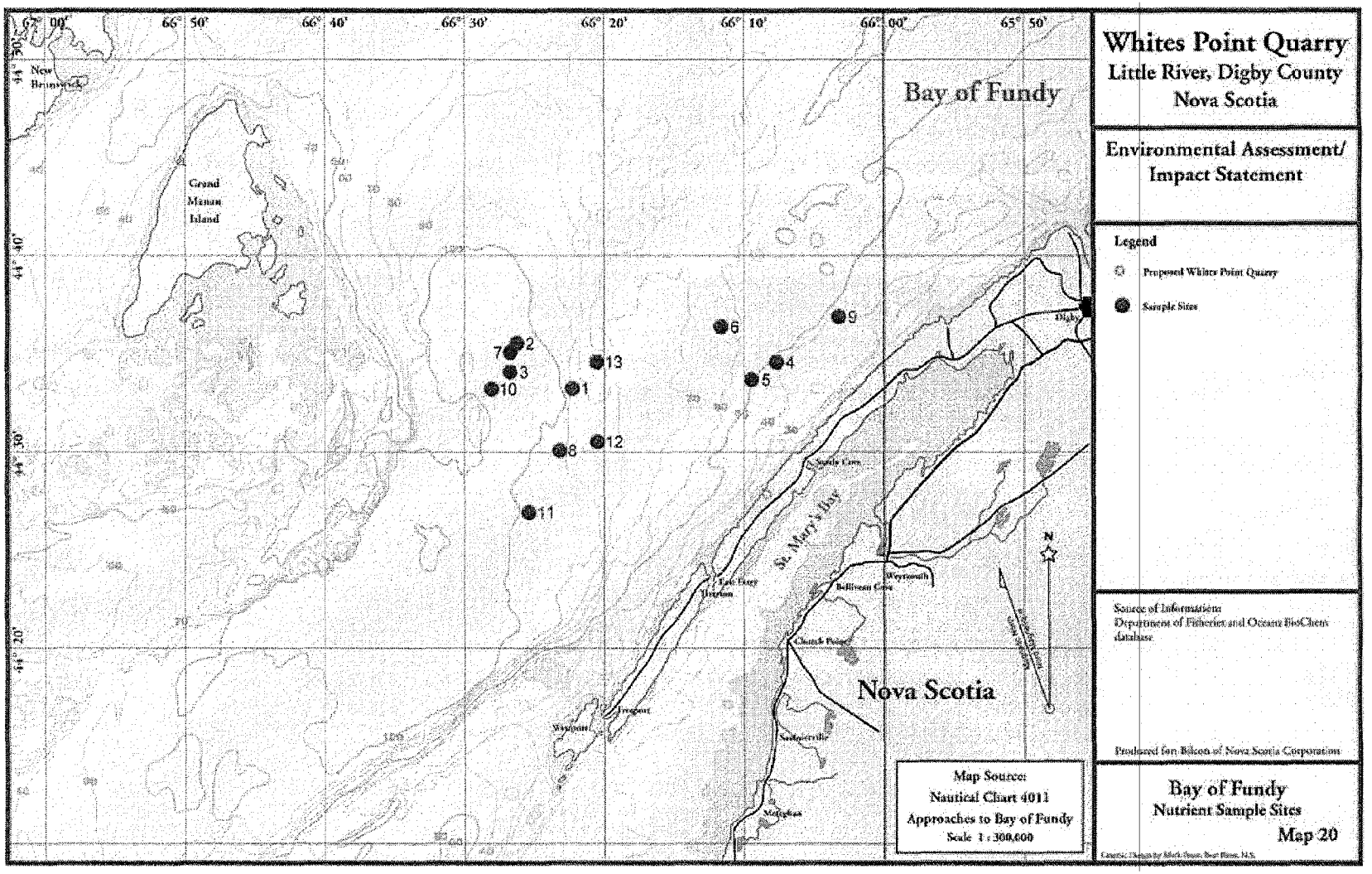

4 925 000m
4 926 000m
4 927 000m
Scale 1:10000
Coastal Headland 2
Coastal Headland 1
Whites Cove Road
Bay of Fundy
Whites Cove
Whites Point
Abandoned Pit
Coastal Bog
Shallow Pond
Cattail Marsh
DIGBY
West Mink Cove
5 369 000m
5 370 000m
N
Map Source:
Nova Scotia Department of Housing and Municipal Affairs
Sheet 10 44 4500 66 100
Primary Reference Grid:
Nova Scotia 3 M.T.M. Projection
Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/
Impact Statement
Legend
4 Hectare Quarry
Highway 217
Gravel Road
Property Line
Stand Number
Clear Cut
Coastal Faunal Survey - 2002
Breeding Bird Survey - 2002 & 2004
Nocturnal Bird Survey - 2002 & 2004
Breeding Bird Survey - 2004
Bog wetland
Odonata Survey Location - 2005
Lepidoptra Survey, August 2005
Source of Informations
Allinton, W. George, PhD. "Faunal Analysis of the Proposed Whites Point Quarry Site, Digby Neck, Digby County, Nova Scotia", August 2002
"2004 Breeding Bird Surveys of the Proposed Whites Point Quarry Site, Digby Neck, Digby County, Nova Scotia", 6 December 2004
Department of Natural Resources - Forest Cover Type map May 1993
Brylinsky & Kern - On-site investigations July 14, 2005
Department of Natural Resources - Wetlands Data Base 2005
Brundle, Paul M. - Odonata Survey 2005
Neil, Kenneth A. - Lepidoptra Survey 2005
Produced for Bilcon of Nova Scotia Corporation
Terrestrial Ecology
Vegetative Cover &
Faunal Surveys
Map 18B

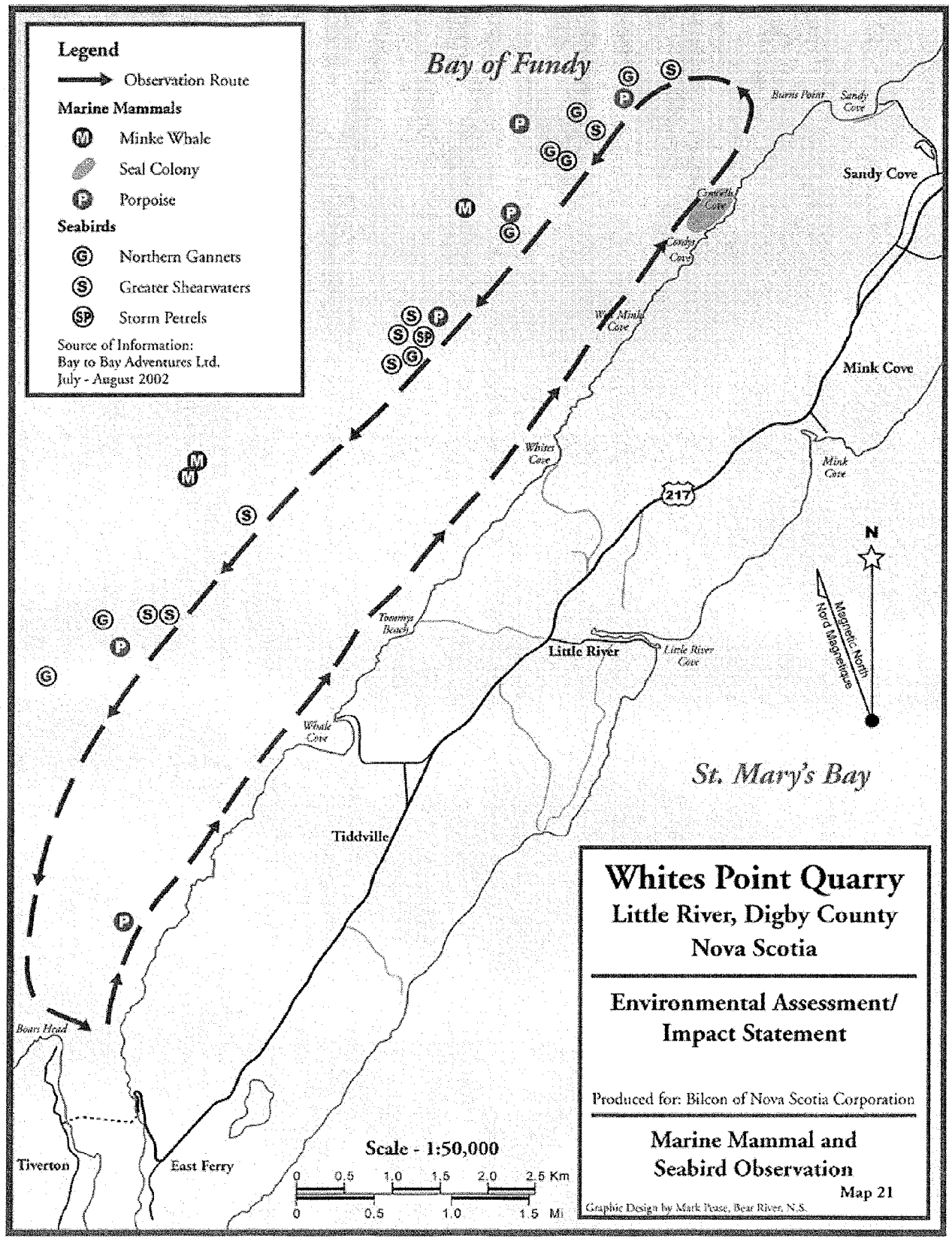
C0001-178

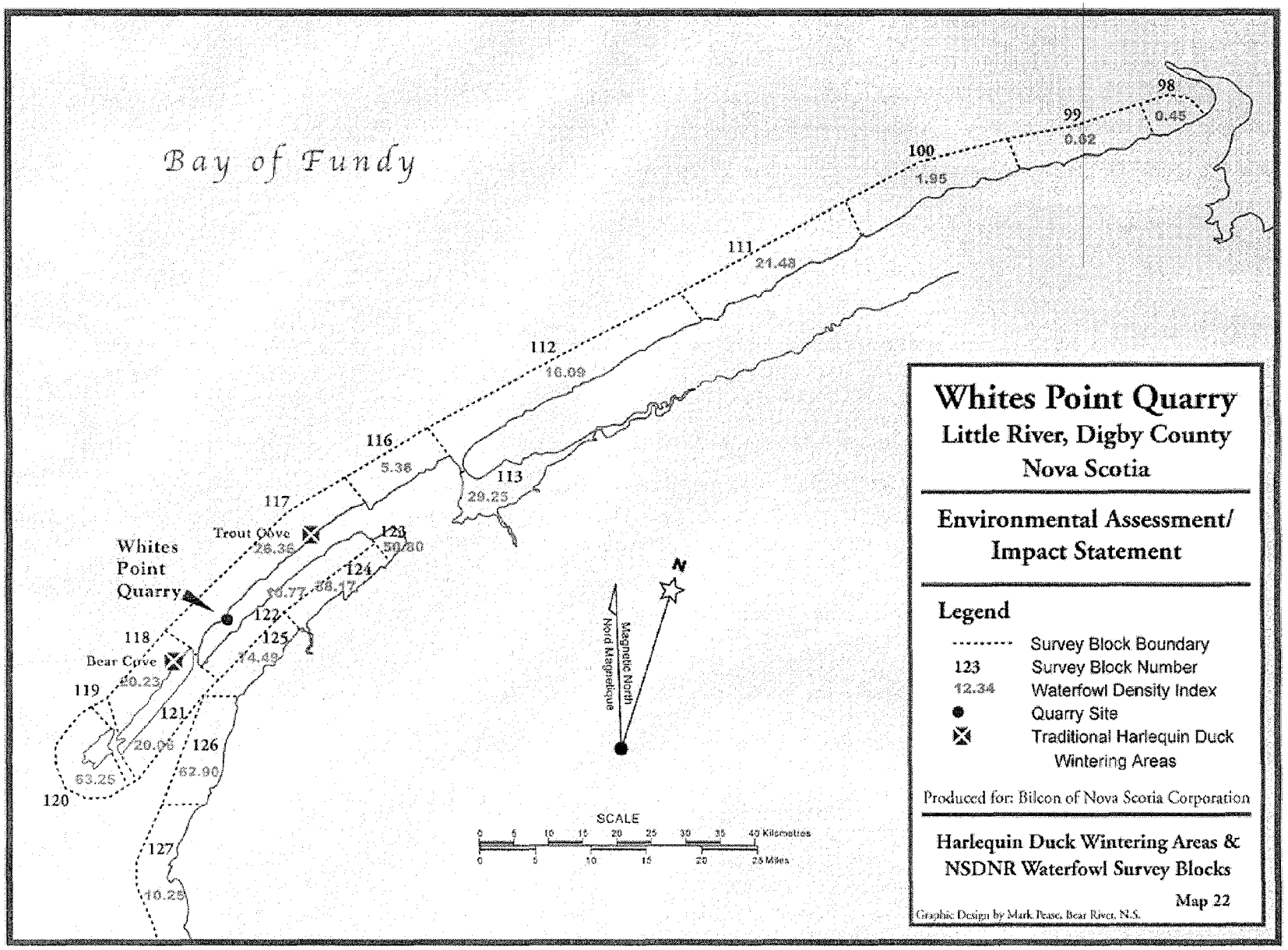


018218


Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/
Impact Statement
Scale 1:10000
0 200 400 600 meters
0 500 1000 1500 2000 feet
Bay of Fundy
4 925 000m
4 926 000m
4 927 000m
5 369 000m
5 370 000m
Whites Cove
Whites Point
W.W.P. 5
West Mink Cove
217
Magnetic North
True Magnetic
N
Legend
Highway 217
Gravel Road
Property Line
Coastal Bog
Intermittent Watercourse
W.W.P. # - Water Sample Station
Intertidal Transects
Near Shore Habitat & Surficial Geology
Bedrock
Thin Veneer of Sand Overlying Bedrock
Concentrated Boulders
Surficial Sediments
Bottom Grab Sample Location
Video Transect
Source of Information:
Brylinsky, Michael, PhD. "Results of a Survey of the Intertidal Marine Habitats and Communities at a Proposed Quarry Site Located in the Vicinity of Whites Cove, Digby Neck, Nova Scotia" 30 June 2002
Canadian Seabed Research Ltd. June 2002
Produced for Bilcon of Nova Scotia Corporation
Map Sources
Nova Scotia Department of Housing and Municipal Affairs
Sheet 10 44 4500 66 100
Primary Reference Grid:
Nova Scotia 3 M.T.M. Projection
Aquatic Ecology
Marine
Map 19B

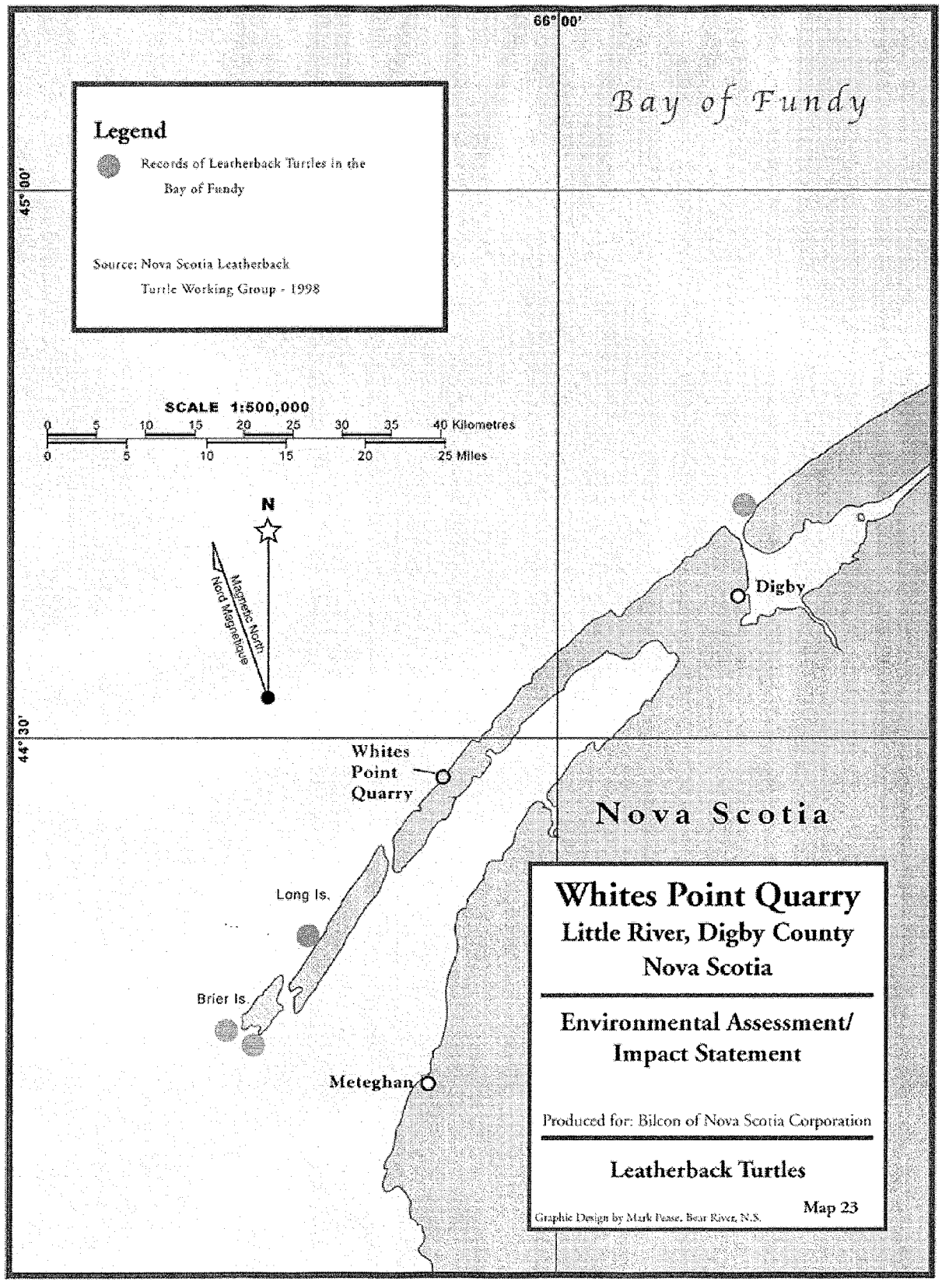

Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/
Impact Statement
Legend
Proposed Whites Point Quarry
Sample Sites
Source of Information:
Department of Fisheries and Oceans BioChem database
Produced for Balcon of Nova Scotia Corporation
Bay of Fundy
Nutrient Sample Sites
Map 20
Bay of Fundy
Nova Scotia
New Brunswick
Grand Manan Island
St. Mary's Bay
Digby
Weymouth
Bellivean Cove
Westport
Map Source:
Nautical Chart 4011
Approaches to Bay of Fundy
Scale 1 : 300,000
N
1
2
3
4
5
6
7
8
9
10
11
12
13

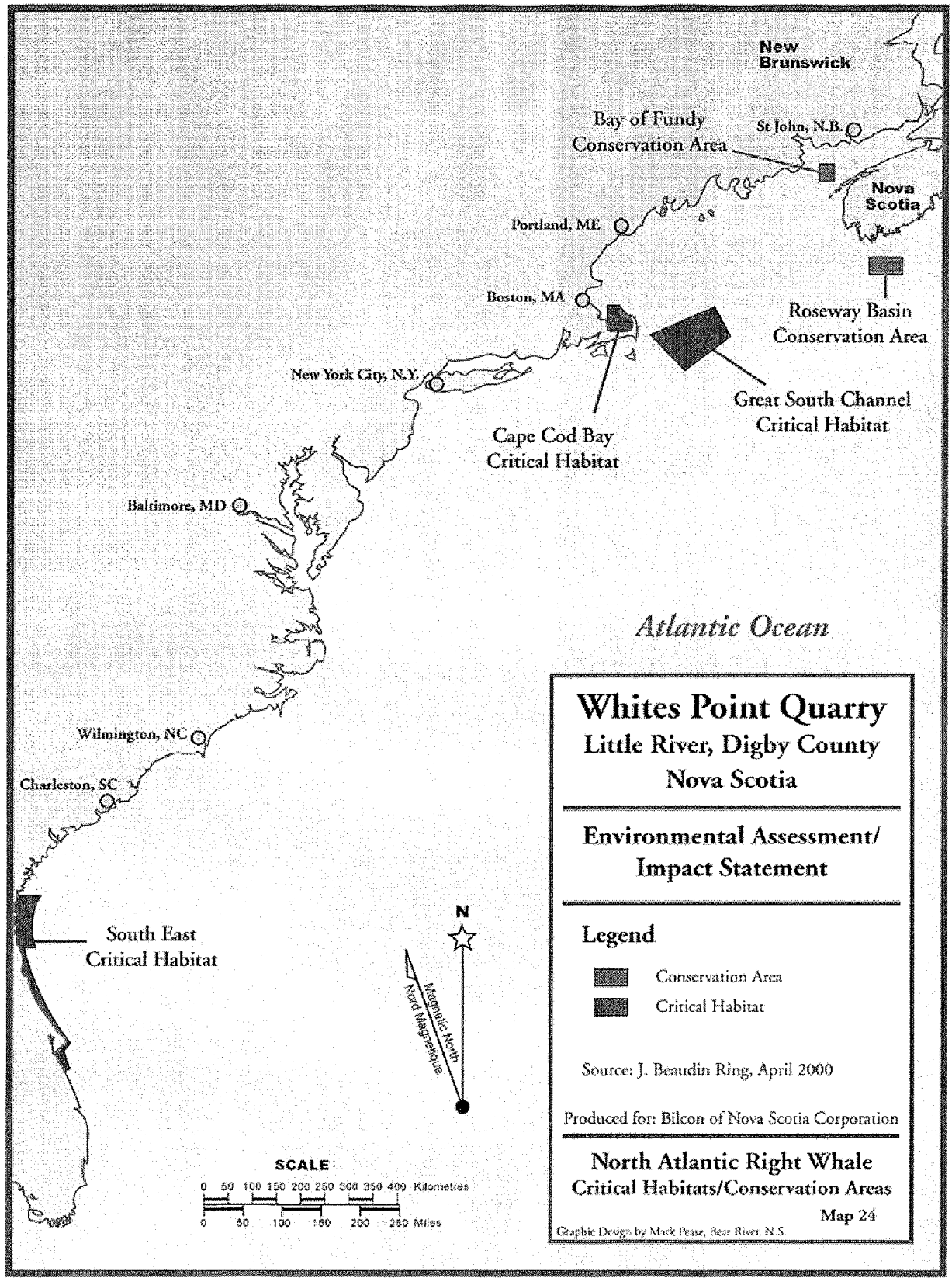

Legend
Observation Route
Marine Mammals
Minke Whale
Seal Colony
Porpoise
Seabirds
Northern Gannets
Greater Shearwaters
Storm Petrels
Source of Information:
Bay to Bay Adventures Ltd.
July - August 2002
Bay of Fundy
Burns Point
Sandy Cove
Sandy Cove
Cornelia Cove
Conley Cove
West Minks Cove
Mink Cove
Mink Cove
Whites Cove
217
N
Magnetic North
Nord Magnetique
Tommy Beach
Little River
Little River Cove
Whale Cove
St. Mary's Bay
Tiddville
Boars Head
Tiverton
East Ferry
Scale - 1:50,000
0 0.5 1.0 1.5 2.0 2.5 Km
0 0.5 1.0 1.5 Mi
Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/
Impact Statement
Produced for: Bilcon of Nova Scotia Corporation
Marine Mammal and
Seabird Observation
Map 21
Graphic Design by Mark Pease, Bear River, N.S.

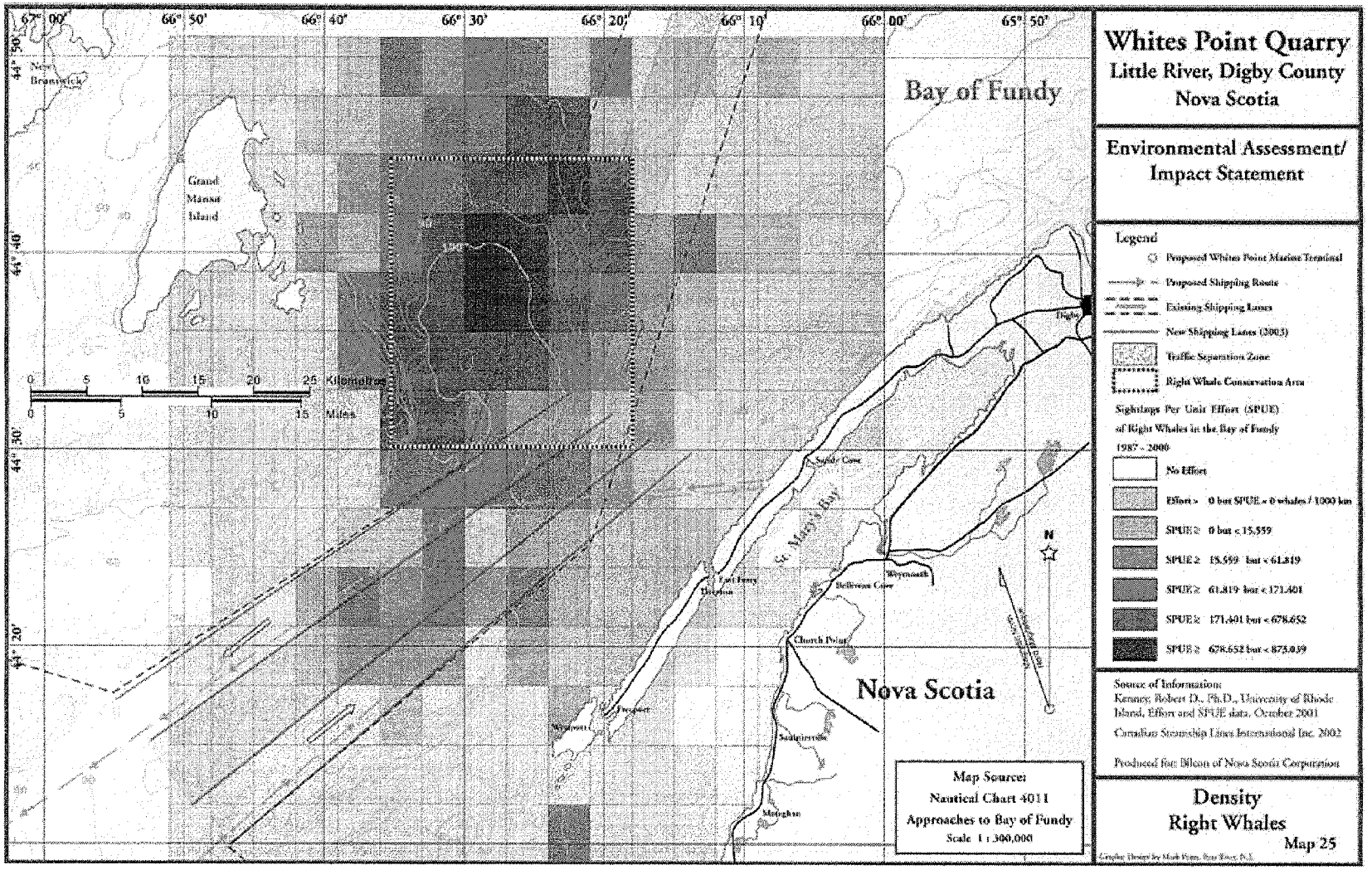


018222

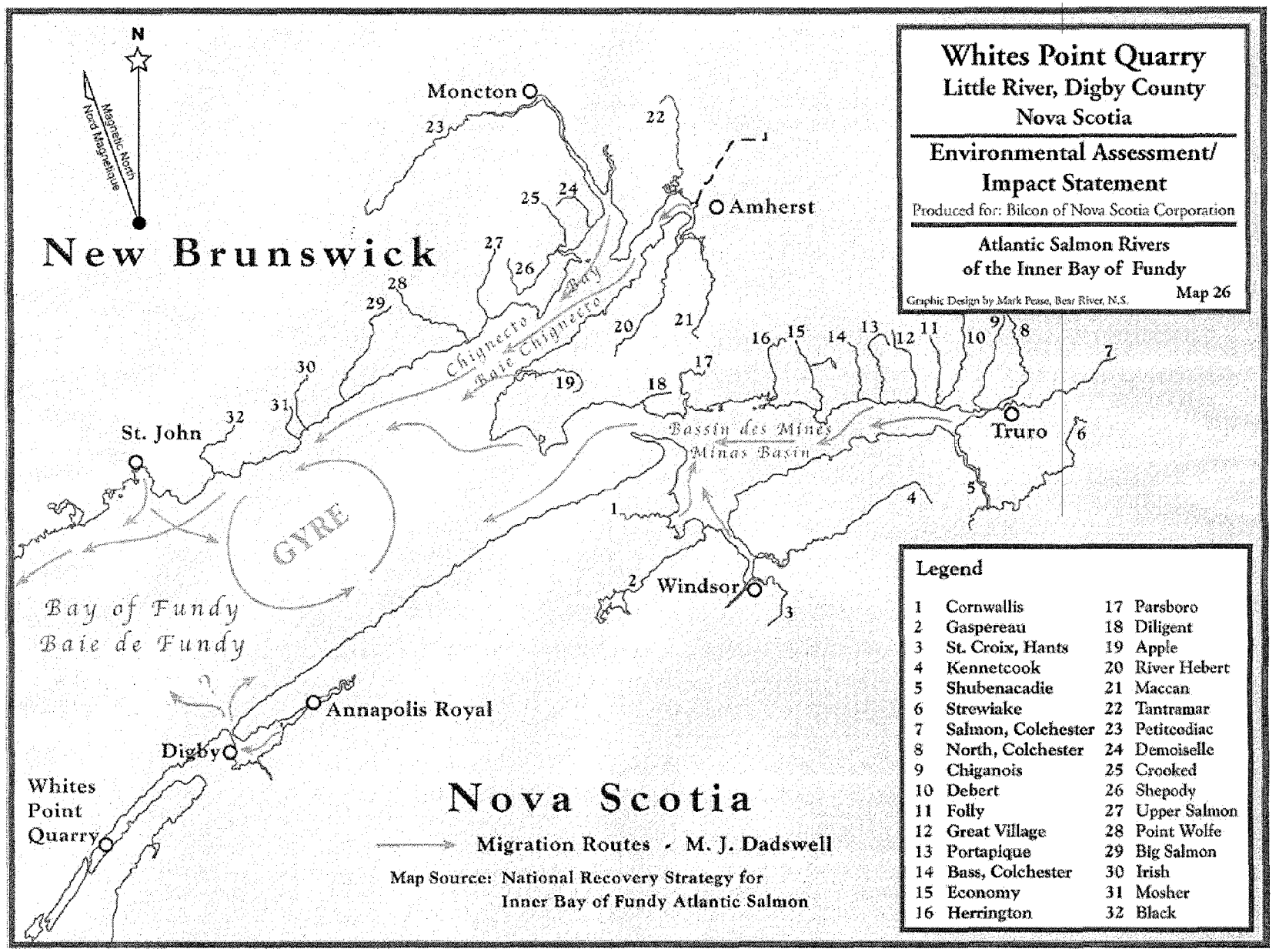
C0001-182


66° 00'
Bay of Fundy
Legend
Records of Leatherback Turtles in the Bay of Fundy
Source: Nova Scotia Leatherback Turtle Working Group - 1998
45° 00'
SCALE 1:500,000
0 5 10 15 20 25 30 35 40 Kilometres
0 5 10 15 20 25 Miles
N
Magnetic North
Nord Magnetique
Digby
44° 30'
Whites Point Quarry
Nova Scotia
Long Is.
Brier Is.
Meteghan
Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/ Impact Statement
Produced for: Bilcon of Nova Scotia Corporation
Leatherback Turtles
Map 23
Graphic Design by Mark Pease, Bear River, N.S.

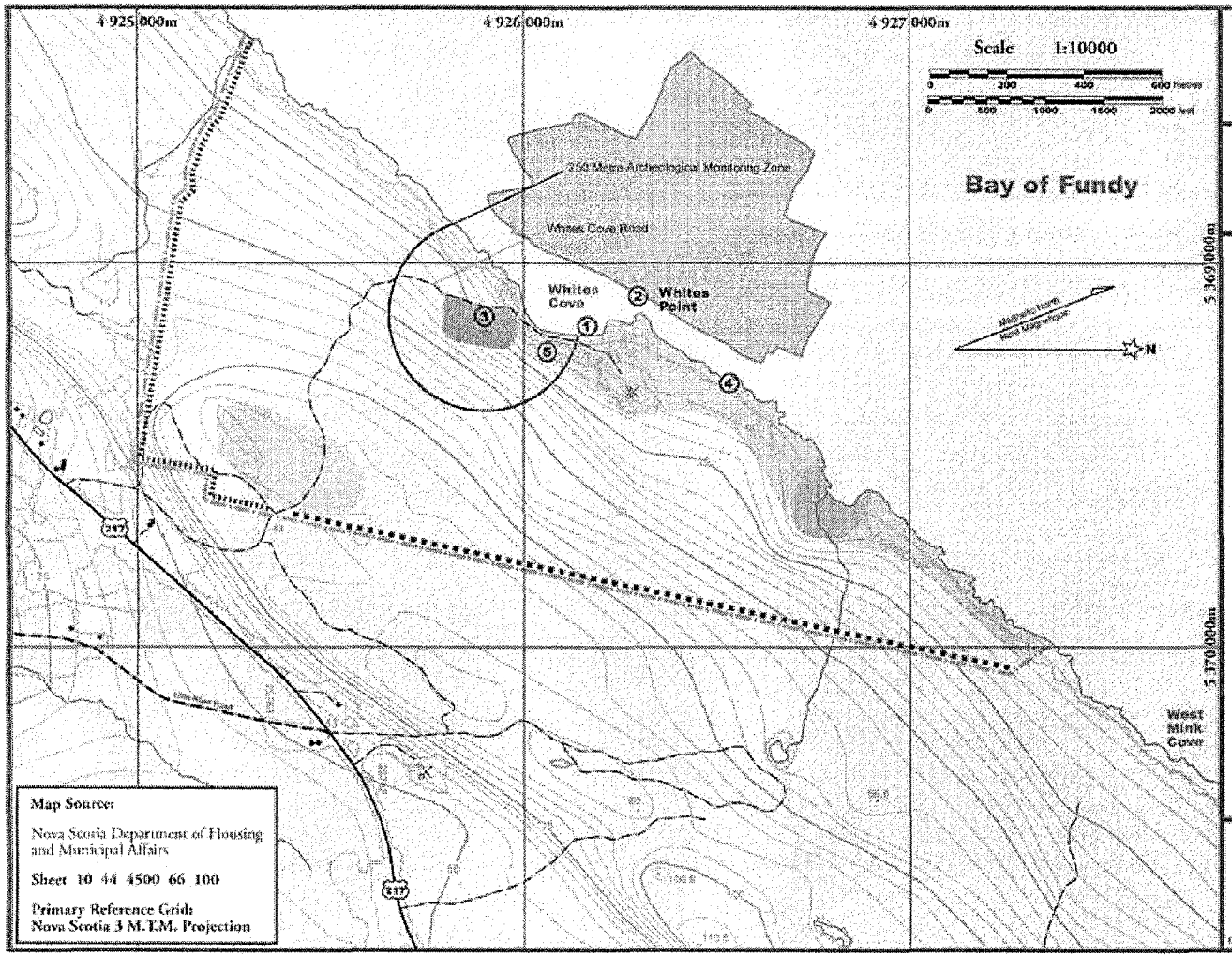

New Brunswick
Bay of Fundy Conservation Area
St John, N.B.
Nova Scotia
Portland, ME
Boston, MA
Roseway Basin Conservation Area
New York City, N.Y.
Great South Channel Critical Habitat
Cape Cod Bay Critical Habitat
Baltimore, MD
Atlantic Ocean
Wilmington, NC
Charleston, SC
South East Critical Habitat
N
Magnetic North
Nord Magnétique
SCALE
0 50 100 150 200 250 300 350 400 Kilometres
0 50 100 150 200 250 Miles
Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/ Impact Statement
Legend
Conservation Area
Critical Habitat
Source: J. Beaudin Ring, April 2000
Produced for: Bilcon of Nova Scotia Corporation
North Atlantic Right Whale
Critical Habitats/Conservation Areas
Map 24
Graphic Design by Mark Pease, Bear River, N.S.


Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/
Impact Statement
Legend
Proposed Whites Point Marine Terminal
Proposed Shipping Route
Existing Shipping Lanes
New Shipping Lanes (2003)
Traffic Separation Zone
Right Whale Conservation Area
Sightings Per Unit Effort (SPUE)
of Right Whales in the Bay of Fundy
1987 - 2000
No Effort
Effort > 0 but SPUE = 0 whales / 1000 km
SPUE ≥ 0 but < 15.559
SPUE ≥ 15.559 but < 61.819
SPUE ≥ 61.819 but < 171.401
SPUE ≥ 171.401 but < 678.652
SPUE ≥ 678.652 but < 875.039
Source of Information:
Kenney, Robert D., Ph.D., University of Rhode Island, Effort and SPUE data, October 2001
Canadian Steamship Lines International Inc. 2002
Produced for: Bilcon of Nova Scotia Corporation
Density
Right Whales
Map 25
Bay of Fundy
Nova Scotia
Grand Manan Island
St. Mary's Bay
Digby
Map Source:
Nautical Chart 4011
Approaches to Bay of Fundy
Scale 1 : 300,000
0 5 10 15 20 25 Kilometres
0 5 10 15 Miles
N

C0001-186



018226



Whites Point Quarry

Little River, Digby County
Nova Scotia

Environmental Assessment/ Impact Statement

Legend

- Highway 217
- Gravel Road
- Property Line
- Intermittent Watercourse
- Bottom Survey Area

Artifacts

1. Skidway Remains
2. Shipwreck - S.S. Newfield - 1900
3. Foundation Remains
4. Hydrographic Monument No. 7084
5. Household Remains

Onsite Investigations

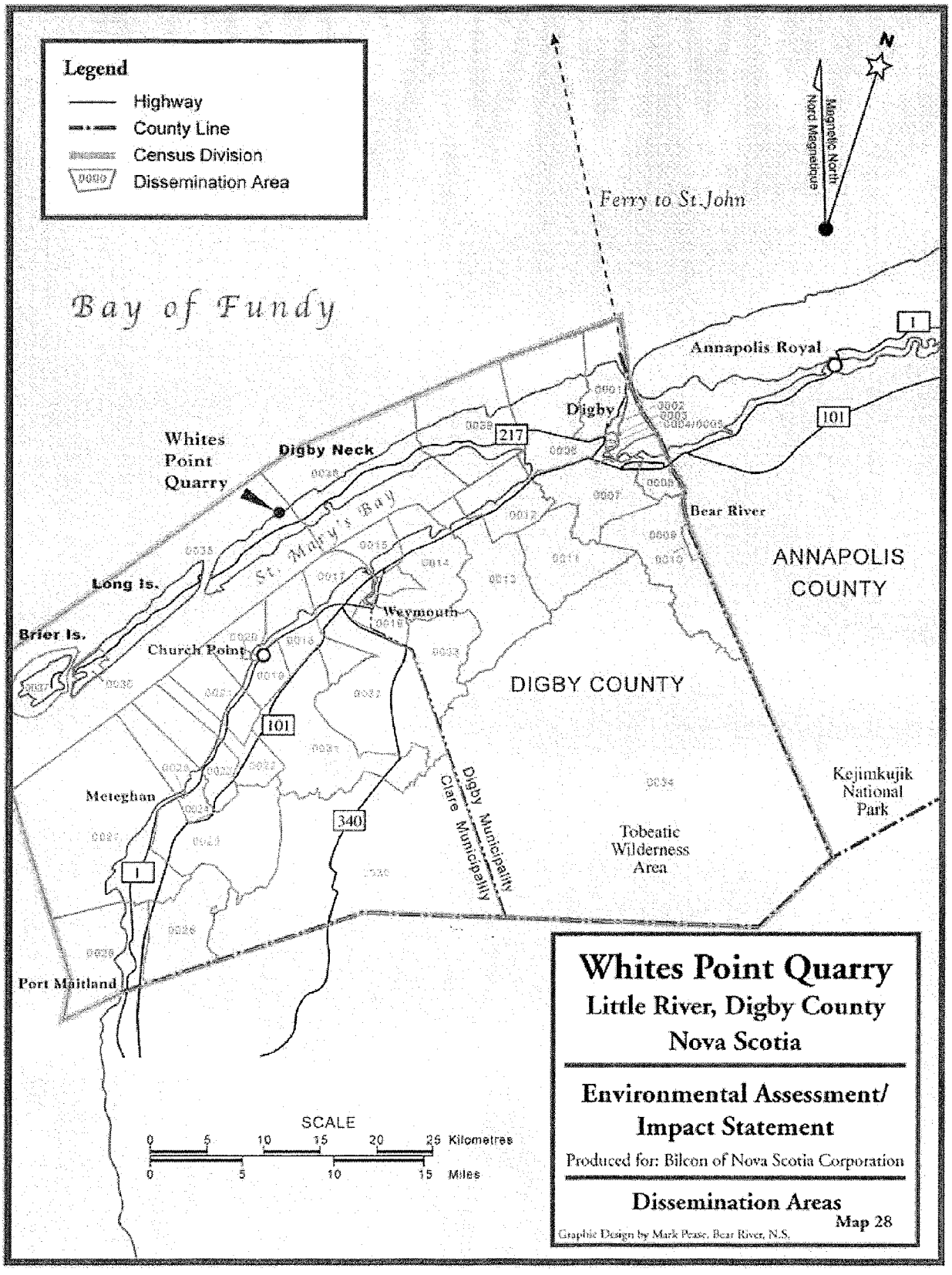
- Study Zone 1
- Study Zone 2
- Study Zone 3
- Study Zone 4
- Study Zone 5
- Study Zone 6

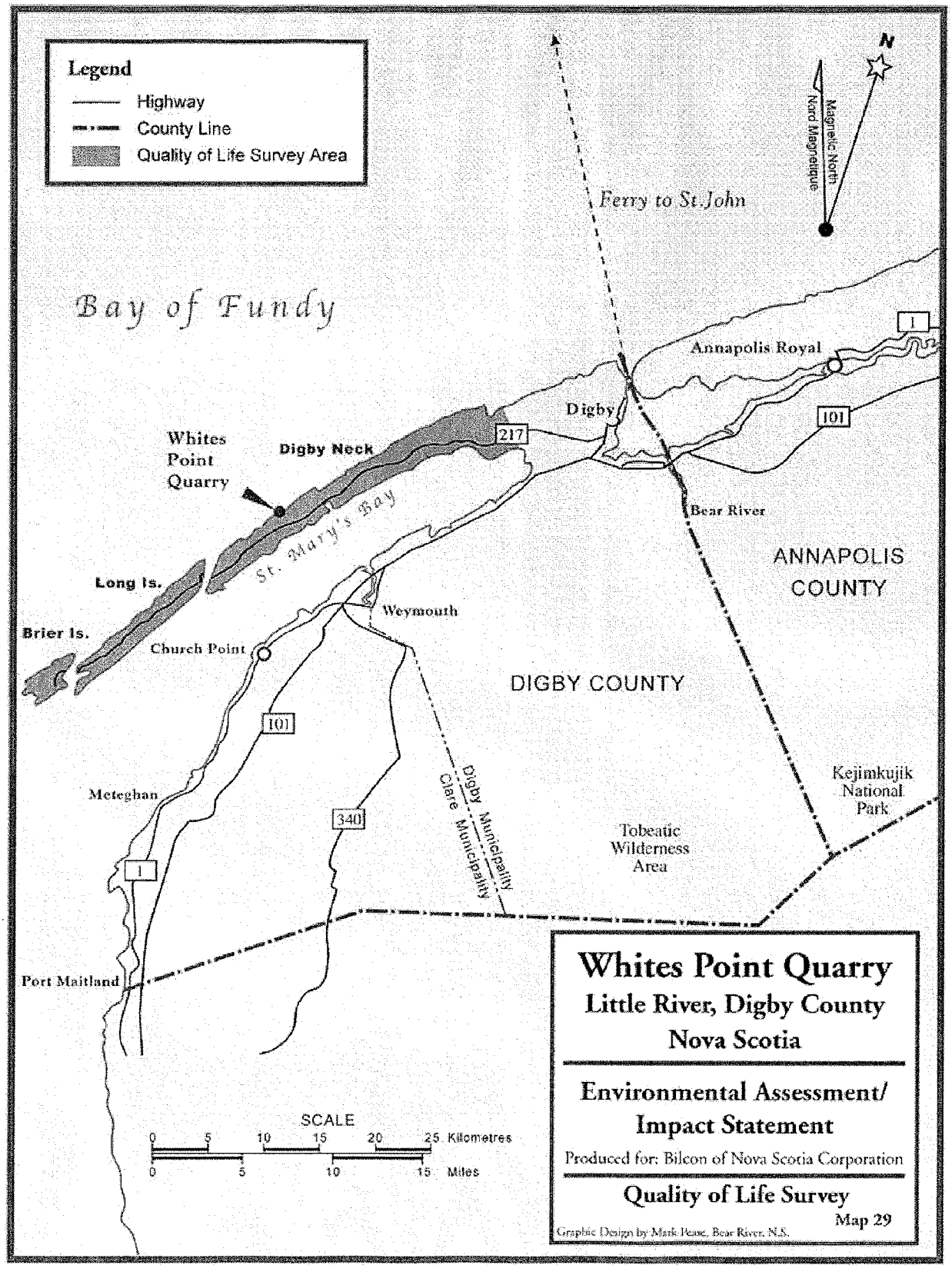
Produced for Bilcon of Nova Scotia Corporation

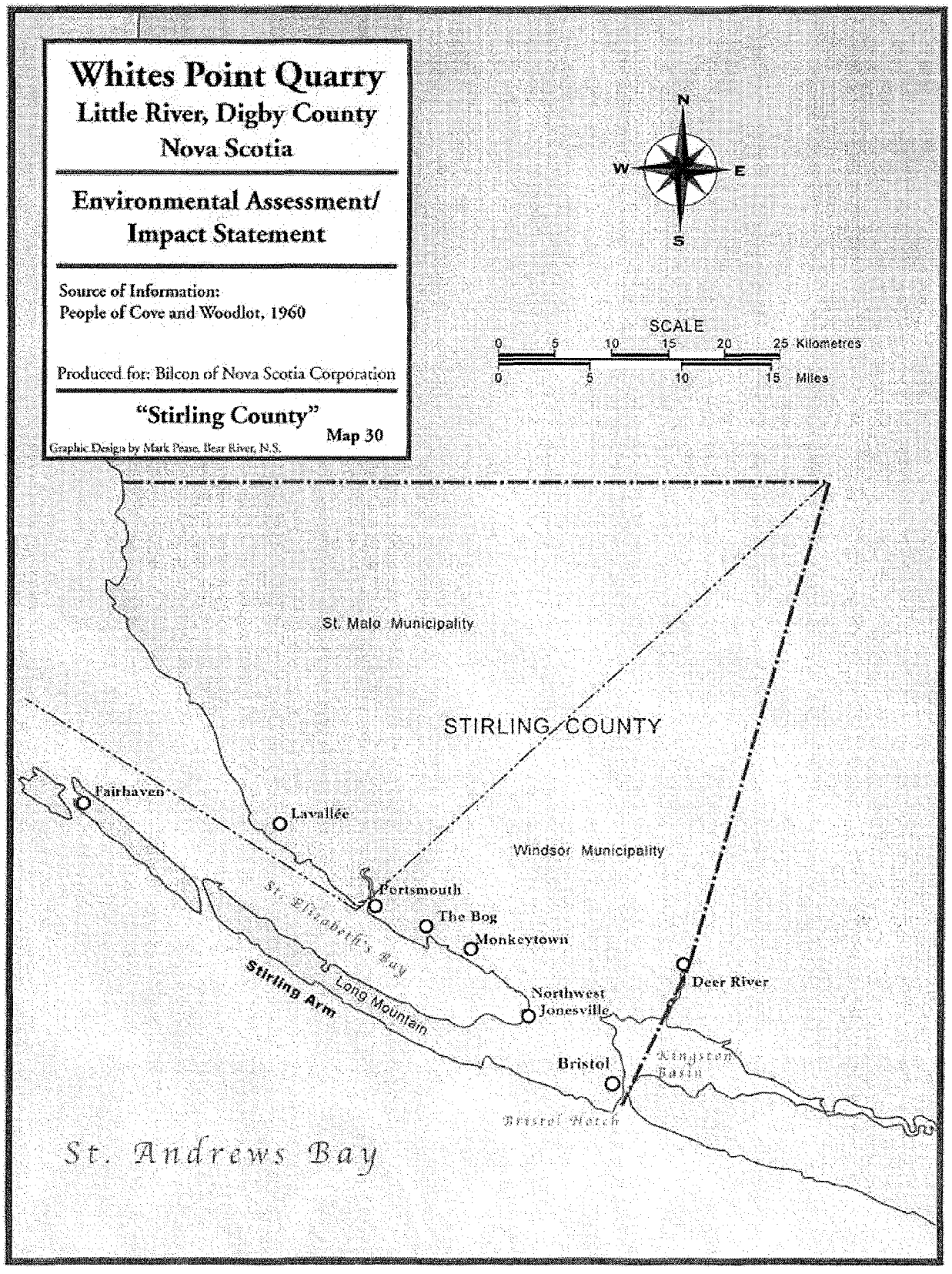
Cultural Resources

Map 27

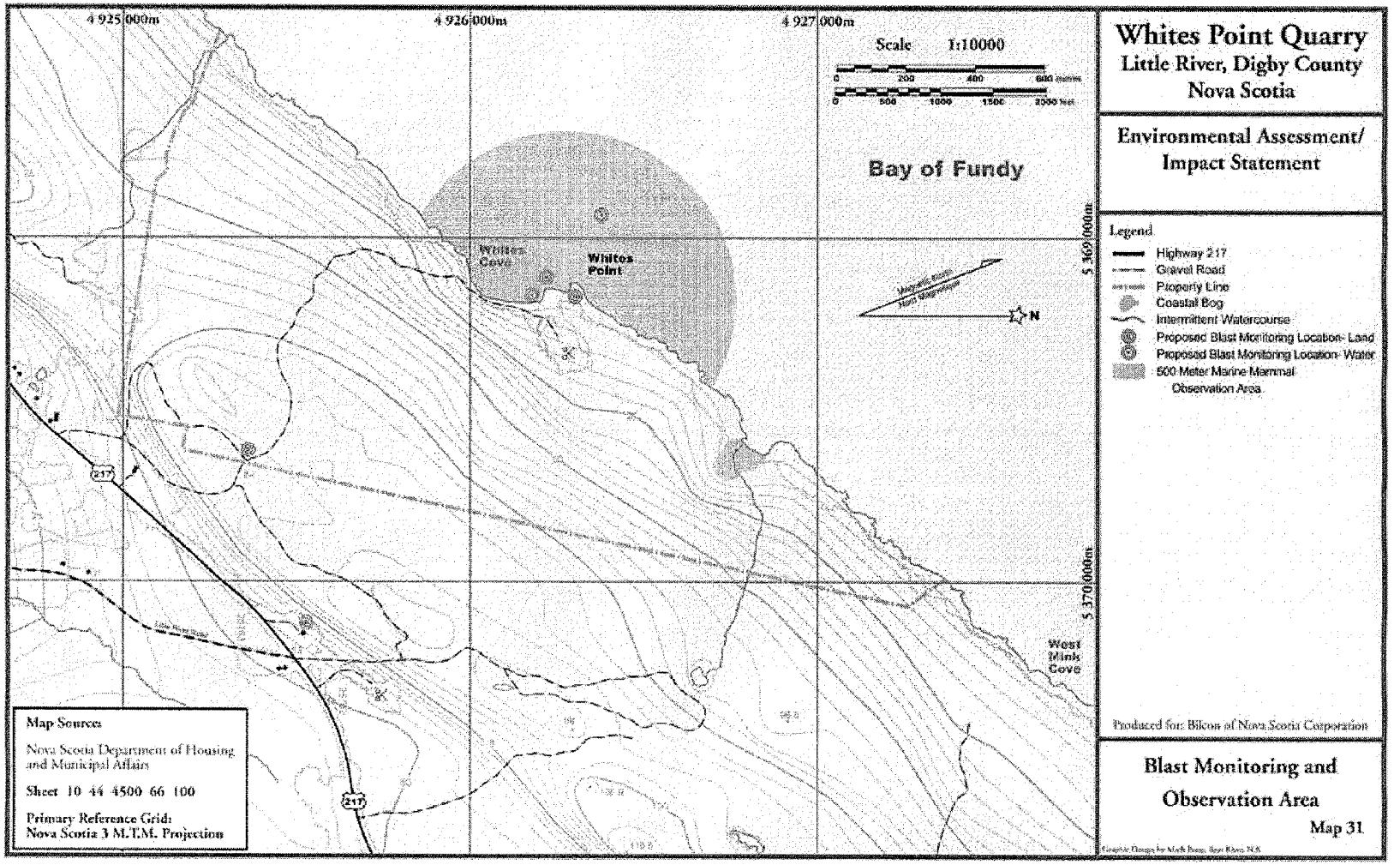
Graphic Design by Mark Dunn, Bear River, N.S.


Legend
Highway
County Line
Census Division
Dissemination Area
Ferry to St. John
Bay of Fundy
N
Magnetic North
Nord Magnétique
Annapolis Royal
Digby
Whites Point Quarry
Digby Neck
St. Mary's Bay
Bear River
ANNAPOLIS COUNTY
Long Is.
Brier Is.
Weymouth
Church Point
DIGBY COUNTY
Meteghan
Digby Municipality
Clare Municipality
Kejimkujik National Park
Tobeatic Wilderness Area
Port Maitland
SCALE
0 5 10 15 20 25 Kilometres
0 5 10 15 Miles
Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/ Impact Statement
Produced for: Bilcon of Nova Scotia Corporation
Dissemination Areas
Map 28
Graphic Design by Mark Pease, Bear River, N.S.


Legend
Highway
County Line
Quality of Life Survey Area
Ferry to St.John
N
Magnetic North
Nord Magnetique
Bay of Fundy
Annapolis Royal
1
Digby
101
217
Whites
Point
Quarry
Digby Neck
St. Mary's Bay
Bear River
ANNAPOLIS
COUNTY
Long Is.
Weymouth
Brier Is.
Church Point
DIGBY COUNTY
101
Meteghan
340
Digby Municipality
Clare Municipality
Kejimkujik
National
Park
Tobeatic
Wilderness
Area
1
Port Maitland
SCALE
0 5 10 15 20 25 Kilometres
0 5 10 15 Miles
Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/
Impact Statement
Produced for: Bilcon of Nova Scotia Corporation
Quality of Life Survey
Map 29
Graphic Design by Mark Pease, Bear River, N.S.


Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/
Impact Statement
Source of Information:
People of Cove and Woodlot, 1960
Produced for: Bilcon of Nova Scotia Corporation
"Stirling County"
Map 30
Graphic Design by Mark Peace, Bear River, N.S.
N
W
E
S
SCALE
0 5 10 15 20 25 Kilometres
0 5 10 15 Miles
St. Malo Municipality
STIRLING COUNTY
Fairhaven
Lavallée
Windsor Municipality
Portsmouth
The Bog
Monkeytown
St. Elizabeth's Bay
Long Mountain
Stirling Arm
Northwest
Jonesville
Deer River
Bristol
Kingston
Basin
Bristol Notch
St. Andrews Bay

C0001-191



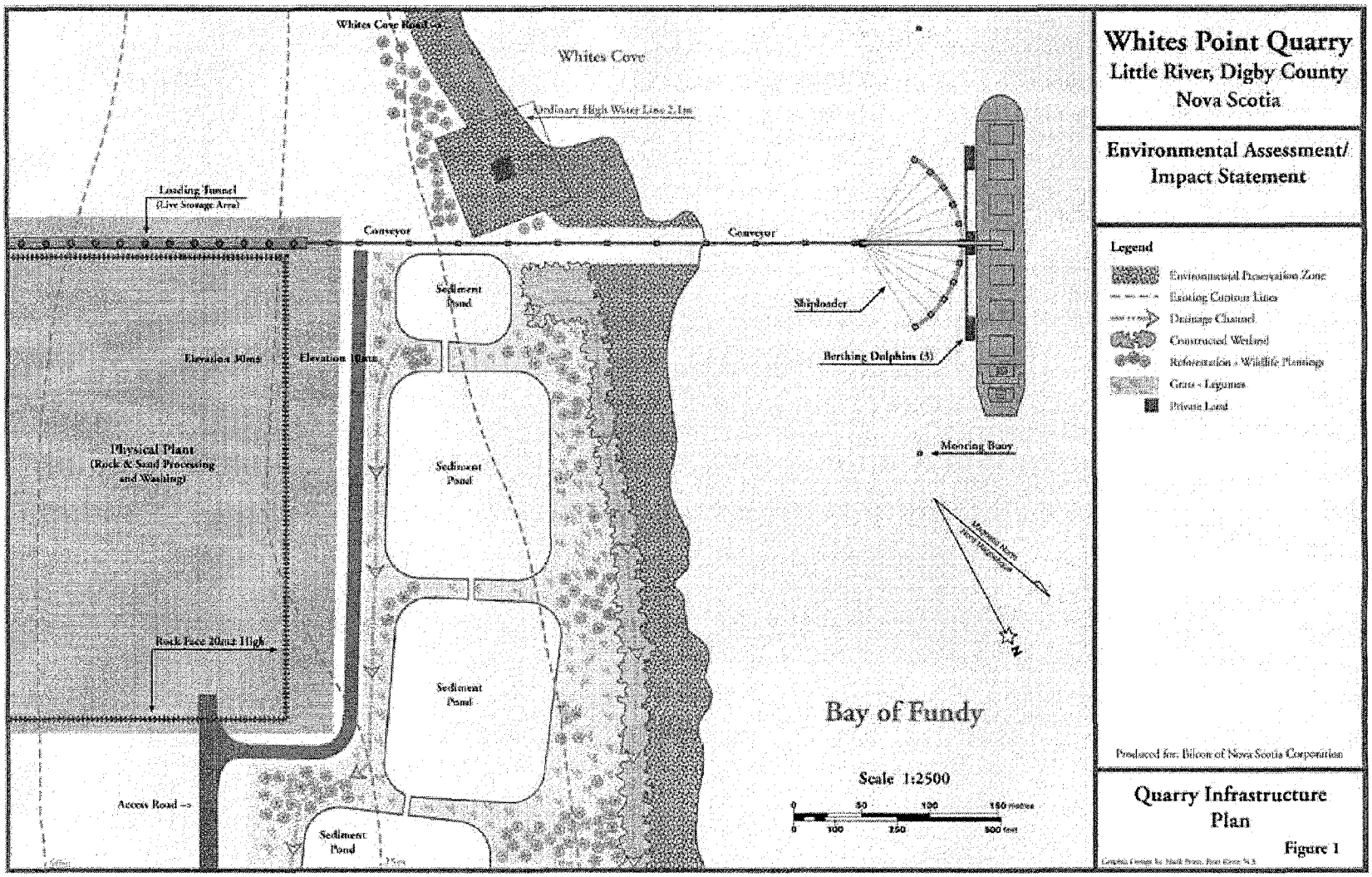
Whites Point Quarry
Little River, Digby County
Nova Scotia

Environmental Assessment/ Impact Statement

Blast Monitoring and Observation Area

Map 31

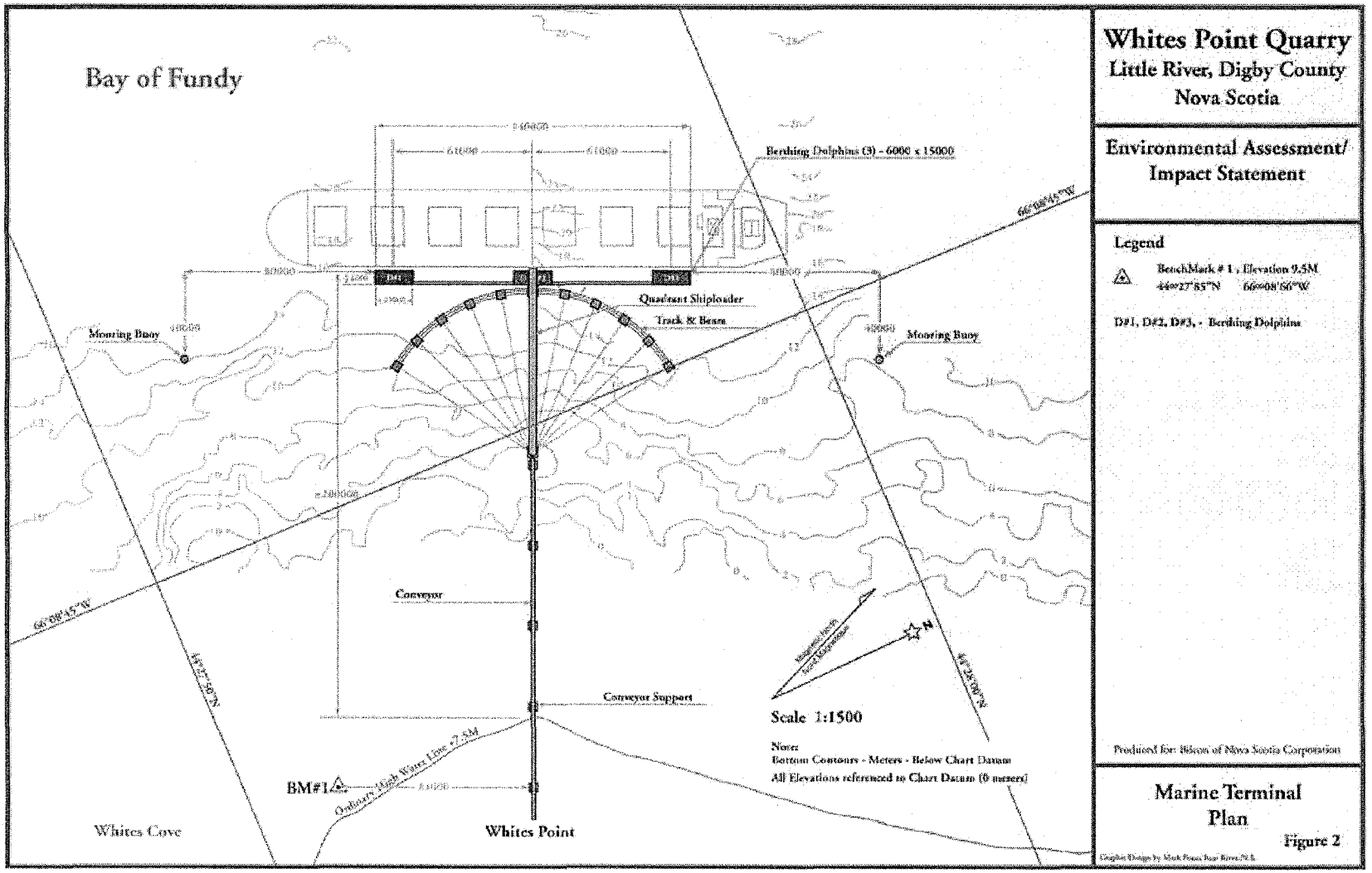
018231



018232

C0001-192

C0001-193



Whites Point Quarry

Little River, Digby County
Nova Scotia

Environmental Assessment/ Impact Statement

Legend

BenchMark # 1 , Elevation 9.5M
44°27'85"N 66°08'50"W

D#1, D#2, D#3, - Berthing Dolphins

Produced for: Bilcon of Nova Scotia Corporation

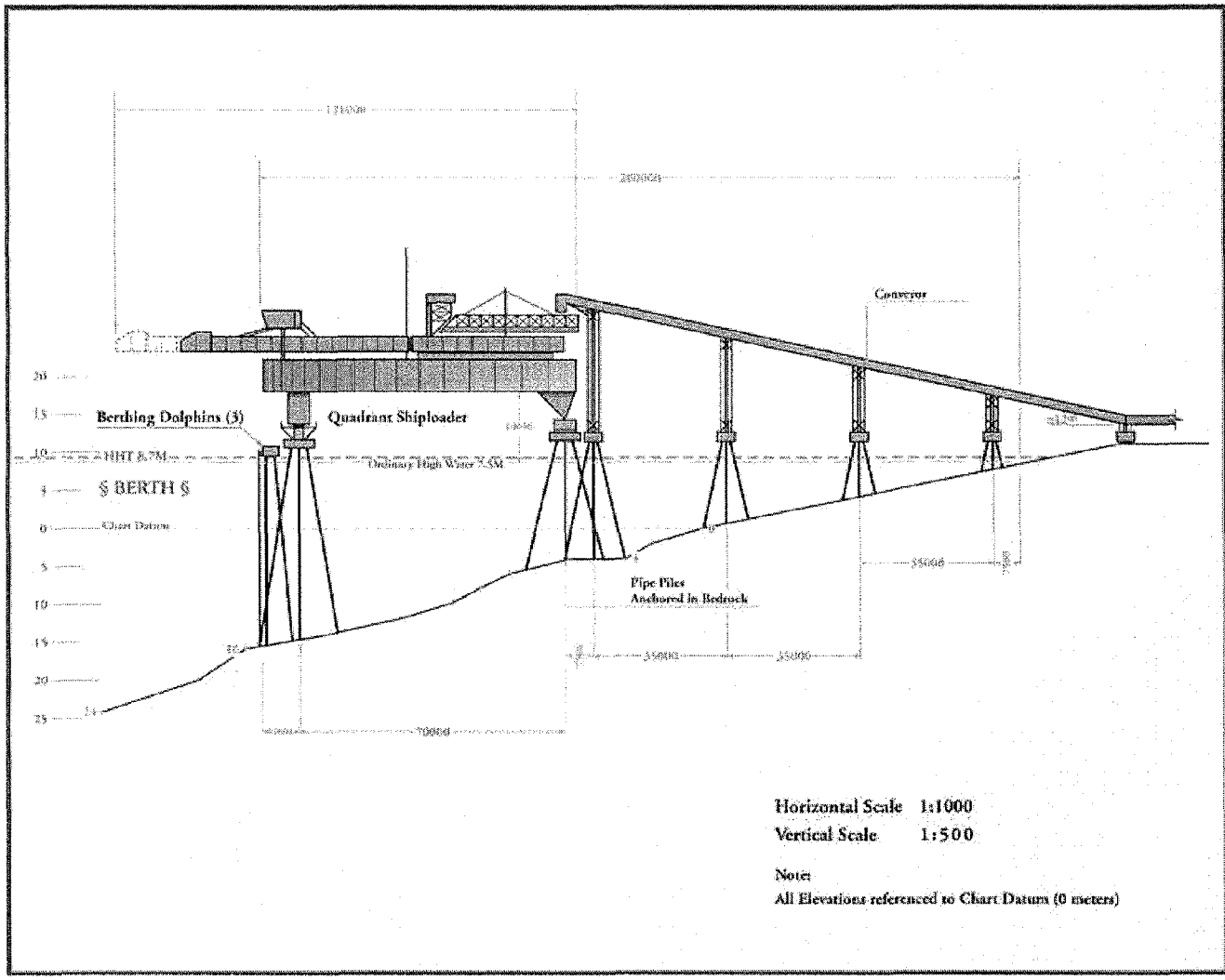
Marine Terminal Plan

Figure 2

Graphic Design by Mark Poole, Port Rowan, N.S.

018233

C0001-194



Whites Point Quarry

Little River, Digby County
Nova Scotia

Environmental Assessment/
Impact Statement

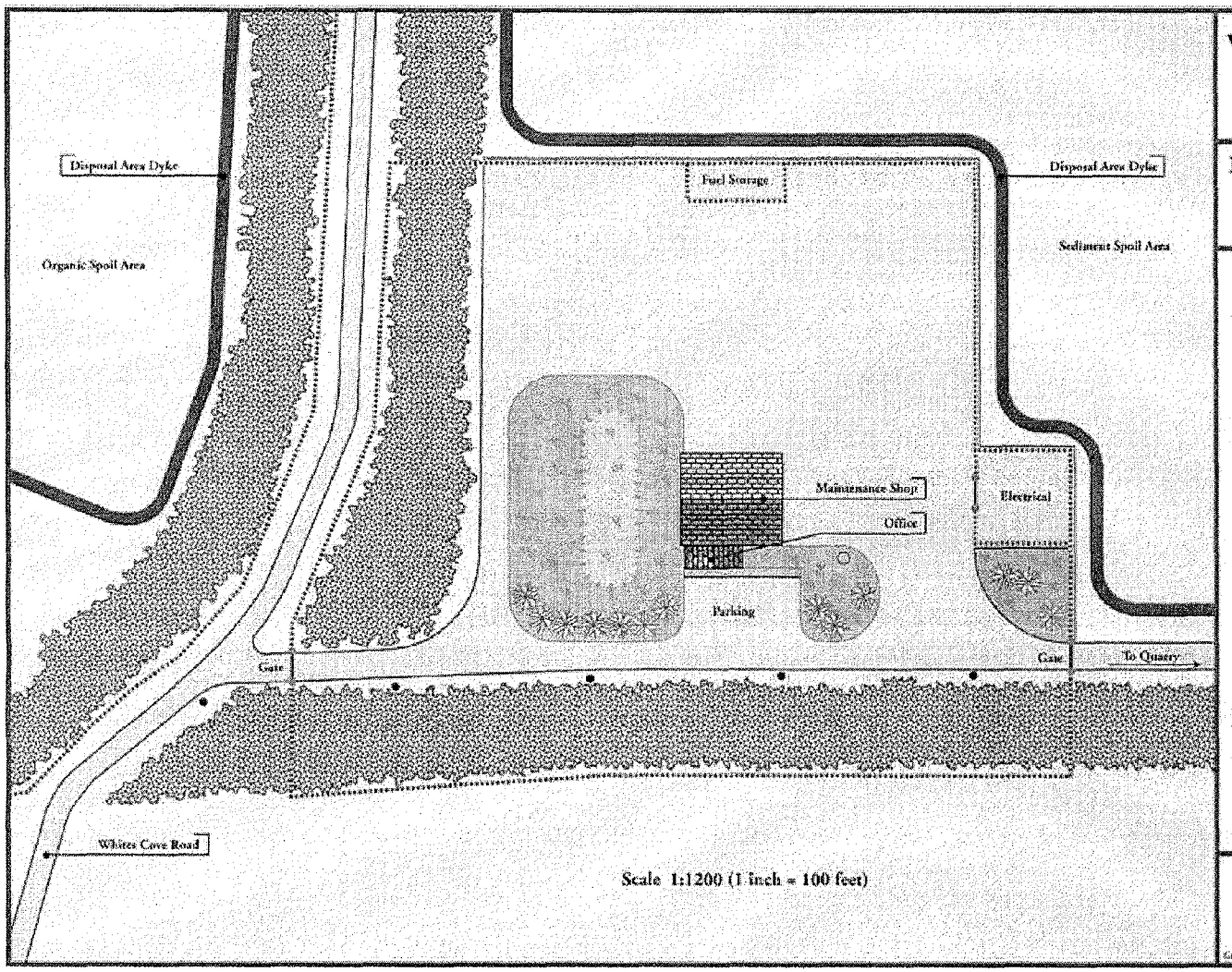
Prepared for: Bilcon of Nova Scotia Corporation

Marine Terminal
Elevation

Figure 3

Graphic Prepared by Mark Pane, New River N.S.

018234



Whites Point Quarry

Little River, Digby County
Nova Scotia

Environmental Assessment/ Impact Statement

Legend

- Environmental Preservation Zone - 300ft wide
- Security Fence
- Landscaped Area
- Well
- Septic Field
- Electrical Power Poles

Produced for: Bilcon of Nova Scotia Corporation

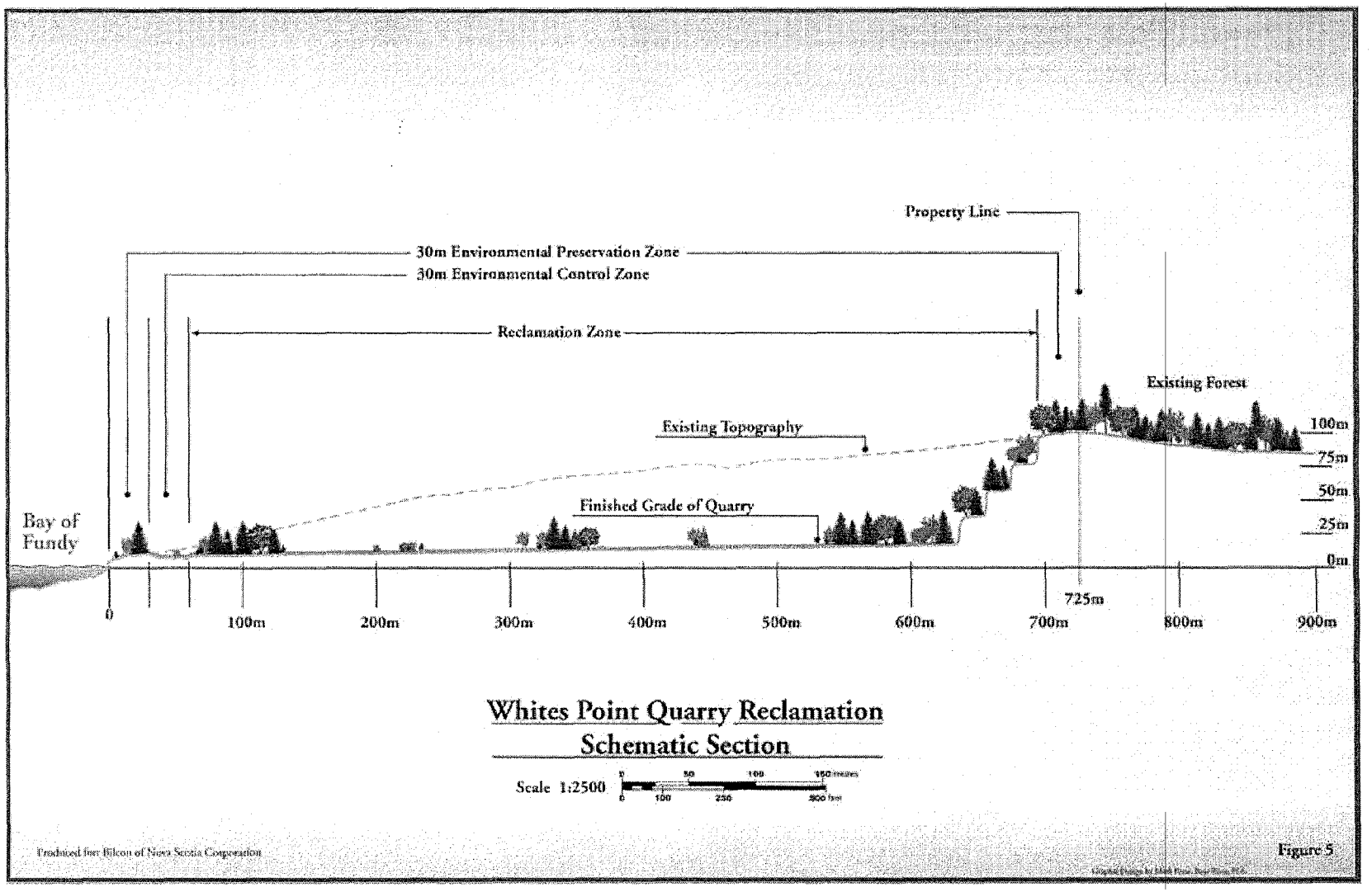
Quarry Compound Plan

Figure 4

Graphic Design by Mark Fraser, Saint Rhoes, N.S.

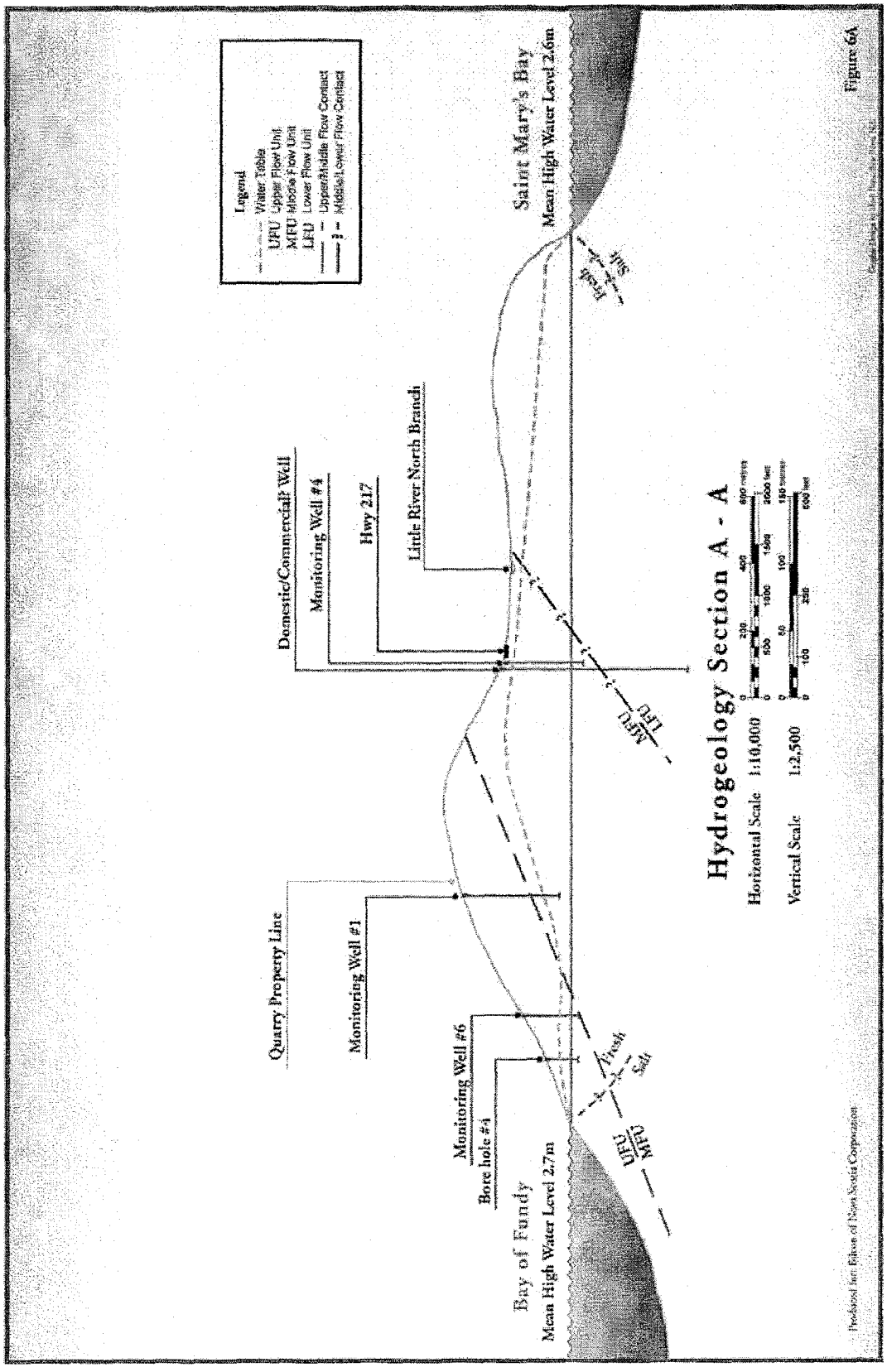
018235

C0001-195



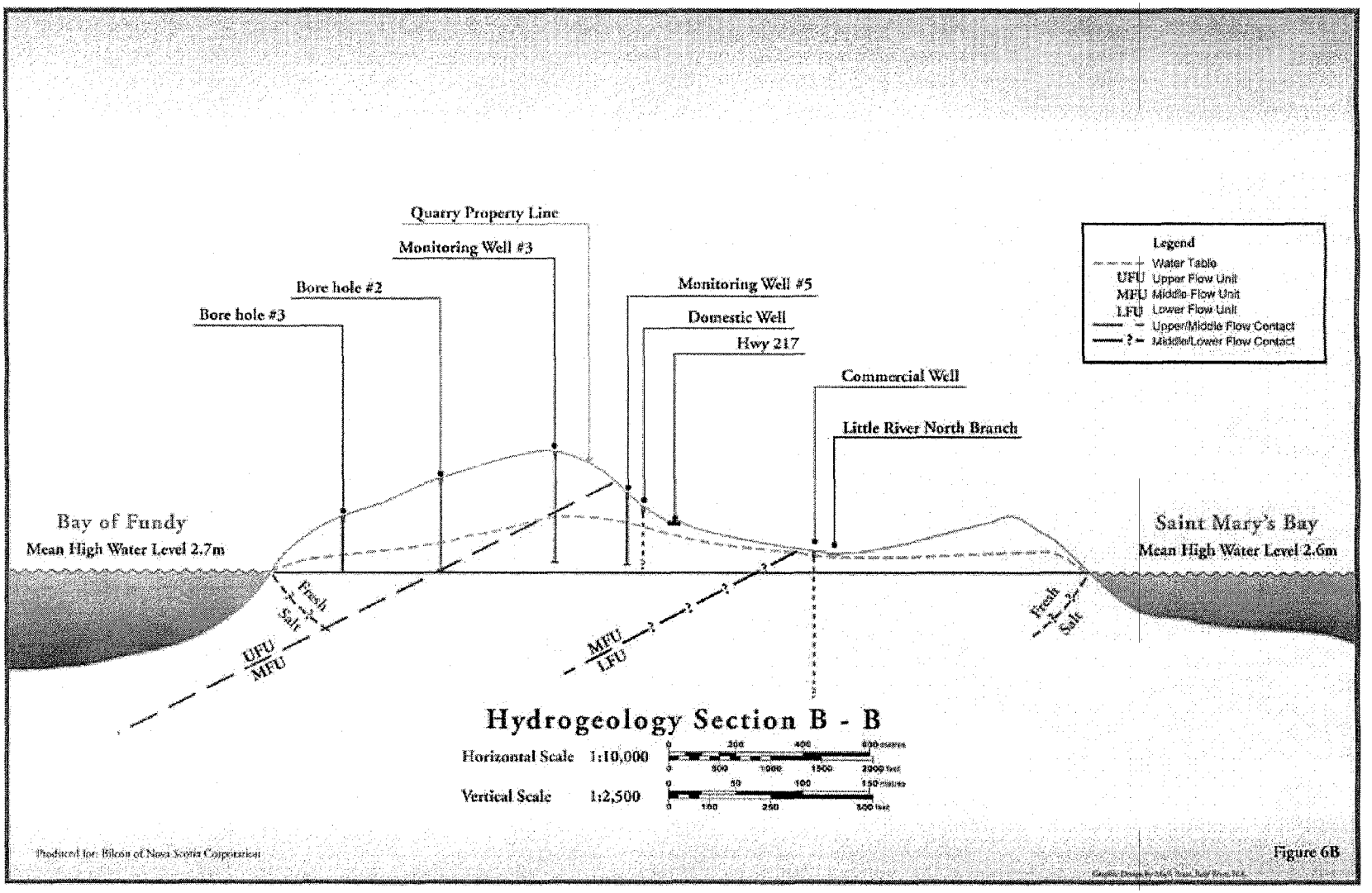
018236

C0001-196



018237

C0001-197



018238

C0001-198

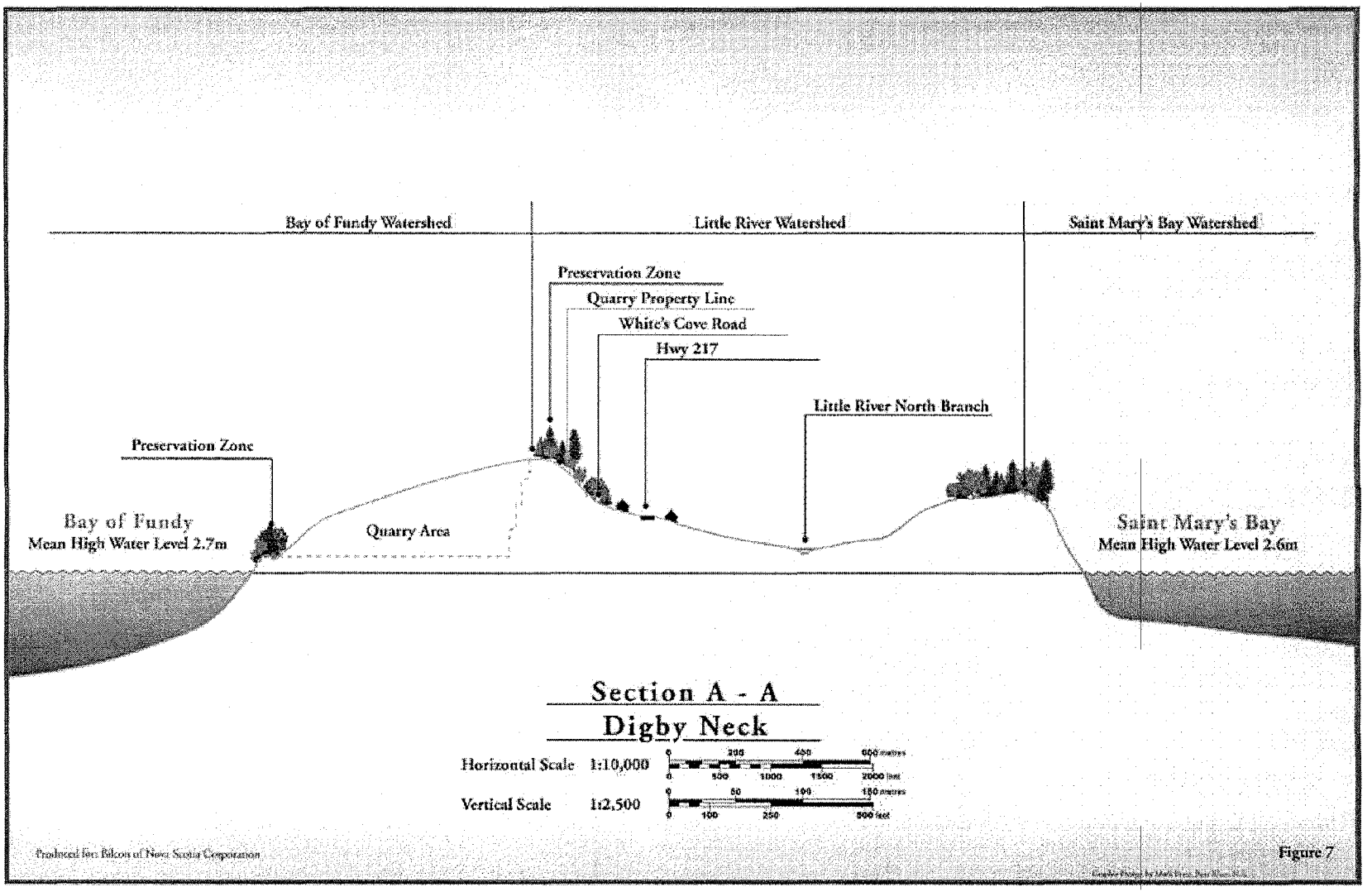
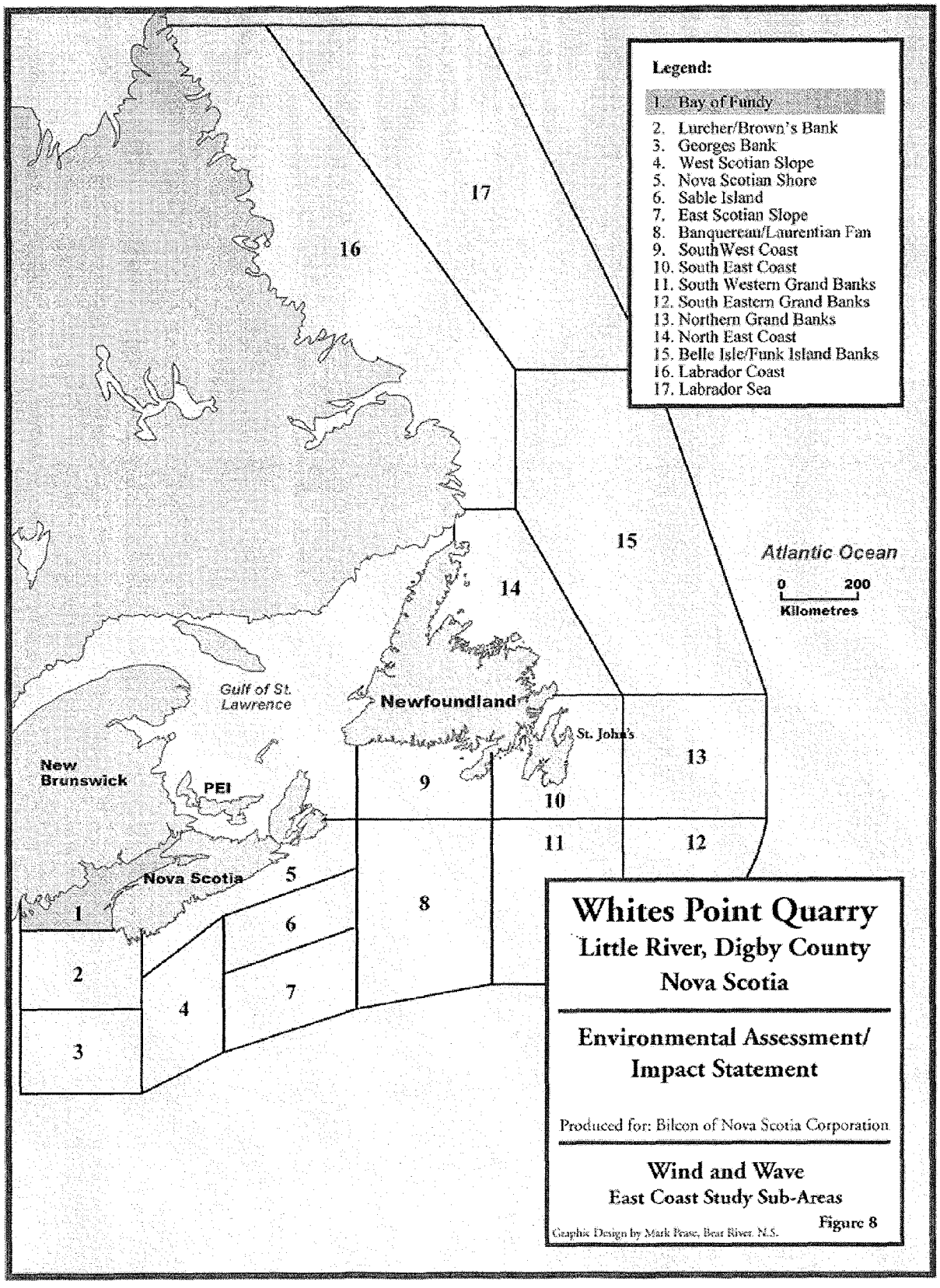
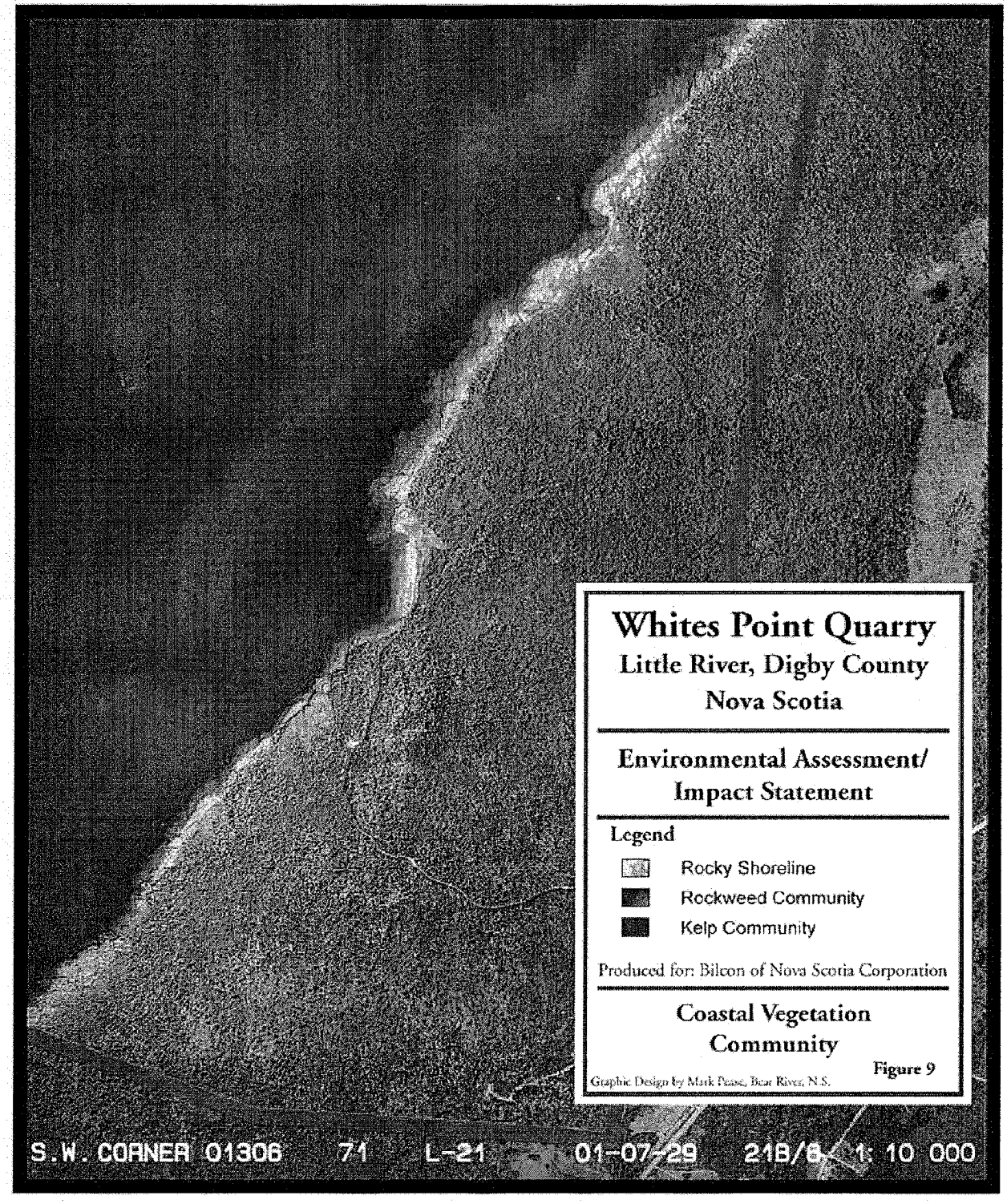


Figure 7

018239

C0001-199


Legend:
1. Bay of Fundy
2. Lurcher/Brown's Bank
3. Georges Bank
4. West Scotian Slope
5. Nova Scotian Shore
6. Sable Island
7. East Scotian Slope
8. Banquereau/Laurentian Fan
9. SouthWest Coast
10. South East Coast
11. South Western Grand Banks
12. South Eastern Grand Banks
13. Northern Grand Banks
14. North East Coast
15. Belle Isle/Funk Island Banks
16. Labrador Coast
17. Labrador Sea
Atlantic Ocean
0 200
Kilometres
Gulf of St. Lawrence
Newfoundland
St. John's
New Brunswick
PEI
Nova Scotia
Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/
Impact Statement
Produced for: Bilcon of Nova Scotia Corporation
Wind and Wave
East Coast Study Sub-Areas
Figure 8
Graphic Design by Mark Pease, Bear River, N.S.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Nova Scotia
Environmental Assessment/
Impact Statement
Legend
Rocky Shoreline
Rockweed Community
Kelp Community
Produced for: Bilcon of Nova Scotia Corporation
Coastal Vegetation
Community
Figure 9
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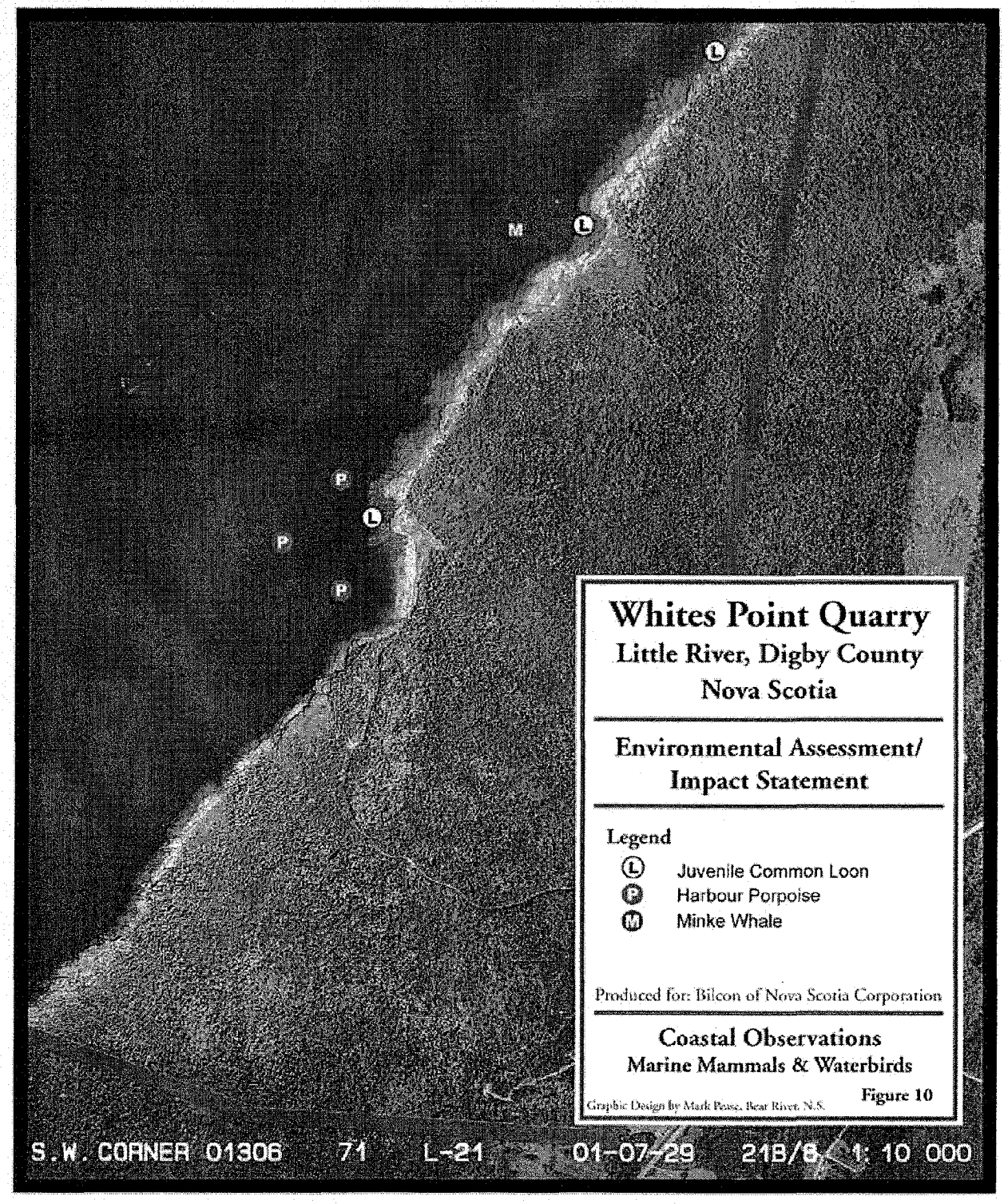
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Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/
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L Juvenile Common Loon
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Produced for: Bilcon of Nova Scotia Corporation
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Graphic Design by Mark Pease, Bear River, N.S.
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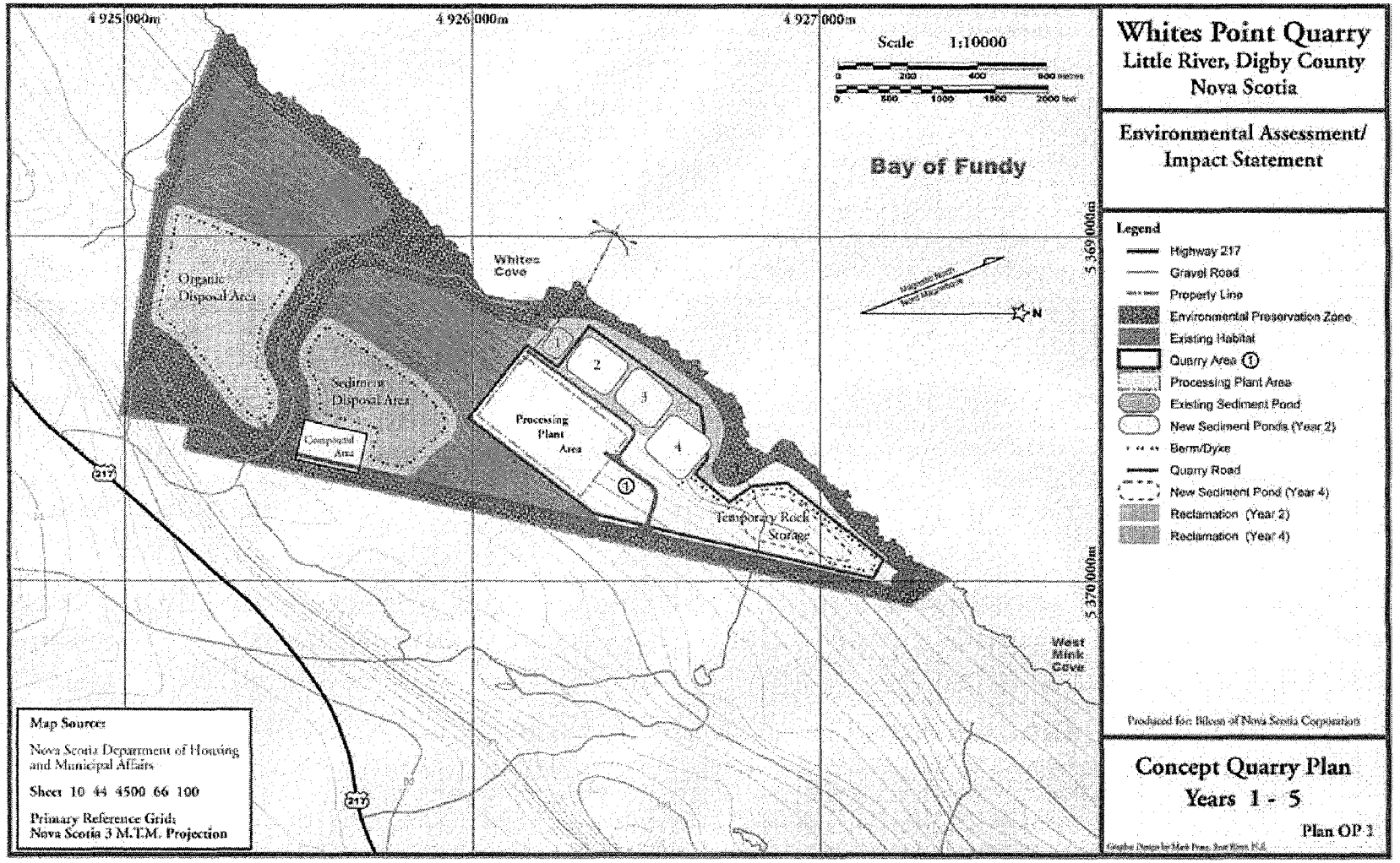

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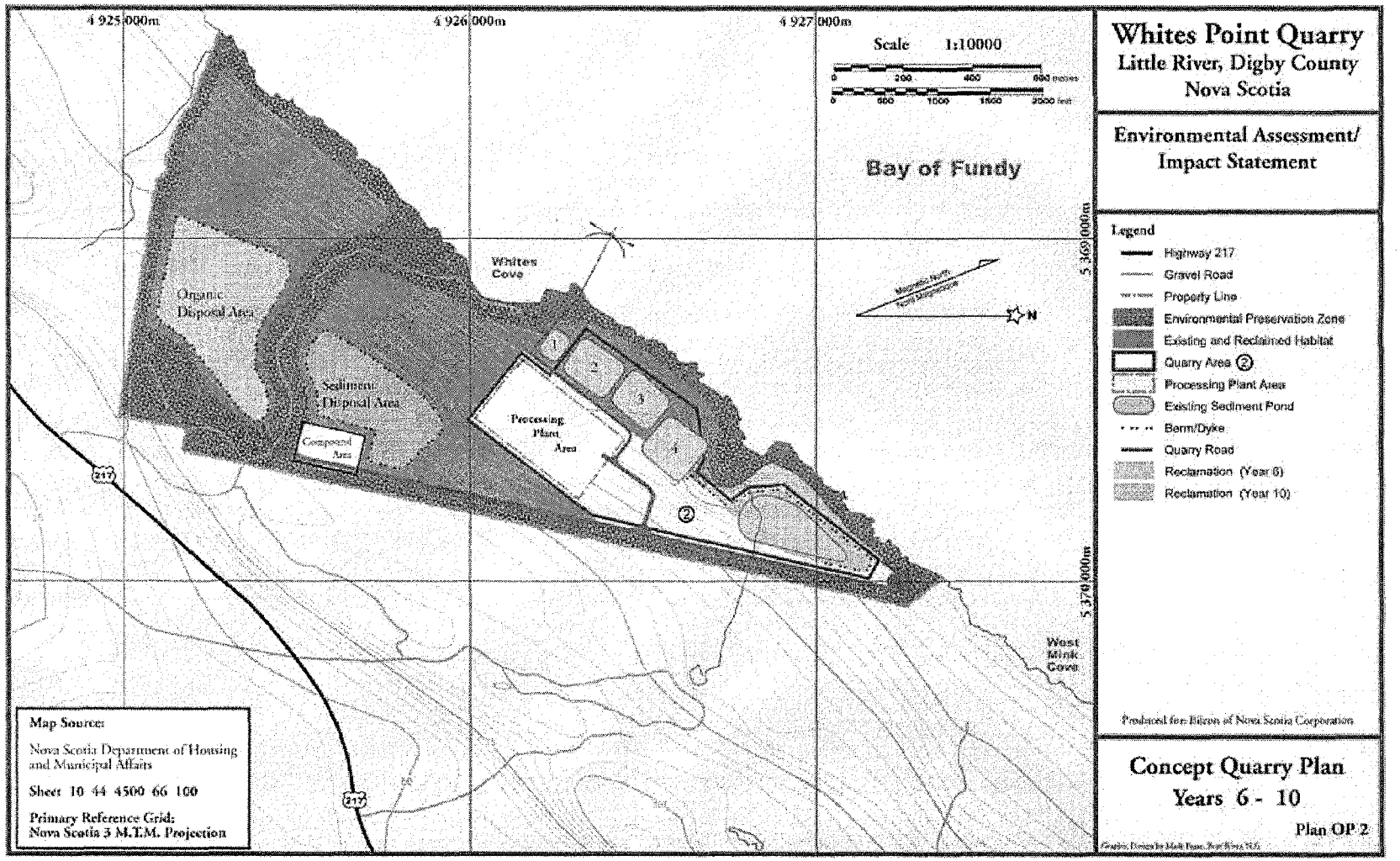

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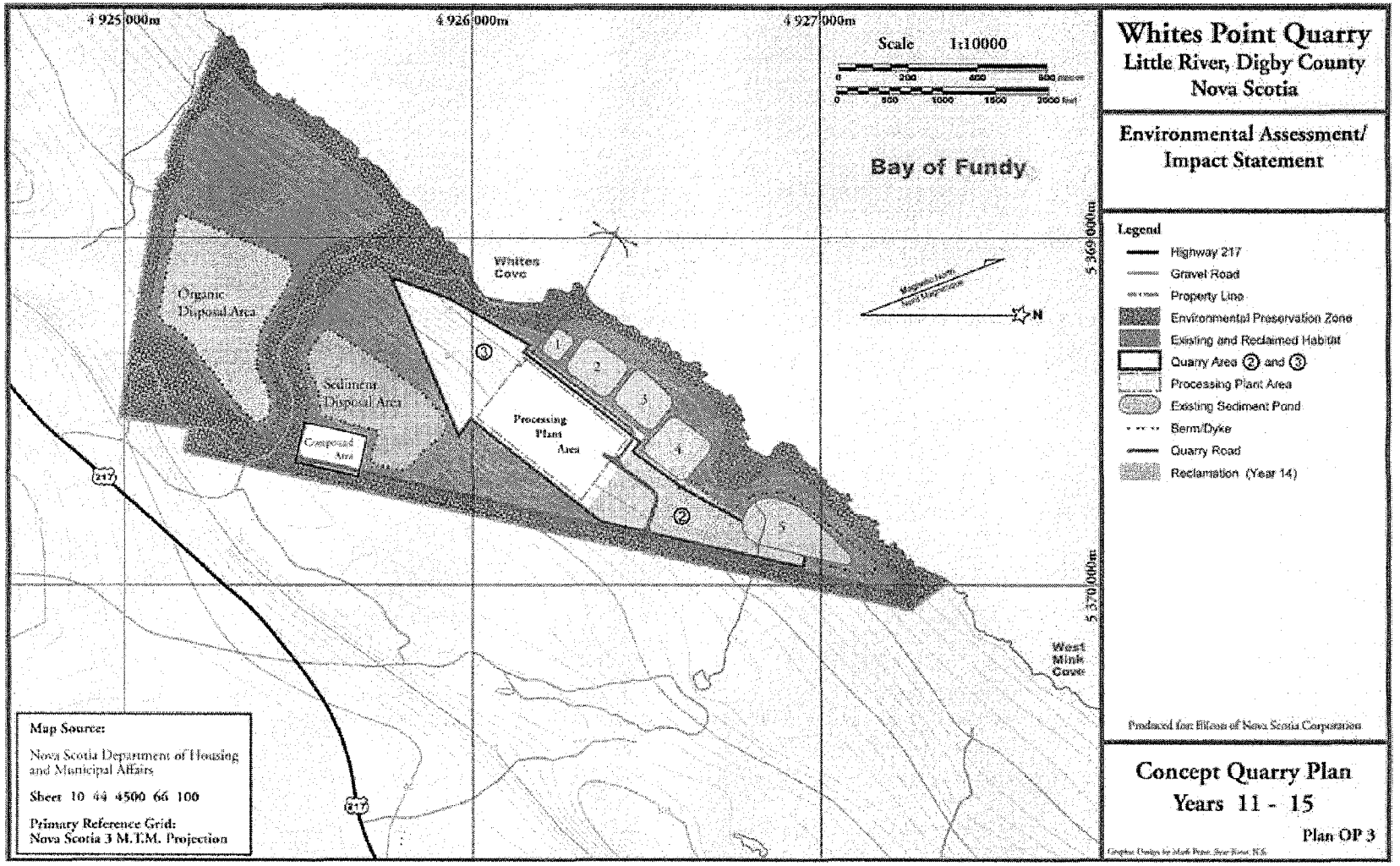
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Concept Quarry Plan
Years 11 - 15
Plan OP 3
Scale 1:10000
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West Mink Cove
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Sediment Disposal Area
Compound Area
Processing Plant Area
4 925 000m
4 926 000m
4 927 000m
5 369 000m
5 370 000m
217
N
Legend
Highway 217
Gravel Road
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Berm/Dyke
Quarry Road
Reclamation (Year 14)
Map Source:
Nova Scotia Department of Housing and Municipal Affairs
Sheet 10 44 4500 66 100
Primary Reference Grid:
Nova Scotia 3 M.T.M. Projection

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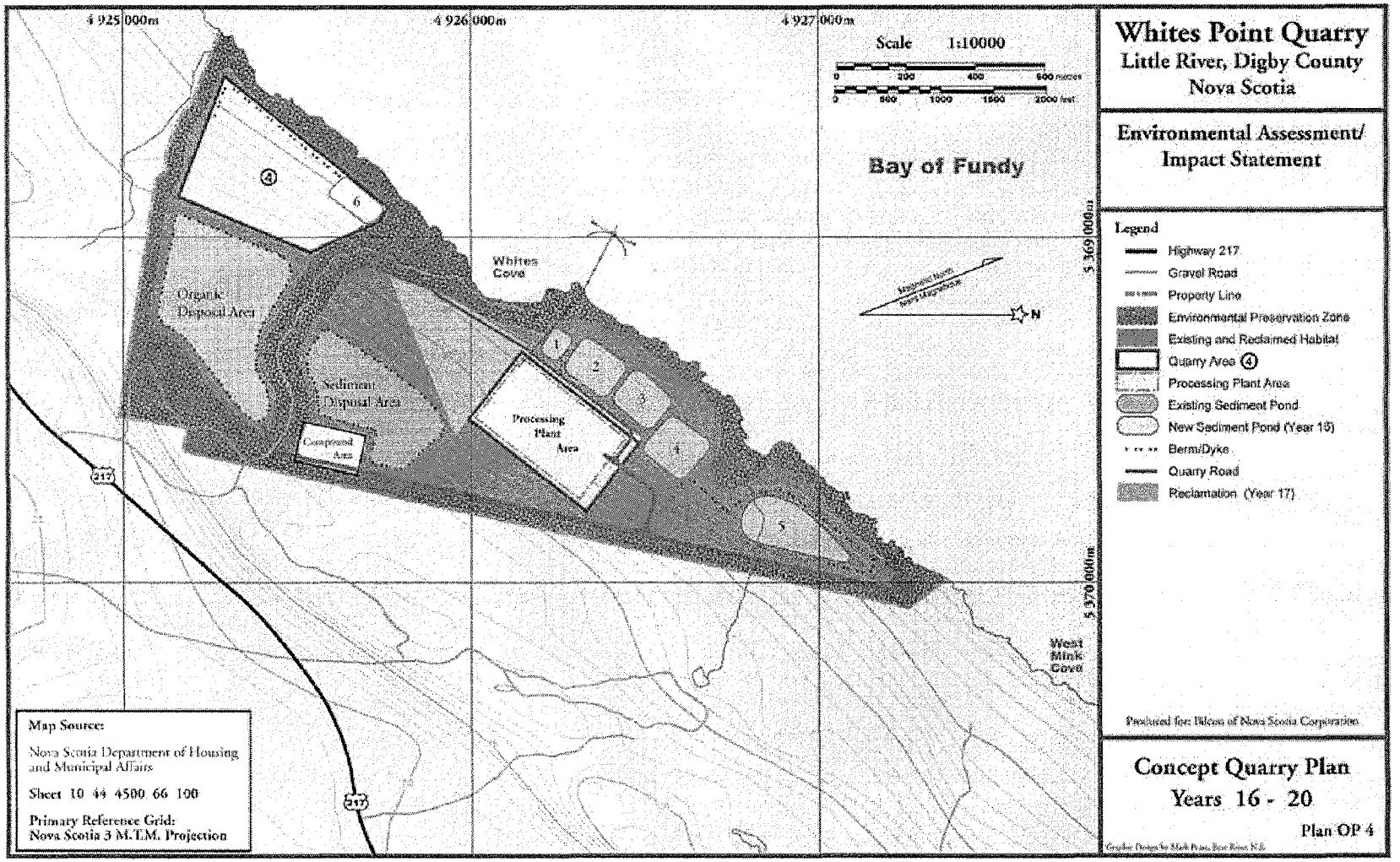

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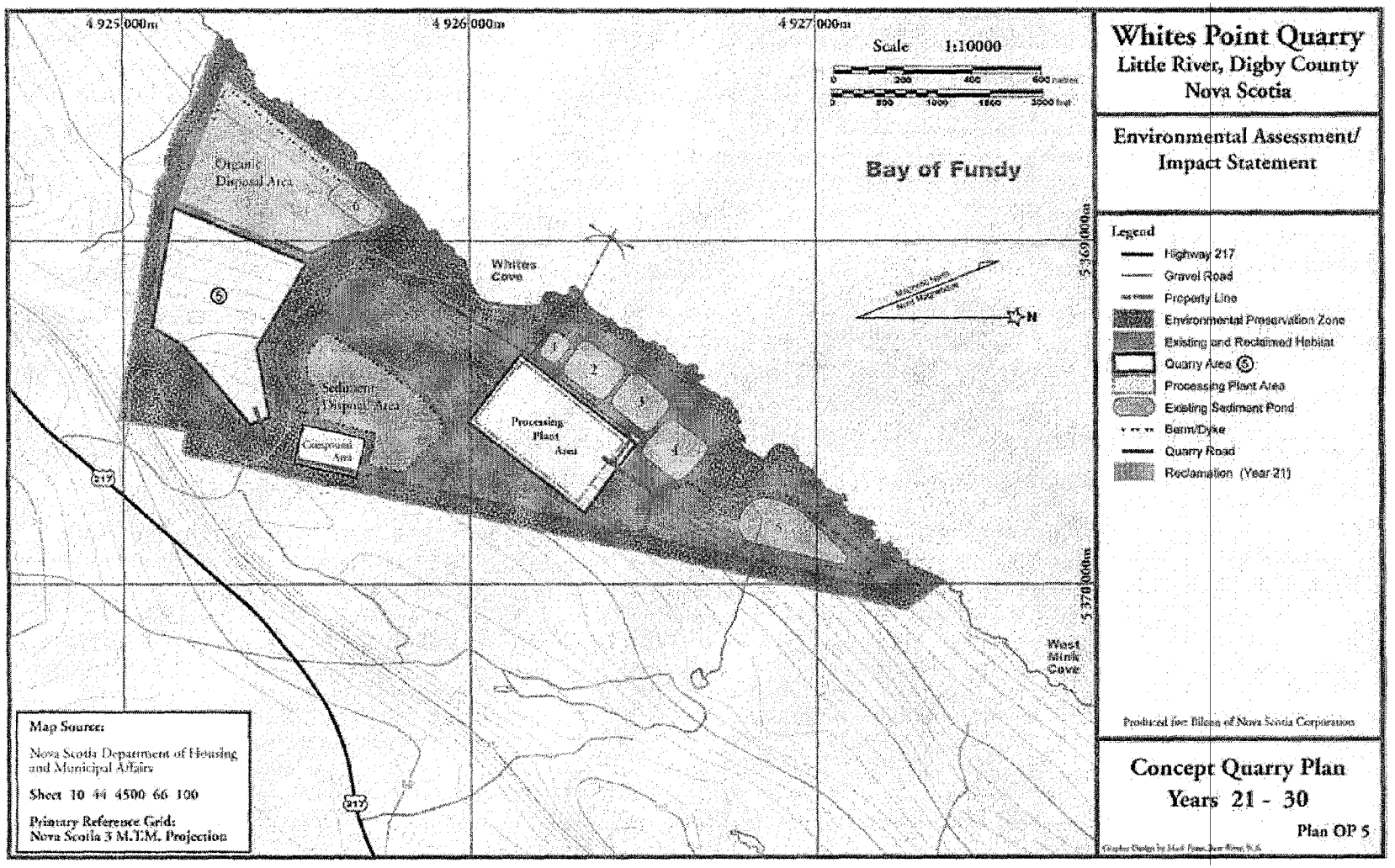

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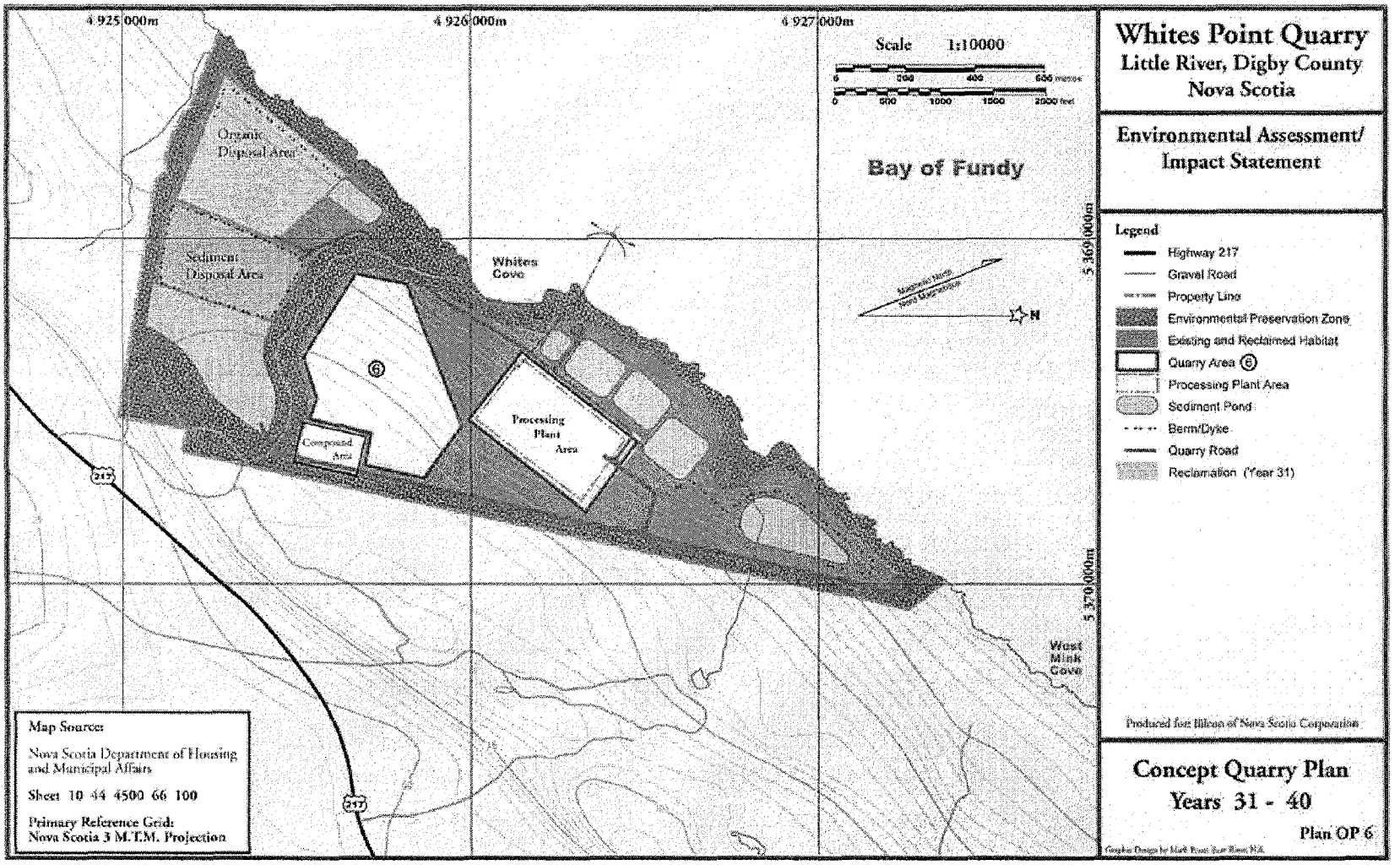

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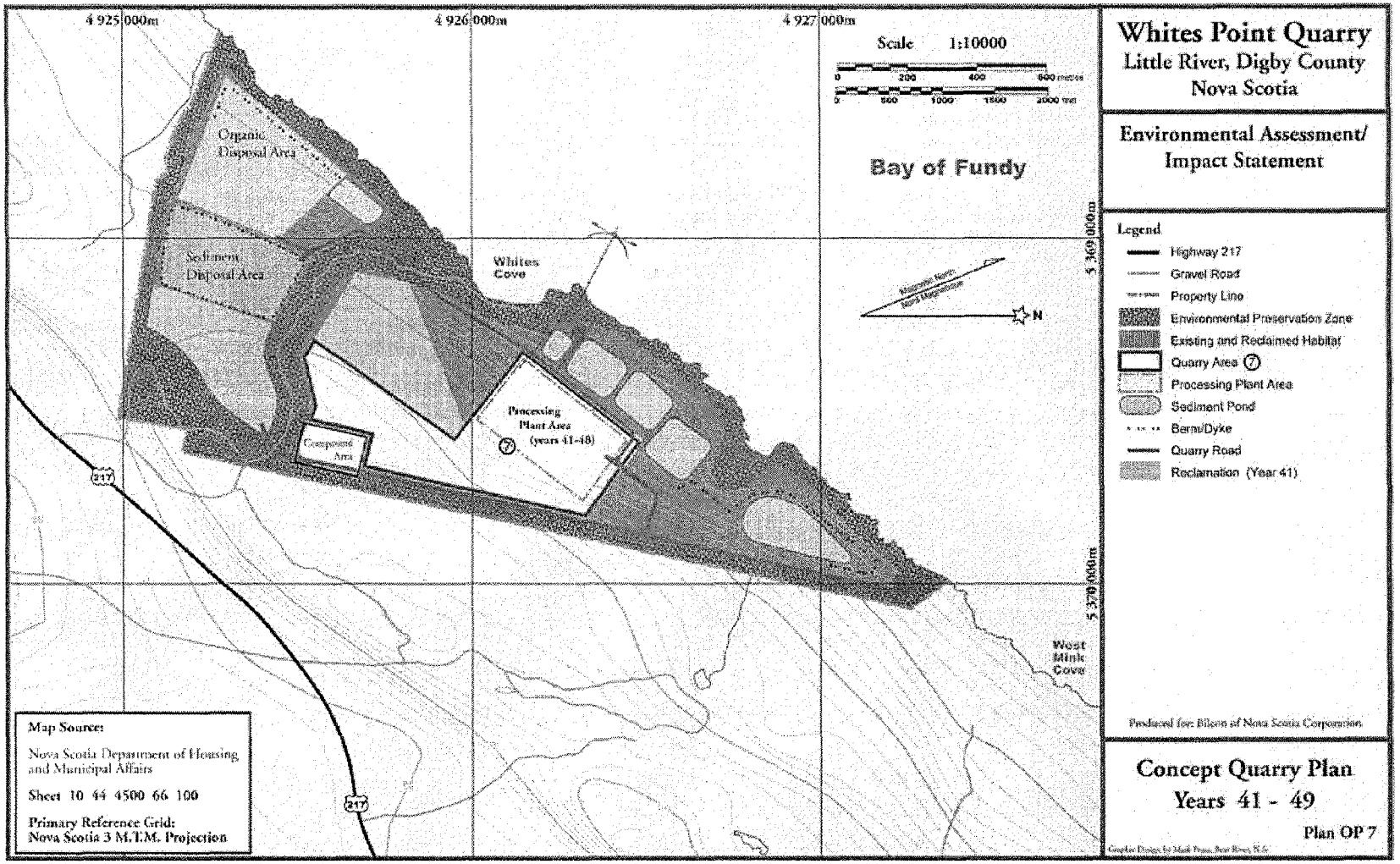

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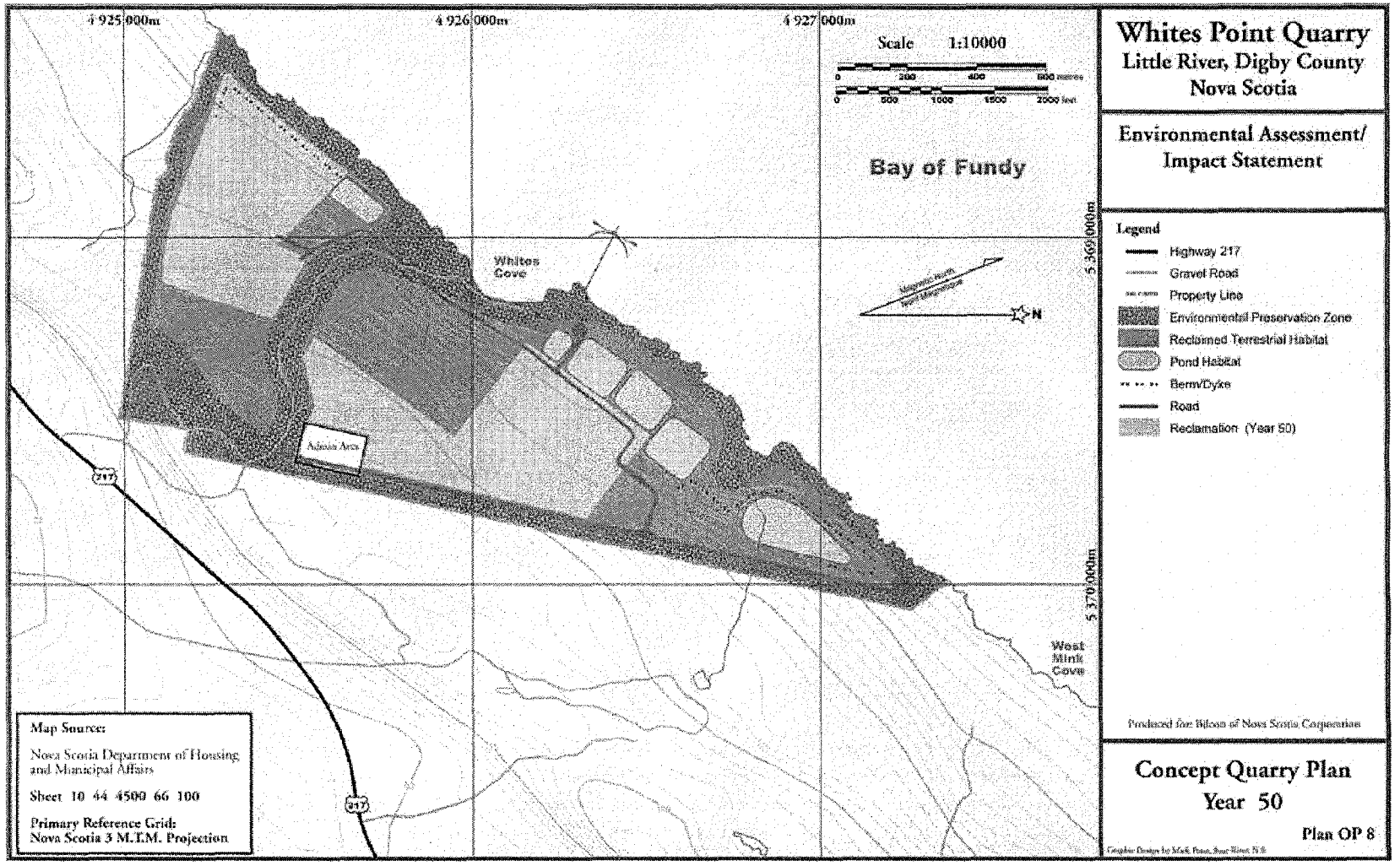

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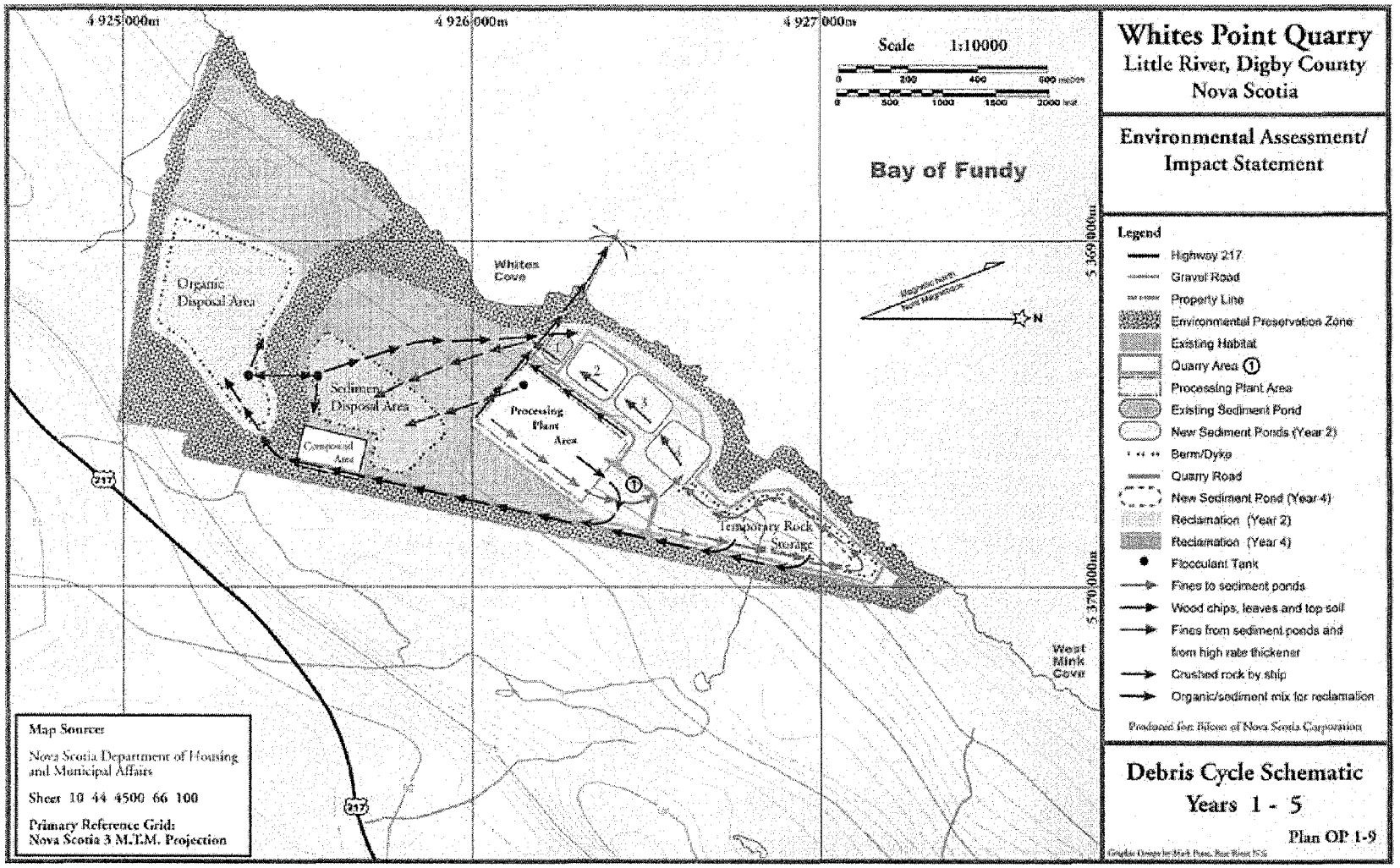

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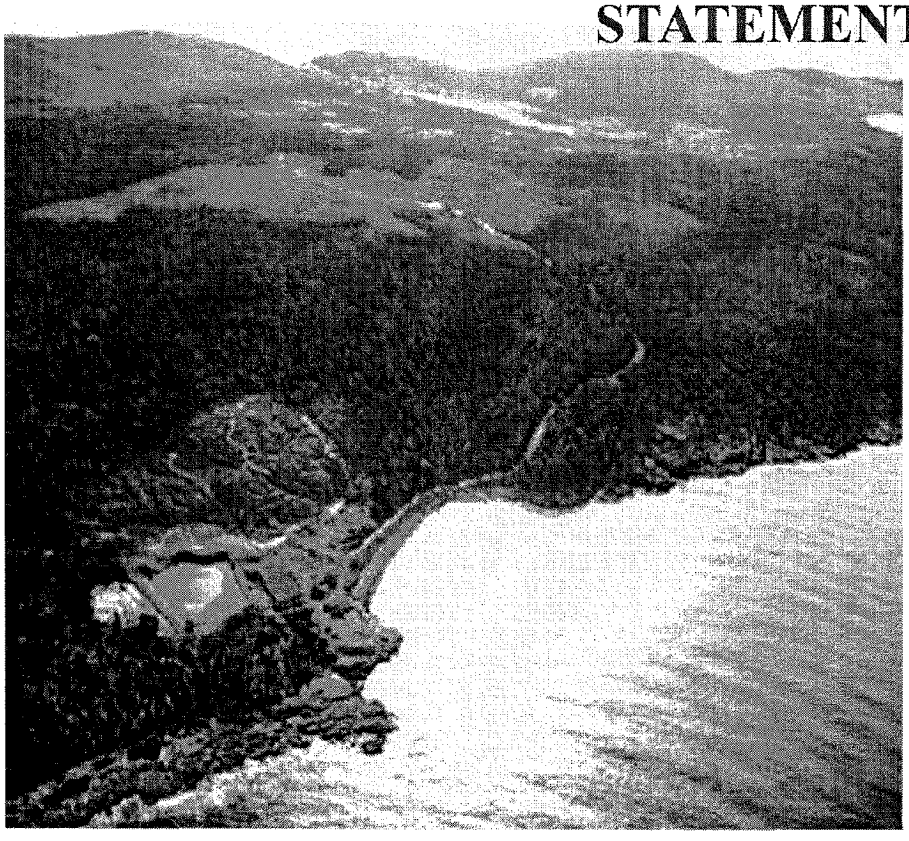

BILCON OF NOVA SCOTIA

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March 31, 2006

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EXECUTIVE SUMMARY

1.0 The Project

Bilcon of Nova Scotia Corporation (the Proponent), a Nova Scotia registered corporation, proposes to construct, operate and decommission a basalt quarry, ship loading facility, and marine terminal for the production and export of crushed rock at Whites Cove on Digby Neck in Digby County, Nova Scotia.

The project is subject to a Joint Panel Review under an agreement between the Federal Government and the Province of Nova Scotia and an environmental assessment has been carried out in accordance with the agreement.

The components of the project are:

- Rock extraction
- A rock crushing and screening plant
- A loading tunnel
- A ship loading facility
- A marine terminal

Works associated with the construction, operation and decommissioning of the project including: site access road, sediment retention ponds, maintenance area, preservation areas, and sediment and topsoil storage areas.

The project would be located on private property leased by the Proponent with exception of the ship loading facility and marine terminal which is proposed for provincial Crown foreshore and nearshore in Whites Cove.

The lifespan of the project is projected to be 50 years, with the annual production of 2 million tonnes being shipped to the United States for use by the Proponent's parent company, Clayton Concrete Block and Sand.

The location of the project is shown on Map 1.

The capital cost of the project is estimated to be $40.6 million over a one-year construction period with annual expenditures estimated to be $20 million. The project is expected to create 34 direct full-time jobs over the projected 50 year lifespan.
The Environmental Assessment

The environmental assessment which was carried out over a three and a half year period covered the valued environmental components set out in Table 2.

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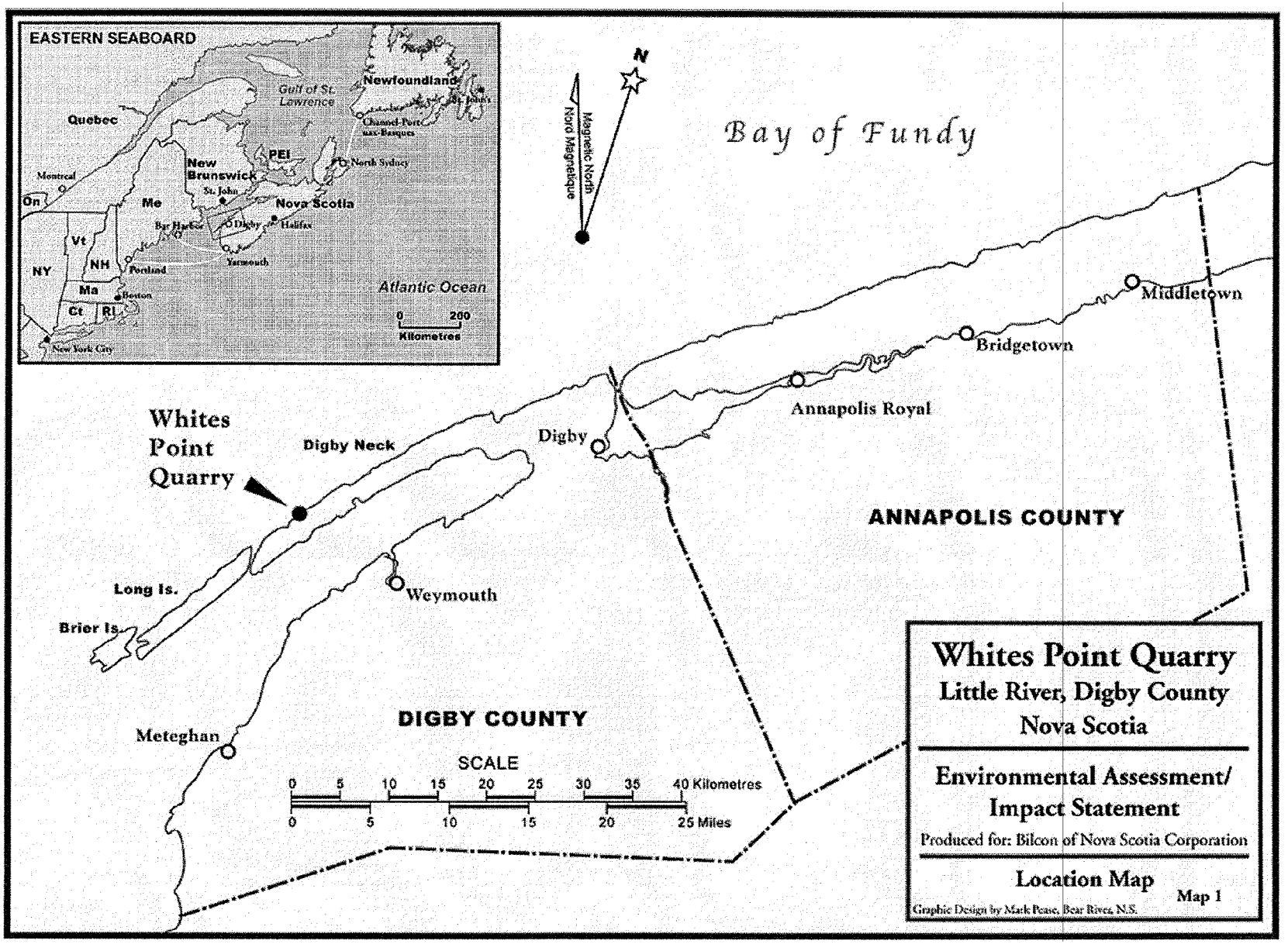

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The following additional elements were also covered as required in the Final Guidelines:

- Alternative Means of Carrying out the Project
- Cumulative Environmental Effects
- Environmental Management
- Accidents and Malfunctions
- Follow-up Program

2.0 Information Disclosure and Public Consultation

During the issues scoping phase, Bilcon provided information regarding the project as it became available.

The issues scoping process was designed not only to provide information, but also to gather input on how communications could be provided throughout the life of the project. This two-way dialogue has already resulted in, and will continue to result in, a regularly updated communications plan to address and integrate feedback.

Methods for providing this information included the Community Liaison Committee, public information sessions, individual interviews, media notices, workshops, website, panel displays, and handouts.

Bilcon carried out extensive public consultation over a three and a half year period including more than 107 different stakeholder consultations, open houses, an attitude survey, a quality of life survey, exit surveys, and a store-front operation.

Bilcon sought to consult with the First Nations over the life of the Environmental assessment. However, Bilcon was advised by Kwilnul Maw-klusaqn (Mi'kmap Rights Initiation) that the position being taken was that consultation with First Nations groups could only be undertaken by the federal government with Kwilnuk Maw-klusaqn. A report entitled "*Mi'kmaq Use of Oositookum (Digby Neck), It's Surrounding Waters, and The Mainland Shore of St. Mary's Bay*" was presented to the Panel in January 2006, and this report was reviewed by the Proponent.

Information gathered during the public consultation process and, in particular, the traditional community knowledge, was used extensively by the Proponent to identify the valued environmental components and in the preparation of the Environmental Impact Statement.

Concerns raised by the public were documented and were considered in the selection of the valued environmental components and during the preparation of the Environmental Impact Statement. A concordance table is included in the Environmental Impact Statement

listing the concerns and issues raised by the public and where these issues and concerns have been addressed.

Bilcon and its consultants also sought advice from both federal and provincial regulatory agencies during the preparation of the Environmental Impact Statement and the assistance of the Department of Fisheries and Oceans, in particular, is recognized.

3.0 Environmental Effects

The main concerns raised by the public were water supply and quality, air quality and noise, quality of life, the fishery, tourism, cemeteries, and species at risk. Each of these topics was examined in detail, together with many other issues raised by the public or regulatory agencies which emerged during the assessment process.

Where negative effects were identified, mitigation measures have been proposed, together with an extensive monitoring program to ensure that the mitigation will be successful.

Mitigation measures and monitoring programs are set out in the EIS for each VEC. However, they are set out in tabular form in Chapters 11.4 and 11.5 of the EIS and these tables are included in this Executive Summary.

The Impact Summary Table 2 in this Executive Summary sets out each of the issues identified during the environmental assessment process and the residual impact after mitigation rated temporally and spatially and for the level of significance.

No significant adverse residual effects were identified while several significant positive effects were identified.

Cumulative effects are dealt with in Chapter 10 of the EIS and the Summary Table of Cumulative Effects is included in this Executive Summary.

The Commitments Table in this Executive Summary sets out the commitments with respect to mitigation, monitoring, and compensation made by Bilcon as part of this application.

4.0 Conclusion

Based on the information set out in the application and the Proponent's Commitments, the Proponent submits that the project is not likely to cause any significant adverse effects.

Glossary of Terms

Aggregate	Pieces of crushed stone, gravel, etc. used in making concrete.
Abandonment	The permanent removal from service of Project facilities.
Adverse Effect	An effect that impairs or damages the environment, including an adverse effect respecting the health of humans or the reasonable enjoyment of life or property.
Agency	The Canadian Environmental Assessment Agency.
Agreement	The Agreement between Canada and Nova Scotia setting up the Joint Review Panel (See Appendix 1).
Archaeology	The study of human history and prehistory through the excavation of sitesand the analysis of physical remains.
Ballast Water	Water carried by a ship to secure stability.
Bathymetry	The measurement of ocean depths and the charting of the topography of theocean floor.
Bilge Water	Filthy water that collects inside the bilge (the lowest area inside a ship, where water collects).
Clearing and Grubbing	The process of removing vegetation and large stumps and roots from a site in preparation for topsoil stripping or other excavation.
Commitments Table	A table that identifies the commitments of the Proponent in relation to managing the effects of the Project.

Glossary of Terms

Contingency Plan	A program intended to address malfunctions, accidents or unplanned events that may occur in connection with the proposed Project.
Cumulative Environmental Effect	The additive and interactive effects of the proposed Project in combination withother projects or activities that have been or will be carried out.
Cumulative Impacts	Changes to the environment that are caused by an action in combination with other past,present, and future human actions. A cumulative impact assessment is an assessment of those impacts. Actions include bothfacilities and activities.
Day	A calendar day.
Decibel	A unit (one-tenth of a bel) used in the comparison of two power levels relating to electrical signals or sound intensities, one of the pair usually being taken as a standard.
Disturbed Area	Land that has had its surface altered by grading, digging, or other construction-related activities.
Effect	The result or consequence of an action.
EIS Guidelines	The direction provided to the Proponent by the Panel on matters which must be addressed in the Proponent's Environmental Impact Statement.
Environment	The components of the earth and includes land, water, and air, including all layers of the atmosphere, all organic and inorganic matter and livingorganisms, the social, economic, recreational, cultural, spiritual, and aesthetic conditions and factors that influence the life of humans and communities, and a part or

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Glossary of Terms

	combination of those things and the interrelationships bwtween two or more of them.
Environmental Assessment	An assessment of the environmental effects of the proposed Project that is conducted in accordance with the Agreement and Terms of Reference.
Environmental Effect	In respect of the Project, means any change that the Project may cause in the environment, including any change it may cause to a listed wildlife species, its critical habitat, or the residence of individuals of that species, as those terms are defined in subsection 2(1) of the *Species at Risk Act,* any effect of any change referred to in paragraph a) on health and socio-economicconditions,physical and cultural heritage, the current use of lands and resources for traditional purposes by Aboriginal persons, any structure, site or thing that is or historical, archaeological, paleotological or architectural significance, or any change to the Project that may be caused by the environment, Whether any such change or effect occurs within or outside Canada.
Environmental Impact Statement (EIS)	The report that presents the results of the environmental assessment conducted by the Proponent.
Federal Minister	The Minister of the Environment of Canada.
Fetch	The extent of ocean over which wind blows to create waves.

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Follow-up Program A program to verify:

(a) Tthe accuracy of the environmental assessment of the proposed Project

(b) Determine the effectiveness of any measures taken to mitigate the adverse environmental effects of the proposed Project, and

(c) Implement measures to mitigate adverse environmental effects identified in (a) or (b)

Geology The science of the earth, including the composition, structure, and origin of itsrocks.

Gradient Vertical drop per unit of horizontal distance.

Groundwater Water held in soil or rock, especially that below the water table.

Habitat A place or environment where a plant or animal species naturally lives and grows.

Hydrogeology The branch of geology dealing with underground and surface water.

Lithology The description of rocks, in hand specimen and outcrop, or the basis of such characteristics as colour, structures, mineralogic composition, and grain size.

Mitigation The elimination, reduction or control of the adverse environmental effects of the proposed Project, and includes restitution for any damage to the environment caused by such effects through replacement, restoration, compensation or any other means, and "mitigate" has a corresponding meaning.

Panel The Joint Review Panel appointed pursuant to the Agreement.

Project The proposed development described in the Agreement.

Glossary of Terms

Proponent	Bilcon of Nova Scotia, Corporation.
Provincial Minister	The Minister of Environment and Labour of Nova Scotia.
Reclamation	The remedial process to restore land used for quarrying to an acceptable environmental condition.
Regolith	A general term for the entire layer of loose, fragmental and unconsolidated rock material, of whatever origin, that nearly everywhere forms the surface of the land and covers the more coherent bedrock.
Residual Effect or Impact	Environmental effect remaining after all mitigative measures have been applied.
Responsible Authority	Federal body that is required under CEAA to ensure that an environmental assessment of the proposed Project is conducted.
Riparian	Of or relating to land lying immediately adjacent to a water body and having specific characteristics of that transitional area (e.g., riparian vegetation).
Secretariat	Administrative staff in support of the Joint Panel activities, established under the terms of the Agreement.
Stratigraphy	The arrangement of strata (bedded layers) of sedimentary and volcanic rocks as to geographic position and chronologic order of sequence.
Surficial	Relating to the earth's surface.

Glossary of Terms

Terms of Reference	Terms of Reference for the Panel, as set out in Appendix 1.
Threatened Species	Species that are likely to become endangered if limiting factors are mitigated.
Valued Environmental Components	Selected components of the physical, biological and human environments which will be the focus of the environmental assessment.
Viewplane	A geographic area of land where all features are visible.

Table ECM - 1
Environmental Component Mitigation

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Whites Point Quarry and Marine Table
Table ECM - 1 Summary Table
Environmental Component Mitigation

Environmental Component	Project Phase		Project Component		Proposed Mitigation	Reference Paragraph
	Construction	Operation	Land	Marine		
Physical Environment **Climate** Greenhouse Gas	X	X	X		• Creation of a permanent environmental preservation zone of approx. 80 acres	para. 9.1.1
	X	X	X		• Maintaining over 300 acres of land surrounding the quarry property in managed forest land	
		X	X		• Incremental forest clearing and reclamation procedures to maximize carbon dioxide uptake and oxygen production	
	X	X	X		• Reduction of greenhouse gas emissions by chipping and composting wood fibre from land clearing activities rather than burning	
		X	X		• Heavy operational equipment diesel engines meeting EPA Tier 3 emission specifications	
		X	X		• Recycling of waste oil and lubricants for heating buildings	
		X	X		• Stationary equipment using electrical energy	
		X		X	• Transport of quarry products directly by ship once per week rather than by ground transportation to port	
Geology Basalt Rock		X	X		• Production of high grade aggregate for value added construction industry products	para. 9.1.2
		X	X		• Rock extraction will not be carried out below sea level to eliminate the possibility of salt water intrusion	

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Whites Point Quarry and Marine Table
Table ECM - 1 Summary Table
Environmental Component Mitigation

Environmental Component	Project Phase		Project Component		Proposed Mitigation	Reference Paragraph
	Construction	Operation	Land	Marine		
Physical Environment						
Geology		X	X		• Rock extraction will not be carried out below the contact of the middle and upper flow units	para. 9.1.2
Basalt Rock (Cont'd)		X	X		• Quarrying will be conducted to use surface water drainage and avoid dewatering by pumping	
	X	X	X		• A security fence will be installed along public property lines for public safety	
Hydrogeology		X	X		• Quarrying and adjacent water wells will occur in different geological horizons or hydro-stratigraphic units	para. 9.1.3
Groundwater		X	X		• Adjacent water wells will be located hydraulically down gradient of the quarry and/or on opposite sides of the ground water divide	
		X	X		• Recharge and discharge areas for the quarry and adjacent water wells will be located in different watersheds	
		X	X		• Quarrying will be carried out above the natural water table and will not require mine dewatering and pumping or associated ground-water withdrawal or drawdown	
		X	X		• Quarrying will be a non-consumptive water use as only water that enters the quarry watershed will be used	
		X	X		• Construction aggregate operations have been used to enhance aquifer recharge via artificial surface recharge of the local groundwater regime	

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Whites Point Quarry and Marine Table
Table ECM - 1 Summary Table
Environmental Component Mitigation

Environmental Component	Project Phase		Project Component		Proposed Mitigation	Reference Paragraph
	Construction	Operation	Land	Marine		
Physical Environment						
Hydrogeology Groundwater	X		X		• Bilcon of Nova Scotia Corporation will conduct a pre-blast survey of adjacent water wells in the immediate area of the quarry in consultation with the NSDEL	para. 9.1.3
		X	X		• Bilcon of Nova Scotia Corporation will replace at their expense any existing water supply proven to be lost or damaged as a result of their quarrying operation	
Surficial Geology & Soils Soils	X	X	X		• Conserving soil resources with a permanent environmental preservation zone around the quarry site with approximately 80 acres in permanent vegetative cover to reduce runoff and potential soil loss from erosion	para. 9.1.4
	X	X	X		• Construction of an organic disposal area for clearing and grubbing materials before site construction begins	
	X		X		• Sediment and organic disposal areas will be dyked to control soil erosion and dykes will receive erosion control measures during construction	
	X	X	X		• Storage and recycling of waste materials (sediments and organics) for reclamation purposes	
	X	X	X		• Incremental forest clearing and reclamation to minimize potential soil loss from erosion	
	X	X	X		• Mixing of composted organics with mineral sediments for a healthy, productive, soil regime for reclamation	

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Whites Point Quarry and Marine Table
Table ECM - 1 Summary Table
Environmental Component Mitigation

Environmental Component	Project Phase		Project Component		Proposed Mitigation	Reference Paragraph
	Construction	Operation	Land	Marine		
Physical Environment **Little River Watershed** Drainage	X	X	X		• All of the Little River watershed on the quarry property, approximately 21 acres, will be within an environmental preservation zone and no quarrying will take place in the Little River watershed	para 9.1.5
		X	X		• Surface water drainage from the quarry compound area within the Little River watershed will be routed toward the active quarry area	
On-site Surface Water Drainage	X	X	X		• Prior to land construction, sediment retention ponds will be constructed to retain surface water runoff from disturbed land areas	para 9.1.6
	X	X	X		• Berms for sediment retention ponds will receive erosion control measures during construction to reduce soil erosion	
	X	X	X		• Water overflows from the sediment retention ponds will drain into a constructed wetland to provide greater retention time before entering the Bay of Fundy	
	X	X	X		• Drainage channels will be constructed as required to direct surface water runoff to the sediment retention ponds	
Wetlands	X	X	X		• Wetlands on the quarry site identified by the NSDNR wetlands database will be included in the permanent environmental preservation zone	para 9.1.6
	X	X	X		• Intermittent surface water flow will be maintained to the "coastal bog" and the environmental preservation zone ex panded in the bog area to conserve this natural wetland habitat	para 9.2.1

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Whites Point Quarry and Marine Table
Table ECM - 1 Summary Table
Environmental Component Mitigation

Environmental Component	Project Phase		Project Component		Proposed Mitigation	Reference Paragraph
	Construction	Operation	Land	Marine		
Physical Environment						
Physical Oceanography						
Site Location		X		X	• The location of the marine terminal will provide a short distance and direct route to and from the designated in bound/outbound shipping lanes with minimal shipping pen etration into the outer Bay of Fundy	para. 9.1.7
	X	X		X	• The location of the marine terminal will be along a homog enous section of the coastline without islands or other physical navigational hazards	
	X	X		X	• The bathymetry of the marine terminal location provides adequate water depth without underwater blasting, dredging or dredge spoil disposal	
	X	X		X	• The location of the marine terminal will avoid the possible archaeological sensitive underwater ridge extending from Sandy Cove west during either construction or subsequent shipping activities	
	X	X		X	• The marine terminal will be located in an area of practically non-existent seismic activity	
		X		X	• Future effect of sea level rise on the marine terminal will be minimal, since this area of coastline has a "low sensitivity in dex" and will remain relatively stable even if sea level rises as predicted	
Water Quality	X			X	• The bottom of the Bay in the location of the marine terminal is mainly exposed bedrock affording good foundation conditions with little sediment deposits for resuspension during marine construction activities	para. 9.1.7

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Whites Point Quarry and Marine Table
Table ECM - 1 Summary Table
Environmental Component Mitigation

Environmental Component	Project Phase		Project Component		Proposed Mitigation	Reference Paragraph
	Construction	Operation	Land	Marine		
Physical Environment						
Physical Oceanography Water Quality	X			X	• Bottom sediment contaminates including metals, PCBs, PAHs, and pesticides are within CCME Guidelines reducing the possibility of contaminate resuspension during marine construction activities	para. 9.1.7
	X			X	• If unexpected turbidity conditions develop during installation of the pipe piles for the marine terminal exceeding CCME Guidelines, controls such as silt curtains will be implemented	
Tides and Currents		X		X	• The pipe pile construction method for the marine terminal will have minimal effect on intertidal and nearshore tides and currents allowing practically unobstructed movement and flows with no infilling	para 9.1.7
Air Quality Particulate Emissions		X	X		• Quarry products will be transported by water, thereby eliminating heavy trucks travelling and raising dust on rural/ residential roads	para. 9.1.8
		X	X		• A paved access road from Highway 217 to the quarry site will be constructed thereby practically eliminating dust generated by employee and delivery vehicles commonly associated with gravel access roads	
		X	X		• Water sprays will be used to control dust on quarry roads and work areas caused by quarry mobile equipment and on stockpiles	

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Whites Point Quarry and Marine Table
Table ECM - 1 Summary Table
Environmental Component Mitigation

Environmental Component	Project Phase		Project Component		Proposed Mitigation	Reference Paragraph
	Construction	Operation	Land	Marine		
Physical Environment **Air Quality** Particulate Emissions (cont'd)		X	X		• The processing plant will be located 1000m from the nearest residence with processing equipment enclosed whenever feasible to control fugitive dust	para. 9.1.8
		X	X		• Vertical separation and vegetative buffer zones will further separate the processing plant from adjacent residences	
		X	X		• Quarry products will be washed during processing with state of the art mist systems	
		X	X		• Load out tunnels will be used to reduce product handling and associated dust generation; conveyors will be hooded to reduce fugitive dust	
		X	X		• Infrequent blasting is proposed to be once every two weeks during production for a duration of less than one second per blast event	para. 9.1.9, para. 9.1.10, para. 9.1.11
Noise and Vibration Blasting		X	X		• Blasting will not be conducted on cloudy or overcast days to minimize sound propagation	
		X	X		• No blasting will be conducted within 800 m of residential structures not located on quarry property without written permission of the property owner	
		X	X		• An environmental preservation zone will be maintained around the perimeter of the quarry to further reduce sound levels by absorption from blasting activities	
		X	X		• Noise and vibration from blasting will meet the requirements set forth in the NSDEL "Pit and Quarry Guidelines"	

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Whites Point Quarry and Marine Table
Table ECM - 1 Summary Table
Environmental Component Mitigation

Environmental Component	Project Phase		Project Component		Proposed Mitigation	Reference Paragraph
	Construction	Operation	Land	Marine		
Physical Environment		X	X		• The processing plant will be located 1000m from the nearest residence with processing equipment enclosed whenever feasible to buffer sound levels at the source & by attenuation	para. 9.1.9, para. 9.1.10, para. 9.1.11
Noise and Vibration Processing Plant		X	X		• A minimum 30m wide environmental preservation zone will be maintained around the perimeter of the quarry property to further reduce sound levels by absorption	
		X	X		• A vertical separation of approximately 60m will be maintained between the processing plant and the nearest residence to dissipate sound waves upward	
		X	X		• Equipment such as truck bodies and screens will be rubberized to reduce sound levels when loading and screening rock products	
		X	X		• Noise and vibration from the quarry will meet the require ments set forth in the NSDEL "Pit and Quarry Guidelines" at the quarry property line	
Ship Loading		X	X		• A horizontal separation distance of over 1.5km will be maintained between the ship loading activity and the nearest residence with vegetative buffer zones to further reduce sound levels by attenuation and absorption	
		X	X		• Infrequent ship loading is proposed once per week during production for a duration of approximately 8 hours using double-hulled vessels to minimize noise during loading	

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Whites Point Quarry and Marine Table
Table ECM - 1 Summary Table
Environmental Component Mitigation

Environmental Component	Project Phase		Project Component		Proposed Mitigation	Reference Paragraph
	Construction	Operation	Land	Marine		
Physical Environment **Light** Artificial	X	X	X	X	• Adjacent residences will receive no direct light from quarry lighting infrastructure due to horizontal and vertical separation and visual buffers	para. 9.1.12
		X	X		• Quarry production will be concentrated during seasons of longer daylight hours, thereby reducing requirements for artificial light and for energy savings	
		X	X		• Except for regulatory navigational lighting, quarry lighting will be placed in buildings or be shielded whenever feasible to reduce "light spill"	
Biological Environment **Terrestrial Ecology** Habitat	X	X	X		• Approximately 80 acres of quarry land is proposed to be conserved and managed as a permanent environmental preservation zone	para. 9.2.1
	X	X	X		• Over 300 acres of non-quarry land within the same ecosys tem is proposed to be managed as forest/wildlife resource land for the 50 year life of the quarry project	
		X	X		• Incremental forest clearing and reclamation will be carried out during the 50 year life of the quarry project to maintain habitat stability	
		X	X		• Construction of sediment retention ponds and associated constructed wetlands will create habitat diversity	
	X	X	X		• In accordance with the Migratory Bird Protection Act, habitat alteration from clearing activities will generally take place during late fall and winter to avoid nesting periods and spring and fall migrations	

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Whites Point Quarry and Marine Table
Table ECM - 1 Summary Table
Environmental Component Mitigation

Environmental Component	Project Phase		Project Component		Proposed Mitigation	Reference Paragraph
	Construction	Operation	Land	Marine		
Biological Environment **Terrestrial Ecology** Habitat (cont'd)		X	X		• To reduce the possibility of migratory bird collisions with lighted structures, night lighting will be kept to a minimum and shielded whenever possible to dirert light downward	para. 9.2.1
Species at Risk	X	X	X		• Three provincially designated Flora species at risk will be permanently preserved in an environmental preservation zone for the 50 year life of the quarry project	para. 9.2.1
	X	X	X		• No federal or provincial designated vertebrate species at risk are expected to breed on the quarry site - no mitigation proposed	
	X	X	X		• Preservation and creation of wetland habitats will provide potential habitat for some Odonata species at risk	
	X	X	X		• Maintaining early successional stages of vegetation on dykelands will provide potential habitat for some Lepidoptera species at risk	
	X	X	X		• All toxic substances will be stored appropriately and not be accessible to wildlife	
Aquatic Ecology On-site Freshwater	X	X	X		• The two watercourses at the north and south property lines of the quarry will be included in the environmental preservation zone	para. 9.2.2
	X	X	X		• The watercourse in the active quarry was determined to be not suitable fish habitat by DFO, however, surface water flow to the coastal bog will be maintained	
	X	X	X		• All outflows from the sediment retention ponds and/or constructed wetlands into the Bay of Fundy will meet the NSDEL "Pit and Quarry Guidelines" for Total Suspended Solids and pH	

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Whites Point Quarry and Marine Table
Table ECM - 1 Summary Table
Environmental Component Mitigation

Environmental Component	Project Phase		Project Component		Proposed Mitigation	Reference Paragraph
	Construction	Operation	Land	Marine		
Biological Environment						
Aquatic Ecology Marine Intertidal Zone	X	X		X	• The conveyor system for ship loading quarry products will be designed to span the majority of the intertidal zone with only one group of pipe piles installed directly in the intertidal zone affecting .001 acres of intertidal bottom habitat	para. 9.2.2
		X		X	• A fish habitat compensation plan has been approved in principle by DFO at three times the loss of bottom habitat in the intertidal zone	
	X			X	• Installation of the pipe piles will be conducted from the shore at low tide by socket drilling, producing aggregate size waste material with minimal fines	
		X		X	• The conveyor over the intertidal zone will be hooded to control dust and equipped with spill containment to catch any product from entering the intertidal zone	
		X		X	• The surface of selected pipe piles will be equipped with wire cages to enhance pelagic fish food sources	
Coastal/Nearshore Marine Habitat	X	X		X	• The foundation system selected for the ship loader and mooring dolphins in nearshore waters will be pipe piles anchored to the bedrock bottom resulting in minimal effect on bottom habitat of approximately .008 acres	para. 9.2.3
		X		X	• A fish habitat compensation plan has been approved in principle by DFO at three times the loss of bottom habitat in the nearshore waters and with pelagic fish food enhancements	
	X			X	• Installation of the marine terminal infrastructure will be done from shore and floating platforms to minimize disturbance to the nearshore bottom habitat	

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Whites Point Quarry and Marine Table
Table ECM - 1 Summary Table
Environmental Component Mitigation

Environmental Component	Project Phase		Project Component		Proposed Mitigation	Reference Paragraph
	Construction	Operation	Land	Marine		
Biological Environment Coastal/Nearshore Marine Habitat (cont'd)	X			X	• Socket drilling for anchoring the pipe piles will be done to produce aggregate size waste material with minimal fines and turbidity	para. 9.2.3
		X		X	• During the infrequent, once per week, vessel arrival and departure, a trained observor will be stationed on the ship loader and if marine mammals or waterbirds are sighted, their location will be communicated to the ship's captain	
		X		X	• The loading of vessels at night will be avoided whenever possible to minimize the possibility of lights attracting coastal migrant waterbirds and subsequent collisions	
Species at Risk	X	X		X	• Three federally designated fish species at risk may frequent nearshore waters at the marine terminal: Bilcon of Nova Scotia Corporation will work with the appropriate Recovery Teams in their efforts to re-establish fish species at risk populations such as the inner Bay of Fundy Atlantic salmon, Atlantic cod, and striped bass	para. 9.2.5, para.. 9.2.6
		X		X	• A fish habitat compensation plan has been approved in principal by DFO for intertidal and nearshore bottom habitat at three times the direct loss and for alteration of pelagic fish habitat	
		X		X	• Two federally designated waterfowl species at risk may occur in nearshore waters at the marine terminal: Bilcon of Nova Scotia Corporation will continue to coordinate with the Canadian Wildlife Service in their efforts to re-establish waterfowl species at risk populations such as the Harlequin duck and Barrow's goldeneye	para. 9.2.7

Whites Point Quarry and Marine Table
Table ECM - 1 Summary Table
Environmental Component Mitigation

Environmental Component	Project Phase		Project Component		Proposed Mitigation	Reference Paragraph
	Construction	Operation	Land	Marine		
Biological Environment Species at Risk (cont'd)		X		X	• One federally designated marine reptile species at risk could occur in nearshore waters at the marine terminal: Bilcon of Nova Scotia Corporation will coordinate any sightings of leatherback turtles to the Nova Scotia Leatherback Turtle Working Group	para. 9.2.8
Blasting Fish Habitat	X	X		X	• Blasting will be guided by "Bilcon of Nova Scotia Corporation's 'Blasting Protocol'" and adhere to the Department of Fisheries and Oceans "Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters"	para. 9.2.9 para. 9.2.10
		X		X	• Blasting will be conducted infrequently, once every two weeks during production, with a duration of each blast event of less than one second, blasts will be conducted when no atmospheric inversions are present and as close to low tide as feasible to maximize setback distances from the blast and fish habitat	
		X		X	• An additional mitigative measure will be adopted of three times the designated setback indicated in the "Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters" from the blast to fish habitat during times of the year when inner Bay of Fundy Atlantic salmon could be present in these coastal waters	

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Whites Point Quarry and Marine Table
Table ECM - 1 Summary Table
Environmental Component Mitigation

Environmental Component	Project Phase		Project Component		Proposed Mitigation	Reference Paragraph
	Construction	Operation	Land	Marine		
Biological Environment						
Blasting Marine Mammals	X	X		X	• Blasting will not be conducted if marine mammals (whales, porpoises, or dolphins) are observed within 500m of the detonation site or if seals are within 170m of the detonation site	para. 9.2.11
	X	X		X	• Blasting will not be conducted if marine mammal species at risk (fin, blue or North Atlantic right whales) are observed within 2500m of the detonation site	
		X		X	• An experienced marine mammal observor will be employed to verify any marine mammals present within the safety radii and will communicate with the blast coordinator an "all clear" signal if no marine mammals are observed	
	X			X	• Monitoring of an initial blast is proposed to verify modeling procedures with results from this initial blast being used to further define mitigative setback distances from the detona tion to a marine mammal	
Blasting Waterbirds		X		X	• An experienced waterbird observor will be employed to verify any waterbirds present within the 170m safety radii and will communicate with the blast coordinator an "all clear" signal if no waterbirds are observed	para. 9.2.12

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Whites Point Quarry and Marine Table
Table ECM - 1 Summary Table
Environmental Component Mitigation

Environmental Component	Project Phase		Project Component		Proposed Mitigation	Reference Paragraph
	Construction	Operation	Land	Marine		
Ship Interactions Marine Mammals		X		X	• Vessels transporting quarry products will not have to pass through the North Atlantic right whale conservation area	para. 9.2.13
		X		X	• The proposed ship route to and from the marine terminal and the shipping lanes will pass through an area of low sightings of North Atlantic right whales per unit of effort	
		X		X	• The proposed ship route to and from the marine terminal and the shipping lanes will pass through an area of low sightings of humpback, fin and minke whale, and harbour porpoises	
		X		X	• The speed of the vessel in waters between the shipping lanes and the marine terminal will be less than 12 knots/ hour, i.e., significantly less than the speed of most severe and lethal ship strikes	
		X		X	• Coordination with whale and seabird cruises operating in the waters of the Bay of Fundy between the shipping lanes and the marine terminal will be maintained on days when vessels are due to arrive and depart for reports of marine mammal sightings	
		X		X	• Bilcon of Nova Scotia Corporation will cooperate with the Canadian North Atlantic Right Whale Recovery Team to achieve the objectives of their recovery strategy	
Ballast Water		X		X	• Compliance with ballast water management guidelines and pending regulations are the responsibility of the shipping industry: Bilcon of Nova Scotia Corporation will contract reputable shipping companies	para. 9.2.14

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Whites Point Quarry and Marine Table
Table ECM - 1 Summary Table
Environmental Component Mitigation

Environmental Component	Project Phase		Project Component		Proposed Mitigation	Reference Paragraph
	Construction	Operation	Land	Marine		
Biological Environment Noise and Vibration Marine					• Large vessel traffic is minimal in waters between the shipping lanes and marine terminal and cumulative noise from the quarry vessel is not expected to be as great as presently experienced in the North Atlantic right whale conservation area - no mitigation proposed	para. 9.2.15
Human Environment **Heritage Resources** Marine Archaeology	X			X	• Prior to marine construction, Bilcon of Nova Scotia Corporation will have the appropriate archaeological investigations conducted under permit with the Nova Scotia Museum: if archaeological resources are discov ered as a result of this investigation, appropriate mitigation actions will be taken in consultation with the Nova Scotia Museum	para. 9.3.1
Heritage Resources Land Archaeology	X	X	X		• Archaeological recording and limited testing of the Hersey House foundation will be conducted under permit with the Nova Scotia Museum if the foundation cannot be avoided during quarry construction or operations	para. 9.3.2
	X	X	X		• Before construction and operation of the quarry, an educational briefing concerning archaeological and historical resources will be conducted for all quarry employees	para. 9.3.3

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Whites Point Quarry and Marine Table
Table ECM - 1 Summary Table
Environmental Component Mitigation

Environmental Component	Project Phase		Project Component		Proposed Mitigation	Reference Paragraph
	Construction	Operation	Land	Marine		
Human Environment **Aboriginal Land and Resource Use**	X	X	X	X	• Bilcon of Nova Scotia Corporation will continue its efforts to consult with First Nations and address their concerns.	para. 9.3.3
Heritage Resources History	X	X	X		• As part of the educational briefing concerning archaeologi cal and historical resources, training with respect to the requirements of the Cemeteries Protection Act will be conducted for all quarry employees	para. 9.3.4
Heritage Resources Heritage Properties	X	X	X		• Registered or designated heritage properties are not located within view planes of the quarry - no mitigation proposed	para. 9.3.5
Aesthetics	X	X	X		• The quarry will not be visible in a view plane from the land along Highway 217 - no mitigation proposed	para. 9.3.6
	X	X		X	• A minimum 30m wide environmental preservation zone will be maintained along the coastline of the quarry as a buffer to enhance visual qualities when viewed from the Bay of Fundy with incremental forest clearing and incremental reclamation	
Community Profile					• The community profile presents historical background data - no mitigation proposed	para. 9.3.7

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Whites Point Quarry and Marine Table
Table ECM - 1 Summary Table
Environmental Component Mitigation

Environmental Component	Project Phase		Project Component		Proposed Mitigation	Reference Paragraph
	Construction	Operation	Land	Marine		
Human Environment **Transportation**		X	X	X	• Shipping quarry products directly by water will eliminate heavy truck traffic on rural, two-lane highways, truck traffic inconveniences for residents and tourists, and associated noise and vibration for those residents and school along Highway 217	para. 9.3.8
	X	X	X		• Upgrading of the intersection of the quarry entrance road and Highway 217 will be done to meet Nova Scotia Department of Transportation and Public Works standards	
Economy - Whites Point Quarry and Marine Terminal	X	X	X	X	• The construction and operation of the quarry and marine terminal will provide positive aspects for local employment, community development through economic spin-off, and municipal tax revenues - no mitigation proposed	para. 9.3.9
Economy - Fishery / Aquaculture		X	X	X	• Blasting in proximity to land and water based aquaculture will be subject to the same setbacks as outlined in DFO's "Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters"	para. 9.3.10, para. 9.3.11
Economy - Fishery / Intertidal	X	X		X	• Continued access through quarry property to the beach for harvesting will be provided for beach harvesters upon appropriate arrangements with quarry management	para. 9.3.12

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Whites Point Quarry and Marine Table
Table ECM - 1 Summary Table
Environmental Component Mitigation

Environmental Component	Project Phase		Project Component		Proposed Mitigation	Reference Paragraph
	Construction	Operation	Land	Marine		
Human Environment **Economy - Fishery / Nearshore**		X		X	• Coordination of a designated ship route to and from the marine terminal to the inbound / outbound shipping lanes in the Bay of Fundy is proposed with all stakeholders	para. 9.3.13
		X		X	• Coordination of the approach / departure area for the vessel at the marine terminal is proposed with local fishers	
		X		X	• Re-establishment of the Community Liaison Committee with a local fisherman representative is proposed to maintain lines of communication between the quarry and fishing industries	
		X		X	• To minimize possible inconvenience to local fishers, advance notice of shipping schedules will be made available	
		X		X	• A "lobster trap fund" will be established and funded by Bilcon of Nova Scotia Corporation and administered by a designated fisher group to compensate for fishing gear destroyed as a result of the vessel transporting quarry products	
Economy - Tourism		X	X		• Re-establishment of the Community Liaison Committee with a local tourism representative is proposed to maintain lines of communication between the quarry and tourism industries	para. 9.3.14
Economy - Land Value		X	X		• Compensation will be paid to adjacent property owners within 800m of the active quarry if property values are shown to be diminished	para. 9.3.15

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Whites Point Quarry and Marine Table
Table ECM - 1 Summary Table
Environmental Component Mitigation

Environmental Component	Project Phase		Project Component		Proposed Mitigation	Reference Paragraph
	Construction	Operation	Land	Marine		
Human Environment **Recreation**		X	X		• Continued access through quarry property to the beach will be provided for non-motorized recreation users upon appropriate arrangements with quarry management	para. 9.3.16
Human Health and Community Wellness					• Human health and community wellness presents back ground data - see noise, dust, water quality, etc.	para. 9.3.17
Human Health Drinking Water Quality	X		X		• All wells constructed on-site for domestic water supply will meet the NSDEL requirements for the construction of water wells - no mitigation proposed	para. 9.3.18
Human Health Marine Contaminates	X	X		X	• On-land environmental control structures and quarry operating procedures will be designed to control any on-site contaminates from entering the marine environment	para. 9.3.19
		X		X	• The risk of spills in the marine environment will be minimal since ships will not be fueled at the marine terminal	
		X		X	• Electrical motors for the conveyor systems will be used over the intertidal and nearshore waters which require minimal lubricants and will be equipped with drip pans and maintained	
Human Health Land Contaminates	X	X	X		• Only pesticides, herbicides, and other chemical agents registered for their particular use and application by licensed persons will be used on-site	para. 9.3.20

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Whites Point Quarry and Marine Table
Table ECM - 1 Summary Table
Environmental Component Mitigation

Environmental Component	Project Phase		Project Component		Proposed Mitigation	Reference Paragraph
	Construction	Operation	Land	Marine		
Human Environment **Human Health** Land Contaminates (cont'd)	X	X		X	• Explosives will not be stored on-site and will be delivered and handled by qualified persons in accordance with provincial and federal regulations	para. 9.3.20
	X	X		X	• Fuels, oils, lubricants, and coolants will be stored on-site in spill containment areas and vehicle fueling will be done using closed systems with dry break disconnect couplings	
					• Sewage disposal will be by on-site sewage disposal systems designed and maintained in accordance with NSDEL guidelines	
Human Health Country Foods	X	X	X	X	• Mitigation measures regarding potential pathways (air, water, and soil) for country food contaminates are pre sented in previous paragraphs	para. 9.3.21
Socio-economic Patterns	X	X	X	X	• Communication and community involvement of the pre-project environmental assessment and pre-project engi neering will be continued by Bilcon of Nova Scotia Corporation through open houses, newsletters, and with interested individuals	para. 9.3.22
	X	X	X	X	• Bilcon of Nova Scotia Corporation intends to re-establish the Community Liaison Committee and invite an adjacent property owners to be members of the Committee	

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Whites Point Quarry and Marine Table
Table ECM - 1 Summary Table
Environmental Component Mitigation

Environmental Component	Project Phase		Project Component		Proposed Mitigation	Reference Paragraph
	Construction	Operation	Land	Marine		
Human Environment **Socio-economic Patterns** (cont'd)	X	X	X	X	• A complaint process will be established by Bilcon of Nova Scotia Corporation to address environmental matters and any quality of life issues	para. 9.3.22
Education, Training, and Skills		X	X	X	• Training for quarry employees will be provided by Bilcon of Nova Scotia Corporation at the Company's expense	para. 9.3.23
		X	X	X	• Hiring priority will be given to Digby Neck residents with emphasis on education and skill development to introduce and maintain women in the workforce	
Infrastructure and Institutional Capacity	X	X	X	X	• No burden on existing infrastructure or institutional capacity is anticipated and no mitigation is proposed	para. 9.3.24

Table ECM - 2
Environmental Component Follow-up Monitoring

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Whites Point Quarry and Marine Terminal
Table ECM - 2 SUMMARY TABLE
Environmental Component Follow-up Monitoring

Environmental Component	Project Phase		Frequency	Description/EIS Paragraph	Regulatory Requirement
	Construction	Operation			
Physical Environment					
Climate					
Precipitation	Yes	Yes	Monthly	•On-site precipitation measurement **(para. 9.1.1.4)**	No
Geology					
Basalt Rock	No	No	NA		N/A
Hydrogeology					
Groundwater Quality	Yes	Yes	Annually	•Bacteriology, chemistry, trace metals **(para. 9.1.3.4)**	Yes-NSDEL
Groundwater Level	Yes	Yes	Monthly	•Groundwater level measurement at 6 monitoring well locations **(para. 9.1.3.4)**	No
Surficial Geology & Soils					
Soil	No	Yes	5 Years	•Soil testing for reclamation **(para. 9.1.4.4)**	No
Little River Watershed					
Drainage	Yes	Yes	Annually	•Off-site surface water drainage **(para. 9.1.5.4)**	No
On-Site Surface Water Drainage					
Water Quality	Yes	Yes	Weekly	•Total suspended solids and pH from sediment pond outfalls **(para. 9.1.6.4)**	Yes-NSDEL
Water Quantity	Yes	Yes	Monthly	•General chemistry **(para. 9.1.6.4)** and flow when measurable **(para. 9.2.2.4)**	No
Physical Oceanography					
Water Quality	Yes	No	Monthly	•Turbidity measurements if required during marine construction **(para. 9.1.7.4)**	No
Air Quality					
Particulate Emissions	Yes	Yes	Daily	•Suspended particulate matter measurements if required at quarry property line **(para. 9.1.8.4)**	Yes-NSDEL

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Whites Point Quarry and Marine Terminal
Table ECM - 2 SUMMARY TABLE
Environmental Component Follow-up Monitoring

Environmental Component	Project Phase		Frequency	Description/EIS Paragraph	Regulatory Requirement
	Construction	Operation			
Noise & Vibration					
Blasting - Land	Yes	Yes	Weekly	•Concussion and ground vibration measurements at 3 land monitoring stations **(para. 9.1.9.4)**	Yes-NSDEL
Plant Operations - Land	No	Yes	Daily	•Sound level measurements at property line **(para. 9.1.10.4)**	Yes-NSDEL
Light					
Night Light	Yes	Yes	Monthly	•Visual observations by a CLC member **(para. 9.1.12.4)**	No
Biological Environment					
Terrestrial Ecology					
Flora Species at Risk					
Glaucous Rattle-snake Root	Yes	Yes	Annually	•Visual population appraisal and photographic documentation **(para. 9.2.1.4)**	No
Mountain Sandwort	Yes	Yes	Annually	•Visual population appraisal and photographic documentation **(para. 9.2.1.4)**	No
Hemlock Parsley	Yes	Yes	5 Years	•Visual population appraisal and photographic documentation **(para. 9.2.1.4)**	No
Invasive Plants	No	Yes	5 Years	•Visual population appraisal and photographic documentation **(para. 9.2.1.4)**	No
Vertebrate Fauna	No	Yes	5 Years	•On-site vertebrate survey including a breeding bird survey **(para. 9.2.1.4)**	No
Odonata/Wetlands	No	Yes	5 Years	•Visual odonata population appraisal and wetland habitat appraisal **(para. 9.2.1.4)**	No
Lepidoptera	No	Yes	5 Years	•Visual lepidoptera and host plant appraisal **(para. 9.2.1.4)**	No
Aquatic Ecology					
Marine Intertidal Zone	Yes	No	Monthly	•Visual monitoring and turbidity measuremnts if required during marine construction **(para. 9.2.3.4)**	No
Coastal-Nearshore	Yes	No	Daily	•Visual monitoring and turbidity measuremnts if required during marine construction **(para. 9.2.4.4)**	No
Fish Habitat Compensation	No	Yes	Annually - 5 yrs	•Video documentation of pre & post compensation conditions, biological sampling **(para. 9.2.4.4)**	Yes-DFO
Fish and Fish Habitat-Blasting	Yes	No	Initial Blast	•Peak pressure and ground vibration at 3 stations in marine environment **(para. 9.2.9.4)**	Yes-DFO
Marine Mammals-Blasting	Yes	No	Initial Blast	•Peak pressure & ground vibration at 3 stations in marine environment **(para. 9.211.4)**	No
Marine Mammals-Blasting	Yes	Yes	Initial Blast	•Noise measurement and video documentation of seal colony at Crowells Cove **(para. 9.2.11.4)**.	No
Noise and Vibration-Marine	Yes	Yes	Weekly	•Noise and vibration in water column at marine terminal **(para. 9.2.15.4)**	No

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Whites Point Quarry and Marine Terminal
Table ECM - 2 SUMMARY TABLE
Environmental Component Follow-up Monitoring

Environmental Component	Project Phase		Frequency	Description/EIS Paragraph	Regulatory Requirement
	Construction	Operation			
Human Environment **Heritage Resources** Land Archaeology	Yes	Yes	NA	•Visual investigation if land disturbances within 250m of Hersey house foundation **(para. 9.3.2.4)**	Yes - NS Museum
Aesthetics Reclamation	Yes	Yes	5 years	•Inspection of environmental preservation zone and reclamation procedures **(para. 9.3.6.4)**	No
Transportation Marine	Yes	Yes	Annually	•Lobster fishermen monitor trap or gear loss resulting from shipping activities **(para. 9.3.8.4)**	No
Fishery Intertidal	Yes	Yes	Daily	•Registration at the quarry office when harvesting in the coastal zone **(para. 9.3.12.4)**	No
Nearshore	Yes	Yes	Daily	•Recording of frequency and duration of vessels at marine terminal **(para 9.3.13.4)**	No
Tourism Bay of Fundy	Yes	Yes	Monthly	•Tourism representative to participate on Community Liaison Committee **(para. 9.3.14.4)**	No
Recreation Outdoor	Yes	Yes	Daily	•Registration at the quarry office when accessing the coastal zone **(para. 9.3.16.4)**	No
Human Health Drinking Water Quality Country Foods	Yes No	Yes Yes	Annually 5 years	•Chemical, physical, and bacteriaology parameters **(para. 9.3.18.4)** •Metal content in periwinkles and wild raspberries **(para. 9.3.21.4)**	Yes - HC No

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Units of Measure

%	Percent
o	Degrees
°c	Degrees Celcius
cm	Centimetres
DWT	Deadweight metric tonnes
g	Grams
g/cc	Grams per cubic centimetre
g/m^3	Grams per cubic metre
h	Hour(s)
ha	Hectares (10,000 square metres)
HP	Horsepower
kg	Kilograms
km	Kilometres
km^2	Square kilometres
kW	Kilowatts
l/s	Litres per second
M	Millions
m	Metres
m^3	Cubic metres

Units of Measure

masl	Metres above sea level
mm	Millimetres
Mm^3	Millions of cubic metres
Mtpy	Millions metric tonnes per year
Mt	Metric tonne
MW	Megawatts
ppm	Parts per million
ST	Short ton (2,000 lbs)
tph	Metric tonnes per hour
tpy	Metric tonnes per year
C$ M	Millions Canadian dollars
US$ M	Millions US dollars
C$/t	Canadian dollars per metric tonne
US$/t	US dollars per metric tonne
wt%	Weight percent
mg/l	Milliograms per litre
µg	Micrograms
dbA	Decibel
Rms	Root mean square

Table 2

Impact Summary Tables

Valued Environmental Component Impact Summary

Whites Point Quarry and Marine Terminal
Environmental Impact Statement

Table 2, Part 1

	Time		Type/Significance of Effect					Scale			
	Short Term	Long Term	Significant Positive	Insignificant Positive	Neutral	Insignificant Negative	Significant Negative	Local	Regional	Provincial	National/International
Physical Environment											
Climate - Greenhouse Gas		●				○			Ⓡ		
Geology - Basalt rock		●				○		Ⓛ			
Hydrogeology - Residential Well Water Yield		●			○			Ⓛ			
Hydrogeology - Residential Well Water Quality		●			○			Ⓛ			
Surficial Geology and Soils		●		○				Ⓛ			
Little River Watershed		●			○				Ⓡ		
On-site Surface Water Drainage - Wetlands		●			○			Ⓛ			
On-site Surface Water Drainage - Quality		●			○			Ⓛ			
Physical Oceanography - Turbidity	◔					○		Ⓛ			
Physical Oceanography - Tides and Currents		●				○		Ⓛ			
Air Quality - Particulate Emmissions		●			○			Ⓛ			
Noise and Vibration - Blasting		●			○			Ⓛ			
Noise and Vibration - Processing Plant		●			○			Ⓛ			
Noise and Vibration - Shiploading		●			○			Ⓛ			
Light - Night		●				○		Ⓛ			

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Valued Environmental Component Impact Summary

Whites Point Quarry and Marine Terminal
Environmental Impact Statement

Table 2, Part 2

	Time		Type/Significance of Effect					Scale			
	Short Term	Long Term	Significant Positive	Insignificant Positive	Neutral	Insignificant Negative	Significant Negative	Local	Regional	Provincial	National/International
Biological Environment											
Terrestrial Ecology - Habitat Alteration		◕				●		L			
Terrestrial Ecology - Habitat Diversity		◕		●				L			
Terrestrial Floral Species at Risk		◕	●							P	
Terrestrial Vertebrate Species at Risk		◕				●		L			
Terrestrial Odonata Species at Risk		◕		●				L			
Terrestrial Lepidoptera Species at Risk		◕				●		L			
Terrestrial Wetlands		◕		●				L			
Migratory Land Birds		◕				●		L			
Aquatic Ecology - Freshwater Fish Habitat		◕			●			L			
Aquatic Ecology - Marine Intertidal Habitat	◔					●		L			
Aquatic Ecology - Marine Intertidal Habitat		◕			●			L			
Aquatic Ecology - Marine Nearshore Habitat	◔					●		L			
Aquatic Ecology - Marine Nearshore Habitat		◕			●			L			
Marine Mammals and Waterbirds - Nearshore		◕				●		L			
Fish - Endangered (Inner Bay of Fundy Salmon)		◕			●						N

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Valued Environmental Component Impact Summary

Whites Point Quarry and Marine Terminal
Environmental Impact Statement

Table 2, Part 3

	Time		Type/Significance of Effect						Scale			
	Short Term	Long Term	Significant Positive	Insignificant Positive	Neutral	Insignificant Negative	Significant Negative		Local	Regional	Provincial	National/International
Fish - Threatened and Special Concern		●			●							N
Waterfowl - Special Concern		●			●							N
Marine Reptiles - Endangered		●			●							N
Blasting - Fish Habitat		●				●			L			
Blasting - American Lobster		●				●			L			
Blasting - Marine Mammals		●				●			L			
Blasting - Marine Mammals - Species at Risk		●				●						N
Blasting - Waterbirds		●				●			L			
Ship Interactions - North Atlantic Right Whale Conservation Area		●			●							N
Ship Interactions - North Atlantic Right Whale Nearshore		●				●						N
Ballast Water		●			●					R		
Noise and Vibration Marine		●				●			L			
Human Environment												
Heritage Resources - Marine Archaeology	◔				●				L			
Heritage Resources - Land Archaeology		●			●				L			

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Valued Environmental Component Impact Summary

Whites Point Quarry and Marine Terminal
Environmental Impact Statement

Table 2, Part 4

	Time		Type/Significance of Effect					Scale			
	Short Term	Long Term	Significant Positive	Insignificant Positive	Neutral	Insignificant Negative	Significant Negative	Local	Regional	Provincial	National/International
Heritage Resources - History		◕				●		L			
Heritage Resources - Heritage Properties		◕			●				R		
Aesthetics - Highway #217		◕			●				R		
Aesthetics - Bay of Fundy		◕				●			R		
Economy - Quarry Construction Employment	◔		●						R		
Economy - Quarry Construction GDP	◔			●						P	
Economy - Quarry Operation Employment		◕	●						R		
Economy - Quarry Operation GDP		◕		●						P	
Economy - Quarry Operation Tax Revenue		◕		●						P	N
Economy - Quarry Operation Mun. Tax Revenue		◕	●						R		
Economy - Fishery - Aquaculture		◕			●				R		
Economy - Fishery - Intertidal		◕			●				R		
Economy - Fishery - Nearshore		◕				●		L			
Economy - Tourism		◕				●			R		
Economy - Land Value		◕				●		L			
Recreation		◕			●			L			

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Valued Environmental Component Impact Summary

Whites Point Quarry and Marine Terminal
Environmental Impact Statement

Table 2, Part 5

	Time		Type/Significance of Effect					Scale			
	Short Term	Long Term	Significant Positive	Insignificant Positive	Neutral	Insignificant Negative	Significant Negative	Local	Regional	Provincial	National/International
Socio-Cultural - Quality of Life - Social Relations		●		○					R		
Socio-Cultural - Social Capital - Pre-project	◔					○			R		
Socio-Cultural - Social Capital - Life of Project		●		○					R		
Socio-Cultural - Commercial Patterns		●				○			R		
Socio-Cultural - Quality of Life - Environmental		●				○		L			
Community Infrastructure		●			○				R		
Community Institutional Capacity		●			○				R		
Education Training and Skills		●		○					R		
Transportation - Land - Construction	◔					○			R		
Transportation - Land - Operation		●			○				R		
Transportation - Marine - Construction and Operation	◔	●				○		L			
Human Health - Offsite Drinking Water Quality		●			○			L			
Human Health - Onsite Drinking Water Quality		●				○		L			
Human Health - Marine Contaminates		●			○			L			
Human Health - Land Contaminates		●			○			L			
Human Health - Country Foods		●			○			L			

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Table CEM - 1
Cumulative Environmental Component Monitoring

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Whites Point Quarry and Marine Terminal
Table CEM - 1 Summary Table
Cumulative Environmental Component Monitoring

Environmental Component	Project Phase		Frequency	Description/EIS Paragraph	Regulatory Requirement
	Construction	Operation			
Greenhouse Gas	Yes	Yes	Annually	•Measurement of energy consumption by type of fuel **(para. 10.0)**	No
Flora Species at Risk	Yes	Yes	Varies by Species	•Maintain liaison with federal and provincial agencies regarding additions or deletions of regional species at risk **(para. 10.0)**	No
Marine Mammals - Blasting	Yes	Yes	Varies by Species	•Maintain liaison with federal and provincial agencies regarding additions or deletions of regional species at risk and adaptive management procedures **(para. 10.0)**	No
Marine Mammals - Ship Interactions	Yes	Yes	Varies by Species	•Work with the shipping company and DFO to develop detection systems for marine mammals in the designed ship route to and from the shipping lanes and the Whites Point Marine Terminal **(para. 10.0)**	No
Bay of Fundy Aesthetics	Yes	Yes	5 years	•Photographic documentation of view planes from the Bay of Fundy to the coastline to appraise effectiveness of reclamation **(para. 10.0)**	No
Employment / Quarry Operation	No	Yes	Annually	•Maintain a list of direct employment by occupation of quarry workers **(para 10.0)**	No
Municipal Tax Revenue / Quarry Operation	No	Yes	Annually	•Maintain amount of direct taxes paid to Municipality **(para. 10.0)**	No
Tourism	No	Yes	Annually	•Maintain rural landscape at entrance to quarry at Highway 217 **(para. 10.0)**	No
Quality of Life	No	Yes	after 5 years	•Assess quality of life of residents on Digby Neck by survey **(para. 10.0)**	No
Social Capital	No	Yes	after 5 years	•Assess success of training and local hiring of workforce at quarry **(para. 10.0)**	No

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Table CI-1
Committments Table

Whites Point Quarry & Marine Terminal
Table C-1 Commitments Table

Bilcon Commitment	Project Phase	Responsibility	Approving Agency
1) Project Design 1.1 Bilcon of Nova Scotia Corporation will design, construct, operate and decommission the project as set out in the EIS including subsequent specific changes required in future permits or authorizations.	Construction Operation Closure	Bilcon	EC, TC, DFO, NSDEL, NSM Municipality of Digby
1.2 Project construction, operation and closure will be in compliance with the terms and conditions set out in the Industrial Permit.	Construction Operation Closure	Bilcon	NSDEL
1.3 Bilcon will complete the environmental monitoring plans set out in the EIS in consultation with regulatory agencies and implement the plans when appropriate.	Operation	Bilcon	All Agencies
1.4 Bilcon will complete environmental contingency plans and spill response plans in consultation with regulatory agencies.	Operation	Bilcon	NSDEL, TC
1.5 Training programs will be implemented for operations staff.	Construction Operation	Bilcon	
1.6 Systems will be installed for the handling of domestic, sanitary and hazardous wastes.	Construction Operation	Bilcon	NSDEL, EC
1.7 No quarried rock product will be trucked on local roads.	Operation	Bilcon	
1.8 Bilcon will complete the reclamation plans and provide surety as required.	Operation	Bilcon	NSDEL

Whites Point Quarry & Marine Terminal
Table C-1 Commitments Table

Bilcon Commitment	Project Phase	Responsibility	Approving Agency
2) Physical Environment 2.1 No excavation will be carried out below sea level.	Operation	Bilcon	
2.2 No excavation will be carried out below the upper basalt flow unit.	Operation	Bilcon	
3) Groundwater 3.1 Quarrying will not take place below the groundwater table.	Operation	Bilcon	NSDEL
3.2 Water for the wash cycle will be made up from surface water storage. No ground water will be used for processing.	Operation	Bilcon	NSDEL
3.3 A pre-blast survey will be carried out on wells as required by NSDEL.	Operation	Bilcon	NSDEL
3.4 Monitoring – groundwater levels will be monitored in the existing wells both on and off site.	Operation	Bilcon	NSDEL
3.5 Monitoring – groundwater analysis for bacteriology, general chemistry and trace metals will be carried out once per year in the monitoring wells	Operation	Bilcon	NSDEL
3.6 Monitoring – adjacent property owners with wells will be invited to sit on the Community Liaison Committee.	Operation	Bilcon	
4) Watershed 4.1 No quarrying will take place in the Little River watershed.	Operation	Bilcon	NSDEL

Whites Point Quarry & Marine Terminal
Table C-1 Commitments Table

Bilcon Commitment	Project Phase	Responsibility	Approving Agency
5) Marine Water Quality 5.1 Monitoring – water quality monitoring of all outflows from sediment retention ponds will be conducted weekly for Total Suspended Solids and pH and monthly for general chemistry.	Operation	Bilcon	NSDEL
5.2 Monitoring – turbidity levels during pile installation will be monitored and if necessary silt curtains will be employed.	Operation	Bilcon	DFO
5.3 No bilge discharge or fuelling operations will be permitted at the marine terminal.	Operation	Bilcon	
5.4 Bilcon will require its shippers to comply with Transport Canada Guidelines for ballast water management.	Operation	Bilcon	TC
5.5 Bilcon will install the necessary equipment to prevent spillage of product during loading operations.	Operation	Bilcon	
6) Air Quality 6.1 Bilcon will pave access roads from Hwy #217 to the quarry site.	Construction Operation	Bilcon	
6.2 Bilcon will enclose processing equipment which will be located approximately 1000 m from the nearest residence.	Operation	Bilcon	
6.3 All pit roadways will be watered during dry conditions to minimize dust.	Construction Operation	Bilcon	
6.4 Bilcon will chip remaining wood fibre following the harvesting of merchantable timber, rather than burning, to reduce emissions.	Construction Operation	Bilcon	

Whites Point Quarry & Marine Terminal
Table C-1 Commitments Table

Bilcon Commitment	Project Phase	Responsibility	Approving Agency
6.5 Heavy operational mobile equipment will be equipped with diesel engines meeting the US EPA Tier 3 emission standards and maintained in good operating condition.	Operation	Bilcon	
6.6 Monitoring – Bilcon will monitor particulate emissions when requested.	Operation	Bilcon	EC, NSDEL
7) Noise 7.1 Monitoring – All blasts will be monitored for concussion and ground vibration in consultation with NSDEL	Operation	Bilcon	NSDEL
7.2 Bilcon will enclose its crushing and screening operation.	Operation	Bilcon	
7.3 Bilcon will employ quarry trucks with rubber lined boxes and rubberized screens.	Operation	Bilcon	
7.4 Bilcon will employ alternate back up warning devices.	Operation	Bilcon	
7.5 Bilcon will drill sockets in the bedrock for seating the piles rather than a continuous pile driving process.	Operation	Bilcon	
7.6 Preservation zones will be kept in a forested condition between the quarry and adjacent residences.	Operation	Bilcon	
7.7 Monitoring – sound level monitoring stations will be established in consultation with NSDEL.	Operation	Bilcon	NSDEL

Whites Point Quarry & Marine Terminal
Table C-1 Commitments Table

Bilcon Commitment	Project Phase	Responsibility	Approving Agency
8) Employment and Training 8.1 Bilcon will engage staff whenever possible from the local area and will not recruit from existing businesses.	Operation	Bilcon	
8.2 Bilcon will establish a training program for all staff. All training will be funded by Bilcon.	Operation	Bilcon	
8.3 Bilcon will give preference to hiring women.	Operation	Bilcon	
9) Archaeology 9.1 Monitoring – if significant heritage resources are discovered an appropriate monitoring or recovery program will be developed in consultation with the Nova Scotia Museum.	Operation	Bilcon	NSM
9.2 All staff will be given special training in recognising heritage resources and the procedures to be followed.	Operation	Bilcon	
9.3 All contractors and sub contractors will be required to follow procedures set out by Bilcon with respect to recognising heritage resources and the procedures to be followed.	Operation	Bilcon	
9.4 Bilcon will conduct a program of archeological investigation in the nearshore waters prior to pile installation. Professional divers trained in archaeological techniques will conduct the investigations.	Operation	Bilcon	NSM

Whites Point Quarry & Marine Terminal
Table C-1 Commitments Table

Bilcon Commitment	Project Phase	Responsibility	Approving Agency
10) Marine Fish Habitat 10.1 Bilcon has received approval in principal for a Compensation Plan under Section 35(2) Fisheries Act. Bilcon will further develop a monitoring plan in concert with DFO.	Construction	Bilcon	DFO
10.2 Commitments regarding sediment entering the marine habitat are detailed above under marine water quality.	Construction and operation	Bilcon	NSDEL, DFO
11) Lobster Fishery 11.1 Bilcon will advise lobster fishers using Whites Cove on the arrival and departure times of all bulk carriers during the lobster season.	operation	Bilcon	
11.2 Bilcon will ensure that all bulk carriers enter and leave Whites Cove, from and to the shipping lanes, on the same predetermined bearing.	operation	Bilcon	
11.3 Bilcon will provide compensation to a Committee of Whites Cove lobster fishers who will assess and compensate for loss of lobster gear due to ship movements. Compensation as a fixed sum will be paid on an annual basis.	operation	Bilcon	
12) Marine Species 12.1 Bilcon will not carry out any blasting in marine waters.	operation	Bilcon	DFO
12.2 Bilcon will conduct on land blasting in accordance with the "Guidelines for the Use of Explosives in or near Canadian Fisheries Waters".	operation	Bilcon	DFO

Whites Point Quarry & Marine Terminal
Table C-1 Commitments Table

Bilcon Commitment	Project Phase	Responsibility	Approving Agency
12.3 Bilcon will triple the setback distances indicated in the " Guidelines for the Use of Explosives in or near Canadian Fisheries Waters"when iBoF Atlantic salmon may be present in nearshore waters.	Operation	Bilcon	DFO
12.4 Bilcon will use experienced observers to identify the possible presence of marine mammals within safety radii as set out in the Blasting Protocol.	Operation	Bilcon	DFO
12.5 Bilcon will monitor noise levels in the marine environment as set out in the EIS and will work with DFO to increase the knowledge base with respect to species at risk.	Operation	Bilcon	DFO
12.6 Bilcon will visually monitor and measure noise levels at the seal colony at Crowells Cove during the initial blast in consultation with DFO.	Construction	Bilcon	DFO
12.7 Bilcon will advise its shipper of any whale sightings in the area between the shipping lanes and the marine terminal.	Operation	Bilcon	DFO
12.8 Bilcon will not permit a ship speed in excess of 12 kn/hour during the transit from shipping lanes to the marine terminal.	Operation	Bilcon	DFO
12.9 Bilcon will work with other groups to provide better data to ships captains with respect to the location of marine mammals.	Operation	Bilcon	DFO

Whites Point Quarry & Marine Terminal
Table C-1 Commitments Table

Bilcon Commitment	Project Phase	Responsibility	Approving Agency
12.10 Bilcon will maintain communications with local whale watch and seabird cruise operators operating in the Digby Neck area.	Operation	Bilcon	DFO
12.11 Bilcon will report sightings of marine reptiles during routine monitoring of the arrival and departure of the vessel at the marine terminal to the Nova Scotia Leatherback Turtle Working Group and the Nova Scotia Museum of Natural History.	Operation	Bilcon	DFO
13) Terrestrial Species 13.1 Bilcon will establish and maintain 78.9 acres of environmental preservation zone as set out in the EIS.	Construction Operation	Bilcon	NSDEL
13.2 Monitoring – a breeding bird survey will be conducted every five years to document any change in species composition.	Operation	Bilcon	NSDEL
13.3 Monitoring – an Odanata survey will be conducted every five years to documentany changes in species composition.	Operation	Bilcon	NSDEL
13.4 Monitoring – a Lepidoptera survey will be conducted every five years to document any changes in species composition.	Operation	Bilcon	NSDEL
13.5 Monitoring – an invasive plant species survey will be conducted every five years to document the level of success of the program to detect and remove invasive plant species.	Operation	Bilcon	NSDEL

Whites Point Quarry & Marine Terminal
Table C-1 Commitments Table

Bilcon Commitment	Project Phase	Responsibility	Approving Agency
13.6 Monitoring – Flora species at risk will be monitored as indicated in the EIS.	Operation	Bilcon	NSDEL
13.7 Bilcon will store any toxic substances used during quarry operations (diesel fuel, gasoline, hydraulic fluids etc) in a safe manner such that they are not accessible to wildlife.	Operation	Bilcon	NSDEL
13.8 During clearing operations Bilcon will comply with all relevant federal and provincial legislation protecting birds, nests and eggs.	Operation	Bilcon	NSDEL, EC
13.9 Bilcon will continue coordination and cooperation with CWS in monitoring waterfowl of special concern (harlequin duck and Barrow's goldeneye).	Operation	Bilcon	NSDEL, CWS
14) Light Bilcon will design lighting for operations, security and safety so as to minimize night glow.	Operation	Bilcon	NSDEL
Bilcon will employ minimal lighting on the ship loading structure commensurate with safe loading operations and navigation.	Operation	Bilcon	NSDEL, TC
15) Vegetation 15.1 Bilcon will monitor the health and integrity of trees in all preservation zones.	Operation	Bilcon	NSDEL
15.2 Bilcon will carry out a silviculture program on lands owned by Bilcon adjacent to the quarry property.	Operation	Bilcon	NSDEL

Whites Point Quarry & Marine Terminal
Table C-1 Commitments Table

Bilcon Commitment	Project Phase	Responsibility	Approving Agency
16) Reclamation 16.1 Reclamation will be incremental throughout the life of the project.	Operation	Bilcon	NSDEL
16.2 No top soil will be removed from the quarry site. All top soil and chipped material from the clearing and grubbing operation will be stored on site and mixed with the stored waste fines for reclamation.	Operation Closure	Bilcon	NSDEL
16.3 All reclaimed areas will be reforested with native tree species under the direction of a professional forrester.	Operation Closure	Bilcon	NSDEL
16.4 Reclamation will be monitored by a professional forrester to ensure the success of the program.	Operation Closure	Bilcon	NSDEL
16.5 The reclamation program will include a program for the control of invasive species.	Operation Closure	Bilcon	NSDEL
17) First Nations 17.1 Bilcon will continue its efforts to involve the Design First Nations in the project.	Design Operation	Bilcon	NSDEL
18) Land Values 18.1 Bilcon will carry out an appraisal of residential properties within 800 m of the quarry prior to operations and after five years of operation. Compensation will be offered where property values have been diminished	Operation	Bilcon	NSDEL

Bilcon Commitment	Project Phase	Responsibility	Approving Agency
19) Economy 19.1 Bilcon will wherever possible, procure supplies in the local area and generally support local business both during construction and operation.	Construction Operation	Bilcon	

Abbreviations

CWS	Canadian Wildlife Service
DFO	Department of Fisheries and Oceans
EC	Environment Canada
NSM	Nova Scotia Museum
NSDEL	Nova Scotia Department of Environment and Labour
TC	Transport Canada

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Table CEM - 2
Cumulative Impact Summary Table

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Whites Point Quarry and Marine Terminal
TABLE CEM- 2 CUMULATIVE IMPACT SUMMARY TABLE
VALUED ENVIRONMENTAL COMPONENT (VEC)

POTENTIAL CUMULATIVE ENVIRONMENTAL COMPONENT	SCALE	CUMULATIVE EFFECT Significance / Type	PROBABILITY
Greenhouse Gas	Regional	Insignificant / Negative	Possible
Flora Species at Risk	Provincial	Significant / Positive	Likely
Marine Mammals - Blasting	National	Insignificant / Negative	Unlikely
Marine Mammals - Ship Interaction	National	Insignificant / Negative	Unlikely
Bay of Fundy Aesthetics	Regional	Insignificant / Negative	Possible
Employment	Regional	Significant / Positive	Likely
Municipal Tax Revenue	Regional	Significant / Positive	Likely
Tourism	Regional	Insignificant / Negative	Possible
Quality of Life	Regional	Insignificant / Positive	Possible
Social Capital	Regional	Insignificant / Positive	Likely

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1.0 ENVIRONMENTAL ASSESSMENT OF THE PROJECT

1.1 Background

A Joint Review Panel (the Panel) has been established by the Minister of the Environment, Canada (under the authority of the *Canadian Environmental Assessment Act*), and by the Minister of Environment and Labour, Nova Scotia (under the authority of the *Nova Scotia Environment Act*), to consider the possible environmental effects associated with the Whites Point Quarry and Marine Terminal Project (the Project), proposed by Bilcon of Nova Scotia Corporation (the Proponent/Bilcon).

The Proponent is proposing to construct and operate a basalt quarry, processing facility and marine terminal on Digby Neck, Digby County, Nova Scotia, where quarrying and associated activities are scheduled to take place on 150 hectares of land. Production is expected to reach 2 million tonnes of aggregate per year, or approximately 40,000 tonnes per week. The quarry is expected to expand its operational footprint by four hectares each year of operation. Land-based operations are expected to occur year-round, with aggregate stockpiled for ship loading once each week. Drilling and blasting of basalt rock, loading, hauling, crushing, screening, washing and stockpiling will be done on-site.

Land-based structures will include: rock crushers, screens, closed-circuit wash facilities, conveyors, load-out tunnel, support structures and environmental control structures. Associated construction processes will include erection of on-land aggregate processing equipment, conveyors and wash-water pumping systems.

Marine facilities will include a conveyor, ship loader, berthing dolphins and mooring buoys. Construction processes for the marine terminal infrastructure would include the anchoring of pile support structures to the seafloor, along with the construction of concrete caps as dolphins. Ship visits for the purposes of loading aggregate will occur weekly - (See Reference 37 - EIS Guidelines, Chapter 1 Background).

1.2 The Joint Panel Review Mandate

The Panel has been charged with the responsibility to identify, evaluate and report on the potential impacts (adverse and beneficial effects) of the Project on the physical, biological and human environments. The mandate of the Panel is defined in the Agreement signed by Federal and Provincial levels of government (See Appendix 24). The Agreement explicitly states, "The Panel shall conduct its review in a manner that discharges the requirements set out in the Canadian Environmental Assessment Act, Part IV of the Nova Scotia Environment Act and the Terms of Reference attached hereto as an Appendix."

The Agreement and Terms of Reference (TOR) found in Appendix 24 of this document outlines the factors the Panel must consider in conducting its environmental assessment. The Panel has considered these factors in developing the EIS Guidelines. It is the responsibility of the Proponent to prepare an EIS that identifies and evaluates the effects of the Project for submission to the Panel.

All materials related to the Projeet received by the Panel and federal and provincial departments will be made publicly accessible through a Public Registry available on-line and in designated sites in the community.

At the conclusion of the public hearings on the Project, the Panel will prepare a report that will include its finding and recommendations, and will submit the report to the Ministers- (See Reference 37 - EIS Guidelines Chapter 1, The Joint Panel Review Mandate).

1.3 Cost Recovery

Bilcon of Nova Scotia Corporation was advised at a meeting with the Canadian Environmental Assessment Agency (CEAA) and the Nova Scotia Department of Environment and Labour (NSDEL) in October, 2004 that a cost recovery agreement with respect to the Joint Panel Review was being prepared and would be forwarded to Bilcon for signature in November, 2004.

In February, 2005, a Memorandum of Understanding Concerning Cost Sharing Related to the Environmental Assessment of the Whites Point Quarry and Marine Terminal (See Appendix 27) was signed by Bruce Young, Director, Project Assessment for CEAA and by William G. R. Lahey for NSDEL. This document sets out the costs borne out by each party to the Memorandum, cost sharing and a dispute resolution mechanism.

In October, 2005, a Service Level Agreement Respecting the Joint Panel Review of the Whites Point Quarry and Marine Terminal Project (See Appendix 37) signed by Bruce Young and William G.R. Lahey was received by the Proponent. This agreement was signed by the Proponent on November 7th, 2005. This agreement sets out the Background (Cost Recovery Authority and Secretariat Operations), Financial Considerations (Budget Estimate, Invoicing and Payment Due), Audit, Dispute Resolution and Amendment and Termination of the Agreement.

1.4 Participant Funding

On November 9th, 2004, the Canadian Environmental Assessment Agency announced funding in the amount of $100,000 (See Appendix10) to assist the public to take part in the Panel Review process. The announcement advised that in Phase I up to $25,000 was

being provided to the public for the review of the Environmental Impact Statement (EIS) Guidelines. In Phase II that amount rose to $75,000 to prepare for and participate in the public hearings. Applications for Phase I funding were to be received by the CEAA no later than December 10th, 2004.

A funding review committee, independent of the Joint Review Panel, assessed the applications and on December 30th, 2004, announced that seven groups had been awarded funding in the amount of $25,583 to assist with participation in the review of the draft EIS Guidelines. (See Appendix 10)

The groups are as follows:

- The Community Liaison Committee for Whites Point Quarry
- Enviro-Clare
- The Sierra Club of Canada
- The Clean Annapolis River Project
- The Ecology Action Centre
- The Partnership for Sustainable Development of Digby Neck and Islands Society
- The Digby Neck Community Development Association

On April 30th, 2005, the CEAA announced that $81,300 was available to participate in the review of the EIS and the panel hearings to follow. Applications for this funding were to be received by the CEAA by May 11th, 2005. A funding review committee, independent of the panel, again reviewed the applications and on July 26th, 2005, the CEAA announced that funding had been awarded to the following groups (See appendix 10):

- The Canadian Parks and Wilderness Society - Nova Scotia Chapter
- The Sierra Club of Canada - Atlantic Canada Chapter
- The Ecology Action Centre
- The Confederacy of Mainland Mi'kmaq (CMM)
- The Partnership for Sustainable Development of Digby Neck and Islands Society
- The Digby Neck Community Development Association
- The Clean Annapolis River Project
- Tony Kelly (Residents group)

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2.0 THE REVIEW PROCESS

2.1 Scope of the Assessment

The factors that define the scope of the environmental impact assessment review are described in general terms in Part III of the Panel's Terms of Reference (TOR)-(See Appendix 24).

2.2 Environmental Impact Statement (EIS)

Environmental impact assessment is a planning tool intended to identify and mitigate significant adverse environmental effects induced by projects.

The definition of environmental effect forms the basis for the assessment and includes consideration of the physical, biological and human elements and the interactions between them. In understanding impacts, the Panel is guided by federal and provincial legislation and definitions of environmental effects and adverse effects; in the case of different standards in the legislation, the higher standard will prevail.

The *Canadian Environmental Assessment Act* (1992) defines "environmental effect" to mean: any change that the Project may cause in the environment, including any change it may cause to a listed wildlife species, its critical habitat or the residence of individuals of that species, as those terms are defined in subsection 2(1) of the *Species at Risk Act*, any effect of any change referred to in paragraph (a) on health and socio-economic conditions, physical and cultural heritage, the current use of lands and resources for traditional purposes by Aboriginal persons, any structure, site or thing that is of historical, archaeological, paleontological or architectural significance, or any change to the Project that may be caused by the environment, whether any such change or effect occurs within or outside Canada.

In addition, the Panel is mandated to consider the direct socio-economic effects of the Project. The *Nova Scotia Environment Act* defines "adverse effect" to mean "an effect that impairs or damages the environment, including an adverse effect respecting the health of humans or the reasonable enjoyment of life or property".

The EIS document produced by the Proponent identifies the effects (both beneficial and adverse) of the Project on the environment. The EIS will serve as the cornerstone of the Panel's review and evaluation of the potential impacts of the Project.

The public (including Aboriginal peoples), interested parties and government representatives will be invited to comment on the completeness and accuracy of the EIS, and to submit materials for the Panel to consider. Should the Panel deem further information necessary, it may arrange for additional studies which it will include in the Public Registry. The Panel will consider all materials included in the Registry in evaluating the Project. The EIS will help regulators and members of the public to understand the Project, the existing environment, and the potential adverse or beneficial effects of the Project - (See Reference 37 - EIS Guidelines, Chapter 2, Environmental Impact Statement).

2.3 Purpose of the Guidelines

The document entitled "Environmental Impact Statement Guidelines for the Review of the Whites Point Quarry and Marine Terminal Project" dated March 2005 provides specific direction to the Proponent regarding the preparation and structure of the EIS. The EIS Guidelines define the issues that the Proponent must address. It is the responsibility of the Proponent to provide sufficient data and analysis on any potential adverse environmental effects to permit proper evaluation by the Panel, the public, and technical and regulatory agencies. The Guidelines outline the minimum information required by the Panel while leaving the Proponent some latitude in selecting methods to compile the EIS - (See Reference 37 - EIS Guidelines, Chapter 2, Purpose of the Guidelines).

2.4 Timing

Following submission of the EIS to the Panel, the Panel will make the EIS available to the public and other stakeholders for examination and comments regarding the document's completeness, accuracy, and compliance with the guidelines The Panel will receive written comments during a review period of not less than 90 days. Comments submitted in writing to the Panel will immediately be provided to the Proponent and added to the Registry. Following the examination period, the Panel may determine that deficiencies identified during the review of the submitted EIS require additional information from the Proponent. The Panel will issue requests for additional information within fifteen (15) days of either the expiration of the public examination period or receipt of the Proponents response to the public's written comments, whichever occurs later.

As appropriate, not later than fifteen (15) days after the completion of the public examination period, the Proponent shall provide to the Panel a response to written comments provided by the public and other stakeholders.

Following the Proponent's response, should the Panel believe that deficiencies remain in the EIS, or that the Panel requires additional information for a proper evaluation of evidence, the Panel has the authority to commission expert studies. Any such studies will be provided to the Proponent and added to the Registry.

Once the Panel is satisfied that sufficient information has been provided it will hold public hearings. The Panel will set hearing dates after considering the volume of material accumulated for public review and the right of the Proponent to a timely hearing. In any event, the Panel will give not less than thirty (30) days notice of the hearings.

Within ninety (90) days, of completion of public hearings, the Panel will prepare and submit its report to the provincial Minister of Environment and Labour and the federal Minister of the Environment. The report will include recommendations on all factors set out in section 16 of the *Canadian Environmental Assessment Act* and pursuant to Part IV of the Nova Scotia *Environment Act*. At that time, the Panel will recommend either approval (including mitigation measures) or rejection of the Project- (See Reference 37 - EIS Guidelines, Chapter 2, Timing).

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3.0 PRINCIPLES

3.1 Use and Respect for Traditional and Community Environmental Knowledge

The value of traditional and community environmental knowledge in the preparation of Environmental Impact Statements is widely accepted. Bilcon of Nova Scotia Corporation, for the subject study, gathered extensive input with respect to community environmental knowledge over a four-year period and this was used extensively throughout the preparation of the EIS.

It is, however, unfortunate that the Aboriginal Community did not make their Traditional Knowledge available to Bilcon of Nova Scotia Corporation until January 10th, 2006, when the study entitled *"Mi'kmaq Use of Oositookum (Digby Neck), It's Surrounding Waters, and The Mainland Shore of St. Mary's Bay Report"*, (see Appendix 16), prepared by the Confederacy of Mainland Mi'kmaq was submitted to the Panel. Reference to Section 9.3.5 of the EIS sets out the steps taken by Bilcon of Nova Scotia Corporation to engage the Aboriginal Community in consultation from the fall of 2002.

Notwithstanding past difficulties, Bilcon of Nova Scotia Corporation is committed to working with the Aboriginal Community and looks forward to further dialogue.

Valuable information was obtained during the preparation of the EIS from the Community Environmental Knowledge gathering process on virtually all the Valued Environmental Components (VECs) and this information was instrumental in the selection of the VECs and contributed significantly to a better understanding of the potential impacts of the project.

3.2 Public Involvement

Bilcon of Nova Scotia Corporation recognises public participation as a crucial objective in the environmental assessment process and the EIS sets out the various elements of public involvement and consultation which contributed to the EIS.

In this regard, it should be noted that Bilcon of Nova Scotia Corporation commenced public consultation in July 2002, with the formation of the Community Liaison Committee (CLC) for the 4 hectare quarry, and has maintained an office in Digby since July 2002. Bilcon of Nova Scotia Corporation initiated these activities almost a year prior to the Project being placed in a Panel Review process.

Bilcon of Nova Scotia Corporation has encouraged public consultation through:

- The CLC
- Open Houses
- Newsletters
- Attitude Survey
- Quality of Life Survey
- Traditional Knowledge Gathering
- Bilcon of Nova Scotia Website
- Office Drop-ins

Bilcon of Nova Scotia Corporation is committed to continuing the public consultation process throughout the life of the Project.

All comments received from the public have been addressed and a Concordance Table (see Chapter 5) sets out each of the issues and concerns raised over three and a half years of consultation, in addition to the section of the EIS that deals with those issues and concerns.

3.3 Sustainable Development

The Canadian Environmental Assessment Act defines sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs". This means managing any adverse effects of the Whites Point Project to achieve the goal of protecting the environment, as well as the economic and social health of present and future generations. Paragraph 3.3 of the Environmental Impact Statement Guidelines provides project related specifics.

To realize the aims of sustainable development, this EIS takes the first step of identifying ecosystem boundaries and ecosystem elements, or valued environmental components (VECs), such as physical, biological, and human resource elements. This is followed by establishing measures to ensure the protection of these elements from adverse effects of the project through the conservation of ecosystem health within predetermined boundaries.

Protection of the ecosystem elements is to be ensured through the proactive approach of adaptive management. Adaptive management employs the precautionary approach to environmental decision-making and enables Bilcon of Nova Scotia Corporation to intervene in a timely manner to control environmental damage that may arise from the project. This is accomplished through the use of additional mitigation or effects avoidance techniques thus ensuring sustainability. Bilcon's commitment to this approach is outlined elsewhere in the EIS and detailed strategies in this regard are noted throughout the EIS.

Bilcon of Nova Scotia Corporation acknowledges its obligation to ensure that this project is undertaken in a manner consistent with the goals of sustainable development – the efficient and environmentally responsible use of resources. This commitment to sustainable development is reflected throughout this EIS.

3.4 The Ecosystem Approach

The ecosystem approach evolved from the Convention on Biological Diversity (Reference 165-Secretariat of the Convention on Biological Diversity 2001-2005). It is a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. A balance of three objectives – conservation, sustainable use, and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources are the basis of application of the approach.

Further, the ecosystem approach is based on the application of appropriate scientific methodologies focused on levels of biological organization which encompass the essential structure, processes, functions, and interactions among organisms and their environment. It also recognizes that humans, with their cultural diversity, are an integral component of many ecosystems. This focus on the structure, processes, functions and interactions is consistent with the definition of "ecosystem" provided in Article 2 of the Convention on Biological Diversity.

"Ecosystem means a dynamic complex of plant, animal, and micro-organism communities and their non-living environment interacting as a functional unit".

Realizing the complex, dynamic, and dimensional nature of ecosystems in time and space, the ecosystem approach requires adaptive management to deal with uncertainties and in many cases the absence of complete knowledge or understanding of their function. There is no single way to implement the ecosystem approach. However, the following twelve principles create a complementary and inter-linked framework.

1. The objectives of management of land and living resources are a matter of societal choice.

2. Management should be decentralized to the lowest appropriate level.

3. Ecosystem managers should consider effects (actual or potential) of their activities on adjacent and other ecosystems.

4. Recognizing potential gains from management, there is usually a need to understand and manage the ecosystem in an economic context. Any such ecosystem – management programme should: (a) reduce those market distortions that adversely

affect biological diversity: (b) align incentives to promote biodiversity conservation and sustainable use: and (c) internalize costs and benefits in the given ecosystem to the extent feasible.

5. Conservation of ecosystem structure and functioning, in order to maintain ecosystem services, should be a target of the ecosystem approach.

6. Ecosystems must be managed within the limits of their functioning.

7. The ecosystem approach should be undertaken at the appropriate spatial and temporal scales.

8. Recognizing the varying temporal scales and lag-effects that characterize ecosystem processes, objective ecosystem management should be set for the long term.

9. Management must recognize that change is inevitable.

10. The ecosystem approach should seek the appropriate balance between and integration of conservation of biological diversity.

11. The ecosystem approach should consider all forms of relevant information, including scientific and indigenous local knowledge, innovations and practices.

12. The ecosystem approach should involve all relevant sections of society and scientific disciplines.

The following five points provide operational guidance for application of the ecosystem approach.

1. Focus on the functional relationships and processes within ecosystems.
2. Enhance benefit-sharing.
3. Use adaptive management practices.
4. Carry out management actions at the scale appropriate for the issue being addressed, with decentralization as appropriate.
5. Ensure intersectoral cooperation.

The preparation of this Environmental Impact Statement has applied, to the extent practical under the EIS Guidelines (Reference 37) requirements, the principles and guidance contained in Division V/6 of the Convention on Biological Diversity. As advancements in ecosystem knowledge and science evolve over time, Bilcon of Nova Scotia Corporation will adhere to a precautionary approach and an adaptive management process as more fully described in the next section of this report.

3.5 The Precautionary Approach

The precautionary principle is now commonly used to guide environmental decision-making when faced with scientific uncertainty and insufficient knowledge. The most widely accepted definition of the precautionary principle is that developed at the 1992 Rio Conference (Reference 95 - Anonymous 1992). This definition states that "where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation".

At the Whites Point Quarry and Marine terminal, Bilcon will apply the precautionary principle to all phases of the project through its approach to environmental risk management. In this case, risk management combines an understanding of baseline conditions with the effects of the project operation itself to determine the appropriate techniques to ensure that mitigation and monitoring objectives are respected.

Where there is uncertainty with respect to the effectiveness of measures that are used to prevent serious or irreversible environmental damage, Bilcon will take an adaptive management approach. Adaptive management uses monitoring results to accommodate uncertainty. This will permit early intervention through the use of additional mitigation, or avoidance, to control potential environmental damage.

The use of an adaptive management approach, based on scientifically defensible performance based standards, will be adhered to by Bilcon during the life of the project. Performance based standards are physical, biological and human indicators or thresholds that approximate and rank the quality of the environment in the area. As scientific knowledge expands, these standards may be refined to provide more confidence in environmental decision-making.

Bilcon's commitment to the use of the precautionary approach in environmental decision-making is reflected throughout this Environmental Impact Statement. Various phases of the project exhibit this approach including project planning, design, construction, operation, and closure. Specific examples of how the precautionary approach was applied are contained in subsequent sections of the Environmental Impact Statement.

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4.0 PREPARATION OF THE EIS

4.1 Approach

Bilcon of Nova Scotia Corporation's approach to the preparation of the EIS is set out in Section 6.05.

4.2 Format

Bilcon of Nova Scotia Corporation considered with great care the suggestions set out in the EIS Guidelines for the Review of the Whites Point Quarry and Marine Terminal dated March 2005, and in general has attempted to follow the format suggested. However, Bilcon of Nova Scotia Corporation felt that a consideration of existing conditions, research, analyses, mitigation, potential impacts and monitoring would be much clearer if all these elements were set out in the same order in the consideration of each VEC.

Accordingly, Sections 9, 10, 12.4 and 12.5 in the Guidelines have been combined in the consideration of each VEC. Tables, however, have been prepared showing each of the VECs with the mitigation and monitoring set out in tabular format thus drawing all mitigation and monitoring together as suggested in the Guidelines.

Maps have been included in the sections where they are most helpful. However, because some of the maps are referenced in multiple sections, a volume of maps at a larger size has been prepared to make map referencing easier.

The individual issues set out in the Guidelines have been cross referenced to indicate where each issue is dealt with in the EIS. This cross reference is bound in a separate volume. A Concordance Table which sets out each of the issues raised by the public or regulatory authorities throughout the process and where they have been dealt with in the EIS is found in Chapter 5.

Appendices are bound in four volumes and are clearly labled and tabbed. References in the text of the EIS are clearly numbered, i.e. Reference 37. These can be found in the bibliography which is in EIS Volume VII.

Reference documents are bound in six volumes, arranged in groupings of issues and all references noted in the text of the EIS are clearly tabbed , i.e. Ref. Vol II tab 10.

The Executive Summary, as requested in the guidelines, has been bound separately as EIS Volume I - Plain Language Summary. The condensed Executive Summary is found in EIS Volume IV

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5.0 CONCORDANCE TABLE	**2**

A cross reference of issues and concerns raised and where they are dealt with in the EIS

Type of Issue	Issue	Concerns	Source	EIS Chapter
Environmental Effects	**Air**	Dust could be generated during the construction and operation activities at the quarry Dust and air particulates could affect residents' quality of life as well as their property (e.g. paint of the exterior of houses)	Interview 15-1/6/05 CLC Meeting 19-1/7/05 Meeting 24-1/1/05 & 9/22/05 Interview 56-9/22/05 Interview 60-1/6/05 Interview 67-1/6/05 Interview 84-3/1/05 Interview 99-1/9/05 Interview 101-12/1/04 Interview 154-5/10/05 Interview 165-1/9/05	**9.1.8.1** **9.1.8.2** **9.1.8.3** **9.1.8.4** **9.1.8.5** **9.3.2.1** **9.3.22.3**
	Cumulative Effects	Project could expand and/or other similar basalt quarry projects could occur in area because of approval and presence of infrastructure such as marine terminal. Fear exists that once this project is initiated, nobody will be able to stop other projects Socio-economic cumulative effects should also be considered Cumulative effect of draw-down water	Interview 4-1/6/05 Meeting 72-1/8/05 Interview 77-1/8/05 Meeting 91-1/8/05 Interview 102-1/7/05 Meeting 171-1/11/05	**10.0** **7.8** **10.9** **10.10** **10.12** **10.13** **9.1.3**
	Fish	Potential impact of the terminal on lobster spawning and nursery area Potential impact of the blasting (sound and vibration) and disturbance of fish, lobster and juvenile stocks	Meeting 7-1/7/05 CLC Meeting 36-1/7/05 Interview 56-9/22/05 Interview 59-1/6/05 Interview 60-1/6/05	**9.2.4** **9.2.9** **9.2.10**

Type of Issue	Issue	Concerns	Source	EIS Chapter
Environmental Effects	**Fish**	Potential impact of runoff on fish and associated impact of increased sediments on marine species . Importance of fish for local economy Low trust in scientific data on fisheries "that never matches what's in the water". Fishermen expressed their desire to corroborate, through traditional knowledge, the findings of the marine studies	Meeting 74-9/23/05 Interview 96-1/6/05 Interview 102-1/7/05 Interview 165-1/9/05 Meeting 167-1/9/05 Meeting 171-1/11/05	**9.1.6** **9.3.10** **9.3.11** **9.3.12** **9.3.13**
	Food	One report of a concerned blueberry farm owner about potential dusty blueberries	CLC	**9.3.21**
	Landscape	Quarry development will affect the spectacular and pristine beauty of the place. Landscape valued by locals and tourists Digby Neck and North Mountain is a place of sightseeing Site will be visible from the road in addition to from the sea Site lights will illuminate the sky at night Will the site be rehabilitated? How will it end up? What will be left?	Meeting 6-1/6/05 Interview 12-5/1/04 & 9/23/05 CLC Meeting 19-1/7/05 Meeting 24-1/1/05 & 9/22/05 Meeting 36-1/7/05 Interview44-12/1/03 &5/1/04 Interview 49-1/7/05 & 1/9/05 Interview 59-1/6/05 Interview 67 1/6/05 Meeting 74-9/23/05 Interview 81-4/1/04 Interview 85-1/7/05 Interview 87-12/17/03 Interview 95-1/8/05 Meeting 171-1/11/05	**9.3.6** **9.3.14** **9.3.6** **9.3.14** **9.3.6.2** **9.1.12** **7.10**

Type of Issue	Issue	Concerns	Source	EIS Chapter
Environmental Effects	**Noise**	Impact of blasting, equipment use and ship loadings-nearby residents, nearby businesses (two campgrounds adjacent) and marine species (vibration in water) Noise impact on resident's physical health and result in sleep deprivation. Anxiety for others to "put up" with noise and other inconveniencies in their own backyards How loud will the blasting be?	Interview 4-1/6/05 Interview 15-1/6/05 CLC Meeting 19-1/7/05 Interview 54-1/6/05 Interview 59-1/6/05 Interview 60-1/6/05 Interview 67-1/6/05 Meeting 74-9/23/05 Interview 81-4/1/04 Interview 96-1/6/05 Interview 165-1/9/05 Meeting 167-1/9/05 Meeting 171-1/11/05	**9.1.9** **9.1.10** **9.1.11** **9.2.9** **9.2.10** **9.2.11** **9.2.12** **9.3.22.3** **Ref. Vol V, Tab 31** **Ref. Vol. VI, Tab 34**
	Other Environmental Effects	Project activities and diesel consumption will increase greenhouse gas emissions for Canada Land geography, because of its narrowness, can't support blasting of such magnitude General environmental degradation and pollution. The rock is a non-renewable resource Effects of local weather on project activities (e.g. marine traffic, winter storms) and local environment	Meeting 6-1/6/05 Meeting 7-1/7/05 Meeting 9-1/6/05 Interview 14-1/6/05 Meeting 19-1/7/05 Meeting 25-1/6/05 Meeting 31-1/8/05 Meeting 33-1/7/05 Interview 34-6/1/04 Interview 38-1/7/05 Interview 40-12/1/03 Interview 48-1/9/05 Interview 49-1/7/05 & 1/9/05 Interview 54-1/6/05 Interview 60-1/6/05 Interview 67-1/6/05 Interview 69-1/8/05 Meeting 72-1/8/05 Meeting 74-9/23/05 Interview 77-1/8/05 Interview 81-4/1/04 Interview 84-3/1/05 Meeting 91-1/8/05 Interview 95-1/8/05;	**9.1.1** **9.1.2** **9.1.9** **9.1.10** **Impact Summary Table 2** **9.1.1** **9.3.8** **7.2.1** **9.1.7**

Type of Issue	Issue	Concerns	Source	EIS Chapter
Environmental Effects	**Other Environmental Effects**		Interview 96-1/6/05 Interview 102-1/7/05 Interview 103-1/6/05 Meeting 104-1/8/05 Interview 111-5/10/05 Interview 128-5/10/05 Interview 159-5/10/05 Interview 164-1/6/05 Interview 165-1/9/05 Meeting 171-1/11/05	**Impact Summary Table 2**
	Soil and Sediments	Basalt rock abundance in region which could later be exploited outside of current project area Potential sedimentation of silt generated by project activities if runoff is not to be managed properly Concern about sediment	Interview 4-1/6/05 Meeting 6-1/6/05 CLC Meeting 42-12/31/03 Meeting 43-7/24/04 Interview 48-1/9/05 Interview 50-12/31/03 Interview 165-1/9/05 Meeting 167-1/9/05 Meeting 171-1/11/05	**9.1.2** **Ref. Vol III, Tab 19** **9.1.6** **Ref. Vol. II, Tab 9** **Ref. Vol. II, Tab 12**
	Water	Groundwater used by local residents and industries could be affected (quantity and quality) by project blasting through potential lowering of the water table (draw down) and infiltration of salt water: resulting in brackish water Loss of water wells due to blasting Surface water environmental quality degradation as a result of project related activities	Interview 4-1/6/05 Interview 11-4/1/05 Interview 14-1/6/05 Interview 16-1/9/05 CLC Meeting24-1/1/05 &9/22/05 Meeting 31-1/8/05 Interview 38-1/7/05 Interview 48-1/9/05 Interview 49-1/7/05 &1/9/05 Interview 54-1/6/05	**9.1.3** **9.1.3** **9.2.2** **9.1.5** **9.1.6**

Type of Issue	Issue	Concerns	Source	EIS Chapter
Environmental Effects	**Water**	Waters from the Bay will be affected by the washing of the rock and surface runoff (if inadequate erosion and silt control) and thus could impact fishing ground High tide could cause silt to migrate further in the Bay The practice of emptying the ballast water of ships near dock or at large perceived as a threat to fisheries and healthy ecosystems since it could introduce non-indigenous organisms and cause environmental impacts (e.g. shell diseases, impact on seaweed) Concerns with the archaeology and sea level history	Interview 60-1/6/05 Interview 61-1/6/05 Interview 63-3/1/05 Interview 76-12/16/03 Interview 79-1/6/05 Interview 84-3/1/05 Interview 87-12/17/03 Meeting 88-12/31/03 Meeting 91-1/8/05 Interview 96-1/6/05 Interview 99-1/9/05 Interview 101-12/1/04 Interview 102-1/7/05 Interview 111-5/10/05 Interview 160-5/10/05 Interview 164-1/6/05; Interview 165-1/9/05 Meeting 167-1/9/05 Interview 170-12/17/03 Meeting 171-1/11/05	**9.1.6** **7.7.1** **Ref. Vol. III, Tab 19** **9.2.14** **9.3.1** **Ref. Vol. III, Tab 14**
	Wildlife	Impact of project and related activities on whales, to a less extent on migratory birds and other marine mammals Concern blasting (noise and vibration) could affect directly whales (i.e. right whales) and the runoff andand sedimentation could affect the whales' food supply Potential whale mortality, including the rare Northern Right Whale, caused by increased marine traffic Fear that marine traffic will decrease sociability of whales	Meeting 5-7/1/04 Meeting 9-1/6/05 Interview 12-5/1/04 & 9/23/05 Interview 13-2/1/05 CLC Interview 21-1/22/04 Meeting 24-1/1/05 & 9/22/05 Meeting 36-1/7/05 Interview 41-2/1/05 Interview 49-1/7/05 & 1/9/05 Interview 50-12/31/03 Interview 60-1/6/05	**9.2.4** **9.2.7** **9.2.8** **9.2.11** **9.2.12** **9.2.13** **9.2.15** **9.1.6** **9.2.13**

Type of Issue	Issue	Concerns	Source	EIS Chapter
Environmental Effects	**Wildlife**	Effect on the Northern Right Whale population	Interview 66-12/31/03 &1/1/04 Interview 68-1/8/05 Meeting 74-9/23/05 Interview 79-1/6/05 Interview 80-7/1/04 Interview 81-4/1/04 Interview 85-1/7/05 Meeting 91-1/8/05 Interview 96-1/6/05 Interview 165-1/9/05 Meeting 167-1/9/05 Meeting 171-1/11/05	**9.2.11** **9.2.13** **9.2.15**
Project Socio-Economic Context	**Consultation Process**	Some organizations and groups felt that they had not been directly contacted by the proponent to discuss if project could affect them Proponent must cooperate with groups of stakeholders interested in healthy prosperous local economies Not enough opportunities to meet with Bilcon	Meeting 7-1/7/05 Meeting 9-1/6/05 Interview 12-5/1/04 & 9/23/05 Interview 16-1/9/05 CLC Interview 18-10/1/04 Meeting 25-1/6/05 Meeting 33-1/7/05 Interview 56-9/22/05 Interview 64-1/6/05 Meeting 78-1/6/05 Interview 81-4/1/04 Meeting 171-1/11/05	**8.2** **Ref. Vol. IV** **Tab 21** **Tab 22** **Tab 23** **8.2** **Appendix Vol II**
	Environmental Impact Assessment Methodology	Numerous concerns raised by the public at the scoping session meetings on the EIS guidelines. These are not reported here in since they were addressed by the joint-panel review in the production of the final EIS guidelines	Interview 4-1/6/05 Meeting 6-1/6/05 Meeting 7-1/7/05 Meeting 9-1/6/05;16; CLC Meeting 19-1/7/05 Meeting 25-1/6/05 Interview 30-1/6/05 Meeting 33-1/7/05	**6.05** **6.7** **8.0**

Type of Issue	Issue	Concerns	Source	EIS Chapter
Project Socio-Economic Context	**Environmental Impact Assessment Methodology**		Meeting 36-1/7/05 Interview 49-1/7/05 & 1/9/05 Interview 57-1/8/05 Interview 64-1/6/05 Meeting 78-1/6/05 Interview 81-4/1/04 Meeting 91-1/8/05 Interview 102-1/7/05 Interview 110-5/10/05 Interview 165-1/9/05	
	Mitigation	Concerns that mitigation measures will not be in place to prevent environmental effects or damage to resources (water table and private wells) valued by stakeholders or their equipment (e.g. fixed-gear used by fisherman at sea) Site restoration "Mitigation is an oxymoron when talking about the use of a non-renewable resource" Access to beach for periwinkle and dulse harvesters would have to be provided by proponent	Interview 4-1/6/05 CLC Interview 49 1/7/05 & 1/9/05 Interview 64-1/6/05 Interview 81-4/1/04 Interview 103-1/6/05 Interview 165-1/9/05	**Mitigation Table 11.5** **Commitments Table -Vol. IV Executive Summary** **9.1** **9.2** **9.3** **7.10** **9.3.12.3**

Type of Issue	Issue	Concerns	Source	EIS Chapter
Project Socio-Economic Context	**Other Regulatory Issues**	Proponents could use rights under NAFTA, Chapter 11 Project activities and burning of diesel fuel will increase greenhouse gas and limit capacity of Canada to respect its engagements under Kyoto Litigation with a resident of Little River over defamation was reported by stakeholders on numerous occasions and created resentment against the proponent	Interview 3-1/7/05 CLC Meeting 19-1/7/05 Interview 46-1/8/05 Interview 49-1/7/05 & 1/9/05 Interview 54-1/6/05 Interview 81-4/1/04 Meeting 91-1/8/05 Interview 103-1/6/05	**6.6.1** **9.1.1** **6.6.2** **Ref. Vol. IV** **Tab 21** **Tab 22** **Tab 23**
	Panel Review	Some stakeholders voiced their concerns on the importance of panel transparency and impartiality. Some level of distrust exists of the whole environmental assessment process.	Meeting 9-1/6/05 Interview 16-1/9/05 Interview 30-1/6/05 Interview 56-9/22/05 Interview 64-1/6/05 Interview 67-1/6/05 Meeting 78-1/6/05 Interview 81-4/1/04	**1.2**
	Provincial and Federal Regulations	Mention of provincial environmental regulations, including conditions to obtain permit for quarry, and concerns about compliance and surveillance	Interview 4-1/6/05 CLC Interview 30-1/6/05 Meeting 33-1/7/05 Interview 81-4/1/04	**6.5**
Socio-Economic Effects	**Compensation**	The issue of compensation has been raised under various circumstances. Three groups of compensation comments	Meeting 7-1/7/05 CLC Meeting 19-1/7/05 Interview 38-1/7/05	**11.8**

Type of Issue	Issue	Concerns	Source	EIS Chapter
Socio-Economic Effects	**Compensation**	1) Where the project could have an impact of the livelihood of residents and, therefore, on local business and industries. For example, if the fisheries were affected by the project or damage to lobster traps 2) Where stakeholders referred to compensation as a way to mitigate predicted social and environmental impacts and impact on individual's wealth and quality of life such as loss of property value, loss of water, having to cope with dust and noise, mental anguish because of tensions between proponents and residents 3) Where it was mentioned that the proponent should share project benefits with the community since, apart from a few jobs, the project is not seen as having a beneficial impact on the community. Some suggested that some profits be invested to enhance social and historical activities for communities in the project area but being careful not to buy people's acceptance of the project	Interview 48-1/9/05 Interview 49-1/7/05 & 1/9/05 Interview 60-1/6/05 Interview 69-1/8/05 Interview 79-1/6/05 Interview 99-1/9/05 Interview 102-1/7/05 Interview 103-1/6/05 Interview 165-1/9/05 Meeting 167-1/9/05 Meeting 171-1/11/05	**9.3.13.3** **11.8** **9.1.3** **9.1.8** **9.3.15** **9.1.9** **9.1.10** **9.3.9** **6.0.1** **9.3.24** **9.3.23**

Type of Issue	Issue	Concerns	Source	EIS Chapter
Socio-Economic Effects	**Employment**	First Nations and African Canadian Communities would like opportunities for the members of their community to obtain employment Locals would welcome the project to provide employment to those currently unemployed, to diversify local industries and to retain young people in the project area communities Quality and quantity of new jobs Whether locals will be offered the jobs before outsiders Quarry activities could put at risk other local industries (fishing and eco-tourism) because of potential environmental degradation. In other words, concern that new jobs could be gained at the expense of current jobs in the fishing and tourism industry and threaten stable employment Some local employers fear losing current employees to the quarry because of better working conditions for unskilled employees. They are also concerned at having to offer similar conditions	Meeting 9-1/6/05 Interview 10-1/8/05 Interview 12-5/1/04 & 9/23/05 CLC Interview 18-10/1/04 Interview 21-1/22/04 Meeting 24-1/1/05 & 9/22/05 Interview 27-9/22/05 Interview 29-12/1/03 Interview 49-1/7/05 & 1/9/05 Interview 56-9/22/05 Interview 59-1/6/05 Interview 60-1/6/05 Interview 66-12/31/03 & 1/1/04 Interview 70-2/1/04 Meeting 74-9/23/05 Interview 75-11/1/04 Interview 76-12/16/03 Interview 77-1/8/05 Interview 81-4/1/04 Interview 85-1/7/05 Interview 92-12/1/03 Interview 94-12/1/03 Interview 97-12/16/03 Interview 108-5/10/05 Interview 109-5/10/05 Interview 110-5/10/05 Interview 111-5/10/05 Interview 114-5/10/05 Interview 117-5/10/05 Interview 128-5/10/05 Interview 162-5/10/05 Interview 166-12/1/03 Interview 167-1/9/05 Meeting 171-1/11/05	**9.3.23** **7.6** **9.3.3** **Ref. Vol. IV, Tab 21** **9.3.23** **7.6** **Commitments Table- Vol. IV** **Executive Summary** **9.3.6** **9.3.10** **9.3.11** **9.3.12** **9.3.13** **9.3.23** **9.3.23** **Commitments Table- Vol. IV** **Executive Summary**

Type of Issue	Issue	Concerns	Source	EIS Chapter
Socio-Economic Effects	**Fisheries**	Fisherman, their families and their coastal communities expressed concern that the project would cause environmental effects that could impact the marine environment and fishery Fishing has been a way of subsistence and a way of life in the project area for hundred of years Fishermen are afraid that their living could be threatened by the project. For some, investments made in their equipment are considerable. They would like assurance that if a project related effect damages their fishery or equipment, they will be compensated Fishermen want the opportunity to review any expert studies that would be done by scientists on fishing	Meeting 7-1/7/05 Interview 8-7/1/04 Interview 11-4/1/05 Interview 15 1/6/05 Interview 18-10/1/04 Meeting 24-1/1/05 & 9/22/05 Meeting 25-1/6/05 Meeting 36-1/7/05 Interview 37-12/1/03 Interview 38-1/7/05 Interview 41-2/1/05 Interview 43-7/24/04 Interview 44-12/1/03 &5/1/04 Interview 47-1/1/04 Interview 48-1/9/05 Interview 49-1/7/05 & 1/9/05 Interview 50-12/31/03 Interview 54-1/6/05 Interview 56-9/22/05 Interview 59-1/6/05 Interview 60-1/6/05 Interview 63-3/1/05 Interview 69-1/8/05 Meeting 72-1/8/05 Meeting 74-9/23/05 Interview 75-11/1/04 Interview 76-12/16/03 Interview 79-1/6/05 Interview 80-7/1/04 Interview 84-3/1/05 Interview 94-12/1/03 Interview 96-1/6/05 Interview 99-1/9/05 Interview 101-12/1/04 Interview 108-5/10/05 Interview 111-5/10/05 Interview 128-5/10/05 Interview 165-1/9/05	**9.3.10** **9.3.11** **9.3.12** **9.3.13** **9.2.3** **9.2.4** **9.2.9** **9.2.10** **9.2.14** **9.2.15** **10.2** **11.8** **Ref. Vol II Tabs 8 - 13** **Ref. Vol. III Tabs 14 - 20** **Ref. Vol. V Tab 25 Tab 27**

Type of Issue	Issue	Concerns	Source	EIS Chapter
Socio-Economic Effects	**Human Health**	Many have raised the issue of health effects for nearby residents (e.g. impact on their drinking water, air quality, noise) and impact on quality of life such as lack of peace and quiet. Sleep deprivation could have an effect on one's health and wellbeing Impacts of the project on mental health, such as anguish that the project will be built against their will and from being worried about the impact on their way of life and livelihood (fisheries and tourism)	Interview 10-1/8/05 Interview 14-1/6/05 CLC Meeting 22-4/11/05 Meeting 25-1/6/05 Meeting 32-7/8/05 Interview 67-1/6/05 Interview 79-1/6/05 Meeting 93-9/22/05 Interview 103-1/6/05 Meeting 167-1/9/05	**9.1.8** **9.1.9** **9.1.10** **9.1.11** **9.1.12** **9.3.17** **9.3.18** **9.3.19** **9.3.20** **9.3.21** **9.3.22**
	Interactions with Project Proponent	Overall, stakeholders both for and against the project reported that the proponent's working relationship with the community could have been better. Criticisms ranged from the initial buy of the land, where some claimed that the proponent was less than honest about the land's future use, to interactions through the CLC hat was created at the request of the province, to litigation against a critic.	Meeting 9-1/6/05 Interview 11-4/1/05 Interview 12-5/1/04 & 9/23/05 Interview 14-1/6/05 CLC Interview 18-10/1/04 Meeting 25-1/6/05 Meeting 36-1/7/05 Interview 37-12/1/03	**8.2**

Type of Issue	Issue	Concerns	Source	EIS Chapter
Socio-Economic Effects	**Interactions with Project Proponent**	Interactions have been described as negative because currently some stakeholders do not trust the proponent or find the company credible. They feel that the proponent does not respect their concerns, has tried to intimidate them, has undermined their social values and had acted inappropriately on a few occasions	Interview 46-1/8/05 Interview 49-1/7/05 & 1/9/05 Interview 59-1/6/05 Interview 64-1/6/05 Interview 65-12/31/03 Interview 67-1/6/05 Interview 80-7/1/04 Interview 87-12/17/03 Interview 99-1/9/05	**6.0.1**
		Because of past changes in the proponent's name, people question who the company is and what is their record with communities?		**6.1**
	Land Sale	A few stakeholders said that the land bought by the owner was not bought fairly either because the intention was not clear or because they could have exerted pressure-some older people	Interview 14-1/6/05 CLC Interview 59-1/6/05 Meeting 171-1/11/05	**9.3.15** **6.1**
		Some residents were curious to know if it would be an option to get their land bought instead of having to live up with the inconvenience of dust, noise, etc		**11.8**
		What is being done with the additional land that is being acquired?		**9.3.15**

Type of Issue	Issue	Concerns	Source	EIS Chapter
Socio-Economic Effects	**Other Construction and Operation Issues**	Curiosity and interest in getting more details-project operations Proximity of properties to operations Marine traffic and increased risks to fishermen's fixed-gear, especially during lobster season Increased potential for forest fires Continuity of operations (day and night) and associated inconvenience (such as noise) and multi-year duration of the project Restricted-access to Whites Cove Fear that hazardous waste will be transported instead of ballast water and buried on site Concerned about the increase in vehicle traffic, (i.e. trucks) Issue with ships berthing. Status of geoscience knowledge in the Bay of Fundy on overall Concern over the nature of the seabed (bedrock) off Brier Island.	Interview 4-1/6/05 Meeting 7-1/7/05 Meeting 9-1/6/05 Interview 15 1/6/05 CLC Interview 18-10/1/04 Meeting 19-1/7/05 Meeting 36-1/7/05 Interview 38-1/7/05 Meeting 43-7/24/04 Meeting 48-1/9/05 Interview 49-1/7/05 & 1/9/05 Interview 50-12/31/03 Interview 59-1/6/05 Interview 60-1/6/05 Interview 67-1/6/05 Interview 69-1/8/05 Meeting 71 in 03, Interview 80-7/1/04 Interview 81-4/1/04 Interview 84-3/1/05 Interview 85-1/7/05 Meeting 91-1/8/05 Interview 95-1/8/05 Interview 101-12/1/04 Interview 103-1/6/05 Meeting 171-1/11/05	**7.7** **7.8** **8.2** **7.4** **7.5** **9.3.13** **11.2** **9.1.8.3** **9.1.9** **9.1.10** **9.1.11** **9.3.16.3** **7.10** **Commitments Table - 5.0** **9.3.8** **7.7.2** **Ref. Vol. III Tabs 14-20** **Ref. Vol. III Tabs 14-20**

Type of Issue	Issue	Concerns	Source	EIS Chapter
Socio-Economic Effects	**Other Socio-Economic Issues**	Why is the project in the project area? American and big corporation factor. Who is proponent and does it have a good corporate history? Site decommissioning. If proponent fails to meet its obligation, who will be responsible to restore the site? Historical ties to Loyalist Communities' participation in planning of their future. Capacity to take part in decision-making Impact-social, cultural and historical values as well as possibility for residents to have reasonable access to enjoyment of life and property especially for seniors Economic impacts, cost-benefit analysis should be undertaken Other industries that would have tried to establish in Digby before would have been rejected, such as Michelin Tire The project causes strong reactions,including emotional issues	Interview 10-1/8/05 Interview 11-4/1/05 Interview 12-5/1/04 & 9/23/05 Interview 14-1/6/05 CLC; Meeting 19-1/7/05 Meeting 24-1/1/05 & 9/22/05 Meeting 25-1/6/05 Meeting 28-9/22/05 Interview 30-1/6/05 Meeting 31-1/8/05 Meeting 33-1/7/05 Meeting 36-1/7/05 Interview 38-1/7/05 Interview 46-1/8/05 Interview 49-1/7/05 & 1/9/05 Interview 56-9/22/05 Interview 57-1/8/05 Interview 60-1/6/05 Interview 62-12/31/03 Interview 63-3/1/05 Interview 67-1/6/05 Interview 68-1/8/05 Interview 69-1/8/05 Meeting 74-9/23/05 Interview 77-1/8/05 Meeting 78-1/6/05 Meeting 82-12/31/03 Interview 85-1/7/05 Interview 87-12/17/03 Meeting 91-1/8/05 Interview 95-1/8/05 Interview 103-1/6/05 Meeting 104-1/8/05 Interview 163-1/8/05 Interview 165-1/9/05 Meeting 167-1/9/05 Interview 170-12/17/03 Meeting 171-1/11/05	**7.1** **6.1** **6.01** **7.10** **Commitments Table-Vol. IV Executive Summary** **8.2** **9.3.7** **9.3.22** **9.3.17** **9.3.18** **9.3.19** **9.3.20** **9.2.21** **9.3.9** **9.3.22** **Ref. Vol. VI, Tab 34**

Type of Issue	Issue	Concerns	Source	EIS Chapter
Socio-Economic Effects	**Other Socio Economic Issues**	Community cohesion has been affected by project. It was reported that some stores have been boycotted because of their position on the project and some people have reported others being intimidated. Many residents who provided Elgin Consulting with stories on traditional knowledge said they were in favour of the project because it created employment, but they were afraid to say this publicly		**9.3.22** **Ref. Vol. VI, Tab 34**
		Need for Archeological survey		**9.3.3** **9.3.4** **9.3.5** **Ref. Vol. VI, Tab 35**
		Impact on quality of life		**9.3.22**
		Site is location of "Fog Magic" story		**Ref. Vol. IV, Tab 23**
		Psychosocial damage of environmental degredation		**9.3.22**
	Project Area Economic and Environmental Sustainability	People earning living from fishing and tourism industries and other local businesses all care for the project area's sustainability because they depend on the areas environmental diversity, renewability and productivity for their living.	Interview 12-5/1/04 & 9/23/05 Interview 13-2/1/05 Interview 14-1/6/05 Meeting 19-1/7/05 Interview 27-9/22/05 Meeting 31-1/8/05	**Impact Summary Table 2 - 9.4** **Commitments Table - 5.0** **9.3.9** **9.3.10** **9.3.11** **9.3.12** **9.3.13**

Type of Issue	Issue	Concerns	Source	EIS Chapter
Socio-Economic Effects	**Project Area Economic & Environmental Sustainability**	This might explain the importance residents from the Digby Neck area place-economic and environmental sustainability in the project area Digby Neck, in the opinion of many stakeholders, houses healthy rural communities with prosperous traditional local economies From what some residents and local and regional organizations say, they don't see how the quarry fits with the vision they have for the area Some residents are extremely concerned that the project might cause environmental degradation and that their current industries will be affected by it. They want to make sure that they can sustain their living and their way of life How will the proposed project contribute to the sustainability of their communities? Other stakeholders, especially those that are not directly relying on fisheries, pointed out that in the past	Meeting 33-1/7/05 Meeting 36-1/7/05 Interview 41-2/1/05 Interview 44-12/1/03 & 5/1/04 Interview 48-1/9/05 Interview 49-1/7/05 & 1/9/05 Interview 54-1/6/05 Interview 56-9/22/05 Interview 59-1/6/05 Interview 65-12/31/03 Interview 69-1/8/05 Meeting 72-1/8/05 Meeting 74-9/23/05 Interview 76-12/16/03 Interview 77-1/8/05 Interview 79-1/6/05 Interview 81-4/1/04 Interview 83-5/1/04 Interview 84-3/1/05 Interview 85-1/7/05 Interview 87-12/17/03 Meeting 91-1/8/05 Interview 97-12/16/03 Interview 102-1/7/05 Interview 103-1/6/05 Meeting 104-1/8/05 Interview 108-5/10/05 Interview 117-5/10/05 Interview 128-5/10/05 Interview 165-1/9/05	**9.3.14** **9.3.15** **9.3.16** **9.3.17** **9.3.22** **9.3.24** **Impact Summary Table 2 - Vol IV - Executive Summary** **9.3.9**

Type of Issue	Issue	Concerns	Source	EIS Chapter
Socio-Economic Effects	**Project Area Economic & Environmental Sustainability**	the fishing industry has not always been sustainable for communities because of the fluctuation in resource availability (e.g. collapse of ground fisheries) and that with the current importance of lobster fisheries, economic diversification would, in the long run, benefit the area's economic sustainability	Interview 166-12/1/03 Meeting 167-1/9/05 Meeting168,date unknown, Interview 170-12/17/03	**9.3.14** **9.3.15** **9.3.16** **9.3.17** **9.3.22** **9.3.24**
	Project Economic Benefits	Numerous concerns were expressed about potential project economic benefits. While for some it is obvious that the project will create economic benefits for the area, for others the project will have overall a negative impact on local and regional economies. Concern that all project benefits will go to the Americans If there are economic gains for the area, there might be other social and environmental costs	Meeting 9-1/6/05 Interview 10-1/8/05 Interview 18-10/1/04 Meeting 19-1/7/05 Meeting 36-1/7/05 Interview 40-12/1/03 Interview 48-1/9/05 Interview 49-1/7/05 & 1/9/05 Meeting 53-6/1/04 Interview 54-1/6/05 Interview 59-1/6/05 Interview 63-3/1/05 Meeting 72-1/8/05 Interview 76-12/16/03	**9.3.9** **9.3.10** **9.3.11** **9.3.12** **9.3.13** **9.3.14** **9.3.15** **Ref. Vol. VI, Tab 32** **Ref. Vol. VI, Tab 32** **Ref. Vol. VI, Tab 32**

Type of Issue	Issue	Concerns	Source	EIS Chapter
Socio-Economic Effects	**Project Economic B enefits**	Benefits going to the proponent while communities will have to deal with the consequences of the project including environmental degradation and impact on their quality of life and economic sustainability	Interview 77-1/8/05 Interview 81-4/1/04 Interview 87-12/17/03 Interview 108-5/10/05 Meeting 167-1/9/05 Interview 170-12/17/03 Meeting 171-1/11/05	**9.3.9** **9.3.10** **9.3.11** **9.3.12** **9.3.13** **9.3.14** **9.3.15**
		The eco-tourism industry sustainability and potential growth was seen as having more potential to bring money to local economy than mining operations especially when considered the time scale of the project likely being over in approximately 25 years		**Ref. Vol. VI, Tab 32**
		The quarry is not valued as an economic development project.		**Ref. Vol. VI, Tab 32**
		The idea that most benefits would go to an American company, with no royalties or benefits to Nova Scotia or communities, left a few bitter. Residents, in particular, were not willing to make a lot of sacrifices for a company in the States to make big profits		**Ref. Vol. VI, Tab 32**

Type of Issue	Issue	Concerns	Source	EIS Chapter
Socio-Economic Effects	**Project Expansion**	Proposed project could expand and result in additional exploitation of basalt in contiguous areas or the project approval could open the door to similar basalt quarry in the area to extract the remaining length of the deposit The natural area around the quarry is so small that it needs adequate protection. A buffer zone around the project was proposed to make sure the project would not result in a domino effect Additional concern is that NAFTA, Chapter 11, could influence future plans for expansion for the basalt quarry in Nova Scotia and leave out the option of local and regional stakeholders to oppose future plans	Meeting 6-1/6/05 Meeting 33-1/7/05 Interview 56-9/22/05 Interview 59-1/6/05 Meeting 72-1/8/05 Meeting 74-9/23/05 Interview 77-1/8/05 Interview 81-4/1/04 Interview 10	**7.3** **9.3.15** **6.6.1**
	Project Related Business Opportunities	Potential economic spin-offs from additional employment and other project activities and the benefits on local businesses Creation of additional business opportunities, including manufacturing. Could the proponent identify opportunities for local residents?		**9.3.9** **9.3.23** **Committments Table - Economy in Executive Summary**

Type of Issue	Issue	Concerns	Source	EIS Chapter
Socio-Economic Effects	**Property Value**	Some nearby and Little River residents expressed concern that the project would affect property values Concern was raised that the presence of the project could affect real estate (one's capacity to obtain a mortgage, construction activities, sales),especially in an area where summer residents are buying properties	Interview 15 1/6/05 CLC Meeting 167-1/9/05	**9.3.15** **11.8**
	Tourism	The direct and indirect impacts of the project on tourism are a key issue to stakeholders Eco-tourism is an important feature of Digby Neck Although no tourist activity appears to take place at the project location, it is feared that the project could affect whales on which operators rely and the interest of summer residents and visitors by coastal destruction and environmental effects such as noise and dust Development organizations in the area have invested time and money in the promotion of the area to sustain current activities and are hoping to attract even more visitors as an eco-tourism destination. A proposal is	Meeting 5-7/1/04 Meeting 6-1/6/05 Interview 8-7/1/04; Interview 11-4/1/05 Interview 12-5/1/04 & 9/23/05 Interview 13-2/1/05 CLC Meeting 19-1/7/05 Interview 21-1/22/04 Meeting 24-1/1/05 &9/22/05 Meeting 25-1/6/05 Interview 27-9/22/05 Meeting 28-9/22/05 Interview 29-12/1/03 Interview 41-2/1/05 Interview 44-12/1/03 & 5/1/04 Interview 47-1/1/04 Interview 48-1/9/05 Interview 49-1/7/05 & 1/9/05 Interview 56-9/22/05 Interview 60-1/6/05 Interview 62-12/31/03	**9.3.14**

Type of Issue	Issue	Concerns	Source	EIS Chapter
Socio-Economic Effects	**Tourism**	being developed to build the Bay of Fundy Discovery Centre as well as a proposal to have Digby Neck recognized by UNESCO. Fear exists that the project could damage the area's reputation and affect investors (summer residents and eco-tourism operators)	Interview 63-3/1/05 Interview 65-12/31/03 Interview 66-12/31/03 & 1/1/04 Interview 69-1/8/05 Interview 70-2/1/04 Meeting 72-1/8/05 Meeting 74-9/23/05 Interview 76-12/16/03 Interview 77-1/8/05 Interview 79-1/6/05 Interview 81-4/1/04 Interview 83-5/1/04 Interview 84-3/1/05 Interview 85-1/7/05 Interview 87-12/17/03 Interview 92-12/1/03 Interview 97-12/16/03 Interview 101-12/1/04 Meeting 104-1/8/05 Interview 105-9/22/05 Interview 166-12/1/03 Meeting 167-1/9/05 Interview 169-3/1/04 Interview 170-12/17/03	**9.3.25**
	Workers' and Residents' Safety	The Proponent has built a fence, and access to site is restricted (to prohibit access because of machinery and other site activities as per provincial requirements) Potential hazards for workers	CLC Interview 81-4/1/04	**11.0** **11.2** **11.0** **11.2**

Type of Issue	Issue	Concerns	Source	EIS Chapter
Traditional and Community Environmental Knowledge (TCEK)	**Traditional Knowledge**	More than 60 individuals/ meetings contributed to overall traditional and community knowledge. The following headings detail some of that knowledge.	Meeting 9-1/6/05 Interview 11-4/1/05 Interview 14-1/6/05 CLC Meeting 19-1/7/05 Meeting 25-1/6/05 Meeting 36-1/7/05 Interview 46-1/8/05 Interview 49-1/7/05 & 1/9/05 Interview 50-12/31/03 Meeting 52-12/1/03 Interview 54-1/6/05 Interview 57-1/8/05 Interview 59-1/6/05 Interview 61-1/6/05 Interview 67-1/6/05 Interview 69-1/8/05 Meeting 72-1/8/05 Interview 77-1/8/05 Interview 79-1/6/05 Interview 95-1/8/05 Interview 102-1/7/05 Interview 103-1/6/05 Interview 106-162-5/10/05 Interview 163-1/8/05 Interview 165-1/9/05	**Ref. Vol. II, Tab 23** **8.2** **8.3** **9.1** **9.2** **9.3**
	Berries	Whites Cove was reported as one location to gather berries	Interview 106-5/10/05 Interview 111-5/10/05 Interview 117-5/10/05 Interview 139-5/10/05	**9.3.21**
	Employment	School was not attended for very long since manual jobs were more attractive.	Interview 112-5/10/05 Interview 114-5/10/04 Interview 117-5/10/05 Interview 128-5/10/05	**9.3.22** **9.3.23**

Type of Issue	Issue	Concerns	Source	EIS Chapter
Traditional and Community Environmental Knowledge (TCEK)	**Education**	Some residents have reported migrating outside of the area in the past to find employment to sustain them. At first, most people were living from fisheries	Interview 150-5/10/05 Interview 159-5/10/05 Interview 160-5/10/05 Interview 162-5/10/04	**9.3.23** **9.3.22** **9.3.7**
	Family	Previously, families were more numerous and there were more young people in communities	Meeting 36-1/7/05 Interview 54-1/6/05 Interview 61-1/6/05 Interview 69-1/8/05 Interview 77-1/8/05 Interview 79-1/6/05 Interview 103-1/6/05 Interview 110-5/10/05 Interview 111-5/10/05 Interview 113-5/10/05 Interview 114-5/10/05 Interview 117-5/10/05 Interview 128-5/10/05 Interview 139-5/10/05 Interview 160-5/10/05 Interview 163-1/8/05	**9.3.7** **9.3.22**
	Farming	Whites Cove would have been used as a pasture. In surrounding communities most families had gardens to provide them with vegetables. Product trades were much more common	Interview 106-5/10/05 Interview 110-5/10/05 Interview 114-5/10/05 Interview 117-5/10/05 Interview 128-5/10/05 Interview 139-5/10/05 Interview 150-5/10/05 Interview 160-5/10/05 Interview 161-5/10/05 Interview 162-5/10/05	**Ref. Vol. IV, Tab 23** **9.3.15** **Ref. Vol. VI, Tab 33**

Type of Issue	Issue	Concerns	Source	EIS Chapter
Traditional and Community Environmental Knowledge (TCEK)	**Fishing**	Whites Cove was used in the past for fishing. At that time of the hook-and-line fishery, a small boat such as a dory was the preferred way. white fish, pollock, hake and haddock were harvested. Many remember the changes to bigger boats and new technologies that some say negatively affected stocks because of the effectiveness	Meeting 25-1/6/05 Meeting 36-1/7/05 Interview 59-1/6/05 Interview 61-1/6/05 Interview 69-1/8/05 Meeting 72-1/8/05 Interview 77-1/8/05 Interview 102-1/7/05 Interview 106-5/10/05 Interview 107-5/10/05 Interview 108-5/10/05 Interview 110-5/10/05 Interview 117-5/10/05 Interview 128-5/10/05 Interview 139-5/10/05 Interview 150-5/10/05 Interview 160-5/10/05 Interview 161-5/10/05 Interview 163-1/8/05	**9.3.4** **9.3.10** **Ref. Vol. IV, Tab 23**
	History	Residents knew about the history of the community and were interested in preserving it	CLC Meeting 25-1/6/05 Meeting 36-1/7/05 Interview 49-1/7/05 & 1/9/05 Meeting 52-12/1/03 Interview 54-1/6/05 Interview 59-1/6/05 Interview 79-1/6/05 Interview 102-1/7/05 Interview 110-5/10/05 Interview 111-5/10/05	**9.3.2** **9.3.4** **9.3.5** **Ref. Vol. VI, Tab 33** **Ref. Vol. IV, Tab 23**
	Quality of Life	Stakeholders reported having a fair quality of life despite some periods of rougher times (e.g. during the Second World War and the Depression)	Interview 11-4/1/05 CLC Meeting 19-1/7/05 Meeting 25-1/6/05 Meeting 36-1/7/05 Interview 50-12/31/03 Interview 67-1/6/05 Interview 69-1/8/05 Meeting 72-1/8/05	**9.3.7** **9.3.22** **Ref. Vol. IV, Tab 23**

Type of Issue	Issue	Concerns	Source	EIS Chapter
Traditional and Community Environmental Knowledge (TCEK)	**Quality of Life**		Interview 77-1/8/05 Interview 79-1/6/05 Interview 102-1/7/05 Interview 107-5/10/05 Interview 109-5/10/05 Interview 110-5/10/05 Interview 120-5/10/05 Interview 162-5/10/05 Interview 162-1/9/05	
	Neck and Island Memories	These memories were primarily about traditional knowledge issues addressed above	Meeting 36-1/7/05 Interview 79-1/6/05 Interview 103-1/6/05 Interview 106-5/10/05 Interview 107-5/10/05 Interview 108-5/10/05 Interview 109-5/10/05 Interview 110-5/10/05 Interview 111-5/10/05 Interview 112-5/10/05 Interview 113-5/10/05 Interview 114-5/10/05 Interview 117-5/10/05 Interview 128-5/10/05 Interview 139-5/10/05 Interview 159-5/10/05 Interview 160-5/10/05 Interview 161-5/10/05 Interview 162-5/10/05	**9.3.2** **9.3.4** **9.3.5** **Ref. Vol. IV, Tab 23**
	Other Traditional Knowledge Issues	Stakeholders were also knowledgeable about the sources of water and its importance for various uses	Meeting 9-1/6/05 Interview 14-1/6/05 CLC Meeting 36-1/7/05 Interview 54-1/6/05 Interview 56-9/22/05	**9.1.3** **Ref. Vol. IV, Tab 23**

Type of Issue	Issue	Concerns	Source	EIS Chapter
Traditional and Community Environmental Knowledge (TCEK)	**Other Traditional Knowledge Issues**	Stakeholders were also knowledgeable about the sources of water and its importance for various uses	Interview 69-1/8/05 Meeting 72-1/8/05 Interview 77-1/8/05 Interview 95-1/8/05 Interview 102-1/7/05 Interview 103-1/6/05 Interview 108-5/10/05 Interview 109-5/10/05 Interview 110-5/10/05 Interview 111-5/10/05 Interview 112-5/10/05 Interview 128-5/10/05 Interview 139-5/10/05 Interview 150-5/10/05 Interview 159-5/10/05 Interview 160-5/10/05 Interview 161-5/10/05 Interview 162-5/10/05 Interview 163-1/8/05	
	Religion	The Church played a central role in people's existence. Church suppers were quite popular social events	Interview 108-5/10/05 Interview 109-5/10/05 Interview 139-5/10/05 Interview 150-5/10/05	**9.3.22** **Ref. Vol. IV, Tab 23**
	Road	The development and paving of Highway #217 in the 1950's had a great impact on the insular communities. Mobility was increased and exchanges between communities were more frequent. The road also brought summer residents from outside the area including New England	Interview 106-5/10/05 Interview 107-5/10/05 Interview 108-5/10/05 Interview 109-5/10/05 Interview 111-5/10/05 Interview 112-5/10/05 Interview 117-5/10/05 Interview 128-5/10/05 Interview 139-5/10/05 Interview 150-5/10/05 Interview 159-5/10/05 Interview 162-5/10/05	**9.3.7** **9.3.22** **9.3.8** **9.3.14** **Ref. Vol. IV, Tab 23**

Type of Issue	Issue	Concerns	Source	EIS Chapter
Traditional and Community Environmental Knowledge (TCEK)	**Social Cohesion**	Each community was living of itself and interactions between them were not frequent prior to Highway #217 being built. Some people reported occasional tensions between communities (e.g. Sandy Cove and Little River) in the past, the sense of community was perceived as stronger with people caring for each other	Interview 109-5/10/05 Interview 139-5/10/05 Interview 150-5/10/05 Interview 159-5/10/05 Interview 161-5/10/05 Interview 162-5/10/05	**9.3.7** **9.3.22** **Ref. Vol. IV, Tab 23** **Ref. Vol. VI, Tab 34**
	Technologies	Elders remembered the impact of various technologies-their way of life including cars, televisions, more complex fishing equipment	Interview 59-1/6/05 Interview 112-5/10/05 Interview 117-5/10/05 Interview 139-5/10/05 Interview 160-5/10/05 Interview 161-5/10/05 Interview 162-5/10/05	**Ref. Vol. IV, Tab 23** **9.3.22**
	Whites Cove Memories	Few respondents spent much time at the Whites Cove, but they went to visit, collect berries, log wood and access the shore for leisure or for fishing. After the 1900s, a camp belonging to a Reverend was used for social meetings and family gatherings. Later on, Whites Cove was also use as gravel pit for the paving of Highway #217	Meeting 36-1/7/05 Interview 46-1/8/05 Interview 59-1/6/05 Interview 106-5/10/05 Interview 107-5/10/05 Interview 108-5/10/05 Interview 109-5/10/05 Interview 110-5/10/05 Interview 111-5/10/05 Interview 112-5/10/05 Interview 113-5/10/05 Interview 114-5/10/05 Interview 117-5/10/05 Interview 128-5/10/05 Interview 139-5/10/05 Interview 150-5/10/05 Interview 159-5/10/05 Interview 160-5/10/05 Interview 161-5/10/05 Interview 162-5/10/05	**Ref. Vol. IV, Tab 23** **9.3.22**

Type of Issue	Issue	Concerns	Source	EIS Chapter
Traditional and Community Environmental Knowledge (TCEK)	**Whites Cove Settlement**	It was remembered by some, of a past settlement with only a few houses prior to the 1900s. Some knew that their ancestors lived there and then migrated to nearby settlements. Regarding a cemetery, many could recall seeing the white painted stones and even participating in their painting but recollections on why were vague. One stakeholder thought that it could have been done as a gesture for babies and children who died. However, many doubted that the bodies could have been buried there because little soil covered the extreme rock out cropping.	Interview 59-1/6/05 Interview 107-5/10/05 Interview 108-5/10/05 Interview 109-5/10/05 Interview 110-5/10/05 Interview 113-5/10/05 Interview 117-5/10/05 Interview 139-5/10/05 Interview 150-5/10/05 Interview 159-5/10/05 Interview 161-5/10/05 Interview 162-5/10/05	**9.3.2** **9.3.4** **Ref. Vol. IV, Tab 23**

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6.0 INTRODUCTION TO THE EIS

6.0.1 The Proponent

Bilcon of Nova Scotia Corporation is a registered Nova Scotia company and is a subsidiary of Bilcon of Delaware, a holding company controlled by the Clayton group of companies of New Jersey. Details of the Proponent and its relationship with other companies is set out in 6.1.

The Clayton group of companies has been operating in New Jersey for over fifty years and has been widely recognized for the excellence of its products and its outstanding community contributions. Clayton has received over two hundred citations for excellence of design and manufacturing and has made literally thousands of contributions to health, education, and other community causes (examples are shown in Appendix 12) Clayton has been recognized in both Houses of the New Jersey Legislature as an outstanding corporate citizen and in 2004, was recognized by both Houses as the outstanding corporate citizen of the year in New Jersey.

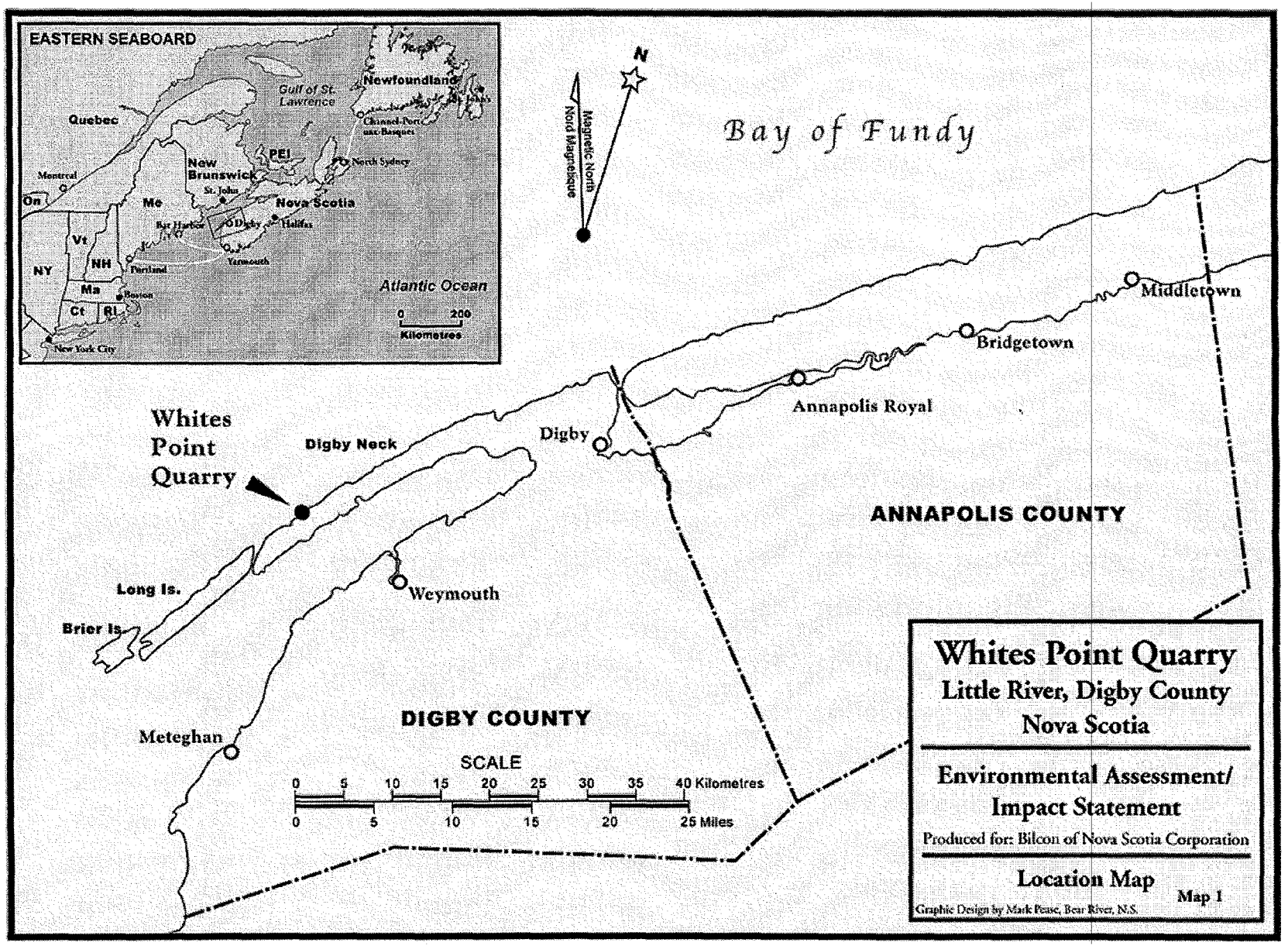
Clayton employs over 850 staff at its various operations in New Jersey and has an enviable record with respect to employee relations, benefits, and occupational health and safety.

Clayton has the internal financial resources to construct and operate the Whites Point facility without government assistance for any aspect of the project and has not, and will not, make application for government assistance.

6.0.2 The Setting

The Whites Point Quarry and Marine Terminal is located on Digby Neck, Digby County, Nova Scotia see **Map 1 and Aerial View**. Digby Neck is a narrow, 30 km long peninsula extending between the Bay of Fundy and St. Mary's Bay and leads to two Islands - Long Island and Brier Island. The 2001 population of Digby Neck and Islands was 1,890. Land use on Digby Neck is primarily rural residential with the majority of the land forested. Small fishing villages exist on both the St. Mary's Bay and Bay of Fundy shores.

The proposed site for the quarry comprises approximately 380 acres with 2.6 kms of coastline along the Bay of Fundy. The land is in private ownership, forested, with no land or coastline developments. Soils are thin overlying the North Mountain Basalt. Existing topography slopes toward the Bay of Fundy with several intermittent water courses. The physical oceanography in this area of the outer Bay of Fundy is typical with basalt bedrock extending into the near shore waters. Lobster is fished seasonally in the near shore and is the most lucrative species landed on Digby Neck and Islands.



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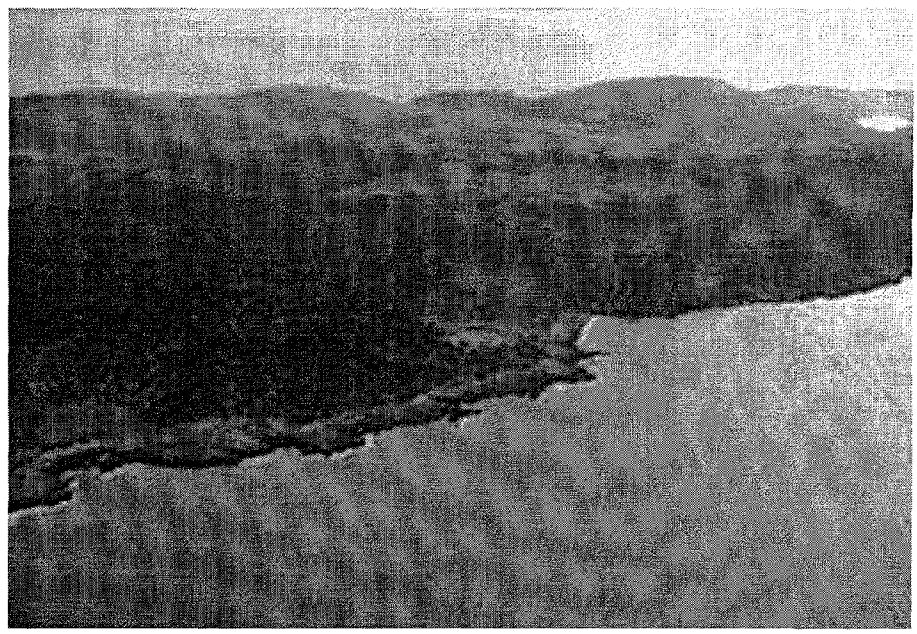


Aerial View of the Whites Cove Site
Photo By Ron Cooper

Marine mammals, including the endangered North Atlantic Right Whale, frequent these outer Bay waters and whale watching is a seasonal tourism attraction. A more detailed description of the human, physical and biological resources of the quarry site is contained in subsequent sections of the EIS.

6.0.3 The Assessment Process

In early 2002, Nova Stone Exporters Inc.(Nova Stone), a Nova Scotia company, applied for and was granted a permit for the operation of a less than 4 hectare quarry at Whites Cove on Digby Neck. Subsequent to the granting of this permit, Nova Stone joined with Bilcon of Nova Scotia Corporation (Bilcon) to form Global Quarry Products, with the purpose of expanding the Whites Cove operation to increase production and add a marine terminal to ship the product.

To this end, Global Quarry Products made application for the installation of a marine terminal serving ships in excess of 25,000 Dead Weight Tonnes. This application under the Navigable Waters Protection Act triggered an assessment under the Canadian Environmental Assessment Act (CEAA). A meeting was held with Federal and Provincial regulators in January 2003, and it was determined that the Department of Fisheries and Oceans Canada was the Responsible Authority and that a Comprehensive Study would be required to assess the project. Global Quarry Products submitted a project description and commenced the preparation of a Comprehensive Study.

In June of 2003, Global Quarry Products was advised that the project had been referred to a Review Panel. A letter dated June 26, 2003, from the Honourable Robert Thibault, Minister of Fisheries and Oceans Canada, to the Honourable David Anderson, Minister of Environment Canada, set out the reasons for the referral - see Appendix 19.

Due to the additional cost and extended time frame required for a Review Panel, Nova Stone withdrew from the Global Quarry Products partnership which was dissolved, leaving Bilcon of Nova Scotia Corporation as the sole Proponent.

Draft Guidelines for the Preparation of the Environmental Impact Statement for the Whites Point Quarry and Marine Terminal Project were distributed to the Proponent, the community, and stakeholders in November, 2004, and the Panel Members were announced in November, 2004. The Panel conducted a series of Public Hearings on the Guidelines in January, 2005, in Sandy Cove, Digby, Meteghan, and Wolfville. Following these hearings and consideration of the verbal and written presentations, the Panel issued the final Environmental Impact Statement Guidelines for the Whites Point Quarry and Marine Terminal project on March 31st, 2005.

Bilcon of Nova Scotia Corporation, as the sole Proponent, has prepared an EIS which was submitted to the panel in the spring of 2006. The EIS starts the process of assessment which will culminate with recommendations by the panel to the joint ministers, and a decision by the joint ministers. The process will involve public hearings and a review by the panel of the findings.

6.0.4 The Regulatory Environment

See 6.5

6.0.5 Study Strategy and Methodology

Rather than engaging a multi-disciplinry consulting group to carry out the EIS, Bilcon of Nova Scotia Corporation engaged a Senior Environmental Consultant to manage the process and in each of the elements under consideration, Bilcon engaged expert individuals or companies to provide the research. A full list of the contributors and their qualifications can be found in Appendix 1. Essentially, Bilcon attempted to engage the most qualified people in their fields of expertise.

In addition, Bilcon carried out extensive discussions with Regulatory Agencies (RA's) throughout the preparation of the EIS and in particular, the Department of Fisheries and Oceans (DFO), Health Canada (HC), Environment Canada (EC) the Nova Scotia Department of Natural Resourses (NSDNR) and the Nova Scotia Department of Environment and Labour (NSDEL). Many of the individual experts also met with regulators and government scientists in the course of preparing their reference documents. The advice and assistance of the DFO over a three and one half year period is particularly acknowledged by Bilcon.

Most importantly, Bilcon conducted an extensive public consultation process commencing in July 2002 encompassing Community Liaison Committee meetings, interviews with business and community stakeholders, traditional knowledge interviews, open houses, newsletters, attitude and quality of life surveys, public information sessions, and fact sheets. Bilcon has maintained an office in Digby since July 2002 to facilitate and encourage drop-ins. Details of the consultation process can be found in Chapter 8.2 of this report.

6.1 The Proponent

In 2001 Nova Stone Exporters Inc. (NSE), a Nova Scotia registered company entered into a lease arrangement with the owners of the 380 acre parcel of land at Whites Cove, Digby County for the purpose of constructing and operating a quarry operation on the site.

In April, 2002, NSE applied for and was granted a permit (See Appendix 33) by the NSDEL to construct and operate a quarry of less than 4 hectares on the Whites Cove site.

In May, 2002, NSE entered into a partnership agreement with Bilcon of Nova Scotia Corporation, a Nova Scotia registered company, forming Global Quarry Products (GQP).

Bilcon of Nova Scotia Corporation is a wholly owned subsidiary of Bilcon of Delaware, which in turn is wholly owned by the principals of the Clayton group of companies of New Jersey, which includes Ralph Clayton and Sons and Clayton Concrete, Block and Sand. Bilcon of Delaware is the holding company for the Clayton's quarrying interests.

In April, 2004, Bilcon of Nova Scotia Corporation bought out the partnership interest of NSE and the partnership was dissolved. Bilcon is now the sole proponent of the Whites Point Project at Whites Cove. Concurrent with the buy-out of NSE, Bilcon entered into a new lease arrangement with the owners of the 380 acre parcel of land at Whites Cove. The lease arrangement is for a 90 year period with the provision for a buy-out of the subject parcel (See Appendix 25).

6.1.1 Management Structure

Permitting Process and Conceptual Design

The permitting process and the conceptual design of the project is the responsibility of the Project Manager for Bilcon, Paul G. Buxton P. Eng.

Detailed Design and Construction

The detailed design and construction of all quarry components is the responsibility of the Operations Manager for Bilcon, John Wall.

Operation and Modification

The operation and plant modification of all quarry components will be the responsibility of the Operations Manager for Bilcon, John Wall.

Implementation of Environmental Mitigation Measures and Environmental Monitoring

The implementation of environmental mitigation measures and all ongoing environmental monitoring will be the responsibility of the Operations Manager for Bilcon, John Wall, assisted by a trained and qualified technical staff.

Management of Potential Adverse Environmental Effects

The management of potential adverse environmental effects will be the responsibility of the Operations Manager, John Wall, assisted by a trained and qualified technical staff.

Corporate Experience in Operating Quarry and Industrial Operations

The Clayton Companies were founded more than fifty years ago with the purchase of fifteen acres of land and one truck. Today, the company operates on over 3,000 acres of land at twenty-five locations with approximately 750 employees.

The Companies are managed by Mr. William Clayton, Sr., the founder, and his three sons who all actively participate in the Companies' operations, assisted by a team of twenty managers.

The Clayton Companies are now New Jersey's largest masonry building materials suppliers and are principally engaged in the production and sale of ready mixed concrete and concrete block, as well as the mining, processing, and sale of sand.

Clayton is also a 50% owner of Amboy Aggregates, which dredges sand from the Atlantic Ocean and has an investment in aggregate distribution terminals in Brooklyn, New York and Amboy, New Jersey.

The Clayton Sand Company mines sand with hydraulic dredges at three sites, one owned and two leased. The sand operations produce approximately 3 million tons of sand per year, approximately half of which is used internally while the remainder is sold to external customers. The sand is used in concrete, asphalt, concrete block, masonry joints, stucco, and as construction fill.

Ralph Clayton and Sons operates fifteen ready mixed plants at twelve locations and delivers the product with a fleet of 225 concrete mixer trucks.

The Clayton Block Company manufactures block and resells masonry building materials, such as bag cement, reinforcing steel, brick, decorative stone, and tools at twelve masonry yards in New Jersey. Clayton manufactures block at eight locations with an annual capacity of 43 million eight-inch equivalents of block.

Related Transportation Systems

The Clayton fleet includes 225 concrete mixer trucks plus 30 spare concrete mixer trucks, 72 tractors used to haul bulk cement trailers, dump trailers or flat bed trailers, 47 dump trucks, 58 block delivery trucks, and 192 light trucks, pick-up trucks and automobiles. Substantially all of the vehicle service work is performed at Company repair locations.

Amboy Aggregates, formed in 1989, is a joint venture, 50% owned by Clayton and 50% by Great Lakes Dredge and Dock Corporation. This joint venture dredges sand in the Ambrose ship channel entering New York harbour. It produces over 2 million tons of sand per year which is delivered by 30 company-owned deck barges or by truck.

Amboy Aggregates is also a 50% owner of New York Sand and Stone, which is a Brooklyn, New York, based stone terminal that imports crushed stone from New Brunswick in partnership with Florida Rock Industries Inc. and operates two leased aggregate distribution terminals comprising approximately 9.5 acres. Ships used to transport the stone from New Brunswick are essentially the same type and size of vessels contemplated for Whites Point.

6.1.2 Environmental Performance and Capability

The Proponent

The Clayton Companies maintain a highly qualified staff to oversee and direct the corporate operations with respect to environmental issues, as well as occupational health and safety issues.

All facilities are monitored daily by the operations manager, monthly safety and environmental check lists are carried out, and an in-house safety and environmental audit is carried out annually at a minimum.

Spill kits are located in all repair shops and at all major fuel tank facilities. The company operates its own spill response trailer.

The Clayton Companies are continually evaluating new technologies with respect to dust collection, concrete recycling, solar power, etc., and operate recycling operations.

The companies have had no incidents leading to major violations of New Jersey Regulations with respect to the Environment or Safety.

The Clayton Companies work with other groups to promote research into site restoration techniques. For example, Clayton contributed $35,000 USD to Rutgers University (See Appendix 13) to unravel the ecology of the Sickle-leaved Golden Aster, *Chrysopsis falcata,* a small endangered wildflower that seeds into open sandy areas and flourishes there until it is shaded out by taller vegetation.

Management of the Whites Point Site to Date

Management of the Whites Point Quarry project was carried out by NSE until the termination of the partnership agreement in 2004. Bilcon has managed the site since that time.

In 2003, NSE stripped approximately half of the permitted 4 Hectare site and created a settling pond to capture particulates from the runoff from the stripped area. During construction of the settling pond - (see photos) , a major rain storm caused an overflow from the pond. The settling pond berms were raised and the settling pond and the additional check dams have functioned well since that time. Water samples were collected on a weekly basis during 2002 and 2003 (See Appendix 45) which show that levels of particulates in water discharged from the site have not exceeded the levels set out in the Permit issued for the 4 hectare quarry.

The Whites Cove Road #422 from Highway #217 to the Bay of Fundy shore adjacent to the quarry site is an abandoned provincial road but still gives access for four wheel drive hicles. At the west end of the road as it turns to the north paralleling the shore, there has been considerable wash out onto the beach area - (see photos). Repairs to the road were carried out by the Nova Scotia Department of Transportation and Public Works in 2003, but these have long since washed out. Bilcon agreed to permit drainage of flood water to enter the quarry site to alleviate the problems at the beach and this has reduced the flows and the amount of sediment flowing into the Bay from the road to some extent.

Bilcon has requested the sale of the road property from the Nova Scotia Department of Transportation and Public Works, but this request has been denied to date and essentially there is little that Bilcon can do to prevent the continuing flow of particulates from the Whites Cove Road.

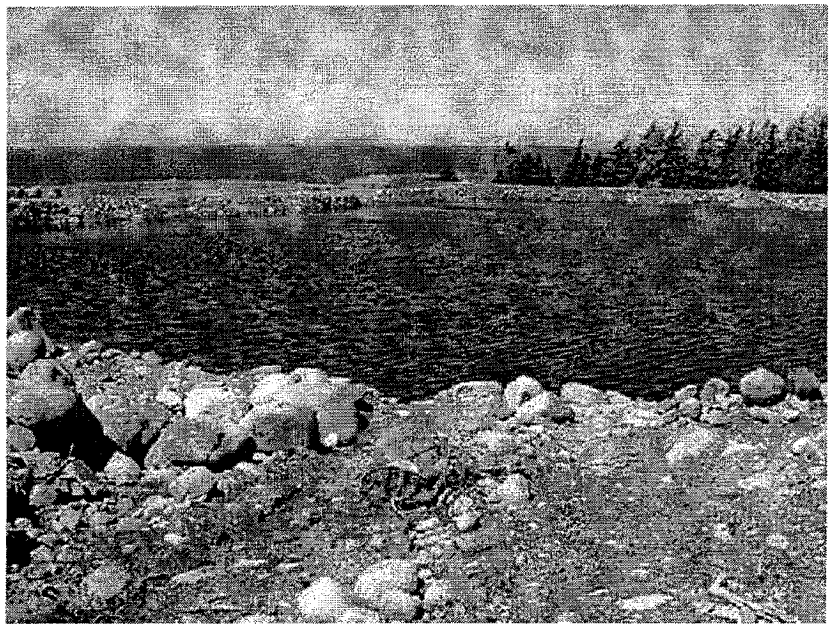
Since 2002, the site itself has been the subject of significant vandalism. Three of the original four bore holes were blocked, hay stacked for emergencies was burnt, the fence around the working area was pulled down on many occasions, check dams and silt fences were destroyed, and seeded areas are continuously damaged by four wheelers. In the face of this and the open access from the Whites Cove Road, it has been difficult to maintain a secure site.

It is the intent of Bilcon to fence the quarry area and maintain security during construction and operation of the quarry. In February, 2006 three of the six new monitoring wells were vandalized and blocked.

Environmental Record of Key Subcontractors

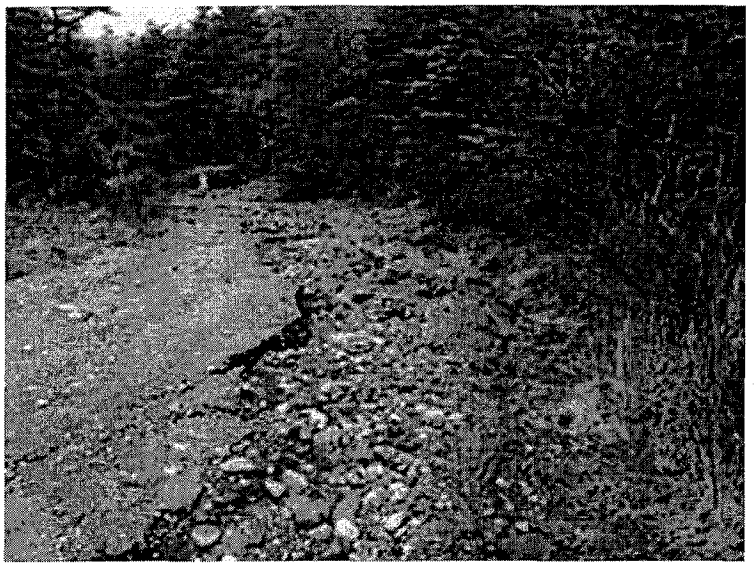
Bilcon has entered into no contractual arrangements for the construction of the on-site structures or the marine terminal structure, nor has it entered into any contractual arrangements for the shipment of the crushed product.

Bilcon, however, will ensure that all subcontractor work, including the shipment of crushed stone, will be carried out by experienced contractors who will be required to demonstrate excellent environmental records and to carry appropriate insurance and bonding.



Sedimentation Pond Looking Toward the Bay of Fundy

Access for Beach Harvesters



Erosion of the Whites Cove Road

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6.2 Project Overview and Purpose

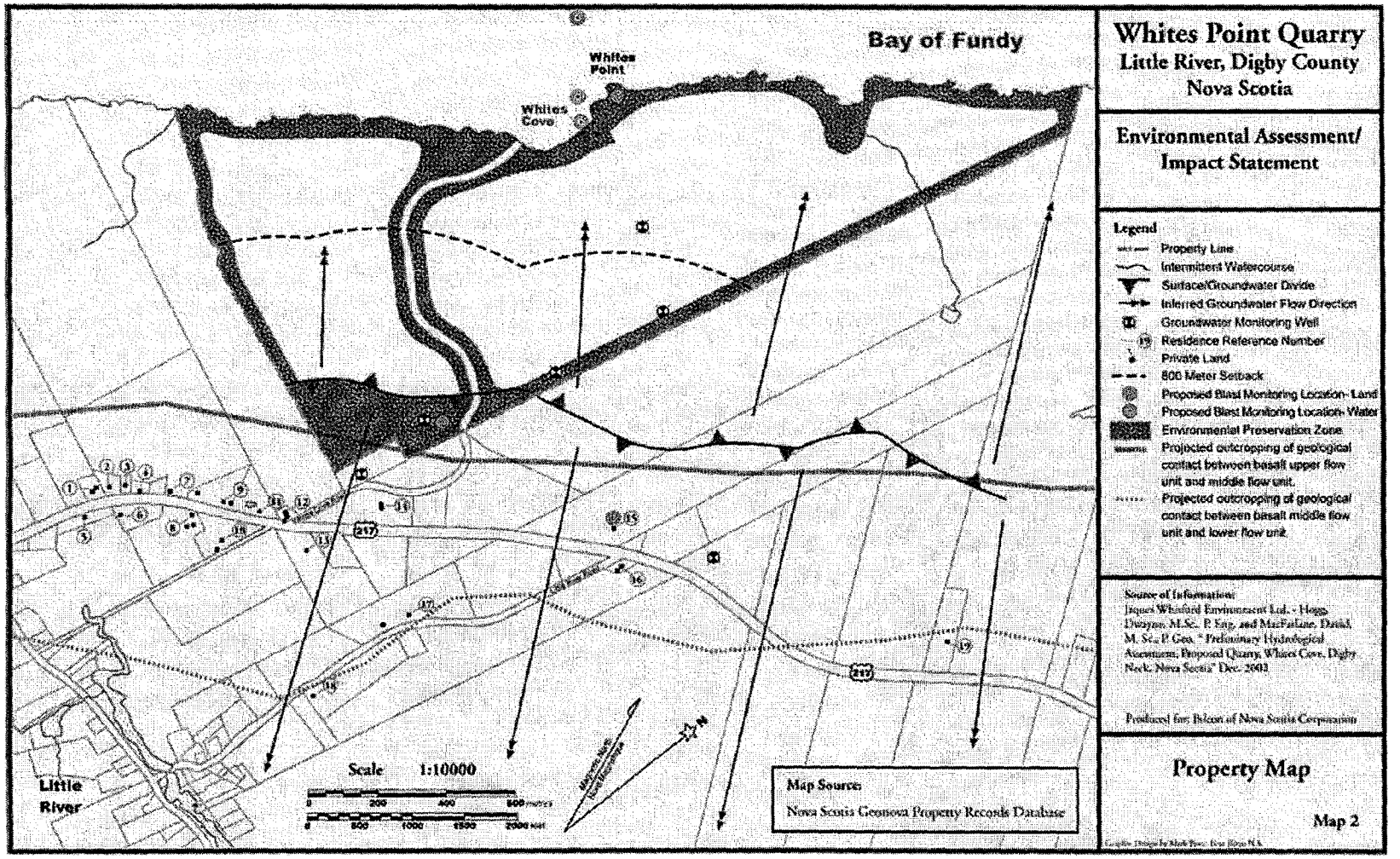
The proposed Whites Point Quarry and Marine Terminal is located at Little River, Digby Neck, Digby County, Nova Scotia. The regional location of the project is shown on **Map 1.** The purpose of the proposed project is to quarry basalt rock and ship processed aggregate products to New Jersey. The quarry property is on private land and comprises approximately 380 acres – **see Map 2.** PID number of the property is 30161160. The location of the marine terminal along the Bay of Fundy coast is 44° 27' 47" N, 66° 08' 31" W.

Three major phases of the project are proposed including construction, operation and maintenance, and decommissioning and reclamation. Major components of the quarry infrastructure include an on land aggregate processing plant, a marine terminal for shipping aggregate products and environmental control structures – see **Figures 1 and 4.** An overall plan of development for the quarry property in years 1 to 5 is shown on **Plan OP-1.** The artist's rendering gives an overall perspective.

A total thirty-four person workforce, working two shifts, will be required to produce the two million tons of aggregate per year. Equipment to produce this amount of aggregate products will include stationary and mobile equipment. Stationary equipment will include rock crushers, screens, conveyors, a radial arm ship loader, and mooring dolphins. Mobile equipment will include off-road rock trucks, loaders, excavators, and bulldozers.

Activities at the quarry site will include drilling and blasting the basalt rock, processing the rock (crushing, screening, washing) and ship loading. The proposed construction phase is one year and is scheduled for 2007 – 2008. The operational phase will extend over a fifty year time period. Decommissioning and final reclamation will be completed in year fifty.

The estimated capital cost of the project is 40.6 million dollars with yearly operating expenditures exceeding 20.0 million dollars. More detailed descriptions of the aforementioned project elements are contained in subsequent sections of this Environmental Impact Statement.


Bay of Fundy
Whites Point
Whites Cove
Little River
Scale 1:10000
Map Source:
Nova Scotia Geonova Property Records Database
Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/
Impact Statement
Legend
Property Line
Intermittent Watercourse
Surface/Groundwater Divide
Inferred Groundwater Flow Direction
Groundwater Monitoring Well
Residence Reference Number
Private Land
800 Meter Setback
Proposed Blast Monitoring Location- Land
Proposed Blast Monitoring Location- Water
Environmental Preservation Zone
Projected outcropping of geological contact between basalt upper flow unit and middle flow unit.
Projected outcropping of geological contact between basalt middle flow unit and lower flow unit.
Source of Information:
Jacques Whitford Environment Ltd. - Hogg, Dwayne, M.Sc., P. Eng. and MacFarlane, David, M. Sc., P. Geo. " Preliminary Hydrological Assessment, Proposed Quarry, Whites Cove, Digby Neck, Nova Scotia" Dec. 2002
Produced for: Falcon of Nova Scotia Corporation
Property Map
Map 2

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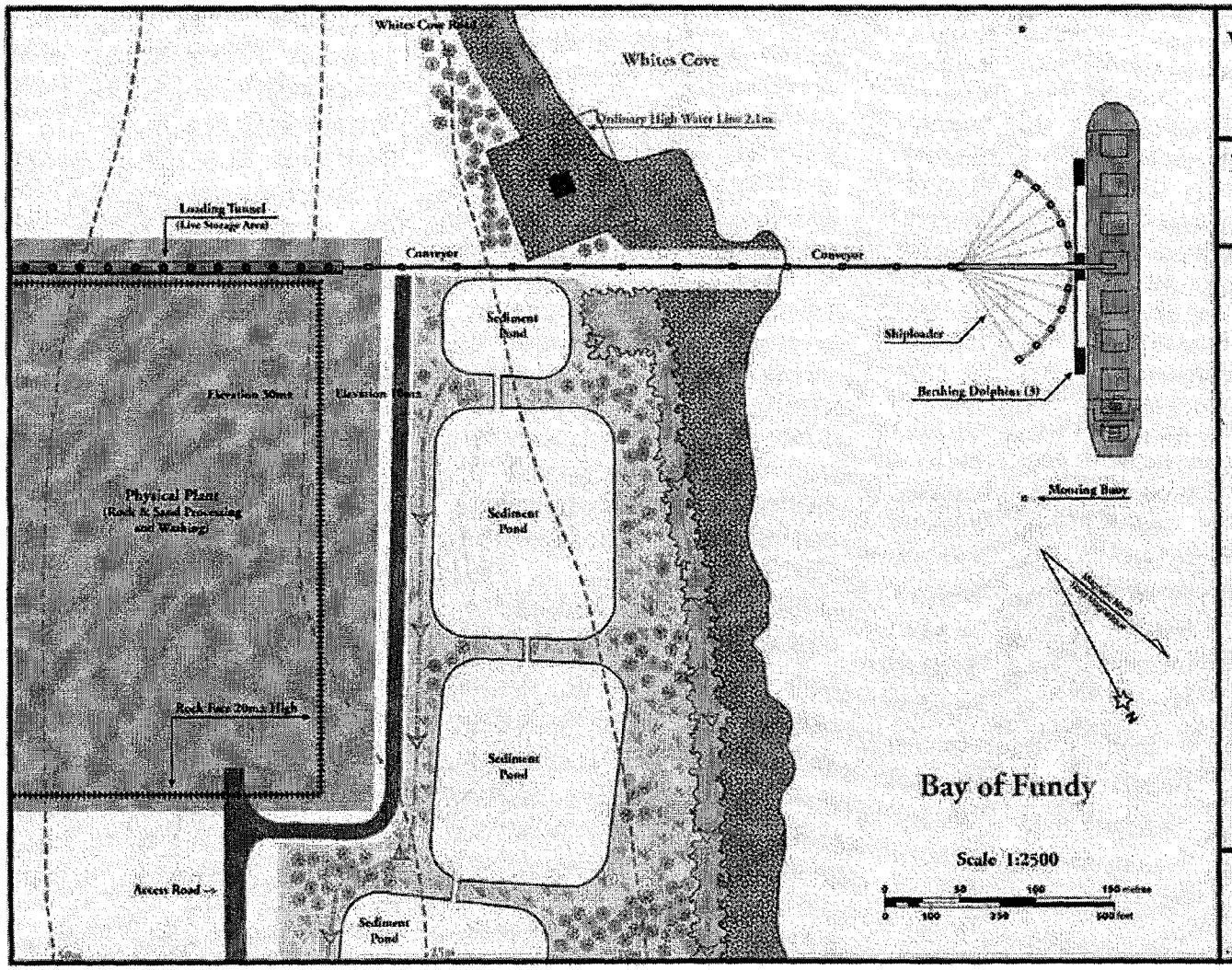

Whites Point Quarry

Little River, Digby County
Nova Scotia

Environmental Assessment/ Impact Statement

Legend

- Environmental Preservation Zone
- Existing Contour Lines
- Drainage Channel
- Constructed Wetland
- Reforestation + Wildlife Plantings
- Grass + Legumes
- Private Land

Produced for: Bilcon of Nova Scotia Corporation

Quarry Infrastructure Plan

Figure 1

Graphic Design by Shell Press, Bear River, N.S.

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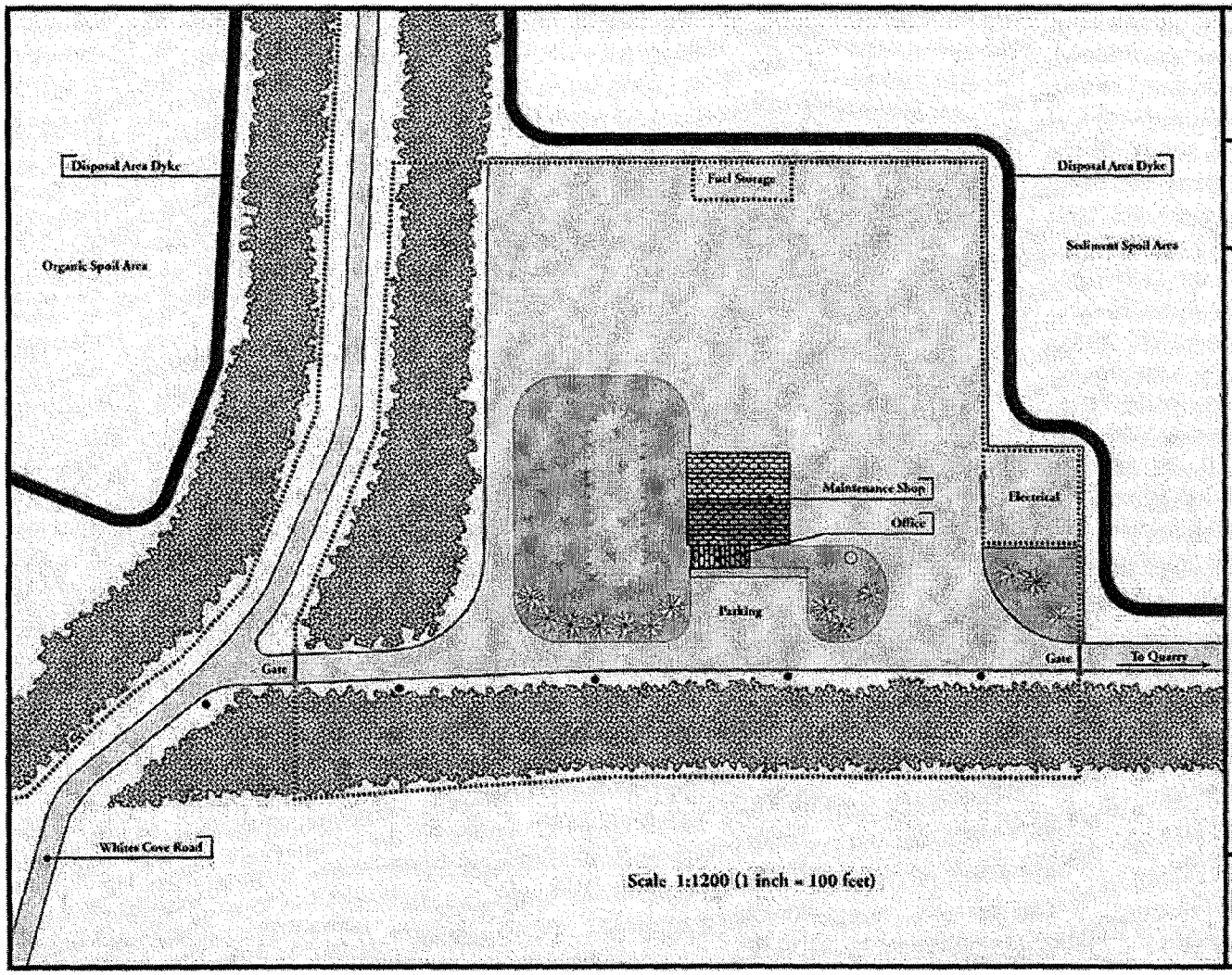

Whites Point Quarry
Little River, Digby County
Nova Scotia

Environmental Assessment/ Impact Statement

Legend

- Environmental Preservation Zone - 30M wide
- Security Fence
- Landscaped Areas
- Well
- Septic Field
- Electrical Power Poles

Produced for: Bilcan of Nova Scotia Corporation

Quarry Compound Plan

Figure 4

Graphic design by Mark Fraser, Iona Ross, N.S.

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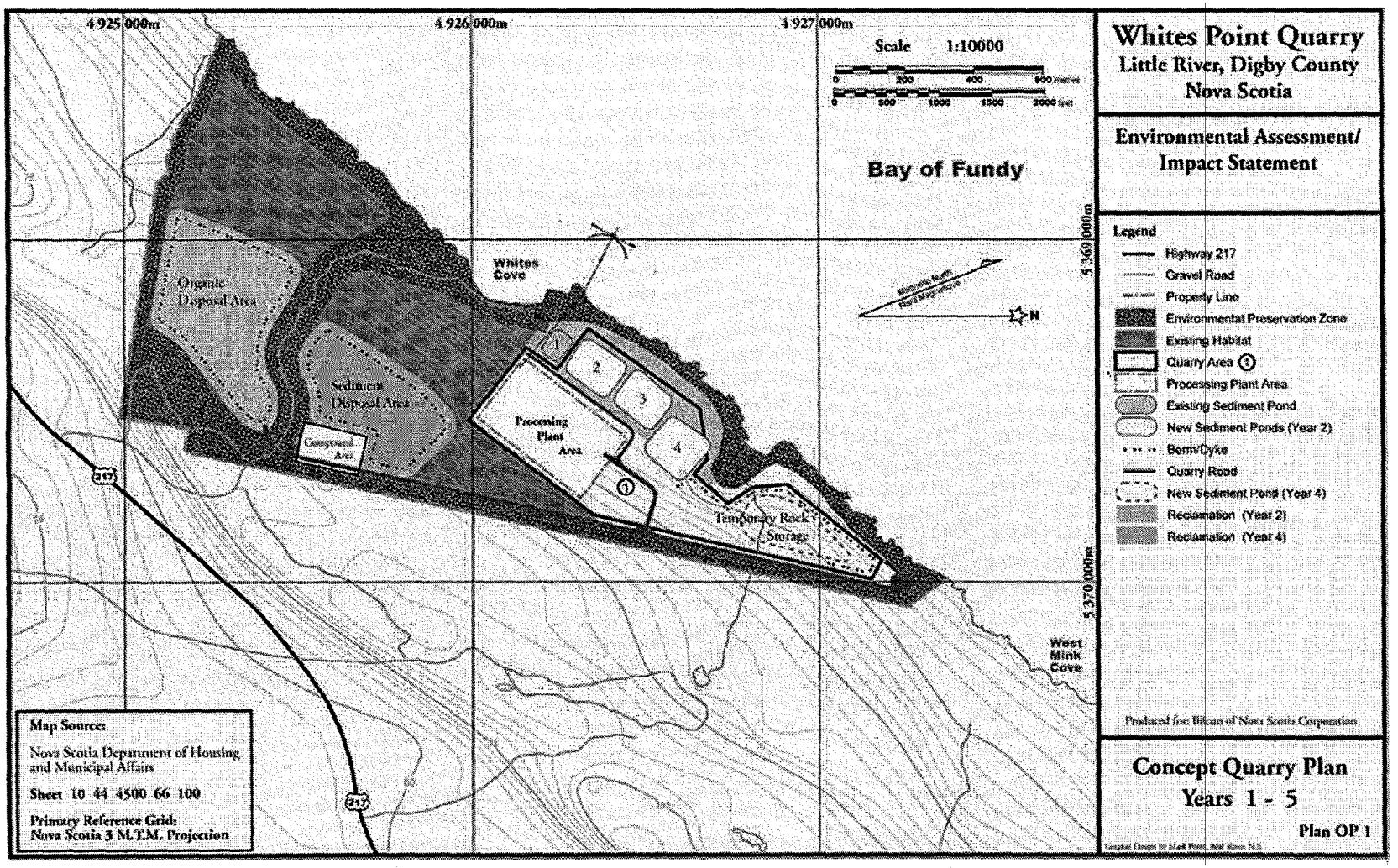

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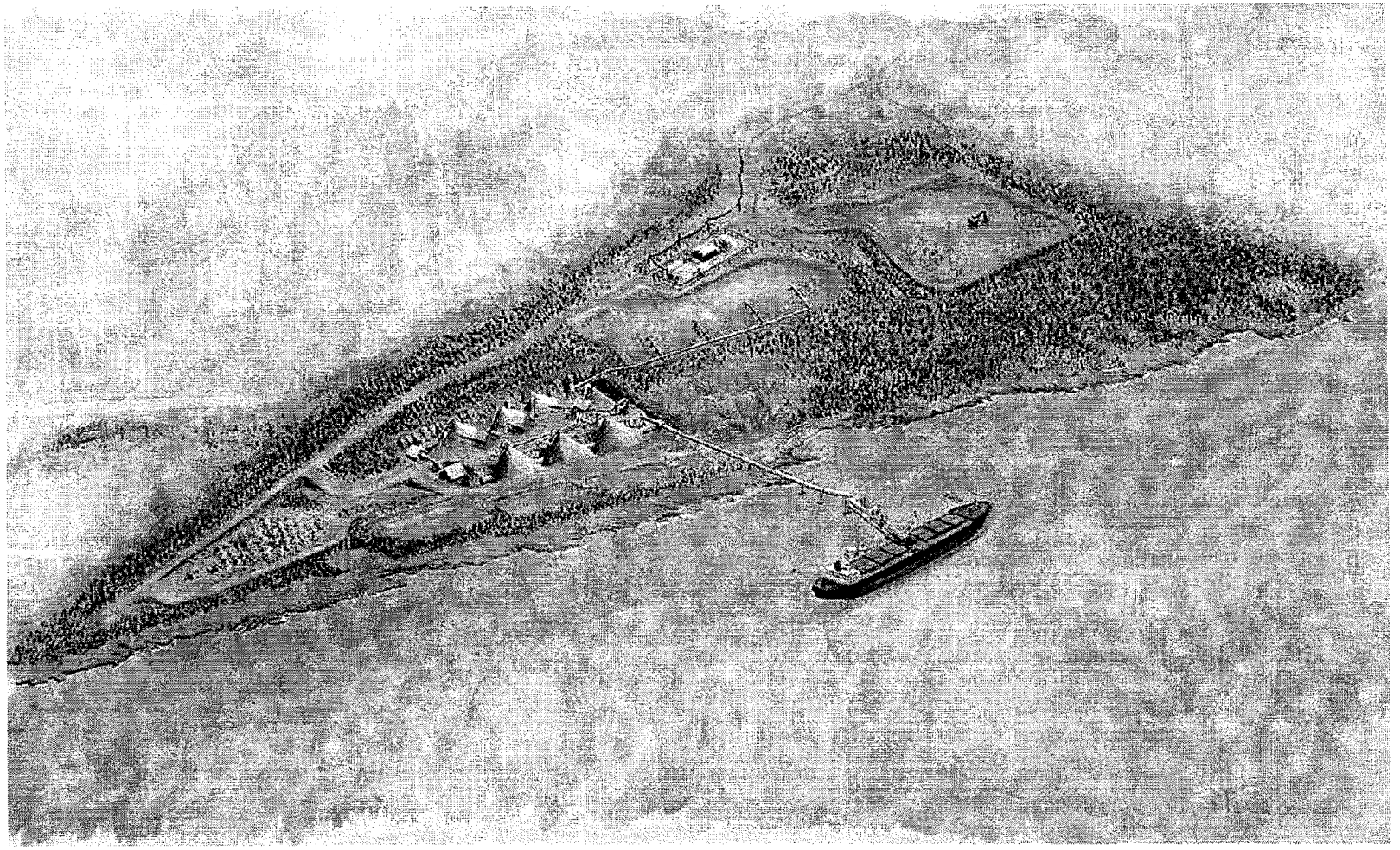

Artist's Rendering of the Whites Point Quarry and Marine Terminal
by
Mark Pease

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6.3 The Project Setting

Terrestrial

The geographic setting of the Whites Point Quarry and Marine Terminal is along the coast of the Bay of Fundy on the Digby Neck peninsula. Physical components of the land include the North Mountain Basalt which extends from Brier Island north to Cape Blomidon, a distance of over 200 km. Glacial deposits of overburden along Digby Neck consist of the Basalt Till Facies of the Beaver River Till Unit. This till is generally thin and mantled over the basalt bedrock. Rossway soils cover the entire quarry site and are generally stony and well drained.

The existing topography of the proposed quarry site slopes toward the Bay of Fundy. Relief at the highest point is over 90 m (See **Map 1B** and photo). Extreme gradients range up to 50% slope with more common slopes in the range of 10 % to 20%. Several areas such as those along the shoreline, the abandoned pit, and the southeast ridge of the site are relatively flat. Surface water runoff from the majority of the site flows toward the Bay of Fundy except for an approximate 10 hectare area at the southeast corner which drains toward Saint Mary's Bay. Ground water flows generally follow the same pattern as surface waters. Several, small, intermittent, irregularly defined water courses, typical of the North Mountain, are evident flowing down the mountain side and dispersing into the Bay.

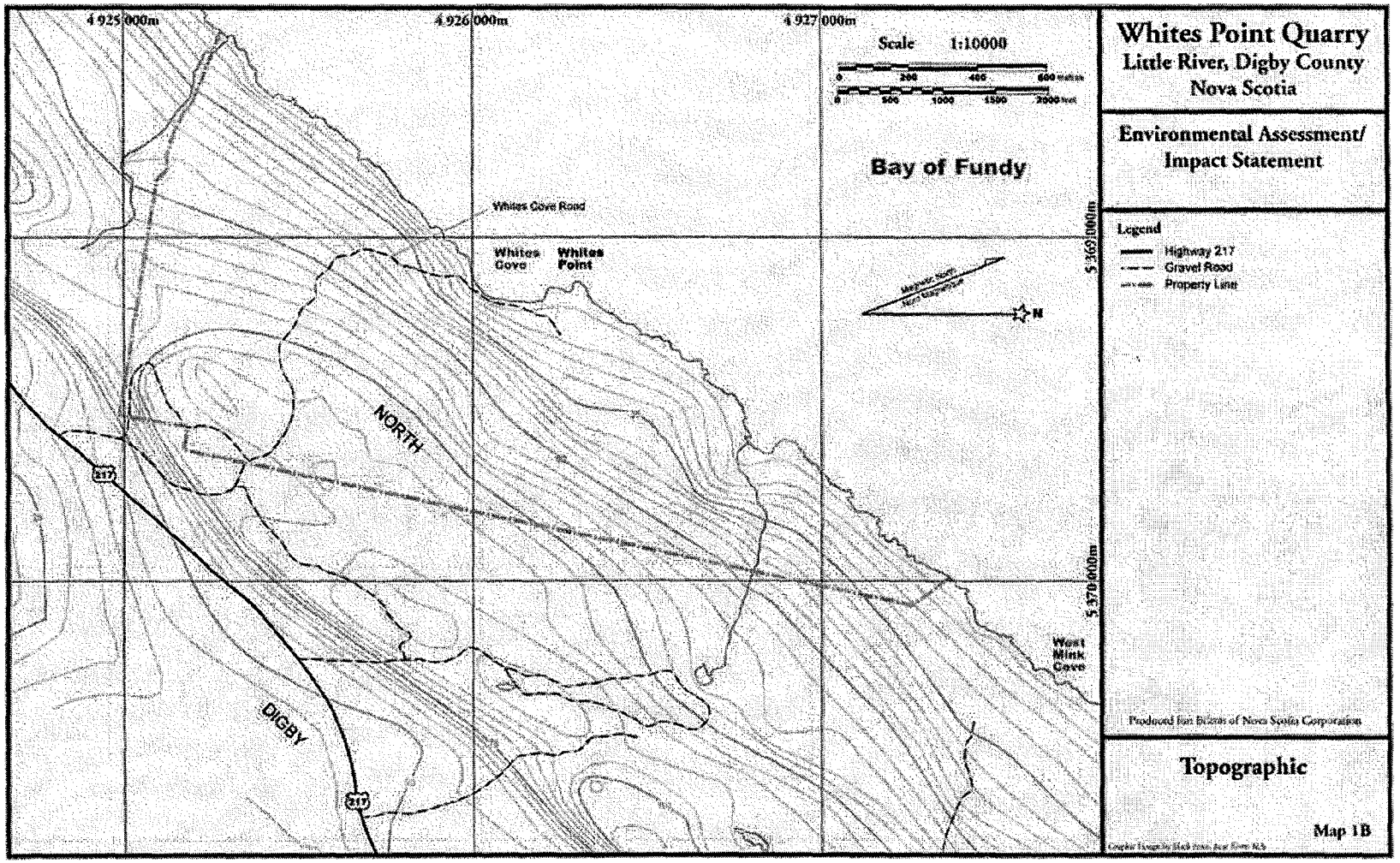
Forests and the habitats they provide are typical of the area and of coastal forests of the North Mountain Basalt Ridge Natural Landscape extending from Cape Blomidon to Brier Island. The property is almost entirely forested, dominated by coniferous species, with the exception of two coastal barrens south of Whites Cove and a coastal bog north of the Cove.

Wildlife consists of common animal, bird, reptile, amphibian, and arthropod species. Provincially identified wetlands and sensitive terrestrial habitats existing on the property will be contained in an environmental preservation zone.

Aquatic

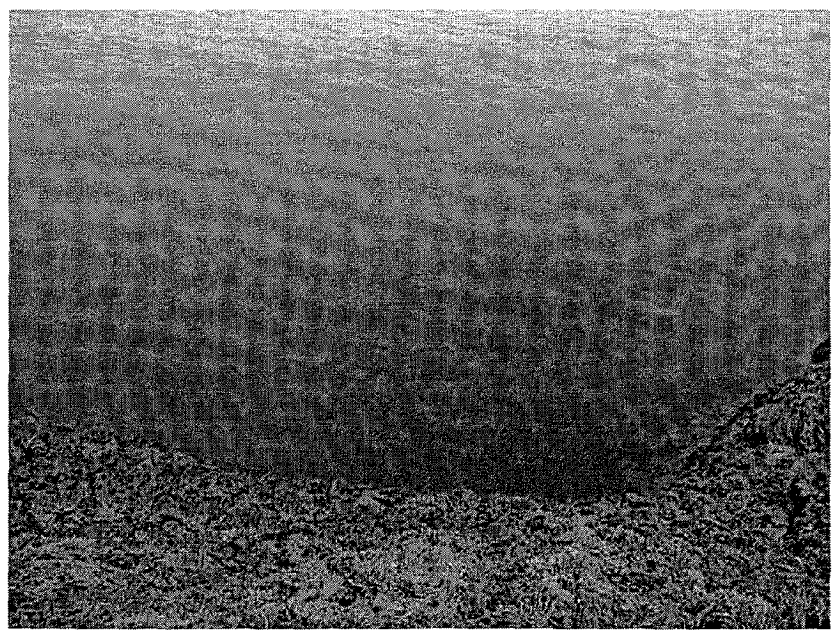
A few intermittent water courses flow down the mountain side into the Bay of Fundy. Also, a small coastal bog exists where one of the watercourses enters the Bay. These watercourses, due to their intermittent flow are not suitable or are marginal as freshwater fish habitat.

The intertidal zone - (see photo) is comprised mainly of bedrock outcrops with a cobble zone at Whites Cove. Most of the mid and lower intertidal zone bedrock is covered with


4 925 000m
4 926 000m
4 927 000m
Scale 1:10000
0 200 400 600 metres
0 500 1000 1500 2000 feet
Bay of Fundy
Whites Cove Road
Whites Cove
Whites Point
5 369 000m
5 370 000m
N
NORTH
DIGBY
217
West Mink Cove
Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/
Impact Statement
Legend
Highway 217
Gravel Road
Property Line
Topographic
Map 1B

018396

Existing Topography at Whites Point



Marine Intertidal Zone

a thick mat of rockweed. Periwinkles, blue mussels, hermit crabs, dog welks and green crabs inhabit the areas of the intertidal zone. The bottom composition of the subtidal and nearshore waters is primarily bedrock and supports lobster, starfish, sea urchins, sea cucumbers, and various pelegic fish including herring. Marine mammals such as minke whales, porpoises, and harbour seals also frequent the nearshore waters. Seabirds, waterfowl, and other waterbirds such as common eiders, scoters, gulls and double-crested cormorants also inhabit the intertidal and nearshore waters of the Bay of Fundy in this region.

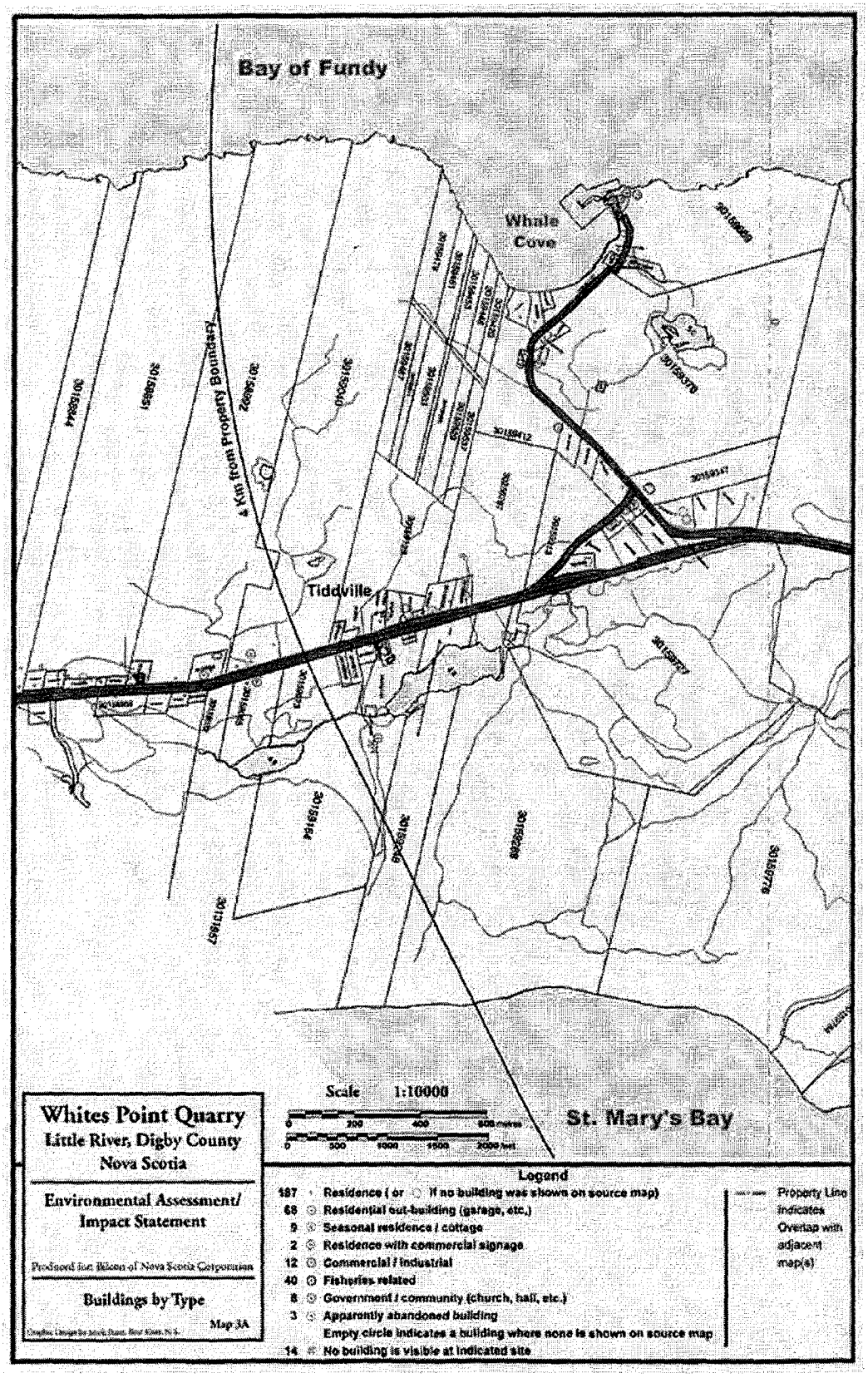
Socio-cultural Interrelationships

The regional land use setting of the project is primarily rural residential with limited commercial and industrial development. The only land transportation route on Digby Neck is Highway #217. The mix of rural development, by building type, within 4 km of the quarry project is shown on **Maps 3A, 3B, 3C, 3D and 3E** More specifically, five residences are within 500 m of the working area of the quarry, nineteen within 500 – 1000 m, sixty within 1000 – 1500 m and twelve within 1500 – 2000 m.

Historically, primary resource industries such as agriculture and forestry dominated the land and the fishery dominated the water. Although technology has changed the fishing industry over the past fifty years, the fishery remains the primary industry on Digby Neck. Small fishing villages within the immediate area of the quarry property such as those located in Little River, Whale Cove, and Sandy Cove remain the centres of the rural community.

Presently, the quarry property has no development and is partially forested after recent clear-cutting. The practice of clear-cutting is typical of the surrounding region. Traditional community knowledge indicates land use on the property has included farming, a haul-up/boat skidway at Whites Cove, fish shacks/camps, homes and an abandoned gravel pit.

The nearshore portion of the Bay of Fundy is used primarily by lobster, herring, and sea cucumber fishers. During the six month lobster fishing season, lobster boats can frequent the nearshore waters on a daily basis. Other fishing boats, whale and seabird cruise boats, bulk container and tanker vessels use the offshore waters. The proposed shipping route from the inbound shipping lane to the marine terminal and from the terminal to the outbound shipping lane is shown on **Map 4.**



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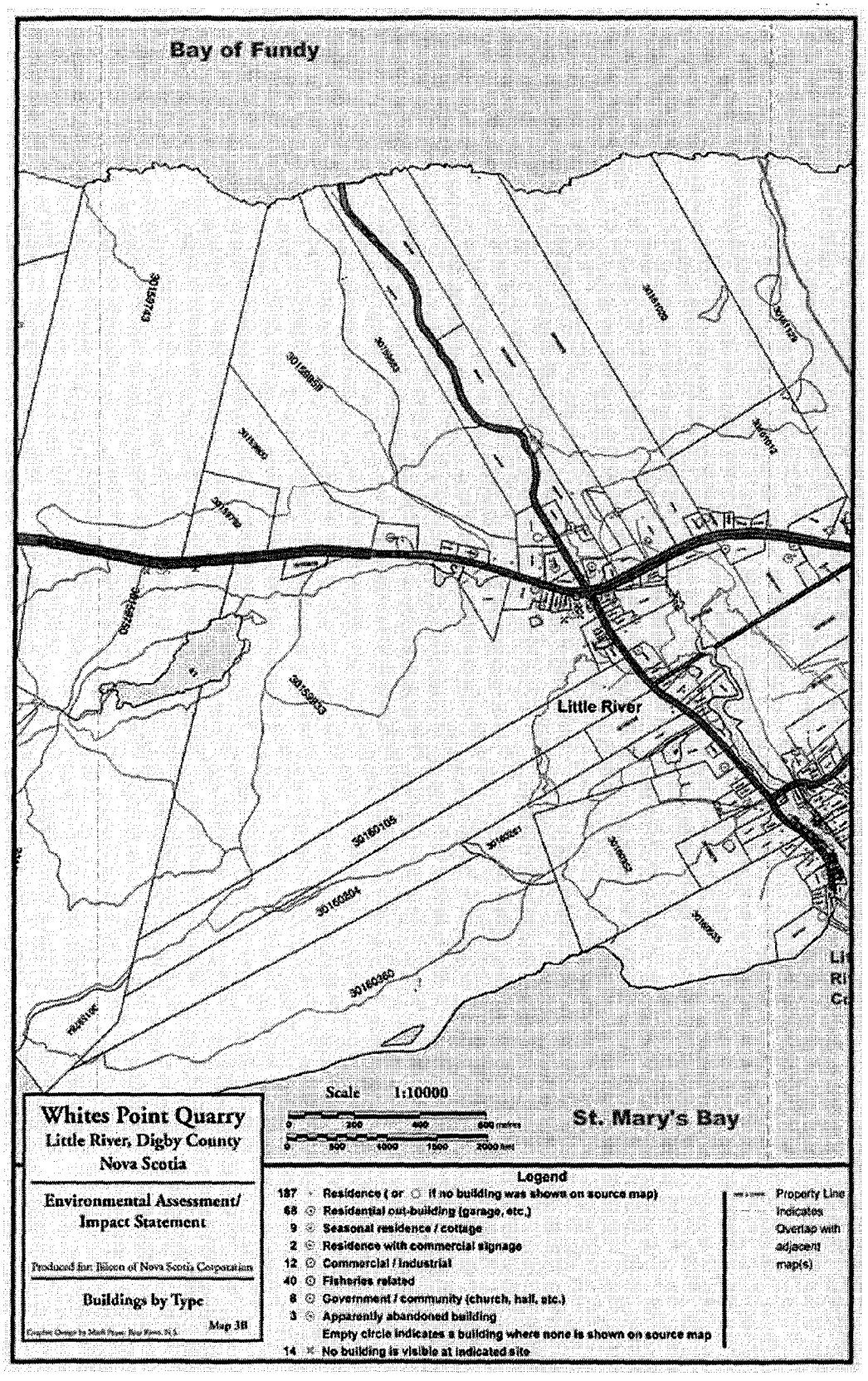
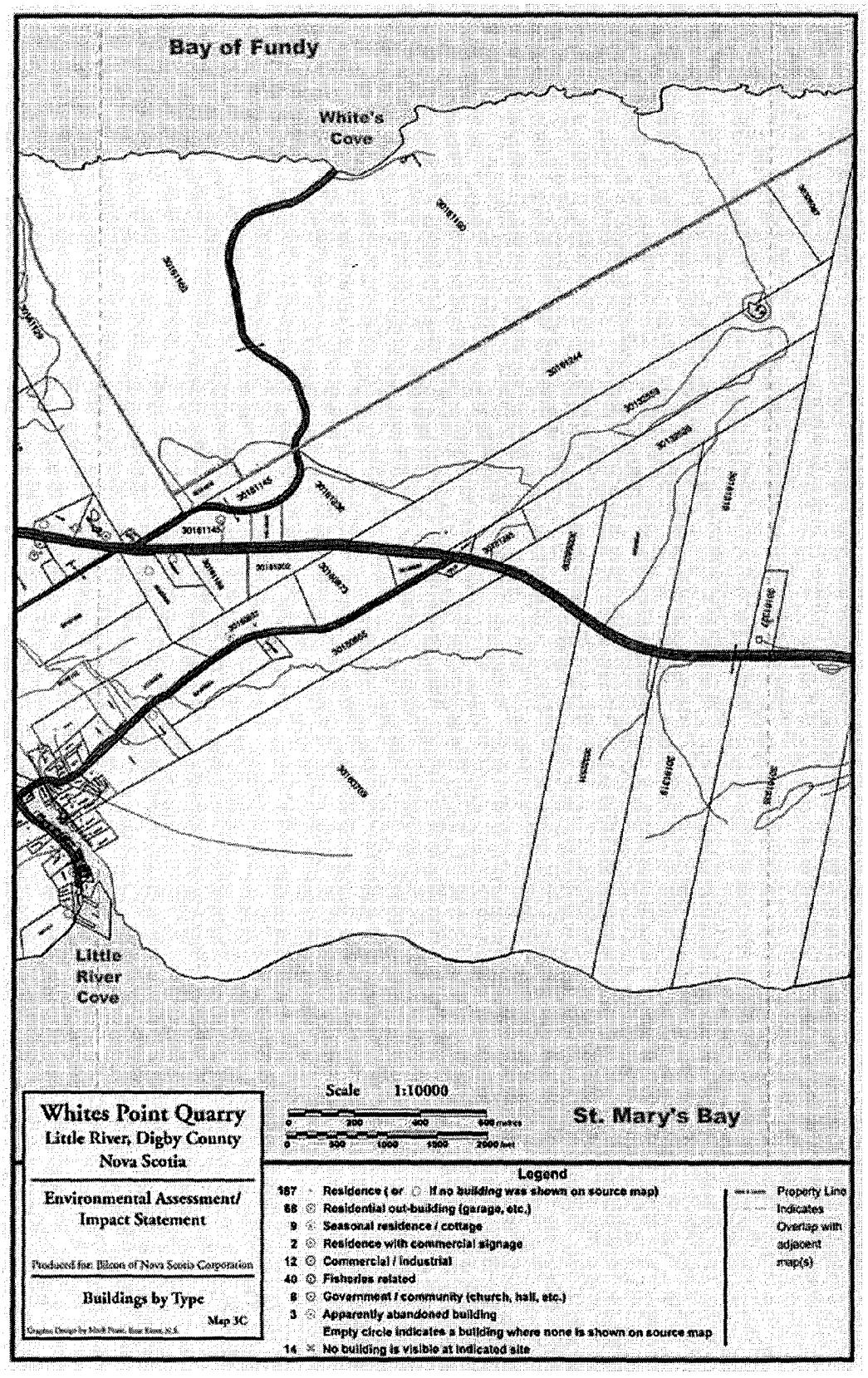
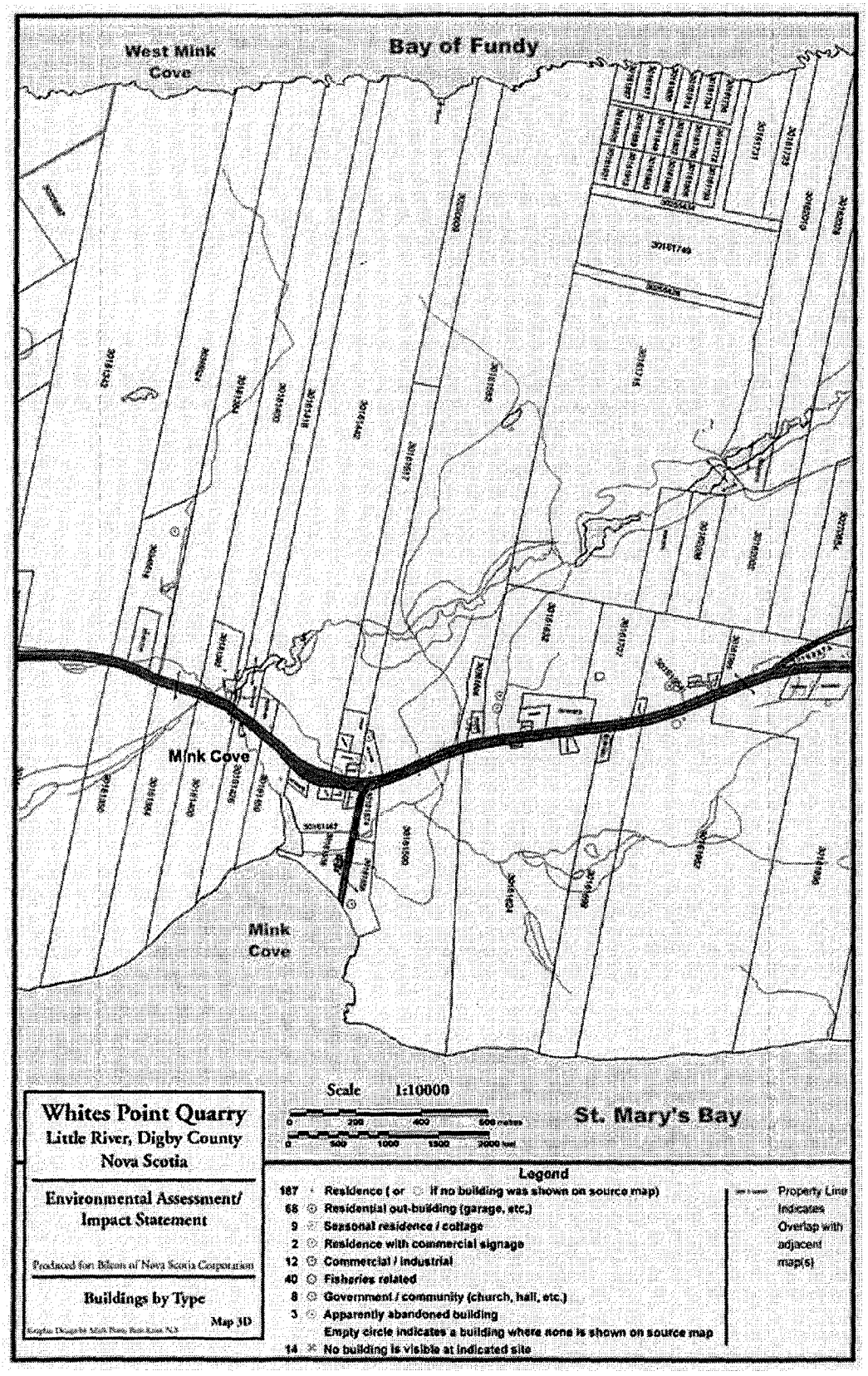
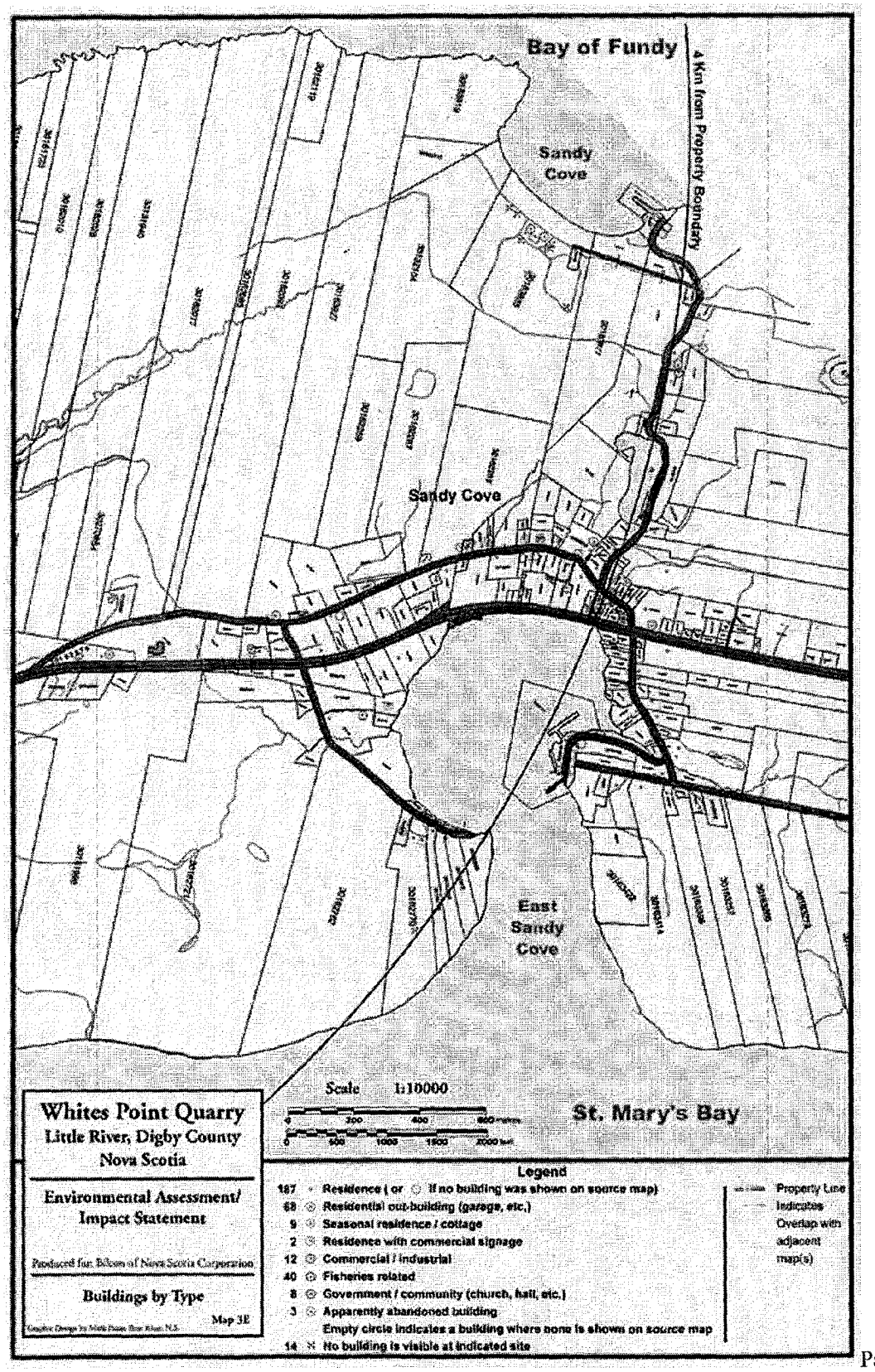
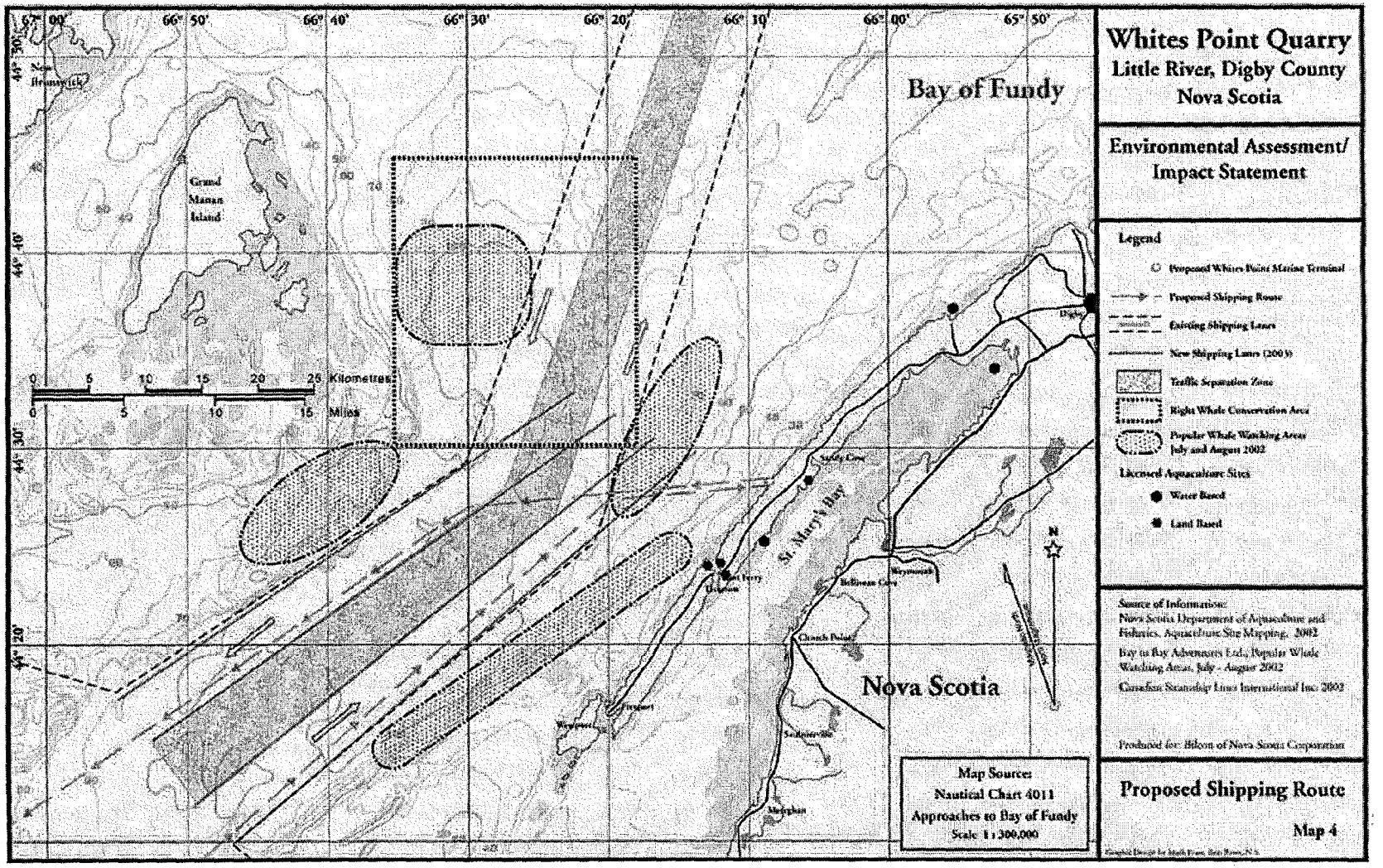

Bay of Fundy
Little River
St. Mary's Bay
Scale 1:10000
0 200 400 600 metres
0 500 1000 1500 2000 feet
Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/
Impact Statement
Produced for: Bilcon of Nova Scotia Corporation
Buildings by Type
Map 38
Legend
187 Residence (or ◯ if no building was shown on source map)
68 Residential out-building (garage, etc.)
9 Seasonal residence / cottage
2 Residence with commercial signage
12 Commercial / Industrial
40 Fisheries related
8 Government / community (church, hall, etc.)
3 Apparently abandoned building
Empty circle indicates a building where none is shown on source map
14 No building is visible at indicated site
Property Line
Indicates
Overlap with
adjacent
map(s)


Bay of Fundy
White's Cove
Little River Cove
St. Mary's Bay
Scale 1:10000
0 200 400 600 metres
0 500 1000 1500 2000 feet
Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/ Impact Statement
Produced for: Bloom of Nova Scotia Corporation
Buildings by Type
Map 3C
Legend
187 Residence (or) if no building was shown on source map)
68 Residential out-building (garage, etc.)
9 Seasonal residence / cottage
2 Residence with commercial signage
12 Commercial / industrial
40 Fisheries related
8 Government / community (church, hall, etc.)
3 Apparently abandoned building
Empty circle indicates a building where none is shown on source map
14 No building is visible at indicated site
Property Line
Indicates Overlap with adjacent map(s)


West Mink Cove
Bay of Fundy
Mink Cove
Mink Cove
St. Mary's Bay
Scale 1:10000
0 200 400 600 meters
0 500 1000 1500 2000 feet
Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/ Impact Statement
Produced for: Bloom of Nova Scotia Corporation
Buildings by Type
Map 3D
Legend
187 Residence (or if no building was shown on source map)
68 Residential out-building (garage, etc.)
9 Seasonal residence / cottage
2 Residence with commercial signage
12 Commercial / industrial
40 Fisheries related
8 Government / community (church, hall, etc.)
3 Apparently abandoned building
Empty circle indicates a building where none is shown on source map
14 No building is visible at indicated site
Property Line
Indicates Overlap with adjacent map(s)


Bay of Fundy
4 Km from Property Boundary
Sandy Cove
Sandy Cove
East Sandy Cove
St. Mary's Bay
Scale 1:10000
Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/ Impact Statement
Produced for: Bilcon of Nova Scotia Corporation
Buildings by Type
Map 3E
Legend
187 Residence (or) If no building was shown on source map)
68 Residential out-building (garage, etc.)
9 Seasonal residence / cottage
2 Residence with commercial signage
12 Commercial / Industrial
40 Fisheries related
8 Government / community (church, hall, etc.)
3 Apparently abandoned building
Empty circle indicates a building where none is shown on source map
14 No building is visible at indicated site
Property Line
Indicates Overlap with adjacent map(s)



Whites Point Quarry
Little River, Digby County
Nova Scotia

Environmental Assessment/ Impact Statement

Proposed Shipping Route

Map 4

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6.4 The Environmental Impact Assessment Process and Approvals

6.4.1 Overview

On June 26th, 2003, in accordance with the request by the Minister of Fisheries and Oceans to the minister of the Environment (see Appendix 19), the Whites Point Quarry and Marine Terminal project was placed under an Environmental Assessment (EA) by a Joint Federal - Provincial Review Panel.

The following sections address the arrangements surrounding the practice of environmental assessments and those by the Whites Point Quarry and Marine Terminal Review Panel in particular. Information on the environmental assessment Review Panel process is available on the Environment Canada (EC) website: www.ec.gc.ca and Canadian Environmental Assessment Act (CEAA) website: www.ceaa.gc.ca and is specified below. Highlights of the EA processes applied specifically to the proposed Whites Point Quarry and Marine Terminal project follow the general information on the process. Specific project descriptions are found elsewhere within this EIS document and the project details will not be repeated.

Federal Environmental Assessment

Environmental assessment is a process to predict the environmental effects of proposed initiatives before they are carried out. An environmental assessment:

- Identifies possible environmental effects
- Proposes measures to mitigate adverse effects
- Predicts whether there will be significant adverse environmental effects, even after the mitigation is implemented

For clarity section 4 of the Environmental Assessment Act states:

(1) The purposes of this Act are

(a) to ensure that projects are considered in a careful and precautionary manner before federal authorities take action in connection with them, in order to ensure that such projects do not cause significant adverse environmental effects;

(b) to encourage responsible authorities to take actions that promote sustainable development and thereby achieve or maintain a healthy environment and a healthy economy;

(b.1) to ensure that responsible authorities carry out their responsibilities in a coordinated manner with a view to eliminating unnecessary duplication in the environmental assessment process;

(b.2) to promote cooperation and coordinated action between federal and provincial governments with respect to environmental assessment processes for projects;

(b.3) to promote communication and cooperation between responsible authorities and Aboriginal peoples with respect to environmental assessment;

(c) to ensure that projects that are to be carried out in Canada or on federal lands do not cause significant adverse environmental effects outside the jurisdictions in which the projects are carried out; and

(d) to ensure that there be opportunities for timely and meaningful public participation throughout the environmental assessment process.

Duties of the Government of Canada

(2) In the administration of this Act, the Government of Canada, the Minister, the Agency and all bodies subject to the provisions of this Act, including federal authorities and responsible authorities, shall exercise their powers in a manner that protects the environment and human health and applies the precautionary principle.

In summary the main purposes of environmental assessment:

- Minimize or avoid adverse environmental effects before they occur
- Incorporate environmental factors into decision making
- May reduce environmental liability for parties involved in EA

Timely and efficient environmental assessments result in more informed decision-making that supports sustainable development.

By considering environmental effects and mitigation early in the project planning cycle, environmental assessment can have many benefits, such as:

- An opportunity for public participation
- Increased protection of human health
- The sustainable use of natural resources
- Reduced project costs and delays
- Minimized risks of environmental disasters
- Increased government accountability

Many important steps help to identify possible environmental effects and mitigative measures.

- Determine if an environmental assessment is required
- Identify who's involved
- Plan the environmental assessment - scope of the proposed project
- Conduct the analysis and prepare the environmental assessment report
- Review environmental assessment report
- Make environmental assessment decision
- Implement mitigation and follow-up program, as appropriate

Public participation is an important element of an environmental assessment process. It strengthens the quality and credibility of environmental assessments. The public is an important source of local and traditional knowledge about a proposed project's physical site and likely environmental effects. Through public participation activities, project proponents can obtain information, better understand and respond to public concerns, and inform people about decisions.

Canadian Environmental Assessment Act

The Canadian Environmental Assessment Act is the legal basis for the federal environmental assessment process. The Act sets out the responsibilities and procedures for carrying out the environmental assessments of projects, which involve federal government decision-making. A number of regulations have been established under the Act. Some are essential to the functioning of the Act. Others apply in special circumstances. The four essential regulations are the:

- Inclusion List Regulations
- Law List Regulations
- Exclusion List Regulations
- Comprehensive Study List Regulations

The federal environmental assessment process is applied whenever a federal authority has a specified decision-making responsibility in relation to a project, also known as a "trigger" for an environmental assessment. Specifically, it is when a federal authority:

- Proposes a project
- Provides financial assistance to a proponent to enable a project to be carried out
- Sells, leases, or otherwise transfers control or administration of federal land to enable a project to be carried out
- Provides a license, permit or an approval that is listed in the *Law List Regulations* that enables a project to be carried out

The subject project was triggered under the latter point.

If a project does not involve any of the "triggers" to the Act, an environmental assessment under the Act may still be possible. If the Minister of the Environment receives a petition from individuals or interested parties requesting a project to be referred to a mediator or Review Panel and the Minister considers the project has the potential to cause significant adverse environmental effects across boundaries between non-federal and federal lands, or across provincial or international boundaries, then the Minister has the authority to require an assessment of the transboundary effects in some circumstances. In the subject Project, the Minister of Fisheries and Oceans requested that the Minister of Environment refer the project to a Review Panel.

Types of Environmental Assessment

The Act describes different types of environmental assessment that may be required: Screenings (including class screenings), comprehensive studies, mediations and review panels. Screenings and comprehensive studies are conducted under the auspices of the federal agency / department most affected or in control of the proposed works. That agency is referred to as the responsible authority or RA. In the subject project, there are two Responsible Authorities, Department of Fisheries and Oceans (DFO) and Transport Canada (TC). Review panels and mediations are independent of government. For additional information on screenings, comprehensive studies and mediations, the reader is referred to the CEAA web site.

Review Panel

A Review Panel is a group of experts selected on the basis of their knowledge and expertise and appointed by the Minister of the Environment. The Minister also appoints one of the panel members as chair.

A Review Panel is appointed to review and assess, in an impartial and objective manner, a project that may cause significant adverse environmental effects. A Review Panel may also be appointed in cases where public concerns warrant it. Such projects may be referred by the responsible authority to the Minister of the Environment for assessment by a Review Panel. Only the Minister of the Environment may order an assessment by a Review Panel. A Review Panel submits its recommendations to the Minister of the Environment and to the RA for subsequent action and decision.

Review panels have the unique capacity to encourage an open discussion and exchange of views. They also inform and involve large numbers of interested groups and members of the public by allowing individuals to present evidence, concerns and recommendations at public hearings. A panel allows the proponent to present the project to the public and explain the projected environmental effects, and provides opportunities for the public to hear the views of government experts about the project.

When a project requires a decision from the federal government and another level of government, they may choose to conduct the assessment through a Joint Review Panel to save time and money. The government has developed harmonization agreements with some provinces to facilitate such reviews.

In the case of the Whites Point Quarry and Marine Terminal, a Joint Canada-Nova Scotia Review Panel has been struck as follows:

- Panel Chair — Dr. Robert O. Fournier, Ph.D.
- Panel Member — Dr. Gunther Mueke, D.Phil.
- Panel Member — Dr. Jill Grant, Ph.D.

Once the Review Panel has completed the public hearings and its analysis, it must prepare an environmental assessment report, which summarizes its rationale, conclusions and recommendations, and includes a summary of comments received from the public. This report is submitted to the responsible authorities and the Minister of the Environment who then makes it public. The RAs must take the Review Panel's report into consideration before making any decision with regard to the project. It must also respond to the report, with the approval of Cabinet.

6.4.2 Key Elements, Milestones and Actions

A number of important steps that pre-dated the establishment of the Review Panel, illustrate the progression of the EA process.

June 2002 — Initial meetings between Project Managers and Nova Scotia Environment and Labour (NSDEL)

July 2002	Meeting of Project Managers with representatives of Habitat Management Division (DFO) and Navigable Waters Protection Program (TC)
Jan 2003	Meeting of Project Managers with Federal and Provincial agencies, EC, CEAA, administrators of NWPA, DFO, NSDEL. Designation of DFO as RA by application of Law list under Subsection 35(2) of *Fisheries Act* concerning fish habitat,
March 2003	Proponent submission of Project Description to CEAA

The intended and stated outcome of these preliminary meetings and actions during the early part of 2003 was the designation of a Comprehensive Study as the EA process. The regulator group notified the Proponent that a Memorandum of Understanding would be prepared to harmonize the Federal and Provincial EA requirements and also that a draft Scoping Document for the comprehensive study would be made available for public and proponent review and comment. That initiative was never completed.

In June of 2003, The Hon. Robert Thibault, Minister of Fisheries and Oceans and also the RA, requested the Minister of the Environment to refer the project for a Review Panel in accordance with paragraph 21(b) of the CEAA. The Minister of the Environment consented to the request and decided to submit the Whites Point Quarry and Marine Terminal project to an EA Panel Review.

6.4.3 Joint Panel Review Process and Timeline

By means of a joint press release on August 11, 2003, (Appendix 32 - Federal Minister of the Environment David Anderson and Nova Scotia Minister of Environment and Labour Ronald Russell, released a draft Agreement on the Joint Environmental Assessment Panel Review Process for the Proposed Whites Point Quarry and Marine Terminal in Digby County for public comment. "In deciding to refer this project to a Review Panel," stated Minister Anderson, "I believe that a public process will help Nova Scotians better understand the potential impacts of this project. Public discussion and debate are crucial elements in the review process."

Following the comment period for the draft agreement a final agreement was signed by the Federal and Provincial Governments. The Whites Point Quarry and Marine Terminal Project Joint Review Panel was announced in Halifax on November 5, 2004. A three-member panel chaired by Dr. Robert O. Fournier was set up to review the proposed project. The Panel was established on the basis of the Agreement, establishing the Panel, setting out the rules for conducting the joint review process, the procedures for appointing Panel members and the Panel's terms of reference.

On November 10th, 2004, the agencies invited the public to comment on draft Guidelines for the preparation of the EIS for the Whites Point Quarry and Marine Terminal project in Digby County. The Guidelines identify the issues that Bilcon will be required to address in its environmental assessment of the proposed project. The Guidelines also provide direction to Bilcon on how to describe and assess these issues, and how to structure the EIS that will be submitted to the Joint Review Panel.

December 2nd, 2004, the Joint Review Panel invited the public to attend public meetings where their views were sought on the draft EIS Guidelines. These scoping meetings were a part of the public participation process that began November 10, 2004 with the release of the draft EIS guidelines for public comment.

The times and locations for the scoping meetings were:

January 6: Digby Neck Consolidated School, Sandy Cove, 7:00 p.m. - 10:00 p.m.
January 7: Digby Regional High School (cafeteria), Digby, 7:00 p.m. - 10:00 p.m.
January 8: Horton High School (cafeteria), Wolfville, 1:00 p.m. - 4:00 p.m.
January 9: Meteghan Fire Hall, Meteghan, 1:00 p.m. - 4:00 p.m.

As a product of these sessions and also the written comments received, the Review Panel released the final Guidelines on March 31st, 2005 for the preparation of the EIS. In transmitting the Guidelines to the proponent, the Panel asked the Proponent to provide a schedule indicating the anticipated timeframe to produce the EIS. The Proponent offered a tentative date for the completion of the EIS as October 31st, 2005 later revised to mid December, 2005 and again revised to March 31st, 2006.

Following the receipt of the EIS from Bilcon, the public will be invited to assist in the EIS review by submitting written comments over a period of at least 90 days, on the statement's conformity to the Guidelines. Once the Review Panel has determined that the EIS is complete and no additional information is required, public hearings will be scheduled.

The Panel will hold public hearings in locations determined by the Panel within the area likely to be affected by the project, or in any area where appropriate reasonably close to where the project is proposed to be carried out.

The Panel shall deliver its report and recommendations to the Minister of the Environment and to the Minister of Fisheries and Oceans within ninety days (90) following the close of the public hearings.

6.4.4 Stakeholders

The stakeholders with interest in the Whites Point Quarry and Marine Terminal project are:

Proponent

Bilcon of Nova Scotia Corporation as project owner

Community

- Residents of communities of Digby Neck and surrounding areas
- Municipal, Provincial and Federal Governments
- Various commercial and environmental and industrial associations
- Potential future employees as quarry and screening plant operators, ship loaders, labourers, supervisors, office workers and management
- Commercial suppliers of goods and services to the project
- Near shore fishers of the Bay of Fundy close to the marine terminal

Governments

The principal agencies are listed. The specific roles of Government agencies are detailed in section 6.5 of this document.

Municipality of Digby as regulator and tax collector

Province of Nova Scotia as regulator

- NS Department of Environment and Labour
- NS Department of Natural Resources
- NS Department of Finance

Government of Canada as regulator

- Environment Canada
- Canadian Environmental Assessment Agency
- Canadian Wildlife service
- Fisheries and Oceans Canada
- Transport Canada
- Revenue Canada
- Health Canada
- Natural Resources Canada

6.5 Regulatory Environment

6.5.1 Overview and Approach

Three levels of government, Municipal, Provincial and Federal, regulate commercial operations in Nova Scotia. General matters relating to zoning, noise and other bylaws, building permits etc. are administered under the authority of Municipal Councils. The Province of Nova Scotia regulates matters relating to environmental approvals, labor concerns, and land leases under provincial authorization. Some aspects of commercial operations are regulated under provincial taxation laws with respect to road tax, business tax and requirements relating to workers compensation. All businesses are regulated under federal corporate taxation law. In this particular case, where environmental issues are deemed important federal issues, regulations under the Departments of the Environment Canada, Fisheries and Oceans Canada, Transport Canada, and Health Canada, among others, will apply.

The following sections will address the various acts and requirements that will apply to the proposed Whites Point Quarry and Marine Terminal project in sufficient detail to meet the requirements of the EIS guidelines.

In the case of the federal statutes, those Acts and Regulations that apply strictly to the actual quarry and marine terminal installation have been listed. There are a great many regulations that apply to all shipping vessels operating in Canadian waters. Of these, only those that pertain to the proposed project defined parameters and limits have been identified. For example, "Aids to Navigation Protection Regulations under the Shipping Act" has been identified as being relevant to near shore navigation but "Boat and Fire Drill Regulations" as not being project specific.

Clearly the project conducting an approved and lawful business will have to adhere to all the laws of the land, and the legislation that is most relevant to the current EA approvals and associated proposed commercial operations has been listed.

The preceding section of text addressed all of the matters relating to the environmental assessment processes and therefore those topics will not be repeated in detail here. In accordance with the instructions presented in the EIS guidelines, the various pieces of legislation tabulated in the prescribed manner have been listed.

6.5.2 Municipality of Digby

By Laws and Regulations

The Municipality of Digby advises that bylaws dealing with Buildings and Noise are enforced. The Municipality does not have a municipal development plan and does not impose any zoning restrictions or exercise any planning guidelines for establishing industries or projects.

Assessments of Land, building, and equipment values performed by Nova Scotia tax assessors forms the basis of the value of taxation revenues collected by the Municipality.

Table 6A presents a list of the relevant Municipal legislation.

6.5.3 Government of Nova Scotia

Acts and Regulations

The Government of Nova Scotia under the authority of the Environment Act and Labour Standards Code will regulate all of the on site activities relating to operations, ranging from the construction activities associated with the access and infrastructure, quarry development and marine terminal construction phase. During operational phases of quarry and ship loading worker safety and monitoring of environmental controls will be the prime areas of regulator concern.

Issuance of a lease for a water lot to accommodate the marine shipping terminal and ship berthing structure is required from the Province of Nova Scotia.

Site reclamation planning, bonding with progressive and final execution is normally regulated by Nova Scotia. In the case of the Whites Point Quarry and Marine Terminal as a joint Canada / Nova Scotia Environmental Assessment, some of the on going environmental and final reclamation requirements may also be approached on a joint Canada / Nova Scotia basis. It is possible that the environmental monitoring and regulator management may also be performed on a joint basis as well. The conditions of EA release will specify the final arrangements, particularly the responsibilities assigned to the various levels of government regulators.

Matters of provincial taxation assessment are a provincial responsibility. Harmonized Sales Tax (HST) is a provincial concern although administered by the CCRA (Canada Customs and Revenue Agency). Likewise the provincial share of corporate and employee income tax will be of interest to the Province of Nova Scotia. Table 6A presents a list of the relevant Nova Scotia legislation.

6.5.4 Government of Canada

Acts and Regulations

Canadian Environmental Assessment Act

The Government of Canada's responsibilities for Environmental Assessment is mandated primarily by the Canadian Environmental Assessment Act. The details of the EA process are given in Sec 6.4. Following release from the joint EA, ongoing environmental monitoring and regulator management may also be performed on a joint basis as well. The conditions of EA release will specify the final arrangements, particularly the responsibilities assigned to the various levels of government regulators.

The Canadian Environmental Protection Act, 1999 (CEPA 1999)

CEPA 1999 is a major legislative initiative guided by a set of principles that ensure consistent approaches for achieving clear objectives to:

- Contribute to sustainable development by preventing pollution;
- Promote coordinated action with provinces, territories, Aboriginal governments, and federal departments to achieve the highest level of environmental quality for the health of Canadians; and
- Manage risks from harmful substances and virtually eliminate releases of those substances determined to be the most dangerous

CEPA 1999 contributes to sustainable development, which means meeting the needs of the present without compromising the ability of future generations to meet their own needs. The Minister of the Environment is accountable to Parliament for the administration of all of CEPA 1999.

In consultation with representatives of EC the following summarizes the key thrusts, legislation, programs, plans and policies administered by Environment Canada.

Toxic Substances

Toxic substances and waste materials are controlled by Environment Canada under the authority of the *Canadian Environmental Protection Act*, 1999 (CEPA 1999)

Substances found to be toxic and listed in Schedule 1 of CEPA 1999 can be controlled by a variety of instruments such as regulations, guidelines, codes of practice and pollution prevention plans. These instruments may be applicable to any aspect of the life cycle of a toxic substance - from the research and development stage through manufacture, use, storage, transport and ultimate disposal.

New Substances Notification

The New Substances Notification Regulations of CEPA 1999 stipulate the information that must be submitted to Environment Canada *prior* to the import or manufacture of any new substance in Canada. The Domestic Substances List, which is a list of approximately 24,000 substances that are presently in Canadian commerce, is the basis for determining if a substance is considered to be new.

Export and Import of Hazardous Wastes

The transboundary movement of hazardous wastes intended for disposal and hazardous recyclable material intended for recycling is subject to the requirements set out in Part 7, Division 8 of CEPA 1999 and the *Export and Import of Hazardous Wastes Regulations* also made under that Act and administered by EC.

The Whites Point Quarry and Marine Terminal project will not engage in trade of hazardous wastes therefore this element of CEPA 1999 will not be relevant to the EA of the project.

Environmental Emergency Regulations

The Environmental Emergency (E2) Regulations under Section 200 of CEPA apply to any person in Canada who owns, or has charge, management or control of, a substance listed on Schedule 1 of the regulations that is present in a quantity equal to or greater than that specified in the Schedule.

Protection of Migratory Birds

The *Migratory Birds Convention Act, 1994* (MBCA) implements the 1916 treaty of the same name under which Canada and the United States coordinate their efforts to conserve and protect migratory birds. The Parksville Protocol, an amendment to the Convention, came into force in October 1999. Migratory birds include those species listed in the Canadian Wildlife Service Occasional Paper No. 1, *Birds Protected in Canada under the Migratory Birds Convention Act.*

The MBCA and the Migratory Birds Regulations include general prohibitions against harming migratory birds, their nests and their eggs. For example, the Migratory Birds Regulations prohibit the deposition of any "...oil, oil wastes or any other substance harmful to migratory birds in any waters or any area frequented by migratory birds" (s. 35).

Protection of Species at Risk

The *Species at Risk Act* (SARA) came into force in June 2003 with the exception of prohibition and penalty provisions that came into force in June 2004. The SARA fulfils, in part, Canada's commitments under the *United Nations Convention on Biological Diversity, 1992.* SARA aims to prevent wildlife species from becoming extinct, and to secure the necessary actions for their recovery. Environment Canada is responsible for the overall administration of SARA. However, the Minister of Fisheries and Oceans is responsible for aquatic species, and the Minister of Environment is responsible for all other species including migratory birds.

Protection of Water Quality

Environment Canada is responsible for the administration and enforcement of Section 36 of the *Fisheries Act, which* prohibits the deposit of a deleterious substance into waters frequented by fish.

The Government of Canada has also developed a number of plans, policies and programs to support environmental and conservation initiatives with relevance to the Whites Point Quarry and Marine Terminal project listed below. Where relevant, the provisions of these various plans, policies and programs will be consulted and adhered to as the project develops.

- A Wildlife Policy for Canada
- Canadian Biodiversity Strategy
- Canadian Shorebird Conservation Plan
- Federal Policy on Wetland Conservation
- Federal Water Policy
- North American Waterbird Conservation Plan
- North American Waterfowl Management Plan
- Partners in Flight – Canada
- Pollution Prevention – Federal Strategy for Action
- Sea Duck Joint Venture
- Toxic Substances Management Policy
- Western Hemisphere Shorebird Reserve Network

For the convenience of the reader additional selected information on these items are presented as an addendum at the end of this section.

Canada Health Act

Both the Minister of the Environment and the Minister of Health jointly administer the task of assessing and managing the risks associated with existing and new substances. The Minister of Health is required to conduct research on the role of substances in illnesses and health problems. Health Canada must provide expert information and knowledge on health issues when requested by other federal departments carrying out environmental assessments under CEAA. Therefore, Health Canada's role in the EA process is legislated under CEAA and HC is responsible for providing expert advice as a Federal Authority on projects where human health is an issue.

Fisheries Act

Section 35 of the Fisheries Act, reproduced below, addresses the matter of fish habitat that will apply to the Whites Point Quarry and Marine Terminal project. The required permit application has been filed together with a compensation plan. The compensation plan has been approved in principle by the Department of Fisheries and Oceans (SeeAppendix 17).

> 35. (1) No person shall carry on any work or undertaking that results in the harmful alteration, disruption or destruction of fish habitat.
>
> (2) No person contravenes subsection (1) by causing the alteration, disruption or destruction of fish habitat by any means or under any conditions authorized by the Minister or under regulations made by the Governor in Council under this Act.

Navigable Waters Protection Act

The Navigable Waters Protection Program ensures the protection of the public right to navigation and the protection of the environment through the administration of the Navigable Waters Protection Act (NWPA). The NWPA regulates the following:

- The approval of any works built or placed in, on, over, under, through or across navigable water in Canada prior to construction of the work(s)
- The removal of obstructions to navigation including unauthorized works or other obstructions such as sunken or wrecked vessels.
- The regulation of the provision and maintenance of lights, markers, etc. required for safe navigation during and/or on completion of the construction of certain works.

Issues relating to marine shipping including communication licenses and navigational related fees are regulated by Transport Canada under the Canada Shipping act. Taxation measures are administered by CCRA that will include corporate and employee income tax. An application under the Navigable Waters Protection Act was submitted with respect to the marine terminal in December 2002 (See Appendix 26). An application was also filed under the Navigable Waters Protection Act with respect to the fish shelters proposed under the Fish Habitat Compensation Plan (See Appendix 17).

Table 6A - Relevant Legislation

Municipality of Digby

Act, Regulation or Bylaw	Agency	Project Activity
Building Bylaw	Municipality	Construction and approval phase
Building Bylaw	Municipality	Construction and approval phase

Province of Nova Scotia

Act, Regulation or Bylaw	Agency	Project Activity
Crane Operators & Power Engineers Act Regulations	NSDEL	Construction and operational phase
Crown Lands Act & Regulations Beaches Act & Regulations Beaches & Foreshores Act & Regulations	NSNR	Water Lot Lease Construction and operational phase
Dangerous Goods Transportation Act & Regulations	NSTPW	Operational phase explosives & fuel storage
Electrical Installation& Inspection Act Regulations	NSDEL	Construction & operational phase
Elevators & Lifts Act Regulations	NSDEL	Construction & operational phase
Environment Act & Regulations	NSDEL	EA approval & operational phase
Endangered Species Act & Regulations	NSDEL	EA approval & operational phase

Province of Nova Scotia

Act, Regulation or Bylaw	Agency	Project Activity
Fire Safety Regulations	NSDEL	Construction and operational phase
Labour Standards Code	NSDEL	Construction and operational phase
Occupational Health and Safety Act and Regulations	NSTPW	Construction and operational phase
Pit and Quarry Guidelines	NSDEL	Approval, Construction and operational phase
Water Resources Protection Act	NSDEL	Construction and operational phase
Wildlife Act and Regulations	NSNR	EA approval and operational phase
Workers' Compensation Act	WCB	Project operational phase

Government of Canada

Act, Regulation or Bylaw	Agency	Project Activity
Canada Wildlife Act and Regulations	EC	Construction and operational phase
Migratory Birds Convention Regulations	EC	Construction and operational phase
Species at Risk	EC	Construction and operational phase
Canadian Environmental Assessment Act and Regulations	CEAA	EA approval

Act, Regulation or Bylaw	Agency	Project Activity
Canadian Environmental Protection Act	Marine Environment Division Environmental Protection Service EC, HC	Project operational phase, hazardous wastes
Canadian Environmental Protection Act Part VI (Ocean Dumping Regulation 1988)	Marine Environment Division Environmental Protection Service EC, EPS	Marine Terminal
Navigable Waters Protection Act Navigable Waters Works Regulations	TC DFO	Works or construction activity in navigable waters
Canada Shipping Act Aids to Navigation Protection Regulations Air Pollution Regulations Anchorage Regulations Charts and Nautical Publications Regulations Eastern Canada Vessel Traffic Services Zone Regulations Garbage Pollution Prevention Regulations Non-Pleasure Craft Sewage Pollution Prevention Regulations Oil Pollution Prevention Regulations Pollutant Discharge Reporting Regulations Ship Radio Inspection Fees Regulations Ship Station Technical Regulations VHF Radiotelephone Practices and Procedure Regulations	CCG DFO TC	Shipping operations Worker health and safety

Government of Canada

Act, Regulation or Bylaw	Agency	Project Activity
Transportation of Dangerous GoodsAct 1992 and Regulations	TC	Transporting and handling dangerous goods
Explosives Act Explosives Regulations	NRC	Provision of expertise to EA Approval
Transportation Act Flammable Liquids Bulk Storage Regulations	CTC	Storage of flammable liquids at site
National Building Code of Canada	Canadian Commission on Building and Fire Codes	Facilities
Radio Communications Act	Industry Canada	Ship to shore communication

6.5.5 Regulatory Approvals and Guidelines

Pending release from EA and subject to any stipulations or restrictions as may be recommended by the Review Panel, the proposed Whites Point Quarry and Marine Terminal will need to apply for and secure a number of approvals and authorizations from all levels of Government. Generally these approvals are required of any project regardless of the nature of EA. Table 6B lists the various approvals organized by level of government and in accordance with the instructions in the EIS Guidelines

Table 6B Regulatory Approvals and Guidelines

Municipality of Digby

Regulation/Act	RA	Activity	When Required
Approval under the National Building Code of Canada and other codes adopted by NS	Municipality of Digby	Approval under the National Building Code of Canada	Design and Construction

Province of Nova Scotia

Regulation/Act	RA	Activity	When Required
Transportation Act	NSDTPW	Permit for Access Road	In advance of operational startup
Water Approval Environment Act and Regulations	NSDEL NSNR	Permits the extraction of surface and ground water for project use in quantities greater than 23,000 litres per day	In advance of operational l startup
Water Lot Grant		Assigns ownership of submerged land in coastal waters to permit the construction of large wharves, causeways, infills or breakwaters	In advance of construction

Government of Canada

Regulation/Act	RA	Activity	When Required
Release from EA Environment Act EC and Regulalations	Review Panel	EA	Release from EA Environment Act EC & Regulalations
Permit for Construction within Navigable Waters	DFO Coast Guard	5. (No work shall be built, or placed in, on, over, under, through or across any navigable water unless (a) the work and the site and plans thereof have been approved by the Minister, on such terms and conditions as the Minister deems fit, prior to commencement of construction	Permit for Construction within Navigable Waters
Authorization for Works or Undertakings Affecting Fish Habitat	DFO	35.(1) No person shall carry on any work or undertaking that results in the harmful alteration, disruption or destruction of fish habitat	Authorization for Works or Undertakings Affecting Fish Habitat
Explosives Transportation Permit	TC	Explosives transport by licenced contractor	Explosives Transportation Permit

6.5.6 Addenda

This addendum provides selected additional information on federal legislation, programs and policies for the convenience of the reader.

The Canadian Environmental Protection Act, 1999 (CEPA 1999)

The health of Canadians and economic and social progress are fundamentally linked to the quality of the environment. The Canadian Environmental Protection Act, 1999 is one of the Government of Canada's primary tools for achieving sustainable development and pollution prevention. In Canada, the federal government, as well as provincial, territorial and Aboriginal governments, share responsibility for protecting the environment — an approach that calls for close collaboration as governments work to support the well being of Canadians. As a cornerstone of the Government of Canada's environmental legislation, CEPA 1999 is aimed at preventing pollution and protecting the environment and human health.

One of CEPA 1999's major thrusts is the prevention and management of risks posed by harmful substances. As well, CEPA 1999 provides for the assessment and/or management of the environmental and human health impacts of new and existing substances. This includes products of biotechnology, marine pollution, disposal at sea, vehicle, engine and equipment emissions, fuels, hazardous wastes, environmental emergencies and other sources of pollution. CEPA 1999 contributes to sustainable development, which means meeting the needs of the present without compromising the ability of future generations to meet their own needs.

CEPA 1999 is a major legislative initiative guided by a set of principles that ensure consistent approaches for achieving clear objectives to:

- Contribute to sustainable development by preventing pollution;
- Promote coordinated action with provinces, territories, Aboriginal governments, and federal departments to achieve the highest level of environmental quality for the health of Canadians; and
- Manage risks from harmful substances and virtually eliminate releases of those substances determined to be the most dangerous.

The Minister of the Environment is accountable to Parliament for the administration of all of CEPA 1999. Both the Minister of the Environment and the Minister of Health jointly administer the task of assessing and managing the risks associated with existing and new substances. The Minister of Health is required to conduct research on the role of substances in illnesses and health problems. Work carried out under CEPA 1999 is complemented by other federal Acts administered (fully or partially) by the Minister of

the Environment for example, the Fisheries Act, the Canada Water Act, the Species at Risk Act, the Canada Wildlife Act, and the Canadian Environmental Assessment Act.

CEPA 1999 Guiding Principles

Work under CEPA 1999 is guided by principles that contribute to and reinforce the importance of:

- Sustainable development — development that meets the needs of the present without compromising the ability of future generations to meet their own needs.
- Pollution prevention — the use of processes, practices, materials, products, substances or energy that avoid or minimize the creation of pollutants or waste and reduce the overall risk to the environment and human health.
- Virtual elimination — ensuring that releases into the environment of non-naturally occurring, persistent (meaning they take a long time to break down) and bioaccumulative substances (meaning they collect in living organisms) resulting from human activity are reduced to extremely low levels.
- Ecosystem approach — reflecting the dynamic interrelationships between living organisms (plant, animal and microorganism communities) and their non-living environment.
- Precautionary principle — where there are threats of serious or irreversible damage, lack of full scientific certainty will not postpone cost-effective measures to prevent environmental degradation.
- Intergovernmental cooperation — recognition that all governments in Canada face environmental problems that can benefit from cooperative resolution.
- Polluter-pays principle — producers and users of harmful substances, pollutants and wastes have a responsibility for bearing the costs associated with the safe use and disposal of these substances and wastes.
- Science-based decision-making — decisions based on scientific information and traditional Aboriginal knowledge (where available), using a weight of evidence approach along with the application of the precautionary principle, where necessary.

Environment Canada Policy on Public Consultations

The involvement of the public in matters related to CEPA 1999 is an integral part of the success of this Act. Environment Canada shares its responsibility to protect the environment and to promote sustainable development with all sectors of society and with individual Canadians. This warrants their meaningful participation in the decisions related to the development and amendment of policies, legislation, programs and services. Environment Canada's commitment to public consultations is directly related to the priority to make sustainable development a reality in Canada. Environment Canada believe that meaningful public consultations will help Environment Canada and the government as a whole make better decisions. At Environment Canada, consultation is an interactive and iterative process that elicits and considers the ideas of people and provides opportunities to influence decisions before they are made.

Environment Canada's policy on public consultations provides a framework to support the ongoing activities of the department. Commitments to public consultation and the related issues of access to information and public right to know are also reinforced by relevant provisions of legislation such as the Canadian Environmental Protection Act (CEPA) and the Canadian Environmental Assessment Act (CEAA). Environment Canada will seek to improve the application and relevance of public consultations in legislation under its responsibility. Environment Canada will promote its commitment to effective public consultations in its joint initiatives with other federal departments, other levels of government and, the non-governmental sectors. This policy also provides the basic framework for consulting aboriginal peoples on environmental policy, program or legislative issues where Environment Canada plays the lead federal role.

The Declaration of the Canadian Environmental Protection Act, 1999 states that "the protection of the environment is essential to the well-being of Canadians and the primary purpose of this Act is to contribute to sustainable development through pollution prevention". The Declaration underscores the importance placed by the Government of Canada on prevention of harm to the environment and its commitment to sustainable development.

The Canadian Environmental Protection Act, 1999 has the following key elements:
Authority and provisions to:

- Require submission of information on any subject covered by the Act;
- Control the introduction into Canadian commerce of substances that are new to Canada;
- Obtain information on and to require testing of both new substances and substances already existing in Canadian commerce;

- Control all aspects of the life cycle of toxic substances from their development, manufacture or importation, transport, distribution, storage and use, their release into the environment as emissions at various phases of their life cycle, and their ultimate disposal as waste;

- Create guidelines and codes for environmentally sound practices as well as objectives that set desirable levels of environmental quality;

- Control nutrients, such as phosphates, in water conditioners or cleaning products, including detergents, which can interfere with the use of waters by humans, animals, fish or plants;

- Issue permits to control disposal at sea from ships, barges, aircraft and structures (excluding normal discharges from off-shore facilities involved in exploration for, exploitation and processing of seabed mineral resources);

- Regulate fuels and components of fuels;

- Control emissions from motors that power automobiles, trucks and other equipment such as lawnmowers, outboard motors and all-terrain vehicles;

- Control the export, import and transit through Canada, as well as shipments within Canada which cross internal provincial or territorial borders, of hazardous waste and hazardous recyclable material;

- Identify, by regulation, specific non-hazardous waste which may be exported, imported or travel through Canada in transit to another destination, where that non-hazardous waste is destined for final disposal, and authority to impose controls on those shipments;

- Control sources of air or water pollution in Canada where a violation of an international agreement would otherwise result, or where the air or water pollution caused in Canada affects another country;

- Deal with environmental emergencies, where no other federal Act does so in a manner that protects the environment and human health;

- Regulate activities of federal departments, boards, agencies and Crown corporations to ensure that those activities have as little as possible negative impact on the environment;

- Regulate federal works, undertakings and to regulate activities on federal land and aboriginal land, where no other federal legislation and/or regulations are in force and, in the opinion of the Governor in Council, provide sufficient protection to the environment and human health;

- Sign agreements with a provincial, territorial or aboriginal government or aboriginal people regarding administration of the Act;

- Sign agreements that recognize that legislation or regulations adopted by a provincial, territorial or aboriginal government are equivalent to CEPA regulations and will apply instead of the CEPA requirements; and

- Delegate the powers that may be exercised by the Minister, enforcement officers and CEPA analysts in enforcing the legislation.

The Minister of Health has responsibility under the Act to provide advice in relation to human health aspects to the Minister of Environment. Among the subjects on which the Minister of Health may give advice are the toxicity of substances, the ability of the substance to become incorporated into and to accumulate in human tissue, and the ability of the substance to cause biological change, as well as the human health effects of emissions and discharges from Canadian sources of international air or international water pollution. In addition, jointly with the Minister of Environment, the Minister of Health recommends regulatory actions for toxic substances to the Governor in Council.

The areas of CEPA, 1999 that are open to an order by the Governor in Council declaring the requirements of another government to be equivalent to those developed under CEPA, 1999 are:

- Regulations dealing with toxic substances;
- Regulations dealing with Canadian sources of international air or international water pollution;
- Regulations dealing with environmental emergencies; and
- Regulations respecting the practices of federal departments, boards, agencies, commissions, federal Crown corporations, federal works or undertakings, or respecting federal land or aboriginal land and persons on that land or whose activities involve that land.

Regulations

A regulation is the manifestation of a legislative power conferred by Parliament on the executive branch of government. *The Statutory Instruments Act* (R.S., 1985, C. S-22) defines the term regulations and establishes the basic legal process the federal government must follow when developing regulations.

Current Regulations with potential application to the Whites Point Quarry and Marine Terminal project are:.

- Contaminated Fuel
- Disposal at Sea
- Environmental Emergency
- Fuels Information, No. 1
- New Substances Fees
- New Substances Notification
- New Substances Notification (Chemicals and Polymers)
- New Substances Notification (Organisms)
- Off-Road Compression-Ignition Engine Emission
- Off-Road Small Spark-Ignition Engine Emission
- On-Road Vehicle and Engine Emission
- Respecting the Form and Content of an Application for a Permit for Disposal at Sea
- Rules of Procedure for Boards of Review
- Sulphur in Diesel Fuel
- Sulphur in Gasoline

Toxic Substances List -Updated Schedule 1 as of August 31, 2005

CEPA, 1999 provides the Government of Canada instruments, including regulations, to protect the environment and human health, and establishes strict timelines for managing substances found toxic under the Act. Substances that are determined to be "toxic" under CEPA 1999 are recommended for addition to the List of Toxic Substances (Schedule 1) of the Act. Preventive or control actions such as regulations, guidelines or codes of practice, are then considered for any aspect of the substance's life cycle from the research and development stage through manufacture, use, storage, transport and ultimate disposal or recycling. Furthermore, substances determined to be "toxic", persistent, bioaccumulative, anthropogenic, and which are not naturally occurring radionuclides or naturally occurring inorganic substances shall be proposed for implementation of virtual elimination under Section 65 (3) of CEPA, 1999.

Guidelines and Codes of Practice

In Part 3 of CEPA 1999, the Minister of the Environment (Section 54) and the Minister of Health (Section 55) are enabled to create a wide range of non-regulatory tools, such as guidelines and codes for environmentally sound practices, and objectives for desirable levels of environmental quality. Such tools provide a scientific basis for the development of environmental quality/human health objectives and for performance measures for Strategic Options and risk management initiatives. Guidelines can be developed to set a numerical concentration for toxic substances in water, agricultural water, soil, sediment, and human and animal tissue. Similarly, codes of practice can be developed, providing

systematic collections of principles or rules describing accepted (desirable) professional or operating practice.

Guideline for the Release of Ammonia Dissolved in Water Found in Wastewater Effluents

> *Whereas ammonia dissolved in water is a substance specified on the List of Toxic Substances in Schedule 1 of the Canadian Environmental Protection Act, 1999;*
>
> *Whereas the Minister of the Environment published a Proposed Notice requiring the preparation and implementation of pollution prevention plans for ammonia dissolved in water, inorganic chloramines and chlorinated wastewater effluents in the Canada Gazette, Part I, on June 7, 2003;*
>
> *Whereas persons were given the opportunity to file comments with respect to the Proposed Notice for a comment period of 60 days;*
>
> *Whereas the Minister has considered all comments received;*
>
> *Whereas this Guideline is issued as an instrument respecting preventive and control actions in relation to ammonia dissolved in water found in wastewater effluents in application of section 92 of the Act;*
>
> *And whereas the Minister of the Environment has published a Notice requiring the preparation and implementation of pollution prevention plans for inorganic chloramines and chlorinated wastewater effluents;*
>
> *Therefore, the Minister of the Environment, pursuant to subsection 54(1) of the Canadian Environmental Protection Act, 1999, has decided to issue a Guideline as a means to reduce the impact of releases of ammonia dissolved in water to surface water, and pursuant to subsection 54(4) directs that it be published in the Canada Gazette, Part I.*

Environmental Emergency Plans

Section 201 of CEPA 1999 requires that, when an environmental emergency occurs for any of the substances on the list established on Schedule 1 under the Environmental Emergency Regulations, any person who owns or has the charge, management or control of the substance immediately before the emergency shall, as soon as possible, notify an enforcement officer or any other person designated pursuant to the Regulations. In addition, this person must abide by a number of other requirements, such as taking all reasonable

measures consistent with protection of the environment and public safety and providing a written report.

There are no environmental emergency notification and reporting thresholds associated with the 174 substances listed in Schedule 1 of the Regulations at this time. Specific notification and reporting points of contact as well as verbal and written report information requirements are contained in Appendix 6 of these Guidelines.

Part 8 of CEPA 1999 on environmental emergencies provides various powers to address the prevention of, preparedness for, response to or recovery from environmental emergencies caused by uncontrolled, unplanned or accidental releases of toxic or other hazardous substances. In investigating various measures to increase the safety and security of Canadians in the event of an environmental emergency, the Government of Canada has identified sections 200 and 199 of Part 8 as important tools. These sections allow the Government of Canada to require environmental emergency plans for toxic or other hazardous substances. The primary objective for requiring environmental emergency planning under sections 200 and 199 is to ensure that appropriate risk management measures are adopted and implemented for potential risks associated with the manufacture, storage and use of toxic and other hazardous substances in Canada.

Section 199 gives the Minister authority to require the preparation and implementation of environmental emergency plans for substances listed on Schedule 1 of CEPA 1999 (the List of Toxic Substances) or for substances that the Ministers of the Environment and Health have recommended the Governor in Council add to Schedule 1.

Environment Canada's objective for environmental emergency planning in Part 8 of CEPA 1999 is to ensure that risk management measures adopted for hazardous substances include effective prevention, preparedness, response and recovery components. The Government of Canada has the authority to require environmental emergency plans to complement other existing or forthcoming risk management measures (e.g., regulations and guidelines) for hazardous substances. When a substance is declared toxic under CEPA 1999 or determined to have other hazardous properties, it may be necessary to ensure that environmental emergency measures are implemented immediately to prevent, prepare for, respond to and recover from sudden, unplanned or accidental releases of that substance. Under section 193, CEPA 1999 defines an environmental emergency as:

1 An uncontrolled, unplanned or accidental release in contravention of regulations made under this Part, of a substance into the environment; or

2 The reasonable likelihood of such a release into the environment.

Notification and Reporting of Environmental Emergencies

Canadian Environmental Protection Act 1999 - Section 201 Verbal and Written Report Information Requirements

- Verbal Notification is to be made by telephone as soon as possible in the circumstances to the authorities named in column 2 of Schedule 6 of the Regulations and Appendix 6 of these Guidelines.
- Written Report should be made within 30 days to the relevant authorities

Transportation of Dangerous Goods Act

Accidental Release Reporting Requirements

Class	Amount / Emission Level
Class 1	Any quantity that could pose a danger to public safety or 50 kilograms
Class 2	Any quantity that could pose a danger to public safety or any sustained release of 10 minutes or more
Class 3	At least 200 litres
Class 4	At least 25 kilograms
Class 5.1	At least 50 kilograms or 50 litres
Class 5.2	At least 1 kilogram or 1 litre
Class 6.1	At least 5 kilograms or 5 litres
Class 6.2	Any quantity that could pose a danger to public safety or 1 kilogram or 1 litre
Class 7	Any quantity that could pose a danger to public safety.An emission level greater than the emission level established in section 20 of the "Packaging and Transport of Nuclear Substances Regulations"
Class 8	At least 5 kilograms or 5 litres
Class 9	At least 25 kilograms or 25 litres

For purposes of section 9 of the Environmental Emergency Regulations, environmental emergencies notification:

Nova Scotia

Verbal Notification/24 hr Phone Line	Written Report/Designated Person
902 426-6030- within Halifax area 902 565-1633 -outside Halifax	Director, Environmental Protection Atlantic Region, EC 16th Fl. Queen Sq. Alderney Dr. Dartmouth, NS B2Y 2N6

Pollution Prevention Planning

Part 4 of CEPA 1999 gives the Minister of the Environment the authority to require the preparation and implementation of pollution prevention plans (P2 plans) for CEPA 1999 toxic substances (substances that have been added to Schedule 1 of CEPA 1999). This document provides an indication of the circumstances under which pollution prevention plans will be required. For more information on how these provisions of CEPA 1999 are implemented, go to the Plans section of the CEPA Registry.

Pollution Prevention (P2) Plans

Pollution prevention is defined in CEPA 1999 as "the use of processes, practices, materials, products, substances or energy that avoid or minimize the creation of pollutants and waste and reduce the overall risk to the environment or human health." Pollution prevention planning is a systematic, comprehensive method of identifying and implementing pollution prevention options to minimize or avoid the creation of pollutants or waste. The plan would also identify recycling, treatment and other measures needed to meet environmental goals.

In order to be most effective, P2 plans could be expected to contain the following elements:

- A senior-level sign-off;
- The designation of an accountable senior manager for the plan;
- A clear statement of the risk management (and other) objectives for the plan;
- A schedule for meeting those objectives;
- A review of all significant aspects of the management of the substance (including purchasing, processing, producing, generating, distributing, treating, disposing, storing, or releasing of the substance);
- An identification, review and selection of options;
- A plan and schedule for implementing the selected options;
- A plan for measuring, tracking and evaluating the success of the selected options and for implementing corrective and preventative measures;
- A plan for reporting on progress towards the plan's objectives; and
- A continual improvement program.

A person subject to a P2 Notice requiring the preparation and implementation of P2 plans must submit the following according to the timelines set in the published Notice.

- Declaration of Preparation
- Declaration of Implementation
- Interim Progress Reports (as required)

Environmental Emergency (E2) Plans

The Environmental Emergency Regulations aim at enhancing the protection of the environment and human health in environmental emergency situations by promoting prevention and ensuring preparedness, response and recovery. They require persons who own or manage specified toxic and hazardous substances at or above the specified thresholds to provide required information on the substance(s), their quantities and to prepare and implement environmental emergency plans.

The Regulations contain a list of substances under the Canadian Environmental Protection Act, 1999 (CEPA, 1999), and other hazardous substances which, if they enter the environment as a result of an environmental emergency,

- Have or may have an immediate or long-term harmful effect on the environment or its biological diversity,
- Constitute or may constitute a danger to the environment on which human life depends, or
- Constitute or may constitute a danger in Canada to human life or health.

The role of Enforcement Under CEPA 1999

Enforcement is part of the compliance continuum, and part of the goal in achieving the highest level of environmental quality for all Canadians. Usually, the first stage of enforcement is inspection by site visit or review of submitted reports as a means of verifying compliance with the Act and its regulations. An effective approach by Environment Canada in providing opportunities for input to the creation of regulations and in compliance promotion should result in a high rate of compliance.

In cases of non-compliance, enforcement officers will investigate. If a violation is confirmed, action will be taken using one or more of the enforcement tools available under CEPA 1999 such as warnings, directions, tickets, or environmental protection compliance orders.

Canadian Wildlife Service

Canada's national wildlife agency handles wildlife matters that are the responsibility of the federal government. This includes the protection and management of migratory birds and nationally important wildlife habitat, endangered species, research on nationally important wildlife issues, control of international trade in endangered species, and international treaties. Wildlife management in Canada is shared by the federal and the provincial / territorial governments.

In the early 1900s there was a drastic decline in migratory bird populations, particularly in

eastern North America. As the decline in abundance of migratory birds was a responsibility shared by all states and provinces, an agreement between the Canadian and American federal governments was required to regulate hunting and undertake conservation programs. In 1916, Canada and the U.S. signed the Migratory Birds Convention, and the following year Parliament passed the Migratory Birds Convention Act giving the federal government responsibility for the management of certain species of migratory birds. In 1947, the Dominion Wildlife Service was created, to bring together public servants with responsibilities for conservation of birds and terrestrial mammals.

By the late 1960s, it was clear that action by the federal government was required on many other issues, such as management of mammals that cross international boundaries and the serious problem of species becoming threatened with extinction. As a result, in 1973 the Canada Wildlife Act was passed enabling the federal government to carry out wildlife research and, in cooperation with the provinces, to undertake a wide range of wildlife conservation and interpretation activities for "any non-domestic animals or their habitats."

Conservation of Migratory Birds

CWS conducts research on a wide variety of wildlife topics, particularly migratory birds. Its research provides the science base for conservation actions. To maintain optimum populations of migratory waterfowl, various field surveys are conducted in cooperation with the U.S. Fish and Wildlife Service and other organizations.

When coastal habitats are ravaged by oil spills, the effects on seabirds can be devastating. Increased development and offshore activities in the Arctic, where many species breed, threaten the seabird populations. Information on their numbers and distribution in nesting areas and at sea is gathered, and maps are produced showing critical areas.

The most ambitious migratory birds conservation program to date is the North American Waterfowl Management Plan (NAWMP). It is a $1.5 billion joint Canada / U.S. program designed to protect and enhance wetland habitat throughout North America. Waterfowl are the most economically important group of migratory birds, but they face a serious decline throughout their range. The objective of NAWMP is to restore the populations of ducks, swans, and geese to the levels of the 1970s.

Species at Risk

The Canadian Wildlife Service (CWS) plays a prominent role in the protection of species at risk. CWS developed and promoted the adoption of the Species at Risk Act (SARA). This act, which came into effect in 2003, protects species from extinction and their critical habitat from disappearance, and it ensures their recovery. The CWS is also a founding

member of the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), which assesses the status of species at risk in Canada.

Conservation of Wildlife Habitat

Habitat used by wildlife is also essential for agriculture, forestry, and other competing interests. To accommodate all concerns, CWS works with other agencies and groups to minimize the impact on critical wildlife habitat. CWS also provides advice on projects such as planning the location of highways and pipelines to avoid sensitive habitats.

Towards an Environment Canada Srategy for Coastal and Marine Protected Areas

The Canadian Wildlife Service (CWS) of Environment Canada is charged with developing and implementing a marine habitat conservation program with a focus on habitat for migratory birds. CWS has set up a Marine Habitat Working Group to define the department's role in marine habitat conservation, and in particular the establishment of marine protected areas (MPAs).

This document was prepared to provide context for the development of an Environment Canada strategy for marine habitat conservation and MPAs. Part 1 introduces MPAs as a conservation tool and then focuses on various aspects of the current Environment Canada program and activities regarding MPAs. It describes the three legal designations-national wildlife area, marine wildlife area and migratory bird sanctuary-that CWS can use to protect marine areas. To June 1996, 13 out of the country's 49 national wildlife areas and 56 of the 98 migratory bird sanctuaries have coastal, estuarine or marine components.

The total amount of coastal, estuarine and marine wildlife habitat protected in these 69 sites is about 3.8 million hectares. Several proposed national wildlife areas will include a significant marine component; the proportion is expected to increase. The marine wildlife area designation is a new mechanism added to the Canada Wildlife Act by amendment in 1994 to provide for MPAs in the 12 to 200 nautical mile zone, where a different regulatory regime is required. The origins and nature of this amendment are reviewed.

North American Waterfowl Management Plan

The North American Waterfowl Management Plan is an international action plan to conserve migratory birds throughout the continent. The Plan's goal is to return waterfowl populations to their 1970s levels by conserving wetland and upland habitat. The Plan is a partnership of federal, provincial/state and municipal governments, non-governmental organizations, private companies and many individuals, all working towards achieving better wetland habitat for the benefit of migratory birds, other wetland-associated species and people.

Plan projects are international in scope, but implemented at regional levels. These projects contribute to the protection of habitat and wildlife species across the North American landscape. In fact, the North American Waterfowl Management Plan is considered one of the most successful conservation initiatives in the world.

To conserve waterfowl, biologists must ensure there is adequate habitat. The North American Waterfowl Management Plan identifies the landscape conditions needed to sustain waterfowl. This "landscape approach" means balancing conservation with socioeconomic requirements. Many economic activities can affect waterfowl habitat, including agriculture, forestry, urban development, mining and fishing. Organizations participating in the Plan get involved in the planning process of economic and social policies that affect the landscape. These Plan partners promote landscape conditions that sustain waterfowl and benefit other wetland species, including endangered species.

Shorebird Reserve Network

The Western Hemisphere Shorebird Reserve Network (WHSRN) was created in 1985 to address shorebird conservation needs on an enormous scale. It is a voluntary, non-regulatory coalition that identifies and promotes conservation of crucial sites for shorebirds, no matter whether they are used in the breeding, migratory, or "winter" season. The Executive Office provides core staff and services to WHSRN's Site Partners, governing councils, and the Scientific Advisory Committee. Shorebirds are among the most migratory of all species on Earth and they are in trouble. More than one-fourth of all of North America's shorebird species and subspecies are in serious decline. WHSRN's mission is to conserve shorebird species and their habitats across the Americas through a network of key sites.

One site with two locations is in sections of the Upper Bay of Fundy between New Brunswick-Nova Scotia in the Minas Basin, Nova Scotia: 45 50'-45 10'N and Shepody Bay, New Brunswick: 64 40'-64 00'W. Canada. Area of Site: 620 square km. (239 square miles)

Wings Over Water - Canada's Water Bird Conservation Plan

Wings Over Water (WOW), Canada's Water Bird Conservation Plan, outlines the steps needed to conserve the broad array of species of seabirds, inland colonial water birds, marsh birds and other water-related species that are addressed in this plan. Of the 93 species covered by the plan, 30% show negative population trends while another 10% are not well enough known to determine their trend. Water bird biologists have made a preliminary list of those species where monitoring, research and conservation should be a priority.

They have also identified the most important factors affecting water bird populations in Canada. These include, for example, habitat change, oil spills, and fisheries by-catch and competition.

Many water bird species are shared with other nations, so Canada has chosen to work in a broad continental framework in order to increase the potential for conservation success. To this end, Wings Over Water forms the Canadian component of Water Bird Conservation for the Americas: North American Water Bird Conservation Plan. Accordingly, the Vision of WOW is to ensure populations of water birds are sustained or restored throughout their historical range, in Canada and globally.

To attain this Vision, WOW outlines four Conservation Goals that need to be followed. They address population and habitat conservation, information exchange and coordinated action. More specifically the Conservation Goals are to:

- Sustain the natural distribution, diversity and abundance of water birds within Canada, and restore populations of priority species and those in decline;
- Secure and enhance sufficient high quality habitat to support robust populations of water birds throughout their ranges in Canada;
- Ensure that information for the conservation of water birds is widely available to decision makers, the public, and all those whose actions affect populations of these birds; and
- Ensure that coordinated conservation efforts for water birds are guided by common principles, and are in place throughout the range of those species that occur in Canada.

Canadian Shorebird Conservation Plan

Canada's national biodiversity strategy calls on government and other stakeholders to attack the causes of biodiversity loss at their source and prevent further endangerment of species. Canada has a unique responsibility with respect to shorebirds. For many species, more than half of their breeding range occurs in Canada. Opportunities exist to cooperate with ongoing conservation initiatives such as the Western Hemisphere Shorebird Reserve Network (WHSRN), U.S. Shorebird Conservation Plan, Partners in Flight, Wings Over Water, North American Bird Conservation Initiative, North American Waterfowl Management Plan, and others.

The plan's vision is for healthy populations of shorebirds to be distributed across their range and diversity of habitats in Canada and throughout their global range. The plan thus recognizes the need to collaborate internationally as well as regionally and locally.

The Canadian Shorebird Conservation Plan has five goals designed to fulfill the needs for research, monitoring, and evaluation as well as conservation, communication, and international linkages. Those goals are to:

- Sustain the distribution, diversity, and abundance of shorebird populations within Canada and restore populations of declining, threatened, and endangered species;
- Secure and enhance sufficient high-quality habitat to support healthy populations of shorebirds throughout their ranges in Canada;
- Ensure that information on shorebird conservation needs and practices is widely available to decision makers, land managers, and the public;
- Ensure that coordinated shorebird conservation efforts are in place, on the ground, throughout the range of Canadian shorebird species;
- Ensure that shorebird conservation efforts are guided by common principles throughout the Western Hemisphere.

Partners in Flight–Canada Canadian Land Bird Conservation Program

Land birds include some of the most familiar and best-loved birds in Canada. But populations of this group, representing about 220 species of birds, have shown long-term declines over the last 30 years. Loss and degradation of wildlife habitat are believed to be the primary causes of these declines. In response to concern for these birds, the Canadian Wildlife Service, with its mandate for migratory bird conservation, is working with partners to build a national land bird conservation program.

Consultations with interested parties resulted in the development of the Canadian Land Bird Conservation Program in 1994. Those discussions supported the Canadian Wildlife Service of Environment Canada (CWS) in taking the lead to develop a framework for implementing land bird conservation at the national level. The goal of Partners in Flight – Canada (PIF) is to ensure the long-term viability of populations of native Canadian land birds across their range of habitats. Implementation of this goal will occur at national, regional and local levels to help keep our common birds common. This approach will help prevent the addition of birds to the list of species at risk.

Canadian Wildlife Service Guidelines

Canadian Wildlife Service guidelines aims to promote best practices for environmental assessments that are required under the Canadian Environmental Assessment Act (CEAA) and also for those environmental assessments conducted by other jurisdictions in which Environment Canada is involved. Current guidelines include:

- Environmental assessment guideline for forest habitat of migratory birds
- Migratory birds environmental assessment guideline
- Wetlands environmental assessment guideline
- Environmental Assessment Best Practice Guide for Wildlife at Risk in Canada

Environmental Assessment Guideline for Forest Habitat of Migratory Birds

The importance and vulnerability of migratory birds was recognized nationally and internationally as early as 1916 with the signing of the Migratory Birds Convention between the United States and Canada. In recent years, particular concern has arisen about migratory birds that depend on forests. This concern has resulted in the establishment of the Canadian Land Bird Conservation Program (also known as Partners in Flight — Canada), the goal of which is to ensure the long-term viability of populations of native Canadian land Birds across the whole range of their habitats.

In Canada, most forest habitat has been allocated for logging. Forest Management Plans (FMPs) establish ground rules for forestry practices that affect large expanses of forested land. These practices and large-scale nonforestry projects in forested landscapes affect habitats of forest-dependent migratory birds. Also, logging or other types of projects on private lands in or near forests also affect migratory bird habitat. These pressures on forest bird habitat continue to grow. Environmental assessment of projects and participation in the development and review of environmental assessments for FMPs offer opportunities to assess the potential environmental effects of proposed projects and forestry practices on the habitat of migratory birds. These assessments should result in decision-making that minimizes disruption to migratory bird populations and their forest habitat.

Migratory Birds Environmental Assessment Guideline

Pressures on migratory bird populations and their habitat continue. Careful planning of projects can reduce these pressures. In particular, environmental assessment offers an opportunity to assess the potential environmental effects of proposed projects on migratory birds so that informed decisions can be taken that result in the least disruption to these birds and their habitats.

The Convention on Biological Diversity specifically addresses the application of environmental assessment to biodiversity. It identifies environmental assessment as a process that will help to ensure that proposed projects are undertaken with a "view to avoiding or minimizing" significant adverse effects on biological diversity. The Canadian Biodiversity Strategy echoes the need for the use of environmental assessments to determine potential environmental effects on biodiversity, including ecosystems.

Wetlands Environmental Assessment Guideline

There is national and international concern for the conservation of wetlands given their important ecological roles and in recognition of past and present stress on wetlands from human activities. As a result of this concern, Canada has joined with other nations in a number of international endeavors such as the Ramsar Convention and the North American

Waterfowl Management Plan, whose objectives are the conservation and enhancement of wetlands. The federal policy's objective is to promote the conservation of Canada's wetlands to sustain their ecological and socio-economic functions, now and in the future. Although wetland conservation in Canada is a shared federal, provincial, and territorial responsibility, the federal government has a particular interest. The preservation of wetland integrity is critical to federal responsibilities for maintaining the quality of the environment, migratory bird populations, inland and ocean fisheries, and international and transboundary resources such as water and wildlife. The environmental assessment guideline is one tool that can be used to fulfill the federal government's role. Addressing functions and values, in addition to ecosystem components, will facilitate the application of No Net Loss principles and result in the least impact on wetland ecosystems.

Also, as required in CEAA, an environmental assessment must address impacts in an integrated manner. Therefore, in the case of an environmental assessment involving wetlands, the links between the wetland functions, their derived values, and the components of the ecosystem must be considered holistically. An impact on one function or ecosystem component can, and usually will, affect others. Similarly, when mitigation measures are applied, an understanding of their effects on nontarget components or functions must be evaluated. As stated in the guiding principles to the federal policy, wetlands and wetland functions are inextricably linked to their surroundings, particularly aquatic ecosystems, and therefore wetland conservation must be pursued in the context of an integrated systems approach to environmental conservation and sustainable development

Environmental Assessment Best Practice Guide for Wildlife at Risk in Canada

Initiating the Project and Assessment

Consider relevant plans and strategies for conservation and sustainable development at the landscape, ecosystem, community and species levels. In this way, project siting, design and timing can be tailored to the habitat and residence requirements of all wildlife, including wildlife at risk. When considering site or design alternatives, direct projects and physical activities away from biodiversity or extinction hotspots, rare ecosystems and other areas identified as conservation priorities.

Scoping the Assessment

Investigate whether wildlife at risk—or their survival or recovery habitat or residences—are located within the project study area by referring to existing information sources, including wildlife experts, specialists and local and Aboriginal communities. Conduct field surveys if it is likely that wildlife species at risk are present in the study area or if wildlife data for the site are lacking or outdated. Document as part of the assessment all efforts to identify wildlife at risk. Involve the appropriate government departments and

specialists if wildlife at risk are an issue in the assessment or in the case of any uncertainty about whether they are an issue. Work through environmental assessment coordinators to make appropriate contacts.

Assessing Environmental Effects

Identify wildlife species at risk as valued ecosystem components, and include them among the species selected to focus the assessment. Describe project effects on wildlife at risk with rigour and detail, reflecting the current understanding of the ecology of species. Use status reports, recovery strategies, action plans and species management plans as main information sources where available, and consult with wildlife experts, specialists and local and Aboriginal communities. Consider all direct, indirect and cumulative effects in the analysis.

Mitigating Adverse Environmental Effects

Plan the project to avoid or minimize effects on all species designated as being at risk anywhere in Canada , as well as the habitat and residences that are essential to their survival or recovery. Work out the best approach to mitigation on a case-by-case basis. Pay particular attention to recognized threats that negatively affect species populations and habitat requirements. The mitigation plan should be aimed at ensuring the survival of wildlife at risk and contributing to their recovery.

Determining theSignificance of Residual Adverse Environmental Effects

Residual effects that will prevent the achievement of self-sustaining population objectives or recovery goals should be deemed significant.Apply the precautionary approach/ principle when making decisions concerning significance of effects on wildlife species at risk.

Verifying Accuracy of Predictions and Ensuring Success of Mitigation

Verify the accuracy of predictions and ensure the success of mitigation measures for wildlife at risk through follow-up programs; plan contingencies and implement midcourse corrections if necessary to protect species.

6.6 International Agreements

6.6.1 North American Free Trade Agreement (NAFTA)

NAFTA is a treaty between the United States, Mexico, and Canada, which deals with a vast range of matters relating to the liberalization of trade. It is clear from a review of literature, that NAFTA has generated concern in the environmental community. It is also fair to say that Chapter 11 of NAFTA, which authorizes various claims by foreign investors against the government of the country in which the investment is made, has been the greatest source of concern. Generally, the focus appears to be on Article 1110, which provides for investment protection for measures that are "tantamount to expropriation". Essentially, the concern has been that NAFTA's promotion of trade will come at the cost of a degraded environment. Even with NAFTA's preamble and the addition of the North American Agreement on Environmental Cooperation ("NAAEC"), many observers fear that private corporations' use of NAFTA's Chapter 11 will force tribunals to prioritize promotion of trade over environmental considerations.

Under Chapter 11, NAFTA extends significant protection to US, Mexican and Canadian investors who own or control investments in the territory of another party. Section A of Chapter 11 establishes a number of substantive obligations with respect to investments. It sets out the conditions against which a NAFTA party's actions may be measured. This includes Article 1102 which is the national treatment whereby NAFTA parties must treat NAFTA investors and investments as favourably as they treat their own domestic investors and investments in like circumstances; Article 1103, which is the most favoured nation treatment clause provides that NAFTA parties must treat investors' investments as favourably as they treat non-NAFTA investor's investments in like circumstances; Article 1105, the minimum standard of treatment, requires that NAFTA parties must ensure that a minimum standard of treatment prescribed by international law, such as due process of law and natural justice is provided to NAFTA investors; Article 1106, the performance requirements, requires that NAFTA parties must not impose or enforce certain specific performance requirements for the establishment, operation, management, conduct and operation of investments; Article 1110, the expropriation and compensation clause, requires that NAFTA parties must not expropriate investments, either directly or indirectly, or through a measure tantamount to an expropriation unless such expropriation is for a public purpose, is non-discriminatory, meets the prescribed international minimum standards or treatment, and is accompanied by compensation at a fair market value.

Section B of Chapter 11 concerns jurisdiction and procedure defining the method by which an investor claiming a violation of the obligations established in Section A may seek redress. Section B sets out who can invoke a claim and governs the subject matter that is covered. Thus, it may be that a foreign investor entitled in principle to protection

under NAFTA may enter into contractual relations with a public authority and may suffer a breach by that authority and still not be in a position to state a claim under NAFTA since claims cannot be submitted to investor-state arbitration unless the claim is founded upon a violation of an obligation established in Section A.

Section B provides that NAFTA investors are provided the right to unilaterally initiate a claim against a host NAFTA party where any of the commitments in Section A are not met. This ability under Chapter 11 for an investor to directly initiate a claim against a party was the perhaps most innovative part of NAFTA. Prior to this, a multi-lateral trade agreement did not allow for a party to directly hold a state accountable for the state's conduct through a binding dispute settlement mechanism. Of course, those that oppose NAFTA generally see this as a stick which can be wielded against NAFTA parties in circumstances where the country's legislation, programs or policies have an adverse impact on the investment in that country. On the other hand, those that support Chapter 11 see the dispute settlement provisions representing an important right which ensures that parties will abide by their commitments under Chapter 11 of NAFTA and it is only where their conduct violates Chapter 11 that they can be held directly accountable.

It should be noted that in interpreting Chapter 11, tribunals are guided by more than the language in NAFTA. A tribunal must decide issues in a dispute in accordance with the NAFTA agreement and the applicable rules of international law. It is suggested that according to Article 1131, Chapter 11 must be interpreted in accordance with three sources of law: (i) any previous interpretations by the Free Trade Commission; (ii) the terms of NAFTA itself; and (iii) general principles of public international law. Likewise, it is important to note that a tribunal must be guided by NAFTA as a whole rather than being restricted to only the terms of Chapter 11 or, more restrictively to only Article 1110 itself.

Generally, Chapter 11 is seen as being used both retroactively, as a vehicle for obtaining substantial monetary rewards, and prospectively, as a threat to governments considering imposing regulations. Opponents argue that this provision is especially broad and can be, therefore, applied to a wide range of government actions. While there is no doubt that there have been concerns that Article 1110 may have a deterrent effect on governments contemplating activities that could be considered to be expropriation or tantamount to expropriation, there is language in NAFTA which limits the reach of Article 1110. Furthermore, Article 1114 (Environmental Measures) does not prevent a government from adopting, maintaining or enforcing any measure otherwise consistent with the Chapter [Chapter 11] that it considers appropriate to ensure that investment activity and its territory is undertaken in a manner sensitive to environmental concerns. Additionally, parties under Article 12 are to recognize that it is inappropriate to encourage investment by relaxing domestic health, safety or environmental measures. Although any actions taken must be consistent with Chapter 11 as a whole, Article 1114 suggests that the NAFTA

governments maintain significant flexibility in their ability to impose environmental protections and by prohibiting parties from pursuing investment goals at the expense of the environment. Furthermore, it is suggested that Article 1114 implies that environmental considerations should receive priority over encouragement of investments.

Additionally, the scope of Article 1110 is limited by the preamble to NAFTA. The preamble states that parties "undertake each of the proceeding in a manner consistent with environmental protection and conservation". Although there is not consensus in the courts on the interpretation of the language of preambles, it is generally agreed that the preamble language represents the overall philosophy that must be applied by the parties to all provisions of the agreement. Therefore, the broader goal of environmental protection conservation is binding on all parties in their adherence to the specific provisions of NAFTA, including Chapter 11. Although the preamble will not require a member state to prioritize environmental protection over avoidance of expropriation, the preamble could limit Article 1110's ability to deter environmental protection.

In addition to NAFTA itself, there were various side agreements entered into during the negotiations of the NAFTA agreement. The parties to the North American Agreement on Labour Cooperation and the North American Agreement on Environmental Cooperation (NAAEC) now exist. Many of the provisions of NAAEC, which forms a substantive set of obligations for the NAFTA parties in addition to the responsibilities under NAFTA itself, suggests that member states have a duty to ensure environmental protection despite the investor-friendly provision under Article 1110. Furthermore, under the Vienna Convention on Treaties, the NAAEC provides relevant contexts for purposes of interpreting Chapter 11. While such agreements are not direct authority on the meaning of Article 1110, it does help inform a tribunal by providing insight into the overall goals of NAFTA

6.6.2 Kyoto

From December 1st through 11th, 1997, more than 160 nations met in Kyoto, Japan, to negotiate binding limitations on green-house gases for the developed nations, pursuant to the objectives of the Framework Convention on Climate Change of 1992. The outcome of the meeting was the Kyoto Protocol (Ref. 227), in which developed nations agreed to limit their greenhouse gas emissions, relative to the levels emitted in 1990.

The problem the Kyoto Protocol is trying to address is climate change, and more specifically, the speed at which the earth is warming up. Whether the climate is changing is a matter of debate. The United Nations thinks so as do most, but not all, scientists who study climate. The United Nations Intergovernmental Panel on Climate Change (IPCC) summarizes the work of 2,000 of the world's top climate experts. The conclusion is that the world is getting warmer. The IPCC says that the average global surface temperature has risen by about 0.6 degrees Celsius since 1900 with much of that rise coming in the 1990's, which was perhaps the warmest decade in 1,000 years.

The IPCC also found that snow cover since the late 1960's has decreased by about 10 percent and lakes and rivers in the Northern Hemisphere are frozen over about two weeks less each year than they were in the late 1960's. Mountain glaciers in non-polar regions have also been in retreat in the 20th century, and the average global sea level has risen between 0.1 and 0.2 m since 1900.

The IPCC predicts more floods, intense storms, heat waves and droughts. Its study forecasts a rise of 1.4 to 5.8 degrees Celsius in the global mean surface temperature over the next 100 years, with developing countries most vulnerable. Other studies predict even more severe effects. A report commissioned for the World Wildlife Fund predicts dangerous warming of the earth's surface in as little as 20 years, with the Arctic warming so much that the polar ice could melt in the summer by the year 2100, pushing polar bears close to extinction.

The Arctic Climate Impact Assessment predicts that caribou, musk ox and reindeer would find their habitats severely reduced. Northern aboriginal peoples around the world would find their way of life changed forever.

Most scientists think that industrialization is the cause of the warming trend. Certainly, since the early 19th century, the developed countries have been producing ever-increasing volumes of heat-trapping greenhouse gases like carbon dioxide. In addition, developed countries have cleared forests which absorb carbon dioxide.

The six greenhouse gases that Kyoto targets are: carbon dioxide, methane, nitrous oxide, sulphur hexafluoride, hydrofluorocarbons and perfluorcarbons.

Greenhouse gases allow solar radiation to pass through the earth's atmosphere but after the earth has absorbed part of that radiation it reflects the rest back. The greenhouse gases absorb part of this reflected radiation and in doing so; warm up the atmosphere - the greenhouse effect.

While there is agreement that the earth is warming there is not total agreement on the causes. A significant number of scientists are of the opinion that the earth warms and cools in long cycles that have nothing to do with greenhouse gases. Most climatologists, however, agree that global warming is causing significant climate change.

The Kyoto Protocol is considered a first step in reducing greenhouse gases and is not expected to solve the world's climate change problems by the time its first commitment period ends in 2012. Kyoto sets out an agenda for reducing greenhouse gas emissions by 5.2% from 1990 levels. Each country must develop its own strategy to meet its Kyoto commitments and those countries that ratify Kyoto are legally bound to see that their emissions do not exceed the 2008/2012 targets.

The Kyoto Protocol went into effect February 16th, 2005 with 141 countries signing on, including every major industrialized country – except the United States and Australia. The United States is responsible for about a quarter of the emissions that have been blamed for global warming. In addition, two of the world's biggest – and growing – polluters also have not signed on. They are not required to since they are considered to be developing countries and are outside the Protocol's framework.

Canada ratified the Kyoto Protocol in 2002 and is implementing its plan to reduce greenhouse gases as laid out in Action Plan 2000 and the Climate Change Plan for Canada 2002.

On April 13th, 2005, the Government of Canada launched the first phase of Project Green by releasing an updated plan for a healthy environment and a competitive economy: Moving Forward on Climate change: A Plan for Honouring our Kyoto Commitment. This plan provides for Government of Canada investments in the order of $10 billion between now and 2012 to fully realize the anticipated reductions of about 270 megatonnes. Several initiatives were announced in Budget 2005 such as the Climate Fund and the Partnership Fund but at the time of writing, details of these initiatives are not available.

The Government has also announced its intent to put in place regulations under the *Canadian Environmental Protection Act* for Large Final Emitters (the oil and gas, thermal electricity, mining and manufacturing sectors) which will allow for compliance monitoring and emissions trading.

On February 16th, 2005, the Prime Minister announced that Canada will host the Eleventh Conference of the Parties to the United Nations Framework Convention on Climate Change. Consideration of the successor agreement to the Kyoto Protocol is scheduled to begin at this conference.

While the rules are not yet clear, Bilcon of Nova Scotia Corporation will be proactive in its approach to the emission of greenhouse gases in ensuring that equipment employed on the project will incorporate the most up-to-date technology for fuel efficiency and emission controls.

6.6.3 World Biosphere Reserve

Introduction

A biosphere is a unique category of protected area dedicated to solving problems associated with human impacts on natural ecosystems. A model biosphere reserve consists of a protected (core) area, a managed-use area (buffer zone), and a zone of cooperation (transition area).

Biosphere Reserve Status is awarded by the United Nations Educational Scientific and Cultural Organizations (UNESCO) to those protected areas that combine scientific research and monitoring, conservation, education and training. Each site is nominated by its country Man and Biosphere (MAB) Program. The Biosphere reserve designation does not provide any additional international protection to the site nominated. There are approximately 352 biosphere reserves in 87 countries.

A protected area consists of examples of minimally disturbed ecosystems and has secure domestic legal protection. Only activities that do not adversely affect the natural habitat are allowed. The managed use area is adjacent to the protected area and here activities such as fishing, hunting, camping and other activities are encouraged.

The zone of cooperation is a regional size area which contains settlements, croplands, managed forests, recreation areas and other economic uses characteristic of the region. The UNESCO Biosphere Reserve designation does not recognize the zone of cooperation. It is only a suggested concept to promote the establishment of cooperative programs and partnerships between the protected area managers and the surrounding community.

Biosphere Reserves cover a great variety of natural areas of the biosphere, ranging from high mountains to greatly human-impacted plains, from coastal regions and islands to inland forests, from hot deserts to the tundra of the Polar Regions.

Each Biosphere Reserve is intended to fulfill three basic functions:

- A Conservation Function - to contribute to the conservation of landscapes, ecosystems, species and genetic variation;
- A Development Function – to foster economic and human development which is socio-culturally and ecologically sustainable;
- A Logistical Function – to provide support for research;

To qualify for designation as a Biosphere Reserve, an area should normally:

- Be representative of a major biogeographic region, including a gradation of human intervention in these systems;
- Contain landscapes, ecosystems or animal and plant species, or varieties which need to be conserved;
- Provide an opportunity to explore and demonstrate approaches to "sustainable development" within the larger region where they are located;
- Be of an appropriate size to serve the three functions of Biosphere Reserves noted above;
- Have an appropriate zoning system with accompanying legislation.

Individual Biosphere Reserves remain under the sovereign jurisdiction of the countries in which they are located.

6.6.4 Southwest Nova Scotia Biosphere Reserve

The region of Southwest Nova Scotia was designated a Biosphere Reserve in September, 2001 by UNESCO under the MAB program.

The designation recognizes the importance of two large contiguous protected areas in Southwestern Nova Scotia, Kejimkujik National Park and the Tobeatic Wilderness Area, and of the potential in the broader region for multi-sector cooperation and sustainable development. The five counties surrounding these parks are included in the designation on a voluntary basis, as determined by community interest and project development.

There are no land-use or management changes associated with the designation of "Biosphere Reserve", but the designation recognizes beneficial land use already occurring in the region. Lands serving as a buffer function for the core areas of the Biosphere Reserve are managed either by provincial (Department of Natural Resources) or private jurisdiction (e.g. Nova Scotia Power and Bowater Mersey Paper Company), according to a voluntary commitment to support the goals of sustainable development and conservation.

The Southwest Nova Biosphere Reserve Association (SWNBRA) was incorporated in March, 2000 and is a non-profit organization of volunteers from different sectors including academe, government, industry, non-governmental organizations and community members.

6.6.5 Bay of Fundy Biosphere

In 2000, a Biosphere Reserve in the Bay of Fundy was proposed and two organizations, the Bay of Fundy Ecosystem Partnership and the Bay of Fundy Products Club commenced work to explore the potential of a Biosphere Reserve in the upper Bay of Fundy. This was to be the first to span two provinces.

Subsequently, a Bay of Fundy Environmental Partnership Steering Committee and a Working Group were formed to pursue the concept. In a report to the Steering Committee by the Working Group in June, 2003, it was noted that the proposed area of the Biosphere had been scaled back. It had originally proposed that all of the area in the upper bay region would be included, but the size of the area and the complexity of issues proved to be too difficult. It was therefore decided to initiate the project on the New Brunswick side of the upper Bay of Fundy for the time being and take a longer-term view to include additional areas as support and experience grew.

In a report to the Steering Committee in 2004, it was reported that the Fundy Biosphere Initiative was continuing in a development phase. A partnership was being steadily developed, a strategy plan was being developed and information was being gathered to aid in the development of the proposal to be submitted to UNESCO.

Bilcon of Nova Scotia Corporation

Given the extent of Environmental Assessment that has been carried out in the preparation of the Environmental Impact Statement for the Whites Point Project and the relatively low impact of the project as demonstrated in the EIS, Bilcon does not feel that the project contravenes the principles of a proposed Bay of Fundy Biosphere Reserve or the existing Southwest Nova Biosphere Reserve.

Indeed, the level of research carried out during the EIS preparation adds significantly to the level of knowledge of project impacts and amply demonstrates that projects of this type can be successfully carried out without damaging the environment or causing long-term ecological damage.

6.6.6 Gulf of Maine

Gulf of Maine Council

The governors and premiers of the states and provinces bordering the Gulf of Maine created the Council in 1989 as a regional entity to help "protect the Gulf's ecological integrity and the many uses that depend upon its continued good health". Since its formation, the Council has hosted more than forty conferences, workshops and symposia on research, education and policy topics.

Mission Statement

To maintain and enhance environmental quality in the Gulf of Maine and to allow for sustainable resource use by existing and future generations.

Guiding Principles

These principles help guide the Council and participating agencies in their decisions involving the Gulf of Maine ecosystem. Each principle is congruent with other international protocols, as well as state, provincial and national legislation in Canada and the United States.

Ecologically Sustainable Development

The Council seeks to meet the region's current social, cultural and environmental needs without compromising the needs of future generations. Working in partnership with others, it strives to sustain ecological processes and enhance the region's quality of life.

Ecosystem-Based Planning and Management

The Council supports collaborative management that integrates economic and ecological values and objectives, emphasizing natural rather than political boundaries.

Environmental Protection Through Precaution

The Council supports conservation of the coastal and marine environment, and urges its members to proceed with caution when scientific information is incomplete to avoid environmental degradation.

Public Information and Participation

The council is committed to a participatory process that informs and engages the public in setting priorities, forming policies and pursuing efforts to conserve the Gulf's environment.

The Action Plan for 2001 – 2006 (Ref.228) describes the following Goals and Objectives:

Goal I: Protect and Restore Coastal and Marine Habitats

Coastal and marine habitats throughout the Gulf of Maine are healthy and support the Gulf's diversity of plant and animal species.

Objectives

a. Increase awareness and improve management of regionally significant habitats.
b. Increase habitat protection.
c. Increase habitat restoration.
d. Increase awareness and improve management of aquatic nuisance species.
e. Enhance citizen stewardship.

Goal II: Protect Human Health and Ecosystem Integrity

Contaminants in the Gulf of Maine are at sufficiently low levels to ensure human health and ecosystem integrity.

Objectives

a. Increase awareness and improve management of priority contaminants.
b. Identify reduction strategies for priority contaminants.
c. Enhance citizen stewardship.

Goal III: Encourage Sustainable Maritime Activities

The council's vision for 2025 is that marine research and nature-based tourism provide unique and significant opportunities for the region. During the next five years, the Council will create strategies to achieve these new objectives.

Objectives

a. Create and implement a marine research and monitoring agency that responds to pressing management issues and supports regional economic development.
b. Develop and implement a nature-based tourism strategy that sustains the environment and the well-being of the local people.

A Gulf of Maine Summit was held in St. Andrews, New Brunswick in October 2004. The Summit Report, (Ref. 228) notes that the Premiers from Nova Scotia and New Brunswick and the Governors from Maine, Massachusetts and New Hampshire released their *Committing to Change* proclamation calling on the Council to:

- Provide timely and responsive information to decision-makers (including a comprehensive state of the environment reporting and indicators series).
- Accelerate trans-boundary habitat conservation, protection and restoration; and
- Support sustainable maritime activities.

In addition, a series of "Next Steps" was recommended.

Bilcon of Nova Scotia Corporation

As with the intent of biosphere reserves, Bilcon is committed to carrying out the Whites Point project under the precautionary principle and with the highest regard for environmental sustainability. Bilcon will work with the Gulf of Maine Council in achieving its goals or objectives.

6.7 Study Strategy and Methodology

Approach

The overall approach to preparation of the Environmental Assessment/Impact Statement is science based and uses scientific methods of investigation. The scientific research procedure included literature research and most importantly, involved original on-site research. On-site research followed acceptable scientific methods of investigation and in some cases modeling of various environmental components. Research was also conducted through public consultation meetings, traditional community knowledge interviews, community surveys, and community open house meetings. Public involvement has been conducted by Bilcon and others during the past four years of the environmental assessment process.

Strategy

The basic strategy used to guide the Environmental Assessment/Impact Statement preparation was to assemble a professional interdisciplinary team of independent scientists. This team of scientists investigated, according to their discipline, the physical, biological and human resources of the project area. The responsibility of the team was to:

- Conduct research, including literature review and original on-site research
- Analyze data to identify potential environmental values and sensitivities
- Develop mitigation measures to lessen any potential problems identified during the analysis stage
- Develop monitoring programs to verify the effectiveness of the mitigation
- Predict potential positive or negative effects of the project on the environment in time, space and significance
- Identify any residual effects that could not be addressed by mitigation and propose adaptive management procedures
- Determine if any positive or negative effects could contribute significantly to incremental cumulative effects in association with past, present, or future projects within the immediate region.

Methodology

Details of the environmental assessment framework used for the Whites Point Quarry and Marine Terminal is presented in Chapter 8. The methodology follows an ecosystem approach wherever possible, and uses established evaluation criteria (quantitative and qualitative) during the data analysis process. In certain instances, modeling is used to predict potential effects on environmental components.

It should be noted here that the approach to presenting the assessment of the effects of the proposed project on Valued Environmental Components differs from that outlined in the Final Guidelines. Due to the complexity and sheer volume of data contained in the Environmental Impact Statement document, all aspects (research, analysis, mitigation, monitoring, effects prediction, and residual effects) are grouped under each Valued Environmental Component.

This approach is being taken to clearly present the sequence of the methodology used to determine predicted effects, and to facilitate review by the various disciplines involved. Hopefully this presentation will avoid having to sort through various volumes to determine, for instance, what monitoring program is proposed for a specific VEC being reviewed. Additionally, Tables will be provided as required in the Final Guidelines summarizing all mitigation measures, monitoring programs, residual effects and cumulative effects for each VEC.

Acronyms

ANFO	Ammonium Nitrate/Fuel Oil
CEAA	Canadian Environmental Assessment Act
CEAR	Canadian Environmental Assessment Registry
CEK	Community Environmental Knowledge
CEPA	Canadian Environmental Protection Act
CLC	Community Liaison Committee
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
DFO	Department of Fisheries and Oceans
EA	Environmental Assessment
EC	Environment Canada
EIS	Environmental Impact Statement
GHG	Green House Gas
GPS	Global Positioning System
MEKS	Mi'kmaq Ecological Knowledge Study
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
NAFTA	North American Free Trade Agreement
NP	Nurse Practitioner
NSCC	Nova Scotia Community College

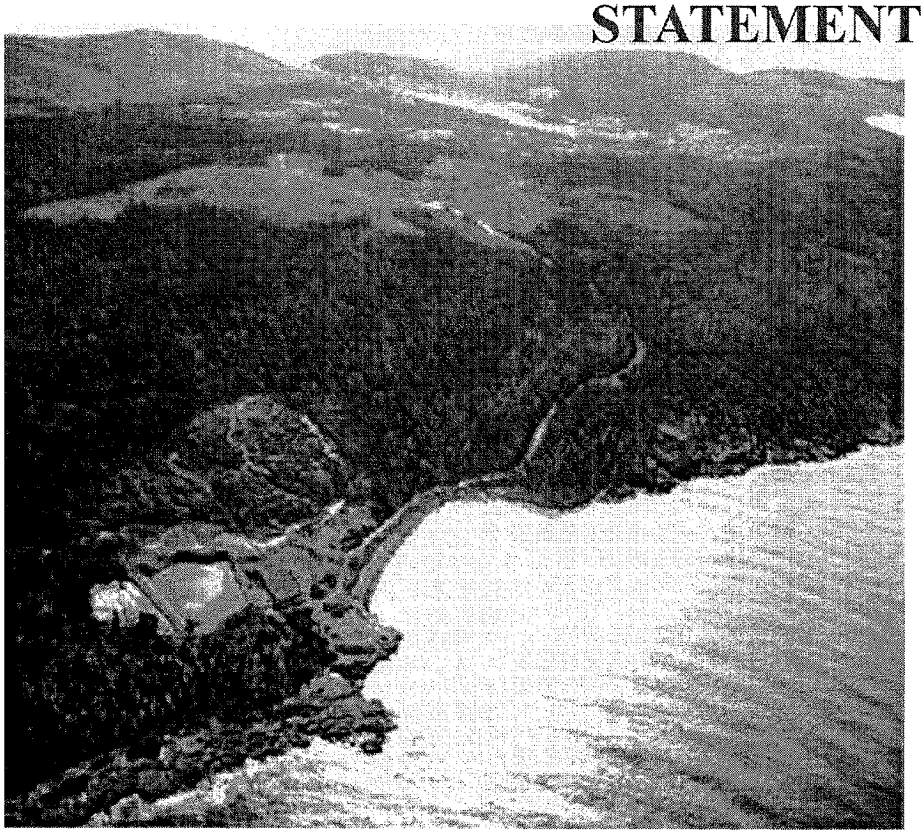
Acronyms

NSDNR	Nova Scotia Department of Natural Resources
NSDEL	Nova Scotia Department of Environment and Labour
NSDOH	Nova Scotia Department of Health
NSEA	Nova Scotia Environmental Act
NSPI	Nova Scotia Power Incorporated
NSTPW	Nova Scotia Department of Transportation and Public Works
NWPA	Navigable Waters Protection Act
PWGSC	Public Works and Government Services Canada
RA	Responsible Authorities
SARA	Species at Risk Act
TCK	Traditional Cultural Knowledge
TK	Traditional Knowledge
TOR	Terms of Reference of the Panel
VEC	Valued Environmental Component
WHIMIS	Workplace Hazardous Materials Infomation System
WVDA	Western Valley Development Association

VOLUME V
CHAPTERS 7 & 8

WHITES POINT QUARRY & MARINE TERMINAL

ENVIRONMENTAL IMPACT STATEMENT



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7.0 PROJECT DESCRIPTION

The Whites Point quarry is a basalt rock quarry with a marine terminal for shipping processed aggregate products. Major components include a physical plant area for processing, screening, washing, and stockpiling aggregate products and a ship loading facility consisting of mooring dolphins, radial arm ship loader, and conveyors – see **Figures 1 and 4.**

Land based infrastructure and activities will include the quarrying of approximately 300 acres of the 380 acre site over 50 years. Annual production of aggregate products is estimated to be 2 million tons. Rock would be extracted by drilling and blasting, then loaded, transported, crushed, screened, washed, and stockpiled at the processing plant area. The plant area comprises approximately 27 acres and is located 30 m above sea level. Other land based infrastructure includes quarry roads, a compound area comprising approximately 5 acres, and dyked organic and sediment disposal areas comprising approximately 30 acres each. All land development and activities will take place within the 380 acre site.

An integral aspect of the land based development is an environmental preservation zone, approximately 30 m wide which will separate the quarry area from adjacent properties. Landward from the environmental preservation zone along the coast, environmental control structures will be developed. These environmental control structures will consist of drainage channels, sediment retention ponds, and constructed wetlands. Also, on the uplands, dyked disposal areas for organic and sediment storage will be constructed. Incremental reclamation of disturbed areas is proposed approximately every five years.

Water based infrastructure and activities will include the ship loading of approximately 40,000 tons of aggregate weekly. Aggregate would be loaded into the hulls of bulk carriers for shipment to New Jersey. Marine infrastructure including conveyors, radial arm ship loader, and mooring dolphins would be constructed over the water and supported by pipe piles anchored to the bedrock in the intertidal and nearshore waters. The ship loading facilities will require a 10 acre water lot lease and extend approximately 200 m into the Bay of Fundy. Water depth at the mooring dolphins would be approximately 16 m below chart datum.

The pipe pile construction technique used to support the marine facilities minimizes alteration to fish habitat. Minimal effects on bottom habitat and tidal movements will result from this construction method. As a result, no dredging or dredge disposal, or fill will be placed in the intertidal or nearshore marine waters.

Electricity would be the primary energy used for operating the land and marine facilities. Diesel fuel will be used for mobile equipment such as loaders and trucks. Ammonium nitrate-fuel oil based explosives will be used for blasting. Water for aggregate washing will be obtained from storage of surface water runoff and recycled after the washing process. Waste oil from the mobile equipment will be recycled and used as fuel for heating the compound area buildings.

7.1 Need for, Purpose of, and Alternatives to the Proposed Project

The following sections address the "Need for", "Purpose of", "Alternatives to", and "Alternative Means" as presented in the Canadian Environmental Assessment Agency's Operational Policy Statement OPS-EPO/2-1998 (Ref. 197). These sections are presented from a private sector proponents perspective. Alternatives To and Alternative Means are, at this stage of project development, broad in scope and conceptual in context.

Bilcon of Nova Scotia Corporation is a private, family owned business. Its parent company Clayton Concrete Block and Sand manufactures concrete products in New Jersey. Bilcon needs a source of raw aggregate materials that is not subject to market fluctuations or market disruptions. Their development of the Whites Point quarry could satisfy this need for the next 50 years. Thus, the fundamental rationale for development of this quarry is to supply a stable "fixed market" with a raw material necessary for their manufacturing processes. The importance of achieving market stability cannot be overstated. Clayton Concrete Block and Sand presently purchases aggregate on the "open market". In order to ensure a dependable, uninterrupted supply, not subject to inconsistencies, Clayton Concrete Block and Sand, through Bilcon, intends to develop and control their own supply of aggregate exclusively for Clayton Concrete Block and Sand. In essence, this stability of a guaranteed market eliminates the instability of the competitive market place which has contributed to the demise of other mining ventures in Nova Scotia.

The main function of the quarry will be to produce aggregates for Clayton Concrete Block and Sand to manufacture concrete and value added concrete products. Since this is an export product, competition with local and regional quarries will not be a factor. In fact, construction and operation of the Whites Point quarry, without public money, will generate stable local, regional, and provincial economic benefits over the next 50 years. During operation, a stable employment environment will be created. Thirty-four, high paying, full time jobs will be realized in the regional area accompanied by local economic diversification. Diversification has been recognized as a corner stone for sustainability of rural coastal communities.

"Alternatives to" the project is defined as functionally different ways to meet the project need and purpose, from the perspective of the proponent – OPS-EPO/2-1998 (Ref 197). Clayton Concrete Block and Sand presently recycles used concrete and other construction materials to supplement their demand for raw aggregate materials. Unfortunately the supply of recyclable materials does not meet their needs or provide a stable supply. Therefore the company is investigating alternatives to their present aggregate supply which will return an economic benefit to the company. Alternatives include purchasing aggregate on the open market and developing their own quarry to supply their needs.

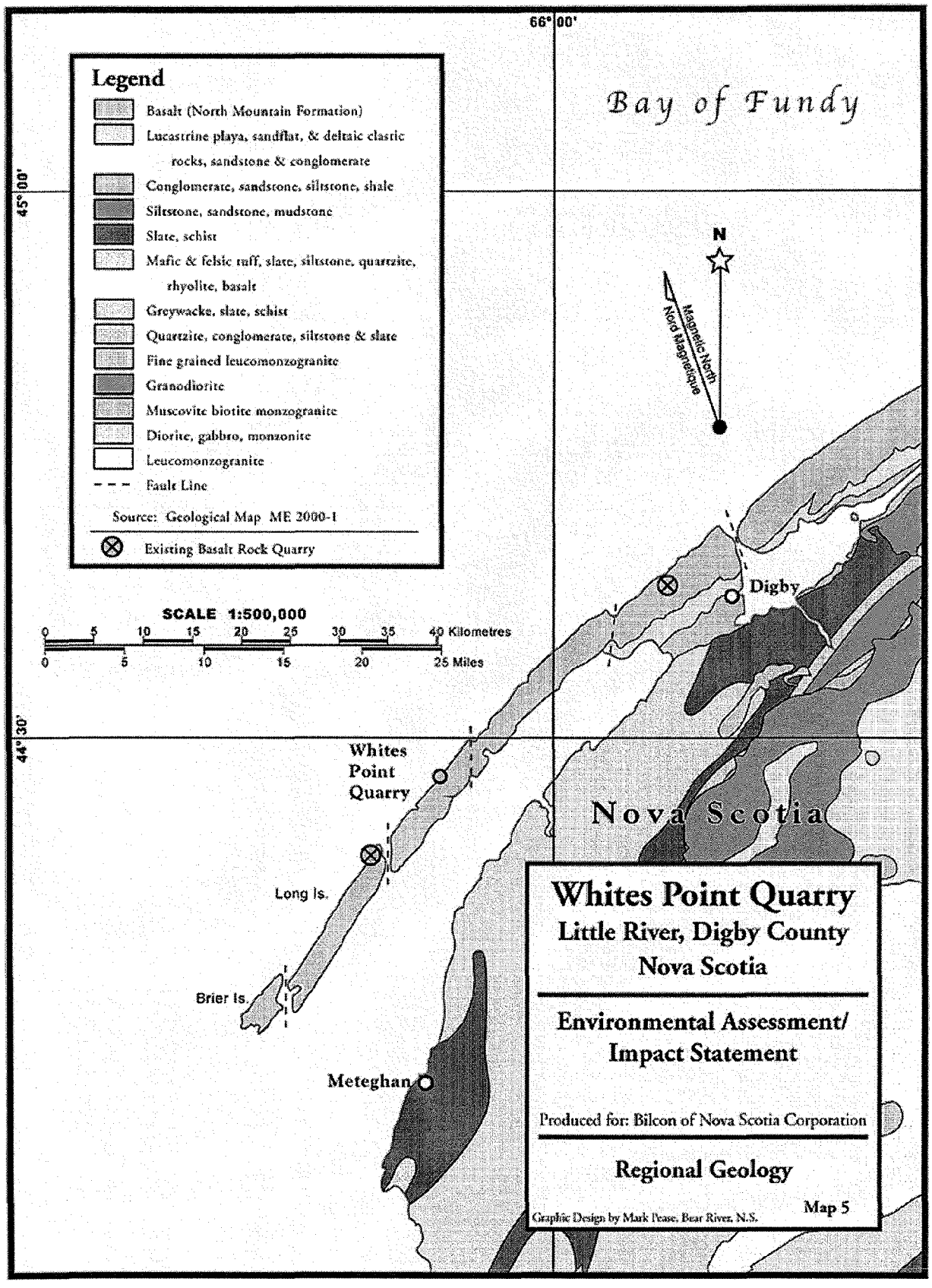
The "do nothing" alternative will not result in a viable economic diversification opportunity for the Digby Neck and region. Past land use of the proposed Whites Point quarry site has included historic use as a pit, farming, boat haul-up, unmanaged forest lands, and recently clear cutting. These past land uses have provided little or no economic diversification benefits for the local and regional area. Without a Planning Strategy in place for Digby County and much of the land in absentee ownership, these historic land use trends are likely to continue into the near future.

Alternative quarry sites were investigated in the Atlantic Provinces and Nova Scotia. These investigations included preliminary literature research and on-site evaluation of the existing physical, biological, and socio-economic conditions. General categories of criteria used at this stage of alternative evaluation included:

- Suitability of the geological resource
- Availability and size of land base
- Proximity to residential development
- Adequacy of transportation systems
- Engineering feasibility
- Economic diversity and sustainability
- Social/cultural health and quality of life
- Unique heritage resources
- Presence of species at risk and biodiversity
- Quality of fish habitat and wetlands

Preliminary evaluation of alternative sites on a provincial scale indicated certain sites possessed some negative attributes based on the general criteria categories mentioned above and were rejected at this stage of investigation.

On a regional scale, potential alternative locations for basalt rock quarries exist throughout the North Mountain Basalt Formation which extends from Brier Island to Cape Blomidon, see **Map 5** – Regional Geology. During preliminary investigations, alternative basalt rock quarry sites were investigated in this region. Several basalt rock quarries presently operate in Digby and Annapolis Counties. After preliminary regional studies concerning environmental sensitivities, subsurface investigations, and economic development costs, Whites Point was selected for further study. During the permitting process for the 3.9 hectare quarry in 2002, on-site environmental surveys were conducted. This information forms the basis of the rationale presented below.


66° 00'
45° 00'
44° 30'
Bay of Fundy
Legend
Basalt (North Mountain Formation)
Lucastrine playa, sandflat, & deltaic clastic rocks, sandstone & conglomerate
Conglomerate, sandstone, siltstone, shale
Siltstone, sandstone, mudstone
Slate, schist
Mafic & felsic tuff, slate, siltstone, quartzite, rhyolite, basalt
Greywacke, slate, schist
Quartzite, conglomerate, siltstone & slate
Fine grained leucomonzogranite
Granodiorite
Muscovite biotite monzogranite
Diorite, gabbro, monzonite
Leucomonzogranite
Fault Line
Source: Geological Map ME 2000-1
Existing Basalt Rock Quarry
N
Magnetic North
Nord Magnetique
SCALE 1:500,000
0 5 10 15 20 25 30 35 40 Kilometres
0 5 10 15 20 25 Miles
Digby
Whites Point Quarry
Nova Scotia
Long Is.
Brier Is.
Meteghan
Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/ Impact Statement
Produced for: Bilcon of Nova Scotia Corporation
Regional Geology
Map 5
Graphic Design by Mark Pease, Bear River, N.S.

Following are the general reasons for selection of the Whites Point site.

- Feasible water depth for the location of a marine terminal to ship aggregates rather than trucking through rural communities.
- The quarry could be developed and not be visible from Highway 217, a seasonal tourist route. Permitted quarries in nearby Tiverton and Seabrook are highly visible from Highway# 217.
- Whale watching tours, recreational boating or adventure boating in the Bay of Fundy presently do not frequent the nearshore waters in the Whites Point area.
- A minimal depth of overburden exists on the site, especially below the 45 m land elevation, which limits the potential for sediment production.
- Minimal nearshore sediment deposits exist, especially within the area of the proposed marine terminal construction, which will limit the potential for turbidity production during construction.
- Construction of the marine berthing facilities will be on bedrock thereby eliminating the necessity for dredging and dredge material disposal during construction and operation.
- No salmonid fresh water fish habitat exists within the active quarry site.
- Nationally, this region is in the lowest category of wetlands and provincially, the quarry site possesses no significant wetlands.
- The quarry is located so ship traffic to and from the marine terminal avoids passing through the designated conservation area of the endangered North Atlantic right whale.
- Winter refuge areas for the Harlequin duck, a species of concern, do not exist along the quarry coastline.
- No spawning rivers for the endangered inner Bay of Fundy (iBoF) salmon exist on the site and the probability of migrating iBoF salmon passing along the quarry shoreline is extremely unlikely.
- The geology of the quarry possesses high quality basalt rock, is of simple and stable character, of volcanic origin with limited permeability, and highly stable cut face integrity.

- Nationally, the quarry site is located in an area of low seismic hazard and no earthquakes have been recorded on Digby Neck.

- Provincially, the quarry site is highly unlikely to contain artifacts or heritage values of archaeological significance.

Any quarry site located in this region could present environmental and socio-economic ramifications. During the following detailed environmental assessment/impact analysis, the Whites Point site did not present any likely significant adverse (negative) impacts that could not be mitigated with currently available technology or project management/ operational procedures. The above reasons for site selection present an overview. Clearly, the preferred alternative, based on the general categories of criteria, which meets the need for the project and achieves the purpose of the project, is development of the proposed quarry site at Whites Point. The complete, documented rationale and analysis is contained in subsequent sections of the Environmental Impact Statement.

7.2 Alternative Means of Carrying Out the Project

Alternative means for accomplishing the major components of the proposed project – land based quarrying and marine terminal construction and operation were investigated. This investigation included alternative means that are deemed to be technically and economically feasible.

The land based portion of the quarry and associated infrastructure is located primarily on previous disturbed lands (abandoned gravel pit, clear cut area, and the recently cleared 3.9 hectare quarry site). Buffer areas in the form of an environmental preservation zone surround the quarry operation. Sensitive and valued environmental components are included in the preservation zone. The quarry site comprises 380 acres with approximately 300 acres scheduled for development. Incremental reclamation procedures are proposed with priority along the coastline to provide a greater visual and environmental buffer along this sensitive zone.

Land based quarrying of this type of massive, hard, volcanic flow of basalt rock generally includes drilling and blasting rock faces. This means is considered to be the industry standard for this type of basalt to produce the proposed production of 2 million tonnes per year. The unfractured, massive nature of the rock structure existing on the Whites Point site basically precludes alternative means or methods of rock extraction such as ripping or auguring. However, alternative methods and processes for blasting and explosive use were investigated. In this regard, all blasting will be done to exceed the guideline criteria stated in "Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters". Blast patterns, timing of delays, weight of explosives, and setbacks from the marine environment will be conducted in a conservative manner.

Also, rock processing will be enclosed and use the latest technologies to minimize noise such as rubber screens, and to minimize air borne particulates with closed circuit washing.

Environmental preservation zones around the quarry site in many places exceed the minimum regulatory requirements of the Nova Scotia Department of Environment and Labour.

Incremental reclamation procedures will also be implemented. Implementation procedures and compliance with regulatory requirements indicate no likely significant adverse (negative) impacts will result from quarrying that could not be mitigated with currently available technologies.

Existing marine infrastructure does not exist along the coastline of the proposed quarry site. As well, no known marine infrastructure presently exists within the region with the required ship loading capability. However, marine terminal location and construction

methods were investigated to reduce marine habitat disruption and existing commercial fishing patterns. Alternative means of construction included in water blasting and dredging, rock fill, and pipe pile construction methods. Due to the sensitivities of the marine environment, blasting and dredging in the intertidal zone and nearshore waters was ruled out. Rock fill as part of marine terminal construction was also ruled out due to habitat and nearshore current alteration associated with fill placement. Also, rock fill construction could result in excessive turbidity during placement. The least intrusive alternative – pipe pile construction – was therefore selected and is expected to produce no net loss of marine habitat that cannot be compensated. This proposed construction method will not result in a likely significant adverse (negative) impact.

Associated with the quarry operation is the means of transporting quarry products. Land transport by rail is not an alternative since rail lines in this region have been abandoned and removed. Land transportation using trucks is an alternative for transport of product to an existing marine terminal. This means was ruled out due to the excessive distance to a suitable existing marine terminal capable of handling the quarry products. Fossil fuel consumption and emissions contributing to "greenhouse gases" as well as probable social/ community disruptions also supported ruling out truck transportation. Water transportation was judged to involve the least social and environmental impact and be the most cost effective method of quarry product transportation. Proposed shipping routes are planned to use designated shipping lanes and avoid sensitive marine mammal habitat in U.S. and Canadian waters. More specifically, routes will avoid designated endangered Right Whale conservation areas and critical habitat in U.S. and Canadian waters. The selected alternative transportation means will not result in a likely significant adverse (negative) impact.

The above discussions identify feasible economic and technical alternative means of carrying out the major components of the proposed project (quarrying, marine terminal and shipping). Whenever applicable guidelines, regulations, or standards present quantitative criteria or thresholds, these were used to determine the least environmental effect of alternative means. Also, comparable projects that have been in operation with ongoing monitoring have been used as applicable to the proposed Whites Point quarry and marine terminal. However, at the stage of alternate means selection, qualitative criteria in conjunction with community traditional knowledge and multidisciplinary team professional judgment is heavily relied upon. Beneficial and adverse effects for the selected alternate will be presented in the following sections of this Environmental Impact Statement.

Options considered for the location and timing of project construction, especially marine construction, is proposed to avoid sensitive biological areas and life cycle periods. Sediment retention ponds are proposed to be constructed before land clearing begins and will be located in the abandoned pit area. Recently clear-cut areas will be used for

temporary holding areas for stripped organic materials and for sediment disposal until needed for reclamation purposes. The selected site for the quarry compound area is proposed within the recently clear-cut area. Since the life of the project is 50 years, much of the existing undisturbed terrestrial habitat will be maintained until required for quarrying.

Proximity of sufficient water depth within a reasonable distance to the land influenced the location of the marine terminal. Fish habitat in the intertidal and sublittoral marine zones influenced the choice of pipe pile marine construction rather than an infill alternative to reduce the amount of fish habitat disturbed. Disruption of nearshore currents will be minimized as compared to the infill alternative.

Recycling of surface water runoff into the proposed closed circuit wash water system eliminates the need for deep well water supply for aggregate washing and dust suppression. Recycling of organic overburden materials as new on-site quarry areas are opened is proposed. Organic materials will be mixed with sediment materials to create the soil for the proposed incremental reclamation process. Also, used oil from mobile quarry equipment is proposed to provide fuel for heating the quarry shop and office buildings. Clarification of wash water will be accomplished using flocculants as an integral part of the closed circuit wash water system.

Alternatives for ship loading include trucking aggregate materials to an existing marine facility or directly to the market. Both of these alternative means are not cost effective. The timing and scheduling of ship loading is dependent upon processing capacity. Loading of ships once per week coincides with production and stockpiling capacity.

Alternative means of transporting aggregate products from the Whites point Quarry by ship were investigated. Two alternative methods of shipping, one by a Bilcon of Nova Scotia Corporation owned bulk carrier, another by a "common" bulk carrier such as a ship owned by Canadian Steamship Lines. An advantage of an "owner" bulk carrier is a more dependable schedule of product shipment to a designated port in the northern New Jersey area. Also, the duration of the round trip from the Whites Point Marine Terminal would meet the scheduled weekly demand for delivery. At this time, the feasibility of a Bilcon owned bulk carrier was dismissed due to the long wait time for construction of a new bulk carrier and the cost at this initial stage of project development.

Options for reclamation and decommissioning (closure), assuming a 50 year project life, include reclamation when the quarry is scheduled for closure. This alternative means was rejected in favour of incremental reclamation for visual and environmental quality reasons. Decommissioning options could include not removing the marine terminal infrastructure and adapting for current (2056) marine demands. Other land use options would be investigated depending on demand at that time.

Mitigation measures for alternative means were evaluated during the analysis and selection of the preferred means of construction and operation. After selecting the means with the least environmental effect, in conjunction with feasible and technically achievable mitigation measures, the preferred means was determined. These selected means will be further analyzed in subsequent component sections of this Environmental Impact Statement.

Criteria are generally defined as a "standard, rule, or test by which a correct judgment can be made". Alternative selection used customized criteria for this type of rock quarry since criteria specific to analyzing alternatives to rock quarries are not readily available. Therefore, generalized criteria from the literature were adapted. A summary of these sources and their applicability is presented below.

Ratcliffe (Ref. 160) proposed the following criteria for evaluating sites in Britain. These criteria were adopted by the Nature Conservancy Council (NCC) to protect a representative cross section of British habitat types and ecosystems of international importance. These consist of six primary criteria and four secondary criteria.

Primary criteria

Size of habitat or site
Diversity
Naturalness
Rarity
Fragility/sensitivity
Typicalness

Secondary criteria

Recorded history
Position in an ecological/geographical unit
Potential value
Intrinsic (or aesthetic) appeal

Dickson, Kern, Ruska, Cairns (Ref. 109) discusses criteria to evaluate quantitative and qualitative environmental component data such as diversity and productivity. They also propose a "working set of criteria that can be applied to each component of the assessment", and where a "uniform set of criteria cannot be established, each discipline be required to identify and carefully define criteria used in making value judgments".

National Energy Board Filing Manual (Ref. 203) suggests the following criteria for evaluation of likelihood and significance of residual adverse effects:

- Direction
- Magnitude
- Duration
- Frequency
- Spatial extent
- Reversibility
- Probability of occurrence
- Permanence; and
- Ecological context

And when defining significance, the use of clear criteria based on the:

- Magnitude
- Duration
- Geographic extent; and
- Degree to which the adverse effects are reversible or irreversible.

Ohio Biological Survey (Ref. 93) established generalized criteria for the evaluation of eighteen environmental components to determine their significance. Significance categories included the following:

- International/national significance
- Statewide/regional significance
- Local significance
- Degraded features

Evaluation criteria were developed for each environmental component by discipline to fit the above significance categories.

In addition to the criteria mentioned above, regulatory criteria which establishes acceptable thresholds, are used whenever possible to provide quantitative analysis of potential adverse or beneficial effects.

Traditional community knowledge (TCK) was gathered through individual personal contacts, while public involvement helped identify and select alternative means for construction and operation through the Community Liaison Committee.

7.2.1 Potential Environmental Effects on the Project

The location of the quarry and marine terminal on the Bay of Fundy coastline presents the possibility of potential adverse natural forces such as tides, wind, wave action, and storm surges. These individual and potential combinations of forces will present the greatest effect on components of the marine terminal (conveyor, ship loader, and berthing dolphins). Preliminary investigations and engineering indicates that the structural systems chosen will be capable of withstanding these natural forces. Detailed design studies will be conducted to ensure adequate infrastructure over the 50 year life of the project.

Land based components of the quarry infrastructure will be located above the 10 m contour elevation and above the coastal flood plain. No significant streams or rivers exist on the site, thus no freshwater flood plains present potential adverse changes to the land based development as a result of extreme rainfall events. Positive surface drainage will be maintained on the quarry site with drainage ways and sediment retention ponds designed for 10 year flood events.

Fog and atmospheric inversions may influence the timing of blasting activities at the quarry. Blasting will not be conducted during periods of fog or atmospheric inversions and will be delayed until clear weather prevails.

This area of the Bay of Fundy is ice free and ice should not pose a navigational hazard.

7.3 The Project

The Whites Point quarry is a small, basalt rock quarry designed to produce 40,000 tons of aggregate products per week and approximately 2 million tons per year over a 50 year project life. Construction is expected to begin in 2006. The quarry is located on Digby Neck in Digby County, Nova Scotia along the Bay of Fundy. Regional location of the quarry and marine terminal is shown on **Map 1.**

The major infrastructure components include a rock processing plant, environmental control structures, marine terminal/ship loading facility and a compound area – see **Figures 1, 2, 3, and 4.** This infrastructure is proposed for construction during 2007 – 2008. Construction and operation plans of the quarry in five and ten year increments are outlined on **Plans OP 1-8.** Permanent infrastructure (roads, processing plant, marine terminal, compound area, and utilities) are proposed. No temporary facilities are proposed at this time.

For a more detailed discussion of construction, operation and maintenance, modifications and decommissioning and reclamation see **paragraphs 7.7, 7.8, 7.9, and 7.10.**

It is anticipated at this time that the marine terminal will only be used for berthing of ships to be loaded with quarry products. During quarry operation, the marine terminal could be used in the event of an emergency in the Bay of Fundy. During and after decommissioning of the quarry, the berthing facilities will be evaluated for further use as a marine facility based on market demand.

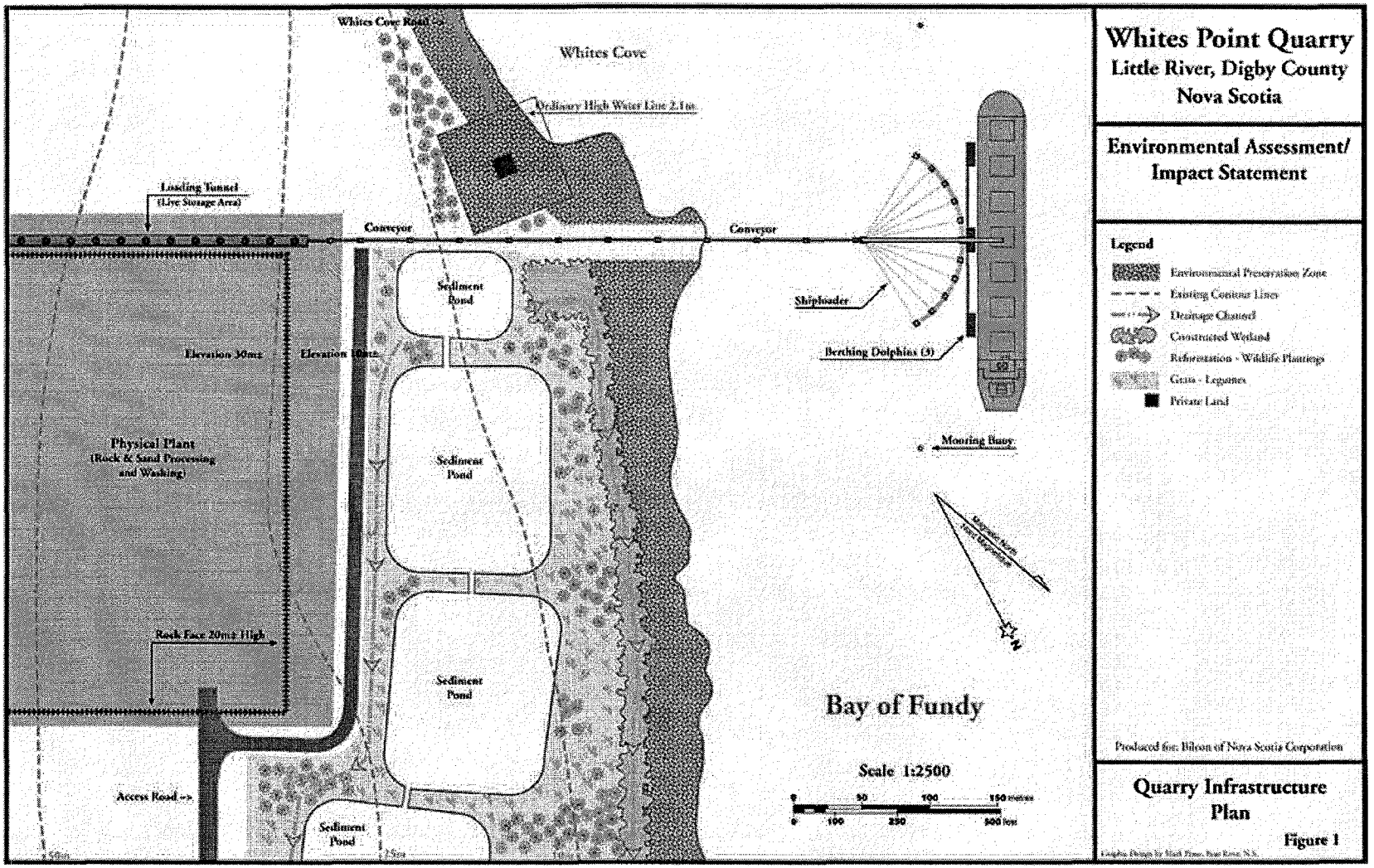
The overall site plans illustrating quarry infrastructure development over the 50 year life of the project (**Plans OP 1-8**) are presented at the same scale (1:10 000) as many subsequent physical, biological, and human resource plans. This is a rather elementary, two dimensional method which facilitates "overlaying" development and resource maps to identify compatibility or conflict.

The boundary of the quarry property in relation to adjacent properties, roads, and land use is shown on **Map 2** Properties with domestic water wells are shown on the same map. No rail lines presently exist in the project region.

Designated inbound/outbound shipping lanes in the Bay of Fundy, along with the proposed ship route to and from the marine terminal are shown on **Map 4.**

Existing land use adjacent to the project is generally rural residential with limited commercial and industrial uses in the village of Little River. Buildings by type within 4 km of the quarry property are shown on **Maps 3 A, 3B, 3C, 3D, 3E.** Businesses and services for the community of Digby Neck are identified on **Maps 6A and 6B .**

C0001-435



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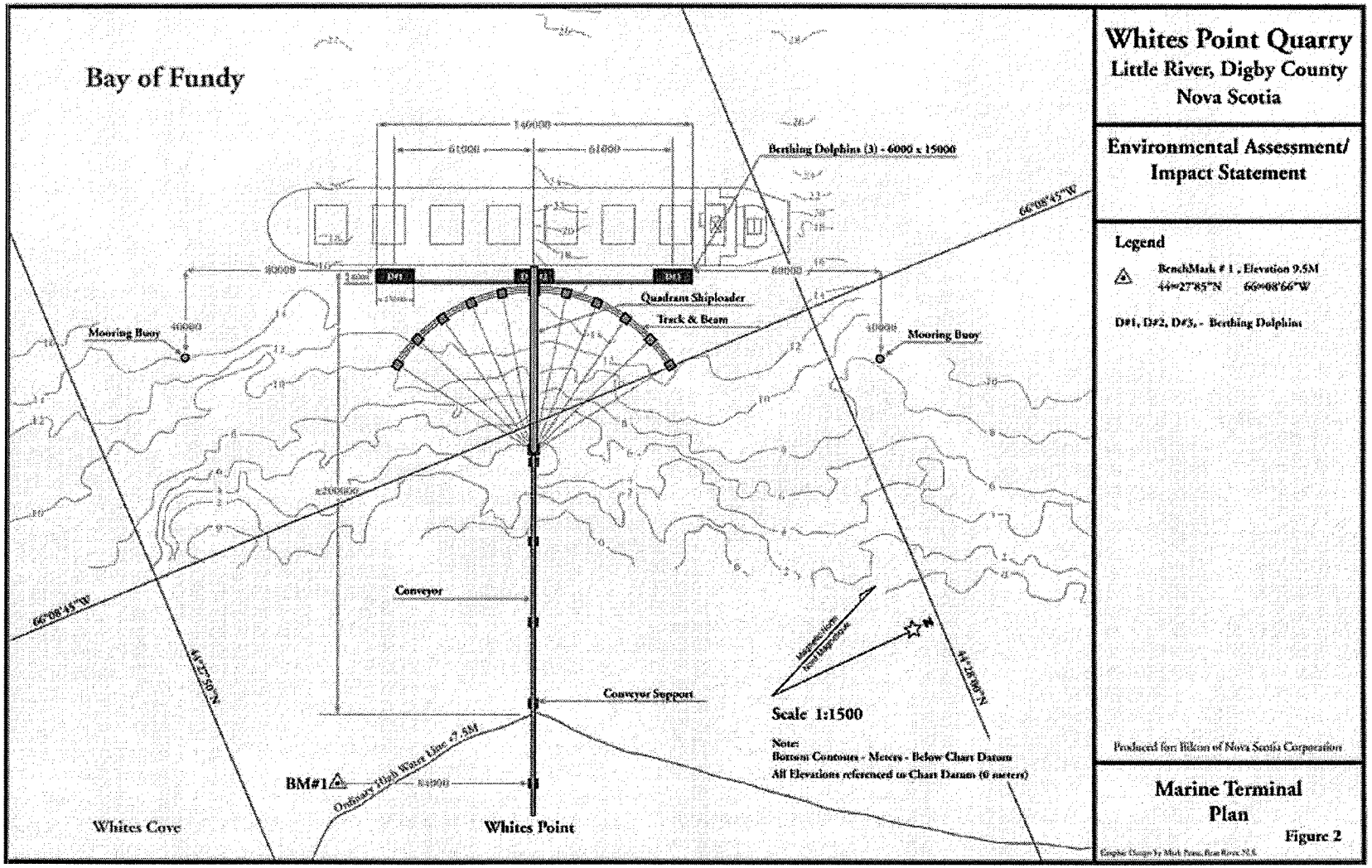
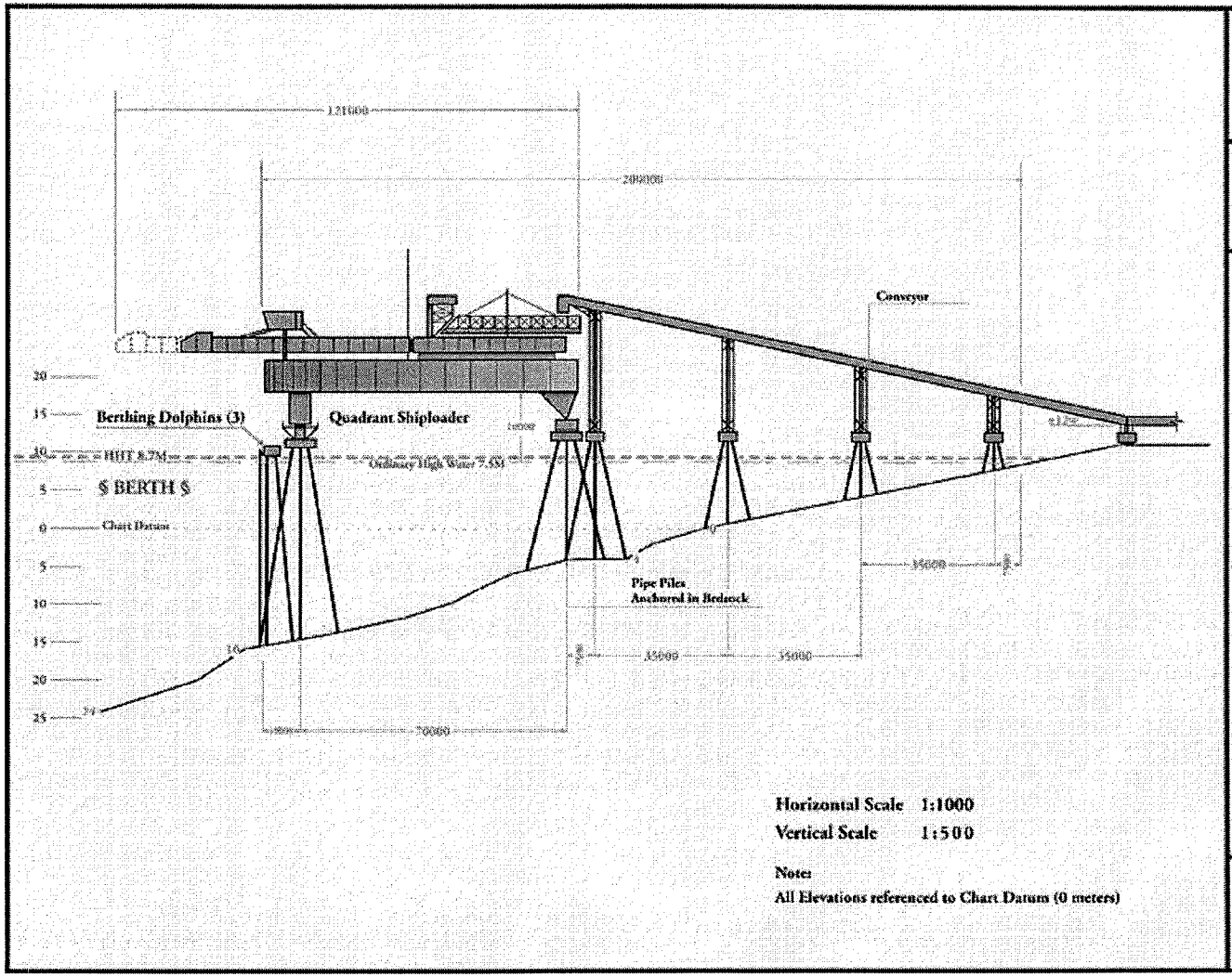

Bay of Fundy
Berthing Dolphins (3) - 6000 x 15000
Quadrant Shiploader
Track & Beam
Mooring Buoy
Mooring Buoy
Conveyor
Conveyor Support
66°08'45"W
66°08'45"W
44°27'90"N
44°28'00"N
Scale 1:1500
Note:
Bottom Contours - Meters - Below Chart Datum
All Elevations referenced to Chart Datum (0 meters)
BM#1
Ordinary High Water Line +7.5M
Whites Cove
Whites Point
Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/
Impact Statement
Legend
BenchMark # 1 , Elevation 9.5M
44°27'85"N 66°08'66"W
D#1, D#2, D#3, - Berthing Dolphins
Produced for: Bilcon of Nova Scotia Corporation
Marine Terminal
Plan
Figure 2

C0001-437



Horizontal Scale 1:1000
Vertical Scale 1:500

Note:
All Elevations referenced to Chart Datum (0 meters)

Whites Point Quarry
Little River, Digby County
Nova Scotia

Environmental Assessment/ Impact Statement

Produced for: Bilcon of Nova Scotia Corporation

Marine Terminal Elevation

Figure 3

Graphic Design by Mark Frase, Truro Heights, N.S.

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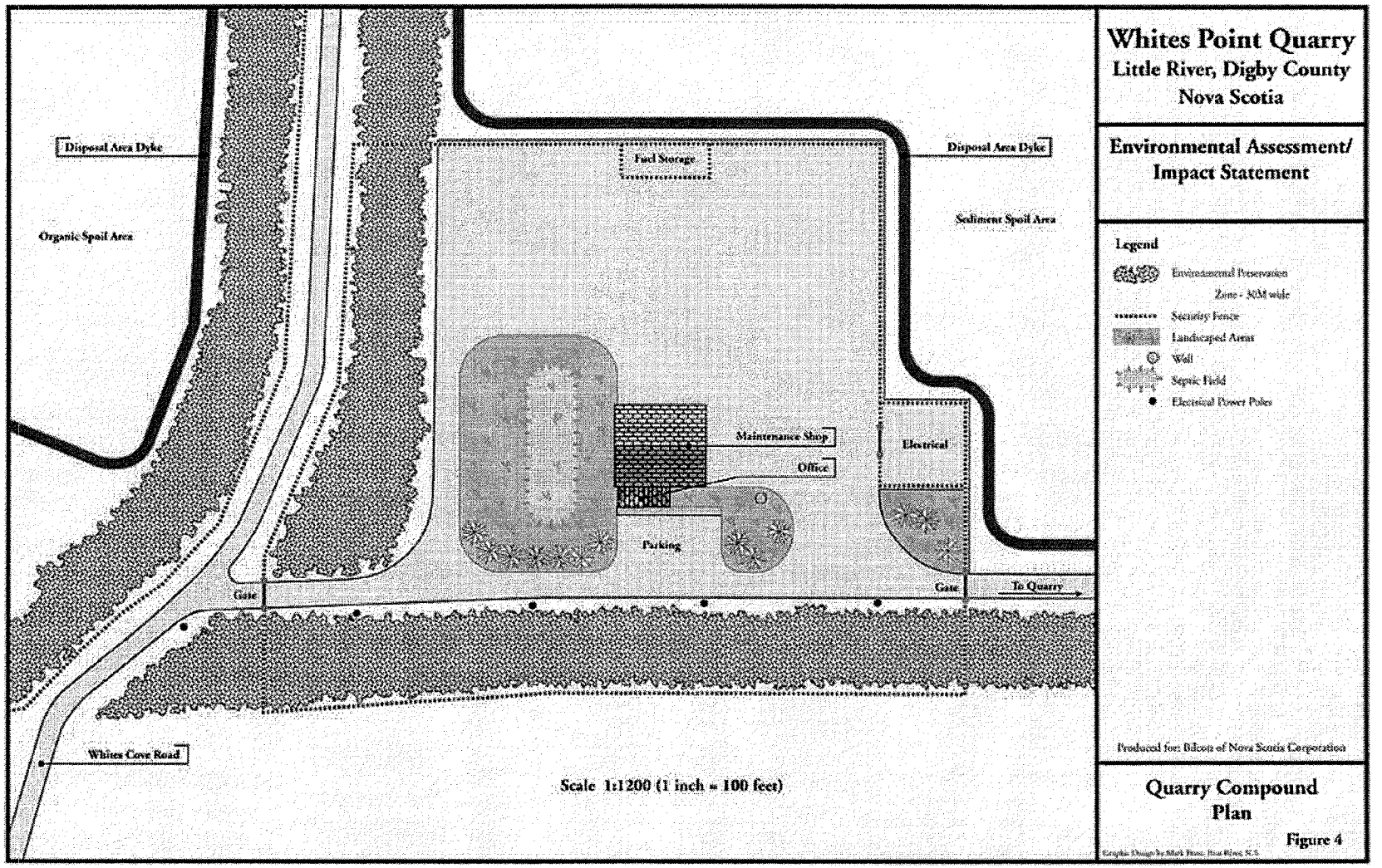

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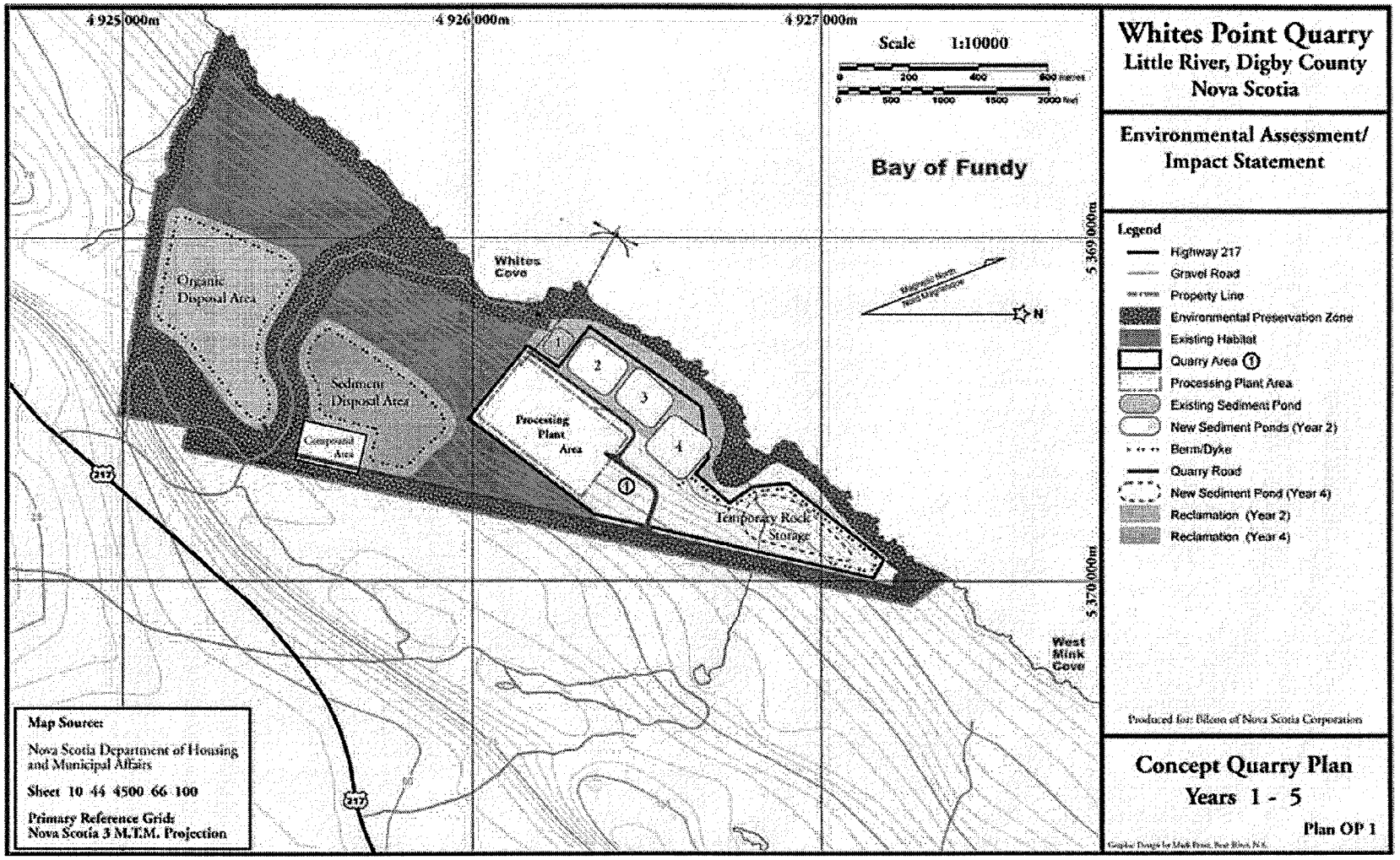

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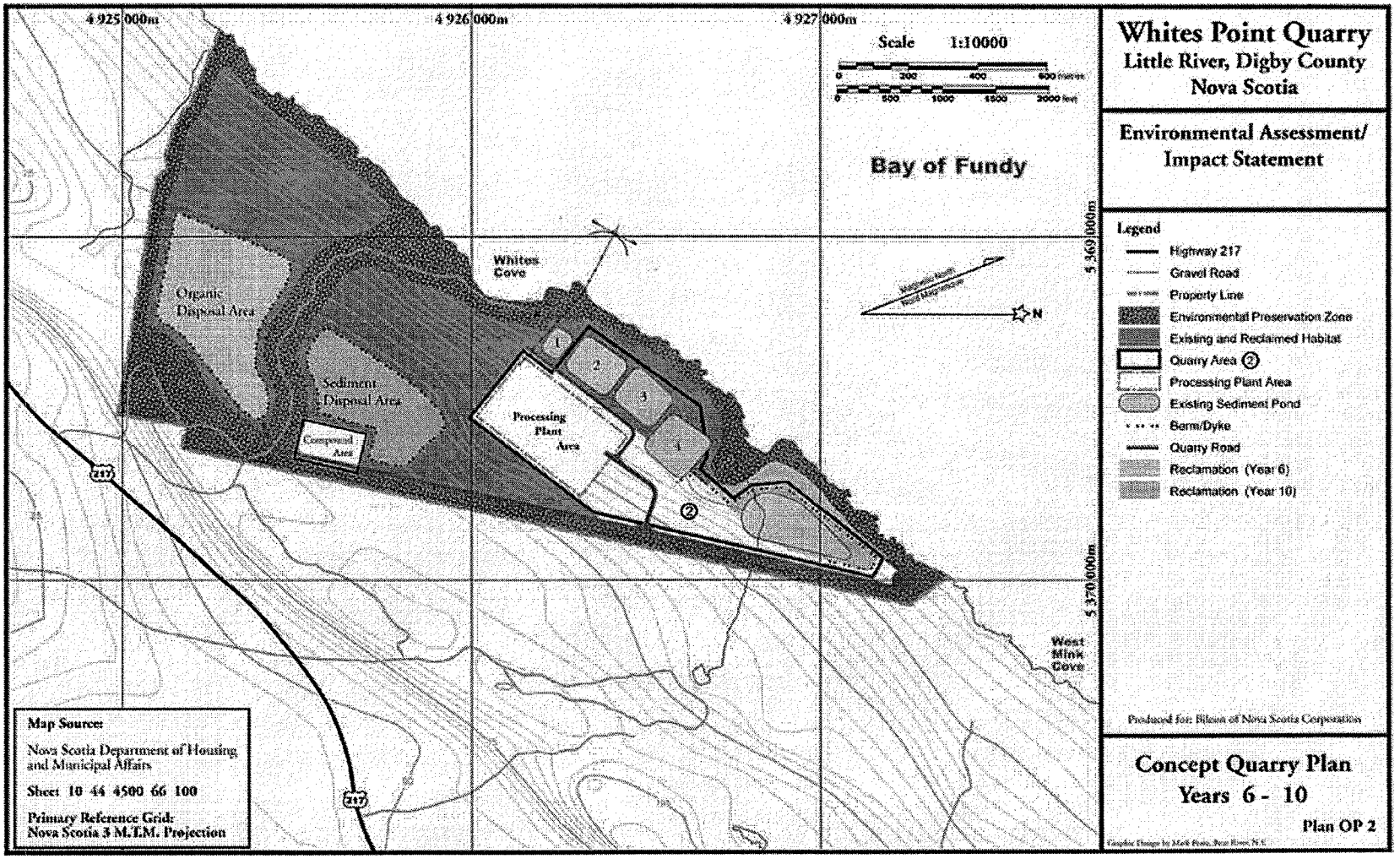

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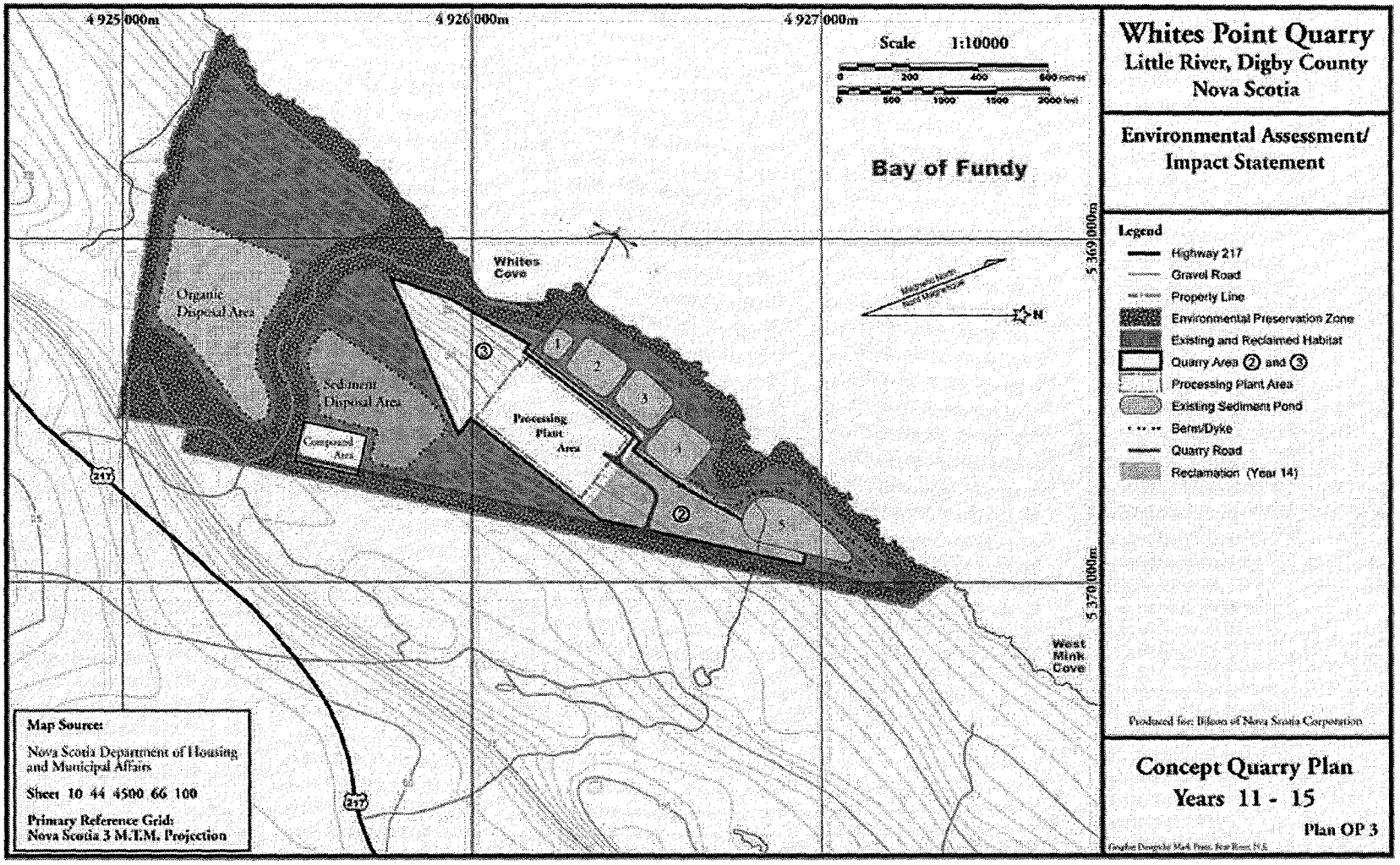

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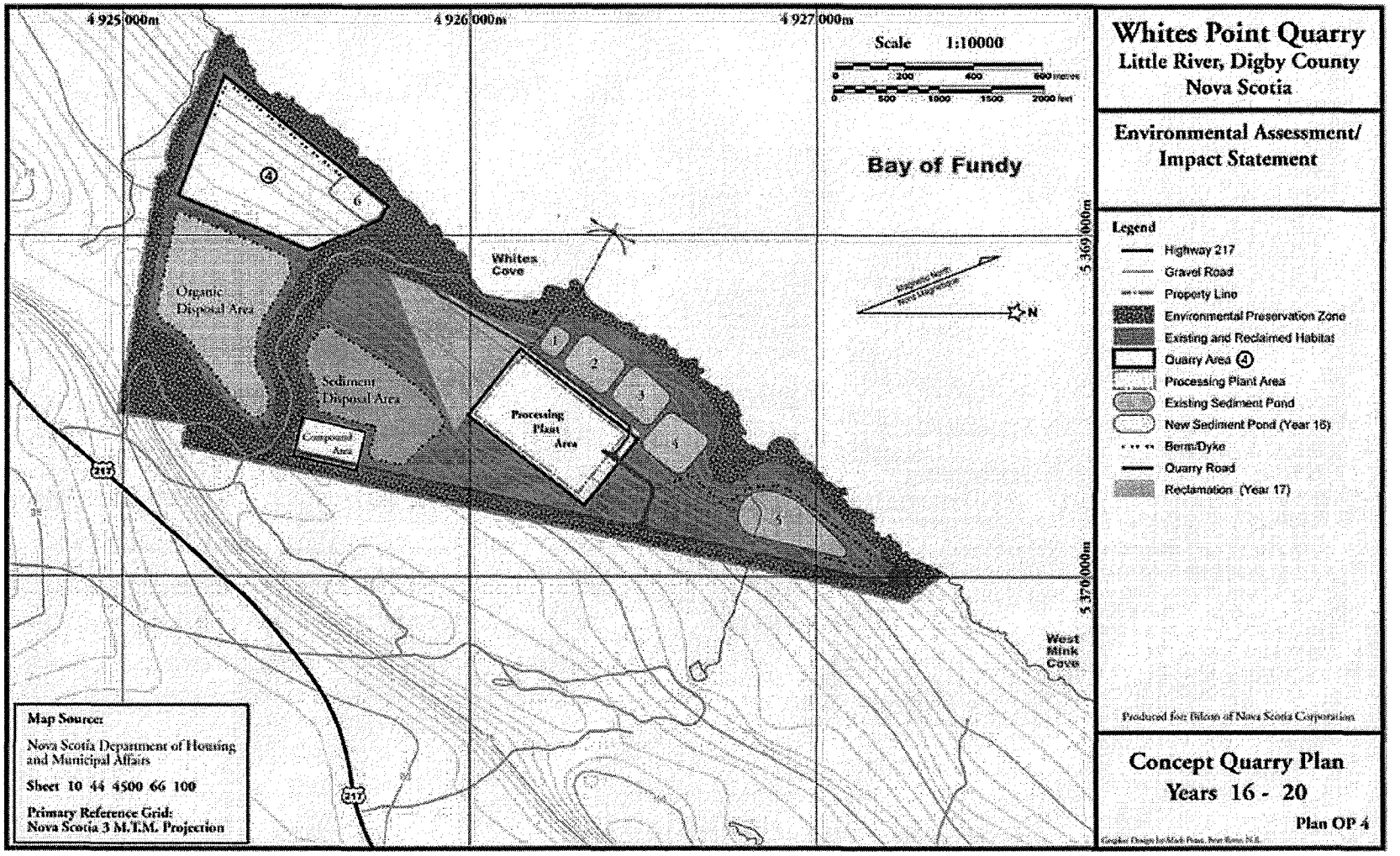

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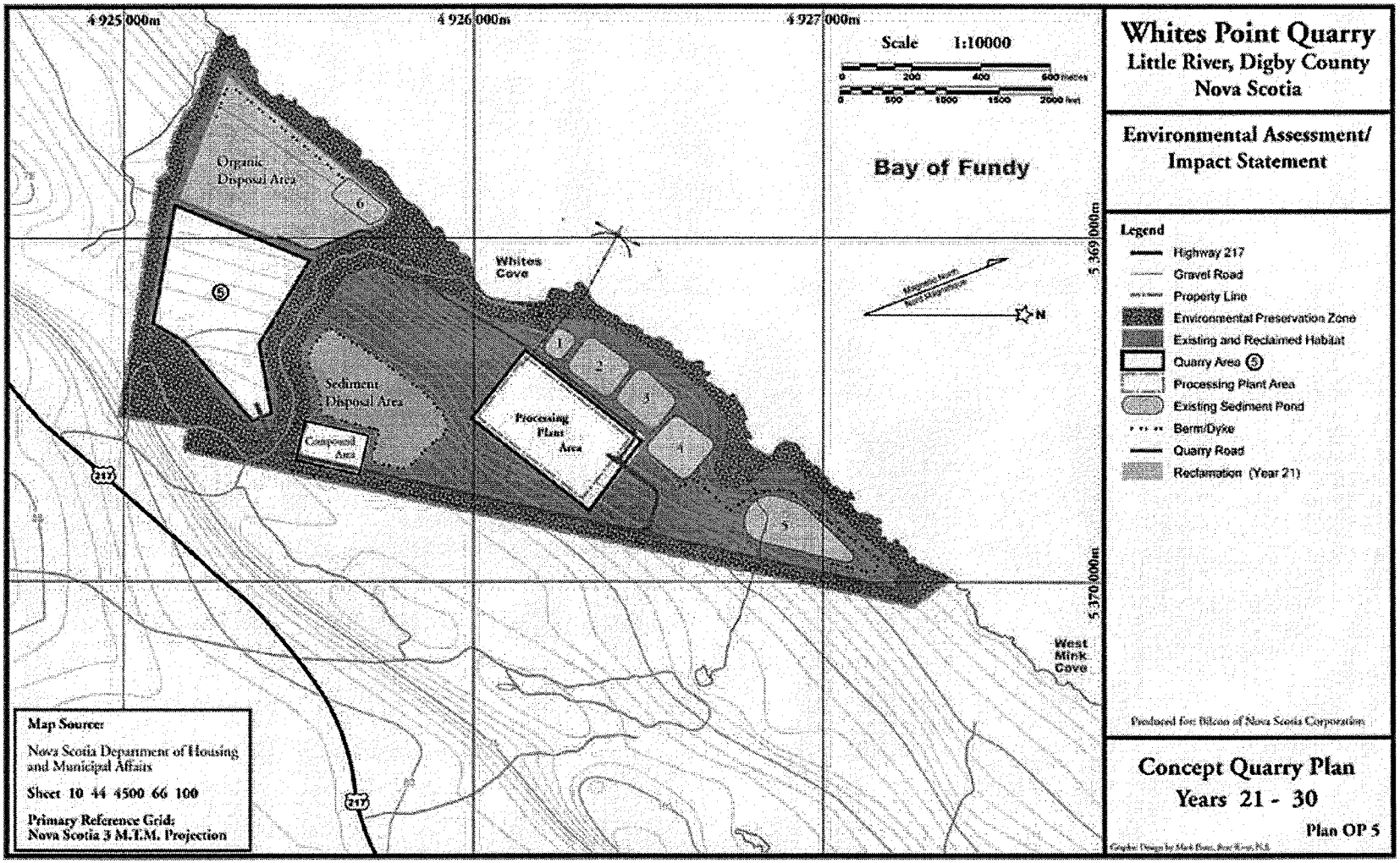

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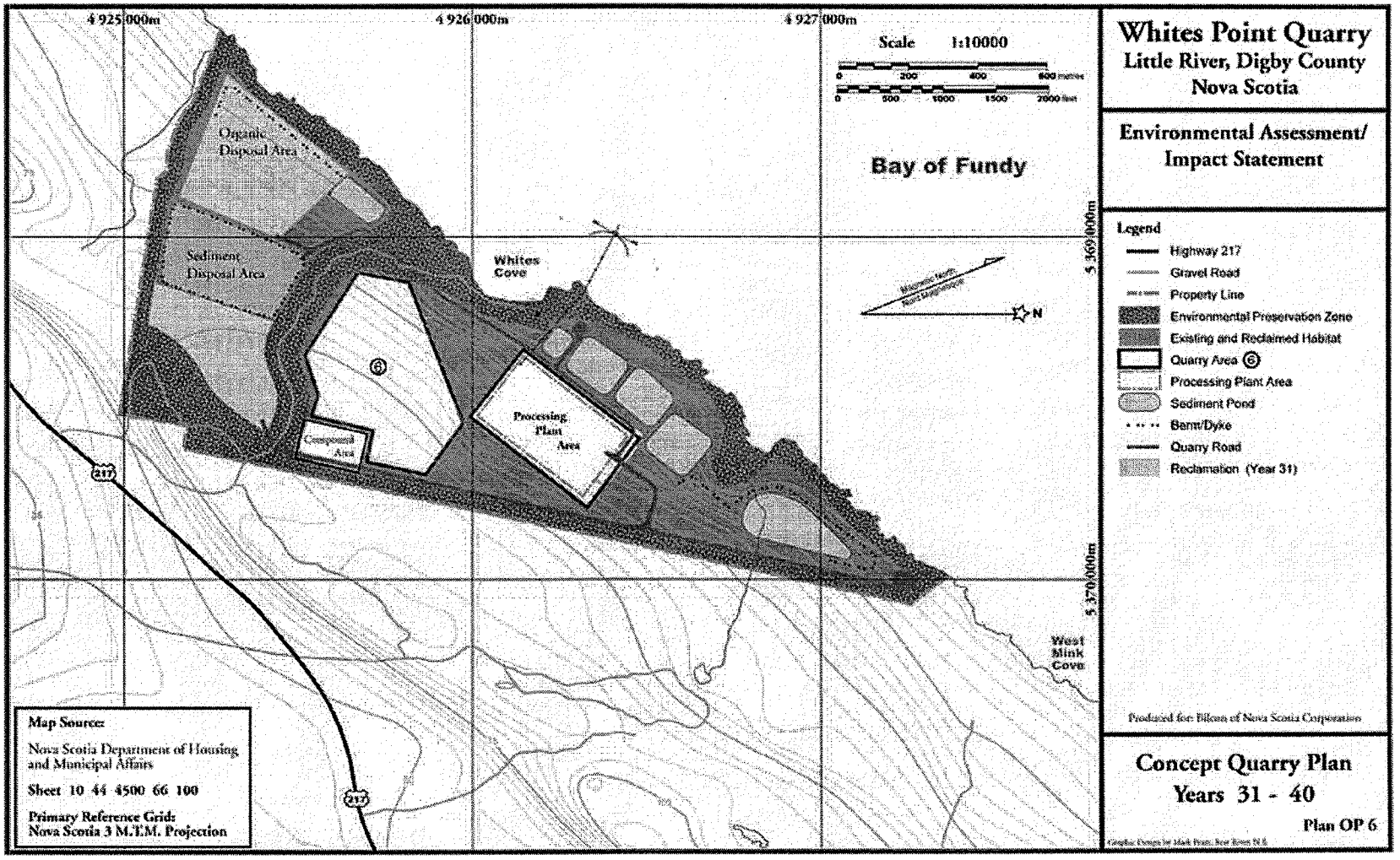
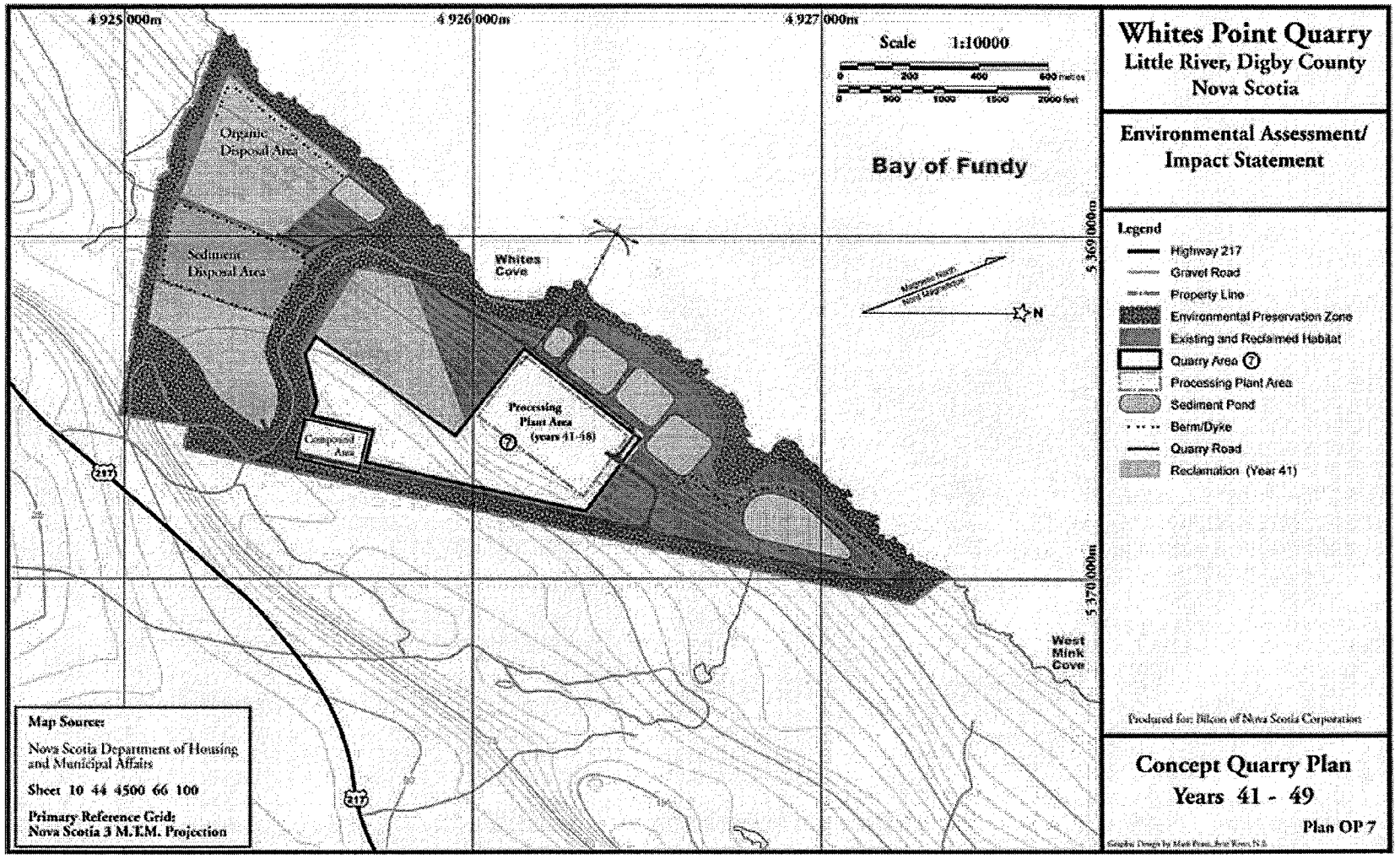

Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/
Impact Statement
Concept Quarry Plan
Years 31 - 40
Plan OP 6
Scale 1:10000
Bay of Fundy
Organic Disposal Area
Sediment Disposal Area
Whites Cove
Processing Plant Area
Compound Area
West Mink Cove
4 925 000m
4 926 000m
4 927 000m
5 369 000m
5 370 000m
N
217
Legend
Highway 217
Gravel Road
Property Line
Environmental Preservation Zone
Existing and Reclaimed Habitat
Quarry Area
Processing Plant Area
Sediment Pond
Berm/Dyke
Quarry Road
Reclamation (Year 31)
Produced for: Bilcon of Nova Scotia Corporation
Map Source:
Nova Scotia Department of Housing and Municipal Affairs
Sheet 10 44 4500 66 100
Primary Reference Grid:
Nova Scotia 3 M.T.M. Projection

018484



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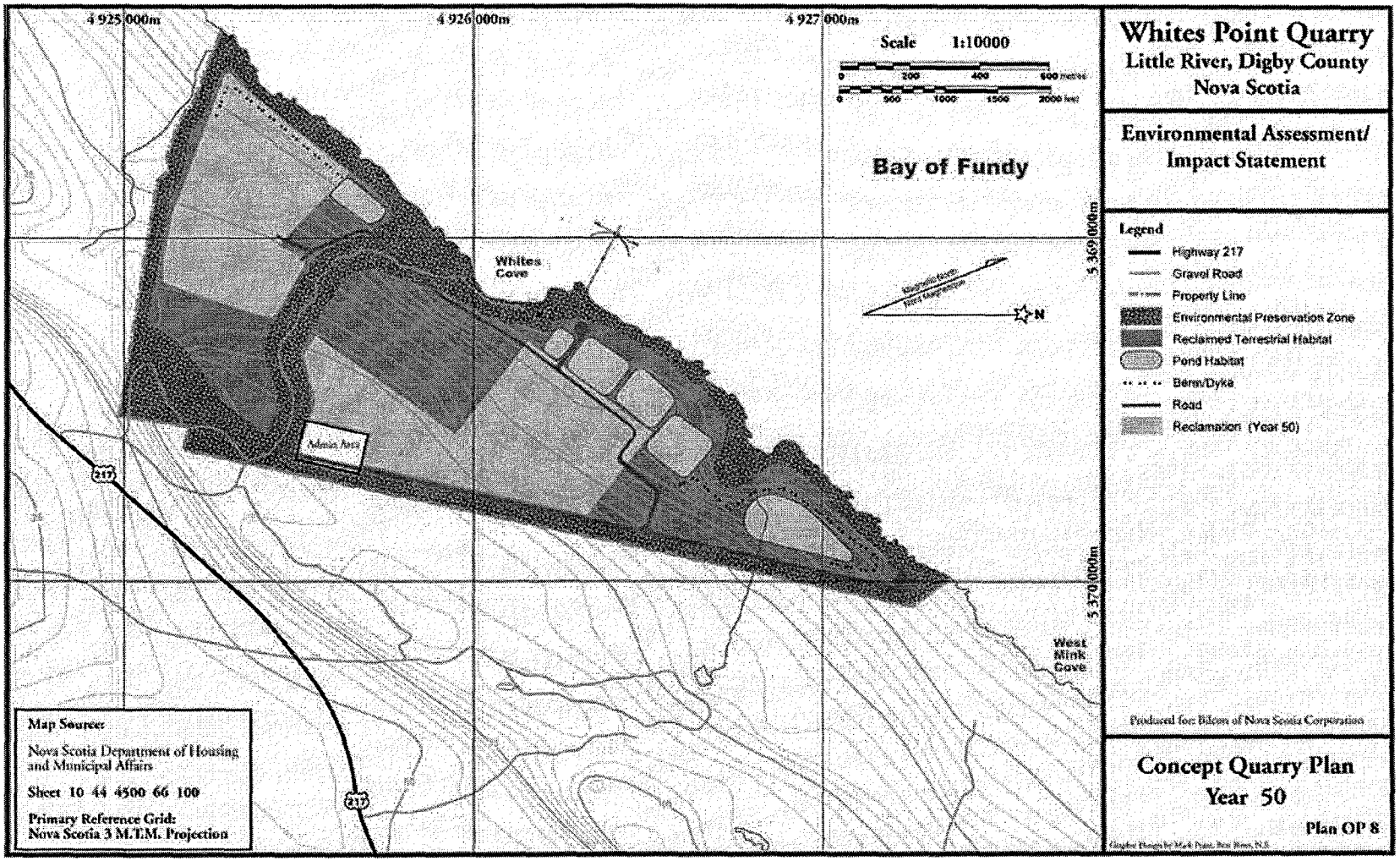
C0001-446



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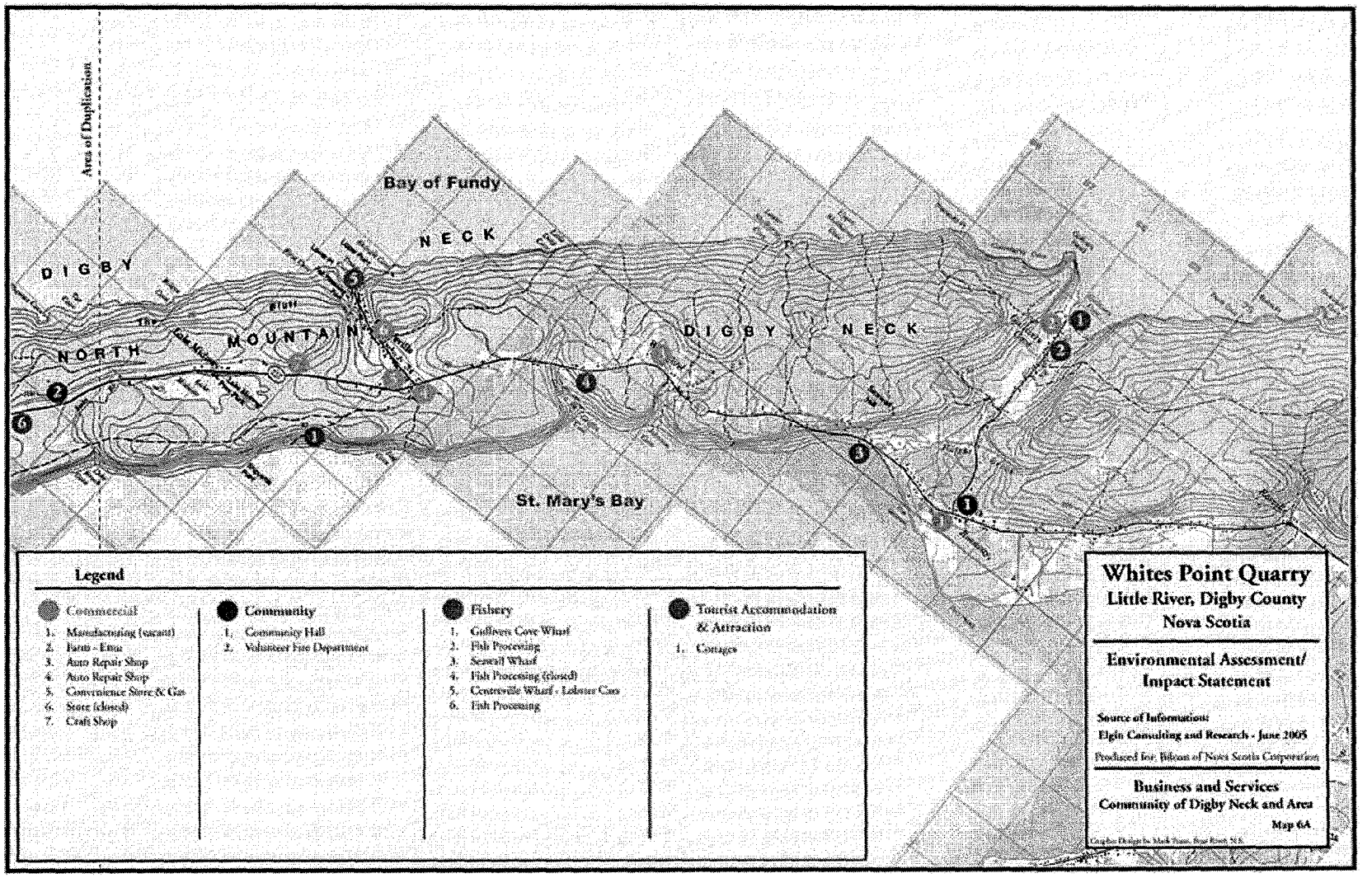
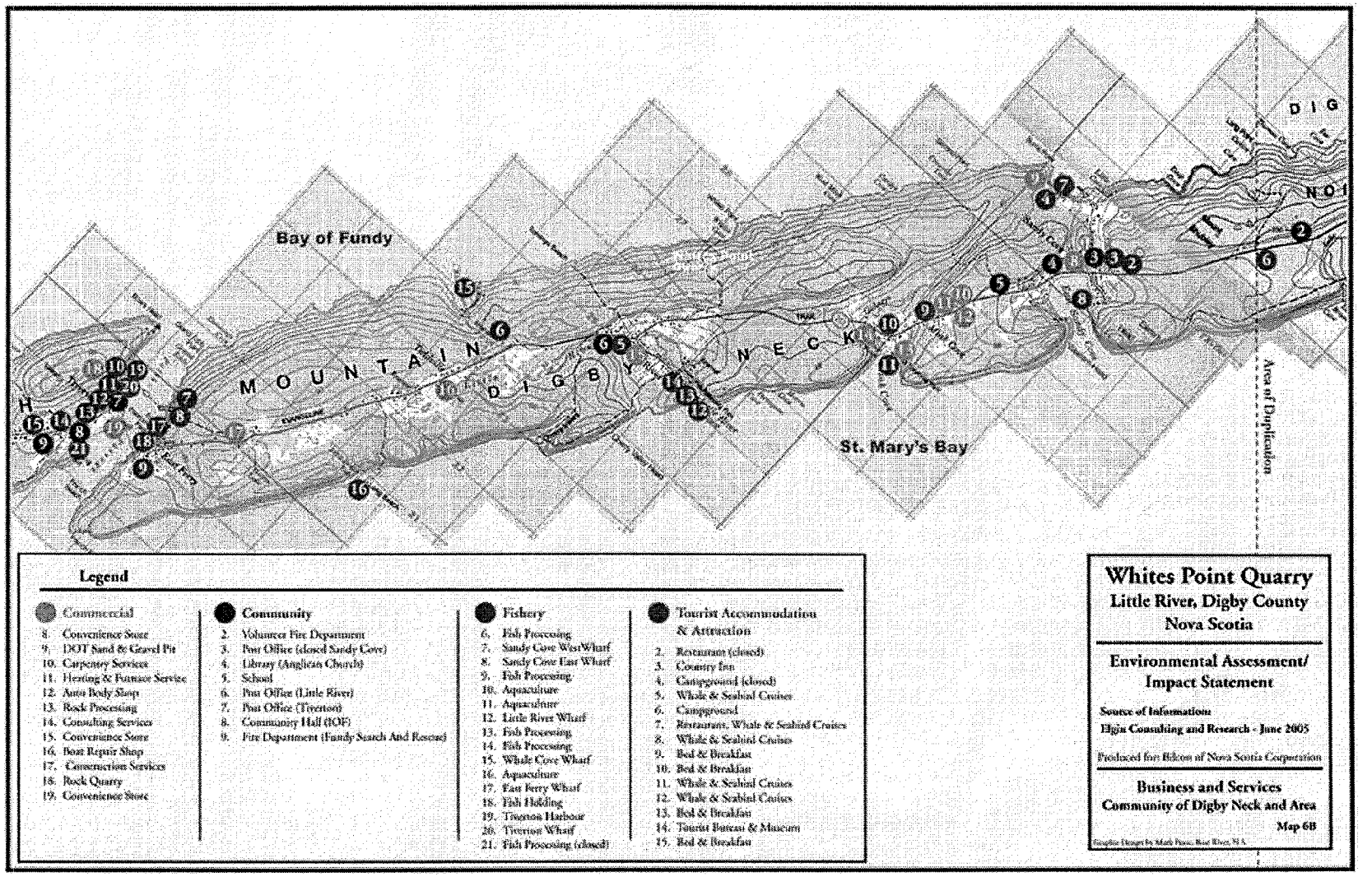

Area of Duplication
Bay of Fundy
NECK
DIGBY
NORTH
MOUNTAIN
DIGBY
NECK
St. Mary's Bay
Legend
Commercial
1. Manufacturing (vacant)
2. Farm - Emu
3. Auto Repair Shop
4. Auto Repair Shop
5. Convenience Store & Gas
6. Store (closed)
7. Craft Shop
Community
1. Community Hall
2. Volunteer Fire Department
Fishery
1. Gulliver's Cove Wharf
2. Fish Processing
3. Seawall Wharf
4. Fish Processing (closed)
5. Centreville Wharf - Lobster Cars
6. Fish Processing
Tourist Accommodation & Attraction
1. Cottages
Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/
Impact Statement
Source of Information:
Elgin Consulting and Research - June 2005
Produced for: Bilcon of Nova Scotia Corporation
Business and Services
Community of Digby Neck and Area
Map 6A

018487


Bay of Fundy
MOUNTAIN
DIGBY
NECK
St. Mary's Bay
Area of Duplication
Legend
Commercial
8. Convenience Store
9. DOT Sand & Gravel Pit
10. Carpentry Services
11. Heating & Furnace Service
12. Auto Body Shop
13. Rock Processing
14. Consulting Services
15. Convenience Store
16. Boat Repair Shop
17. Construction Services
18. Rock Quarry
19. Convenience Store
Community
2. Volunteer Fire Department
3. Post Office (closed Sandy Cove)
4. Library (Anglican Church)
5. School
6. Post Office (Little River)
7. Post Office (Tiverton)
8. Community Hall (IOF)
9. Fire Department (Fundy Search And Rescue)
Fishery
6. Fish Processing
7. Sandy Cove West Wharf
8. Sandy Cove East Wharf
9. Fish Processing
10. Aquaculture
11. Aquaculture
12. Little River Wharf
13. Fish Processing
14. Fish Processing
15. Whale Cove Wharf
16. Aquaculture
17. East Ferry Wharf
18. Fish Holding
19. Tiverton Harbour
20. Tiverton Wharf
21. Fish Processing (closed)
Tourist Accommodation & Attraction
2. Restaurant (closed)
3. Country Inn
4. Campground (closed)
5. Whale & Seabird Cruises
6. Campground
7. Restaurant, Whale & Seabird Cruises
8. Whale & Seabird Cruises
9. Bed & Breakfast
10. Bed & Breakfast
11. Whale & Seabird Cruises
12. Whale & Seabird Cruises
13. Bed & Breakfast
14. Tourist Bureau & Museum
15. Bed & Breakfast
Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/
Impact Statement
Source of Information
Elgin Consulting and Research - June 2005
Produced for Bilcon of Nova Scotia Corporation
Business and Services
Community of Digby Neck and Area
Map 6B

018488

No important environmental features, except several small wetlands, are known to exist immediately adjacent to the quarry property.

Safety features incorporated into the project design include the upgrading of the intersection of the quarry access road and Highway 217. Private access roads within the quarry will be gated and the Whites Cove Road right-of-way will be fenced for security.

Few industrial development projects are known to be planned within the community of Digby Neck. A water bottling plant is under consideration near Gullivers Cove. Also, a water based aquaculture development is presently proposed at Mink Cove. A small craft harbour was recently constructed at Tiverton on Long Island.

The quarry project is approximately 1 km west from the village of Little River within Digby County. Digby County presently does not have a Municipal Planning Strategy or Zoning By-Laws. Industrial development, such as a quarry, is the responsibility of the province. A permit was obtained from the Nova Scotia Department of Environment and Labour in 2002 for the operation of a four hectare quarry within the proposed Whites Point quarry site. Presently, there are no known regional-scale management plans in place for Digby Neck or Digby County.

Major physical components of the quarry are shown on **Figures 1, 2, 3, and 4. Plans OP 1-8** show the development plan in five and ten year increments for the 50 year life of the quarry. For details of the construction, operation and maintenance, and decommissioning and reclamation phases see **paragraphs 7.7, 7.8, and 7.10.** The properties closest to the quarry property are forested. The closest residential dwelling, not owned by Bilcon of Nova Scotia Corporation, is located approximately 450 m from the active quarry area (the area of rock extraction). A total of 5 residences are located within 500 m of the active quarry area and 19 within 500 – 1000 m.

Various sizes of basalt rock aggregates ranging from ¼" to 1", grits, and concrete sand products will be produced for shipment from the quarry. Approximately 40,000 tons is planned to be shipped each week for a total of 2 million tons per year. Clearing and grubbing of land before quarrying will produce approximately 15 acre/feet of organic material for each ten acres cleared. Also, sediments from the aggregate washing process will produce approximately 45 acre/feet per year of sediment for disposal. Organics and sediments will be stored on-site in dyked disposal areas.

Phasing of construction, operation and maintenance, and decommissioning and reclamation are presented in **paragraphs 7.7, 7.8, and 7.10.** Briefly, the quarry will operate for approximately 44 weeks of the year with an 8 week maintenance period during winter months. Hours of operation will be from 0600 to 2200 including two workforce shifts. Specific management procedures for extraction, drilling and blasting, sediment control, and shipping (including ballast water management) are presented in subsequent sections of the Environmental Impact Statement.

7.4 Land requirements

Lands Within the Footprint of the Project

The Proponent does not have title to lands within the footprint of the project. The 380 acre parcel of land is leased from the title holders (see Appendix 25) for a period of 90 years.

The owners of the land and the Proponent are aware that a small (50' x 50') parcel of land exists on the foreshore which is now owned by local residents. The precise location of this parcel is unknown. This parcel of land does not interfere with the quarry layout and there is no structure on this parcel. It is understood that the owners of this parcel have made application for a building permit to erect a cottage on the property but that the application was denied on the grounds that there is no access to the property for emergency vehicles or a right-of-way over private property to the parcel.

The owners of this small parcel have commenced legal action to establish the location of the parcel and to establish a right-of-way to the parcel from the Whites Cove Road and this matter is still before the courts. As noted above, none of the locations suggested for this parcel lie within the footprint of the quarry layout but would lie in the designated buffer zone.

Implications of the Private Property Held by Others and the Public Right-of-Way within the Quarry Site

The location of the 50' x 50' parcel of land held by the local residents on the foreshore of the 380 acre parcel of land leased by the Proponent has not been precisely located but two options have been suggested by surveyors engaged by the owners of this parcel. Neither of these options lie within the boundaries of the working area of the quarry but lie in buffer areas.

Since there is no structure on this parcel, the issue of blasting setback under provincial guidelines does not apply.

The Whites Cove Road which provides access to Whites Cove from Highway #217 is an abandoned road still owned by the Department of Transportation but is not maintained. Severe scour, particularly on the lower section towards the Bay of Fundy, now restricts access to all but four-wheeled drive vehicles.

The layout of the quarry operation is designed to work around the Whites Cove Road and the road itself will not be used by the quarry operation. New roads will be constructed to serve the various areas of quarry operation.

If the Whites Cove Road cannot be acquired, the Proponent will fence the length of the road within the quarry footprint in order to maintain site security, and buffer areas will be maintained along the road.

An additional major issue is the volume of silt, sand, and gravel arising from the scour of the road fill which is currently entering the Bay of Fundy. Acquisition of the road right-of-way would enable control structures to be put in place by the Proponent to prevent sediment from entering the Bay from the road structure.

Existing Rights-of-Way

The only existing right-of-way on the 380 acre quarry site is the right-of-way of the Whites Cove Road, an abandoned road.

A right-of-way does not exist to the previously described 50' x 50' parcel of land not owned by the title holders of the 380 acre parcel.

Riparian Rights

The following extract sets out the law with respect to Riparian Rights.

> "...I refer to *Water Law in Canada - The Atlantic Provinces* (Ottawa: Queen's Printer, 1973) by Gerald V. LaForest and Associates at p. 200:
>
> > *The owner of land adjoining a river stream or lake has certain rights respecting the water therein whether or not he owns the bed. These rights arise from his ownership of the bank, and from the Latin word for bank, ripa, they derive their name of riparian rights. The owner is similarly referred to as a riparian owner.*
> >
> > *It is sufficient for the land to be riparian that it comes in contact with a body of water for a substantial part of everyday in the ordinary course of nature, but such contact need not continue for the whole of the day. Thus land that comes in contact with the sea or a tidal stream at high tide is riparian land, and its owner is entitled to riparian rights in respect of it.*
>
> Riparian rights include the right of access to the water, the right of drainage, rights with respect to the quality of the water and rights with respect to the quality of the water and rights relating to the use of the water." (Corkum v. Nash).

Bilcon has leased all lands in Whites Cove, save a 50' x 50' lot. The leased lands extend up to the shore of the Bay of Fundy. By virtue of the extension of the boundaries to the shore, Bilcon has riparian rights including the right of access to the water, the right of drainage, rights with respect to the quality of the water and rights relating to the use of the water. There is no other ownership of lands fronting up to the sea or extending to the high water mark and therefore there is no other land owner that can assert riparian rights.

There is one other property interest within the boundaries of Bilcon's lands in Whites Cove, that being a 50' x. 50' lot owned by Mary Scott and Carol Mahtab. There is litigation on the precise location of the lot but there is no part of the legal description of that lot that describes the boundaries of the property as extending to the shore of the Bay of Fundy, in contrast to the clear expression in the description for the Bilcon lands. Accordingly, the owners of the 50' x 50' lot are not in a position to assert riparian rights.

In the event that it was determined the location of the Scott-Mahtab lot was such as to establish riparian rights, the proposed development would not interfere with the rights of access from the lot.

Status of Fishing or Fishermen's Privileges

Counsel for the Proponent has been unable to determine any case law that establishes any doctrine for the issue of Fishing or Fishermen's privileges.

The closest concept that could be found is contained in the *Angling Act* which allows as follows:

> *3(1) Any resident of the Province shall have the right to go on foot along the banks of any river, stream or lake, , upon and across any uncultivated lands and Crown lands for the purpose of lawfully fishing with rod and line in such rivers, streams or lakes.*

This allows individuals to cross woodlots and other uncultivated lands for the purpose of fishing but does not appear to create a right-of-way in the sense of something similar to a common law easement.

7.5 Schedule and Boundaries

Physical development of the Whites Point quarry and Marine Terminal spans fifty years including the construction phase in Year 1, the operational and maintenance phase in Years 2 through 49, and the decommissioning phase in Year 50. Quarry plans (mine plans) for the 380 acre land area are shown on **Plans OP 1 – 8** for the fifty year life of the project. Following are time frames and spatial definition for construction and operation of the quarry and marine terminal development.

Year 1 Construction

Construction of the quarry and marine terminal infrastructure is scheduled for Year 1. Conceptual layout for this infrastructure is shown on **Figures 1,2,3 and 4 .** Marine and land construction would proceed simultaneously. The marine terminal will require an approximate ten acre water lot, the physical quarry plant area approximately twenty-seven acres, and the compound area approximately five acres.

Sediment retention ponds (2,3,4) are on approximately fifteen acres, a dyked organic disposal area on approximately thirty acres, and a temporary rock storage area on approximately fifteen acres will be a first order of construction. The location of these areas is shown on **Plan OP – 1.**

Years 2 – 5 Operation

A transition from the construction phase to the operation phase will continue through years 2 – 5. The major construction/operational activities include the construction of a dyked sediment disposal area on approximately twenty acres, site preparation for quarry area 1 on approximately thirty acres, processing and shipment of stockpiled rock, construction of sediment retention pond (5) on approximately ten acres, reclamation of the area around sediment retention ponds 1 – 4, and reclamation of the dykes around the organic and sediment disposal areas. Quarrying, processing, and shipment of rock from quarry area 1 would begin. The location of these areas is shown on **Plan OP – 1.**

Years 6 – 10 Operation

This time frame would include quarrying, processing, and shipment of rock from a portion of quarry area 2. Reclamation of the area surrounding sediment retention pond 4 would be completed. Site preparation of the remaining portion of quarry area 2 on approximately thirty acres would be done. The location of these areas is shown on **Plan OP – 2.**

Years 11 – 15 Operation

This time frame would include quarrying, processing, and shipment of rock from the remaining portion of quarry area 2 and reclamation of a portion of quarry area 2. Site preparation of quarry area 3 would begin on approximately thirty acres of land. The location of these areas is shown on **Plan OP – 3.**

Years 16 – 20 Operation

This time frame would include the quarrying, processing, and shipment of rock from quarry area 3. Construction of sediment retention pond 6 and site preparation of quarry area 4 on approximately forty-five acres of land would be completed. The location of these areas is shown on **Plan OP – 4.**

Years 21 – 30 Operation

This time frame would include the quarrying, processing, and shipment of rock from quarry area 4. Reclamation of a portion of quarry area 4 and relocation of the organic disposal area to the previously quarried area 4 would be completed. Incremental site preparation of quarry area 5 on approximately forty acres of land would also be completed. The location of these areas is shown on **Plan OP – 5.**

Years 31 – 40 Operation

This time frame would include the quarrying, processing, and shipment of rock from quarry area 5. Reclamation of a portion of quarry area 5 and relocation of the sediment disposal area would be completed. Incremental site preparation of quarry area 6 on approximately fifty acres of land would be completed. The location of these areas is shown on **Plan OP – 6.**

Years 41 – 49 Operation

This time frame would include the quarrying, processing, and shipment of rock from quarry area 6 and the incremental site preparation of quarry area 7 on approximately thirty acres of land. Quarrying, processing, and shipment of rock from quarry area 7 would take place in the latter portion of this time frame and complete quarrying activities. Reclamation of a portion of quarry area 6 would be completed. The location of these areas is shown on **Plan OP – 7.**

Year 50 Decommissioning

This time frame would include the decommissioning of the quarry including removal of the processing plant equipment, conveyors, and ship loader. Removal, grading, and reclamation of the organic and sediment disposal areas and final reclamation of quarry areas 6 and 7 including the physical plant area would be completed. The location of these areas is shown on **Plan OP - 8.**

7.6 Cost and Workforce

Capital cost and workforce considerations for the Whites Point Quarry and Marine Terminal have been broken down into three distinct phases – construction, operation, and decommissioning/reclamation.

Construction Phase

The construction cost of the Whites Point Quarry and Marine Terminal has been estimated at $33.1 million. The capital cost for the development of land infrastructure (roads, utilities, compound area facilities, environmental control structures, processing plant inclusive of operations equipment) has been estimated at $14.0 million with associated costs for marine infrastructure (conveyors, radial arm ship loader, mooring dolphins, and buoys) at $19.1 million. In addition, an allocation of $7.5 million has been made for the purchase of various pieces of mobile equipment. (loaders, trucks, excavators, bulldozers, crane, compressors, boats, and a drill rig) The total initial capital cost requirements of the project has been estimated at $40.6 million.

The anticipated construction employment impact, as it relates to the province of Nova Scotia as a whole, has been estimated at 225.4 person-years of employment. (A person-year of employment means one person is employed full-time for one year) This figure was derived from an analysis of expenditures utilizing the EcoTec Economic Impact Model and reflects an estimate of the total direct, indirect and induced impacts on employment. Approximately forty-five of these person years are attributable to Digby County specifically, and of these, 38.5 are considered direct employment impacts with 6.6 full-time equivalents created from spin-off employment. (Gardner Pinfold 2005, **Ref. Vol. VI, Tab 32**).

A skilled and unskilled construction workforce will be required during the construction phase of the project. Marine and land based construction activities will be contracted to local or provincial contractors whenever possible. The work force will consist of workers skilled in concrete and steel fabrication, heavy equipment and crane operators, drillers and blasters, truck drivers, welders, electricians, conveyor system specialists, building trades, computer specialists, environmental technicians, and general labourers. Educational requirements will vary depending upon occupation, however, all trades people will be licensed in their particular trade as applicable.

Operation and Maintenance Phase

Annual operating expenditures at the Whites Point Quarry and Marine Terminal have been estimated to be in excess of $20.0 million. This estimate includes direct expenditures for wages, shipping costs, electricity, blasting and fuel and general operating expenditure considerations for debt service costs, repairs and maintenance, taxes, administrative salaries, insurance, environmental monitoring, reclamation, and other miscellaneous expenditures. These annual expenditure allocations are expected to remain relatively stable over the life of the project.

The total employment impact from operations (direct and spin-off), on an annual basis, has been estimated at 43.5 person-years of employment for Digby County with an additional 39.1 person-years attributable to the rest of Nova Scotia for a total impact of 82.6 person-years of employment. Of the person-years of employment attributable to Digby County, 37.0 are considered full-time direct equivalents created from the operation of the quarry with an additional 6.5 full-time equivalents generated from spin-off activity directly resultant of the quarry. (Gardner Pinfold 2005 **Ref. Vol. VI, Tab 32).** The majority of direct employment impacts from the operation of the quarry would be felt predominately within neighbouring communities of the quarry site.

A skilled and unskilled work force will be required during the operational phase of the quarry over the 50-year life of the project. Skill requirements include a plant manager and operator, office clerk, heavy equipment operators, truck drivers, drillers, mechanics, electricians, welders, quality and environmental control technicians, fuel/greasers, and general labourers. The anticipated hourly wage rates to be paid vary from $12.50 to $20.00. The total annual budget estimate for direct wages and administrative salaries has been established at $1.16 million annually.

The expected operation/technical efficiency of the quarry operation will require a team of skilled workers. In this regard, Bilcon of Nova Scotia Corporation is committed to employing local persons and providing training programs. This corporate position is intended to maintain a highly skilled and committed workforce. Specialized and professional training for equipment operators and maintenance personnel is planned to be provided by the primary equipment supplier on a continuing basis as technologies evolve. Appropriate educational backgrounds would be required for such occupations as the quality and environmental control technicians and plant managers/operators.

Decommissioning and Reclamation Phase

Decommissioning is planned to take place in the final year of operation, year 50, as shown on the Concept Quarry Plan – **Plan OP-8.** Stationary equipment would be removed from the site by the quarry workforce. Final quarrying of the area occupied by the physical plant would be completed. The compound area facilities, utilities, roads, environmental control structures (sediment ponds, constructed wetlands and environmental preservation zones) would remain in place. Also, to avoid disturbance in the marine environment and for potential use, the mooring dolphins, buoys, and conveyor support system would remain in place.

Reclamation of disturbed areas will be incremental over the life of the project as shown on the Concept Quarry Plans **-Plans OP 1-8.** Costs for reclamation are approximately $7,000.00 per hectare as provided in the operational cost estimates. Reclamation would be completed using quarry equipment and contracts with local landscapers. The final areas of reclamation would include the areas used for sediment and organic storage and the last area to be quarried.

7.7 Construction Phase

Infrastructure

The primary construction activities for the Whites Point Quarry and Marine Terminal consists of the physical plant area and marine terminal – see **Figures 1, 2, and 3;** the quarry compound area – see **Figure 4** and environmental control structures – see **Plans OP 1-8.** Land and marine construction will proceed simultaneously and take approximately one year to complete. The following sequence of construction activities is proposed.

7.7.1 Land

Access Road

An access road will be constructed from Highway #217 to the quarry property. Upgrading of the Whites Cove Road is being considered as well as a new access road on Bilcon property to the north of the Whites Cove Road. The new access road location would provide greater separation from existing residences. The access road would be paved and designed to accommodate tanker truck vehicles. The intersection of the access road and Highway #217 will be designed to meet the Nova Scotia Department of Transportation and Public Works standards. Limited cut and fill is expected during road construction. Fill materials would be obtained from the quarry site. Vegetation will be cleared and chipped, and along with materials from grubbing, will be disposed of in the organic disposal area on the quarry site – see **Plan OP-1.** Burning of brush during construction is not planned. Gradients on the access road would not exceed 10%. Necessary environmental controls would be put in place prior to road construction.

Utilities

Electrical energy would be provided from upgraded services on Highway 217 to the quarry compound area. The electrical services to the quarry site would follow the access road right-of-way. On-site distribution would be controlled from the quarry compound area. Other utilities would include an on-site sewage disposal system and domestic water supply. Sewage disposal and water well drilling will be done in accordance with the Nova Scotia Department of Environment and Labour guidelines. Solid waste disposal would be contracted to a private company.

Quarry Compound Area

A layout plan of this area is shown on **Figure 4.** The compound area encompasses approximately 5 acres and would be surrounded with security fencing with gated road access. Construction in this area would include a pre-engineered maintenance shop

approximately 60'x100' of 30' bay height and a lower office/lab and employee facility approximately 40'x40' with an eave height of 14'. The maintenance shop will be constructed on a reinforced concrete slab with adjacent "water stop" sealed curb walls to contain any accidental spillage of fuels or lubricant materials within the building. An electrical distribution centre, on-site sewage, domestic water well, vehicle and equipment parking and fuel storage tank will also be located within the compound area.

The fueling area at the storage tank will be erected on a reinforced concrete slab contained within two side curbs and with a sloping floor that is ramped from a lowpoint at the centre to a high point at the exit and entrance to the fuel station. This configuration will contain any spillage or surface drops within the slab. Release of any water from the fuel pad reservoir will be after filtration and processing is completed.

The majority of the compound surface will be paved. A 30 m environmental preservation zone will buffer adjacent lands. No explosives will be stored on-site.

Quarry Roads

Construction of quarry roads from the compound area to the organic disposal area, processing plant area, Bay of Fundy shoreline, sediment retention ponds, and the marine terminal location are shown on **Plan OP-1.** Subsequent extension of these roads are shown on **Plans OP-4, 5, and 6.** Disposal of materials cleared and grubbed from this road construction will be placed in the berm/dyked organic disposal area also shown on **Plan OP-1.** Fill material for road construction will be obtained on-site. The flow in any drainage ways encountered will be maintained during road construction with culverts, especially the drainage feeding the coastal bog. No wetlands were identified within the proposed road rights-of-way. Gradients on these roads will not generally exceed 10%. Necessary environmental controls will be put in place prior to road construction.

Processing Plant

The physical plant location for processing, stockpiling, and ship loading is shown on **Figure 1.** The processing plant will be located at the 30 m elevation and require approximately 27 acres of land. Rock blasting will be required to create the platform. Drilling and blasting will be conducted in accordance with the Nova Scotia Department of Environment and Labour and the Department of Fisheries and Oceans guidelines. Rock removed from the processing site preparation will be temporarily stored in the northern portion of the quarry property as shown on **Plan OP-1.** This rock may also be used for various land construction activities such as road base and other structural and environmental control structure activities.

Once the platform is established, the crushing and screening equipment will be installed. Crushing and screening equipment will be enclosed to control dust and noise. Also, the crusher feeds and discharges will be treated with an atomized dust suppression vapour that captures the airborne dust generated by the size reduction equipment. The manufactured sand product, the smallest particle product produced at the processing plant, will be processed through a wet classification system, thus removing dust emissions.

On the lower 10 m elevation level, the load out tunnels will be constructed and conveyors installed. Electrical power supply will be provided for the conveyor motors.

Environmental Controls

Once the roads are constructed to the area of the sediment retention ponds, these ponds will be constructed – see **Plan OP-1.** The berms of these ponds will be the first areas to be reclaimed. Erosion control, visual enhancement and creation of wildlife habitat will be the intent. The sediment ponds will be in place before construction of the physical plant begins. Also, site preparation will be carried out and a berm/dyke will be constructed around the temporary rock storage area before rock is stockpiled. This berm/ dyke will form the berm for a future sediment retention pond.

It should be noted that the coastal bog is in the environmental preservation zone in the area of the temporary rock storage and will not be disturbed. During this initial construction phase, berm/dykes will also be constructed around the organic disposal area and the sediment disposal area.

7.7.2 Marine

Marine infrastructure will include the construction of mooring dolphins, a radial arm ship loader, conveyor supports, conveyors, and mooring buoys. A schematic plan and elevation are shown on **Figures 2 and 3.** A water lot lease of approximately ten acres is required for the marine construction and has been requested from the Nova Scotia Department of Natural Resources. Also, a registration has been filed with Transport Canada as required under the Navigable Waters Protection Act for the marine works. No blasting, dredging, or fill placement is anticipated in the marine environment.

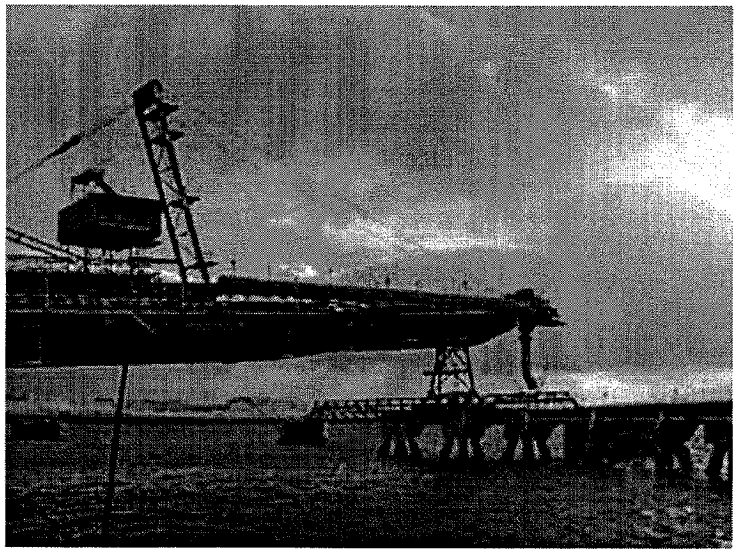
Mooring Dolphins

Three rectangular, concrete capped mooring dolphins, approximately six m wide by fifteen m long are proposed. The construction technique for the pile supported dolphins will use conventional marine methods from a conventional floating barge. The dolphins and piles will be designed to resist horizontal loads due to the berthing of vessels and environmental loads (wind, waves, etc.).

Temporary pile templates will be anchored to the bottom to support the steel pipe piles and dolphin caps. The proposed thirty-six inch diameter pipe piles would then be installed using conventional methods such as pile driving hammers and churn drills. Once seated into the bedrock, the inside of the pile would be churn drilled and cleaned out using a suction lift pressure jet or pump. Any contaminants would be stored for land disposal. After flushing the pile, an approximate four inch diameter core would be drilled into the bedrock for the pile anchor and grouted. The interior of the pile would then be filled with concrete using the tremie method. It should be noted that the majority of the work is inside the pile thereby reducing direct contact with the marine environment. Formwork for the concrete caps would then be installed, supported by the temporary pile template. Spill containment would be installed as part of the formwork and the caps would be poured. Also, depending on the final details, silt curtains and acoustic blankets may be required. For further details on marine noise and sediments refer to **paragraphs 9.1.7.1 and 9.2.1.5.**

Radial Arm Shiploader

Steel fabrication for the shiploader would be done off-site and delivered to the site by barge. Steel pipe piles would be anchored into the bedrock with concrete caps, similar to the dolphin construction, for the shiploader bridge support. The shiploader bridge would contain the mechanical components such as the electrical room, shuttling winch and shiploader drive. The main components of the shiploader are the quadrant shiploader boom with operators cab, the quadrant shiploader shuttle, and the quadrant shiploader suspended conveyor. Both the shuttle and boom are equipped with drip trays. Installation of the shiploader components is proposed to be done from a floating platform. Lighting on the shiploader will be shielded to direct light downward on the conveyor during night loading. Navigational lighting will be provided as required by Transport Canada.



Shiploader at Sydney Steel

Conveyors

The loadout conveyor extending from onshore to the shiploader conveyor will be supported using the same technique of pipe piles with concrete caps. The conveyor trusses allow a 35 m span between support structures thereby reducing the number of supports in the intertidal zone and nearshore waters. Installation of the pipe piles in the intertidal zone would be done at low tide from land. Depending upon final design, smaller diameter pipe piles may be appropriate for the conveyor supports. The loadout conveyor would be equipped with spill containment.

Mooring Buoys

Standard mooring buoys for the previously described panamax size vessel will be installed for bow and stern lines.

7.8 Operation and Maintenance Phase

Operation

The operational life of the quarry and marine terminal is expected to be 50 years based on the available basalt rock reserves on the site. Yearly production is estimated to be 2 million tons with weekly shipments of 40,000 tons. Concept quarry plans – **Plans OP 1 – 8** – show the quarry operation in 5 and 10 year increments over the 50 year life of the project.

Quarrying and ship loading will be carried out for 44 weeks during the year with an 8 week maintenance period during the winter months. Proposed operating hours of the quarry will be from 0600 to 2200 hours. The workforce will consist of two shifts – twenty workers on the first shift and fourteen on the second for a total of 34 during normal production operations. Skill requirements for the workforce will include a plant manager and office clerk, quality control and environmental control technicians, plant operator, quarry face loader operator, quarry rock truck drivers, mobile equipment mechanic, electrician, fuel person, water truck driver, equipment operators, welders, rock driller and helper and labourers.

Administration and Maintenance

The quarry compound area will function as an operations headquarters with office space for administration and technical support staff (manager, office clerk, quality control and environmental technicians). The office will also house the electronic control centre. A maintenance shop will provide space for mobile equipment servicing and repairs as well as interior storage space for oils, greases, and coolants. This interior space will have spill control containment. Heating systems for the office and shop will be fueled by recycling waste oil from the mobile equipment. A double walled fuel storage tank with an alarm system and surrounding spill containment will be located in the compound area. The fuel storage tank will be constructed according to the latest ULC – S601 or UL – 142 standards with ISO 9001 Quality Controls. This area will have security fencing and will be gated at its access point. Services such as parking, electrical control, domestic water supply, and an on-site sewage disposal system will also be located in the compound area – see **Figure 4.**

Stationary Equipment

The operation of the quarry will require stationary equipment to process and load the projected 2 million tons of aggregate products per year. A radial arm ship loader, jaw crusher with feeder and 150 ton rock box, rock crushers, screens, load-out tunnel, conveyors, sand processing equipment, waterlines and pumps, water clarification tank, dewatering screens for sand products, and an emergency generator will be required. The primary energy for the stationary equipment will be electricity.

Mobile Equipment

The operation of the quarry will require mobile equipment for loading, transporting, servicing and environmental controls. The primary mobile equipment includes a face loader, off-road rock trucks, bulldozer, excavators and wheeled loaders, water trucks, crane, miscellaneous service trucks, work boat, barge and a drill rig. The primary energy for the mobile equipment will be diesel fuel.

Blasting

Blasting is planned every two weeks during production. The size and configuration of the blast holes and weight of explosives will vary depending upon production requirements, time of year, proximity to the Bay of Fundy and required set-backs from fish habitat, and proximity to adjacent residences. Blast geometry will also vary depending upon production and site location. All blast design will be done by certified blasters licensed in Nova Scotia. Pre-blast surveys will be conducted in accordance with the requirements set forth by the Nova Scotia Department of Environment and Labour. Blasting will not be conducted during periods of atmospheric inversion. Storage of explosives is not planned on the quarry site. For further details on blasting, refer to "Bilcon of Nova Scotia Corporation – Blasting Protocol" – see Appendix 9.

Process Description

Loading and transportation of the quarried rock will take place within the quarry site. Quarried rock will be loaded and transported to the physical plant area – see **Figure 1**, in off-road trucks. The rock will be deposited into the dump hopper of the primary crusher at the north end of the process plant. A vibratory grizzly feeder then moves the rock at a controlled rate into the jaw of the primary crusher. This crusher will reduce the size of the rock and is housed, along with appurtenances, in an enclosure to provide sound and dust emission control. The crushed material will then travel by belt conveyor to the primary scalping screen for size separation. The material is then conveyed to surge piles according to size.

The larger rock (9"x3") that was segregated to the primary surge pile is automatically reclaimed through an "under pile" tunnel conveying system that meters the rock into a coarse material cone crusher. This crushed rock is deposited onto a belt conveyor and delivered to a double deck sizing screen. This screen will send oversized rock back to a secondary surge pile and any minus 1" product will be conveyed to a tertiary surge pile.

The plus 1" size material that was returned to the secondary surge pile is metered onto a belt conveyor within an "under pile" tunnel to be sent to a second crusher with a medium fineness crushing cavity and is then returned to the double deck sizing screen previously

mentioned. It should be noted that the crushers and screens are enclosed in structures similar to the primary crusher. As the material size is reduced through this crushing/ screening circuit, the 1"x 0" crushed rock is sent to a final tertiary surge pile to be metered into the product screening system.

The product in the tertiary surge pile is then conveyed within an "under pile" tunnel/ conveying system to a triple deck product screening station. This final screening will rinse the stone products as they are being screen-separated to size. The spray wash will remove dust and minus ¼" stone fractions and the slurry will be pumped to a classification and de-watering system. Concrete sand will be separated and the remaining water pumped to a flocculent tank. Here, the particulated solids will drop out of the water. The clarified water will then be recycled to the rinse screen process and the particulates (sediments) pumped to the dyked sediment disposal area. All site water is recycled and reused, all crushed products are utilized as product or during site reclamation, and noise and dust from the processing is controlled as close to the source as possible.

Shiploading

The finished aggregate storage piles will have a reclaim tunnel below the piles with a conveyor system to carry aggregates to a second conveyor that will transport and discharge materials onto a movable ship loading stacking conveyor. Material conveyed over the shoreline and waters of the Bay of Fundy by the belt conveyor will be within long-span gallery trusses. These trusses will have a solid plate steel floor. As well as reducing the number of supports within the Bay, the solid steel gallery floor will provide personnel and equipment access to the conveyor for maintenance or repairs. All conveyors will be equipped with emergency stop switches, mis-alignment switches, and motion switches located on non-powered pulleys.

As mentioned previously, all conveyor systems are electrically powered. There are no oil or lubricant reservoirs required that could introduce petroleum products into the water below. A small amount of lubricant is required within the cast iron gear reducers, no more than several quarts per drive. The reducers are fitted with a drip pan to catch any minute amounts of lubricant. Inspection of seals in the reducers will be performed as part of routine maintenance procedures and replaced during down time as required.

Finally, the radial arm ship loader will then load the materials into the various holds of the bulk carrier. Use of a radial arm shiploader increases loading efficiency since the vessel will not have to move after mooring as would be the case with a stationary shiploader. This will allow the ship to be loaded in less than 10 hours under normal conditions. The frequency of shiploading is expected to be on a weekly basis.

Water Management

Washing of aggregate products is planned as an integral part of production. Wash water systems will be arranged in closed circuit. Surface water runoff will be collected and stored in sediment retention ponds. No deep wells are proposed for wash water supply. Make-up water for aggregate washing will be pumped from the sediment ponds to a flocculent tank, to remove particles, before being pumped to the production area. This water will then be collected, directed and recycled back to the sediment ponds. For a detailed water budget for this process – see Strajt, David. MGI Limited. "Preliminary Results of Hydrologic Budget Analysis, Whites Point Quarry, Digby Neck, Nova Scotia" October 2005. **Ref. Volume V, Tab 30.**

The water budget was prepared for the projected fifty year life of the Whites Point quarry project and is based on the concept quarry plans **OP – 1-8**. Available surface water supply for aggregate washing from the watershed north of the Whites Cove Road was calculated on a monthly basis. The water budget model maintained and operated by the Hydrometeorology Division of the AES, Environment Canada was used. This model is based on the Thornthwaite and Mather Water Balance Procedure. As a result and assuming a five per cent loss from the washing process, a net available water supply exists except for the months of August and September from years 5 through 40. The deficit during these two months is minimal and ranges from 8,000m^3 to 12,000m^3.

Waste Management

Incremental clearing and grubbing for quarry expansion will produce organic materials which will be stockpiled on-site. Also, sediment materials from the flocculent tank will be stockpiled on-site. These material disposal areas will be contained with dykes to control potential runoff. These materials (organics and sediments), will be mixed and recycled during the reclamation process. The location of these disposal areas are shown on the Quarry Concept Plans – **OP – 1-8**. Sewage waste will be handled by an on-site disposal system, while solid waste will be collected by a private contractor and disposed of in an approved landfill. As mentioned previously, waste oil will be collected, stored, and recycled as a heating fuel.

Ammonia from blasting with ammonium nitrate-fuel oil explosives is normally completely consumed during the blast event. Any residue, in the form of nitrates, will be directed by surface water runoff from the blast area to the sediment retention ponds. This will prevent any nitrates from directly entering the Bay of Fundy. Acid-generating rock does not exist on the site. For chemical analysis of the basalt rock – see **paragraph 9.1.2.1** and Appendix 4.

Dangerous Goods

As mentioned previously, explosives will not be stored on-site. Explosives will be trucked to the quarry site on an as needed basis approximately once every two weeks during production blasting. Supply and trucking of explosives will be contracted to a licensed explosives provider. All explosives handling will be done by certified persons.

Diesel fuel will be stored on-site in a bulk tank. Delivery by tanker truck will be approximately once every two weeks during production. The double walled storage tank will be located within a security fenced area and within a spill containment area. Distribution of fuel from the bulk tank to the mobile equipment will be done with an approved fuel truck. All fuel transfers will use dry-break quick disconnect couplings.

Land Transportation

Quarried products will be transported by ship thereby eliminating heavy truck traffic on rural roads and through rural residential areas. Truck traffic from Highway 101, to Highway 217, to the quarry site will increase during the one year construction phase. Delivery of materials and equipment, and the construction workforce will increase traffic during the construction phase. Load size and weights will vary and adhere to restrictions by the Nova Scotia Department of Transportation and Public Works. For further details on land transportation refer to **paragraph 9.3.8**.

Marine Transportation

The Whites Point Marine Terminal will be designed to accommodate "Panamax" bulk carriers. The overall length of this type of vessel is approximately 225 m, a molded

breadth of approximately 32 m, and a molded depth of approximately 19.5 m. Dead weight is approximately 70,018 tonnes with a gross tonnage of 41,428. The proposed route of the vessel from the inbound shipping lane to the marine terminal and from the marine terminal to the outbound shipping lane is shown on **Map 4**. The frequency of call at the marine terminal will be on an average of once per week for a duration of an approximate 10 hour loading time. If severe weather is forecast, the ship's captain will determine an appropriate course of action. Aggregates and sand products are the primary materials to be loaded from the Whites Point Marine Terminal. No off-loading of any materials is anticipated at this time nor will the marine terminal be used for any other purposes except for the Whites Point quarry. If an instance of severe weather develops in the Bay of Fundy, the Whites Point marine terminal could offer refuge for fishing boats or ships in the immediate area. Ship loading will be by conveyor with spill containment. For further details on marine transportation refer to **paragraph 9.3.8.**

Ballast and Bilge Water

Management responsibility of ballast and bilge water lies with the shipping company to operate with reference to Transport Canada's guidelines and regulations. For further details on ballast water management refer to **paragraph 9.2.1.4**.

Environmental Controls

Noise resulting from operation of the quarry and marine terminal will be controlled by attenuation (the distance between the source and receptor), vertical separation, environmental preservation zones, and design of stationary and mobile equipment. Noise from quarry operations, including blasting, will meet the guidelines set forth in Appendix D of the Nova Scotia Department of Environment and Labour's Pit and Quarry Guidelines. For further details on noise control refer to **paragraphs 9.1.9, 9.1.10, 9.1.11 and 9.2.15.**

Dust will be controlled whenever possible at the source. Examples of dust control measures include enclosed crushing and screening equipment, water sprays during aggregate screening and water sprays for dust control on roads. Dust control will meet the requirements of the Nova Scotia Department of Environment and Labour's guidelines for particulate emissions. For further details on dust control refer to **paragraph 9.1.8**.

The quarry operation is not visible from Highway 217 due to the vertical change in topography, horizontal separation and forested slopes. The Whites Cove Road, a public road, is practically inaccessible except by four-wheel drive vehicles, all terrain vehicles, or by foot. This road will have security fencing along both sides and an environmental preservation zone to buffer views of the quarry. Also, views from the coastline and Bay of Fundy will be buffered with an environmental preservation zone and/or berms planted with evergreen trees. For further details on aesthetic controls refer to **paragraph 9.3.6.**

Once the plant begins processing, water from the sediment ponds will be drawn to the flocculent tank where sediments will be removed. Periodically, sediments accumulated in the flocculent tank will be pumped to the sediment disposal area. The sediment disposal area encompasses a maximum of approximately 25 acres while the organic disposal area encompasses approximately 35 acres. Organic and sediment materials will periodically be reused as site reclamation materials.

Maintenance Activities

Quarry infrastructure is designed for the 50 year life of the project. Expansion of the production area is not anticipated at this time. However, if infrastructure or environmental technologies evolve, adaptive management procedures maybe implemented. All repairs and maintenance activities would adhere to environmental regulations in place at that time. Since the marine terminal is to be constructed on bedrock and limited bottom sediments exist in the intertidal and nearshore area, no dredging or disposal of dredge materials is anticipated.

7.9 Modifications

Modifications to the basic quarry infrastructure or operating procedures are not anticipated in the near future. However, the life of the project is projected to be 50 years. Technological and scientific advancements are likely to occur during this time frame and may warrant changes and modifications. In this regard, an adaptive management process is recommended to ensure industry and regulatory authorities are involved in developing feasible and economically viable project modifications.

7.10 Decommissioning and Reclamation Phase

Decommissioning

As mentioned previously, in year 50, Bilcon of Nova Scotia will begin closure of the quarry. This process is expected to take one year. All processing equipment, conveyors and ship loader will be removed from the site. Infrastructure such as the quarry compound area, electrical services, and roads will remain in place for future use. Portions of the marine infrastructure, such as the conveyor support system, gallery trusses and floor, mooring dolphins and buoys will also remain. Navigational lighting will remain. No underwater demolition is proposed. The environmental control structures such as the sediment retention ponds and constructed wetlands will be left in place as wildlife habitat. Any portions of core holes remaining after rock extraction in the quarry area will be appropriately filled.

All of the quarry property is in private ownership. Upon completion of quarrying as a land use, certain infrastructure, as mentioned above, could remain in place. The created land – see **Figure 5,** could be easily developed for a higher economic land use. Land uses such as a resort, residential or eco-tourism development could be considered at that time based on market demand.

Reclamation

Reclamation of the Whites Point Quarry lands is proposed to proceed incrementally over the 50 year life of the project. Approximately six acres of quarry will be opened each year. Burning of brush is not planned during operation. All wood fibre will be chipped and composted in the organic disposal area along with other cleared and grubbed materials. The Concept Quarry Plans – **Plan OP 1 - 8,** identifies land uses in five and ten year increments. Reclamation would include site grading and drainage, soil preparation and planting. The priority area for reclamation would be lands along the coastline north of the Whites Cove Road and landward from the environmental preservation zone and environmental control/constructed wetland area. Reclamation of this coastal area first will increase the buffer area between the quarry and the marine environment providing

more effective erosion control, noise attenuation, enhanced aesthetics, and wildlife habitat. This area would be fully reclaimed after approximately ten years. As quarrying is completed inland from the coast, additional lands will be reclaimed on an incremental basis – see **Plans OP 1 - 8.**

The premise of the environmental reclamation program for the quarry is to maintain and increase a more ecologically diverse and productive quarry site, during and after completion of resource extraction. During project operation, maintaining sensitive habitats and creating habitat diversity is a primary objective. This is accomplished by maintaining an environmental preservation zone, especially along the sensitive coastline, and the creation of constructed wetlands, incremental planting to create various successional stages of vegetation for food and cover for wildlife, and the establishment of a more productive soil regime and forest.

The reclamation process begins after the environmental controls (sediment retention ponds, drainage channels, etc.) are in place. Merchantable timber will be harvested and residual woody plant material will then be chipped and stockpiled for composting. The remaining organic material and overburden will then be cleared and stockpiled in a dyked disposal area for future land reclamation use. Also, sediment retention ponds would be periodically cleaned out, sediments de-watered in a dyked disposal area along with processing sediments for reclamation use. Upon completion of quarrying in a given area, land reclamation would begin.

The area identified for reclamation would be rough graded and contoured for surface drainage. Stockpiled organics and sediments would be mixed and spread on the area to be reclaimed. Soil analysis indicates the existing soils require amendments. The pH is low and requires approximately 15 tons of agricultural limestone per hectare. As well, nitrogen, phosphorus, potassium, and calcium are also low. Appropriate amounts of these nutrients will be added for healthy and productive plant growth. Thus, lime and fertilizer would be incorporated into the soil. An erosion control mix of native grasses would then be seeded. This mix would contain grasses and legumes for nitrogen fixation.

Areas with suitable soil depth would be reforested with softwoods such as red and white spruce or balsam fir. Softwoods for shelter belts and commercial reforestation blocks would be included. Native hardwoods such as white birch, white ash, or red maple would also be included to maintain species diversity. Also, since no herbicides are proposed, natural regeneration would be allowed to occur. The series of benches adjacent to the east and south property line would be seeded and reforested in areas near the faces. Areas at the foot of the faces would be left for natural regeneration. A schematic section of the quarry after year 50 is shown on **Figure 5.**

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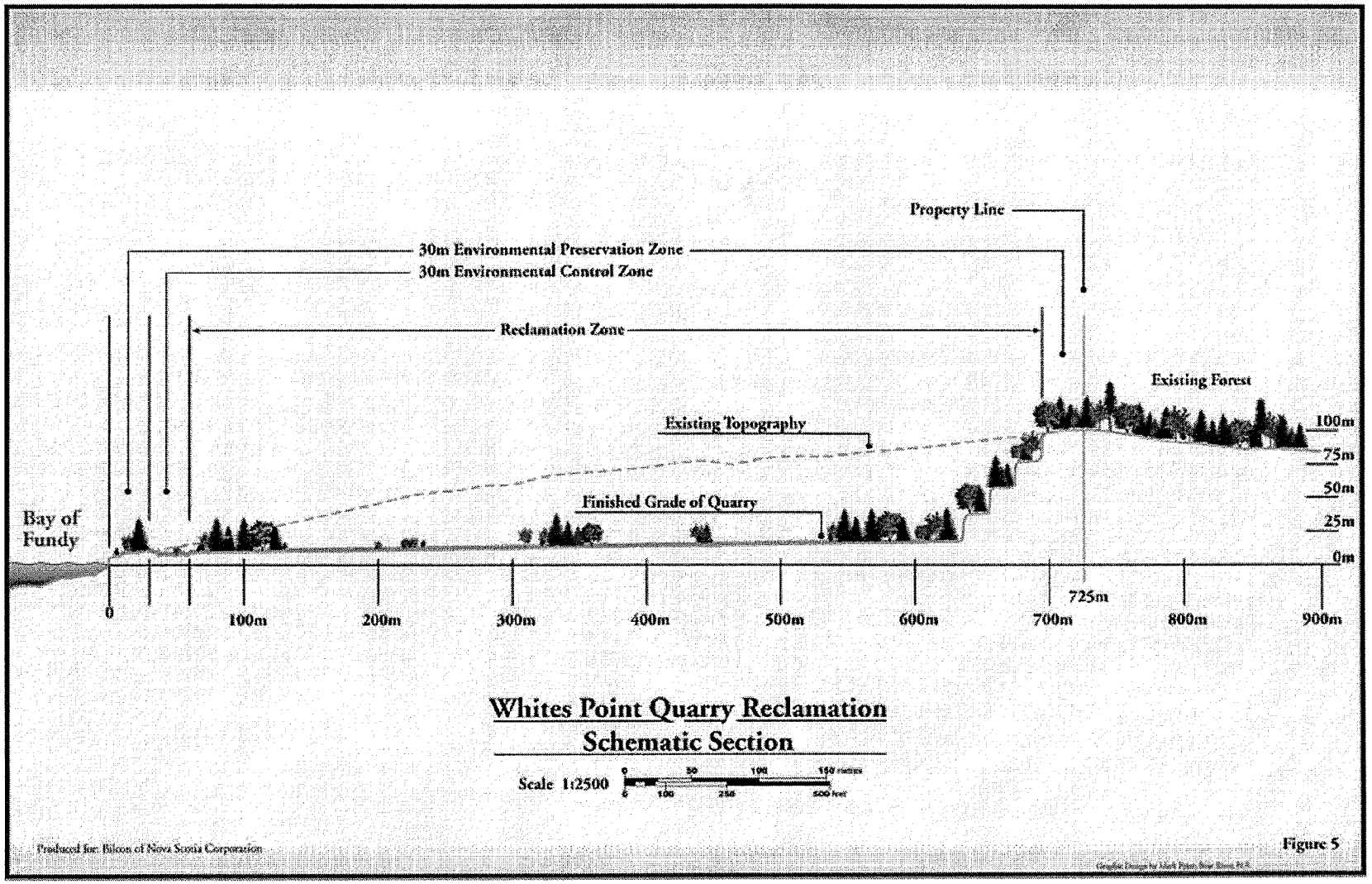

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8.0 IMPACT ASSESSMENT METHODOLOGY

The Whites Point Quarry and Marine Terminal environmental assessment/impact statement was compiled by a team of professionals. The environmental assessment process for the project began in the spring of 2002. The team represented disciplines in marine geology, geology, hydrogeology, mining engineering and operation, economics, marine geophysics, acoustical physics, terrestrial biology, freshwater and marine biology, planning, environmental design and assessment, archaeology, history, psychology, and sociology.

The impact assessment methodology involved the following process for the various physical, biological, and human environmental components.

Research studies included general literature searches, including statistical data research and community/site specific research from secondary sources. Original social research was conducted through community surveys and traditional knowledge interviews. Scientific site specific investigations were conducted in the physical, terrestrial, and aquatic environments. The intent of this research was to establish baseline conditions for the physical, biological, and human resource components.

Analysis of the research data was then performed in relation to the proposed project construction development and operational activities. Data analysis was performed using both quantitative and qualitative methods. These methods included modeling, trend analysis, and professional judgement. The intent of the analysis was to document potential positive and/or negative effects that may occur on the various environmental components as a result of project development and operational activities.

Mitigation measures were then developed to ameliorate any identified adverse effects. These measures include structural alterations and modifications to project components and alterations to operational and maintenance activities. The intent of the mitigation measures is to reduce any adverse effects to within acceptable limits and within technical and economic feasibility.

Monitoring programs were also developed on a case by case basis to determine the effectiveness of the proposed mitigation measures in relation to baseline data and regulatory requirements. The intent of the monitoring programs is to assess the actual effects of project development and operations to determine if adaptive management procedures may be warranted.

Impact statements for each valued environmental component are then prepared based on the following framework. The impact statement identifies the temporal phase of project development, magnitude of residual effect, positive, neutral, or negative, type of effect and the relative scale of effect. The intent is to summarize the temporal phase of project

development (pre-project, construction, operation, or decommissioning), the magnitude (insignificant or significant), the type (positive, neutral, or negative), and the relative scale (local, regional, provincial, or national/international) of the effect.

The impact assessment terminology is further interpreted and defined as follows.

Temporal means the project time period of development and is defined as either *short term* or *long term* in relation to the expected life of the project. More detailed definition and rationale for time periods is contained in **paragraph 8.4.2.** These terms are defined as follows.

Short term effects would occur in the pre-project phase, the construction phase and the decommissioning phase.

Long term effects would occur during the operation and maintenance over the 50 year life of the project.

Magnitude means the significance of the effect and is defined as either *insignificant* or *significant.*

Type means the effect is predicted to be *positive* (incremental to the viability of the environmental component), *neutral* (having no effect), or *negative* (detrimental to the viability of the environmental component).

Scale means the spatial influence of the predicted effect. The proposed hierarchy of scale includes *local, regional, provincial, and national/international.* These spatial definitions are to provide a relative context for the effect assessment. More detailed definition and rationale for the particular geographic area in relation to environmental components is contained in **paragraph 8.4.1.** These terms are defined as follows.

Local would include project effects on valued environmental components on the quarry and marine terminal site and adjacent surrounding land and water area.

Regional would vary depending upon the particular valued environmental component and include a regional terrestrial zone, a regional marine zone, and regional human component zones.

Provincial would include effects on valued environmental components of the province of Nova Scotia's land and waters.

National/International would include effects on valued environmental components of other Maritime provinces and New England land and waters.

8.1 Methods

Criteria

The application of environmental evaluation criteria is used throughout the EIS to predict potential project effects on valued environmental components. Establishment of baseline conditions as part of the research effort provides a sound basis for predictions. Analysis of the interaction of the project development or operational activity on the valued environmental components uses one or a combination of quantitative and qualitative criteria to assess the type of effect (positive, neutral, negative). Quantitative criteria would include standards or thresholds published in regulatory policy or guideline. Qualitative criteria would include diversity, productivity, stability and rarity/uniqueness in evaluating natural or man-made systems. Application of these criteria in an EIS usually involves professional experience and judgement. The following criteria are used to determine the type of effect.

- If the project development or activities is incremental to the viability of the environmental component, a positive effect would result (e.g., the preservation of a habitat for a species at risk, increased employment opportunities, or habitat diversification).
- If the project development or activities are within environmental regulatory regulations or guidelines established for a particular environmental component, a neutral effect would result (e.g., effluent discharges within regulatory water quality requirements of guidelines, compensation of habitat loss).
- If the project development or activities exceed regulatory regulations or guidelines established for a particular environmental component, after mitigation, a negative effect would result (e.g., effluent discharges exceeding regulatory water quality requirements of guidelines, loss of habitat without compensation, or loss of employment opportunities).

Considering the amount and quality of on-site investigations, baseline data collected, modeling and trend analysis within the region, the reliability of effect prediction is high.

All studies including scientific, engineering, and traditional knowledge are referenced in relevant sections of the EIS. These studies are included as reference documents as prepared by the team member. Any models used are identified and referenced in these documents.

Significance

The determination of whether an effect is considered *insignificant or significant* is based primarily on the level of spatial scale (local, regional, provincial, national/ international) and after mitigation measures are considered. Generally, to be considered *significant* the influence of effect would have to be greater than a regional scale – e.g., provincial or national/international in spatial scale. For example, a direct effect on a nationally

or provincially listed species at risk that would destroy core habitat would constitute a potential *significant negative effect* if this effect could not be appropriately mitigated, - whereas a direct effect on a nationally or provincially listed species at risk to preserve its habitat would constitute a potential ***significant positive effect.***

Environmental Impact Statement

A concluding impact statement including the three elements (*temporal, type, and scale)* is then made for the valued environmental component/components. An Environmental Impact Summary Table - **Table 2** - is presented for the environmental components identified as critical to the proposed project's implementation. The Impact Summary Table is found in Chapter 9.4.

Probability

Since many of the environmental components under consideration do not have quantitative threshold criteria, guidelines, standards, or regulations, the probability of an occurrence or event happening is usually a qualitative judgment. Professional judgment using qualitative analysis is commonly used to predict a level of probability (the ratio of the chances favouring an event to the total number of chances for and against it). The following hierarchy of terminology is used in this Environmental Impact Statement to provide a relative scale for statements concerning qualitative probability.

Qualitative Terminology	Probability
Extremely unlikely (occurrence not documented)	< 1%
Highly unlikely	< 5%
Unlikely	< 25%
Possible	50%
Likely	> 75%
Very likely	> 95%
Extremely likely (occurrence documented)	> 99%

In summary, a significant positive or significant negative effect for physical and biological components must be judged to have a provincial or national/international scale of effect and a likely probability of occurence resulting in a ***likely, significant positive or negative environmental effect.*** In the case of human components, a significant positive or significant negative effect must be judged to have a regional, provinical or national/ international scale of effect and a likely probability of occurence resulting in a ***likely, significant positive or negative environmental effect.***

8.2 Public Consultation

8.2.1 Requirements, Approach and Methodology

Legislative Requirements

Public awareness and participation are key principles of the Canadian Environmental Assessment Agency. "The Canadian Environmental Assessment Agency encourages public participation because protecting Canada's environment is everyone's business."(See Ref. 229) This is evident in Section 4, subsection 1(d), under the purposes of this act, where it states "to ensure that there be opportunities for timely and meaningful public participation throughout the environmental assessment process."

Public awareness and participation are also one of the 17 key requirements of the Equator Principles, October 2002.(see Ref. 230) The Equator Principles, adopted by thirty-six financial institutions in sixteen countries, are "An industry approach for financial institutions in determining, assessing and managing environmental & social risk in project financing"(See Ref. 231)

The following is a synopsis of the fundamental principles of Bilcon's public consultation program:

- Public consultation on the Project is an indispensable element of the project and the EIS process.
- Bilcon will ensure public participation (e.g. informing the public about the project and inviting the public to take part in project consultation) at all stages of the project and EIS process.
- Bilcon will give the public the opportunity to receive project and EIS information in a timely manner.
- Public comments submitted about the project will be organized, recorded and responded to and will be taken into consideration by the company during the pre-project planning process

Philosophy, Rationale, Goals and Objectives

A basic premise of all information disclosure and public consultation associated with large-scale projects is that success of a project is predicated on encouraging meaningful and effective public consultation. A key component of any successful public consultation is early planning and implementation in order to allow the public and stakeholder groups sufficient time to influence key stages of a project and its design. Bilcon entered into project discussions early on in the planning stages of the Whites Point project in order to try to reach mutually beneficial goals and objectives.

This has helped and will continue helping to:

- Improve understanding of the potential impacts of the proposed project;
- Identify solutions and mitigation measures;
- Improve environmental and social soundness;
- Clarify values and "trade-offs" associated with different alternatives;
- Identify contentious issues;
- Create accountability and a sense of local ownership during project implementation; and
- Effectively manage risks.

Results of such a project specific consultation process include:

- Fewer conflicts and delays for both Bilcon and the public in achieving their long range goals and in conducting their daily business; and
- Reduced direct, indirect and reputation risk for both Bilcon and the public.

Goals of this project's specific consultation process include:

- Identification of environmental and social opportunities and risks of all project components under consideration;

- Enhanced understanding by public agencies and NGOs regarding their interest in the proposed project;

- Greater understanding of the potential impacts of the project on the people that it may affect;

- Improved mechanisms for ensuring that appropriate mitigative measures are in place, maximum benefits are realized and appropriate compensation programs are applied when necessary;

- Assurance that efficient and effective communication practices are applied in order to minimize recycling of issues;

- Identification of additional opportunities for local employment and the supply of goods and services, by individuals and businesses to the project who might otherwise be marginalized; and

- Enhanced project implementation planning and management, particularly with respect to issues of concern to key stakeholders.

Two primary objectives of Bilcon's public consultation program are:

- To link the input of the major public constituents of this project to the EIS process by identifying project related issues of those constituents and ensuring that Bilcon effectively incorporates and responds to those issues in the EIS (See Chapter 5 Cross Reference of Issues and Where they are Found in the EIS); and

- To ensure that CEAA and Bilcon's public consultation philosophies, requirements and practices are consistently adhered to.

To achieve the first goal, public consultation (i.e. issues scoping) was initiated early on in the project's development. The EIS was then based on those identified issues as well as on other information and data requirements necessary to satisfy regulatory as well as Bilcon's own internal requirements. The EIS document clearly and satisfactorily addresses those issues. The public consultation process will continue to ensure that the public is informed of how their issues have been addressed. Thus, public consultation is the issues management "driver" that links the various components of the EIS.

To achieve the second goal, Bilcon outlines in this section of the EIS how it has met the requirements in a manner that is:

- Transparent;
- Interactive and participatory; and
- Systematic (i.e. information exchange occurs on a regular scheduled basis).

Approach

Bilcon adheres to the following basic set of public consultation principles:

- Bilcon provides consistent key messages and information to all stakeholders;

- All queries, questions and issues are responded to in an appropriate and timely manner;

- Bilcon works with all stakeholders to ensure that all viewpoints are heard in order to balance inputs from particular individuals or organizations that could be viewed as "key experts" with those of potentially affected community members; and

- A systematic public consultation process is rigorously followed based on a work plan that includes specific milestones, locations, dates, times, responsibilities, audiences, intended outcomes, and communication tools.

Key to achieving the goals of the program has been an issues-based assessment and planning process based on identifying and categorizing stakeholders and their issues. To do this Bilcon has tried to understand the stakeholders' 'interest' in the project which leads, in turn, to the identification of key issues that form the focus of on-going consultation activities with each interested party. This approach has been accomplished by prioritizing stakeholders so that effort can be managed to achieve best effect for the project.

Prioritization of stakeholders including the three levels of 'interest' is found in Table 1

Table 1 Prioritization of Stakeholders

Level	Stakeholder	Rationale
1	Decision makers	Can affect outcome of the process/project
2	Affected parties	Are directly affected by the project and need to be involved in the process to understand the nature, breadth, scope and timing of the project and possible impacts (both positive and negative) on them.
3	Third-party interests	Indirectly affected but could affect the project without sufficient knowledge of the project's nature, breadth, scope and timing and/or sufficient opportunities to provide input.

All categories include either individuals and/or agencies/organizations. Level 3 includes organizations/agencies, which in themselves are 'unaffected parties', but which may include individual members and/or subgroups.

Geographical Scope

As a general principle, the scale and effort of public consultation decreases with increasing distance from the project. Notwithstanding this principle, public consultation has been and will continue to be conducted in distinct geographic areas, each with an interest in the proposed project. These areas are:

- Digby Neck; and Islands and;
- Digby and Annapolis County communities within a 50 km radius of the project site

In addition, other pockets of interest may develop as the EIS proceeds. A communications plan will be developed for these stakeholders based on the nature, scope and level of concern regarding the issues raised.

Methodology

The basis for conducting full public consultation and disclosure is to ensure that a rigorous focus is maintained on identifying and resolving key impact issues through meaningful involvement of stakeholders. This means early and substantive involvement by Bilcon with the public and systematic methods of maintaining that involvement throughout the life of the project.

Bilcon first began this systematic identification of key stakeholders and issues in 2002. In addition, a concerted methodological effort has been placed on resolving key impact issues through early and focused discussions. The primary method used is "Public Information Sessions" in which key project personnel are available for extended time periods on a specified publicly advertised day to discuss with stakeholders issues of mutual concern and begin arriving at mutually satisfactory resolutions.

Since project planning initiation, Bilcon has made substantive communications efforts to obtain public opinion about project, input into project plans and to convey project information. In addition, the company constantly monitors its communications efforts in order that they can be improved.

8.2.2 Information Disclosure and Public Consultation Process

The following section outlines the process and philosophy for information disclosure and public consultation.

Information Disclosure

Issues Scoping

As a result of previous public consultation initiatives, special efforts have been made to include issues scoping input from, and discussions with, representatives of Indigenous peoples and the fishing industry, particularly in those regions directly affected by project activities.

During the issues scoping phase, Bilcon provided information regarding the project as it became available.

The issues scoping process was designed not only to provide project information, but also to gather input on how communications could be improved throughout the life of the project. This two way dialogue has already resulted and will continue to result in a regularly updated communications plan to address and integrate feedback.

Methods for providing this information included the Community Liaison Committee, public information session, individual interviews, media notices, workshops, website, panel displays and handouts.

EIS Participation

Information about the project will continue to be disseminated in as broad a spectrum as possible during the review process. Based on the initial issues scoping, several initiatives will be undertaken to ensure that the information reaches the appropriate target audiences. This includes a regularly updated website, open houses and appropriate newsletter articles.

Construction and Operations

Bilcon recognizes the importance of on-going community involvement and encourages employees to participate in community events and will continue to work with community organizations throughout the area. The company has provided and will continue to provide information to environmental groups, local governments, business groups and the general public throughout the life of the project.

Bilcon recognizes the need to keep its own employees aware of project developments throughout the life of the project and will institute various appropriate internal communications once the project proceeds.

8.2.3 Public Consultation

Issues Scoping

Prior to undertaking a planned public consultation process, Bilcon conducted an issues scoping exercise in order to:

- Identify issues to be addressed in the public consultation process;
- Determine their importance to the overall EIS process and, therefore, the level of effort and detail required;
- Facilitate communication regarding the EIS process itself, and
- Provide an efficient process that saves time and other resources.

More than 107 different stakeholders' consultation records have been documented and reviewed (See Appendix 34). The consultation records were produced between 2002 and 2005 as part of Bilcon's efforts to identify and address community concerns and to gather Traditional Community Ecological Knowledge (TCEK) information. Activities initiated by Bilcon include stakeholders' interviews conducted by Elgin Consulting and meeting notes from the CLC meetings (See Appendix 2).

Table 2: Past Public Consultation

Responsible for Consultation	Period of Consultation	Consultation Records
Whites Point Project Personnel through the CLC	July /02 to October /02	Meeting minutes (13 meetings organized)
Elgin Consulting and Research	September/03 to May/05	Notes from meetings with Digby and Area Board of Trade -February 13/03; Whites Cove Lobster fishermen-(November 4/03 February 11/04, March 10/04; Bear River First Nations-(January 4/05; Tourism Sector-(February 15/05 and Weymouth Falls CDS Black Community-May 12/2005
Elgin Consulting and Research	September/03 to May/05	More than 47 interviews with business and community stakeholders
Elgin Consulting and Research	September/03 to May/05	57 traditional knowledge interviews with older citizens who had knowledge of the site and local area
Elgin Consulting and Research	September/03 2003 to May/05	Open Houses-(December 15/03 and December 7 and 8/04

EIS Participation

A number of other initiatives that allow for the open and frank exchange between Bilcon and interested parties have and will continue to take place. These include an open house, an attitude survey, and a store front operation.

Stakeholders interviewed or that participated in CLC's or joint-review panel meetings were local and regional residents, owner and employees of tourism and fishing businesses as well as other businesses (retail, galleries, accommodations and restaurants), community organizations, governmental and non-governmental organizations.
In 2005, AMEC Earth & Environmental, a subcontractor of Bilcon's, conducted an Attitude Survey through an independent consulting group.

Other consultation records reviewed include the joint-panel review scoping meeting minutes, public submissions and the exit survey from the open house as part of the environmental assessment process (See Table 3).

Table 3: EIS Public Consultation

Responsible for Consultation	Period of Consultation	Consultation Records
Joint Review Panel	January/05	Scoping session minutes and presentations to Panel- Review Members (four sessions held)
AMEC Earth & Environmental	August to September/05	Interviews with stakeholders
AMEC Earth & Environmental	November/05	Public Information Session

Construction and Operations

Public consultation during construction and operations of a project is key to maintaining the already established relationship between Bilcon and the affected stakeholders. During construction and operations, many individuals and groups will experience the actual effects of the project that were discussed during the EIS. Ongoing consultation is important to:

- Keep those affected by the project informed of ongoing changes in project activities;
- Provide a forum of on-going discussion about the actual as opposed to predicted or perceived impacts;
- Manage issues and concerns as they arise; and
- Monitor the effectiveness of environmental and social mitigation and compensation.

Issues Management

The most critical element of public consultation is an effective issues management system. To support the public consultation effort, a computer based data management system has been established. This system identifies:

- Location of the meeting;
- Date, time and length of meeting;
- Type of meeting and its purpose;
- Participants;
- Meeting context;
- Category of issues discussed (e.g. environmental, socio-economic); and
- Comment made, the response by Bilcon, and follow-up required including by when and by whom.

Communications Tools

In order to conduct an effective and focused public consultation process, a variety of communication tools are required. These tools are being used throughout the entire project and EIS process and include: public information session, open houses, focus groups, information programs, meetings, printed and audio-visual materials and other. Since visual aids can be an effective means of communications, efforts have been made to convey project related information through large-scale maps and diagrams, which are available on the website at http://www.Bilconof.ns.ca/.

The following information disclosure communication tools (Table 4) have been and will be used throughout the project and EIS process.

Table 4: Information Disclosure Communication Tools

Type	Where	Audience	When	Purpose
Press Releases	Daily News Digby Courier Halifax Herald	Interested public	On going	Notification of public information session, meetings, obtain public input
Displays	Public inform-ation session, Proponent's office	Interested public	On going	Provide information
Project description meeting minutes posters, reports	Upon request and/or dissemination	Interested public	Ongoing	Provide information
Photos, maps, diagrams	Website www.bilconof.ns.ca Meetings, open houses, public information sessions	Interested public	Ongoing	Provide information
Factsheets	Digby, Digby Neck and Islands	Interested public	January/03 April/03 October/03	Provide information
Newsletters 6 issues	Digby, Digby Neck and Islands, Brighton, Barton Marshalltown, Bear River, Smiths Cove	Interested public, first 4 reached 2500 households and the last 2 reached 4000	January/03 February/03 April/03 October/03 November/04 April/05, ongoing	Provide information

The following public consultation communication methods are being used (Table 5).

Table 5: Public Consultation Communication Methods

Type	Where	Audience	When	Purpose
Interviews	Various Locations	Approx 107 Key Stakeholders	July 02 - present	Issues Scoping
Open Houses	Bilcon Office	Digby Municipal Council, Tourism Operators, Interest Groups and Communities 23 attended the 1st open house & 15 attended the 2nd	Dec 15 03 Dec 7&8 04	Exchange information obtain input
Public Information	Sandy Cove Firehall	42 Attendees - 26 signed in, 16 chose not to	Nov 1 05	Exchange information obtain input
Attitude Survey	Digby County and Annapolis County	598 Surveyed	Oct-Nov 05	Identify main concerns and measure understanding
Quality of Life Survey	Digby Neck and Islands	150 Surveyed	Oct 05	Identify main concerns and measure understanding
Exit Surveys	Public Information Session	Session Attendees - 11 completed	Nov 05	Obtain additional information

Schedule

Public consultation will occur throughout the life of the project, but many activities took place during July 2002 to December 2005. During the initial stages, the public was informed about the project and asked for their input as to issues and concerns. During the EIS process scheduled for 2006, the public will be informed about the EIS document. All public comments received up to the submission of the EIS have been incorporated into the EIS document (See Appendix 11).

8.2.4 Specific Activities

Bilcon of Nova Scotia's Office

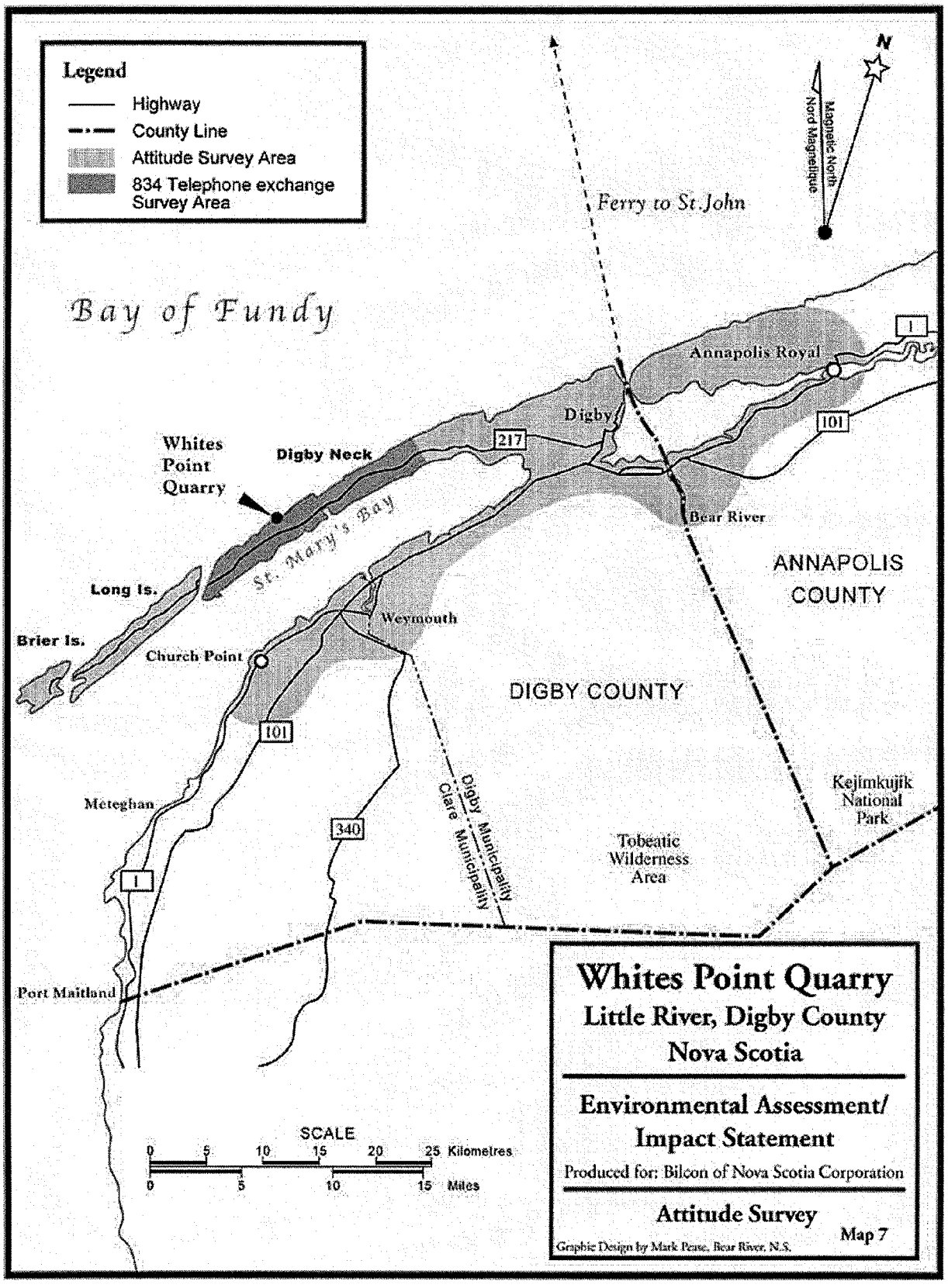
Bilcon's office is located in Digby, Nova Scotia. This office serves as a centre for project management as well as public consultation, information dissemination, and communications. Bilcon's office staff provides a focal point for consultation and communications with local municipalities, schools, businesses, NGO's, other community groups and the media.

Attitude Survey

An attitude survey was conducted to identify the main concerns of residents regarding the project and also to determine the premise for their attitudes – in other words – why they hold certain opinions about the project.

Part of this survey was conducted October 12 – October 21, 2005 with a total sample size of 546 people from Digby Neck, Town of Digby, and adjacent Annapolis County communities - see **Map 7** . The first question asked of respondents was if they were familiar with the project and, if they were not, they were dropped from continuing the survey. The remainder of the survey was completed by 405 respondents. From November 21-21 an additional 52 surveys were collected that focused on the communities of Centreville, Sandy Cove and Little River for a total sample of 457 respondents. This provides a high level of reliability: plus or minus 5.0% at 96% confidence level.

Based on the total sample of 457 respondents, the majority (77.3%) reside in the Digby area. Of the remaining 22.7% respondents, 77.1% are from Annapolis County which is adjacent to Digby County. 6.9% of respondents who do not reside in Digby County have summer homes or residences in the area. The majority of non residents (58.6%) visit the area more than four times per year and the duration of their visit varies.


Legend
Highway
County Line
Attitude Survey Area
834 Telephone exchange Survey Area
Ferry to St.John
N
Magnetic North
Nord Magnetique
Bay of Fundy
Annapolis Royal
1
Digby
101
217
Whites Point Quarry
Digby Neck
St. Mary's Bay
Bear River
ANNAPOLIS COUNTY
Long Is.
Brier Is.
Weymouth
Church Point
DIGBY COUNTY
101
Meteghan
Digby Municipality
Clare Municipality
Kejimkujik National Park
340
Tobeatic Wilderness Area
1
Port Maitland
SCALE
0 5 10 15 20 25 Kilometres
0 5 10 15 Miles
Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/ Impact Statement
Produced for: Bilcon of Nova Scotia Corporation
Attitude Survey
Map 7
Graphic Design by Mark Pease, Bear River, N.S.

The asked questions related to:

- Knowledge about the project and its timing;
- Type of benefits (personal, community, island) individuals expect from such a project;
- Issues/concerns regarding the development and it's impact on the economy;
- Where information is obtained; and
- Knowledge about Bilcon.

In summary:

- General awareness of the White's Point Quarry project is exceptionally high at 96.0% and consistent across all age categories;

- Overall awareness of specific project impacts is highest in the "834" telephone exchange which includes the communities of Centreville, Sandy Cove and Little River. The incidence of "don't know" to virtually all questions in the 834 exchange is generally much lower than the total sample;

- A high percentage of people (55.4%) have received their information by "word of mouth" and from the local newspaper (55.4%), and 59.8% indicated that local newspapers were the best way to inform the local community about development projects in the Digby area;

- 64.6% of respondents know that the project developer is from the United States but 91.2% cannot identify the name of the company;

- 28.9% of respondents think the project will be good for the area generally; 40.3% think the project would not be good while a relatively high percentage, are undecided (30.9%);

- 54.7% of respondents think the jobs created by the project will be important to the area, although concerns exist that local jobs will be unskilled and that workers will be broughtin from the outside;

- 43% of respondents feel that current concerns about the project can be addressed so that the project can proceed; only 26.1% of respondents do not believe that issues can be addressed and 30.9% do not know;

- 30.5% of respondents at the time of the study support the project; 48.2% do not; the remaining 21.3% are undecided;

- Belief that the project would be good for the area is highest among respondents aged 31-40 and 41-50; overall support is highest among those aged 41-50; respondents under the age of 40 are most optimistic that issues can be addressed so that the project can proceed;
- There are a broad range of expectations regarding the economic impacts of the project – number of new jobs, how long the quarry will be viable, local economic impacts– indicating that people do not have consistent and reliable information on the potential or such impacts. Overall 27.4% of total respondents and 50% of the "834" respondents indicated that there would no financial benefits for the region. The incidence of "don't know' declines from 44.2% of the total sample to 23.5% for the 834 exchange
- Concern for environmental impacts – the fishery, traditional activities, the environment, quality of life – increases with age and increases significantly among age categories 51-60, 61-70 and over 70; These respondents are also the people most likely to not support the project; and
- 39.32% of respondents feel that they have not had sufficient opportunity to participate in discussions regarding the project indicating the need to provide the community with information. The preferred way of accessing that information is through newspaper and public information sessions.

More detailed analysis of the survey can be found in Appendix 3.

Issues Scoping

For informational disclosure purposes, Bilcon consulted initially with government agencies, followed by representatives of the Indigenous peoples, stakeholder groups and the general public. Consultation mechanisms varied depending on their suitability for specific groups.

The first issues scoping initiative was conducted during 2002. Meetings were held with individuals representing various organizations, agencies or departments.

During the second issues scoping phase, Bilcon sought advice from potentially affected communities as to their preferred methods of receiving project information. At the same time, the company conveyed project information through a brief project description and by informal presentations to local groups. The initial information disclosed included, but was not limited to, the following:

- Project planning
- Project description, scheduling and location
- Public Consultation Process
- Benefits from the project

Meetings

Government Meetings

Bilcon has promoted ongoing discussions with a broad range of parties interested in the project. Meetings with CEAA, EC,HC, DFO, NSDEL, NSDNR, NRC, TC, Municipality of Digby, Government Caucus Liaison, MLA Digby Annapolis and local administrations have been an important component in addressing regulatory issues. They participated in issues scoping, open houses and workshops. More than 10 meetings have been held with the three levels of government specifically related to issues scoping and/or the EIS process.

Meetings with Indigenous Peoples

Bilcon has made a concerted effort to establish working relations with the Indigenous peoples of the area since October 2002. During this time, exchanges of information occurred among the Bear River First Nations, the Confederacy of Mainland Mi'kmaq and Bilcon, including meetings, letters, telephone calls and two information sessions. The information sessions focused on jobs and training; other meetings and correspondence centered on conducting a Mi'kmaq Knowledge Study (MKS).

In March 2005, Bilcon was informed by Mr. Michael Cox, the Director of Lands, Environment and Natural Resources, that the Confederacy was carrying out a MKS on behalf of the Bear River First Nations and that Bilcon would be provided with a copy once the study was completed. As of November 2005, Bilcon had not received a copy of this study.

As a result of the MKS study, Bilcon has not conducted any public consultation with Aboriginal First Nations on the Bear River First Nations Reserve. Please refer to Chapter **9.3.5** for additional information.

Meetings with Individuals who have an Interest in the Project

Bilcon has made an effort to invite any and all interested parties or individuals to become involved in the project. A number of individuals have done so and their concerns have been addressed in the EIS document.

Meetings with School

Bilcon has made an effort to involve participation of the local schools in the project and EIS process. On November 1st, 2005, approximately 40 students and their teachers (4) from Islands Consolidated School attended the public information session at the Sandy Cove Fire Hall.

Business Meetings

Various meetings have been held with fish processing operators (6), retail businesses (11), craft, gift or galleries (6), accommodations and restaurants (13), campground operators (2), adventure tour operators (8), Aquaculture Industry (1) and the Harbour Authorities (a number of people consulted) to describe the project and obtain local and regional business and individual input. These meetings were held from November 2003 to February 2005. See Reference Document Volume IV, Tab 21. Elgin Consulting and Research, Community and Business Consultation Report for the Whites Point Quarry and Marine Terminal).

Focus Groups

Focus groups are a good method of eliciting a variety of opinions on a particular topic in a short time frame. Focus groups with interested individuals or groups were conducted April 2004 to May 2005. The groups included the Weymouth Falls Development Association, the Bay of Fundy Discovery Centre Society, Bear River First Nations Reserve, the Digby Neck and Islands Tourism Association and the Full Bay Scallop Association. These were often informal discussions centered around various issues of interest to the group in question. Other groups were contacted but declined to participate, including the Digby Neck Community Development Association.

Open House Sessions

Publication of Notification and Open House Sessions

The dates, times and locations of the public information sessions were publicized in local newspapers and on the local radio station. A household leaflet was also delivered to each household and business in the area. (See Appendix 34) 150 households and businesses were sent invitations to attend the open houses, ads were placed in the Digby Courier and a news release notifying the public of the open house was distributed by Bilcon. In addition, posters advertising the dates, times and locations of each Community Liaison Meeting and open house were placed in Digby Neck communities at least five days prior to each open house. Finally, Bilcon staff contacted individuals personally, particularly representatives of the indigenous community, about open house sessions.

Open House Sessions/Public Information Session

Bilcon conducted open house sessions on December 15, 2003 and December 7 and 8, 2004. Bilcon also held a Public Information Session on November 1, 2005.

In total 80 people attended the open houses and public information session.

Information disclosed through the panel displays at these sessions included:

- Project background, schedule and location;
- The environmental impact process;
- Shipping routes;
- Employment;
- Fisheries; and
- Geology.

Issues of concern to the general public and specific groups varied depending on the individual/group, residence, level of interest and ability to be affected by the project. Based on the two open houses, key issues included:

- Project details;
- Fishing concerns;
- Environmental and socio-economic concerns;
- Employment and supply and service benefits;
- Unfair business competition; and
- Insufficient information about the project.

Based on the public information session, key issues included:

- Economic benefits;
- Employment;
- Environment;
- Specific concerns regarding:
- Geology, loss of wells;
- Marine environment impact;
- Fishing impacts; and
- Oil spills.

Exit Surveys

At the November 1st, 2005, public information session, a detailed exit survey was offered to each person. Of the 42 people who attended the sessions, 11 filled out exit surveys. Of those who filled out the surveys, two were from East Ferry, and one each from of Church Point, Whale Cove, Bear River, Little River, St. Joseph, Freeport, Mink Cove, Sandy Cove and Deep Brook. Below is a summary of the responses to the exit surveys. (The complete results and analysis of these surveys can be found in Appendix 3.

- Overall, of the 11 people who were surveyed, 36.36% felt neutral about the effects of construction on their family, 0% said the effects would be somewhat positive, 27.27% thought the effect would be very positive, 9.09% felt they would be somewhat negative, 27.27% wrote that they would be very negative, and 0% gave no response.

- In terms of effects on the community, 0% felt that effects would be somewhat positive, 18.18% said they would be very positive, 36.36% felt neutral, 0% wrote the effects would be somewhat negative, 27.27% felt that they would be very negative, and 18.18% gave no response.
- With respect to the area, 18.18% felt that effects would be very positive, 18.18% thought they would be somewhat positive, 9.09% felt neutral, 0% wrote the effects would be somewhat negative, 36.36% said that they would be very negative, and 18.18% gave no response.
- Additionally, 20% felt that effects of construction on the environment would be somewhat negative, 30% said very negative, 10% were neutral, 10% thought the effects would be somewhat positive, 10% said they would be very positive, and 20% gave no response.
- Finally, 18.18% felt that impacts of the construction phase on the economy would be very positive, 27.27% felt somewhat positive, 0% were neutral, 27.27% felt that impacts would be very negative, 0% felt somewhat negative, and 27.27% gave no response.
- Overall, from the 11 people who were surveyed, 36.36% felt neutral about the impacts that operations would have on their family, 18.18% said operations would affect their family very positively, 18.18% felt it would be somewhat positive, 0% said it would be somewhat negative, 27.27% wrote they would be very negative, and 0% gave no response.
- In terms of effects on the community, 0% felt that impacts would be somewhat positive, 18.18% thought they would be very positive, 36.36% felt neutral, 9.09% said impacts would be somewhat negative, 27.27% wrote very negative, and 9.09% gave no response.
- Additionally, 18.18% felt that impacts would be very positive for their area, 9.09% said somewhat positive, 9.09% were neutral, 18.18% felt that impacts would be somewhat negative, 27.27% thought they would be very negative, and 18.18% gave no response.
- With respect to the environment, 18.18% felt that affects of operations would be somewhat negative, 27.27% said very negative, 18.18% were neutral, 18.18% thought the affects would be somewhat positive, 9.09% said they would be very positive, and 9.09% gave no response.
- Finally, 27.27% felt that impacts of operations on the economy would be very positive, 36.36% felt somewhat positive, 0% were neutral, 27.27% felt that impacts would be very negative, 0% felt somewhat negative, and 9.09% gave no response.

- In terms of benefits from the project, of the 11 people who were surveyed, 45.45% ranked jobs and employment as most important, 18.18% said increased foreign investment and business opportunities were most important, 18.18% ranked increased revenue as most important, and 18.18% ranked other things as most important.

- Regarding issues associated with the project, of the 11 people who were surveyed, 40% said that environmental issues were most important, 8.33% ranked negative impact on quality of life as their most important concern, 30% said that issues concerning negative impacts on the fisheries was most important, 14.28% ranked issues concerning negative impacts on the fisheries as most important and 16.67% said that other issues were most important for them.

Community Involvement

Bilcon recognizes the importance of community involvement. Its staff has participated in numerous community events and will continue to work with community organizations throughout the area in the future.

Bilcon has provided information and presentations to schools, environmental groups, local administrations, business groups and the general public. The company has supported a number of health, culture, education, social and recreation initiatives throughout the area including funding contributions to the Calvary Church, Christmas Daddies, Digby and Area Hospice Society, Digby Area Learning Association, Digby County Exhibition, Learning Grove Centre, Digby Minor Hockey, Digby Regional High School/Islands Consolidated School, Digby Scouts, Royal Canadian Legion - Clementsport, Royal Canadian Legion - Digby, Weymouth and Digby Cancer Society, to name a few.

8.2.5 Results

The following is a summary of results to date.

Stakeholders Identified, Relationships Established, Issues Management System Established

An intensive and systematic identification of stakeholders has taken place and been documented. Using the issues management system, at any time, a stakeholder, issue, response and follow-up can be identified. This system will be continued throughout the life of the project. Every effort will be made to identify stakeholders and respond to their information requests and concerns in a timely and effective manner.

Key Issues Identified and Included in the Project Planning Process

As a result of an extensive, broad and systematic issues identification process, Bilcon has identified the key issues associated with this project, understands the relative

importance of each issue and has incorporated mitigation measures, where required. Examples of this include, but are not limited to, damage to wells, marine wildlife protection guidelines, shipping routes, impact on tourism, and the employment process. All are examples of major issues raised through public consultation process, addressed in the EIS and now incorporated into Bilcon's planning process.

Interactive and Participatory Information Disclosure and Public Consultation Process

Bilcon has established a precedent and procedures for regular meetings with groups and individuals to provide requested project information, where known, and to solicit input into the project at the design stage. Information disclosure will continue through out the life of the project and public consultation will occur for those activities that directly affect the public (e.g. fishing/tourism related activities; etc.).

The Result is an EIS that is Better Informed and Facilitated

The result of this process is a better-informed public, an effective EIS and a project that meets the needs and expectations of both the public and Bilcon.

8.2.6 Future Plans

Bilcon will continue to follow its information disclosure and public consultation plan and will adhere to the philosophies and principles established in **paragraph 8.2.1**
In the long-term, tools to facilitate on-going discussion between those affected by the project and Bilcon will be established and will include:

- Continuation of the issues management system;
- Community forums for the provision of on going information exchange; and
- A stewardship process for community grants.

8.3 Selection of the Valued Environmental Components

A valued environmental component (VEC) is a resource or environmental feature that is important (not only economically) to a local human population, or has a national or international profile, or if altered from its existing status will be important for the evaluation of environmental impacts of industrial developments.

Furthermore, within the Nova Scotia Environmental Assessment Regulations, Valued Environmental Components are interpreted as being environmental, socio-economic, human health, reasonable enjoyment of life and property, cultural, historical, archaeological, paleontological and architectural features that may be impacted, whether positive or negative, inside or outside the Province, by the proposed undertaking. (Ref.77 Guide to Preparing an EA Registration Document for Pit and Quarry Developments in Nova Scotia. December 2002).

Furthermore, within the Environmental Impact Statement Guidelines for the Review of the Whites Point Quarry and Marine Terminal Project, March 2005. Valued Environmental Components are defined as "selected components of the physical, biological, and human environments which will be the focus of the environmental assessments".

Valued environmental components were identified by Bilcon of Nova Scotia Corporation through public consultation, coordination with Federal and Provincial government agencies, and those identified within the Draft Review Panel Guidelines and Public Registry comments, Review Panel Scoping sessions, Final Review Panel Guidelines, the Public Registry, and Traditional Knowledge.

Also, as indicated in the Environmental Impact Statement Guidelines paragraph 9.2.1 "Species at Risk", species designated by SARA and COSEWIC as endangered, threatened, rare, extirpated, or of special concern are considered as VECs. In this regard, these designated species including mammals, birds, reptiles, amphibians, fish, mollusks, butterflies, plants, lichens, and mosses that may possibly occur on or adjacent to the Whites Point Quarry and Marine Terminal site are treated as VECs.

These Valued Environmental Components have been scientifically investigated by a team of qualified professionals – see Appendix 1 . Most components have undergone specific on-site scientific investigations while others have relied on comprehensive literature research and comparable scientific studies to determine and predict the probability of likely significant adverse effects. Considering the level of scientific effort involved, especially on-site and regional investigations, the confidence limits of the data presented in the Whites Point Quarry and Marine Terminal Environmental Assessment/Environmental Impact Statement, are considered high. Conclusions are accurate in relation to the level of scientific investigation in time and space.

8.4 Boundaries

The spatial and temporal boundaries vary according to the environmental component systems being investigated. Time frames for effect assessment of project development and operation activities on valued environmental components have been previously established in paragraph 8.0. Time frames to adequately address historic trends will be set forth in **paragraph 8.4.2.** Realistic time frames are proposed and are based on availability of reliable data for meaningful applications. The gathering of traditional community knowledge through interviews provided insight for the past 75 years. Other component time frames have been researched back to early settlement of the quarry property. Geologic time frames are also applicable to certain physical components.

Spatial boundaries for different valued environmental components will be set forth in **paragraph 8.4.1**. Rationale for selection of the spatial boundaries are based on potential effects of project development and operational activities in relation to component systems. Realistic spatial boundaries are proposed based on reliable data and meaningful applications. Some socio-economic data is reliable at the community level through the national level. Other data such as geological or hydrogeological data may be only relevant at the project site or at a local level. In this regard, Bilcon of Nova Scotia Corporation intends to adhere to the statement in the Guidelines "Bilcon is not required to provide a comprehensive physical and socio-economic baseline description of the environment at every scale, but must provide sufficient detail to address the relevant environmental effects of the Project".

8.4.1 Spatial Boundaries

As mentioned previously, spatial boundaries will vary according to the environmental component systems being investigated. Three general component categories (terrestrial, marine, and socio-economic) are proposed. The terrestrial and aquatic system boundaries are ecosystem based, while the socio-economic boundaries are generally defined by political boundaries. There is no clear "line" defining these systems and interactions between systems are common. The intent is to place the various component systems (terrestrial, aquatic, and socio-economic) into a hierarchy of local, regional, provincial and national/international context to facilitate environmental decision making. This hierarchy and spatial boundaries are described below.

Local

Local spatial boundaries are defined as the project site and adjacent land and water area. This definition is based on the area of most direct effect from proposed development and operational activities of the quarry and marine terminal. More specifically, this "local area" would include the 380 acre quarry site and the 10 acre water lot proposed for the marine terminal. This local area would include properties adjacent to the property line, the adjacent marine intertidal zone, and nearshore waters adjacent to the marine terminal.

Regional

Regional spatial boundaries are defined differently for the three major environmental component systems. These areas are defined using ecological boundaries for the terrestrial and marine system components and political boundaries for the socio-economic system components. The regional area would be subject to potential indirect effects from the proposed development and operational activities of the quarry and marine terminal.

Terrestrial – regional boundaries are generally defined as Theme Region 810 – Basalt Peninsula (Natural History of Nova Scotia, Volume II). The Basalt Peninsula is a westerly extension of the North Mountain Basalt Ridge and includes the land area of Digby Neck and Islands from Gullivers Cove on Digby Neck to Brier Island.

Marine – regional boundaries are generally defined as a section of the outer Bay of Fundy. The outer Bay of Fundy is defined as Theme Region 912 – Outer Bay of Fundy (Natural History of Nova Scotia, Volume II). This would include the nearshore waters within a line running roughly from Digby, Nova Scotia to Saint John, New Brunswick which arbitrarily separates the outer Bay of Fundy from the inner Bay of Fundy; to the inbound shipping lane; and within a line running roughly from Grand Manan Island, New Brunswick to Brier Island, Nova Scotia. This line arbitrarily separates the Bay of Fundy from the Gulf of Maine.

Socio-economic – regional boundaries are more variable and based on both social/ human ecological boundaries (community definition) and political statistical boundaries. Some regional socio-economic spatial boundaries vary according to individual components and include the community (Digby Neck, and Digby Neck and Islands), the county (Digby County), and other regionally based entities such as Health Regions, Health Authorities, and School Boards.

Provincial

Provincial spatial boundaries are defined for component systems as being within Nova Scotia's designated land and water areas for terrestrial, marine and socio-economic components.

National/International

National/International spatial boundaries are defined for component systems as being within the Maritime provinces and New England's designated land and water areas.

8.4.2 Temporal Boundaries

Two different sets of time frames are applicable to the Whites Point quarry and Marine Terminal – historic time frames/boundaries applicable to establishing trends for environmental components and project time frames to assess potential effects of project development and operational activities on valued environmental components.

Historic time frames/boundaries are developed for environmental components as a basis for trend analysis and point in time baseline conditions. These time frames vary by component and according to available data, reliability of the data, and meaningful application of the data during effect analyses. Statistical socio-economic data usually provides comparable data in time and scale for reliable trend analysis. Natural resource data often contains gaps, in many cases is not gathered using standard methodologies, and for some components, the data currently available is very limited.

Project time frames/boundaries or phases are generally considered as pre-project planning, assessment of existing environments, and project design; project construction; project operation and maintenance; and decommissioning and final reclamation. Pre-project planning, environmental assessment and design is normally a three year time period, construction a one year time period, operation and maintenance a fifty year time period and decommissioning and final reclamation a one year time period.

Any cumulative environmental effects resulting from the development of the quarry and marine terminal and operational activities will be presented in **Chapter 10.**

8.5 Application of the Precautionary Principle

As previously discussed in paragraph 3.5 "The Precautionary Approach", application of the precautionary principle has been incorporated into various project development phases. Bilcon of Nova Scotia Corporation recognizes that any activity affecting physical, biological, or human elements is not without some level of uncertainty or has some level of environmental risk. An important initial measure is to define a starting point on which environmental risk assessment can be based. Throughout this assessment, site or community specific baseline data has been gathered to document existing environmental conditions. Many environmental components have involved extensive scientific research to establish a reliable baseline for environmental decision making, prediction of possible adverse or irreversible environmental effects, and as a basis for monitoring long term effects.

The precautionary principle has been applied throughout the project phases. Some examples follow, others are contained in specific environmental component sections of the EIS. In many cases, reduction of environmental risk by application of the precautionary principle increases the overall cost of project development. In other cases, integrating environmental planning and design concepts as part of project development can reduce risks without increased costs.

8.5.1 Planning and Design

- Location of the quarry so that it is not visible from Highway #217
- Location of the marine terminal in deep water so that dredging or underwater blasting is not required
- Design of the marine terminal on pipe pilings, rather than dredging or filling, to reduce marine habitat impact
- Design of enclosed crushers to reduce noise and dust emissions
- Establishment of a Community Liaison Committee to ensure public input during project planning
- Project baseline data acquisition for physical, chemical, and biological elements
- Design of sediment retention ponds to control sediment runoff from disturbed land areas and provide storage for surface water for aggregate washing

8.5.2 Construction

- Establishment of an environmental preservation zone around the perimeter of the quarry property and expanded buffer areas around sensitive areas
- Placement of environmental control structures before construction begins
- Continuing input from the community liaison committee during the construction phase
- Environmental monitoring during construction activities to provide an early warning of potential adverse effects and to take appropriate adaptive management actions, for example, monitoring under water noise during periods that marine mammals may be present and monitoring of quality of water entering the marine environment
- Establishment of expanded buffer zones during times species at risk may be present, for example, a blasting separation zone three times that required by existing guidelines during times the inner Bay of Fundy salmon may migrate past the Whites Point site

8.5.3 Operation and Maintenance

- Using surface water for aggregate washing rather than ground water supplies.
- Incremental reclamation for erosion control and re-establishment of terrestrial habitat.
- Environmental monitoring on land and in the marine environment during quarry operation to provide an early warning of potential adverse effects and to take appropriate adaptive management actions; for example, monitoring in the marine nearshore to detect the presence or absence of invasive species.
- Continuing input from the Community Liaison Committee during the operation and maintenance phase.
- Reduction of noise by absorption using rubberized screens and truck body liners.

8.5.4 Reclamation and Decommissioning

- Leaving in place constructed wetlands and sediment retention ponds after quarry decommissioning for sediment control and wetland habitat.

- Leaving in place the marine construction on pipe pilings so demolition by underwater blasting does not take place.

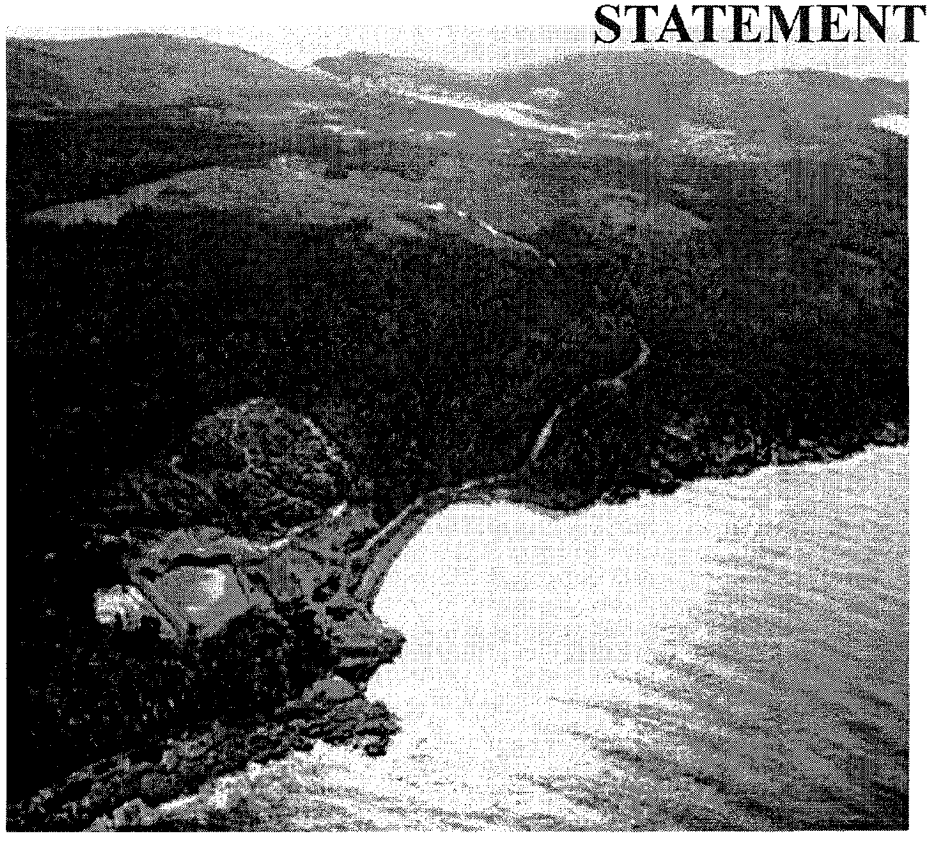
- Leaving in place infrastructure such as roads, electrical services, domestic water wells, and navigational lighting for future generations.

Preproject baseline data acquisition and monitoring is an important aspect of the application of the precautionary principle over space and time. Baseline data provides the basis, and monitoring over time provides an early detection of possible irreversible consequences thus providing opportunity to enact adaptive management actions. Bilcon of Nova Scotia Corporation is currently, and will continue to be committed to working with regulatory agencies to develop adaptive management procedures, on a case by case basis, as new scientific data becomes available. It should be recognized that many environmental components presently do not have performance standards or defined acceptable ranges of environmental tolerance or resiliency. Bilcon intends to work cooperatively, by sharing monitoring data with regulatory agencies in the development of environmental threshold criteria, especially in regard to blasting activities in relation to species at risk.

VOLUME VI
CHAPTERS 9.1 & 9.2

WHITES POINT QUARRY & MARINE TERMINAL

ENVIRONMENTAL IMPACT STATEMENT



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BILCON OF NOVA SCOTIA

March 31, 2006

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9.0 ENVIRONMENTS AND IMPACT ANALYSIS

Introduction

An ecosystem approach has been taken during the preparation of this environmental impact statement. This approach involves determining not only the direct impact of an activity on an ecosystem component, but also how this impact may indirectly affect other ecosystem components. Assessment of the interactions between and within physical, biological, and human environmental ecosystem components is presented to the extent possible realizing that the boundaries of what is considered an "ecosystem" is arbitrary since all ecosystems interact with each other.

An ecosystem can be viewed as a "dynamic complex of plant, animal, and micro-organism communities and their non-living environment interacting as a functional unit" (Convention on Biological Diversity 2001-2005, Ref. 232). These organisms depend upon and are influenced by the habitat in which they live. It is this interaction of the living (biotic) and nonliving (abiotic) components that create an ecosystem. A typical ecosystem consists of four structural components (Smith 1966, Ref. 168): the abiotic component consisting of elements such as soil, water, and minerals; the autotrophic component consisting of producers such as green plants and chemosynthic microrganisms; the heterotrophic component consisting of the larger consumers which feed on plants and other organisms; and the decomposers consisting of bacteria and fungi which break down complex compounds of dead organic matter. The spatial area in which these organisms live is their 'habitat'. Habitats vary in scale and, as previously mentioned, for the purpose of this environmental impact statement have been placed in a hierarchy of local, regional, provincial, and national/international.

9.1 Physical Environment and Impact Analysis

Introduction

The regional setting for the proposed Whites Point quarry and Marine Terminal is the Digby Neck peninsula between the Bay of Fundy and Saint Mary's Bay. The climate is humid temperate with an annual mean precipitation of approximately 1300 mm and an average temperature range of approximately 18° C in summer to -3° C in winter.

Topography along Digby Neck ranges in relief from over 100 m along the ridge to sea level. Regional bedrock geology is shown on **Map 5.** The Digby Neck area is comprised of the North Mountain Formation. The North Mountain Formation is underlain by the Blomidon Formation. Four faults are shown in this regional area of Digby Neck, Long Island and Brier Island at Rossway, Sandy Cove, East Ferry, and Freeport.

Regional surficial geology is shown on **Map 8.** The Digby Neck area is characterized as a stony till plain with occasional alluvial, glaciofluvial, and colluvial deposits. The soils on Digby Neck in the area of the proposed Whites Point quarry are shown on **Map 9.** Rossway soils dominate the Digby Neck area. Surficial geology in the Bay of Fundy is shown on **Map 10.**

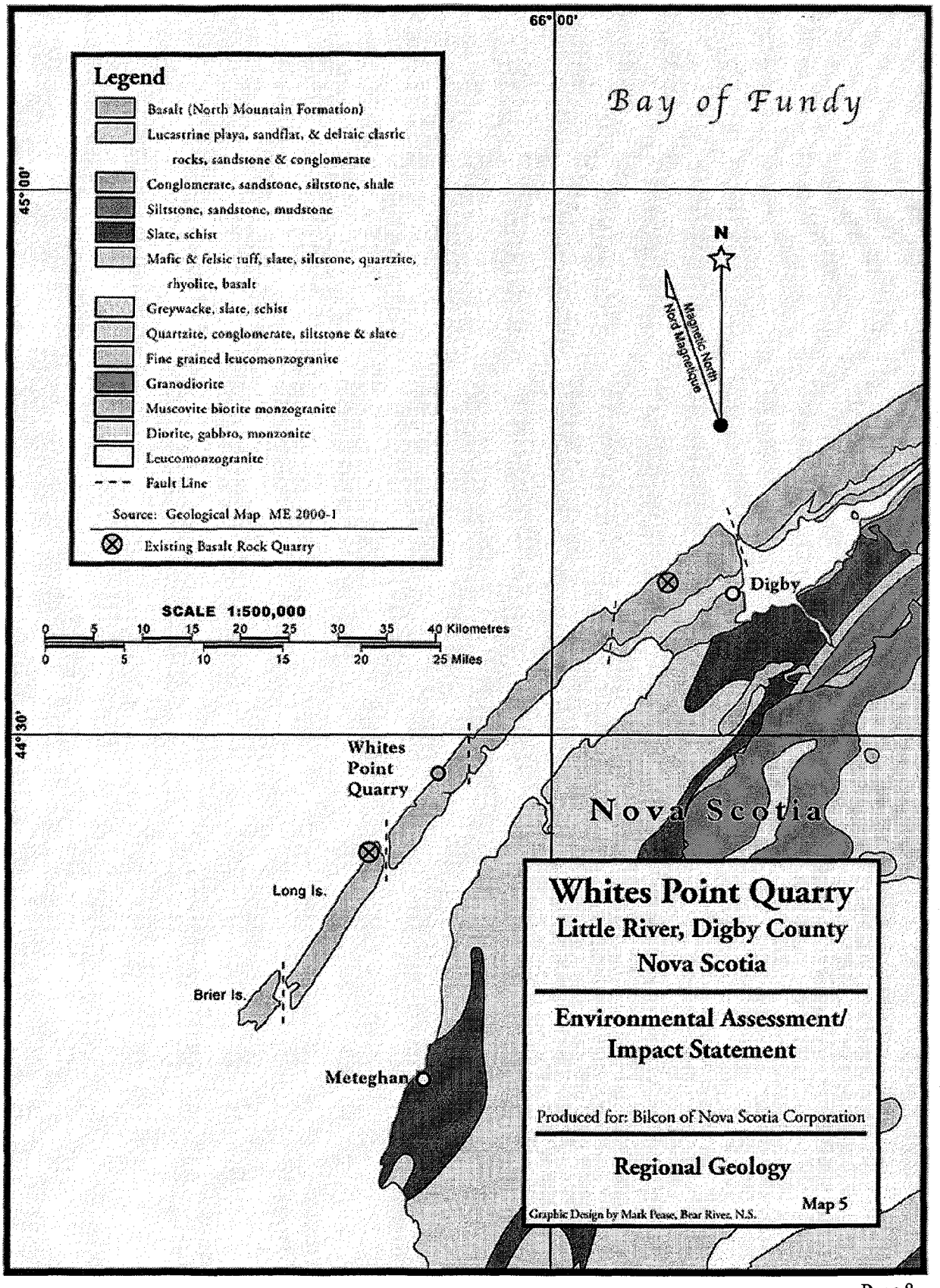
The Whites Point Quarry site is composed of the Jurassic North Mountain Basalt. North Mountain Basalt is present along the Bay of Fundy from Brier Island to Cape Blomidon, a distance of over 200 km. The Quaternary aged glacial deposit overburden on the quarry site is mapped as the Basalt Till Facies of the Beaver River Till Unit. This till is generally thin and mantled over the bedrock and may overlie older till deposits in some areas. Rossway soils cover the entire quarry site and are generally stony and well drained. These soils are chiefly forested in Digby County and on the site.

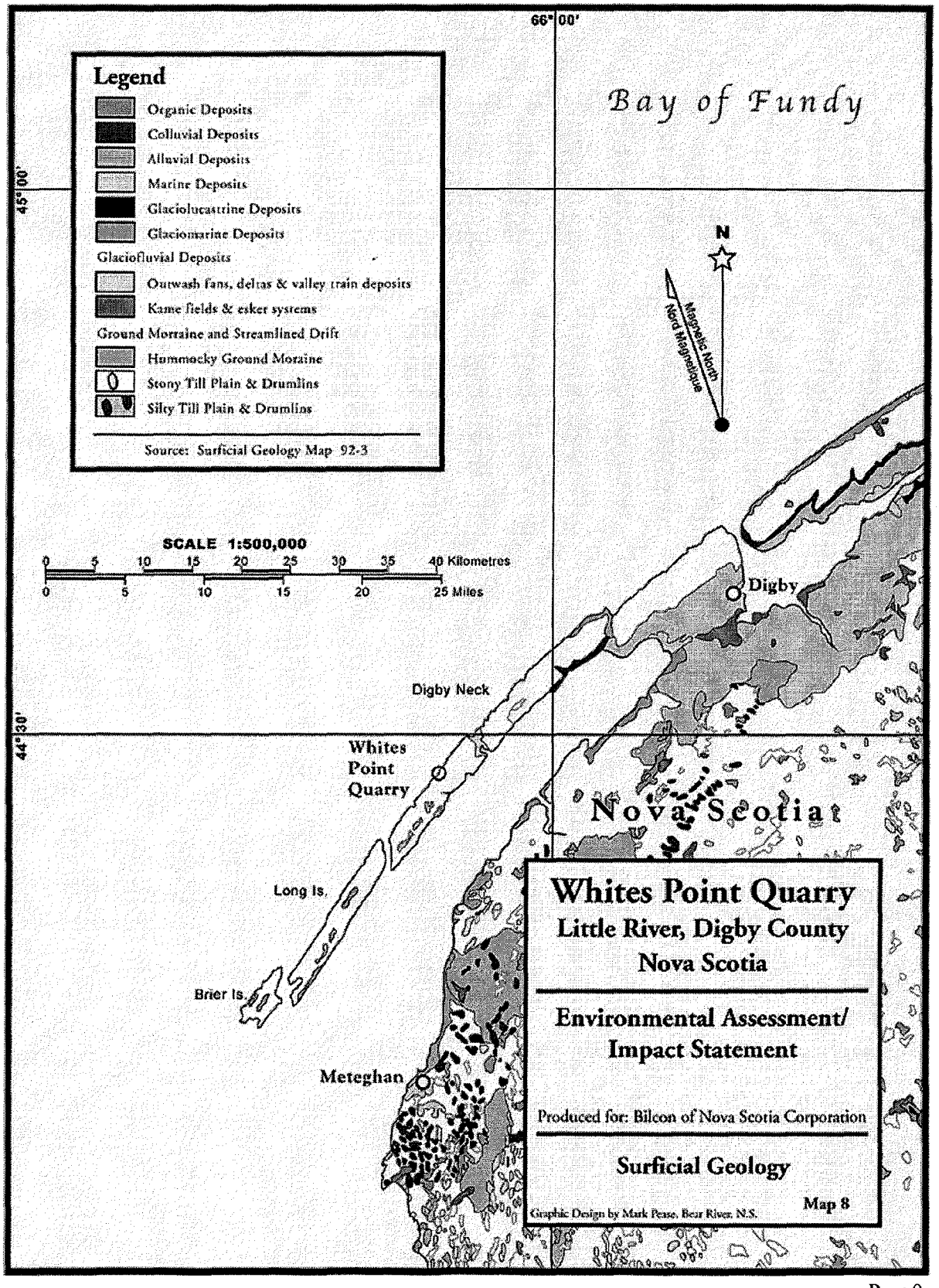
The existing topography of the proposed quarry site is steeply sloping toward the Bay of Fundy. Relief at the highest point is over 90 m. Extreme gradients range up to 50% slope with more common slopes in the 10% to 25% range, - see **Map 11** for slope analysis and aspect. Several areas such as those along the shoreline, the abandoned pit, and the southeast ridge of the site are relatively flat.

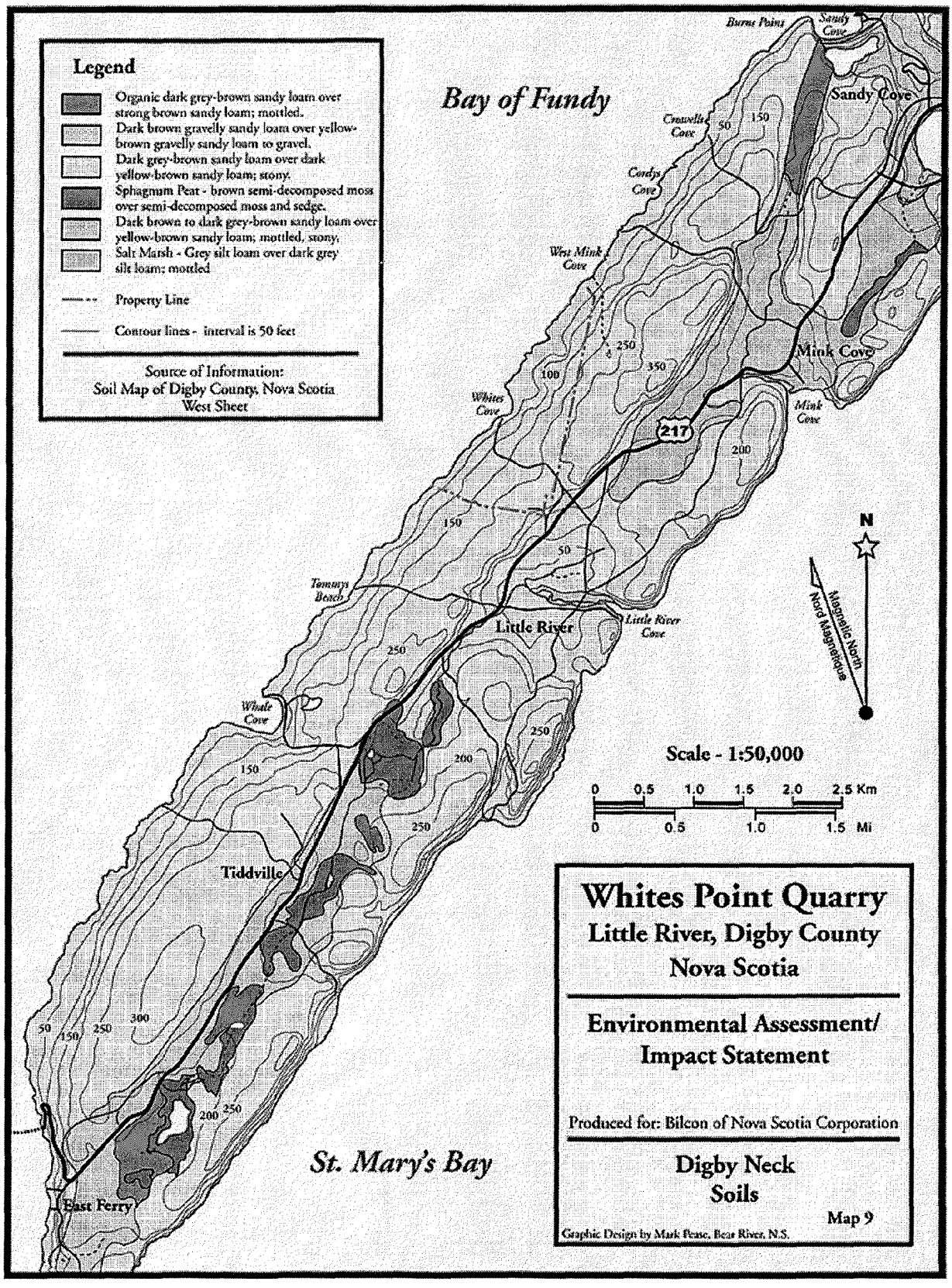
The ridge line and watershed divide are shown on **Map 12.** Surface water runoff from the majority of the site flows toward the Bay of Fundy except for an approximate 21 acre area at the southeast corner which drains toward Saint Mary's Bay. Several, small, intermittent, irregularly defined water courses, typical of the North Mountain, are evident flowing down the mountain side and dispersing into the Bay of Fundy.

The quarry site and nearshore waters are strongly influenced by the Bay of Fundy. An extreme tidal range occurs in this area of the outer Bay of Fundy with nearshore tidal currents ranging from 0 to 2.5 knots along the immediate coast depending on the state of the tide. The onshore basalt bedrock continues seaward into the Bay with areas of sand overlying the rock. Wind speed and direction vary seasonally in this area of the Bay.

Air quality on Digby Neck is good due to the combination of maritime climate, relatively small population, and few industrial bases. These climatic conditions provide good dispersion of air contaminants. The ambient air quality also benefits from the infusion of relatively clear polar and artic air masses. Occasionally, long-range transport of air masses from central Canada or the eastern seaboard of the Unites States may bring contaminants into the area.


66° 00'
45° 00'
44° 30'
Bay of Fundy
Legend
Basalt (North Mountain Formation)
Lucastrine playa, sandflat, & deltaic clastic rocks, sandstone & conglomerate
Conglomerate, sandstone, siltstone, shale
Siltstone, sandstone, mudstone
Slate, schist
Mafic & felsic tuff, slate, siltstone, quartzite, rhyolite, basalt
Greywacke, slate, schist
Quartzite, conglomerate, siltstone & slate
Fine grained leucomonzogranite
Granodiorite
Muscovite biotite monzogranite
Diorite, gabbro, monzonite
Leucomonzogranite
Fault Line
Source: Geological Map ME 2000-1
Existing Basalt Rock Quarry
N
Magnetic North
Nord Magnetique
SCALE 1:500,000
0 5 10 15 20 25 30 35 40 Kilometres
0 5 10 15 20 25 Miles
Digby
Whites Point Quarry
Long Is.
Brier Is.
Meteghan
Nova Scotia
Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/ Impact Statement
Produced for: Bilcon of Nova Scotia Corporation
Regional Geology
Map 5
Graphic Design by Mark Pease, Bear River, N.S.


66° 00'
45° 00'
44° 30'
Bay of Fundy
Legend
Organic Deposits
Colluvial Deposits
Alluvial Deposits
Marine Deposits
Glaciolucastrine Deposits
Glaciomarine Deposits
Glaciofluvial Deposits
Outwash fans, deltas & valley train deposits
Kame fields & esker systems
Ground Morraine and Streamlined Drift
Hummocky Ground Moraine
Stony Till Plain & Drumlins
Silty Till Plain & Drumlins
Source: Surficial Geology Map 92-3
N
Magnetic North
Nord Magnetique
SCALE 1:500,000
0 5 10 15 20 25 30 35 40 Kilometres
0 5 10 15 20 25 Miles
Digby
Digby Neck
Whites Point Quarry
Nova Scotia
Long Is.
Brier Is.
Meteghan
Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/ Impact Statement
Produced for: Bilcon of Nova Scotia Corporation
Surficial Geology
Map 8
Graphic Design by Mark Pease, Bear River, N.S.



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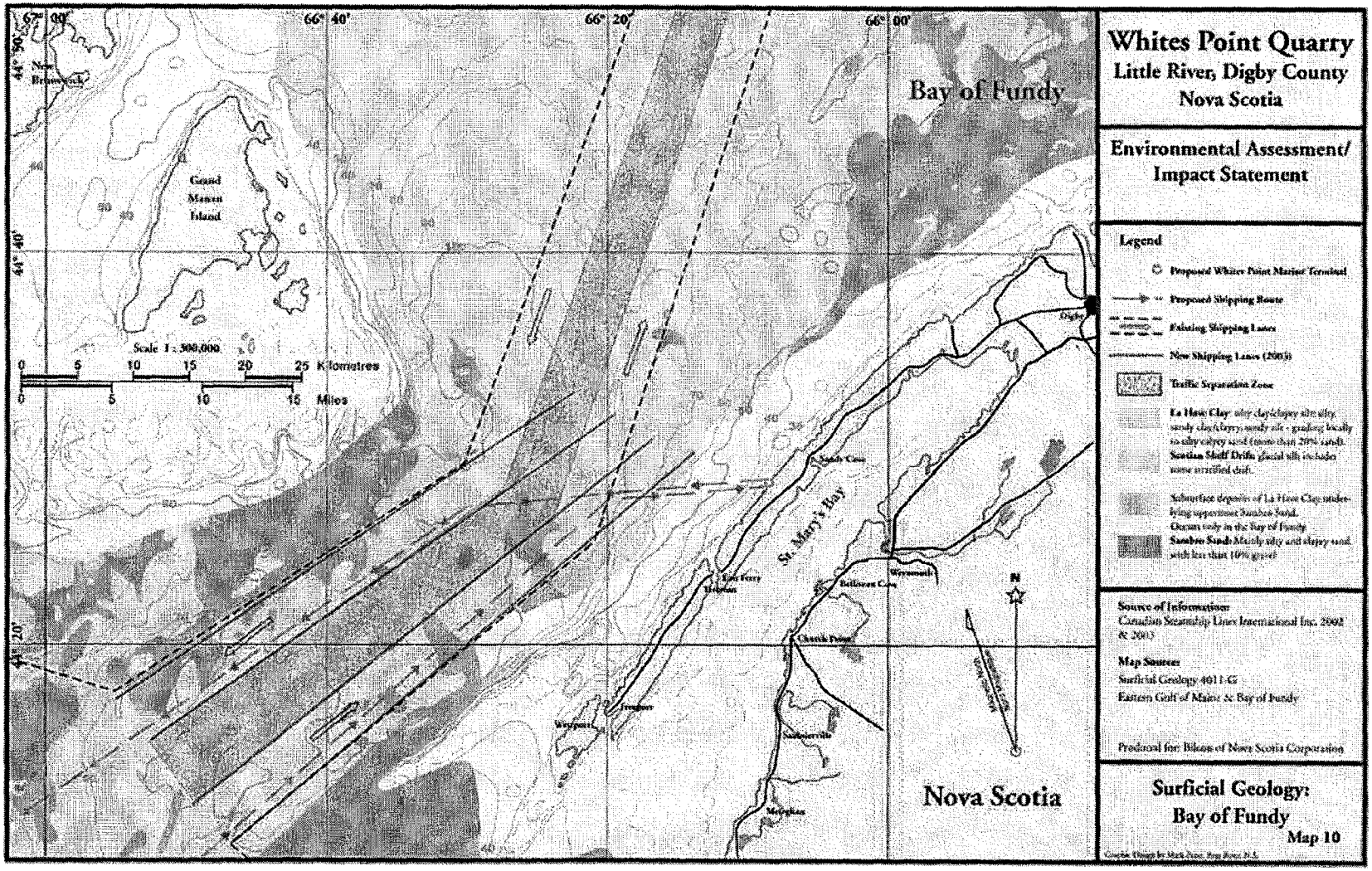
Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/
Impact Statement
Legend
Proposed Whites Point Marine Terminal
Proposed Shipping Route
Existing Shipping Lanes
New Shipping Lanes (2003)
Traffic Separation Zone
La Have Clay: silty clay/clayey silt/silty sandy clay/clayey sandy silt - grading locally to silty/clayey sand (more than 20% sand).
Scotian Shelf Drift: glacial till includes some stratified drift.
Subsurface deposits of La Have Clay underlying uppermost Sambro Sand.
Occurs only in the Bay of Fundy.
Sambro Sand: Mainly silty and clayey sand with less than 10% gravel.
Source of Information:
Canadian Steamship Lines International Inc. 2002 & 2003
Map Sources:
Surficial Geology 4011-G
Eastern Gulf of Maine & Bay of Fundy
Produced for: Bilcon of Nova Scotia Corporation
Surficial Geology:
Bay of Fundy
Map 10
Bay of Fundy
Nova Scotia
Grand Manan Island
New Brunswick
St. Mary's Bay
Digby
Westport
Freeport
Tiverton
Sandy Cove
Bear River
Bellevue Cove
Weymouth
Church Point
Meteghan
Scale 1 : 500,000
Kilometres
Miles
N
66° 40'
66° 20'
66° 00'
67° 00'
44° 50'
44° 40'
44° 20'

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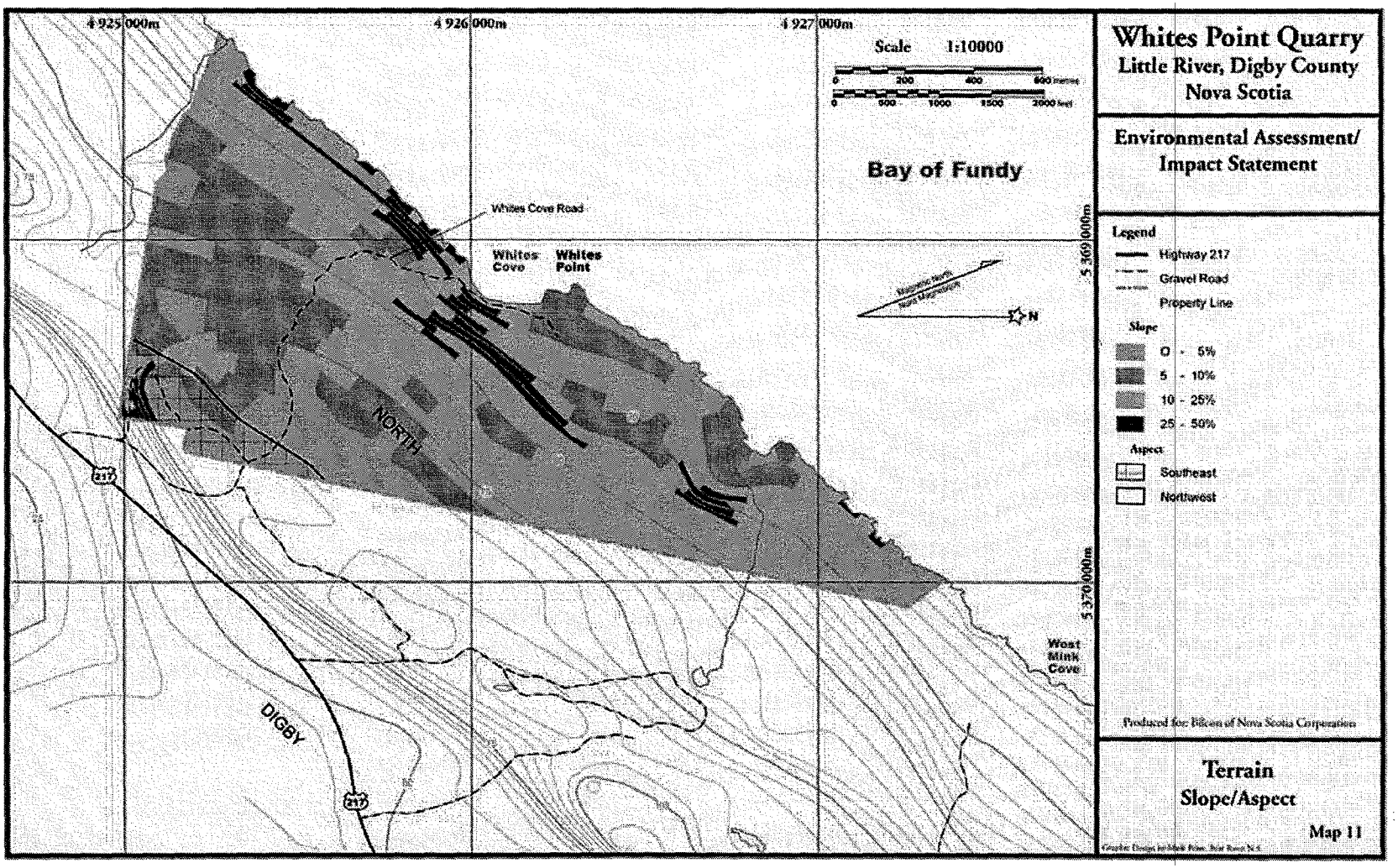

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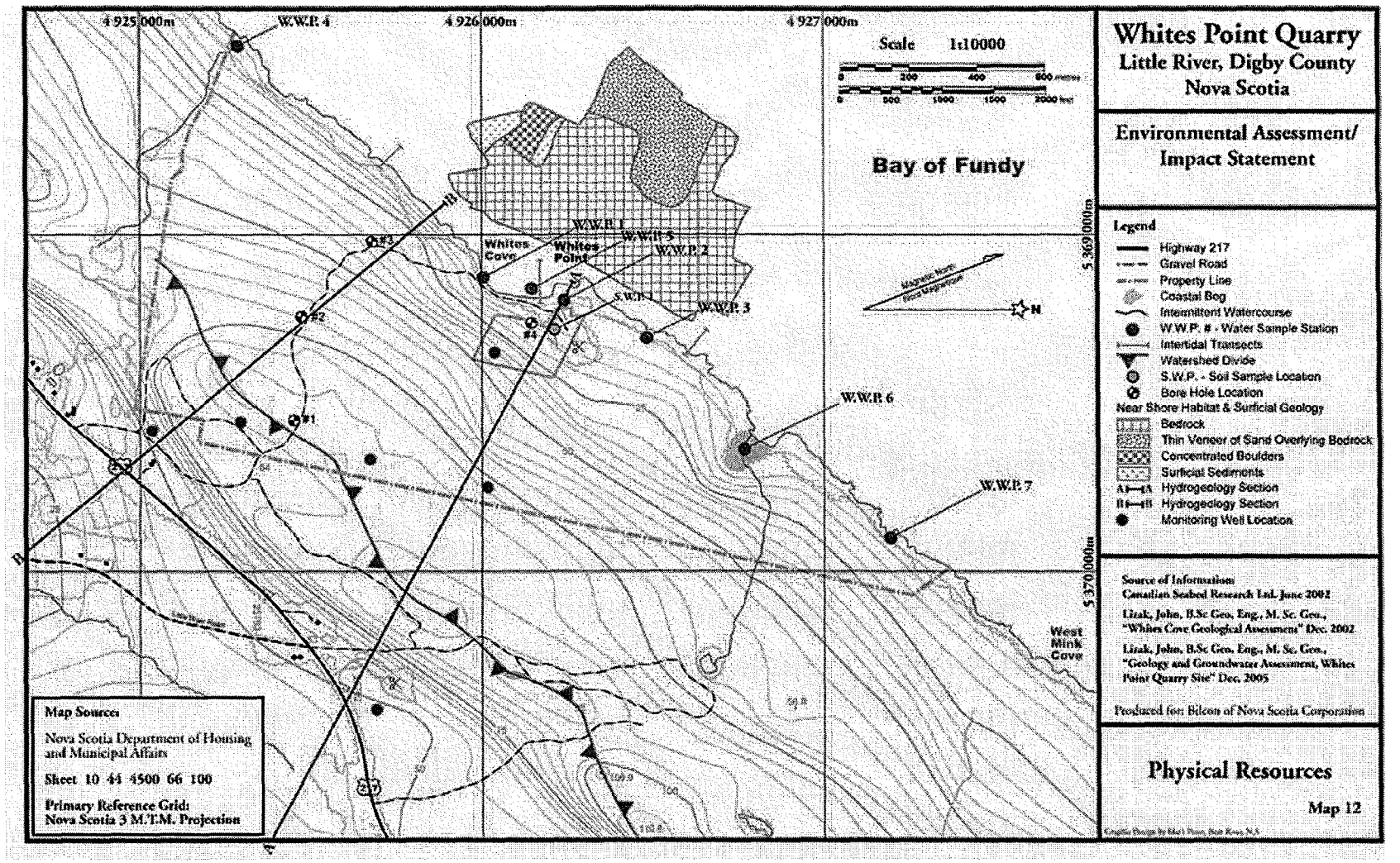

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9.1.1 Climate

9.1.1.1 Research

Precipitation and Temperature

Climatic data from two recording stations located on the Bay of Fundy was researched to establish regional baseline climate conditions. The Prim Point station in Digby County (44° 41' – N, 65° 47' – W) with records from 1965 to 1985 and the Meteghan River station in Digby County (44° 16' – N, 66° 08' – W) with records from 1937 to 1986 were used. Climatic conditions with seasonal variations for temperature and precipitation including rainfall and snowfall are presented in Appendix 14 .

Extreme daily rainfall and snowfall for the 1965 - 1985 period at Prim Point was 106.9 mm in June and 35.8 cm in January respectively. Extreme daily rainfall and snowfall for the 1937 - 1986 period at Meteghan River was 120.7 mm in July and 26.4 cm in February respectively. Highest total precipitation of 154 mm at Prim Point occurred in December and 138.2 mm at Meteghan river in December.

Extreme maximum temperature for the 1965 - 1985 period at Prim Point was 30 ° C in June and 30.6° C in August at Meteghan River. Extreme minimum temperature for the 1937 - 1986 period at Prim Point was – 22.2° C in January and –21.7° C in February at Meteghan River. The highest daily maximum temperatures occurring in August at Prim Point and Meteghan River were 21.2° C and 19.8° C respectively. The lowest daily minimum temperatures occurred in January at Prim Point and February at Meteghan River – 6.9° C and –6.8° C respectively.

Visibility

Canadian climate normals for the 30 year period (1971 – 2000) presents monthly averages for hours with visibility for distances less than 1 km., 1 to 9 km, and greater than 9 km. This data is from the Yarmouth station.

Hours with Visibility

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Total
<1 km	41.4	30.2	40.2	38.2	74.8	106.6	153.3	139.5	70.0	40.3	27.0	29.4	791.1
1 to 9 km	158.63	133.7	117.0	101.8	101.1	121.9	133.4	127.6	100.6	81.8	82.0	136.7	1396.1
>9 km	543.9-6	514.8	586.7	580.0	568.1	491.5	457.3	477.0	549.4	621.9	611.0	577.9	6579.5

The greatest number of hours (over 100) with less than 1 km of visibility occurs in the months of June, July, and August. The months with the greatest number of hours (over 600) with over 9 km of visibility occur in the months of October and November.

Greenhouse Gas

Some greenhouse gases (GHGs) occur naturally in the atmosphere, while others result from human activities. Natural GHGs include water vapour, carbon dioxide (CO2), methane (CH4), and nitrous oxide (N2O). Other GHGs that are not naturally occurring in the atmosphere include hydrofluorocarbons (HFCs), perfluorocarbons (PECs), and sulphur hexafluoride (SF6) which are generated by a variety of industrial processes. These latter gases will not be used or produced at the Whites Point quarry. Based on the nature of the operations taking place at this quarry, carbon dioxide emissions will be the primary focus.

In Nova Scotia, more than 80% of greenhouse gas (GHG) emissions are caused by fuel consumption (Environment Canada 2002, Ref. 111). In the year 2000, GHG emissions by fuel consumption indicated that mining, next to the construction industry, contributed the least amount of all sources of GHGs. Following is the percent by use of GHG emissions from fuel consumption for Nova Scotia in 2000.

- Electricity and Heat Generation 45.5%
- Transport 30.4%
- Residential 9.3%
- Fossil Fuel Industries 5.1%
- Commercial and Institutional 4.7%
- Mining 0.3%
- Construction 0.1%
- Other 1.2%

9.1.1.2 Analysis

The Whites Point quarry and Marine Terminal will contribute to greenhouse gas emissions. Energy and fuel consumption will primarily consist of electrical energy for operation of the plant (crushing, conveying, screening, washing, loading) and fuel consumption for the mobile equipment. In this regard, the engine power of the equipment was used to determine the fuel consumption. Engine fuel consumption typically yields approximately 86 percent carbon which is directly related to the production of CO2. For the purpose of typical fuel consumption, the equipment was assumed to operate at 85 percent of its maximum power. Also, it was assumed that the equipment will be operational for 85 percent of the time under working conditions. The CO2 production at various stages of the operation and the overall tonnes/year of CO2 produced is presented in **Table GHG – 1.**

Table GHG – 1

Carbon Dioxide Production during Quarry Operations at Various Stages
Whites Point Quarry

Stage	Carbon Dioxide Produced (tonnes/year)
Primary	4119
Secondary	14,052
Fine Crushing	20,088
Washing Plant	32,863
Load Out	9,647
Heavy Diesel Vehicles x 3	997
Total	**81,766**

Source: Jacques Whitford 2005

9.1.1.3 Mitigation

The burning of brush during clearing activities for construction and over the life of the project is a common practice. In order not to contribute to emissions of gases such as carbon dioxide, methane, and nitrous oxide from burning, Bilcon of Nova Scotia Corporation proposes to chip and compost wood fibre resulting from land clearing. Chipping is a more costly process than burning, however, the environmental benefits from recycling the composted material as part of the land reclamation process will produce a more productive soil on the quarry site.

The first step in the utilization of carbon dioxide by living organisms is photosynthesis by green plants. In simple terms, green plants take-up carbon dioxide and, through photosynthesis, give off oxygen, and produce carbohydrates. Forests therefore contribute to the reduction of carbon dioxide through carbon dioxide uptake. In this regard, the Whites Point quarry will be developed in increments thereby conserving forest resources until required for quarry expansion. Reclamation will also be conducted incrementally and land will be reforested soon after the rock is extracted. Approximately 20 percent of the quarry site will be conserved in a preservation zone. Also, Bilcon of Nova Scotia Corporation intends to manage over 300 acres of buffer land adjacent to the quarry property as forest resource. This method of land management will greatly mitigate the production of GHGs from the quarry operation.

9.1.1.4 Monitoring

None proposed.

9.1.1.5 Impact Statement

Greenhouse Gas

Considering the inherent relative low production of greenhouse gas from quarry operations as compared to other sources, the amount of land to remain as forest resource over the life of the project, and the proposed reclamation procedures on the quarry site the result will be a ***long term, insignificant negative effect, of regional scale.***

9.1.2 Geology

9.1.2.1 Research

Much of the information on the regional geology has been excerpted from NSDNR Report of Activities 2001 published by D.J. Kontak titled "Internal Stratigraphy of the Jurassic North Mountain Basalt, Southern Nova Scotia". The North Mountain Basalt, typical of the site, has been subdivided into three units based on the nature of the basalt flows. The units are called the lower, middle, and upper flow units. The thickness of the upper flow unit reportedly varies from 0 to 154 m deep and has been subdivided into the columnar jointed lower part and the upper part which is more massive and often contains a honeycomb network of quartz veins. The middle flow unit is amygdaloidal, vesicular and zeolite rich in marked contrast to the massive, and generally vesicle-free, lower and upper flow units. The thickness of the middle flow ranges from 9 to 165 m and it contains 4 to 15 flows. The lower flow unit varies from 40 to 185 m and consists of one flow. The unit is a uniform textured, massive, holocrystalline basalt with well developed columnar jointing. The regional dip of the North Mountain Basalt is 3 to 8 degrees to the northwest and is offset at several locations by northeast trending right lateral faults.

Site geology was initially investigated and evaluated by Mineral Valuation & Capital Inc. – see Lizak, John, "Geological Assessment of the Whites Cove Site" December 2002 (Lizak 2002, **Ref. Vol. V, Tab 29**). The initial geologic assessment was primarily based upon the drilling program and field investigation that was conducted in the spring of 2002. Four core holes were drilled on-site in April and May of 2002 – see **Map 12.** All four holes were continuously cored to a depth from 35.0 to 74.5 m. All but one of the holes was drilled to a depth below sea level.

Field investigations were conducted with Dan Kontak, Ph.D., Regional Geologist with the NSDNR, Minerals and Energy Branch, the recognized expert on the North Mountain Basalt, in December 2004 and May 2005 to supplement the geologic information obtained from the drill holes. Dr. Kontak also examined, described, sampled, and tested the drill core. The primary objectives of the fieldwork were to delineate the structure and the stratigraphy of the upper and middle basalt flows and the contact between the units, and to further describe the physical, chemical, and hydrogeologic characteristics of the upper and middle basalt unit. Thirteen quarry operations in Nova Scotia and New Brunswick were also analyzed and/or inspected with NSDNR and NBDNR geology and quarry experts as part of the field investigation.

Six additional holes were drilled in September of 2005 and completed as monitoring wells – see Mineral Valuation & Capital Inc. "Geology and Groundwater Assessment – Whites Point Quarry Site". December 2005. **Ref. Vol. V, Tab 29.** The monitoring wells were drilled to depths ranging from 36.0 to 79.0 m.

Basalt bedrock samples from core #1 were laboratory analyzed by PSC Analytical Services for potential acid rock drainage. Three rock samples from depths of 5 m, 33 m, and 61 m were analyzed. Following are the analytical test results for acid rock drainage.

SAMPLE

Analyte	Units	EQL	RWP-01-5	RWP-01-33	RWP-01-61
Sulphate Sulphur	%(w)	0.001	0.001	0.003	0.001
Sulphide Sulphur	%(w)	0.03	nd	nd	nd
Max. Potential Acidity	ppt	1.0	nd	nd	nd
Neutralization Potential	ppt	1.	26	25	24
Net Neut. Potential	ppt	1.	26	25	24
Fizz Rating		-	None	Moderate	None
Leach, Aqueous Prep		0.01	5:1	5:1	5:1
PH Paste		-	9:3	9.8	9.3
Sulphur Sub	%(w)	0.020	0.020	nd	0.020

- The units for Maximum Potential Acidity, Neutralization potential and Net Neutralization Potential are : tonne $CaCO_3$ /1000 tonne.

- EQL = Estimated Quantitation Limit is the minimum concentration that can be reliably reported. It is not a regulatory limit.

  nd = Not Detected, instruments did not detect anything above standard EQL.

Basalt bedrock samples from core #1 were laboratory analyzed by PSC Analytical Services for baseline metals. Three rock samples from depths of 5 m, 33 m, and 61 m were analyzed – see Appendix 4 for analytical test results for metals in the bedrock.

The Digby Neck region is located within the Northern Appalachian Seismic Zone (NAN). Maps of seismic risk in the 1995 National Building Code of Canada by the Geological Survey of Canada show the area occurs within Zone 1 and is considered to have a low

earthquake risk. Historically, earthquakes in the Digby Neck Region have been infrequent and of small magnitude. The nearest zone of earthquake activity is across the Bay of Fundy in the Passamaquoddy Bay region. The Oak Bay Fault is considered to be the site of the activity for that region. Two small earthquake epicenters have been reported to the northeast of Digby. Further, an assessment of the proposed quarry site was requested from the Geological Survey of Canada for evaluation against the 1995 National Building Code of Canada. Results of this assessment are contained in (Atlantic Marine Geological Consulting Ltd. 2005, **(Ref. Vol. 3, Tab 18)**.

9.1.2.2 Analyses

The drill data and the fieldwork confirm that the bedrock and the quarry at Whites Point will be comprised exclusively of the upper flow unit of the North Mountain Basalt. The upper flow unit (UFU) is a uniform, hard, massive, vesicle free, medium dark gray to black basalt. The unit attains a maximum thickness of approximately 76 m on the quarry site. It is virtually unweathered with vertical quartz veins observed in the upper third portion of the unit. Some of these veins showed red iron oxidation and some contained calcite. Minor vertical joints were occasionally observed in the basal portion of the upper flow unit, which may indicate the presence of a narrow, possibly lenticular band of columnar jointing. There is, however, virtually no communication between the joints due to the paucity of horizontal fractures and/or the sealing of the original fractures with secondary mineralization. The orientation, spacing, and sealing of the limited fractures in the basalt appear to be random and hence unpredictable.

The top portion of the middle flow unit (MFU) was penetrated by core hole #1 and #2 and monitoring wells #1, #2, and #3. In the southern part of the project area, the top part of the MFU consists of a medium dark gray to dark gray, vesicular, amygdaloidal, zeolite rich basalt with rust colored bands. The contact between the UFU and MFU is virtually indistinguishable on the northern part of the property because the vesicular, amygdaloidal zone is absent or isolated. Unlike the massive UFU, the vesicular, amygdaloidal, zeolite rich upper part of the MFU is not suitable for the production of construction aggregate.

The outcrop of the contact between the UFU and MFU is located along, or near, the southeast flank of the North Mountain (see **Figures 6A and 6B**). Consequently, the bedrock in the valley along Highway #217 is composed of the middle and lower flow units of the North Mountain Basalt. Unconsolidated, Quaternary aged glacial deposits and colluvium that range in thickness from 1m to over 50m purportedly overlie the bedrock in the valley along Highway #217.

On-site, the North Mountain Basalt dips approximately 6 degrees to the northwest and strikes northeast-southwest. Regional faulting is indicated on **Map 5 .** No evidence of unique geological features or faulting was observed on, or near, the Whites Point Quarry site.

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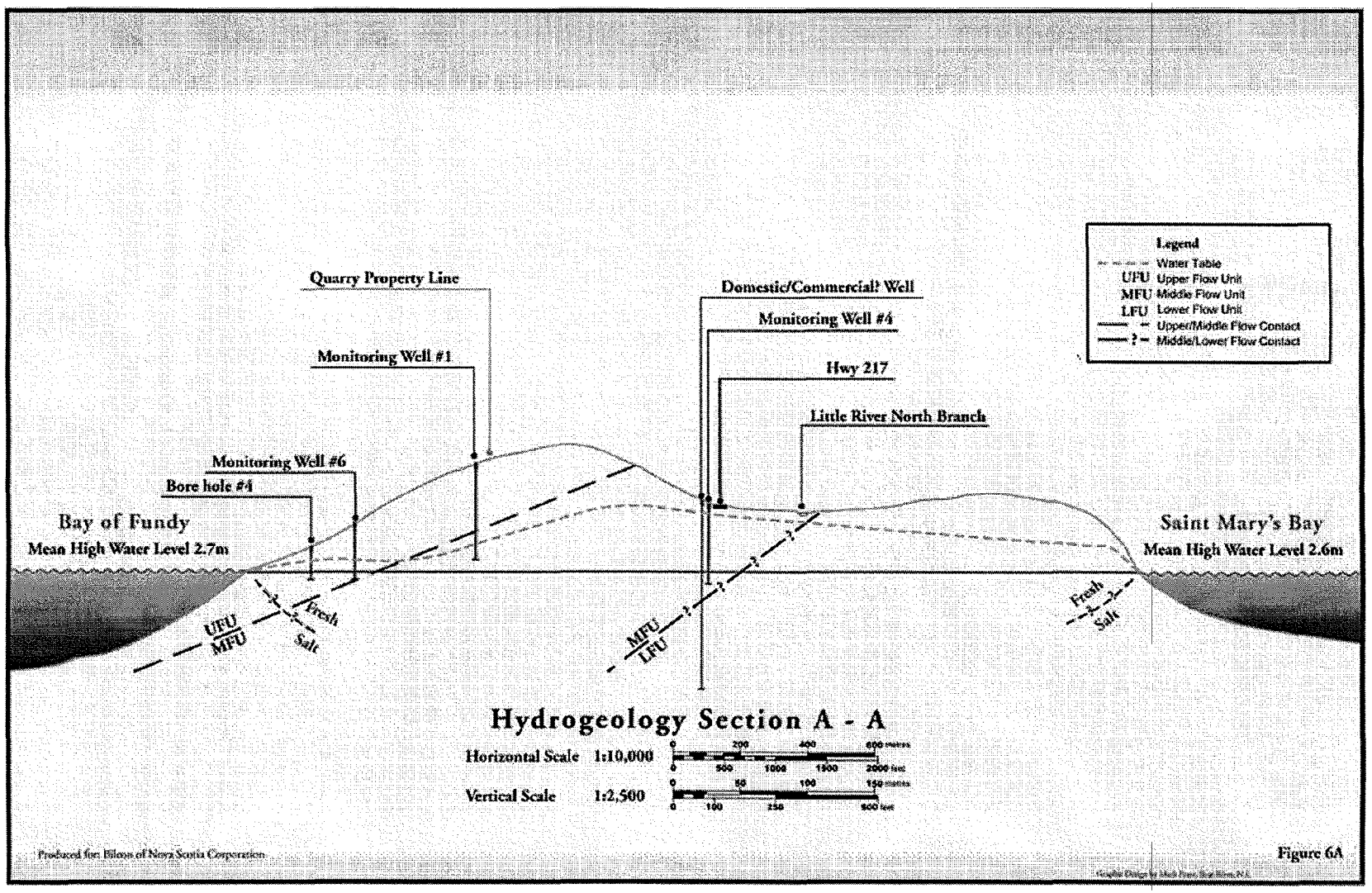

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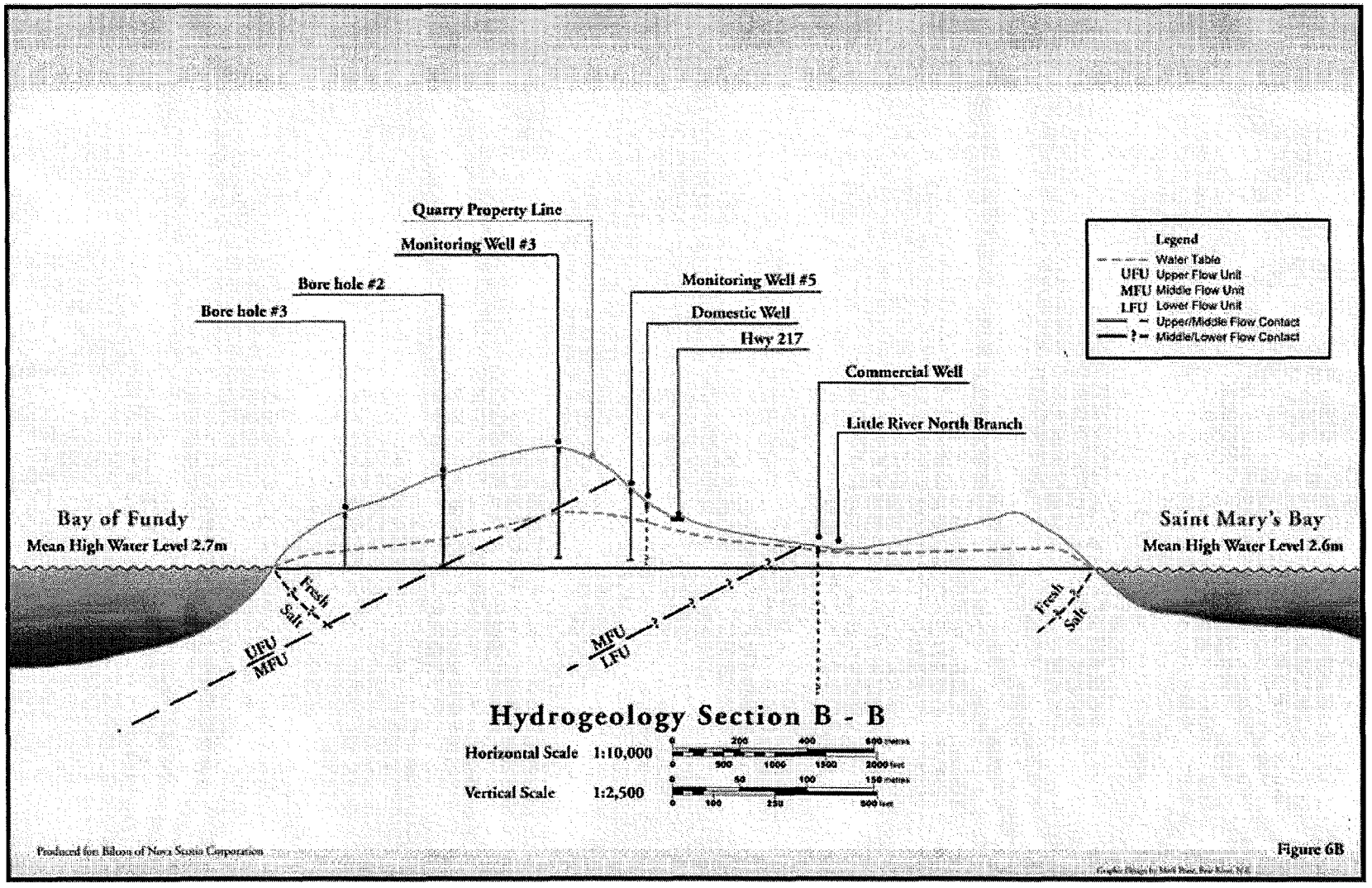
Quarry Property Line
Monitoring Well #3
Bore hole #2
Bore hole #3
Monitoring Well #5
Domestic Well
Hwy 217
Commercial Well
Little River North Branch
Legend
Water Table
UFU Upper Flow Unit
MFU Middle Flow Unit
LFU Lower Flow Unit
Upper/Middle Flow Contact
Middle/Lower Flow Contact
Bay of Fundy
Mean High Water Level 2.7m
Saint Mary's Bay
Mean High Water Level 2.6m
Fresh
Salt
UFU
MFU
MFU
LFU
Fresh
Salt
Hydrogeology Section B - B
Horizontal Scale 1:10,000
Vertical Scale 1:2,500
Produced for Bilson of Nova Scotia Corporation
Figure 6B

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In referring to the extensive outcrop of the upper flow unit of the North Mountain Basalt at Whale Cove, approximately 4 km from the proposed quarry at Whites Point, the statement was made " The exceptionally massive and fresh nature of the UFU here and its location on high-tide water level makes this an excellent location for aggregate production and the Whites Cove area just to the north of here is being examined for such purpose (as of spring 2005)" (Kontak et al 2005 Ref. 129, Page 112).

Additionally, physical and chemical laboratory tests indicate the proposed quarry site at Whites Point contains a large reserve of high quality construction aggregate material. The site contains in excess of 100 million tons of in-place stone which is ideally suited for quarrying and processing for the construction industry.

Sulphide sulphur was not detected at EQL 0.03 at various depths in core sample #1 nor was maximum potential acidity detected in the samples analyzed. Further, net neutralization potential at EQL 1. ranged from 24 – 26 ppt in the samples. Acid slates are not known to exist on the quarry property. Based on this data and research conducted by NSDNR, acid production will not occur on the site during, or after, quarrying of basalt rock.

As expected, the basalt parent material is rich in iron and aluminum as indicated by the 14,000 – 24,000 mg/kg of aluminum and the 20,000 to 23,000 mg/kg of iron in the rock samples – see Appendix 4 . Iron and aluminum in combination with organic matter have certain beneficial effects on soil structure and cation-exchange capacity (Hilchey 1969, Ref. 121). Thus, it is likely that the release of the iron and aluminum during the rock processing could benefit overall soil productivity when sediments are mixed with stripped, stockpiled, and composted organic material and spread during the reclamation process of the quarry site.

Quarrying of the upper flow unit and the related activities will not adversely impact the bedrock stability, the thermal regime, or the infrastructure within and near the Whites Point site. The evidence to support this conclusion comes from the investigation of local and Provincial quarries, assessments of local infrastructure and construction projects and the physical and chemical characterization of the surficial material and bedrock.

The upper flow unit is a uniform, hard, massive, stable basalt with an extremely high compressive strength, which is one of the reasons it is an advantaged source of construction aggregate. Bedding is absent and fracturing is absent or, at most, moderately developed and typically filled with secondary mineralization. As a result, the porosity and permeability are secondary and low. The unit is also resistant to weathering, is stable, has good cut slope stability, and is able to stand in steep cuts. The upper flow unit makes a good quality foundation for heavy structures. Blasting will not reduce the stability of the bedrock beyond the quarry face.

Quarrying and the related activities will not adversely impact the local infrastructure. The quarrying activities will be limited to the Whites Point site and, unlike other County projects, there will be no increased use of the land based infrastructure. Because there

will be no quarry pumping or offsite discharge, the proposed activities will not contribute to frost heaving. Overall, quarrying will have less of an impact on the local infrastructure than the residential, non-residential building (schools, factories, hospitals, etc.) and non-building activities (roads, bridges, etc.) occurring in the area.

Concern about impacts on the thermal regime is typically limited to permafrost regions. The permafrost table may shift upward or downward, sometimes with undesirable consequences, when the thermal regime is upset by natural factors or human activities. However, because there is no permafrost, ground ice, or unusual geothermal activity (geothermal hotspots, underground mine fires, etc.) in the area, quarrying will not impact a permafrost zone or the thermal regime.

9.1.2.3 Mitigation

Quarrying will result in the removal of approximately 100 million tons of naturally occurring basalt rock over the 50 year life of the project, which will then be processed into a high quality, value added construction industry product. This natural geologic resource will be irretrievably lost from the site. Site clearing or opening of new areas within the quarry will proceed in a northerly and southerly direction from the Whites Cove Road. Approximately six acres will be cleared each year with reclamation beginning within five years of operation. This procedure will maintain existing habitat until required for quarrying and begin the reclamation of quarried areas concurrently with quarrying and before exhaustion of the rock resources. Details of the reclamation procedure are contained in **paragraph 7.10**.

No excavation is planned to be carried out below sea level. The floor of the quarry will not extend below the contact of the upper and middle flow units due to the marginal quality of the rock in the middle flow unit. Upon completion of quarry operations, the site will be totally reclaimed to enhance biological productivity and diversity as well as site graded for future development. During quarrying, the floor of the quarry will be sloped toward the working face. Surface water will be retained in this area, and be channeled to the sediment retention ponds.

9.1.2.4 Monitoring

Monitoring of surface water discharges, water quality in receiving marine waters, noise and vibration from blasting, general noise, ground water levels and quality, air borne particulates, and selected biological parameters is proposed by Bilcon of Nova Scotia Corporation. Details of specific monitoring procedures are presented in subsequent environmental component sections of this document.

9.1.2.5 Impact Statement

Basalt Rock

Quarrying will produce a site specific irretrievable loss of approximately 100 million tons of naturally occurring basalt rock and would result in a ***long term, insignificant negative effect, of local scale.***

9.1.3 Hydrogeology

9.1.3.1 Research

Non-intrusive hydrogeological investigations including literature research of the region and of the site and immediate area were conducted during September 5 – 10, 2002 by Jacques Whitford Environment Ltd. – see Hogg, Dwayne, M.Sc. P.Eng. and MacFarlane, David M.Sc. P. Geo. "Preliminary Hydrogeological Assessment, Proposed Quarry, Whites Cove, Digby Neck, Nova Scotia" December 2002 (**Ref. Vol V, Tab28**). The North Mountain Basalt is a groundwater aquifer on Digby Neck and the following research focuses on the hydraulic properties of the aquifer, ground water quantity, and ground water quality.

Regional hydraulic properties of the aquifer are based on hydraulic testing data from the Nova Scotia Department of Environment and Labour pumping test inventory for the Digby area. Based on ten pumping tests in basalt between Halls Harbour and Digby Neck, the basalt aquifer has an apparent transmissivity of 0.27 to 78.8 m^2/d, with a geometric mean of 5.75 m^2/d. Hydraulic testing suggests a safe sustainable well yield of 1.3 imperial gallons per minute (igpm) to 94 ipgm with a geometric mean of 14.4 ipgm for wells ranging in depth from 22.9m to 141.7m for a mean depth of 71.6m.

Review of 32 available well logs, primarily for domestic demand and excluding deep wells (greater than 120m) for fish plants in the Mink Cove and Little River area indicates a poor correlation between well depth and yield (R=0.11). In this area the higher yield wells are between depths of 25m to 30m and 50m to 55m with a mean well yield of 37 L/min (8.2gpm). Also, review of 72 well logs over a larger area from Lake Midway to Tiddville indicates a similar poor correlation (R=0.24). Again the higher yield wells occur between depths of 25m to 30m and 50m to 55m. Yields increase significantly at depths exceeding 107m upon penetration of the underlying Blomidon Shale Unit.

More specifically, the Nova Scotia Department of Environment and Labour well records for drilled water wells located within and between the communities of Little River and Mink Cove were reviewed. Information on 47 drilled water wells is recorded for this area. Well depths range from 18 to 277 m with a median depth of 55 m. Well yield ranged from 0.2 igpm to 65 igpm with a median yield of 7 igpm. It should be noted that these are not all inclusive of residential water sources for this area and many shallow wells or unrecorded drilled wells probably exist.

On-site water samples and water measurements were attempted in the four existing bore holes – see **Map 12.** Three of the four bore holes apparently had been vandalized and obstructions prevented access to the full depth of the holes. Only bore hole #1 could be made accessible to measure the depth to the existing water table. The measured depth to water in bore hole #1 was 53.0 m, inferring an existing ground water elevation of 35.9 m.

Water samples were taken from bore hole #1. Samples were collected in laboratory furnished bottles and analyzed for general chemistry and trace metals by PSC Analytical Services Ltd. Analytical results are contained in Appendix 45.

Subsequent to the initial preliminary hydrogeological investigations (Jacques Whitford Environmental Ltd. 2002, **Ref. Vol V, Tab 28**), comprehensive field investigations of the local geology and hydrogeology of the Whites Point site were conducted – see Mineral Valuation & Capital Inc. "Geology and Groundwater Assessment – Whites Point Quarry Site". December 2005 **Ref. Vol V, Tab 29.** This investigation included:

- The drilling and analysis of six groundwater monitoring wells
- Surveying the location of domestic and industrial well locations adjacent to the quarry property
- Consultation with provincial mining and hydrogeology experts
- Inspection and/or analysis of thirteen quarry operations in Nova Scotia and New Brunswick

Six monitoring wells were drilled in September 2005 – see **Map 12.** The wells were drilled to determine if the quarry operation will affect groundwater quantity or quality and to acquire additional data on groundwater chemistry, the water table, local aquifer characteristics, etc. Two monitoring wells were drilled in the midst of the neighbouring residential wells to directly monitor any effect of the quarry or other adjacent industrial water use on the local groundwater supply. Step down "air blow" tests and recharge tests were conducted to estimate the yield of the hydrostratigraphic units, the aquifer characteristics, etc. A program to routinely measure and record water levels and precipitation was implemented.

In anticipation of conducting a pre-blast survey as required by the Nova Scotia Department of Environment and Labour's "Procedure for Conducting a Pre-Blast Survey", November 1993, domestic and industrial wells adjacent to the quarry property were located. Horizontal coordinates and vertical elevations for 24 active wells were recorded.

Prior to this survey, Bilcon of Nova Scotia Corporation sent a letter to adjacent property owners requesting permission to do this work. All but one property owner agreed to the survey. The survey was conducted by a licensed Nova Scotia land surveyor and the wells were located with the help of the property owners. Twenty-four wells were located, 17 drilled wells and 7 dug wells.

9.1.3.2 Analyses

Using the above research data and relevant data contained in the previous Geology section, some comments can be made concerning potential influences the proposed quarry may have on surrounding residential water supplies. As previously stated, a local ground water source occurs in the basalt aquifer continuously along Digby Neck. However as previously stated, a poor correlation exists between recorded well depths and yield in the immediate area. Most of the original fracture permeability of the basalt has been lost due to secondary mineralization. Groundwater flow occurs primarily along horizontal discontinuities between lava flows with very limited flow along vertical discontinuities. The columnar joints transmit minimal, if any, amounts of groundwater. As a result, the massive upper and lower flow units are relatively tight. Groundwater flows mainly through the horizontal to sub-horizontal fractures located along contacts between flows in the middle unit. In general, the highest well yields are expected from the middle flow zone and poor well yields are expected in the upper and lower flow units.

Water table data was obtained from the existing core holes, the six monitoring wells and neighbouring wells. The ground water regime and the hydrostratigraphic units are shown on **Figures 6A** and **6B**. The two cross-sections - **see Map 12** - depict a "snapshot" of the water table, the hydraulic gradient etc. in the fall of 2005. The data show that the local water table mimics the topography and it is at or near the surface in the valley along Highway #217 and deep below the surface under the North Mountain.

The seventeen drilled wells in the surrounding area of the proposed quarry are completed in different hydrostratigraphic units than the quarry – see **Map 2.** Quarrying will occur in the upper flow unit of the North Mountain Basalt, whereas the neighbouring drilled wells are constructed in the middle or lower flow units of the North Mountain Basalt, or in the deeper Blomidon Formation. Five (Nos. 1, 8, 13, 16, and 19) of the seventeen drilled wells in this area have records. Yields from these wells ranged from 1.2 to 10 gpm. Since only five of the wells have records, other residences are expected to be served with either pre-1965 drilled wells, non-registered wells, dug wells, or springs.

It was concluded that "The Whites Point quarry will not adversely impact the quantity or quality of the groundwater supply or the local wells" (Mineral Valuation & Capital Inc. 2005). This conclusion is based on analysis of the local geology, the local hydrogeology, the monitoring well data, the quarry's operating parameters and relevant case studies and quarry investigations. The salient evidence is as follows:

- Quarrying and local water production will occur in different geologic horizons or hydrostratigraphic units. Quarrying will take place in the upper unit of the North Mountain Basalt, whereas the neighbouring drilled wells are completed in

the middle unit of the North Mountain Basalt, the lower unit of the North Mountain Basalt, and the Blomidon Formation. The neighbouring dug wells appear to be completed in unconsolidated glacial and colluvial deposits.

- The neighbouring domestic and industrial wells are located hydraulically down-gradient of the quarry and/or on opposite sides of the groundwater divide that is near the crest of the North Mountain. The recharge and discharge areas for the quarry and the neighbouring wells are also located in different watersheds on opposite sides of the divide. The recharge area for the neighbouring wells is in the valley not the quarry area. Consequently, the quarry will not adversely impact the relevant recharge regime.

- Quarrying will be carried out above the natural water table. Consequently, mine dewatering and pumping will not be needed and there will be no groundwater withdrawal or drawdown. Bilcon will essentially be dry mining. Quarrying will be a non-consumptive use because none of the water that enters the relevant watershed will leave the watershed as a result of the proposed activity.

- Blasting will not impact the groundwater supply. Agencies such as the U.S. Bureau of Mines, the Montana Bureau of Mines & Geology, etc. have done studies to evaluate the effects of blasting on groundwater supplies and wells. These studies have investigated, among other things, the issues of blasting residue and groundwater chemistry, water well stability and turbidity, yield, etc. No change in groundwater quality or quantity was observed in these studies as a result of blasting in comparable mines.

- Analysis of core hole No. 1 – see Appendix 43 and groundwater samples indicates that the chemistry of the basalt, the groundwater, and the surface water is excellent. The basalt will provide an electrochemically neutral, naturally soft, low total dissolved solids, calcium-magnesium bicarbonate groundwater of very good chemical quality. All parameters except occasional manganese can be expected to meet the "Guidelines for Canadian Drinking Water Quality" (2001).

- Construction aggregate operations have been used to enhance recharge via artificial surface recharge. Quarrying at Whites Point may enhance the local groundwater regime by increasing stormwater retention and aquifer recharge.

- The quarry will not cause saltwater intrusion. Quarrying will occur well above sea level and the freshwater-saltwater interface. No quarry pumping will take place. Construction aggregate mines have been used in coastal areas to prevent saltwater intrusion. The quarry could be part of a long term, comprehensive strategy to protect the local water supply from the seawater intrusion that could result from the unregulated pumping from the deep industrial wells in the area.

9.1.3.3 Mitigation

Due to the lack of water well data for residential wells in the immediate area of the quarry, a pre-quarrying survey of water quality of neighbouring properties is proposed by Bilcon of Nova Scotia Corporation. The survey would be done in consultation with the Nova Scotia Department of Environment and Labour according to their guidelines "Procedure for Conducting a Pre-Blast Survey" November 1993, to establish baseline water quality data. This would include analysis of bacteriology, general chemistry, and trace metals. Six new ground water wells have been drilled – see **Map 12**, and these together with the four existing bore holes will be used to monitor water table levels as quarrying proceeds. In any event, Bilcon of Nova Scotia Corporation will replace, at their expense, any existing water supply, identified as lost or damaged as a result of their quarrying operation.

9.1.3.4 Monitoring

An on-site groundwater monitoring program was selected based on the following rationale:

- On-site and adjacent property groundwater data is essential for establishment of reliable, pre-project baseline conditions of groundwater quantity and quality.
- On-site and off-site monitoring will ensure and further demonstrate that there will be no diminution in groundwater quantity or quality.

A comprehensive groundwater monitoring program was initiated in the fall of 2005 in accordance with the recommendations of Provincial experts. The design and construction of six monitoring wells will allow implementation of a multi-level monitoring program from discreet depths and geologic horizons. The objectives of the monitoring program are to:

- Demonstrate that the quarry project will not diminish the quality or quantity of the neighbouring groundwater supply.
- Acquire additional data on groundwater chemistry, the water table, the local aquifer characteristics etc.
- Address the groundwater issues raised by the neighbours and educate the public about the nature of the local groundwater supply, well design, well maintenance etc.
- Provide a failsafe, early detection system should groundwater issues arise that are not related to Bilcon's quarrying activities.

Precipitation measurements are being recorded concurrently with water level measurements.

Pump or aquifer testing is not proposed as part of the monitoring program since quarrying will be limited to the upper flow unit. This flow unit is tight and it is deemed impractical and unnecessary to pump test a unit that yields less than 1 imperial gallon per day. As well, Bilcon will be "dry mining" above the natural water table. Pump tests could be conducted at wells drilled into the middle flow unit. However, quarrying will not occur in, or impact, this unit.

Water quality monitoring will be performed by Bilcon of Nova Scotia Corporation on an annual basis for bacteriology, general chemistry, and trace metals. Summary reports of groundwater levels and water quality will be provided to the Nova Scotia Department of Environment and Labour monthly during operation of the quarry.

Public participation is proposed to continue during quarry construction and operation. Bilcon of Nova Scotia Corporation intends to re-establish the Community Liaison Committee (CLC) that was established as a result of the permitting of the 4 hectare quarry at the Whites Point site in 2002. In this regard, two neighbours with wells, adjacent to the quarry property will be invited to participate on this committee and be involved with the water well monitoring program.

9.1.3.5 Impact Statements

Residential Water Well Quantity and Quality

Well water quantity and quality in neighbouring, existing wells will not be affected since the location of the wells occur in different geologic horizons or hydrostatigraphic units than those being quarried; the existing wells are located hydraulically down gradient of the quarry and/or on opposite sides of the groundwater divide; quarrying will be carried out above the natural water table with no groundwater withdrawal or drawdown; and blasting at comparable quarries indicates no change in groundwater quantity or quality; thus resulting in a ***long term, neutral (no) effect, of local scale.***

9.1.4 Surficial Geology and Soils

9.1.4.1 Research

The surficial geology of Digby Neck is shown on **Map 8.** The glacial deposit overburden along Digby Neck is mapped as the Basalt Till Facies of the Beaver River Till Unit (Stea 1992, Ref. 169). The Basalt Till Facies consists of yellowish grey, loose, sandy tills with many boulders, sand rims around clasts and inclusion of older tills. The Beaver River Till is generally thin (1 – 10 m thick) and mantled over bedrock topography.

Geochemistry of the Beaver River Till–Basalt Till Facies is contained in Table SG–1. The closest samples 341A and 342A are located near West Mink Cove and Whale Cove respectively. Chemical analysis of these samples are contained in Table SG – 2.

Table SG - 1

Glacial Geology – Geochemical Summary Statistics
Beaver River Till – Basalt Till Facies
N = 5

Element	**Mean** Standard Deriviation	Range **(95th percentile)**
Cd	**.16** .09	.10 - .30 **.30**
Ag	**.31** .26	.05 - .70 **.72**
Cu	**131** 54	80 - 218 **218**
Pb	**10** 4	4 - 15 **22**
Zn	**53** 11	40 - 70 **71**
Ni	**24** 8	17 - 37 **37**
Co	**22** 8	14 - 36 **37**
Mo	**3** 7	2 - 4 **5**
U	**2.3** .7	1.6 - 3.1 **3.6**
Sn	**10** 7	1 - 20 **24**
W	**5** 8	1 - 20 **22**
As	**10** 5	3 - 16 **47**

Source:Province of Nova Scotia - Department of Mines and Energy, 1982

Note: N = number of samples
All values in ppm

Table SG - 2

Glacial Geology – Geochemical Analysis
Beaver River Till – Basalt Till Facies

Element	Sample No. 341A	Sample No. 342A
Cd	.10	<2.0
Ag	.70	.40
Cu	80	107
Ni	20	37
Pb	15	4
Zn	52	70
Co	19	36
Fe%	3.75	5.50
Mn	1000	1000
Ca	3800	12800
Mg	14800	40000
Mo	3	2
U	2.80	1.60
As	16	3
Sn	10	20
W	<2	<2
Depth (m)	1.0	1.0

Source: Province of Nova Scotia – Department of Mines and Energy, 1982

Note: All values in ppm except Fe%

The entire 380 acre quarry site is comprised of the Rossway Series of soils-see **Map 9.** Rossway soils occupy 36,474 acres in Digby County which is 5.4% of the total area of Digby County. The parent material of these soils is a yellowish brown cobbly sandy loam till derived from basalt that is thin and stony. The subsoil is a dark yellowish brown sandy loam and the surface soil is dark grayish brown sandy loam. The soils are stony and well drained with internal drainage medium to rapid. Limiting factors from an agriculture standpoint include extrême stoniness, rock outcrops, and a generally shallow soil occurring on 16% to 30% slopes. Rossway soils in Digby County are chiefly forested and where the soils are thin, as on the site under study, vegetation is stunted.

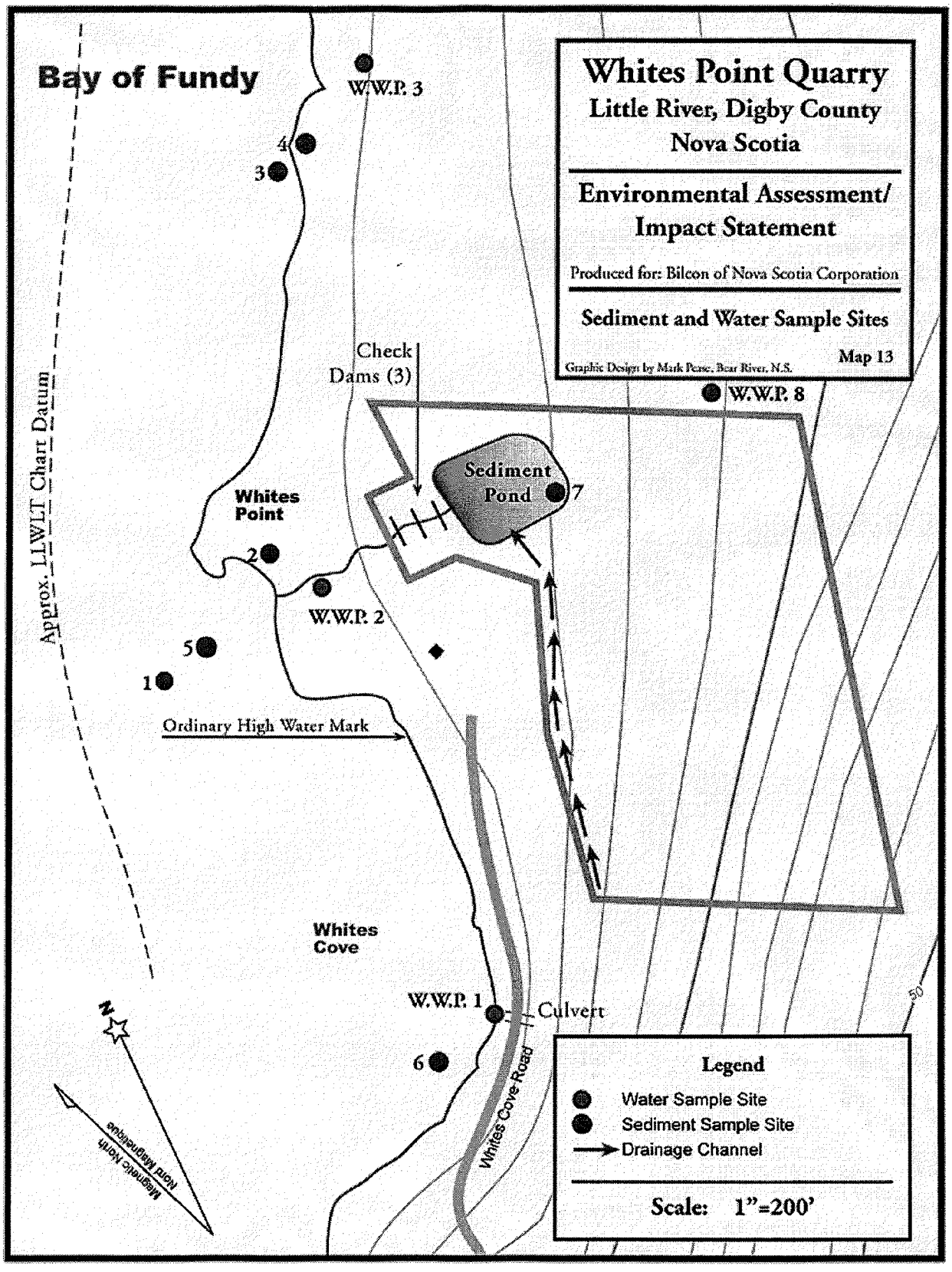
Site specific soil samples were taken on May 22, 2002 for analysis regarding site reclamation requirements and again on June 4, 2002 for analysis regarding available metals and BTEX/TPH MUST – Hydrocarbons for baseline data. The sampling site location (S.W.P. 1) is shown on **Map 12** and analytical data contained in Appendix 38 .

In the spring of 2003, a sediment retention pond was constructed to collect surface water runoff and sediments from a four hectare quarry site. Part of the four hectare quarry site was subsequently cleared of vegetation and grubbed. On July 14, 2005 a sediment sample was taken by Michael Brylinsky, PhD at sediment sample site 7 as shown on **Map 13.** The objective of this particular sample was to document any sediment contamination levels, sediment carbon content, and sediment particle size from the land disturbance caused by the grubbing of the four hectare quarry site.

9.1.4.2 Analyses

On-site soil analysis was conducted to determine baseline pH, nutrient levels, and minerals available in relation to site reclamation requirements. Prior to quarrying, the usable organic and soil layers will be removed and stockpiled for future reclamation use. Also, sediment accumulation from the on-site sediment retention ponds and from the high rate thickener will be recycled as part of the reclamation process. Dyked, stockpile areas are proposed for organic material and sediment disposal. Each area is approximately 30 acres, and is located on recently clear cut portions of the quarry site – see **Plan OP-1** Dykes will contain the wet sediment materials until dry enough to be mixed with the organic material for site reclamation. Likewise, the organic disposal area will be dyked to contain any runoff from this disposal area. Spreading and grading of these soil sources over the quarry floor and benches will be carried out and lime and fertilizer incorporated into the soil, based on the soil test results.

The soil tests taken indicate low pH levels (5.5), relatively high organic matter (18%), very low phosphorus, medium potassium, very low calcium, and high magnesium. After incorporation of the required soil amendments, hydro-seeding and selected planting/ reforestation will be conducted. Due to the thin mantle of till overlying bedrock on the site, the occurrence of land slides, slumping, creep, mudflows, or debris flow is highly unlikely.



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The sediment sample taken from the existing sediment retention pond on the four hectare quarry site was analyzed by Maxxam Analytics Inc. – see Appendix 36.

Particle size composition for this sample was documented as 50% sand, 36% silt, 14% clay, and 0% gravel. Polychlorinated biphenyl (PCBs), polyaromatic hydrocarbons (PAHs) and organochlorinated pesticides were not detected at 0.01 concentration, detection level. Also, this sample was analyzed for levels of metals (cadmium, copper, lead, mercury and zinc). Levels of metals were compared to the Canadian Council of Ministers of the Environment (CCME) 1999 interim freshwater sediment quality guidelines.

All metals except copper were below the interim sediment quality guidelines (ISQG) and the probable effects level (PEL). Copper levels were 52 mg/kg which is greater than the ISQG level of 35.7 mg/kg^{-1} but less than the PEL of 197 mg/kg^{-1}. This level of copper is typical for this area and similar to the background geochemical analysis of the Beaver River Till (see Table SG-2) which ranges from 80 to 107 mg/kg at sample sites at nearby Whale Cove and West Mink Cove.

Also, copper levels taken at various depths in the bedrock indicated background levels ranging from 27 to 170 mg/kg at the estimated quantitation limit (EQL) of 2 mg/kg.

In summary, PCBs, PAHs, and organochlorinated pesticides were not detected in the sediment pond sample. The only metal to exceed the ISQG was copper which has high naturally high levels in this region (Province of Nova Scotia – Department of Mines and Energy, 1982 Ref. 157).

The "Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health – 1999 (Ref. 41), presents guidelines specifically for protection of the ecological receptors in the environment and for the protection of human health associated with identified land uses. These guideline levels are intended to provide a healthy, functioning ecosystem capable of sustaining the current and likely future uses of the site by ecological receptors that sustain normal activities on four categories of land uses (agriculture, residential/parkland, commercial, and industrial). Soil quality, relative to human health, will be presented in a subsequent section of this document.

9.1.4.3 Mitigation

The incremental reclamation procedure planned for the quarry operation will minimize the exposed land susceptible to erosion. Much of the site will remain undisturbed for many years. By beginning reclamation after only approximately five years of operation, the land area susceptible to erosion will be reduced. Also, recycling of soils for use in the site's reclamation process, incrementally, as the quarry operation proceeds, will use the existing resource. The addition of organic compost and other amendments will produce a healthier soil regime than previously existed and in turn support healthier vegetation.

9.1.4.4 Monitoring

Soil tests indicate additives are needed for a healthy soil regime. After spreading and grading of existing soil resources, soil tests will again be taken on the specific soils to be reclaimed. Amendments will be added to meet soil pH and fertility requirements and to ensure soil quality guidelines for the protection of environmental and human health for the particular land use are met.

9.1.4.5 Impact Statement

Soil Resource

Recycling of the existing soil resource and adding required soil nutrients necessary for a healthy soil regime will result in a ***long term, insignificant positive effect, of local scale.***

9.1.5 Little River Watershed

9.1.5.1 Research

The Whites Point Quarry property is located primarily within the Bay of Fundy watershed which stretches from East Ferry to beyond Sandy Cove. Twenty-one acres of the proposed 380 acre quarry, located in the southeast corner of the property, lie in the Little River watershed. The Little River watershed has two main branches – one to the south of the Little River estuary and one to the north of the Little River estuary. The south branch watershed comprises approximately 2,600 acres from Harris Lake to the head of the Little river estuary and the north branch watershed comprises approximately 415 acres from the head of the Little River estuary to the watershed divide. The Little River watershed comprises approximately 3,015 acres.

Land use in the Little River watershed is mainly residential. The highest density of residential development is in the community of Little River (but there are other resource industry land uses such as agriculture, forestry, and the fishery). The Little River watershed is interspersed with lakes and wetlands as shown on **Map 14.** Several "important freshwater wetlands" are designated by the Nova Scotia Department of Natural resources in their Wetlands Atlas in the south portion of the Little River watershed as shown on **Map 15.** These freshwater wetlands provide important habitat for wildlife, act as flood controls, protect subsurface water resources, remove water pollutants, control erosion and provide recreational, educational and scientific opportunities. The wetlands in the Little River watershed are scored from 65 – 79.5, out of a scoring range of 37 – 108, as to their value to wildlife by the Nova Scotia Department of Natural Resources.

Records of endangered plant species, (personal comm. R. Newell), exist for the south portion of the Little River watershed.

Guem peckii – Eastern Mountain Avens is a disjunct plant species found at only six sites in Digby Neck and Brier Island. It is listed as endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and as endangered in 2000 as a wildlife species protected under the Endangered Species Act in Nova Scotia. One of the six records is from the Harris Lake area, all other records are from Brier Island. *Lophiola aurea* – Golden Crest is listed as threatened by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in May 2000. This plant is found in the Little River watershed in the Tiddville area at a former mine site.

Both plants are wetland plants and both are recorded from the southern portion of the Little River watershed before it flows into the Little River estuary and then into Saint Mary's Bay.

9.1.5.2 Analysis

Land use proposed in the twenty-one acre parcel of quarry land lying in the Little River watershed includes the quarry compound area (5 acres) and environmental preservation lands (16 acres). The quarry compound area will contain an office, shop, fuel storage, equipment parking, roads, domestic water supply, on-site sewage disposal, and landscaped areas. Surface water drainage from the compound area will be directed toward the active quarry area and away from the Little River watershed. This runoff will be channeled into the sediment ponds and constructed wetlands before ultimately entering the Bay of Fundy. Thus, the only surface runoff contributed from this area will be from the forested, environmental preservation lands. Further, this contribution of surface runoff will be to the north branch of the Little River, avoiding the more sensitive south branch wetlands with endangered and threatened plant species. A typical section of this area through the Bay of Fundy, Little River and Saint Marys Bay watersheds is shown on **Figure 7.**

Small, isolated wetlands exist in the environmental preservation lands proposed adjacent to the compound area. These wetlands have been created in depressions in the surface of the basalt bedrock and due to the massive, vesicle free make-up of the basalt, minimal infiltration of surface water into the ground water regime is evident. Also, since the contact zone of the upper North Mountain Basalt flow and the middle flow will not be penetrated during quarrying, loss of ground water to the north branch of the Little River through this contact zone is unlikely.

9.1.5.3 Mitigation

A minimum 30 m wide environmental preservation zone is proposed around the perimeter of the quarry property. As a mitigation measure, this preservation zone has been expanded to include all quarry lands contributing surface water runoff to the adjacent Little River watershed. The remaining lands presently within the Little River watershed proposed for the compound area, will be graded to drain toward the quarry property. Consequently, only surface water runoff from forested and wetlands will flow toward the north branch of the Little River.

Due to the massive, vesicle free make-up of the upper flow unit of the basalt bedrock, no transmission of ground water was evident upon examination of the cores (personnel comm. J. Lizak). Thus no transmission or loss of ground water from the Little River watershed is expected during quarrying and no further mitigation is proposed.

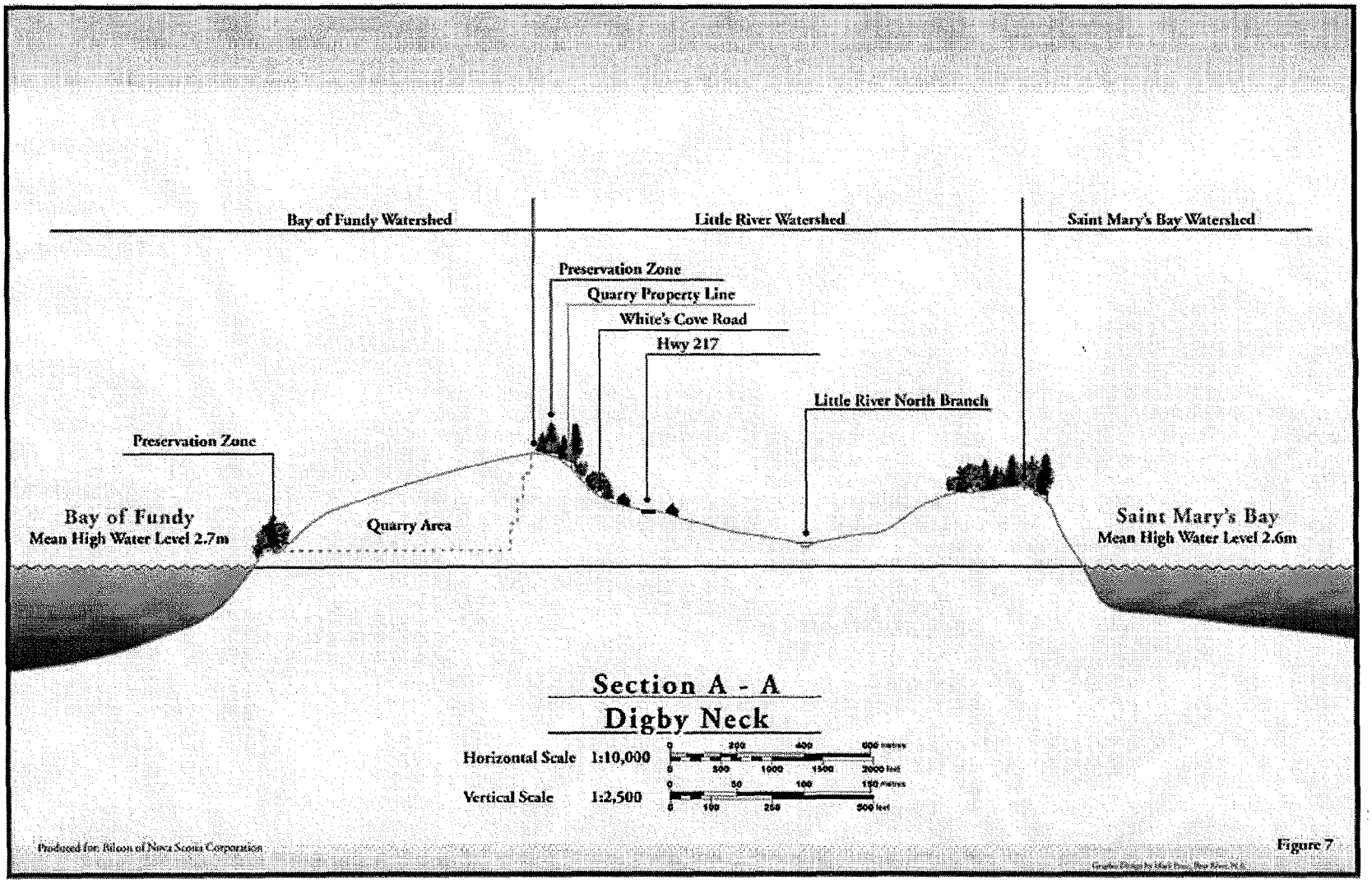

Figure 7

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9.1.5.4 Monitoring

Periodic inspection and maintenance of grading and drainage structures in the compound area by Bilcon of Nova Scotia Corporation will be carried out to ensure that surface water flow from the compound area is toward the quarry property and the environmental control structures (constructed wetlands and sediment ponds). Monitoring of surface water flow from the environmental preservation zone proposed for quarry lands in the Little River watershed is not proposed.

Wells were drilled in October 2005 for ground water quality and quantity monitoring along the east property line of the quarry and east of the groundwater divide. These monitoring wells will provide data on the ground water resource near the ground water divide of the quarry lands and the Little River watershed.

9.1.5.5 Impact Statement

Little River Watershed

Since only surface water runoff from 16 acres of forested and wetlands from the quarry property will enter the north portion of the Little River watershed and sensitive wetlands and endangered/threatened plant species are not reported to be present in the north portion of the Little River watershed, and no loss of ground water from the Little River watershed in the direction of the quarry is expected, this would result in a ***long term, neutral (no) effect, of regional scale.***

9.1.6 On-site Surface Water Drainage

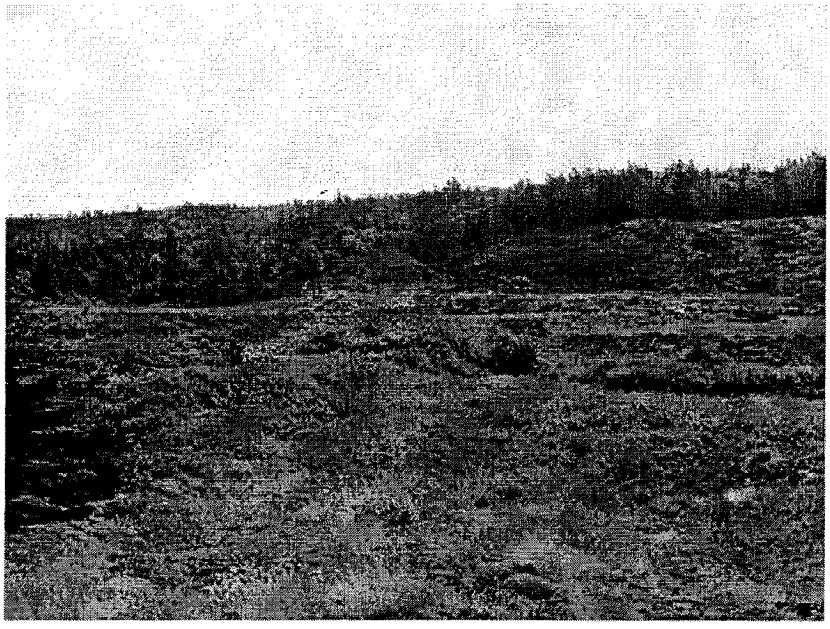
9.1.6.1 Research

Surface water drainage flows are intermittent on the Whites Point quarry site. On-site observations by David W. Kern, B.Sc., indicated several of the watercourses or drainage ways had no flow of water evident during the latter part of August 2002. This was especially evident in the drainage ways entering the coastal bog. Other water courses near the north and south property lines were barely flowing at this time in August. During periods of heavier rainfall, such as in the spring and fall, moderate flows were observed in the more defined watercourses.

Subsequent to the 2002 investigations, on-site review of the two watercourses entering the coastal bog was conducted by David W. Kern, BSc and Michael Brylinsky, PhD on July 14, 2005. The flow in these watercourses was not adequate for flow measurements. Barely a trickle of water flow was evident in both water courses.

Water quality background samples were taken at six locations by David W. Kern, B.Sc. during spring and early summer of 2002 in areas where surface water runoff enters the intertidal zone of the Bay of Fundy. The location of the water sample sites are shown on **Map 12** and a summary of water data analysis is in Appendix 45.

In accordance with the terms and conditions of the four hectare quarry permit, weekly water quality monitoring was conducted for Total Suspended Solids (TSS) and pH in the spring of 2003. Sample station WWP-2 was used to monitor surface water discharges from the quarry operation into the Bay of Fundy. Background water samples were also taken in the watershed up slope from the four hectare quarry at station WWP-8, see **Map 13.** Water data analysis for 2003 is contained in Appendix 45.



View of the 4 Hectare Quarry - Photo by David W. Kern

Sedimentation Pond Looking Toward the Bay of Fundy - Photo by David W. Kern

9.1.6.2 Analysis

Since former sea levels on the site were as high as the 45 m land elevation, fine grained silts and clays have already been removed from the site during regression and transgression associated with past sea level changes. Large areas of the site have a thin overburden and bedrock exposure resulting in minimal amounts of surficial materials having to be removed and redistributed. Also, those materials requiring excavation are mostly well-sorted clean sands and gravels without a fine- grained silt and clay component. This overburden characteristic considerably reduces the potential quantity of fine-grained particulates that could be produced during construction and operation.

One of the most critical physical water quality parameters in fresh water and marine environments is the presence of Total Suspended Solids (TSS). Unacceptable levels of TSS in the water can cause adverse effects on fish, marine mammals, and general fish habitat. Analysis of water samples taken in 2002 from the watercourses/drainage ways entering the Bay of Fundy indicated background levels of TSS in a range of none detected to 4.0 mg/l. Low levels of sediment transport such as these are common from thin soiled, predominately rocky slopes with the underlying bedrock characteristic of this site.

Monitoring of water quality from the clearing and grubbing operation on the four hectare quarry site located within the proposed Whites Point Quarry was conducted. Work commenced on the four hectare quarry in the spring of 2003. Monitoring, as required in the approval document, was conducted on a weekly frequency at station WWP – 2 for Total Suspended Solids (TSS) and pH, - See Appendix 45 . All TSS and pH data are well within the limits set forth in the four hectare quarry approval document. It should be noted that the samples taken during the spring of 2003 were taken during construction of the sediment retention pond, associated dykes, and clearing and grubbing of the four hectare site. Heavy rain events also occurred during this time period.

The permit for construction and operation of the four hectare quarry required that TSS not exceed 50 mg/L per grab sample or a monthly mean of 25 mg/L. **Graph WWP-2003-A and Graph WWP-2003-B** display the maximum TSS recorded per grab sample (50mg/L) and maximum monthly mean (25mg/L) respectively.

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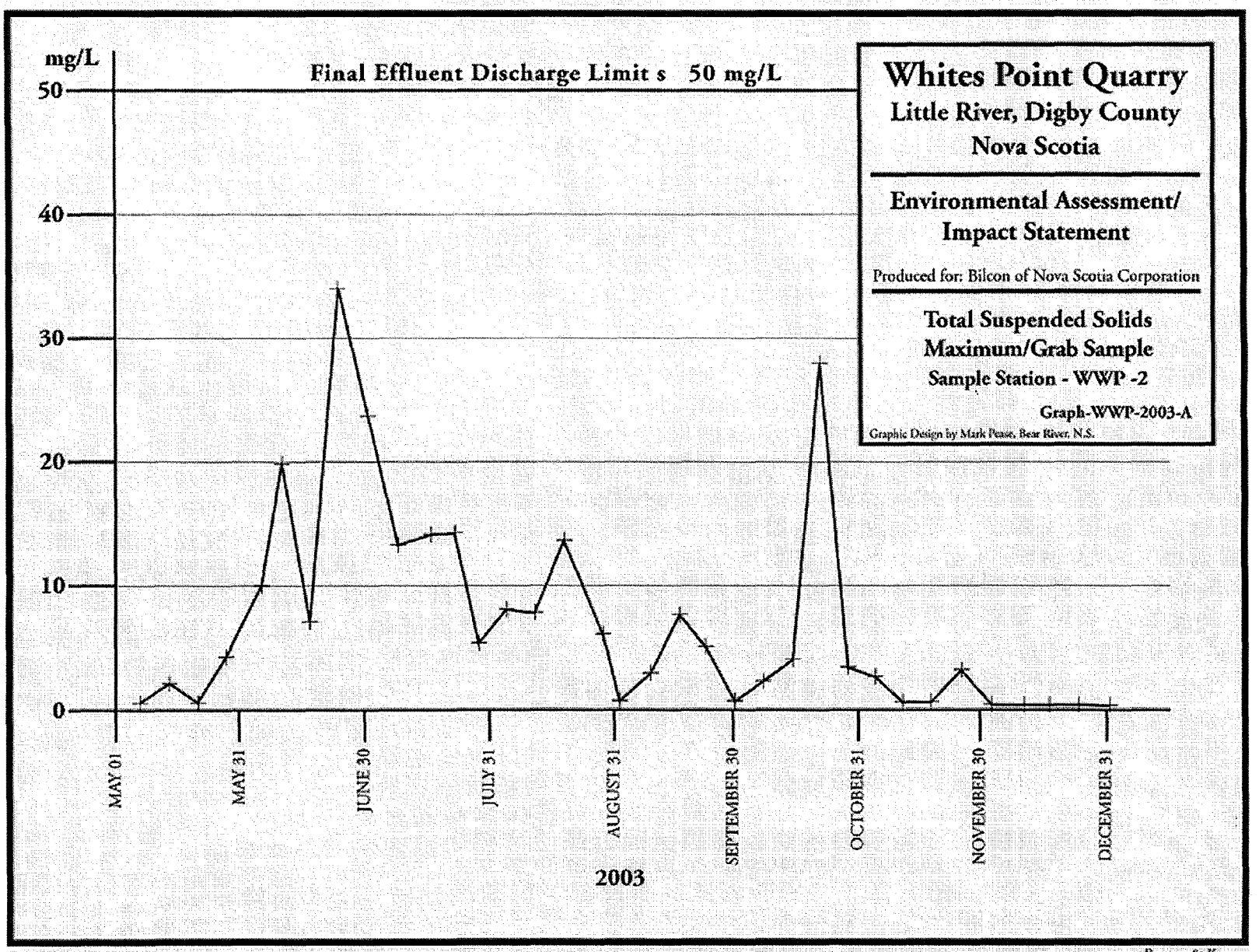
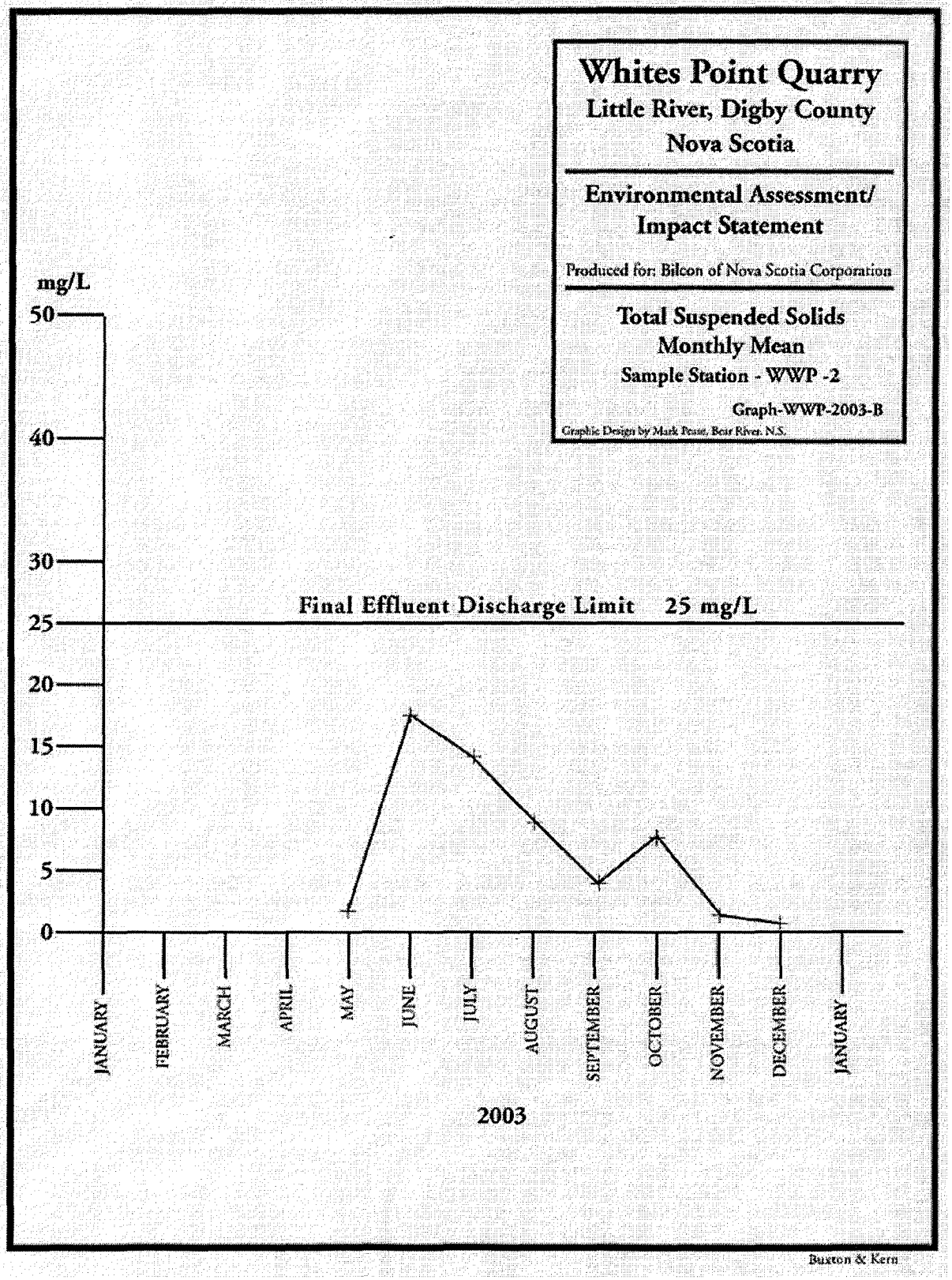



Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/
Impact Statement
Produced for: Bilcon of Nova Scotia Corporation
Total Suspended Solids
Monthly Mean
Sample Station - WWP -2
Graph-WWP-2003-B
Graphic Design by Mark Pease, Beir River, N.S.
mg/L
50
40
30
25
20
15
10
5
0
Final Effluent Discharge Limit 25 mg/L
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
JANUARY
2003
Buxton & Kern

Comparison of TSS at WWP-2 (quarry discharge point into the Bay of Fundy) and WWP-8 (background watershed) are presented below.

	WWP-2	WWP-8
July 23, 2003	14.2 mg/L	27.5 mg/L
August 14, 2003	7.5 mg/L	not detected @EQL 0.5
October 29, 2003	3.5 mg/L	5.5 mg/L
November 26, 2003	not detected @EQL 0.5	3.2 mg/L
December 24, 2003	not detected @EQL 0.5	not detected @EQL 0.5

These results indicate that in all but one instance, TSS was equal to or less than background, at the point of discharge from the four hectare site. Also, TSS and pH were well within the limits set forth in the terms and conditions of the permit.

Sediment samples were taken from the bottom of tide pools within a potential area of influence of the four hectare quarry and from tide pools remote from the quarry operation for comparison – see **Map 13.** Six tide pools, above and below ordinary high tide, indicate no appreciable difference in organic and inorganic composition of bottom sediments. This monitoring of tide pool sediments indicates that there has been little, if any, export of sediments into tide pools in proximity to the four hectare quarry, - see Brylinsky, Michael. "Results of a Suspended Solids Survey at the Whites Point Quarry, Little River, Digby County, Nova Scotia". June 2003. (**Ref. Vol II, Tab 12**). A similar erosion/sediment control plan, as successfully implemented for the four hectare quarry, is proposed for the Whites Point Quarry operation.

9.1.6.3 Mitigation

The quarrying of basalt rock will alter the existing topography of the site and its drainage patterns. A schematic section of the resultant quarry is shown on **Figure 5** contained in the Reclamation Section. The quarry floor during quarry operation, will be back sloped toward the working face to direct surface runoff away from the receiving waters of the Bay of Fundy. Natural surface runoff from the mountain side will be interrupted near the quarry face and diverted at this point into controlled drainage ways and into the environmental control areas such as sediment retention ponds and constructed wetlands, before entering the receiving waters of the Bay. As the quarry operations proceed in a northerly direction, appropriate flows into the coastal bog will be maintained from the diverted water courses. Even though no rare plants or animal species at risk were identified in the bog itself, it was identified as an area of diverse habitat within the site, unusual on a local basis, and it is part of the proposed environmental preservation zone. In this regard, it is proposed to maintain its existing natural habitat requirements such as an intermittent surface water flow through the bog.

Maintaining the appropriate surface water flow into the coastal bog preservation area will be accomplished by diverting runoff from the quarry floor to the sediment retention ponds, through a constructed wetland, and then to the head of the bog. This bog has functioned as a natural filter for upland surface water runoff for years. Thus, the objective is to maintain this natural filtering system for runoff before entering the marine environments of the Bay. All water from the working area of the quarry will enter the sediment retention ponds before flowing into the bog area or being discharged into the constructed wetland and then into the Bay. This will maximize the retention time of any suspended solids before entering marine waters. It should be noted that the background TSS in the marine waters ranged from 9.6 mg/l to 19.2 mg/l – See Appendix 43.

9.1.6.4 Monitoring

Water quality monitoring of all outflows from sediment retention ponds will be conducted weekly for Total Suspended Solids (TSS) and pH and monthly for general chemistry. TSS will be maintained at less than 50 mg/l per grab sample or 25 mg/l monthly arithmetic mean while pH will be maintained within a range of 5 – 9 per grab sample or 6 – 9 monthly arithmetic mean at the sediment pond outlet. These TSS and pH limits correspond with those contained in the permit for the four hectare quarry on this site. The frequency of monitoring will be weekly for TSS and pH and a monthly summary of results will be prepared by Bilcon of Nova Scotia Corporation and be available to regulatory agencies.

9.1.6.5 Impact Statements

Wetlands

Given the inclusion of the coastal bog in the environmental preservation zone and the maintenance of surface water flows to the coastal bog during quarry operations, the effect on this natural wetland would result in a ***long term, neutral (no) effect, of local scale.***

Surface Water Quality

By constructing controlled drainage ways, sediment retention ponds, constructed wetlands, and maintaining a perimeter environmental preservation zone, the effect on receiving marine waters of the Bay of Fundy and adjacent watersheds from quarry runoff would result in a ***long term, neutral (no) effect, of local scale.***

9.1.7 Physical Oceanography

9.1.7.1 Research

Bathymetry

General bathymetry of the outer Bay of Fundy is shown on Nautical Chart 4011 – Approaches to Bay of Fundy. Water depths range from over 100 m in parts of the inbound/ outbound shipping lanes to 16 m below chart datum at the proposed marine terminal. Regional bathymetry in the area extending southwest from Sandy Cove was mapped by the Geological Survey of Canada (Atlantic) using multibeam bathymetry imagery.

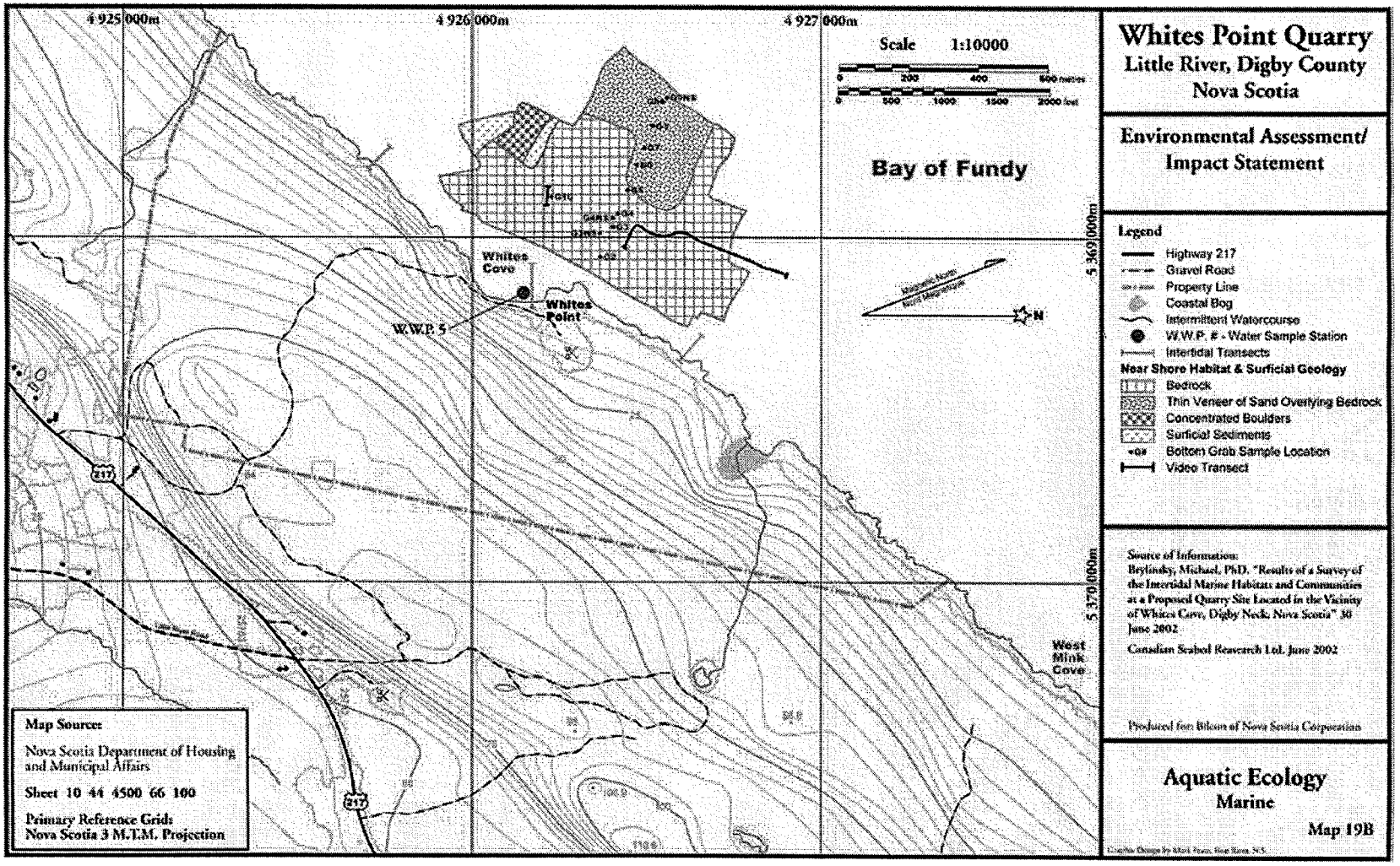
Local bathymetry in the area of the proposed marine terminal was mapped in 2002 (Canadian Seabed Research Ltd. 2002, Appendix 23) when an area 800 m along the coast at Whites Cove/Whites Point by 500 m seaward was mapped. Soundings were recorded continuously along survey lines using a Knudsen 320M (200kHz) echosounder. Bathymetric contours were then plotted at one m intervals. The regional multibeam bathymetry and local bathymetry were georeferenced in 2005 (XY GeoInformatics Services 2005, **Ref. Vol. V, Tab 26**). The general bathymetry of the Bay is shown on **Map 4** and the detailed bathymetry of the marine terminal area is shown on **Figure 2.**

The shoreline of the proposed Whites Point quarry is dominated by exposed basalt rock which extends into the intertidal and sublittoral zones of the Bay of Fundy. Surficial geology of the nearshore at Whites Point is shown on **Map 19B.** Transects in the intertidal zone were conducted in 2002 (Brylinsky 2002, **Ref. Vol. II, Tab 10**).

The 30 – year (1971 – 2000) frequency of presence of sea ice in the Bay of Fundy is 0% (Environment Canada 2004, Ref. 59). However, sea ice in the Bay of Fundy area has not been reported consistently in the period 1971 – 2000. Consequently, data from this reference document is not reliable in that area. Traditional knowledge indicates floating ice has been observed in the Bay off Whites Point, presumably from ice break-up in the inner Bay of Fundy and the Annapolis Basin.

Marine Sediments

Research on seabed sediments, sediment transport, and suspended sediments have been ongoing throughout the Bay of Fundy system (Atlantic Marine Geological Consulting Ltd. 2005, **Ref. Vol. III, Tab 19**). The following research will focus on the regional and local dynamics within the outer Bay of Fundy and the local area that could be influenced by the proposed Whites Point Quarry and Marine Terminal. Fine-grained material (silt and clay) is introduced into the Bay by both natural and anthropogenic sources including ocean dumping activities, river barrier construction, seabed fishing activities and natural erosion of the seabed and adjacent land.



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The first comprehensive Bay of Fundy wide assessment of suspended sediment was conducted by Miller in 1966. Water samples were taken during mid-flood and mid-ebb from 43 stations, at the bottom, 1 m from the bottom, 10 m from the bottom and at the surface. The average concentration was 6.6 mg/l. An analysis by Miller indicates high turbidity water during the ebb moves south and west toward the Gulf of Maine and high turbidity water enters the Bay from the southwest side of Saint John Harbour. Concentration of suspended sediments would be higher during maximum flood and ebb flows. Examination of the suspended sediment found sand, silt, clay, phytoplankton, and other organic debris. Silt and organic debris were the major components. Selected vertical turbidity profiles located off Digby Neck showed near bottom suspended sediment increased on the ebb tide, indicating a source from the northeast and not local erosion of the seabed.

Important to the understanding of sediment deposition, erosion, and transport in the Bay of Fundy is the distribution of sediments at the seabed of the outer Bay in geologic and recent history. Large areas of the seabed of the outer Bay consist of gravel that occurs as a thin layer of till that was deposited directly by glaciers. Surficial geology map 4011 – G depicts the seabed off Digby Neck as consisting largely of till in water depths greater than 90 m. Little has happened to these gravels since they were deposited. As such, they are not in dynamic equilibrium with present conditions of erosion and deposition. These areas of till are non-depositional zones where fine-grained sediments are not deposited on the seabed. As a result, these sediments are not sources for fine-grained material to be eroded and transported throughout the Fundy system.

Sediment transport and deposition in the Bay of Fundy is unique and does not fit the typical model of a continental shelf coastal environment where sediment deposition and transport is controlled by water depth, abundant source material and low velocity currents. In the Bay of Fundy, the strong tidal currents dominate seabed processes and have an effect in all water depths. Additionally, a complex sea-level history of rise and fall has developed sediment textures, distribution and surfaces of high energy that are relict from past environments.

The Marine Terminal will be located on an area of exposed bedrock at the seabed. The only local sediments at the terminal site are small patches of coarse sand and gravel that occur in crevices and ledges on the bedrock surface. Seaward of the Marine Terminal location, is an area of continuous and thin coarse sand that overlies the bedrock surface. The sand is generally less than one metre in thickness and many boulders protrude from beneath the sand. This distribution of bedrock and sand is the direct result of relict processes resulting from sea-level change that occurred over the past 9,000 years. The sea both regressed and transgressed all surfaces in the region from a maximum depth of approximately 60 m to the present shoreline. This effectively eroded previously deposited glacial sediments and produced the present conditions of exposed bedrock in the nearshore.

Multibeam bathymetry collected from the area of the Marine Terminal continuing to the north and sidescan sonar data at the Marine terminal location show that the nearshore off Digby Neck is dominated by a bedrock exposed platform that extends to a water depth of approximately 50 m. At that depth, the seabed steepens and dips rapidly to 70 m water depth where it is dominated by glacial coarse-grained gravelly sediments and glacial unmodified features such as drumlins and flute-shaped gravel ridges. Both the side scan imagery and multibeam bathymetry show no bedforms such as sand waves and mega ripples in this region.

The surficial geology of the nearshore at Whites Point is described and shown on **Map 19B.** This area which was investigated in detail (Canadian Seabed Research Ltd. 2002, Appendix 23) is comprised mainly of massive basalt bedrock outcrops and boulders. In some areas the bedrock is overlain with a thin veneer of sand, and in other areas surficial sediments consisting mainly of coarse to very coarse sand and shell fragments occur. Based on sediment transport modeling, the lack of bedforms in coarse sand indicates that the currents at the seabed are less than 45 cm/s. Small ripples can form in coarse sand at between 35 and 25 cm/s. No sediment bedforms were visible on the sidescan sonar and photographic data indicating little current movement close to the bottom.

A more detailed analysis of bottom sediments and lack of sediments is contained in **Table GS – 2002, see paragraph 9.2.4.1.** Due to the minimal thickness of sediments covering the bedrock in the area of the Marine Terminal, no vertical profiles were taken. Since proposed construction techniques for the marine terminal do not include dredging or dredge spoil disposal, those sections of the Canadian Environmental Protection Act, 1999, and its Disposal at Sea Regulations are not applicable in this case.

In summary, the nearshore of Digby Neck can be described as a starved sediment platform of exposed bedrock formed by relict erosional processes of sea level rise and fall from former low stands to high stands. Sediments are sparse and do not appear to be in transport within the Marine Terminal area and adjacent areas.

Contaminants

On a regional scale, the general distribution of heavy metal concentrations in sea-floor sediments in the outer Bay of Fundy along Digby Neck is low (Bay of Fundy Ecosystem Partnership 2003, Ref. 99). This is relative to the high concentrations on the New Brunswick side northeast of Grand Manan Island, south of Saint John, and along the shores of Annapolis and Kings Counties. Generally, metal concentrations are lower in the coarser, sandier sediments of the central and eastern parts of the Bay and higher in the finer sediments around the Passamaquoddy Bay region of southwestern New Brunswick. The abundance of metals in different areas was also related to the presence of bedrock of differing geologic origins in coastal formations around the Bay. Elevated concentrations of chromium, vanadium, and nickel in the sediments along the Nova Scotia coast and near Grand Manan Island probably result from weathering of volcanic rocks with high metal content (Bay of Fundy Ecosystem Partnership 2004, Ref. 99).

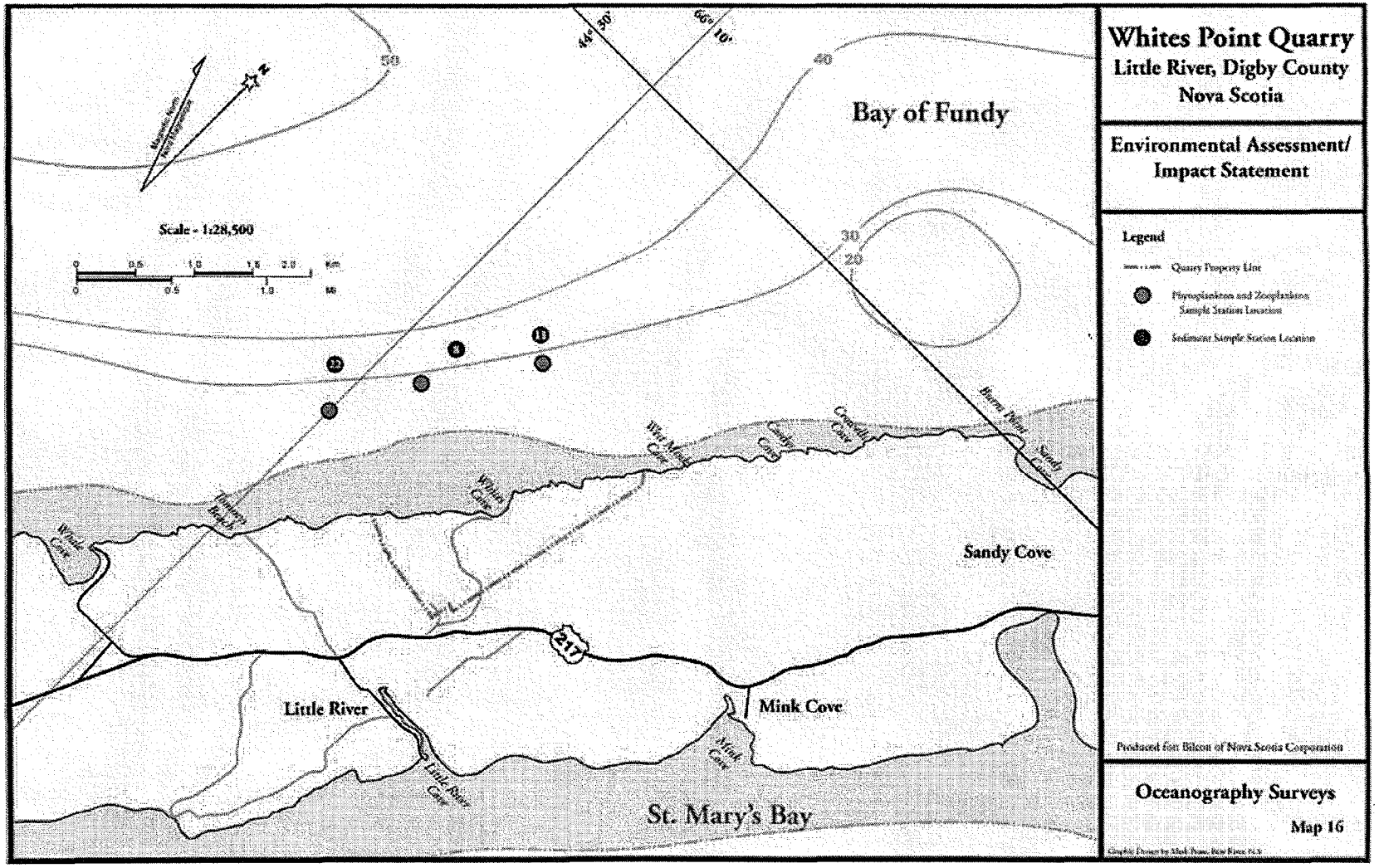
Sediment samples in the nearshore waters off the Whites Point quarry site were taken on July 14, 2005 – see Brylinsky, Michael. "Results of a Sediment Survey in the Near Offshore Waters of the Proposed Quarry Site in the Vicinity of Whites Cove, Digby Neck, Nova Scotia". September 2005. **(Ref. Vol. II, Tab 9**). The objective of the survey was to document sediment contaminant levels, sediment carbon content and sediment particle size. Sediment samples were collected with a 10.4 liter Van Veen Grab fitted with weights, and a total of 30 stations were sampled along three transects perpendicular to the shoreline. Ten sites were sampled along each transect extending from approximately 0.3 to 3 km offshore in water depths ranging from 1.8 to 43.9 m relative to chart datum. Of the 30 grab samples taken, only nine contained sediments.

A sediment sample from each of the three transects, station 8, 11, and 22 – see **Map 16**, was selected for laboratory analysis. Laboratory analysis was performed by Maxxam Analytics Inc. – see Appendix 45 .

Particle size composition varied little among samples and was dominated by sands and gravels. Sands ranged from 34% to 54% depending on sample location while gravels ranged from 29% to 43%. Clays ranged from 2.6% to 15% depending on sample location while silts ranged from 1.1% to 15%. Sediment organic carbon content was very low (less than one percent). The predominant bedrock bottom had a low organic carbon content and a paucity of fine sediments indicating an environment unsuitable for the development of a significant infauna community in these nearshore waters.

Sediment contaminant levels for metals (cadmium, copper, lead, mercury and zinc), polychlorinated biphenyls (PCBs), polyaromatic hydrocarbons (PAHs) and organochlorinated pesticides were analyzed. These data were compared to the Canadian Council of Ministers of the Environment (CCME) 1999 interim guidelines for marine sediment quality. In all cases, the sediment contaminant levels were below the interim sediment quality guideline (ISQG) and the probable effects level (PEL) for metals, total PAHs and total PCBs. Pesticides were not detected at the detection limit of 0.01.

In summary "The results of the sediment survey indicate that the nearshore waters off of the proposed quarry site are characterized by relatively pristine conditions. In most cases contaminant levels are well below current CCME guidelines" and "together with the lack of fine sediments, especially clays, makes it unlikely to be an area where pollutants would be entrained" (Brylinsky 2005 **Ref Vol. II, Tab 9**). Only copper with a contaminant level of 17 mg/kg at station number 8 approached the ISOG guideline of 18.7 mg/kg. This is most likely due to the inherently high background levels of copper in this region.



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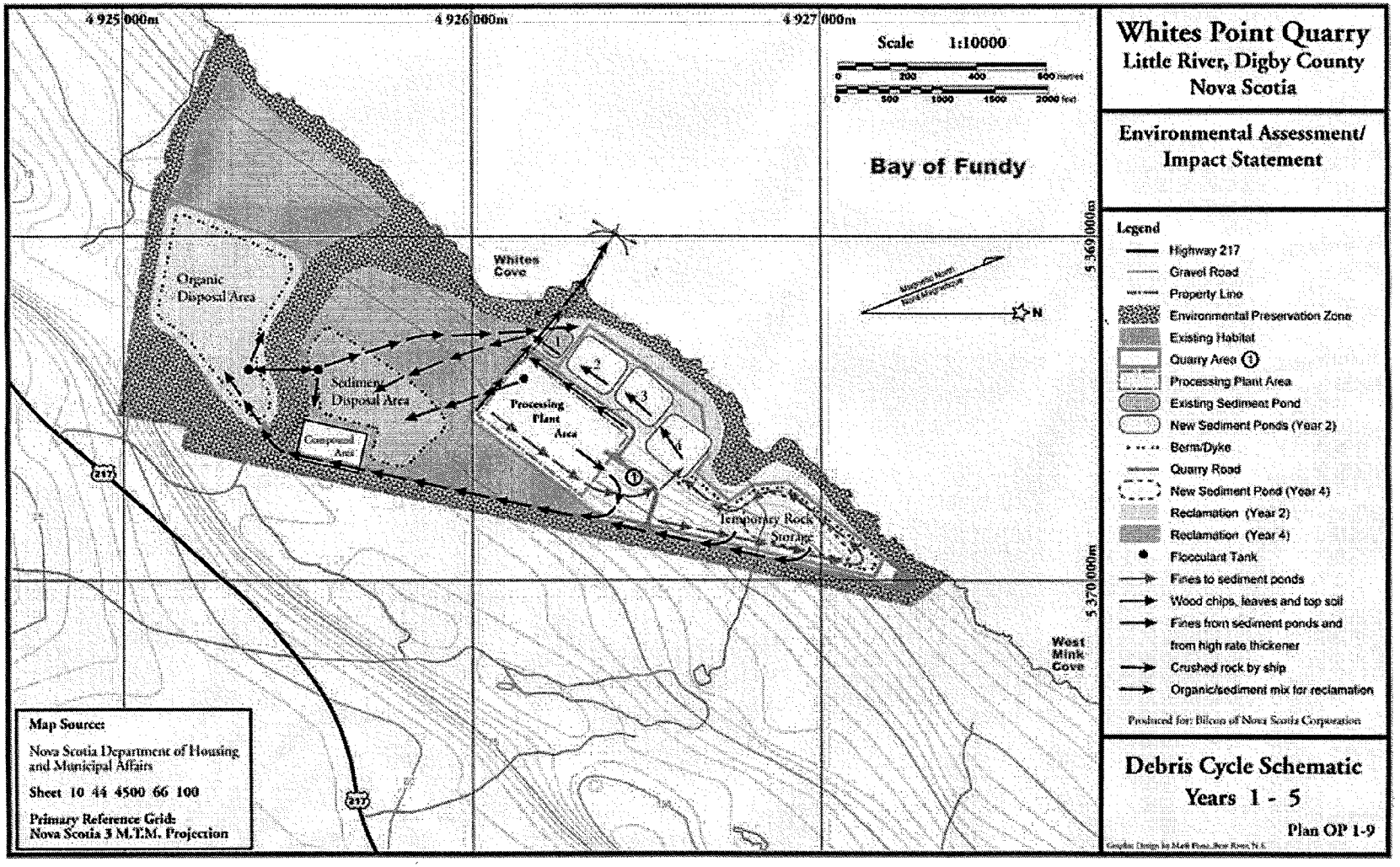
Debris Cycle

The debris remaining from the crushing process will initially be stored in designated areas and subsequently used in the reclamation process. **Plan OP1-9** – Debris Cycle Schematic shows the track of debris for the initial 1-5 years of the quarry operation. Subsequent five-year periods are similar.

Topsoil and chips from the clearing and grubbing process will be transported to the organic disposal area in the southeast corner of the site for temporary storage. This area will be bermed to prevent material washing further down the slope.

Fines from the exposed operations area will be collected in the settling ponds which will be periodically emptied and the fines transported to the sediment disposal area in the easterly area of the site for temporary storage. Fines from the washing operation will be directed to the high rate thickener where, following dewatering, they will be pumped to the sediment disposal area for temporary storage. The sediment disposal area will be bermed to prevent migration of the fines further downslope.

As material is required for reclamation, the organic material and the fine sediment will be mixed and spread for replanting following the addition of soil amendments. Crushed rock and grits will be loaded via the loading tunnel and the shiploader on a period basis for trans-shipment to New Jersey. No debris will be transported off-site since it will all be employed in the reclamation process which will be carried out incrementally throughout the life of the project.



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Ocean Tides and Currents

The tidal regime of the Bay of Fundy is essentially of a lunar semi-diurnal nature (two complete tidal oscillations daily). The tidal range recorded for Sandy Cove (44°30'N Latitude and 66°06'W Longitude) and Tiverton, at Boars Head (44°24'N Latitude and 66°13'W Longitude) is as follows.

	Mean Tide (feet)	Large Tide (feet)
Sandy Cove	18.4	25.7
Tiverton, Boars Head	17.0	23.1

The location of the proposed marine terminal at Whites Point is 44°28'N Latitude and 66°08'W Longitude. Mean water level, above Chart Datum, at Whites Point is approximately 11.5 feet.

Major tidal current patterns in the main portion of the Bay of Fundy indicating the hourly rate and direction are shown in Appendix 40. The currents shown are those to be expected for the average tidal range at Saint John, New Brunswick of 20.0 feet. Currents in this portion of the Bay in the vicinity of the bulk carriers route from the inbound/outbound shipping lanes to the marine terminal at Whites point ranges from 0 – 2.5 knots. It should be noted that these currents are for normal weather conditions. Strong winds and abnormal barometric pressures may modify the rates and directions shown on these charts by causing currents of a non-periodic nature.

Wind

The Whites Point Quarry and Marine Terminal site is located in the Bay of Fundy sub-area 1 of the East Coast of Canada as described in Volume I of the Wind and Wave Climate Atlas – see **Figure 8** for spatial definition. Wind speed and direction vary seasonally in this area of the Bay. Monthly wind statistics (frequency of wind speed by direction) for East Coast Area 1 – Bay of Fundy is contained in Appendix 48. Monthly data statistics indicate December has the highest mean wind speed (21.6 knots) from the northwest. The lowest mean wind speed (13.3 knots) from the southwest occurs in August. Maximum wind speed varies from 49.0 knots in August to 69.0 knots in October. These statistics are based on over 4,000 observations per month.

Wave

Volume I of the Wind and Wave Climate Atlas – see **Figure 8** for spatial location, indicates wave height and direction vary seasonally in this area of the Bay. Monthly wave statistics (frequency of significant wave height by direction) for East Coast Area 1 – Bay of Fundy is contained in **Appendix 46.** Monthly wave statistics indicate December and January have mean wave height of 1.1 m. These statistics are based on over 800 observations per month. The highest percentage frequency of wave occurrence is from the southwest.

Water Quality

Water column characteristics, including temperature, salinity, and water transparency were taken at three locations in nearshore waters – see **Map 16** - during spring, summer, and fall of 2004 (Brylinsky 2004, **Ref. Vol II, Tab 11**). Water quality sampling in the intertidal zone was conducted by David W. Kern, B.Sc. in 2002 – see **Map 12.** Parameters analyzed included coliform and e-coli, general chemistry and trace metals. Laboratory analysis was conducted by ComeauLab (coliform and e-coli) and PSC Analytical Services (general chemistry and trace metals) – see Appendix 45.

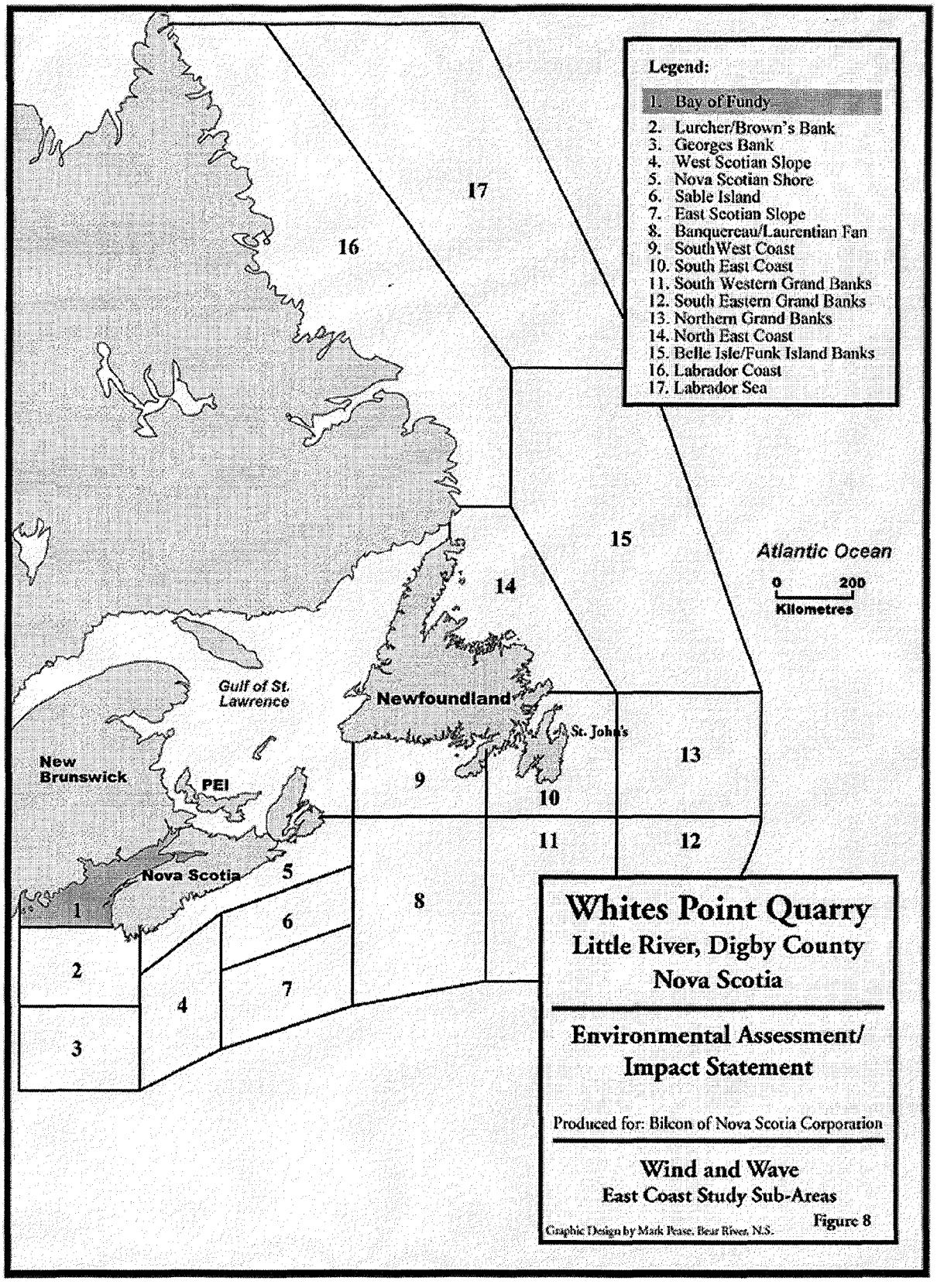
Physical characteristics were surveyed in temporal context during April, July, and October, 2004. Measurements of water column stratification (based on temperature and salinity profiles), water transparency (as Secchi Disk depth) were taken using a Yellow Springs Instrument Salinity – Conductivity – Temperature Meter and a standard 20 cm diameter Secchi Disk. Results of this survey data are contained in (Brylinsky, 2004 **Ref. Vol II, Tab 11,Table 4.2**). There was no indication of water column stratification at any of the sampling stations or during any of the sampling periods. Salinity varied little (30.0-32.3 ppt) and Secchi Disk depth varied little (7.0 – 7.3 m) indicating relatively clear water.

Sea Level Change

Historically, in the Bay of Fundy and particularly along Digby Neck, a former sea level as high as the present land elevation of 45 m occurred at the end of the last glaciation. This was followed by falling relative sea levels to a maximum of 60 m in the Bay of Fundy. During this process, fine-grained sediments were removed and transported to deeper water. Due in part to global melting of glaciers, the resulting sea level rose to the present shoreline elevation. Presently, sea level change is slowing but still rising at rates of between 20 and 30 cm/century (Atlantic Marine Geological Consulting Ltd. 2005, **Ref. Vol. III, Tab 17**).

The sensitivity of coastal areas to a potential global rise in sea level (such as might be caused by global warming) was addressed by a "coastal vulnerability index" (Shaw et al 1998, Ref. 167). Seven variables including relief and vertical land movements, lithology and coastal landform, rates of erosion, wave energy, and tidal range were considered. For example, a coast with a high sensitivity index would be a region with low relief and unconsolidated sediments, with barrier islands, high tidal range, high wave energy levels and where relative sea level is already rapidly rising. This is characteristic of much of the south shore of Nova Scotia along the Atlantic coast. The south shore area has a sensitivity index between 5.0 and greater or equal to 15.0.

A coast with a low sensitivity index would have high relief, a rocky shore with resistant, non-eroding bedrock, falling sea level, low tidal range and low wave energy. This type of coastline, typical of the Bay of Fundy at Digby Neck, is not subject to significant retreat under current conditions and would remain stable even if the sea level rises at the predicted rates. The sensitivity index along Digby Neck coast at Whites Point is low (0 -4.9) indicating a relatively stable shoreline at the Whites Point quarry and Marine Terminal site.


Legend:
1. Bay of Fundy
2. Lurcher/Brown's Bank
3. Georges Bank
4. West Scotian Slope
5. Nova Scotian Shore
6. Sable Island
7. East Scotian Slope
8. Banquereau/Laurentian Fan
9. South West Coast
10. South East Coast
11. South Western Grand Banks
12. South Eastern Grand Banks
13. Northern Grand Banks
14. North East Coast
15. Belle Isle/Funk Island Banks
16. Labrador Coast
17. Labrador Sea
Atlantic Ocean
0 200
Kilometres
Gulf of St. Lawrence
Newfoundland
St. John's
New Brunswick
PEI
Nova Scotia
Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/
Impact Statement
Produced for: Bilcon of Nova Scotia Corporation
Wind and Wave
East Coast Study Sub-Areas
Figure 8
Graphic Design by Mark Pease, Bear River, N.S.

9.1.7.2 Analysis

The bathymetry of the Bay of Fundy in the region of the proposed marine terminal affords adequate, unobstructed water depth for bulk carrier navigation and transport of aggregate materials. Water depths in the proposed ship route from the inbound/outbound shipping lanes ranges from over 100 m to 16 m at the terminal. Location of the terminal near the entrance to the Bay requires no deep penetration of the Bay by shipping and has the closest deep water route to the adjacent Gulf of Maine from the Bay of Fundy. Surficial sediments, including sand and/or muddy sediments are minimal in this region of the Bay.

The marine terminal site consists of a stable and hard bedrock seabed and occurs along a typical Bay of Fundy coastal segment without anomalous bathymetric, bedrock, or sedimentological characteristics. No in water blasting, dredging or dredge spoil disposal are proposed during construction of the marine terminal. Pipe piles are proposed to support the marine terminal infrastructure. Erosion at the base of the piles is extremely unlikely due to the absence of sediments in this area.

Minimal disturbance to the morphology of the seabed in the sublittoral, intertidal, and shoreline zones will result from construction of the marine terminal. The proposed construction method using pipe piles will produce minimal effects on bottom morphology. Analysis of existing bottom current speed and patterns indicate erosion at the base of the pipe piles will not occur. The location of the marine terminal is on exposed bedrock. No armour rock protection at the base of the piles will be required thereby confining the area of direct effect to the pile footprint. The majority of the sublittoral, intertidal and shoreline zones will be spanned – see **Figures 2** and **3**, and produce no direct effect on the bottom in the area of the spanned construction.

The location of the quarry and marine terminal on the Bay of Fundy coastline presents the possibility of potential adverse natural forces affecting the project. Climatic events such as storm surges, tides, and meteorological conditions individually and in combination will present the most probable effect on components of the marine terminal (mooring dolphins, ship loader, and conveyor system). The all time extreme wind event, recorded for this period at the Yarmouth weather station occurred on February 2, 1976. This storm event commonly called the "groundhog day storm" had recorded maximum hourly wind speed of 108.0 km and maximum gust speed of 163.0 km from the southwest.

Detailed engineering design will ensure that the structural systems chosen will be capable of withstanding these natural forces. Necessary studies including wave height and duration, wind speed, and potential sea level rise of 30 cm/century will be conducted during detailed engineering design to ensure adequate infrastructure over the 50 year life of the project.

Terrestrial surface disturbance during construction and operation phases of the quarry including aggregate washing operations will be contained on-site. A system of drainage

channels, sediment retention ponds, constructed wetlands, and an environmental preservation zone will minimize runoff into marine waters. Surface water discharge levels will meet the thresholds established by the Nova Scotia Department of Environment and Labour "Pit and Quarry Guidelines – 1999". Aggregate washing operations will be arranged in a closed circuit and make-up water for the washing will be supplied from surface water runoff. Uncontrolled releases of solids from the closed circuit wash water system are highly unlikely and would be contained by the environmental control structures.

Marine sediment redistribution during construction is extremely unlikely since pilings for the marine terminal are located on exposed bedrock. The design of the marine terminal infrastructure on pipe piles allows for practically unobstructed current and tidal flows when compared to other marine construction techniques (sheet piling and infill or rock fill). This construction technique will produce minimal effects on temperature, salinity, and nutrient concentrations during construction and operational phases. Since currents and tides are practically unobstructed by construction of the marine terminal, effects on nearshore navigation, marine ecology, and harvesting of sea life will be minimal. Also, minimal turbidity will result from drilling of the bedrock to anchor the pile driving templates and pile anchors. If turbidity exceeds the "Canadian Water Quality Guidelines for the Protection of Aquatic Life – Total Particulate Matter". (Ref.45), mitigation measures such as silt curtains will be implemented.

It is highly unlikely that water quality in the marine environment will be affected by the proposed marine terminal construction and operation. Laboratory analysis of marine bottom sediments indicates that metals, PCBs, PAHs, and organochlorinated pesticides were either not detected or are within the CCME interim marine sediment quality guidelines. No provisions for ship refueling are proposed at the marine terminal. Also, uncontrolled releases of fuel oils or nutrients from land infrastructure, operational procedures and mobile equipment will be contained by the environmental control structures. Heavy metals, PCBs, PAHs, and organochlorines substances will not be used or produced during construction and operation. Seasonal water column investigations indicate a non-stratified water column exists in the nearshore marine waters in the vicinity of the quarry property. Since there is no stratification of the water column or seasonal mixing, and, no uncontrolled releases from aggregate washing and no releases of fuel oils, heavy metals, organochlorines or nutrients, there would be no effects on water quality.

In conclusion, based on a marine geological, structural, sedimentological and bathymetric understanding of the Bay of Fundy, the location of the proposed marine terminal offshore Digby Neck is the most optimum location for such a facility within the entire Bay of Fundy " In my opinion, based on a marine geological, structural, sedimentological and bathymetric understanding of the Bay of Fundy, the location of the marine terminal offshore Digby Neck is the most optimum location for such a facility within the entire Bay by shipping and has the closest deep water route to the adjacent Gulf of Maine from the Bay of Fundy. It occurs over a stable and hard bedrock seabed with no surficial sediments including sand and /or muddy sediments. It occurs along a typical Bay of Fundy coastal

segment without anomalous bathymetric, bedrock, or sedimentological characteristics. The area has no active faults within the bedrock and is considered to have a low seismic risk"(G. Fader, Atlantic Marine Geological Consulting Ltd. - personal communication). Additionally, the sensitivity index for sea level change in this area is low, and the proposed site will not require dredging or dredge spoil disposal during the construction and operational phases of the project.

9.1.7.3 Mitigation

Site selection for the marine terminal at Whites Point constitutes a significant mitigating factor from a physical oceanography standpoint. The site is located to provide a natural, unobstructed deep water port. Its location avoids the potentially archaeologically sensitive underwater ridge extending from Sandy Cove. It is located in an area of the Bay with little sediment in the nearshore area. It provides a sound geological bedrock support for the terminal construction and is in an area of practically non-existent seismic activity. Penetration of shipping activity into the outer Bay is minimal and the distance from established shipping lanes to the marine terminal is short and direct. The above factors all contribute to mitigate effects on the regional ecosystem.

Selection of the alternate means of construction – pipe pile supports – for marine terminal infrastructure minimizes effects in the local marine environment. This mitigation measure contributes positively to sustainable development objectives when compared to other marine construction such as withinin water blasting and dredge operations and infill. The marine terminal extends offshore into adequate existing water depth and eliminates the need for blasting and dredging to achieve the necessary water depth. Turbidity within the water column is also greatly reduced with piling construction compared to placing rock infill within the intertidal and sublittoral marine zone. Again, to the extent possible, impact avoidance has been considered.

The primary direct effects on the physical oceanography will be during the construction phase of the marine terminal. Construction affecting the bottom of the intertidal and sublittoral zones will be scheduled during periods of low biological activity. Construction within the sublittoral zone will be carried out from floating platforms to further minimize effects on the pelagic and benthic communities. Construction within the intertidal zone will be done from shore and to the extent possible at low tide. During installation of the pipe pile support structures, if turbidity exceeds prescribed thresholds, silt curtains, a well established and proven mitigation measure (Vagle 2003,Ref. 90), will be installed. Pipe pile construction was selected to minimize effects on nearshore currents and tides. The pilings will provide a stable substrate for long term habitat colonization in the water column.

Secondary effects on marine waters could result from quarry operations. However, runoff from land sources during quarry operations will be routed through sediment retention

ponds and constructed wetlands before entering marine waters. This system of sediment control of Total Suspended Solids (TSS) proved successful in meeting the thresholds established by the Nova Scotia Department of Environment and Labour during construction operations at the 3.9 hectare quarry on the Whites Point site.

9.1.7.4 Monitoring

Monitoring potential effects on the physical oceanography will focus on the direct influences during the construction phase of the marine terminal. Minimal turbidity in the marine water column is anticipated when pipe pile templates and pilings are installed within the intertidal and sublittoral bottom. Turbidity monitoring will be conducted during this construction process. If turbidity exceeds the "Canadian Water Quality Guidelines for the Protection of Aquatic Life – Total Particulate Matter". (Ref. 45), silt curtains will be implemented. Liquid effluent discharge levels from land sources will meet the thresholds established by the Nova Scotia Department of Environment and Labour "Pit and Quarry Guidelines – 1999". (Ref.77).

9.1.7.5 Impact Statements

Physical Oceanography – Construction

Since the only direct construction within intertidal and sublittoral marine waters consists of installation of pipe piles in areas of bedrock, turbidity will be minimal and result in a ***short term, insignificant negative effect, of local scale.***

Physical Oceanography – Life of Project

Placement of pipe piles within the intertidal and sublittoral marine waters will produce minimal alteration and obstruction to nearshore currents and tides and result in a ***long term, insignificant negative effect, of local scale.***

9.1.8 Air Quality

9.1.8.1 Research

On-site investigations indicate no development presently exists on the Whites Point Quarry property and no commercial or industrial land uses are adjacent to the property. The nearest industrial activities are two fish processing plants in the village of Little River over 1km away. Vehicle traffic on Highway #217 is generally light with some increase during the summer tourist season and only minimal internal combustion engine emissions are evident. Emissions from diesel powered fishing boats along the nearshore are also minimal. Vehicular traffic on Whites Cove Road, due to the unimproved condition is practically limited to four wheel drive vehicles and all terrain vehicles which frequent the site. A portion of the site was recently clear cut with logging trucks hauling out along Whites Cove Road generating greater than normal emissions and dust.

Total suspended particulate (TSP) has been the air quality parameter of most concern for quarry operations in Nova Scotia in regard to potential effects on human health and the environment. In June 2000, the Canadian Council of Ministers of the Environment (CCME) "Canada-Wide Standards for Particulate Matter (PM) and Ozone" see – CCME 2000. Ref.46 . was endorsed. Further, "Regulations Related to Health and Air Quality" were published by Health Canada (Health Canada 2003, Ref.63). This latter document sets forth National Ambient Air Quality Objectives & Guidelines in Canada and establishes the following for Total Suspended Particulate (TSP):

Maximum Desirable Level	(annual) 60 μg/m³	(24 hour)
Maximum Acceptable Level	(annual) 70 μg/m³	(24 hour) 120 μg/m³
Maximum Tolerable Level	(annual)	(24 hour) 400 μg/m³

Further, as indicated in Appendix D of the NSDEL Pit and Quarry Guidelines (NSDEL 1999, Ref.77) paragraph VI establishes the following limits for suspended particulate levels at or beyond the property boundary.

Suspended Particulate Matter

Maximum Limit	60 – 70 μg/m³ 120 μg/m³ ave.	annual geometric mean concentration over a 24 hr period

Ambient air quality is monitored in Nova Scotia with a network of 28 sites and generally meets federal ambient air quality criteria for S02, TRS1, H2S, CO, NO, and O3. An exception may be when long-range, trans-boundary events occur (Jacques Whitford 2005, **Ref. Vol V, Tab 31**).

9.1.8.2 Analysis

Particulates such as dust, generated by quarry operations will not exceed the criteria established by the NSDEL at or beyond the property boundaries of 70 $\mu g/m^3$ annual geometric mean or 120 $\mu g/m^3$ daily average (24 hour). Dust generated from on-site haul roads will be controlled with water spray or other approved methods. Dust from rock processing will also be controlled by water sprays from recycled water from the sediment retention ponds.

Quarrying will require heavy mobile equipment, primarily diesel powered, for land operations. Arrival and departure of the bulk carrier once a week will briefly involve diesel powered emissions. Some increase in vehicle traffic, primarily private vehicles, will be generated by the quarry workforce and commercial vehicles delivering equipment and materials during quarry operations. All heavy mobile equipment including quarry trucks and loaders, will have approved emission controls meeting U.S. Environmental Protection Agency Tier 3 emissions regulations. This equipment will be maintained in prescribed mechanical operating condition.

Electrical power will be used for land operations such as the conveyor systems, stationary equipment, and ship loading systems. As a result, emissions are not expected to affect adjacent residences, especially since no stationary machinery activities such as crushing and screening will take place within 800 m of the adjacent residences.

9.1.8.3 Mitigation

Since quarry products will be shipped by water to markets, no heavy trucks hauling rock will generate dust in adjacent residential areas. Also, access to the Whites Point quarry is presently being investigated. A paved access road from Highway #217 to the quarry property is planned. Paving the access road will practically eliminate dust generated from employee and delivery vehicles. The physical plant area where crushing and screening will take place has been located approximately 1000 m from the nearest residence to further reduce any effects of air borne particulates on residential life. As a further precautionary measure, processing equipment will be enclosed whenever practical and hooded conveyor systems used to reduce fugitive dust. Dust control at the source with water sprays, horizontal and vertical separation, maintaining existing forest cover, and an approximate five year revegetation program will collectively eliminate any adverse effect of dust on adjacent residences.

Heavy operational (quarry trucks and loader) mobile equipment will be equipped with diesel engines meeting the U.S. Environmental Protection Agency Tier 3 emission standards and maintained in prescribed mechanical operating condition. This will further ensure emissions of particulate matter, hydrocarbons, nitrous oxide and carbon monoxide are within regulatory standards. Smaller maintenance equipment used on an infrequent basis may not be equipped to Tier 3 emission standards.

The burning of brush and associated wood fibre from land clearing activities causes emissions of gases such as carbon dioxide, methane, and nitrous oxide into the air. This practice is presently common in Nova Scotia with appropriate burning permits. Construction and the opening of new quarry areas over the life of the project will require land clearing. To eliminate the resultant emissions from open burning of brush, Bilcon of Nova Scotia Corporation intends to chip the remaining wood fibre after merchantable timber has been harvested. Wood chips will then be placed in the organic disposal area on-site to be composted and used during land reclamation. The chipping and composting process constitutes a mitigation measure that will increase the costs associated with land clearing.

9.1.8.4 Monitoring

Particulate emissions (dust) will be monitored by Bilcon of Nova Scotia Corporation if requested by the Nova Scotia Department of Environment and Labour. The location of monitoring stations will be established by the Nova Scotia Department of Environment and Labour. If requested, particulates will be measured by the high volume method as described in report No. E.P.S. 1 – AP – 73 –2.

9.1.8.5 Impact Statement

Particulate Emissions

Fugitive dust from quarry operations will be controlled on-site and will not exceed 120 $\mu g/m^3$ daily average or 60 – 70 $\mu g/m^3$ annual geometric mean at the property line as established by the Nova Scotia Department of Environment and Labour's Pit and Quarry Guidelines resulting in a ***long term, neutral (no) effect, of local scale.***

9.1.9 Noise and Vibration - Blasting

9.1.9.1 Research

The Nova Scotia Department of Environment and Labour's terms and conditions for operation of the four-hectare quarry located on the Whites Point Quarry site includes the following:

1 No blasting within 30 m of the boundary of a public or common highway

2 No blasting within 30 m of the bank of any watercourse or ordinary high water mark

3 No blasting within 800 m of the foundation or base of a structure located off site

4 No blasting within 15 m of the property boundary when a structure on the abutting property is not involved.

Further to the above, no blasting will be permitted if there is a thermal atmospheric inversion or a low cloud cover or fog conditions. No blasting shall occur on Sunday, on a statutory holiday prescribed by the Province of Nova Scotia, or on any day between 1800 and 0800 hours.

9.1.9.2 Analysis

The above terms and conditions will be adhered to during blasting operations at the proposed Whites Point Quarry. Also, a technical blast design will be prepared by a qualified person (a blaster with a minimum Class 2 certification for the province of Nova Scotia). The blast design will ensure air concussion does not exceed 128 dBA within 7 m of the nearest structure not located on the site and that ground vibration of 12.5 mm/sec peak particle velocity will not be exceeded below grade or less than 1 m above grade in any part of the nearest structure not located on the site. No blasting is proposed within 800 m of a structure not located on the site, without written permission of the structure owner.

Blast monitoring data at other rock quarries in Nova Scotia indicates concussion below 128 dBA and ground vibration below 12.5 mm/sec as required by the Nova Scotia Department of Environment and Labour can be routinely achieved. For example, data from a rock blast using a four-inch hole loaded at 214 kg of explosive per delay with an average collar of 7 feet produced 88 dBA at 1460 m and 122.4 dBA at 420 m (personal communication, P. Caza, Dyno Nobel North America). A prediction of ground vibration

using the Holmberg Equation and a K factor of 400 (based on actual blast results in a basalt rock quarry), an explosive weight of 45 kg per delay, would result in 1mm/sec ground vibration at a structure 1120 m from the blast site and 7 mm/sec at 150 m. The above circumstances indicate values well within the criteria established by the Nova Scotia Department of Environment and Labour.

The frequency of blasting during quarry start-up is planned to be once per week and once every two weeks during normal operations. Blasting is proposed throughout the year and each blast design will likely be different in regard to number and size of holes, weight of explosives per detonation, and location. However, all blasting will be designed to meet the 128 dBA and 12.5 mm/sec criteria.

9.1.9.3 Mitigation

A minimum 30-m environmental preservation zone is proposed around the perimeter of the quarry and Whites Cove Road. The 30-m zone along the landward property line, between the quarry and residential dwellings, will remain in a forested condition. This forested "buffer" will absorb and deflect sound waves generated by blasting activities. Also, the proposed restoration schedule provides for re-vegetation of quarried areas approximately every five years. The revegetation will provide greater absorption of sound generated by blasting. Further, as a mitigative measure, no blasting is proposed within 800 m of residential structures not located on the quarry property without written permission.

9.1.9.4 Monitoring

Three land monitoring stations are proposed as shown on **Map 2 .** Each blast will be monitored for concussion and ground vibration. Additionally, all blasts will be video taped to record blast efficiency. Monthly reports summarizing the results of blasting activities will be submitted to the Nova Scotia Department of Environment and Labour.

9.1.9.5 Impact Statement

Blasting

Concussion and ground vibration from blasting activities will meet the criteria established by the Nova Scotia Department of Environment and Labour and not exceed 128 dBA and 12.5 mm/sec respectively and result in a ***long term, neutral (no) effect, of local scale.***

9.1.10 Noise and Vibration - Plant

9.1.10.1 Research

Sound levels in rural areas are generally in the range of a minimum of 30 decibels (dB) to a maximum of 75 decibels. The transmission of noise is primarily influenced by climatic conditions, distance from the source, and attenuation resulting from elements or barriers between the sound source and the receiver.

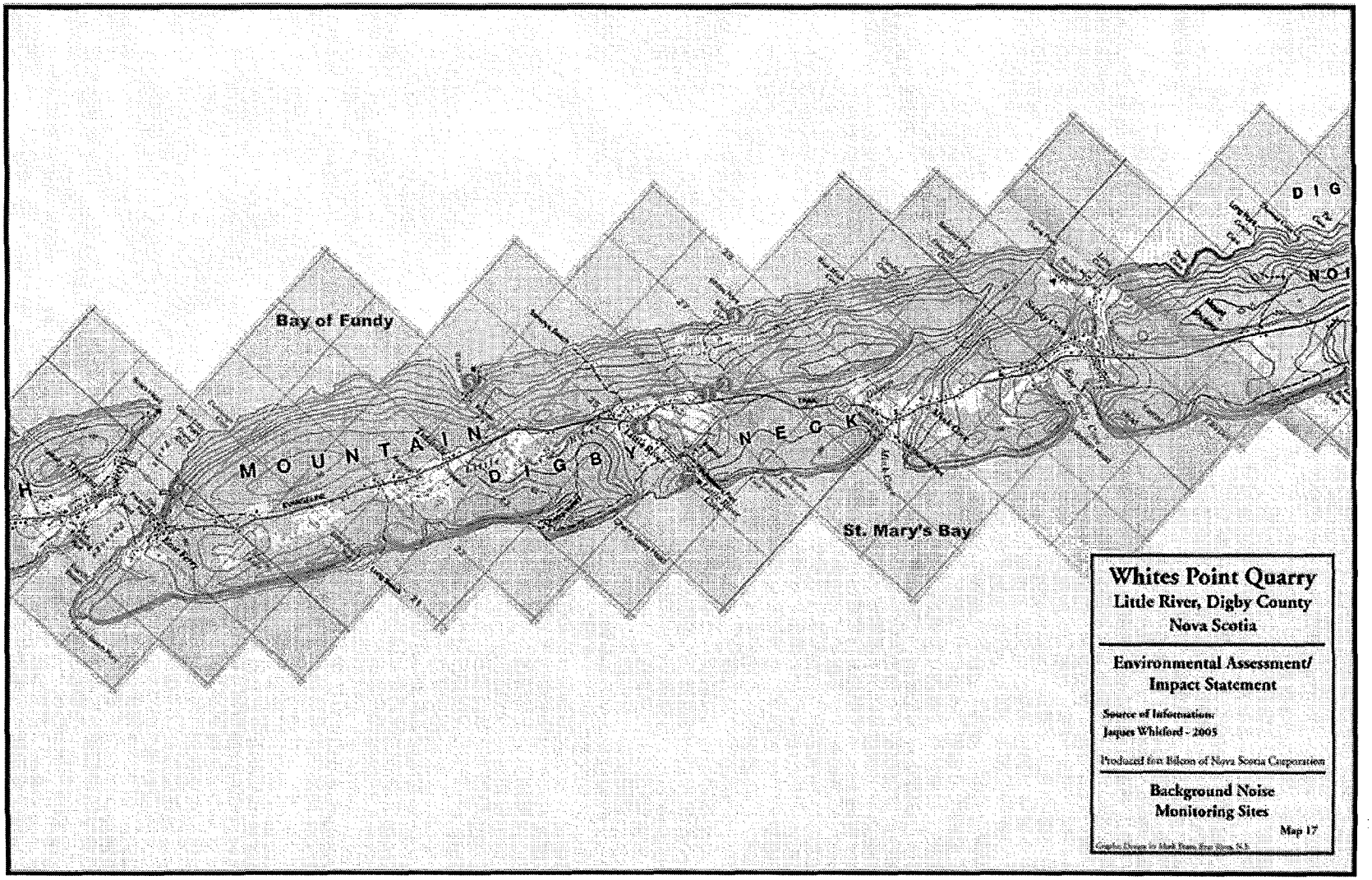
Baseline noise levels of existing conditions were determined by on-site measurements at the Whites Point quarry site and surrounding areas. Measurements were taken during May and June 2005, (Jacques Whitford 2005, **Ref. Vol V, Tab 31**). Sound levels were taken using a Larson Davis Model 824 and Quest Model 2900 Type 2 integrating sound level meters. Eight sites - see **Map 17** - including two on the quarry site, one at the nearest receptor, and five at various locations were measured to compare background sound levels of everyday activities in nearby communities.

Following is the list of sites monitored and the range of sound levels recorded. For details see (Jacques Whitford 2005 **Ref. Vol. V, Tab 31**).

Site Number	Location	Sound Level Range (dBA)
1	Residence Hwy #217	32.9 – 48.1
2	Quarry Property Boundary	35.3 – 57.6
3	Whites Cove Shore	32.8 – 51.9
4	Little River Intersection	52.8 – 65.4
5	Whale Cove Harbour	32.8 – 51.9
6	East Ferry	30.5 – 70.7
7	Little River Fish Plant	37.4 – 66.9
8	Highway #303 Conway	54.7 – 59.8

The frequency of data collection for sites 1 and 2 was at one minute intervals, then averaged for hourly Leq values. Measurements were taken during portions of three daily periods (day 0700 – 1900, evening 1900 – 2300, and night 2300 – 0700) corresponding with provincial guidelines. Sites 3 – 8 used twenty minute recordings to calculate the one minute Leq values.

Sound monitoring was also conducted by David W. Kern B.Sc. in a rural area in Annapolis County, Nova Scotia using a Martel 325 Sound Level Meter with the following results. Rural highway traffic produced a maximum of 75 dB sound level at a distance of 30 m



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from the highway. Comparatively, a person operating a chain saw experienced 88 dB while a person 30 m away experienced a 68 dB noise level. Also, a person operating a diesel powered farm tractor experienced 75 dB to 83 dB while a person 30 m away experienced 60 dB to 65 dB. Studies generally indicate there is a 20 dB reduction in sound level due to distance from a point source at 30 m. Further reductions per 30 m ranging from 1 dB to 5 dB or greater may be achieved by attenuation. A 1 dB reduction per 30 m may be achieved from absorption by a rough grass cover while a 5 dB or greater reduction per 30 m may be achieved from absorption and the scattering of sound waves by vegetative tree cover (Robinette 1972 Ref. 163).

As indicated in Appendix D of the NSDEL Pit and Quarry Guidelines, paragraph VII establishes the following guidelines for sound level limits at the property boundaries of the quarry.

Leq. Sound Level Limits

Night	23:00 – 07:00 & all day Sunday and statutory holidays	55dBA
Evening	19:00 – 23:00	60dBA
Day	07:00 – 19:00 hours	65dBA

9.1.10.2 Analysis

Background noise levels at sites 1 and 2 (residence Highway #217 and the quarry property boundary) did not exceed the guideline sound levels during the twenty-four hour monitoring periods. Background noise level at sites 4, 6, and 7, in surrounding communities, very infrequently exceeded the guideline sound levels during the twenty minute monitoring period. The highest average sound levels recorded were 70.0 – 70.7 dBA at East Ferry, influenced by the arrival and departure of ferry traffic and a transport truck idling near the sound level meter. It should be noted that peak noise levels at sites 5 (Whale Cove) and 7 (Little River Fish Plant) reached 80dBA as a result of harbour activity including boats, trucks, and general traffic.

General noise levels from operations at the Whites Point quarry at the source are expected to be in the range of 65 dB to 85 dB. The primary sources of noise will be from drilling, blasting, hauling, and crushing basalt rock. Sound pressure levels measured at 15 m for operating off-road equipment varied from 82 – 84 dBA. The largest mobile equipment to be used during quarry operations are off-highway trucks (Caterpiller 773E) and a quarry face wheeled loader (Caterpiller 990 Series II). The 773 off-highway truck has a 15 m sound pressure level of 84dBA for the mode of operation that gives the highest level. The 990 wheel loader at 15 m in mid-gear moving operations has a sound pressure level of 82dBA. Other operating equipment such as excavators and bulldozers have similar sound pressure levels. Specific considerations regarding blasting will be discussed in a subsequent section of this report.

The location of the physical plant, which includes the crushers, screens, and conveyor systems, is shown on **Figure 1.** The distance to the nearest residence is approximately 1000 m horizontally and over 60 m below the ridge line separating the quarry and adjacent residences. In addition to the reduction of noise by attenuation over the 1000-m horizontal distance, sound waves will be deflected upwards and dissipated due to the vertical change in topography. As mentioned previously and considering a maximum 85 dB sound level at the physical plant site, the horizontal and vertical separation in conjunction with attenuation by vegetative cover should adequately reduce noise levels at the quarry property line to well below the 65 dBA daytime level and 55 dBA night time level required by the Nova Scotia Department of Environment and Labour.

Noise generated during construction of the quarry access road from Highway #217 to the quarry property would have the potential of affecting nearby residents. Depending on the type of equipment used, and combination of equipment, sound level pressures are not expected to be greater than any other rural road construction. Access road location to the quarry is presently being planned to provide the greatest separation distance feasible from adjacent residences.

9.1.10.3 Mitigation

The primary mitigation measure will be to minimize noise generated at the source from construction and operational activities. For example, during construction of the marine terminal, the installation of steel pipe piles into bedrock will be required. To minimize noise during this construction process, it is proposed to drill sockets in the bedrock for seating the piles rather than a continuous pile driving process.

Equipment design, as a mitigation measure, is also proposed. Processing equipment will be enclosed whenever practical to reduce noise levels at the source. Additionally, noise generated during loading rock into quarry trucks will be reduced by the use of rubber lined truck beds. Rubberized screens will also be used to reduce noise during the aggregate screening process.

A minimum 30 metre environmental preservation zone is proposed around the perimeter of the quarry property and Whites Cove Road. This preservation zone will also act as a noise buffer zone and will remain in a forested condition between the quarry and adjacent residences and public roads. Also, the proposed reclamation schedule provides for re-vegetation of quarried areas approximately every five years. The re-vegetation will provide greater absorption of sound and further reduce noise levels generated by the physical plant operation and associated activities.

9.1.10.4 Monitoring

Monitoring of sound levels will be conducted to ensure the thresholds at the property line is not exceeded. The following equivalent sound levels (Leq) will be met.

Leq	65 dBA 60 dBA 55 dBA	0700 – 1900 hours (days) 1900 – 2300 hours (evenings) 2300 – 0700 hours (nights and all day Sunday and statutory holidays)

Sound level monitoring stations will be located in consultation with the Nova Scotia Department of Environment and Labour. Monthly summary reports of sound level data will be provided to the Nova Scotia Department of Environment and Labour.

9.1.10.5 Impact Statement

Noise – Plant

Sound levels from quarry plant operations are not expected to exceed typical noise experienced in rural residential environments and will not exceed the decibel levels at the quarry property line as required by the Nova Scotia Department of Environment and Labour resulting in a ***long term, neutral (no) effect, of local scale.***

9.1.11 Noise and Vibration – Ship Loading

Questions regarding noise levels during ship loading were raised during the public consultation process. To address these concerns, Bilcon of Nova Scotia Corporation contracted with Jacques Whitford to conduct background noise investigations in the area of the proposed Whites Point Quarry and Marine Terminal – see **Map 17**.

9.1.11.1 Research

Background sound levels were taken onshore at the Whites Point marine terminal location on May 3 and 4, 2005 (Jacques Whitford 2005 **Vol. V, Tab 31).** At this time, fishing boats were operating in the nearshore waters and wind conditions varied from calm to brisk with waves hitting the shore. The averaged background sound levels ranged from 32.8 dBA to 51.9 dBA. The higher noise levels were recorded on May 3, 2005 with continuous peaks of over 55 dBA. These higher recordings were presumably due to the wind and wave conditions on that day. Average background noise levels on May 3, 2005 were 50.6 dBA, while on May 4, 2005, average background noise levels were 34.5 dBA.

9.1.11.2 Analysis

Prediction of noise levels at the proposed marine terminal at Whites Point during ship loading are presented from research conducted at a similar loading facility at Sechelt, British Columbia in April 2004 (Klohn Crippen Consultants Ltd. 2004, Ref. 69).

Background noise levels were taken at Sechelt when no loading or shipping activities were taking place. Weather conditions varied from calm to windy, similar to background weather conditions at Whites Point during background noise monitoring. Average background noise levels at the Sechelt facility ranged from 45 dBA to 53 dBA. During ship loading with conveyors running, radial arm ship loader in operation and the loading of holds in the vessel, the following sound levels were recorded and compared to everyday sound levels.

20 m from source – 70 dBA (equivalent to a vacuum cleaner at 3 m)
500 m from source – 60 dBA (equivalent to conversational speech)
1000 m from source – 58 dBA (equivalent to normal conversation)

It should be noted that these sound levels were recorded over open water with no intervening attenuation features.

The proposed ship loading facility at Whites Point is located approximately 1000 m from the quarry property line and 1500 m from the nearest residential receptor. Using the comparable data from Sechelt of noise levels of 58 dBA at 1000 m over open water and

considering further attenuation provided by land mass, forested buffer zones and horizontal and vertical separation, night time noise levels would be considerably less than 55 dBA at the property line. Further reduction by attenuation would be realized by the 1500 m distance to the nearest residential receptor. This is verified based on data recorded at Sechelt, where without any land or forest attenuation, the maximum distance for sound levels to attenuate to 45 dBA was 1480 m. In association with attenuation, this would be comparable with background noise levels recorded at the nearest receptor to the Whites Point quarry.

The Nova Scotia Department of Environment and Labour's Pit and Quarry Guidelines indicate noise levels at the quarry property line should not exceed 55 dBA between 2300 and 0700 hours. In this regard, night time noise levels from ship loading would be less than the noise levels specified in the Pit and Quarry Guidelines. Therefore, ship loading at night will not exceed the provincial guidelines.

9.1.11.3 Mitigation

The proposed environmental preservation zones along the coast line and property lines of the quarry between the ship loading activities and human receptors will further reduce sound levels by attenuation. These buffer zones and horizontal separation will attenuate noise levels and the vertical separation between the source and human receptors will disperse sound waves upward contributing to dissipation of the noise.

9.1.11.4 Monitoring

Monitoring of sound levels will be conducted to ensure thresholds established in the Pit and Quarry Guidelines are not exceeded. - see **paragraph 9.1.10.4** for monitoring details.

9.1.11.5 Impact Statement

Noise – Ship Loading

Sound levels from ship loading operations are not expected to exceed typical noise experienced in rural residential environments and to not exceed the decibel levels at the quarry property line as required by the Nova Scotia Department of Environment and Labour's Pit and Quarry Guidelines resulting in a ***long term, neutral (no) effect, of local scale.***

9.1.12 Light

9.1.12.1 Research

Anthropogenic light at the proposed Whites Point Quarry and Marine Terminal site is presently non-existent. Existing ambient light levels at the project site consist of natural light. Investigations regarding potential effects of light from project development were conducted – see Jacques Whitford. "Noise and Air Quality Study at Whites Point Quarry"" November 2005. Light can be defined as visible radiation (about 0.4 to 0.7 microns in wavelength) considered in terms of its luminous efficiency.

9.1.12.2 Analysis

The proposed daily operating schedule of the quarry is from 0600 – 2200 hours. This schedule will require artificial lighting in several general areas of the quarry site including the working face, the physical plant, the compound area, and the shiploader and mooring facilities. The level of lighting and timing will vary according to basic safety and operational requirements. Operational lighting will be kept to a minimum and synchronized with needs to reduce energy consumption at the quarry.

The working face of the quarry will require minimal lighting during short daylight days in the spring and fall. Mobile flood lighting directed toward the ground at the base of the face would be mounted on elevated stands, angled downward, and shielded to reduce light spill into the night sky. The vertical face will also act to block light flow horizontally toward adjacent residences. The flood lighting will be directed away from nearshore waters. However, during these times of the year (spring and fall), some "glow" in the night sky may be evident during early evening hours.

Lighting at the physical plant and compound area is in most cases within structures. Security lighting at the compound area would be pole mounted with illumination directed downward. All security lighting would be equipped with dusk to dawn controls for energy efficiency. It should be noted that neither of these buildings and areas would be visible from adjacent residences due to vertical elevation change and forested buffer zones. Some night sky "glow" will result from the security lighting. However, this is expected to be comparable to other adjacent community lighting.

The marine terminal would have navigational lighting as required by Transport Canada. Operation of the shiploader is scheduled once per week. Shiploading is expected to take approximately twelve hours and could occur at night. Lighting of the shiploader and conveyor systems will be required for night time shiploading. Conveyor system lighting will be shielded and directed onto the conveyor belts. The elevated shiploader will be equipped with lighting directed downward to the holds of the ship. Minimal light spill is

expected into the marine waters and into the night sky. Whenever feasible, ship loading would be conducted in daylight hours to avoid night light that could attract fish or birds. More detailed discussion of possible light effects on wildlife are contained in subsequent sections on fish and migratory birds. Again, if ship loading is conducted during early evening, it could contribute to the night sky glow. Considering the horizontal separation distances, vertical change in elevation, and forested buffer zones, minimal light annoyance is anticipated at adjacent residences. No known commercial fishery or whale and seabird cruises or recreational boating are presently conducted at night in the nearshore waters. The only recreational uses observed in the evening were on land by OHV's using the Whites Cove Road. These vehicles are equipped with their own lights.

9.1.12.3 Mitigation

Mitigation measures to reduce the effects of artificial illumination at the quarry site include the timing and frequency of activities, and the location of the light source. All lighting will be designed specifically for the intended use, to reduce light spill, and for overall energy efficiency. Much of the lighting will be enclosed within structures. Outdoor lighting will be shielded to illuminate specific areas or operating elements. The overall objective of the mitigation will be to manage the lightscape to avoid effects on the human and biological environments.

9.1.12.4 Monitoring

Re-establishment of the Community Liaison Committee will provide an opportunity for Bilcon of Nova Scotia Corporation to invite a neighbour to participate on the Committee. This person could communicate any concerns neighbours of the quarry may have about night lighting at the quarry and discuss resolutions.

9.1.12.5 Impact Statement

Light

Considering the duration, frequency and location of proposed night lighting at the quarry and marine terminal site, no direct light is expected to be viewed by neighbouring residences. However, minimal night sky glow may occasionally be experienced resulting in a ***long term, insignificant negative effect, of local scale.***

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9.2 Biological Environment and Impact Analysis

9.2.0 Introduction

9.2.0.1 Species at Risk

Four priority lists of wild species were consulted in the preparation of species at risk lists for this EIS. These priority lists and the species status designations incorporated in this species at risk list are;

1 Species listed under the Federal Species at Risk Act (SARA 2003) as Endangered, Threatened or of Special Concern

2 Species listed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as Endangered, Threatened or of Special Concern

3 Species listed under the Nova Scotia Endangered Species Act (NS ESA 1999) as Endangered, Threatened or Vulnerable

4 Species designated under the Nova Scotia General Status Ranks of Wild Species (NS GSR) as status red or yellow.

As specified in the Guidelines (9.2.1 Species at Risk), while all of the species appropriately designated in the four priority lists indicated above are considered to be at risk, only those identified on the SARA and COSEWIC priority lists are treated individually as Valued Environmental Components (VEC's).

Using these priority lists, a Province of Nova Scotia species at risk list was compiled for the following taxonomic groups (see Appendix 39):

- Vascular plants, mosses and lichens
- Land mammals, amphibians, and reptiles
- Birds (land, water)
- Marine mammals and reptiles, fish, and mollusks
- Butterflies, damselflies, and dragonflies.

By applying information concerning distribution and habitat use obtained from the scientific literature, databases maintained by the Atlantic Canada Conservation Data Centre (ACCDC), the Nova Scotia Museum of Natural History, and NSDNR (Significant Species and Habitat database), and consultation with scientists and naturalists, to the list derived for the Province of Nova Scotia, species at risk that might be found on or adjacent the Whites Point property were identified (see Appendix 39) for qualitative probabilities of

Nova Scotia species at risk occurring on or adjacent the Whites Point property). Ranges, occurrences, and habitat requirements for the priority species identified are described in greater detail in the Terrestrial Ecology and Aquatic Ecology sections of this Environmental Impact Statement.

It should be noted that a number of the field investigations commissioned by Bilcon of Nova Scotia Corporation were completed prior to the establishment of standards and guidelines by NSDNR (November 2004) or the Review Panel (March 2005). Some species at risk lists used in these investigations were derived in whole or in part from the sub-national (Nova Scotia) rankings assigned in ACCDC's priority list. Species considered at risk were those that were classified under this system as S1 (extremely rare), S2 (rare) or S3 (uncommon). The ACCDC rankings tend to identify more species as being at risk than the four priority lists referred to above. While ACCDC rankings are referred to in the supporting documentation, and even on some occasions within this document, the identification of species at risk in this EIS is based on the four priority lists indicated above.

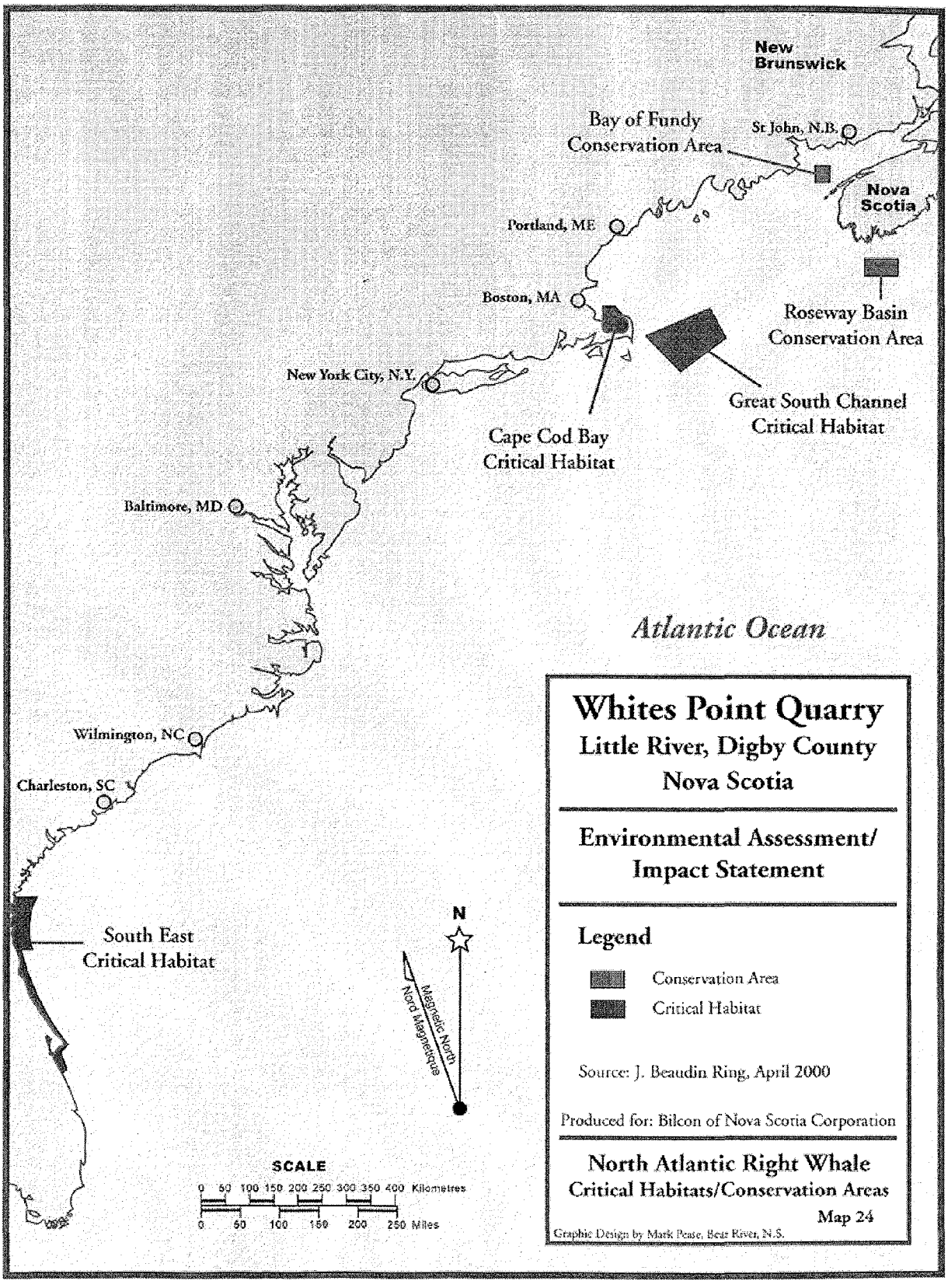
Definitions for the various risk categories for each of these four priority lists used in this document for identifying species at risk can be found in Appendix 39. Definitions for the risk categories for the ACCDC rankings can be found in attached reports (see Alliston 2004a ad Newell 2002).

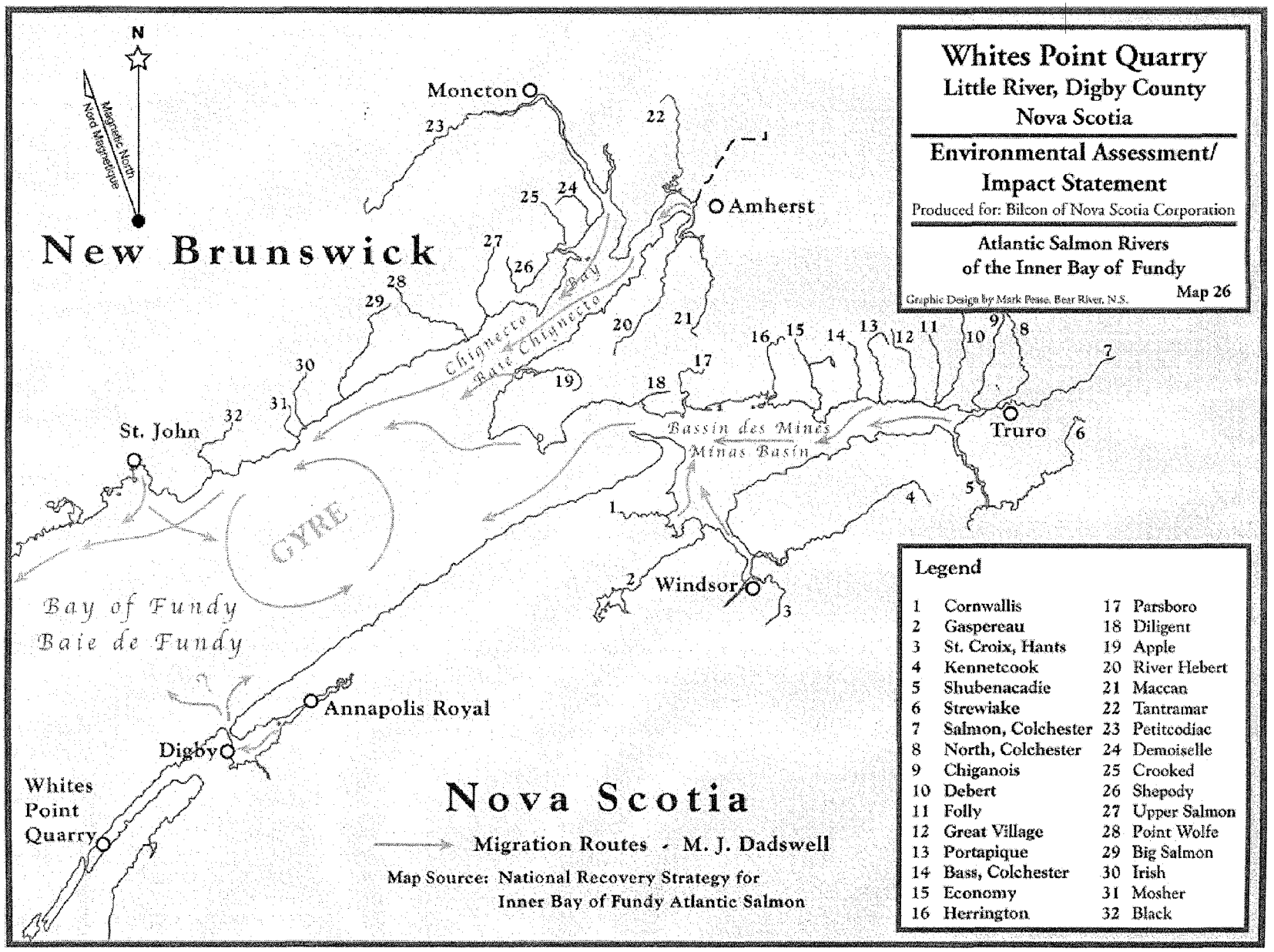
Critical habitat has been identified whenever possible for priority species at risk such as the North Atlantic right whale (*Eubalaena glacialis*) – see **Map 24** , inner Bay of Fundy salmon (*Salmo salar*) – see **Map 26** , eastern mountain avens (*Geum peckii*) and golden crest (*Lophiola aurea*) – see **Map 15** glaucous rattlesnake-root (*Prenanthes racemosa*) – see **Map 18A**, occurring at or adjacent to the Whites Point Quarry and Marine Terminal site. More detailed information is contained in specific sections of this EIS and the accompanying reference documents.

Sites of ecological significance in the vicinity of the project on Digby Neck include the south portion of the Little River watershed —see **Map 15** A provincial picnic park is located at Lake Midway – see **Map 6A**. No federal, provincial, or municipal protected/ conservation areas (national migratory bird sanctuaries, wildlife management areas, provincial wilderness areas), or municipal water supply areas are known to exist in the vicinity of the project on Digby Neck.

9.2.0.2 Invasive Species

The introduction and spread of invasive alien species (IAS) has and continues to affect the economy, environment, and society, including human health. Alien invasive species can be defined as "species of plants, animals, and micro-organisms introduced by human


New Brunswick
Bay of Fundy Conservation Area
St John, N.B.
Nova Scotia
Portland, ME
Boston, MA
Roseway Basin Conservation Area
New York City, N.Y.
Great South Channel Critical Habitat
Cape Cod Bay Critical Habitat
Baltimore, MD
Atlantic Ocean
Wilmington, NC
Charleston, SC
South East Critical Habitat
N
Magnetic North
Nord Magnetique
SCALE
0 50 100 150 200 250 300 350 400 Kilometres
0 50 100 150 200 250 Miles
Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/ Impact Statement
Legend
Conservation Area
Critical Habitat
Source: J. Beaudin Ring, April 2000
Produced for: Bilcon of Nova Scotia Corporation
North Atlantic Right Whale
Critical Habitats/Conservation Areas
Map 24
Graphic Design by Mark Pease, Bear River, N.S.



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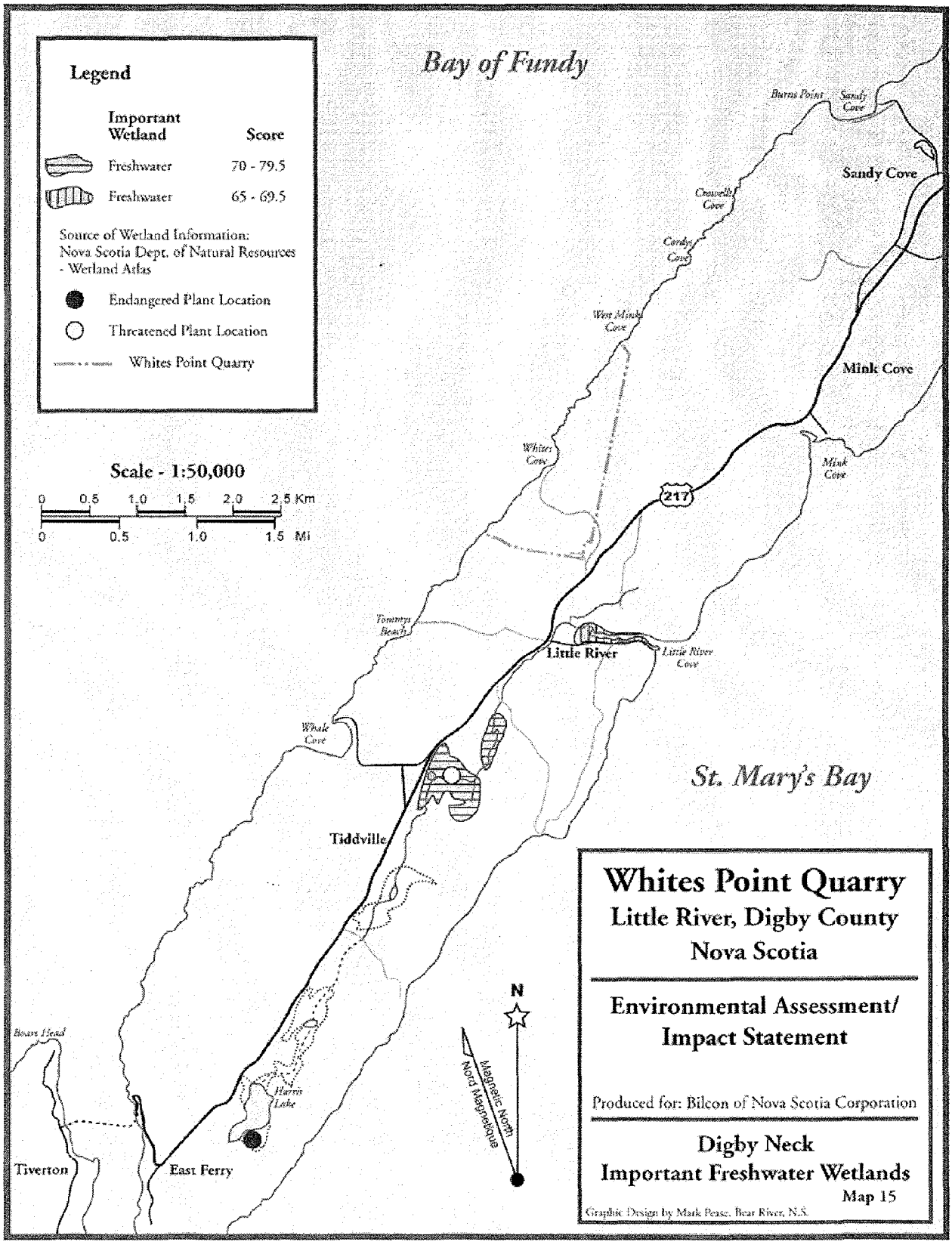
Legend
Important Wetland
Score
Freshwater
70 - 79.5
Freshwater
65 - 69.5
Source of Wetland Information:
Nova Scotia Dept. of Natural Resources
- Wetland Atlas
Endangered Plant Location
Threatened Plant Location
Whites Point Quarry
Scale - 1:50,000
0 0.5 1.0 1.5 2.0 2.5 Km
0 0.5 1.0 1.5 Mi
Bay of Fundy
Burns Point
Sandy Cove
Sandy Cove
Crowell Cove
Corbin Cove
West Mink Cove
Mink Cove
Mink Cove
Whites Cove
217
Tommy Beach
Little River
Little River Cove
Whale Cove
St. Mary's Bay
Tiddville
Boars Head
Harris Lake
Tiverton
East Ferry
N
Magnetic North
Nord Magnetique
Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/
Impact Statement
Produced for: Bilcon of Nova Scotia Corporation
Digby Neck
Important Freshwater Wetlands
Map 15
Graphic Design by Mark Pease, Bear River, N.S.

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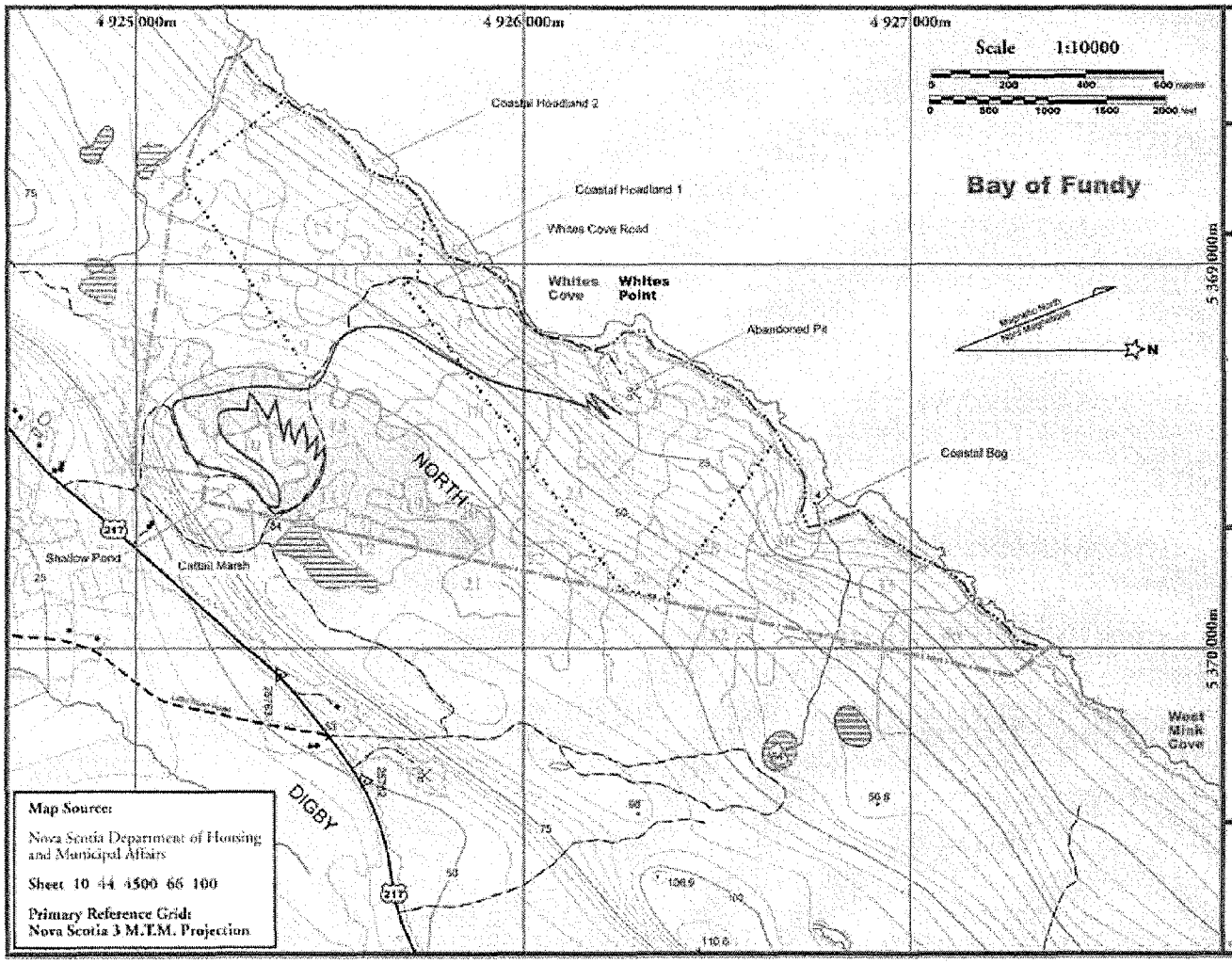

Whites Point Quarry
Little River, Digby County
Nova Scotia

Environmental Assessment/ Impact Statement

Legend

- Highway 217
- Gravel Road
- Property Line
- Stand Number
- Clear Cut
- Woodland Plant Transects - 2002
- Coastal Plant Transects - 2002
- Bog wetland
- Rock Outcrop Plant Transects - 2005

Source of Information:
Newell, Ruth E. B.Sc., M.Sc. "Plant Survey at Whites Cove Property, Digby Neck, Digby County, Nova Scotia" July 2002

Department of Natural Resources - Forest Cover Type map Mar 1993

Brylinsky & Kern - On-site investigations July 14, 2005

Department of Natural Resources - Wetlands Data Base 2005

Proulx, Gisi - On-site investigations November 9, 2005

Produced for: Bilcon of Nova Scotia Corporation

Terrestrial Ecology
Vegetative Cover & Plant Surveys

Map 18A

Graphic Design by Mark Brine, Bear River, N.S.

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action outside their natural past, and present distribution" (MacNeil 2004 Ref.139). Next to loss of habitat, invasive species pose the greatest threat to biodiversity. Many pathways for introduction have been identified for terrestrial and aquatic systems including ballast water, recreational boating, the aquarium trade, animal traffic and various other import items to name a few. Environment Canada is the lead agency for the development of a national plan to address IAS threats. This plan will use a hierarchy approach that prioritizes prevention of new species invasions, early detection of new invaders, rapid response and management of established and spreading IAS through containment, eradication, and control.

A significant aspect of Bilcon of Nova Scotia Corporation's baseline data collection was to identify any existing invasive species on or adjacent to the Whites Point quarry site. Invasive species lists such as the "Global Invasive Species Database" for Canada (Ref. 233), the "Canadian Botanical Conservation Network" (Ref.234), "Invasivespecies.gov" (Ref. 235) and the "Marine Invader Database" (Ref. 236) were consulted. Several invasive species already exist at the Whites Point site in both terrestrial and aquatic ecosystems. As a precautionary measure, phytoplankton and zooplankton samples and marine sediment samples have been taken and undergone laboratory analysis. This includes identification of organisms within the marine environment. These background data samples are in a permanent archival collection. Baseline data regarding invasive species in terrestrial and aquatic environments at Whites Point will be discussed in the relevant environmental component sections of this EIS.

Bilcon of Nova Scotia Corporation intends to work with Environment Canada in addressing IAS threats at the Whites Point Quarry and Marine Terminal site. This will include the implementation of a monitoring program for the early detection of invasive species in terrestrial and aquatic environments.

9.2.1 Terrestrial Ecology

Photo by Ruth Newell

Introduction

The Whites Point Quarry property lies within the North Mountain Basalt Ridge Natural Landscape, one of 80 landscape types found in Nova Scotia as defined by the Nova Scotia Department of Environment and Labour (NSDEL). This landscape extends for approximately 250 km along the Bay of Fundy from Cape Split in the east to Brier Island in the west. The underlying geology and soils of this area have been described in a previous section of this document.

Unlike the domed basalt ridge that forms the North Mountain north of Gullivers Cove, along Digby Neck lava flows have formed twin ridges with a central valley. Within the central valley are freshwater wetlands and long streams connecting lakes and ponds. Coastal wetlands are rare.

The narrow Digby Neck peninsula is more exposed to marine influences than other portions of this landscape. As a result, coastal spruce-fir forests dominate, even in the somewhat protected central valley. Unlike the more northerly portions of this landscape, there are no pure hardwood stands found on Digby Neck.

The 154 ha (380 acre) parcel of land for the proposed Whites Point quarry is located on Digby Neck in Digby County just north of the community of Little River The western boundary of the property extends approximately 3.1 km (1.9 mi.) along the Bay of Fundy shoreline.

Forests and the habitats they provide are typical of the area and of coastal forests of the North Mountain Basalt Ridge Natural Landscape. The property is almost entirely forested, dominated by coniferous species, with the exception of two coastal barrens south of Whites Cove and a boggy marsh north of the Cove – see **Map 18A .**

A significant proportion of the coniferous species, (particularly white spruce (*Picea glauca*), is diseased, dead or dying. Approximately sixty, (60) acres of forest on the site was recently clear - cut, primarily on top of the ridge along the east property line. Infestation of spruce, primarily white spruce, by the spruce beetle (*Dendroctonus rufipennis*) has prompted clear cutting of significant acreage of softwoods on nearby areas of Digby Neck. Low quality round wood harvested from the property was observed piled along Whites Cove Road in the spring of 2002, indicating the unhealthy condition of the forest resource.

9.2.1.1 Research

9.2.1.1.1 Terrestrial Habitats

As indicated on **Map 18A** and described in the accompanying table, the vegetative cover is predominately softwood. The majority of the site slopes to the Bay of Fundy and is exposed to the north - west winds from the Bay. Thus, much of the vegetation exhibits the textbook "Krumholtz" effect. Data for the thirty-four stands of tree cover identified indicates the predominance of a softwood overstory. Specific stand composition is presented in **Table TE – 1.** It should be noted that the stand composition and age is based on 1993 data and areas designated as cleared are now in a stage of early succession. This is typical of the abandoned 2.4 ha (6 acre) pit just east of Whites Cove, and areas on top of the ridge along the east property line, which historically has been used as a dump.

Table TE - 1 - Vegetative Cover

Stand #	Species and composition	Age (1993)
1.	S-40%, IH-30%, TL-20%, OS-10%	7
2.	WS-100%	999
3.	WS-40%, S-30%, IH-20%, OS-10%	43
4.	WS-90%, OS-10%	39
5.	WS-80%, OS-10%, OH-10%	35
6.	WS-100%	39
7.	WS-80%, OS-10%, OH-10%	35
8.	WS-80%, OS-10%, OH-10%	35
9.	WS-100%	999
10.	S-80%, OS-20%	12
11.	WS-90%, OS-10%	20
12.	WS-90%, OS-10%	39
13.	WS-80%, OS-10%, OH-10%	43
14.	WS-80%, OS-10%, OH-10%	999
15.	WS-90%, OS-10%	39
16.	WS-80%, OS-10%, OH-10%	45
17.	WS-90%, OS-10%	39
18.	WS-40%, F-20%, IH-20%, TH-20%	39
19.	WS-60%, OH-20%, OS-20%	999
20.	WS-90%, OS-10%	20
21.	WS-40%, F-30%, IH-20%, OH-10%	35
22.	S-40%, F-40%, OS-10%, OH-10%	35
23.	IH-40%, WS-40%, F-20%	43
24.	WS-80%, OS-10%, OH-10%	48
25.	WS-50%, F-30%, OH-20%	999
26.	WS-40%, S-40%, OH-20%	35
27.	S-60%, OS-20%, IH-20%	16
28.	WS-60%, OS-20%, OH-20%	48
29.	WS-80%, OS-10%, OH-10%	35
30.	WS-40%, IH-30%, OS-20%, OH-10%	999
31.	WS-70%, F-10%, OS-10%, IH-10%	43
32.	WS-60%, S-20%, F-10%, OH-10%	48
33.	S-40%, TL-20%, F-20%, OH-20%	43
34.	WS-70%, F-10%, OS-10%, IH-10%	31
C.	Cleared Land	

Legend

WS – White Spruce
S - Red and Black Spruce
OS – Other Softwood
F - Fir
TL - Larch
TH – Tolerant Hardwood (Sugar Maple, Yellow Birch, Beech, Oak)
IH – Intolerant Hardwood (Red Maple, White Birch)
OH – Other Hardwood

9.2.1.1.2 Wetlands

Natural Resources Canada's "Atlas of Canada – Wetlands" maps wetland regions on a national scale based on the percentage of wetland area occurring across Canada. The North Mountain Basalt Ridge, from Brier Island to Blomidon, all falls within the lowest category of less than 5% of this land area considered wetlands.

Review of the Department of Natural Resources Restricted and Limited Use Land Database Themes revealed the Whites Point site did not fall in any of the theme categories.

Review of the Nova Scotia Department of Natural Resources 1991 Wetlands Atlas – Map 21B – 08 indicates no unique or especially important freshwater wetlands and coastal wildlife habitats are located in or near the Whites Point site. More specifically, no freshwater or marine wetlands, migratory bird habitats, piping plover nesting habitats or bald eagle habitat are indicated within or near the site. Also, no hemispheric shorebird reserve, Nova Scotia Wildlife Sanctuary, Nova Scotia Wildlife Management Area or barrier beach ponds or marshes are found within or near the Whites Point site.

Further review of the Nova Scotia Department of Natural Resources – Wetlands Data Base around the quarry site, identified terrestrial wetlands – see **Map 18B** . These wetlands are classified as bogs. One bog wetland (80% treed, 20% shrub) borders the east property line of the quarry site. A portion of this bog, approximately 0.1 ha (0.3 acres), lies within the quarry property.

On-site investigations identified additional wetlands to those mentioned above. An approximately 1.5 ha (3.7 acres) freshwater wetland is located on the coast approximately 0.6 km (0.4 mi.) northeast of Whites Cove. This area is described by Newell (2002) as a "cinnamon fern/shrub/red maple wetland with a mix of both bog and marsh plant species". The wetland contains only a few small areas with shallow standing water.

Also, on-site review of two potential wetland areas noted as Odonata Survey location - 2005, located in the southeast corner of the quarry property – **see Map 18B** was conducted by David W. Kern B.Sc. and Michael Brylinsky Ph.D. on July 14, 2005. Based on 2001 aerial photo review, both of these wetland areas were open water. On-site investigation in July 2005 revealed a lush growth of cattails (*Typha sp.*) growing in the northerly portion. This area of cattails comprises approximately 0.06 ha (0.15 acres). The southerly portion, approximately 0.07 ha (0.17 acres) remains shallow (less than 30 cm (1 ft.) deep over a hard substrate) open water. Both of these wetland areas appear to be a result of excavations carried out to construct a nearby roadway and may thus be remnant borrow pits.

9.2.1.1.3 Flora and Fauna

Review of databases maintained by the Nova Scotia Museum, the Atlantic Canada Conservation Data Centre (ACCDC) and the Nova Scotia Department of Natural Resources (Significant Species and Habitat database) and historic records from the literature, provided little information from the Whites Point site but did provide some information concerning species at risk in similar adjacent areas. To fill in these information gaps, beginning in 2002, Bilcon of Nova Scotia Corporation contracted a series of site specific flora and fauna investigations.

During the spring/summer of 2002, a botanical survey and a vertebrate faunal analysis of the site were conducted by Ruth E. Newell, B.Sc. (Hons.), M. Sc. and by W. George Alliston, Ph.D., respectively. In the summer of 2004, a replication of the breeding bird survey portion of the 2002 study was conducted by Dr. Alliston. In the summer of 2005, site surveys were conducted for species at risk from two Orders of insects; the Odonates (damselflies and dragonflies) and Lepidoptera (butterflies and moths). Mr. Paul M. Brunelle conducted the Odonate survey and Dr. Kenneth A. Neil the Lepidoptera survey. The following reports, which are included in this submission, provide the detailed findings of these investigations:

Flora:

Newell, Ruth E., "Plant Survey at White's Cove Property, Digby Neck, Digby County, Nova Scotia", July, 2002 (**Ref. Vol. I, Tab 6**).

Fauna: Vertebrates

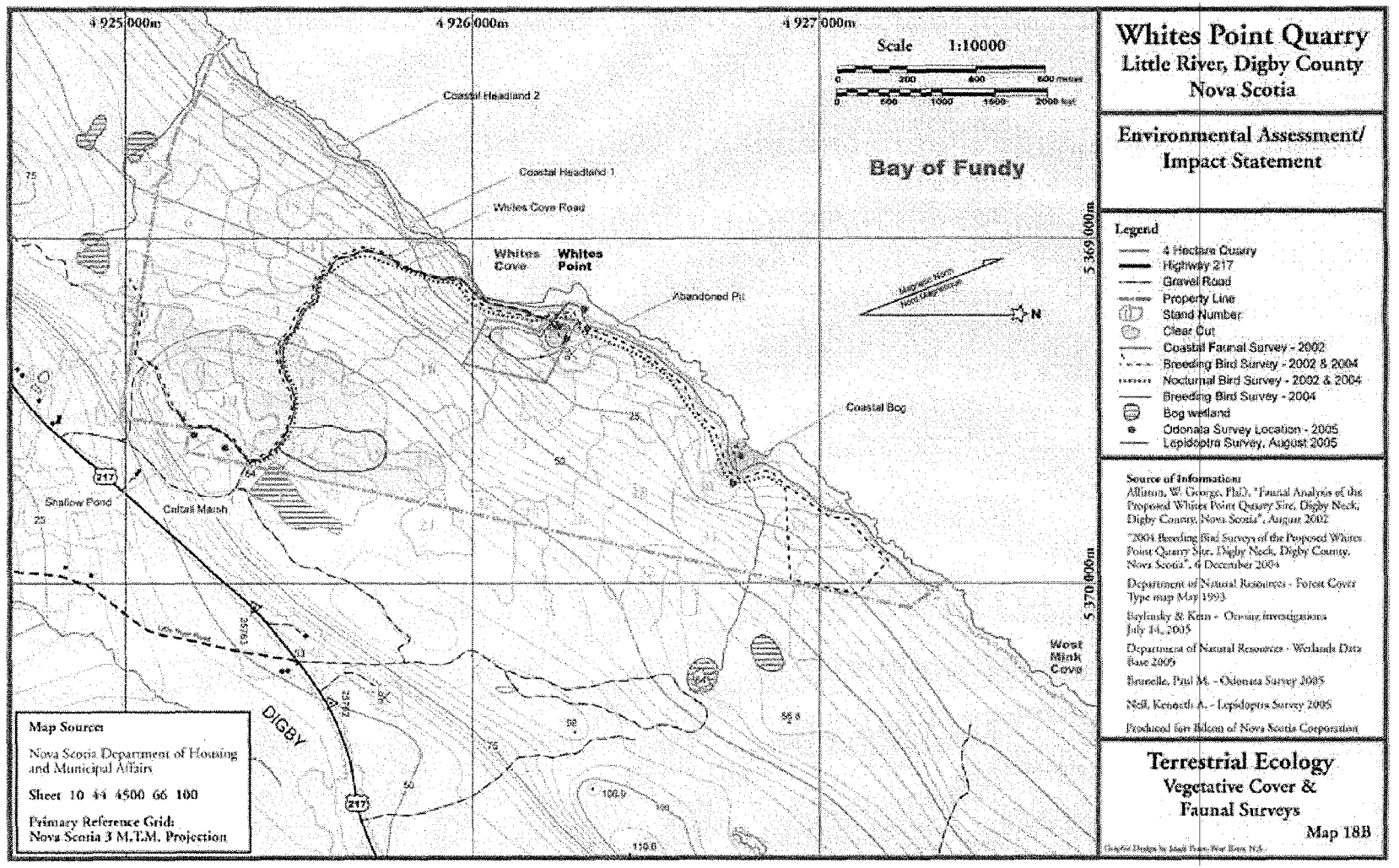
Alliston, W. George, "Faunal Analysis of the Proposed White's Point Quarry Site Digby Neck, Digby County, Nova Scotia," January 2004 (**Ref. Vol. I, Tab 1)**

Alliston, W. George ,"2004 Breeding Bird Surveys of the Proposed Whites Point Quarry Site, Digby Neck, Digby County, Nova Scotia; A Supplemental Report", December 2004 **(Ref. Vol. I, Tab 1)**

Fauna: Invertebrates (Insects)

Brunelle, Paul M., "Odonata Survey 2005: (Damselflies and Dragonflies) Whites Point Property, Digby County, Nova Scotia" August 2005 **(Ref. Vol. I, Tab 4)**

Neil, Kenneth A., "Adult Butterfly Habitat and Larval Host Plant Survey of Whites Point, Digby Co., N.S.", August 2005 **(Ref. Vol. I, Tab 5)**



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Flora

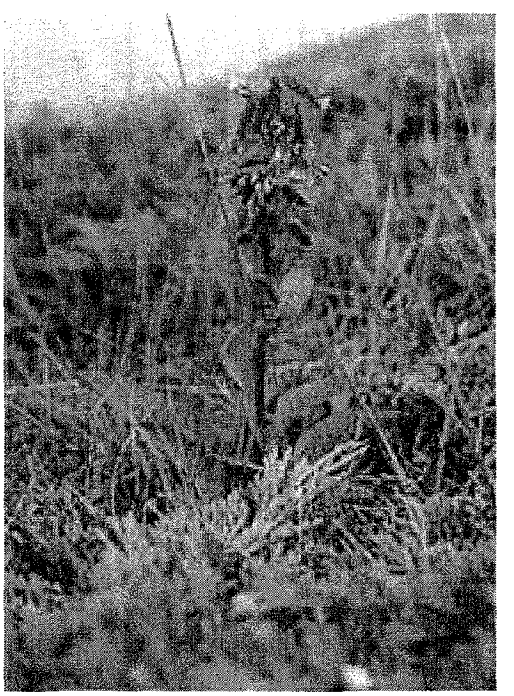
The botanical survey of the Whites Point property was initially conducted over three days, (July 2, 3 and 7, 2002), with two days spent surveying coastal habitats, (headlands, coastal wetlands, rocky shoreline and mountain streams), and one day on forested areas. Nine habitats were investigated: headland at Whites Cove, headlands northeast of Whites Cove, headlands southwest of Whites Cove, coastal marshes/open seepage slopes, rock crevices along lower shoreline, inland boulders and outcrops, coastal "boggy" marsh northeast of Whites Cove, streams, and wooded areas. Plant lists were recorded for each habitat type. Transects in the upland and coastal areas are shown on **Map 18A .**

Floral Species at Risk

The botanical survey documented the occurrence of three species of vascular plants that are at at risk. These species have status "blue" or "yellow" under the NS GSR but are not recognized in the three other priority lists used in this document to identify species at risk. These species and their NS GSR colour rankings are:

1 Glaucous rattlesnake–root *(Prenanthes racemosa)* – blue
2 Mountain sandwort (*Arenaria groenlandica*) – yellow
3 Hemlock parsley (*Conioselinum chinensis*) – yellow

All the above species were in coastal habitats. Bilcon of Nova Scotia Corporation, as recommended by Ruth E. Newell, requested confirmation of glaucous rattlesnake-root during August when this plant normally is in flower. On August 18, 2002, the site was revisited by Ms. Newell who observed and photographed flowering specimens, and confirmed the presence of this plant. In addition to the original clump of 15 plants observed on the upper portion of a rocky shoreline in July, another group of 100 – 200 plants was discovered on the lower portion of a nearby headland south of Whites Cove. It is noteworthy that, prior to this discovery, glaucous rattlesnake-root had not been recorded for more than 50 years and was believed to be extirpated in the Province of Nova Scotia.



Glaucous Rattlesnake-root - Photo by Ruth Newell

Small numbers of hemlock parsley plants were also found scattered along the upper portions of the rocky shoreline and the headlands southwest of Whites Cove. About 15 small clumps of mountain sandwort were found high on the shoreline, at the edge of flat terraced basalt outcrops to the northeast of Whites Point.

Two more plant species were recorded which are not designated as being at risk on the priority lists used in the preparation of this document, but are identified on the ACCDC Nova Scotia priority list. These species are bird's-eye primrose (*Primula laurentiana*) and skunk cabbage (*Symplocarpus foetidus*). About 300 bird's-eye primrose were observed at about 10 locations along the coast southwest of Whites Cove in sheltered areas where rocky shoreline and headlands meet. A single specimen of skunk cabbage was found in woodland habitat.

Two more plant species were recorded which are not designated as being at risk on the priority lists used in the preparation of this document, but are identified on the ACCDC Nova Scotia priority list. These species are bird's-eye primrose (*Primula laurentiana*) and skunk cabbage (*Symplocarpus foetidus*). About 300 bird's-eye primrose were observed at about 10 locations along the coast southwest of Whites Cove in sheltered areas where rocky shoreline and headlands meet. A single specimen of skunk cabbage was found in woodland habitat.

At the November 1, 2005 Open House in Sandy Cove, the possibility of rock spike-moss (*Selaginella rupestris*) occurring on the upland of the Whites Point quarry site was raised. This plant had not been recorded in Nova Scotia for over 50 years (NS GSR - blue) until recently when a population was discovered at Centreville, Digby Neck. Since the Whites Point quarry property contains rock outcrops similar to the site at Centreville where rock spike-moss was found, it was decided to carry out a specific on-site investigation for this species. In this regard, Bilcon of Nova Scotia Corporation contracted Gini Proulx, a local naturalist who discovered this species at Centreville, to do the necessary on-site investigation.

The on-site investigation was conducted by Gini Proulx - see (Proulx, Gini A Report on a Botanical Survey, Bilcon Property, Whites Cove, Little River, Digby County, Nova Scotia, November 2005 **Ref. Vol. I, Tab** 7) specifically for the occurrence of rock spike-moss. The survey routes are shown on **Map 18A.** This intensive one-day site investigation of potential rock outcrop habitats resulted in no findings of rock spike-moss or any additional plant species at risk (personal communication – Gini Proulx).

For a complete listing of floral species at risk in Nova Scotia and probability of occurrence on the Whites Point quarry site – see Appendix 39.

Invasive Flora

Plant lists were compiled for various habitats existing on the Whites Point quarry site (Newell 2002 **Ref. Vol. I, Tab 6**). Review of tree, shrub, vine and herbaceous invasive species lists compiled by the Canadian Botanical Conservation Network indicates invasive plant species presently exist on the site. Two habitats, influenced by past and present anthropogenic activities, contain invasive species. The headland at Whites Cove where past fishing activities, human habitation, sand and gravel extraction and present off highway vehicle (OHV) use is evident, has two invasive species –common St. John's-wort (*Hypericum perforatum*) and Kentucky bluegrass (*Poa pratensis*). North of Whites Cove along an existing OHV trail two other invasive species – Canada bluegrass (*Poa compressa*) and rugosa rose (*Rosa rugosa*) are present. No invasive species were found in other habitats during the botanical survey of 2002. However, it is likely that invasive species exist as a result of human activity along the Whites Cove Road and could be considered a pathway for introduction. Also, the area along the southeast property line that has been used as a dump could provide habitat for invasive plant species.

Faunal Surveys – Vertebrates

Two faunal surveys for vertebrate species were conducted on the Whites Point site, one in June 2002 and another in June 2004. The first survey in June 2002 was conducted over four days (June 4, 15, 22, 23) and focused on the entire coastline and selected woodland habitats to gather information on herptile, breeding bird, and mammal species present. Survey work included a general reconnaissance of the property, a late evening and night census of nocturnal birds, mammals, and amphibians and an early morning census of diurnal breeding birds using the property. The June 2004 survey was a replication of the breeding bird surveys conducted in 2002 plus a new transect through the four hectare (10 acre) approved quarry site which had the vegetation and overburden removed and a sediment retention pond constructed in 2003. The 2004 survey was conducted over two days (June 21 & 22). During these surveys, Dr. Alliston was assisted by Bernard Forsythe, a well recognized amateur ornithologist and naturalist. Transect locations through representative habitats are shown on **Map 18B** .

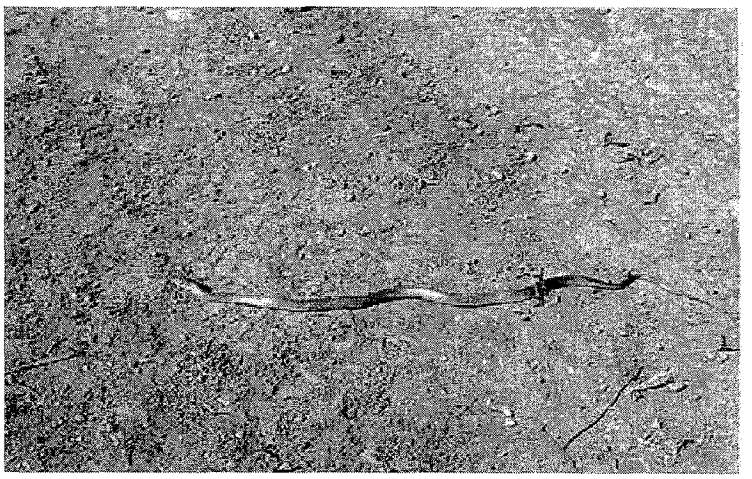
The on-site vertebrate faunal analysis recorded five amphibian and two reptilian species, 45 bird species were observed using terrestrial habitats and may have nested on the site including a pair of barred owls which responded to calls during the nocturnal survey, and nine terrestrial mammal species confirmed by either observation or by sign (Alliston, 2004a and 2004b **Ref. Vol. I, Tab 1**).

Reptiles, Amphibians, and Mammals Species at Risk

For a complete listing of faunal species at risk in Nova Scotia and probability of occurrence on or adjacent to the Whites Point site – see Appendix 39, Table TE-2.

Field studies during 2002 and 2004 did not identify any species of terrestrial reptile, amphibian, mammal or breeding bird currently considered at risk in Nova Scotia using the Whites Point property. These studies did recognize that, although none was observed during the nocturnal surveys of 2002 and 2004, two bat species at risk (NS GNR - yellow), the little brown bat (*Myotis lucifugus*) and northern long-eared bat (*Myotis septentrionalis*) might possibly forage on the Whites Point property. Critical habitats for these two species are those required for maternity colonies and hibernation. Maternity colonies are mainly associated with buildings and sometimes with hollow, preferably hardwood, trees. Caves are used for hibernation. There are neither buildings nor caves on the property and the likelihood of mature, hollow hardwood trees appropriate for maternity colonies in the young, conifer dominated forests on this property, is low. It was also recognized that, although no observations were made during the 2002 and 2004 surveys, the Whites Point property could be part of the home range of breeding northern goshawks (*Accipiter gentilis*), a species at risk (COSEWIC – not at risk; NS GNR – yellow), whose home ranges can exceed 2000 ha (5000 acres). Critical habitat for northern goshawks is associated with the nest site which is normally located in a large tract of mature forest having an open understory. Such habitat does not exist on the Whites Point property. Very marginal habitat for nesting Nelson's sharp-tailed sparrow (*Ammodramus nelsoni*) (COSEWIC – not at risk; NS GSR – yellow) exists in a small coastal "boggy marsh" on the Whites Point property to the north of Whites Cove, although this species was not observed during two years of surveys.

During each of the breeding bird surveys of 2002 and 2004, small numbers of boreal chickadees (*Poecile hudsonica*) were recorded using terrestrial habitats on the proposed quarry site and were believed to nest there. This species is not listed as being at risk in the four priority lists consulted for the preparation of this document. However, the ACCDC ranking for the boreal chickadee is "S3S4" which indicates that under their system it is considered marginally at risk. Nova Scotia is the only province where this species is considered potentially at risk by ACCDC. The boreal chickadee was the only terrestrial vertebrate species on a rather long list that the ACCDC consider at risk, that was found on this property.



Smooth Green Snake - Photo by George Alliston

A smooth green snake (*Liochlorophis vernalis*) was observed at Whites Cove in 2002. This species is not considered at risk in Nova Scotia (status "green"), however, it is on the current (August 4, 2005) COSEWIC candidate list (mid-priority candidate).

A comprehensive list of the birds of nearby Brier Island has been compiled from many years of observations and research (Laviolette 2005, **ref 132**). This list provides information on both the status (year round resident, confirmed or unconfirmed breeder, spring and/or fall migrant, winters, or visitor/vagrant) and relative abundance (common, uncommon, irruptive, rare or exceptional) of the 339 species recorded. This information is presented in Appendix 8.

Species known to breed on Brier Island could be expected at the Whites Point Quarry and Marine Terminal site if suitable habitat exists. A total of 62 species of land birds, including four "rare" and four "exceptional" species have been confirmed as breeding on Brier Island, and another eight species may nest there but nesting has not been confirmed. An additional four seabird species are confirmed breeders on Brier Island and another is suspected but unconfirmed. Of the species of land birds for which nesting has been confirmed, there are only two species at risk; eastern bluebird (*Sialia sialis*) and northern goshawk. A third species at risk, Nelson's sharp-tailed sparrow, is believed to nest on Brier Island but this has not been confirmed.

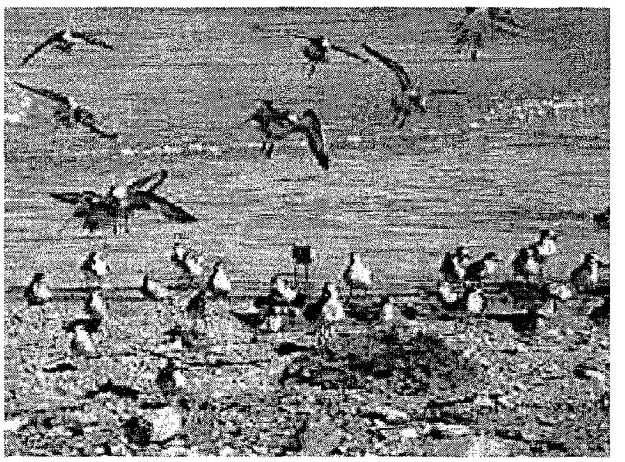
The status of the northern goshawk and Nelson's sharp-tailed sparrow on the Whites Point property have been discussed above. Until the clear cutting of about 60 acres of woodland in 2002 there was no open habitat on the property for eastern bluebirds (COSEWIC – not at risk; NS GSR – yellow) and the clear cut would have produced at best, marginal habitat. No eastern bluebirds were recorded during the 2002 and 2004 surveys of the property. During the period from 1986 to 1990, when research was being conducted for the Atlas of Breeding Birds of the Maritime Provinces (Erskine, 1992), the closest confirmed nesting of eastern bluebirds to that recorded on Brier Island was in the Annapolis Valley some 120 km away.

Migratory Birds

In the 1970's Brier Island was identified as Proposed Ecological Site 59 by the International Biological Program. This identification was due in part to its recognized importance to migrating and wintering birds. Subsequently Brier Island has been designated by Bird Studies Canada as an Important Bird Area and the Island and its surrounding waters are considered Globally Significant for its concentrations of migratory land birds and shorebirds as well as its coastal waters being a year round feeding area for seabirds. Migratory bird research has been ongoing for over 25 years at the Brier Island Bird Migration Research Station. The banding of migratory land birds constitutes a major portion of the work of the Research Station and to date more than 40,000 birds have been banded. These studies indicate that bird species attain their peak numbers at Brier Island during migration (Laviolette 2003Appendix 8). Spring migration is typically April and May, while fall migration is from August to the end of October although this varies considerably by species. Duration of migration for a given species is usually four to six weeks. The orientation of the Digby Neck peninsula, Long Island, and Brier Island is similar to other land bird concentration points in the U.S. and Canada where the numbers of birds found at the tip (Brier Island) are consistent with those at the base (Digby Neck). In this regard, migration data from Brier Island should be applicable to the Whites Point Quarry site located approximately midway on the Digby Neck peninsula. The use of Digby Neck and Long and Brier Islands by migrating land birds is a very important biological feature in southwest Nova Scotia.

While the numbers of spring migrants are small (Lance Laviolette - personal communication), the fall migration is large with daytime counts of passerines (warblers, sparrows, thrushes, et al.) at Brier Island reaching over 1.4 million per month during September and October. A similar situation is found with raptorial birds; whereas small numbers of raptors are observed during spring migration, their numbers can reach over 10,000 per month during September. The most common raptors are sharp-shinned (*Accipiter striatus*) and broad-winged (*Buteo platypterus*) hawks with American kestrels (*Falco sparverius*), merlins (*Falco columbarius*), and red-tailed hawks (*Buteo jamaicensis*) also occurring in substantial numbers. Least common are ospreys (*Pandion haliaetus*) peaking at 15 per day during late September and early October, northern goshawk at 12 per day in late September and peregrine falcon (*Falco peregrinus*) at 5 to 10 per day in late September and early October. The turkey vulture (*Cathartes aura*) has become more common and peak numbers of 50 per day have occurred in October and continuing at 10 to 20 through the winter. It should be noted that radar studies have shown that many more migrant passerines move at night than in the day so the numbers quoted above are underestimates of total migrants (Ref.132).

A total of 226 species of birds, including 154 species of "land birds", 22 species of waterfowl, 26 species of shorebirds and 25 species of seabirds, have been recorded as "common", "uncommon" or "rare" migrants using Brier Island and its surrounding waters (Ref.132).



Fundy Shorebirds - Photo by Glen Parsons

Migratory Land Bird Species at Risk

A total of 36 migrant bird species at risk have been documented at and around Brier Island. Twenty-three of these are "land bird" species (waders are included in this group) and 13 use marine habitats more or less exclusively during migration and are included in sections dealing with nearshore marine areas (below). The "land bird" species at risk that have been documented as migrants or vagrants on Brier Island, their relative abundance and the timing of their peak migration periods are presented in Table **AA.**

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Table AA. Migratory Status and Timing of Land Bird Species at Risk at Brier Island, Digby County, Nova Scotia ⊘

	Migratory Status	Main Migration Period Spring	Fall	Comments
Least Bittern**	Exceptional (1)	?	Sept.	
Snowy Egret	Rare	Apr. - May *	Sept. - Nov.*	
Black-crowned Night Heron	Uncommon	Apr.*	Sept. - Oct.*	
Northern Goshawk	Uncommon	Feb. - Mar.*	Sept. - Oct.	peak in late Sept. at 12/day
Red-shouldered Hawk**	Uncommon		Sept. - Dec.	daily peaks of 5 to 10 in Oct.
Peregrine Falcon**	Common	May	Sept. - Oct.	daily peaks of 5 to 10 in late Sept. - Oct.
Long-eared Owl	Uncommon	?	Oct. - Nov.*	
Short-eared Owl**	Uncommon	Mar. - May	Sept. through winter	daily peaks of 1 to 2
Acadian Flycatcher**	Exceptional (3)	May *	Oct.*	
Loggerhead Shrike**	Exceptional (5)	Apr. - June *	Aug. - Nov.*	
Purple Martin	Rare	Apr. - May *	Aug. - Sept.*	
Eastern Bluebird	Uncommon	Mar. - Apr.*	Sept. - Oct.*	
Bicknell's Thrush**	Exceptional (1)	-	Sept.	
Cerulean Warbler**	Exceptional (2)	May	Sept.	single birds
Prothonotary Warbler**	Exceptional (2)	Apr. - May	Aug.	very rare migrant
Louisiana Waterthrush**	Exceptional (2)	-	Aug. - Sept.	single birds
Hooded Warbler**	Exceptional (4)	Apr. - May	Aug. - Sept.	single birds
Yellow-breasted Chat**	Irruptive	-	Sept. - Oct.	daily peaks of 5 to 10 birds
Vesper Sparrow	Uncommon	Apr. - May *	Sept. - Oct.*	
Ipswich Savannah Sparrow**	Rare	Apr. - May	Nov.	singles and pairs
Nelson's Sharp-tailed Sparrow	Exceptional	June *	Sept. - Oct.*	
Bobolink	Common	May *	Sept. - Oct.*	
Eastern Meadowlark	Uncommon	April *	Oct.*	

Common	observed every year, usually in good numbers
Uncommon	observed almost every year, usually in low numbers
Irruptive	observed some years, sometimes in good numbers
Rare	observed some years, usually in low numbers
Exceptional ( )	exceptionally rare vagrant or migrant; number of sightings in ( )
**	considered at risk by SARA/COSEWIC
*	main migration period determined from observations at locations within Nova Scotia other than Brier Island (Tufts, 1986)
⊘	derived from information compiled by Lance Laviolette (2003 and Nov. 2005)

From Table **AA** we can see that eight of these species at risk are considered "exceptional" and occur only as vagrants or as very rare migrants, having been recorded on only five or fewer occasions during many years of study. Only two species at risk are considered to be common migrants; peregrine falcon, and bobolink (*Dolichonyx oryzivorus*).

While most land birds that use Brier Island during migration will also pass along Digby Neck, the manner in which they use these two areas is very different. Brier Island would be first landfall for comparatively small numbers of spring migrant land birds. These birds would probably use Brier Island as a staging area where they replenish the energy reserves used in their flight across the Gulf of Maine before continuing their migration along Digby Neck. For the much more numerous fall migrants, Brier Island is where they congregate waiting for weather conditions that are favourable for their crossing of the Gulf of Maine. Migrant birds passing along Digby Neck may briefly forage in favoured habitats along the way but their passage through the area would be quite rapid. For any given location it is more likely that most migrants would fly over the area than forage there, however briefly.

As a general rule, small birds migrate at night and larger birds migrate during the day. Night migrants, particularly those migrating in foggy or inclement conditions, can be attracted to lights; particularly white lights that remain on continuously. Most migratory movements occur at altitudes below 1000 m and most small birds migrate at altitudes of from 150 to 300 m (Lincoln et al., 1998).

Migratory Mammals

It has been suggested that migratory mammals, specifically migratory bat species, might use the Digby Neck, Long Island, Brier Island migration route in much the same manner as birds (Davis and Brown, 1997, Ref.214). A study of spring and fall bat migration was conducted on Bon Portage Island, Yarmouth County, and Brier Island, in 2001 (Broders et al., 2003). Of the three migratory bat species that might breed in Nova Scotia; (silver-haired bat – *Lasionycteris noctivagans*; red bat – *Lasiurus borealis*; hoary bat – *Lasiurus cinereus*) only two echolocation sequences of the hoary bat were recorded at Brier Island in September and the other two species were not recorded. Broders et al. (2003) concluded that "no significant bat migration occurred in Nova Scotia in 2001, and unless distributional range has changed in recent years, we suggest that previous records of these species in Nova Scotia are extralimital." Based on this study, we would expect no movement of migratory bat species through the Whites Point property.

Insects

Investigations of two Orders of insects, Odonata (damselflies and dragonflies) and Lepidoptera (butterflies), were conducted for possible occurrence of species at risk on the Whites Point site. For a complete listing of butterfly, damselfly, and dragonfly species at risk and their probability of occurrence on or adjacent to the Whites Point site – see Appendix 39, Table TE-4.

Odonata

An initial screening of databases maintained by the Nova Scotia Museum, the Atlantic Canada Conservation Data Centre (ACCDC) and NSDNR revealed no records of Odonata species at risk at or near the quarry site. Further to these database searches, Bilcon of Nova Scotia Corporation contracted a survey of Odonata on the Whites Point site. This survey was conducted by Paul M. Brunelle on August 6 &7 2005; see Brunelle, Paul M. "Odonata Survey 2005: (Damselflies and Dragonflies) Whites Point Property, Digby County Nova Scotia". (Brunelle 2005, **Ref. Vol. I, Tab 4**). This survey sampled damselflies and dragonflies in freshwater habitats as shown on **Map 18B**. A total of eight habitats were investigated including three natural sites (two intermittent streams and a coastal "boggy marsh") and five which are apparently man-made or man-influenced. Fifty-one records of twenty-one species were documented. All records and sites were documented according to the Atlantic Dragonfly Inventory Program (ADIP) protocols. No exuivae or larvae were encountered. The principal Odonata diversity observed was associated with the five man-made and man-influenced habitats.

Of the 13 Odonate species considered at risk in Nova Scotia, none was recorded during this survey. However, the timing of the survey was not appropriate for all species and potential habitat for five species at risk was identified on the Whites Point property. Mr. Brunelle has indicated that one species identified during this survey, sweetflag spreadwing (*Lestes forcipatus*), which is not currently considered at risk, may be of some conservation concern due to past confusion of this species with the morphologically similar and common northern spreadwing (*Lestes disjunctus*). A sweetflag spreadwing was found at a man-made pond ("Chara Pond") near the southeastern boundary of the property (see **Map 18B**). One species, that is not identified as being at risk on the priority lists used for the preparation of this document, the Canada darner (*Aeshna canadensis*), is presently ranked S3 by the ACCDC and was recorded on the site.

In his report, Paul Brunelle has assigned colour rankings of "red" and "yellow" to an additional ten species whose status is currently considered as "Undetermined" by NSDNR. Aquatic habitats appropriate to three of these ten species have been identified on the Whites Point property.

Lepidoptera

Initial screening of the Heritage Division of the Nova Scotia Museum, the ACCDC and the NSDNR databases identified two at risk Lepidoptera species reported from habitats near the Whites Point quarry site. These species are the monarch butterfly (*Danaus plexippus*) and the satyr comma (anglewing) (*Polygonia satyrus*). Both species are listed as "yellow" in the NS GSR. It should be noted that the monarch is also listed by COSEWIC as of "Special Concern".

Further to this screening, Bilcon of Nova Scotia Corporation contracted a survey of Lepidoptera on the Whites Point site. This survey was conducted by entomologist Dr. Kenneth Neil, B.Sc., PhD on August 22, 2005 – see Neil, Kenneth A. "Adult Butterfly Habitat and Larval Host Plant Survey of Whites Point, Digby Co., N.S." August 2005. **(Ref.Vol. I, Tab 5)**. Selected habitats were investigated and adult butterfly specimens were collected, identified, and released. Eight species of butterflies were observed and all species are considered common to Nova Scotia. The area of investigation is shown on **Map 18B**.

Nine species of butterflies were identified as being at risk in Nova Scotia and for three of these; monarch butterfly, satyr comma and hoary comma (*Polygonia gracilis*), there are appropriate habitats in western Nova Scotia. Of these three species the monarch butterfly is migratory, wintering in large aggregations in the highlands of north-central Mexico and breeding throughout temperate North America, north to southern Canada. In Nova Scotia, monarch butterflies are irruptive and one or two years of relative abundance can be followed by several years when they are quite rare. The satyr and hoary commas are resident species that overwinter as adults.

The 2005 study was preliminary and the status at the Whites Point property of these three butterfly species was not established. It was established that gooseberry (*Ribes hirtellum*), the larval host plant for the hoary comma, was present, however, larval host plants were not present for either the monarch (milkweed – *Asclepias sp.*) or satyr comma (nettles – *Urtica sp.*). Woodland areas on the property could support adult satyr and hoary commas. Asters (*Aster sp.*) and goldenrod (*Solidago sp.*), used as a food source by fall migrant monarch butterflies, were present on the Whites Point property. The recently clear cut area along the ridge of the property could provide potential staging habitat for arriving spring migrant monarch butterflies.

Potential habitat for the mustard white (*Pieris oleracea*) was identified on the Whites Point property. The distribution of this once abundant species is now thought to be limited to only a few locations within Nova Scotia. This species is not currently considered at risk on any of the four priority lists used to identify species at risk for this document. However, Bilcon of Nova Scotia Corporation, at the recommendation of Dr. Neil, will be investigating the possible presence of this species on the Whites Point property

The possible use of the Whites Point site by the five species of Odonates and three species of Lepidoptera considered at risk, for which potential habitat is available, will be further investigated during the preconstruction planning phase of the project. During these studies, at the recommendation of the species specialists conducting these studies, information will also be collected on at least one additional damselfly species (sweetflag spreadwing) and one butterfly species (mustard white), neither of which are currently listed as being at risk on any of the four priority lists used in the compilation of species at risk lists for this document.

Invasive Species

During the terrestrial fauna analysis, various habitats were investigated for mammals, amphibians, reptiles, breeding birds, damselflies, dragonflies, and butterflies at the Whites Point quarry site (Alliston 2004a and 2004b, Brunelle 2005, and Neil 2005). Additionally, research conducted at Brier Island provided a list of birds that includes those that are resident to Brier Island and migrant through the Digby Neck peninsula. Review of the Global Invasive Species Database for Canada indicates only one terrestrial invasive species was recorded during on-site faunal surveys; the cabbage white (*Pieris rapae*) butterfly. The introduction of this highly competitive European species into North America in the 1860's is believed to be partly responsible for the apparent decline in the closely related North American species, the mustard white.

While not observed at the site, introduced bird species such as the European starling (*Sternus vulgaris*), now probably one of the most numerous bird species of its size in the Maritimes, house sparrow (*Passer domesticus*) and rock pigeon (*Columba livia*) and introduced mammal species such as the Norway rat (*Rattus norvegicus*) and house mouse (*Mus musculus*) are well established in the region. All of these species tend to be closely associated with human habitation. Another more recently introduced bird species, the house finch (*Carpodacus mexicanus*), a species native to western North America, was released in New York City in 1940. Breeding in the Maritimes was first confirmed in 1987 and has been reported on Digby Neck and Brier Island in very small numbers. Like the other invasive bird and mammal species mentioned above, the house finch tends to be associated with human habitation.

9.2.1.2 Analyses

A major focus of the environmental impact assessment process has been the evaluation of the potential for impact of the Whites Point Project on species at risk. On site investigations of terrestrial habitats have identified three plant species at risk, one of which (glaucous rattlesnake-root) was considered extirpated in Nova Scotia until discovered during these investigations. All three of these species are found in coastal habitats; rocky shoreline and headlands.

Investigations of vertebrate species, conducted over two summers, identified no amphibian, reptile, mammal or breeding bird species at risk using the property. It was recognized that while two mammal species at risk, little brown bat and northern long-eared bat might visit the property during their nocturnal foraging, critical habitats used for hibernation (caves) and maternity colonies (buildings; mature, hollow hardwood trees) are not present on the property. It is possible that all or part of the Whites Point property could be included in the very large home ranges of another species at risk, the northern goshawk, however, critical nesting habitat for this species, which consists of large areas of mature forest with an open understory, does not exist on the property.

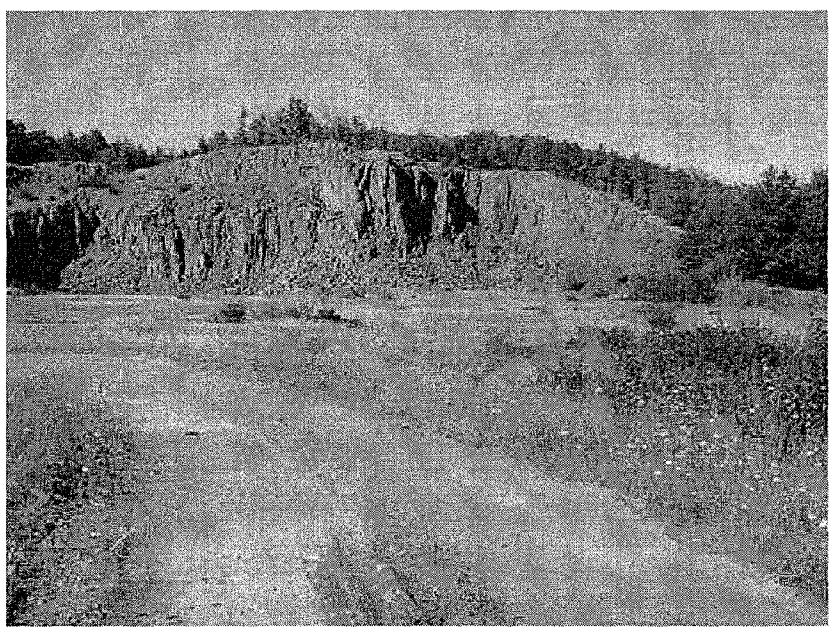
While summer resident vertebrate species using the property consisted of common species, characteristic of the North Mountain Basalt Ridge Natural Landscape, Digby Neck is an important thoroughfare for many species of migrating land birds, mainly during the fall migration period. Annual studies conducted at Brier Island for more than a quarter of a century provide excellent information on the species, timing and relative abundance of fall migrants that follow a route through Digby Neck and Long Island to congregate on Brier Island prior to their flight across the Gulf of Maine. A total of 154 migrant land bird species, including 23 species at risk (13 recognized by SARA/COSEWIC), have been recorded at Brier Island over the years and while eight of these species at risk have been recorded on five or less occasions, and most are considered "rare" or "uncommon", most of these birds would have migrated along the Digby Neck. Most migrant land birds would simply fly over the Whites Point property, however, some would land and forage in favoured habitats for short periods while en route. The greatest potential for migrant birds, including species at risk, to interact with the project is with night migrants that, particularly in foggy or inclement weather can be attracted to lighted structures, particularly towers (Evans-Ogden,1996). Death or injury could result from collision with these structures or the birds could become exhausted from circling these structures (Larkin and Frase, 1988).

Preliminary studies of species at risk from two Orders of Insects, the Odonates (damselflies and dragonflies) and Lepidoptera (butterflies and moths) have not identified any species at risk on the Whites Point property. Potential habitat for five Odonate species at risk has been identified. Larval host plants for one butterfly species at risk, the hoary comma, is present on the property, however, the larval host plants for two other butterfly species at risk (monarch butterfly and satyr comma) that might be found on the property, are not present. Adult forms of all three species might be found on the property including migrating monarch butterflies. Further investigations of Odonate and Lepidopteran species at risk will be conducted during the preconstruction planning stage of the project.

Industrial activities such as the proposed quarry operation will have short and long term effects on the site's terrestrial ecology. The quarrying of rock will permanently alter the existing site's topography, and in the short term, remove habitat and displace wildlife from active areas of the quarry and the lands immediately adjacent to the active areas. In the long term, however, with the successful implementation of a reclamation program in the disturbed areas, the protection of the rarest species and habitats currently found on the site, and the introduction of new habitats, the biological diversity of the site could be enhanced.

Existing forest resources on-site are generally in serious decline. Forests in this area have been harvested since European settlement and these conifer dominated woodlands have recently experienced an epidemic infestation of spruce beetle. Forests in this area tend to be somewhat lacking in diversity.

The proposed land reclamation will increase habitat diversity with the creation of additional coastal wetlands, a habitat that is rare in the North Mountain Basalt Ridge Natural Landscape, and fields. In addition, the existing, more unique and diverse habitats on the site, are to be part of an environmental preservation zone that will be protected throughout the life of the project. These areas include the majority of the coastline, wetlands, and the two prominent headlands which, together, support one uncommon and all three plant species at risk found on the property including glaucous rattlesnake-root that, prior to Bilcon of Nova Scotia Corporation's botanical site survey, was believed to be extirpated within Nova Scotia. The preservation zone also includes some potential marginal nesting habitat for one bird species at risk, Nelson's sharp-tailed sparrow, and potential nesting habitat for the rusty blackbird (*Euphagus carolinus*), a species considered at risk by ACCDC, although neither species has been recorded using this habitat. The reforestation of parts of the property with native tree species, the control of invasive plant species, along with natural regeneration and succession should, over time, return those areas that have not been converted to wetlands, to the conifer dominated forests preferred by such species as the boreal chickadee. Even the rock faces resulting from quarrying may offer habitat for certain species not presently found on the site.



Abandoned Quarry With Natural Regeneration - Photo by David W. Kern

The proposed operating procedure of incremental reclamation of quarried portions of the site will enhance stabilization and initiate habitat reclamation during the life of the project, rather than waiting until quarrying is completed. Also, the operating procedure will preserve portions of the site in its existing natural condition for many years. For example, the land area lying in the Little River watershed will be preserved for the 50 year life of the project.

The land containing the quarry infrastructure is approximately 11 ha (27 acres). Buildings, crushers, work area, load out facilities, stockpile areas, sedimentation ponds and roads will permanently alter the terrestrial ecology of this portion of the 154 ha (380 acre) site. However, much of this infrastructure/work area will be constructed on the previously disturbed pit area or within the 4 ha (10 acre) quarry area. With the active working area of the quarry expected to be 2.4 ha (6 acres) per year, there will be a relatively short term period, approximately five years, before reclamation efforts begin. Land clearing, noise from drilling and blasting, rock crushing and the working face of the quarry will affect local wildlife populations.

Within the boundaries of the property, each year approximately 2.4 ha (6 acres) will be cleared. Any merchantable trees will be harvested, the overburden will be removed, stored, and allowed to decompose naturally for later use in reclamation. In the short term, this process will essentially eliminate wildlife habitat within these areas. Furthermore, noise from the extraction, transportation, and crushing activities could exclude some of the more sensitive species from adjacent, undisturbed habitats and possibly reduce the reproductive success of those that do remain.

The reclamation process will begin after about 12 ha (30 acres) of the quarry has been exhausted (approximately 5 years). Reclamation will involve mixing the decomposed overburden, and sediment from the sediment storage area, spreading this mix over the rock substrate, incorporating lime and fertilizer, and replanting these areas. Native tree species will be planted, primarily along the coast and on the horizontal "steps" of the quarry's working face, but also in other select areas. Most of the reclaimed areas will be planted in grasses and legumes. The drainage channels and sediment retention ponds will remain, resulting in an increase in the wetland habitat on the property.

Successful reclamation efforts will produce fields and small wetlands which could increase the biodiversity by attracting wildlife species that prefer these habitats; habitats that were previously either scarce or nonexistent on the property. Species that could be attracted to these areas could include species at risk such as the bobolink and possibly the vesper sparrow. Extensive fields could support high mouse populations which could attract predatory birds and mammals; possibly even species at risk such as the long-eared owl.

Assuming this reclamation procedure is successful, and the reclaimed areas are left undisturbed over a long period of time, through normal succession processes, the coastal boreal forest and the wildlife species that inhabit it should become reestablished throughout the reclaimed area.

There is a potential for noise from quarrying operations to affect wildlife in areas adjacent to, but not on, the quarry property. Proposed regulations require that noise from ongoing operations not exceed 65 dBA during the day and 55 dBA at night at the property line. Adjacent properties are forested and, given local topography and the relative low level of noise permitted, noise from operations should rapidly dissipate within the forest and not constitute a significant stressor for most wildlife species using these areas. The 55 dBA permit requirement at night would further minimize the potential effects of noise on nocturnal species using adjacent areas.

Blasting is part of the proposed quarry's operations. Noise from blasting can, by regulations, reach levels of 128 dBA at the property boundary. Noise from blasting would carry for considerable distances into surrounding habitats. Blasting will, however, consist only of a single blast with a duration of less than one second, conducted on a weekly basis during the earliest phase of the project, diminishing to biweekly during later phases. Blasting will take place near midday and generally on clear days. While blasting will elicit startle behaviour in wildlife using habitats adjacent to the quarry property, the infrequent occurrence of such blasts should not be a significant stressor for wildlife using these areas.

The Whites Point property is located within the migration path of large numbers of land birds including as many as 23 species at risk. The Whites Point property contains no natural features that would make it particularly attractive to migrating birds. Although some migrant birds would likely stop and forage briefly on the property, most of those that do encounter the property during migration would simply fly over it. Habitat loss to migrant birds by quarrying activities should not be of any consequence. The major potential for interaction between migrating birds and quarry development would be associated with potential hazards presented by the project, generally in the form of high, night lighted structures.

Large land bird species, including raptor species such as the peregrine falcon, migrate by day and would have no trouble avoiding structures, although guy-lines anchoring tall structures could present a hazard. However, most of the smaller bird species migrate by night and particularly under foggy, or otherwise inclement weather conditions, can be attracted to lighted tall structures. Collision with these structures or supporting guy wires can ensue, resulting in death or injury to the birds, and sometimes birds circle these structures to the point of exhaustion.

The tallest structure proposed for the Whites Point Quarry and Marine Terminal is the ship loader, which extends to a maximum height of 30 m (100 ft.) above the ordinary high water line. This loader is located at the base of a steep incline that raises to a height of close to 90 m (300 ft.) near the eastern boundary of the property. Most night migrant land birds would be flying at heights of 150 m (500 ft.) to 300 m (1000 ft.) above the land (Lincoln et al., 1998 so are unlikely to be in close proximity to the ship loader. The compound area is situated near the highest point on the property, however, no tall communication towers, wind turbines, or tall, continuously night lighted structures are planned for the compound area or indeed any other location on the site. Lighting on the ship loader would only be used when loading a ship at night and will be shaded so that light is directed downward. At most, loading would occur once a week. When not being used, the ship loader would not be lighted thereby greatly reducing the possible collision hazard for night migrating land birds. No structures on the quarry site will require stabilization through the use of guy-wires.

The construction of buildings on the site could attract some vertebrate invasive species. While sanitary conditions at the site will be such that species that are mainly attracted by refuse (e.g. Norway rat) would not be attracted to the area, other species that might find buildings and cleared areas attractive (European starling, house sparrow, rock pigeon) might be attracted to the site. The European starling is a predator of other birds eggs and nestlings and will compete with other hole nesting bird species (e.g. northern flicker) for nest sites. House sparrows also compete with other hole-nesting birds (e.g. chickadees, swallows) for nest sites.

The construction of buildings could attract more than invasive exotic species. Two mammal species at risk which are likely to occur in the area, little brown bat and northern long-eared bat, are attracted to buildings for roosting and for a critical part of their life history, the rearing of young, which is done in maternity colonies located, by preference, within buildings.

In reality, many "non-industrial" development projects do not require permits or are not required to undergo the formal environmental assessment process. Some may have adverse impacts on the terrestrial ecology, especially plants. Examples of such projects occurring provincially and on Digby Neck include:

- Land clearing for agricultural purposes
- Forestry operations including clear cutting
- Recreation/tourism development projects including campgrounds and golf courses
- Waterfront housing/cottage development
- The indiscriminate recreational use of all terrain vehicles

The use of off highway vehicles (OHV's) on the site presently poses a problem for a clump of Mountain Sandwort which was found on an OHV trail. Also, extensive clear cutting of large tracts has recently altered the terrestrial ecology on Digby Neck. Land development for housing with preferred waterfront locations result in potential destruction of rare plant habitat, especially the preferred habitat of coastal rare plants as found on the quarry site. Subdivision of land is spreading along Digby Neck as evidenced in Culloden, and nearby Crowells Cove and Whale Cove. This development is occurring in areas of potential rare plant habitat and without the requirements of environmental assessment.

9.2.1.3 Mitigation

The terrestrial environmental assessment for the Whites Point quarry has verified the existence of three species of plants that are considered at risk, on the property, including one species that, until these studies, was thought to have been extirpated in Nova Scotia. All three of these species are found in coastal habitats. Without the quarry project, the possibility of a "non-industrial" development for this waterfront land could happen in the future. Thus, the quarry project offers the opportunity to protect the coastal habitat that supports these species at risk as part of the quarry's proposed environmental preservation zone along the coastline of this section of the Bay of Fundy.

Bilcon of Nova Scotia Corporation proposes a minimum 30m (100 ft.) environmental preservation zone, extending from the mean high water mark, inland along the 3 km (1.9 mi.) coastline of the property, (except in the area of the marine terminal), to protect the coastal rare plants identified. The extent of the preservation zone generally extends from the ordinary high water mark inland to the defined inland edge of tree cover. This proposed environmental preservation zone will include approximately 9 ha (22 acres) of general coastline and be expanded inland to encompass an additional 1.2 ha (2.9 acres) at the first headland south of Whites Cove, an additional 0.7 ha (1.8 acres) inland at the second headland south of Whites Cove and an additional 1.8 ha (4.5 acres) inland at the "boggy marsh" north of Whites Cove. This amounts to a minimum of 12.7 ha (31.2 acres) of coastal habitats included in the environmental preservation zone. Also, a 30m (100 ft.) upland buffer zone including the portion of the upland bog, is proposed around the perimeter of the property line for wildlife, noise attenuation and as a visual screen. An additional 8.5 ha (21 acres) at the southeastern corner of the property, which is part of the Little River watershed, will be included in the upland buffer zone. The total upland buffer zone will amount to 19.3 ha (47.7 acres) of upland habitat. Together the coastal and upland environmental preservation zones total 32 ha (78.9 acres) – 20% of the total site area.

The coastal preservation zone will include all habitats where the three plant species at risk identified on this property occur. These species are mountain sandwort, hemlock parsley and glaucous rattlesnake-root; the latter species was thought to be extirpated in Nova Scotia prior to its discovery at this site. In addition, the coastal preservation zone will include all habitats on the property where bird's-eye primrose, a species identified as being at risk by ACCDC, occur. Preservation of the coastal "boggy marsh" area will protect not only a rare habitat within the North Mountain Basalt Ridge Natural Landscape but potential nesting habitat for rusty blackbird (a species considered at risk by ACCDC), and marginal potential nesting habitat for Nelson's sharp-tailed sparrow (NS GSR – yellow).

The Little River watershed portion of the upland environmental preservation zone contains the habitat where a damselfly (sweetflag spreadwing) that may be of conservation concern, was found. A single specimen of skunk cabbage, a species considered at risk by ACCDC, is not within any environmental preservation zone and would be destroyed by quarrying operations.

The 1917 *Migratory Birds Convention Act* refers to the protection of nesting birds and their habitat. In this regard, Bilcon of Nova Scotia Corporation will take the following steps to mitigate impacts on birds and meet its obligation under the Migratory Birds Convention Act. The scheduling of any habitat alteration – e.g. clearing of forest cover and overburden for quarry expansion – will be done to minimize direct impacts on all bird species. Clearing activities for quarry expansion will generally take place during late fall through winter to avoid spring and fall migrations on Digby Neck and to avoid the most sensitive spring and summer nesting period for resident species.

As a precautionary measure, minimal night lighting is proposed to reduce the possible collision hazard for night migrating birds. Night lighting would be used for navigational safety requirements, operations, and security. Outdoor operation and security lighting would be shielded whenever possible to direct light downward. To the extent practicable, ship loading would be conducted during daylight hours to reduce the necessity for lighting the ship loader at night.

Small numbers of boreal chickadees (identified as a species at risk by the ACCDC but not by the four priority lists used in this document), were observed using terrestrial habitats on the proposed quarry site in 2002 and 2004. Incremental clearing of approximately 2.4 ha (6 acres)of forest cover per year is planned during the life of the project. This procedure, in conjunction with the proposed environmental preservation zones, should provide some nesting habitat for on-site breeding populations of the boreal chickadee. Also, properties surrounding the quarry site are relatively undeveloped and consist primarily of coniferous (spruce/fir) forest, preferred habitat of the boreal chickadee.

Also, the wetlands (cattail marsh and shallow pond) located in the southeast corner of the quarry site and the treed bog north of the Whites Cove Road identified in the NSDNR Wetlands Data Base will be included in the environmental preservation zone. In addition to the existing sediment pond, a series of five new sediment ponds are proposed – see **Plan OP - 1.** This series of ponds, comprising approximately 8 ha (20 acres) of surface water, will overflow into a constructed wetland. The constructed wetlands will be designed to attract avian wildlife, especially resident waterfowl and migratory species who may use them for both nesting and staging sites. This additional wetland development will create aquatic habitat and add to the natural habitats already existing on the site thereby providing potential habitat for some Odonata species at risk and other wildlife species.

Incremental reclamation, including reforestation with native species and natural regeneration, is proposed to begin within five years of the beginning of quarry operations. This will result in varied successional stages of forest growth thereby potentially supporting a greater species diversity of breeding birds on the site. The sediment retention pond – constructed in 2003 has already provided habitat diversity and a resting area for waterfowl.

Early vegetation successional stages could also provide staging and resting areas for migrating monarch butterflies. It is proposed to allow native plants such as goldenrod and aster to become permanently established on the dykes around the sediment retention ponds. Since no farmland exists adjacent to the quarry site, these weed species, and even the introduction of milkweed, should not cause conflicts with adjacent land uses. Selective management of the dyke land will enhance both migratory habitat and possible breeding habitat for the monarch butterfly, a species identified by COSEWIC as being of special concern.

Known nesting areas of birds that are sometimes attracted to quarry areas such as killdeer (*Charadrius vociferus*), common nighthawk (*Chordeiles minor*), or spotted sandpiper (*Actitis macularia*) will be avoided, where possible, if found within active quarry areas until the young have left the nest...

Any toxic substances used during quarry operations (diesel fuel, gasoline, hydraulic fluids, antifreeze, etc) will be stored appropriately and not be accessible to birds or other wildlife. Any accidental spills will be dealt with as outlined in other sections of this document.

All segments of the environmental preservation zone would be environmentally managed and monitored by Bilcon of Nova Scotia Corporation. Access to the preservation zone would be controlled and if necessary restricted by Bilcon of Nova Scotia Corporation to ensure public access does not impact rare plant or other sensitive species.

9.2.1.4 Monitoring

Monitoring of plant populations that are considered at risk would be conducted by Bilcon of Nova Scotia Corporation, for as long as they operate the quarry. Professionals, contracted by Bilcon of Nova Scotia Corporation, would conduct inspections at the appropriate times to document the condition of the rare plant populations and their habitats. Appropriate monitoring procedures would be developed depending on the characteristics of each plant population. This monitoring procedure would involve checking each of the known locations where these plants are found, photographing and recording the total numbers, numbers that are flowering, the general condition of the plants and the condition of the surrounding vegetation. The frequency of monitoring would vary depending on the vulnerability of the species. The glaucous rattlesnake-root is vulnerable due to its concentration in one small area and will be monitored annually during the first five years of the project. Mountain sandwort, whose populations are expected to be somewhat dynamic and are in close proximity to project activities during its early phases, will also be monitored annually during the first five years of the project. Hemlock parsley, which is widely scattered and removed from the area where early project development will occur will initially be monitored once every five years. A written report of findings would be submitted to the Nova Scotia Department of Environment and Labour upon completion of each of these inspections.

Also, monitoring of invasive plant species would be included in the monitoring program. An overall long term objective of site reclamation is to encourage native species through planting and natural succession. Invasive plant species often initially become established in disturbed areas where there is ample available open habitat. Once established in these areas of disturbance, they may spread into adjacent undisturbed habitat and displace native plant species. Therefore, early detection is important and if located, removal would be carried out. The incidence of invasive species and proposed control methods would be included in a written report that would be submitted to the Nova Scotia Department of Environment and Labour. The proposed frequency of monitoring would be every five years.

Although no species at risk were documented during the vertebrate faunal studies, the boreal chickadee, identified as a species at risk by the ACCDC, was observed on the proposed quarry site. In this regard, Bilcon of Nova Scotia Corporation proposes to conduct vertebrate faunal monitoring surveys. Professionals, contracted by Bilcon of Nova Scotia Corporation would conduct a breeding bird survey every five years to determine any change in species composition, including the boreal chickadee, as a result of quarry operations. A written report of findings would be submitted to the Nova Scotia Department of Environment and Labour upon completion of each survey.

To document the potential effects of preserving existing wetlands and increasing wetland habitat with constructed wetlands, Bilcon of Nova Scotia Corporation will conduct general wetland and Odonata surveys. Professionals contracted by Bilcon will conduct

wetland and Odonata surveys every five years. The objective of these surveys will be to document any changes in species composition and diversity. A written report will be prepared upon completion of the surveys.

Finally, the effectiveness of reclamation procedures will be monitored over the life of the quarry. Management and monitoring of the environmental preservation zone and reclaimed areas is part of the overall reclamation program. Included in this program will be the management of the sediment retention pond dyke lands as monarch butterfly habitat. Professionals contracted by Bilcon of Nova Scotia Corporation will conduct a Lepidoptera survey every five years. The objective of this survey will be to document any changes in Lepidoptera populations on-site with particular emphasis on the monarch butterfly. A written report will be prepared upon completion of each survey.

9.2.1.5 Impact Statement

Terrestrial Habitat - Alteration

Loss of habitat will result from construction of quarry infrastructure and noise will exclude sensitive fauna from habitats immediately adjacent operations activities, however, considering environmental preservation zones, phased quarry operations and incremental reclamation, effects on the site's terrestrial habitat would result in a ***long term, insignificant negative effect, of local scale.***

Terrestrial Habitat - Diversity

After quarry closure, and considering completion of on-site reclamation with the resultant habitat diversification, effects on the site's terrestrial habitat would result in a ***long term, insignificant positive effect, of local scale.***

Floral Species at Risk

Assuming acceptance of the previously stated environmental preservation zone and buffer areas, reclamation, mitigation, and monitoring plans, effects on floral species at risk would result in a ***long term, significant positive effect, of provincial scale.***

Vertebrate Species at Risk

Since no terrestrial vertebrate species at risk were identified during on-site field studies and critical habitat is marginal for vertebrate species at risk that could possibility use the site, effects on terrestrial vertebrate species at risk would result in a ***long term, insignificant negative effect, of local scale.***

Odonata Species at Risk

While on-site censuses of Odonata species at risk are not complete, none was identified during 2005 studies and considering that all aquatic habitats where Odonates have been observed will be preserved and new wetland habitat will be created, effects on Odonata species at risk would result in a ***long term, insignificant positive effect, of local scale.***

Lepidoptera Species at Risk

Since no Lepidoptera species at risk were identified during on-site field studies and on-site habitat is marginal, and considering habitat reclamation and creation, effects on Lepidoptera species at risk would result in a ***long term, insignificant negative effect, of local scale.***

Wetlands

Inclusion of the coastal bog, treed bog, cattail marsh, and shallow pond in the environmental preservation zone, proposed pond and wetlands construction, and maintenance of surface water flows to the coastal bog during quarry operations, will result in a net increase in wetland habitat resulting in a ***long term, insignificant positive effect, of local scale.***

Migratory Land Birds

Considering there will be no communication towers, wind turbines or any tall night lighted structures and land clearing will be scheduled to avoid nesting periods and migration seasons, effects on migrating land birds would result in a ***long term, insignificant negative effect, of local scale.***

9.2.2 Aquatic Ecology – On-site Freshwater

Introduction

The proposed 380 acre Whites Point Quarry property lies between the Bay of Fundy and the Little River watershed on Digby Neck. The quarry property extends approximately 3.1 km (1.9) miles along the Bay of Fundy shoreline with several intermittent water courses flowing through the property toward the Bay of Fundy.

Direct, land based development, including the quarry operation, will be discussed in relation to the Little River watershed, the on-site freshwater Bay of Fundy watershed, and any influences that may occur on the receiving waters of the Bay of Fundy. Direct, marine based development including the ship loader, conveyor system, and marine terminal will be discussed in relation to the intertidal zone and the coastal-nearshore marine habitats in subsequent sections. Indirect, induced influences of quarry operations and construction – e.g., possible offshore whale/ship interactions and noise/marine mammals will be discussed in other sections of the Environmental Impact Statement document.

Watersheds in the vicinity of the proposed Whites Point Quarry on Digby Neck, as mapped by the Nova Scotia Department of Natural Resources – Wildlife Division are shown on **Map 14.** The Whites Point Quarry property watershed is bordered mainly by two small streams located to the north and south and the mountain ridge to the east. The Gidneys Brook watershed is located to the northeast of the quarry property and the Little River watershed to the southeast of the quarry property.

9.2.2.1 Research

During the spring and summer of 2002, on-site field reconnaissance and water sampling was conducted in freshwater habitats by David W. Kern, B.Sc. Several intermittent water courses and surface water drainage ways flow from the site into the Bay of Fundy. The most defined water courses are located near the north and south property lines and in the coastal bog area – see **Map 18B.** On-site observations during the spring and fall indicated moderate flows in these water courses, however, in late August of 2002, no flow was observed in the water course entering the bog area and only a slight trickle in the north and south water courses. These three water courses as well as three additional drainage ways were sampled for water quality (bacteriological, general chemistry, and trace metals) by David W. Kern, B.Sc. during the spring and summer of 2002 – see **Map 19A.**

Also, during late spring (June 13 and 14, 2002) on-site field reconnaissance of the three water courses was conducted by Dr. Michael Brylinsky, – see Brylinsky, M. "Results of a Survey of the Intertidal Marine Habitats and Communities at a proposed Quarry Site Located in the Vicinity of Whites Cove, Digby Neck, Nova Scotia", 30 June 2002 (**Ref. Vol. II, Tab 10**). The following descriptions of the three freshwater water courses are excerpted from his report.

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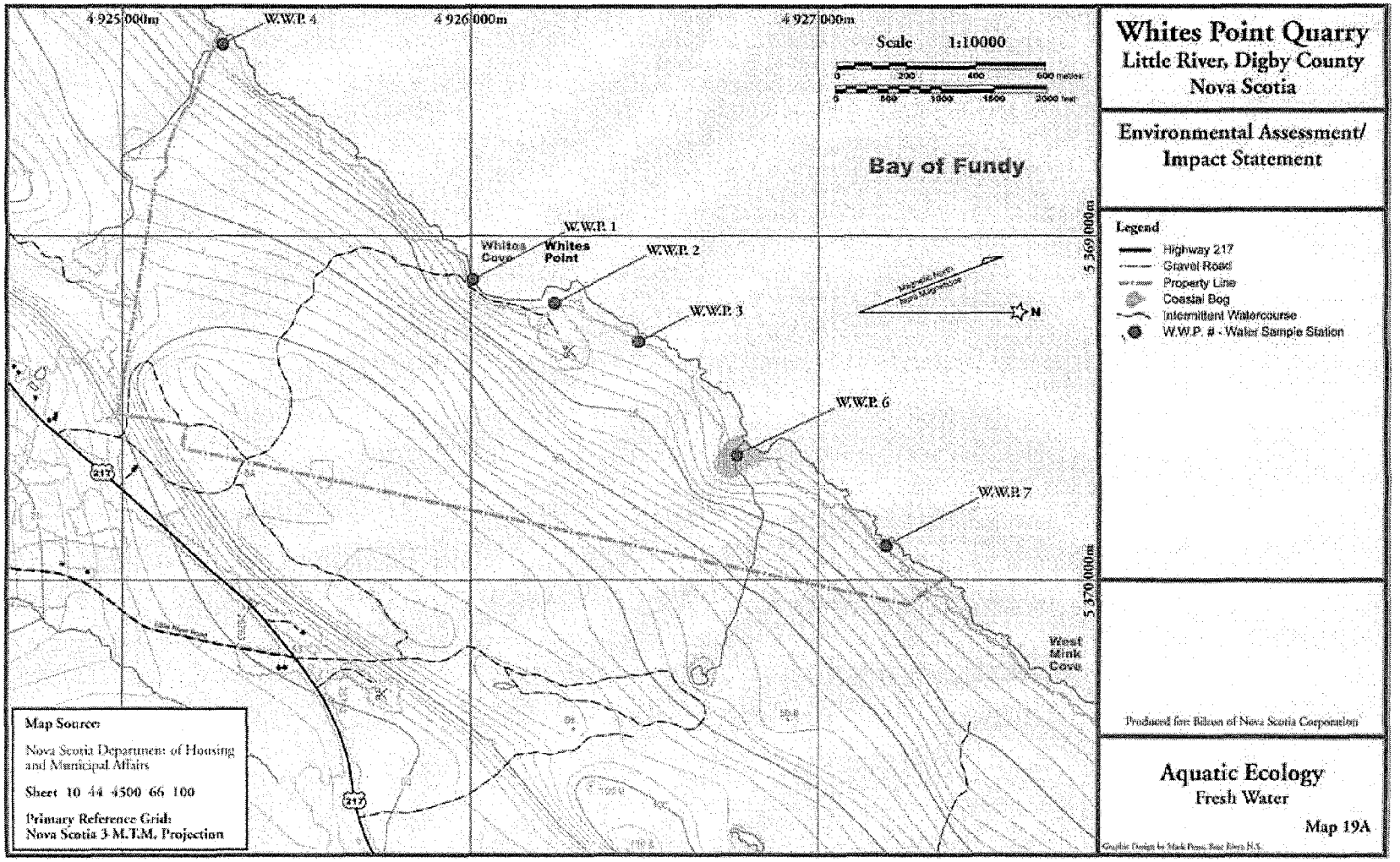

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The lower portion of the north water course at water sampling station WWP-7 (**Map 19A**) is about 0.7 – 1.0 m in width and, at the time of survey, had a moderate flow of water. Water depths averaged about 0.2m, but in some places there were small pools, generally less than one metre in diameter and 0.5 m in depth. The streambed of the water course was mainly bedrock with a few small areas that contained cobbles. There was little evidence of any sandy or gravelly areas. Two Surber samples, taken in an area containing a cobble substrate, contained only a few caddis fly larvae, and visual examination of the undersides of submerged rocks failed to reveal the presence of any other types of aquatic invertebrates.

This north water course does not appear on the Nova Scotia 1:10 000 Topographic Series Sheet 10 44 4500 66 100 mapping with 5m contours, or on the more detailed mapping with 2.5m contours specifically flown for the quarry project. The inability to locate this water course is due primarily to poorly defined contour signatures. Water courses such as this are cut into the surface of the basalt rock formations and are common along the Bay of Fundy watershed. In this case, this precludes definitive water course or watershed delineation.

The south water course at water sampling station WWP – 4 (**Map 19A**) is only about 0.2 – 0.5 m in width at its lower end and flows at approximately a 12% gradient. This water course contains a number of small water falls at its lower end before entering the Bay. Water depths were only 5 – 10 centimetres at the time of the survey. Due to its small size, no Surber samples were taken.

This south water course provides a more defined contour signature and appears on the Nova Scotia 1:10 000 Topographic Series Sheet 10 44 4500 66 100. The majority of this stream flows outside the quarry property and enters the quarry property where it then empties into the Bay of Fundy – see **Map 19A.** The watershed comprises approximately 34 ha (85 acres) and is primarily forested with a lowland area near the head of the watershed. Approximately 10% of this total watershed lies within the quarry property and all of this eight plus acres is proposed to be within the environmental preservation zone around the perimeter of the quarry property.

The water course at water sampling station WWP – 6 (**Map 19A**) flowing through the bog located just above the shoreline forms a small, less than 3 m diameter, shallow, less than 0.2 m deep pool. At the time of the survey, the surface of the pool was covered with a green filamentous algae, and most of the bottom was covered with a brown bacterial mat (probably a sulphur bacteria). This pool had a strong hydrogen sulphide odour which is indicative of anoxic conditions.

Invasive Species

Freshwater habitats on the Whites Point quarry site are limited to intermittent water courses and small wetlands. Review of the Global Invasive Species Database for Canada and Invasivespecies.gov, list no invasive fish species or aquatic plant species presently exist on the Whites Point site, especially fish and molluscs. One aquatic plant which could possibly exist in on-site wetlands is Purple Loosestrife (*Lythrum salicaria*) which was recorded in a botanical survey at nearby Sandy Cove (Newell 2002). However, Purple Loosestrife was not identified on-site during the botanical survey for Whites Cove (Newell 2002).

9.2.2.2 Analyses

Water samples were taken at six locations to establish background water quality data for the fresh water entering the intertidal zone of the Bay of Fundy by David W. Kern, B.Sc. The locations of the sample sites are shown on **Map 12 .** Samples were taken in laboratory furnished bottles. Laboratory analyses for total coliform and total e-coli was conducted by Comeau Lab and for general chemistry and trace metals by PSC Analytical Services. A summary of these analyses is contained in Appendix 46 . With the exception of one parameter – aluminium – the analyses showed that all other parameters were within the "Canadian Water Quality Guidelines for the Protection of Aquatic Life" (1999, Ref. 43).

Aluminium exceeded the Canadian Council of Ministers of the Environment (CCME) 5 – 100 *ug*/L at all freshwater water sampling stations. Values for aluminium ranged from 110 *ug*/L at pH 7.2 to 320 *ug*/L at pH 5.7. It should be noted that the maximum concentration of aluminium allowable in freshwater by the U.S. Environmental Protection Agency is 750 *ug*/L at ph 6.5 to 9.0. These values in the fresh water runoff at the Whites Point Quarry site indicate background levels of aluminium presently exceed the CCME guidelines.

Regarding suitability of the water courses for fish habitat, it is concluded in Brylinsky's report that the two small brooks examined near the north and south property lines at WWP–7 and WWP - 4 do not appear to be particularly good salmonid habitat due to their small size, steep gradient, and lack of substrate suitable for spawning (Brylinsky 2002, **Ref.Vol. II, Tab 10**). Also, due to the anoxic conditions encountered at the bog water course WWP–6, it was determined that this stream is not suitable as fish habitat and was not examined in detail.

Subsequent to Dr. Brylinsky's spring reconnaissance, representatives of the Department of Fisheries and Oceans, Habitat Management Division, examined the full length of the water course at WWP - 6 flowing into the bog to its source. In their September 18, 2002 letter DFO concluded that "this watercourse cannot be categorized as "Fish Habitat", therefore the *Fisheries Act* does not apply", - see Appendix 18 .

The 3 plus hectares (8 acres) of surface acres of the south water course watershed within the quarry property will be protected within the proposed environmental preservation zone. The remaining 90% of the surface of this watershed is outside the quarry property and subject to prevailing local land uses. Quarrying in the area of the south water course will be in the upper flow unit, a uniform, hard, massive, vesicle free medium dark gray to black basalt. Quarrying below the contact of the upper flow unit and the middle flow unit, will not be carried out, and no loss of groundwater through this fractured zone to the south water course is expected.

9.2.2.3 Mitigation

As previously addressed in the component entitled "On-site Surface Water Drainage", surface water flow to the coastal bog will be maintained during quarry operations. Also, this existing wetland habitat is included in the proposed environmental protection zone. The water courses near the north and south property lines will also be included in the minimum 30 m buffer zone proposed around the perimeter of the property. The proposed 30 m buffer zone actually exceeds by one third the requirements of the Nova Scotia Natural Resources, Wildlife Habitat and Watercourses Protection Regulations which became law on January 14, 2002. A "Special Management Zone" (SMZ) of at least 20 m is required for watercourses 50 centimetres or more in width during forest harvesting under these regulations. By including these water courses in the preservation zone and/ or buffer zones, the quality of surface water flowing into the intertidal zone of the Bay will be maintained. Further, all surface runoff from disturbed land, before restoration is complete, will flow through a series of sediment retention ponds and then into a constructed wetland. Discharges from the wetland will meet the criteria established by the Nova Scotia Department of Environment and Labour for Total Suspended Solids (TSS) and pH.

Based on the results of the monitoring program, if the criteria established by the Nova Scotia Department of Environment and Labour (NSDEL) is exceeded, increased sediment pond capacity and/or retention time will be developed to maintain acceptable levels of TSS at the discharge point. PH will also be monitored. If the criteria established by the NSDEL exceed the acceptable range for pH, adjustments to the pH levels will be made with the addition of lime.

9.2.2.4 Monitoring

As previously stated in the component entitled "On-site Surface Water Drainage", a water quality and flow monitoring program will be implemented by Bilcon of Nova Scotia Corporation. This program will include monitoring of all outflows from sediment retention ponds for Total Suspended Solids (TSS), pH, and total water flow. The frequency of monitoring will be weekly and a monthly report of results will be prepared by Bilcon of Nova Scotia Corporation and be available to regulatory agencies.

9.2.2.5 Impact Statement

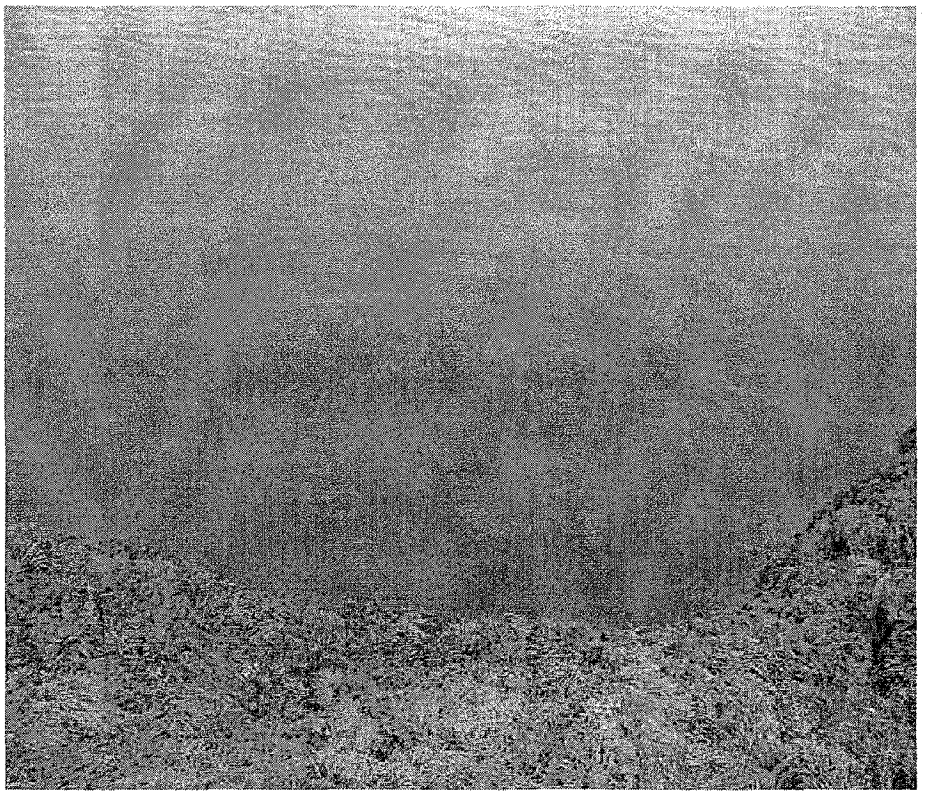
Freshwater Fish Habitat

Since on-site studies and reconnaissance by the Department of Fisheries and Oceans, Habitat Management Division, have concluded that the only watercourse within the active quarry area is not suitable as fish habitat, this would result in a ***long term, neutral (no) effect, of local scale.***

Adjacent Watersheds

The watersheds of the north and south watercourses are within the environmental preservation zone and would not be altered by quarry operations resulting in a ***long term, neutral (no) effect, of local scale.***

9.2.3 Aquatic Ecology - Marine Intertidal Zone



Marine Intertidal Zone – Bay of Fundy, Whites Point- Photo by David W. Kern

9.2.3.1 Research

During the spring and summer of 2002, on-site field reconnaissance and water sampling was conducted within the intertidal habitats. One water sampling station in Whites Cove and three intertidal transects were established – see **Map 19B.** The intertidal zone was sampled for background water quality including bacteriological, general chemistry and trace metals including total suspended solids and mercury, see Appendix 44. Three intertidal transects were established by Dr. Michael Brylinsky – see Brylinsky, Michael, "Results of a Survey of the Intertidal Marine Habitats and Communities at a Proposed Quarry Site Located in the Vicinity of Whites Cove, Digby Neck, Nova Scotia" 30 June 2002 **(Ref. Vol. II, Tab 10)**. The following descriptions of the three transects are excerpted from the above report.

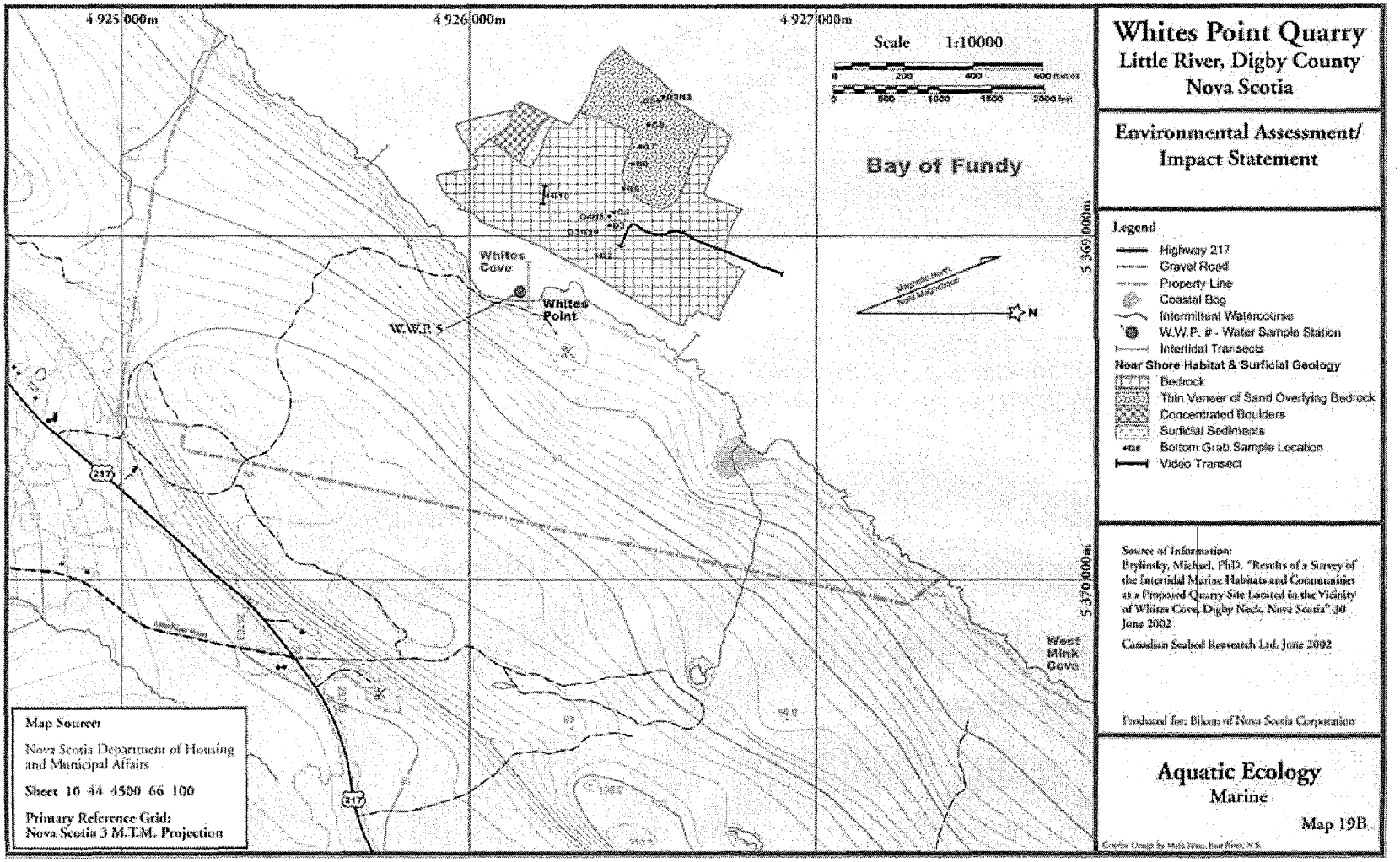
The Whites Cove transect, because of its more general relief (less than 4% gradient), exhibits the most distinct intertidal zonation pattern. The upper shore consists largely of sparsely scattered mats of rockweeds (*Fucus vesiculosus* and *Ascophyllum nodosum)* and patches of barnacles (*Balanus balanoides*). The intertidal community is poorly developed in this area as a result of the "mobile" cobble substrate. This area also lacked a distinct barnacle zone as barnacles were only present on some of the larger, more immobile boulders. The substrate of the mid and lower shore is more stable being composed mainly of bedrock which is overlain with a thick mat of rockweeds. Other algae observed included sea lettuce (*Ulva lactuca*), dulse (*Palmaria palmata*), Irish moss (*Chondrus crispus*), and deadman's fingers (*Briareum asbestinum*). Periwinkles (*Littorina spp.*) are abundant in this area, especially in the tide pools and rock crevices. Other marine animals observed included blue mussels (*Mytilus edulis*), horse mussels (*Modiolus modiolus*), hermit crabs (*Pagurus spp.*), dog whelk (*Thais lapillus*), and European green crabs (*Carcinus maenas*). It should be noted that the European green crab was introduced to the Bay of Fundy over 20 years ago and has since spread throughout the Bay.

The north and south transects are quite similar to each other with pronounced relief of a stable bedrock substrate and abundant tide pools. Yellow patches of lichens are prevalent on the bedrock of the upper zone in contrast to blue green algae which imparts the dark green colour to the rock surfaces. Tide pools are scattered throughout the mid and lower shore zones. A diversity of marine organisms inhabits this zone including periwinkles, amphipods, red coralline algae, and limpets with some occurrence of brown algae. The dominant macroalgae in all three transects was *Fucus* and *Ascophyllum*.

Coastal vegetation communities including the coastline, intertidal, and sublittoral are shown on **Figure 9.** These communities were identified using aerial photography interpretation, on-site flora surveys, on-site intertidal transects, near shore bottom sampling, and underwater video.

Invasive Species

Investigations of the marine intertidal zone were conducted at three transects along the Whites Point property coastline (Brylinsky 2002). Review of the Global Invasive Species Database for Canada and Invasivespecies.gov indicate invasive marine species presently exist in the intertidal zone at Whites Point. The European green crab and the common periwinkle (*Littorina littorea*) were identified during intertidal investigations. It should be noted that the common periwinkle is presently commercially harvested along the Whites Point shoreline.



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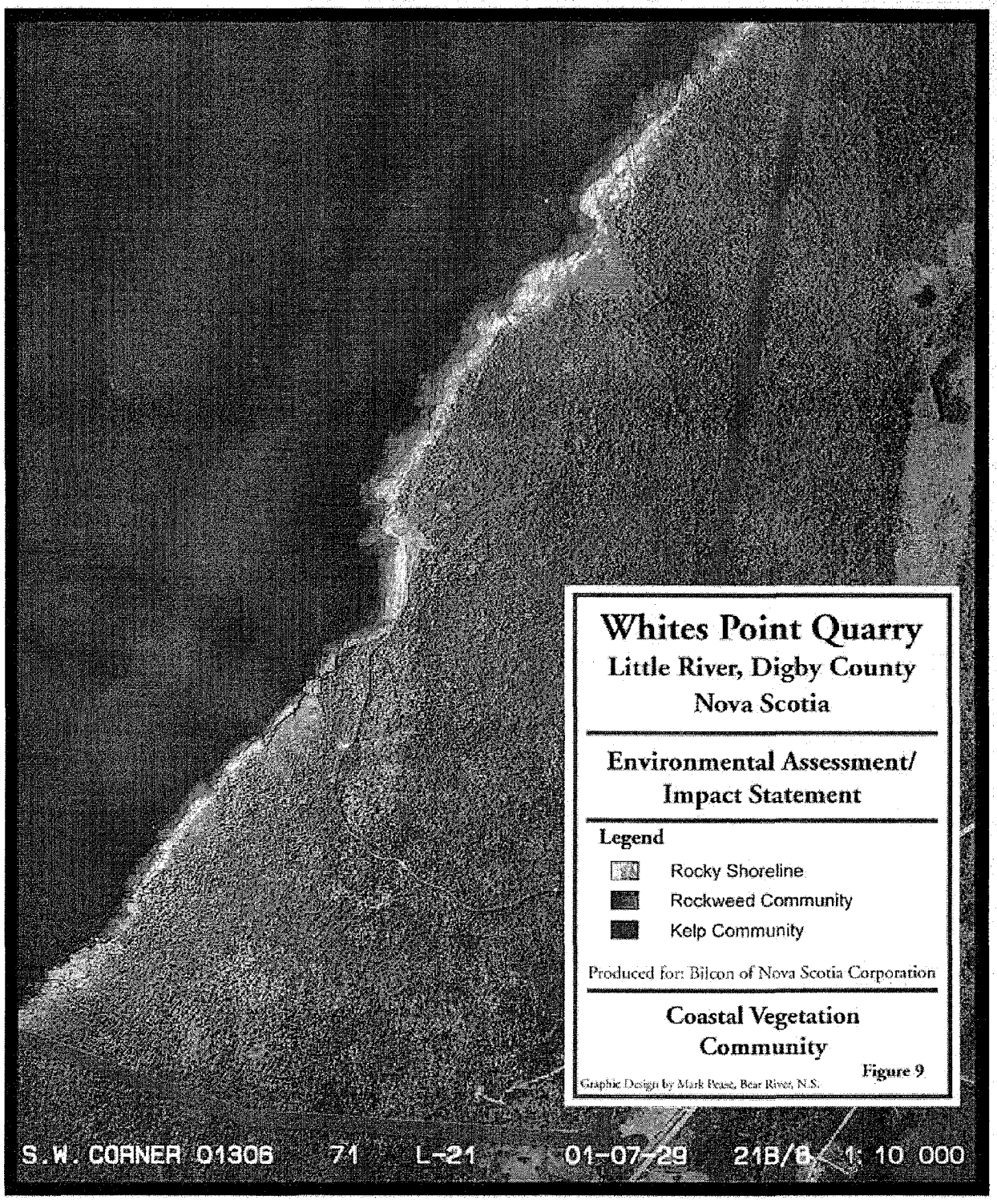
9.2.3.2 Analyses

A water sampling station was established in Whites Cove to establish water quality data in the intertidal marine environment. The location of the sampling station is shown on **Map 19B**. Samples were taken in laboratory furnished bottles and laboratory analysis for coliform and e-coli was conducted by Comeau Lab and for general chemistry and trace metals by PSC Analytical Services. A summary of the analyses is contained in **Appendix 45.** Few guidelines for parameters in marine waters are available in the "Canadian Water Quality Guidelines for the Protection of Aquatic Life" (1999) however, all parameters indicated in the Guidelines for marine environments were within acceptable limits.

The intertidal zone along the Bay of Fundy shore bordering the property is approximately 3.1 km (1.9 mi.) long and consists of a predominately rocky shoreline dominated by basaltic bedrock. Fine sediments are scarce resulting in a lack of sandy beaches and mudflats. An exception to this is the beach at Whites Cove which varies from small boulders at low tide to cobbles along the high tide mark. The lack of sediment and the presence of hard substrate provides ideal conditions for the establishment of macroalgal communities which are very well developed along the entire shoreline of the property. Results of the survey transects indicate that the intertidal marine communities and habitats present along the shoreline of the property are typical of the rocky shoreline areas of the Lower Bay of Fundy. The dominant rockweed community of *Fucus* and *Ascophyllum* is well developed and appears to be in a healthy, prolific condition. No unique or extraordinary characteristics associated with this shoreline were observed.

These rocky intertidal macroalgal communities play a number of important ecological roles as part of the larger marine environment. They are major primary producers, and although macroalgae are grazed on directly by some animals such as sea urchins, much of this material is eventually exported to the open waters of the Bay of Fundy where it becomes part of the detrital food web. Rafts of floating, detached macroalgae also play an important role as a feeding area for seabirds, marine mammals, and fish. Macroalgae are an important energy source and provide foraging and refuge habitat for many species of marine organisms. Estimates indicate as many as 31 species of fish use the rockweed habitat typical of that at Whites Point during the summer and about 17 species are present as juveniles (Rangley, R.W. 1998, Ref. 159), suggesting it is an important nursery habitat. Lobsters also rely on macroalgal habitat during various stages of their life cycle and ducks forage for amphipods and periwinkles living in the rockweed community. No disturbance of the rockweed community resulting from commercial harvesting by licensed seaplant harvesters was apparent along this section of shoreline.


Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/
Impact Statement
Legend
Rocky Shoreline
Rockweed Community
Kelp Community
Produced for: Bilcon of Nova Scotia Corporation
Coastal Vegetation
Community
Figure 9
Graphic Design by Mark Pease, Bear River, N.S.
S.W. CORNER 01306 71 L-21 01-07-29 21B/6 1: 10 000

9.2.3.3 Mitigation

Since the intertidal zone is important to the overall marine environment from a habitat, primary production and species diversity standpoint, the proposed method of construction for the conveyor system to the ship loader – see **Figures 2 and 3** - was chosen to span the intertidal zone. No filling such as a rock causeway or infilled crib work or sheet piling within the intertidal zone is proposed. Approximately three conveyor supports on pipe piles, anchored into the bedrock, will be located within the intertidal zone. Construction within the intertidal zone will require drilling sockets and anchor holes for the conveyor support pipe piles. The proposed pipe piles, pending detailed design, are a maximum thirty-six inch diameter resulting in a permanent displacement of intertidal bottom habitat of 5.9 m^2 (63 ft^2) or 0.0006 ha (0.001 acres).

This harmful alteration, disruption or destruction (HADD) of fish habitat will require a *Fisheries Act Subsection 35(2) Authorization.* A "Fish Habitat Compensation Plan" – see Appendix 17 - to balance this habitat loss has been approved in principle by the Department of Fisheries and Oceans – Habitat Management Division.

Construction within the intertidal zone will be done from the land during low tide periods. Socket drilling will produce aggregate size material with little or no fines. Anchor drilling will be done within the pile casing thus confining any fines. Since construction will be done from and in basalt bedrock, and no bottom sediments are present, water quality in the intertidal zone should experience negligible alteration with this construction process. Importantly, the use of this construction technique will maintain unobstructed shoreline currents.

Although more expensive than other construction techniques, the loss of habitat is very small and will be compensated for, as noted above. The intertidal zone extends approximately 35 m (115 ft.) seaward from the ordinary high water line. Thus vertical habitat surface within the tidal water column on the piles will result, especially for organisms such as barnacles. No other disturbances are proposed within the intertidal zone along the shoreline of the property.

9.2.3.4 Monitoring

A water quality monitoring program within the intertidal zone in Whites Cove will be implemented by Bilcon of Nova Scotia Corporation during construction of the conveyor supports. This program will include monitoring of Total Suspended Solids (TSS) within the intertidal marine environment. The frequency of monitoring will be monthly with a monthly report of results prepared for Bilcon of Nova Scotia Corporation which will be available to regulatory agencies. Since no disturbance within the intertidal zone is anticipated after the construction is complete, monitoring of TSS within the intertidal marine environment will be discontinued. As indicated in previous sections, the marine conveyor will have spill containment. In the event of a conveyor malfunction requiring off loading, the aggregate will be off loaded into a barge moored on-site.

9.2.3.5 Impact Statement

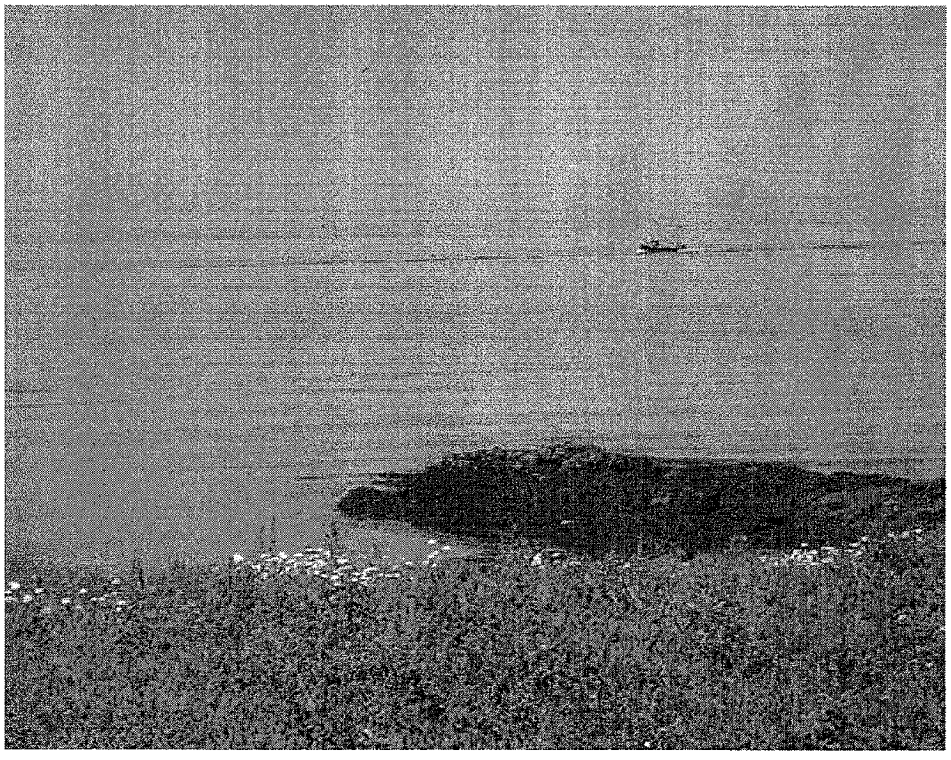
Intertidal Habitat – Construction

Since construction within the intertidal zone for three conveyor supports is expected to take less than one year and will be conducted during periods of low biological activity, this would result in a ***short term, insignificant negative effect, of local scale.***

Intertidal Habitat – Life of Project

Since the only disturbance within the intertidal zone along the entire shoreline of the property is the construction of three conveyor supports, no net loss of habitat is anticipated after compensation resulting in a ***long term, neutral (no) effect, of local scale.***

9.2.4 Aquatic Ecology - Coastal / Nearshore Marine Habitat



Coastal / Nearshore Waters, Bay of Fundy, Whites Point - Photo by David W. Kern

9.2.4.0 Introduction

The site of the proposed Whites Point Quarry and Marine Terminal is located along the western shoreline of Digby Neck, Nova Scotia and on the northwestern shoreline of the outer Bay of Fundy. In broader context, it lies within the Gulf of Maine/Bay of Fundy system, an area considered to be one of the world's richest marine ecosystems (Tyrell 2005, Ref. 89).

This introduction presents an overview of the marine ecosystem with some selected examples of life and interactions. In preparing the Environmental Impact Statement for the Whites Point project, an ecosystem approach has been taken, emphasizing the complexities of interactions within and among ecosystems and communities.

9.2.4.0.1 Benthic Habitats and Communities

The major benthic marine habitats and communities present in the immediate area of the quarry site include a rocky intertidal area colonized extensively by a diversity of marine macrophytes, and a subtidal area that is largely erosional due to the presence of strong currents. There are also numerous tide pools present within depressions that have formed within the intertidal area that serve as habitat for some animals and plants.

Rocky intertidal macroalgal communities play a number of important ecological roles. They are major primary producers and, although macroalgae are grazed on directly by some animals, especially sea urchins, much of this material is eventually exported to the open waters of the Bay where it becomes part of the detrital food web (Bradford 1989; Mann 1992). Rafts of floating, detached macroalgae are also thought to play an important role as a feeding area for seabirds, marine mammals and fish (Rangley 1994).

Intertidal macroalgae are not only important as an energy source but, because of their large size and structural characteristics, are also important in providing foraging and refuge habitat for various species of marine organisms (Mann 1992: Percy, 1996). Rangley (1998) estimates that as many as thirty-one species of fish use rockweed habitat during summer, and about seventeen species are present as juveniles suggesting it is an important nursery habitat. American black ducks (*Anas rubripes*) and common eiders (*Somateria mollissima*) are known to forage for amphipods and periwinkles living in the rockweed community. Macroalgae that is ripped from its substrate by storms and eventually deposited along beaches as wrack becomes colonized by various crustaceans that use it for food and shelter and which in turn become food for various species of shorebirds.

Rockweed is also a valuable commercial commodity that is harvested and processed for use in food and agricultural products, livestock feed and as an emulsifier in numerous products such as paints, cosmetics and foods. Species currently being harvested in the Bay of Fundy region include dulse, Irish moss, kelps (*Laminaria spp.*) and rockweeds (*Ascophyllum nodosum).*

The subtidal community consists of attached macrophytes, mainly kelps, and numerous species of epifauna, such as sea anemones and mussels that are adapted to living attached to hard substrates. There are virtually no deposits of fine sediments in this area and, as a result, no infaunal communities are present. Scattered boulders along the seafloor provide important hiding and living spaces for swimming organisms and others that live on the bay bottom.

Commercially important species that may frequent or live in the nearshore benthic subtidal habitats include some demersal fish species such as Atlantic cod (*Gadus morhua*), cunner (*Tautogolabrus adspersus*) and redfish (*Sebastes marinus*), as well as numerous invertebrates such as American lobster (*Homarus americanus*), sea scallops (*Placopecten magellanicus*), rock crabs (*Cancer spp.*), sea cucumbers and sea urchins.

9.2.4.0.2 Pelagic Habitats and Communities

The pelagic zone or water column extends from the sea surface to the bottom substrate. In many areas of the Bay, the water column is often stratified and consists of distinct layers that form different habitats. The upper water mass is composed of less dense warmer water, and the bottom water layer consists of more dense colder water. If there is a source of fresh water input nearby, the upper layer may also have a lower salinity than the bottom layer. Because of the differences in salinity and temperature, these water masses represent different habitats. In addition to the habitat differences created by stratification of the water column, there are also habitat differences created by the attenuation of solar radiation through the water column. The upper water layer to a depth where there is sufficient light for photosynthesis to occur is called the euphotic zone and is the habitat where phytoplankton grow and reproduce. The area below the euphotic zone, where there is insufficient light for photosynthesis, is referred to as the aphotic zone. Organisms living in this zone receive their food from materials that either sink from the upper euphotic zone or are resuspended from the bottom substrate.

There is tremendous diversity in the kinds of pelagic, or open-water, organisms that live within the water column in terms of both size and life style. Pelagic organisms can be characterized as planktonic or nektonic.

9.2.4.0.3 Plankton Community

This community consists of small organisms that have limited ability to swim against ocean currents and, although many planktonic organisms can migrate vertically within the water column, their movements and distribution are dictated largely by the factors that control the circulation of oceanic water masses.

The phytoplankton community is composed of microscopic plants that have the ability to photosynthesize. These organisms are in turn fed upon by the zooplankton, the small microscopic animals that inhabit the water column. The zooplankton community consists of small crustaceans, such as copepods, as well as the larval stages of fish and numerous bottom dwelling organisms such as shellfish, sea anemones, crabs and American lobsters. The zooplankton community is an important food source for the younger stages of many fish species as well as for large marine mammals such as baleen whales that have the ability to strain these organisms out of the water column as they swim through it.

In addition to the phyto- and zooplankton communities, there exists a pelagic community that consists of very small organisms such as bacteria and protozoans. This community forms the microbial food chain which is considered by some to be important in making dissolved organic material available to larger organisms.

9.2.4.0.4 Nekton Community

Larger organisms that have the ability to swim independently against water currents form the nekton community. This community is typically dominated by chordates, or vertebrate or cartilaginous fish, marine mammals and reptiles. The nekton community is typically comprised of pelagic fish, whales, sharks, turtles, and seals; arthropods, such as shrimp; and some molluscs, such as squid and octopus.

Nektonic organisms can be considered as top predators and are mainly carnivores preying on smaller fish, but some are planktivores or omnivores. This means that they rely on a healthy food chain for survival. With the exception of anadromous and catadromous species, nektonic organisms live and breed in marine waters. Many pelagic fish live in schools that facilitate reproductive activities and increase swimming efficiency and reduce predation.

There is a significant economic reliance on nektonic species in the Bay of Fundy. Commercial fisheries rely on pelagic species such as herring and Atlantic mackerel (*Scomber scombrus*). Ecotourism depends on various species of whales and seals.

It is difficult to generalize about the ecology of nektonic organisms; however, herring is used as an example because of their ecological role as a "middle predator/prey". Herring typically spawn in shallow waters in spring, but summer and fall spawners prefer to spawn offshore. They eat plankton and their main food source is crustaceans such as copepods and euphaniids. They are preyed on by most of the larger fish species such as cod, tuna (*Thunnus spp.*), and Atlantic salmon (*Salmo salar*), and by seals, whales and sea birds. Herring form the basic food supply for many marine species. Commercially, they are harvested by gill nets, weirs, and seines.

The pelagic community offshore of Whites Point lies in an area that is considered to be very productive. Unlike the central Gulf of Maine, the water column remains unstratified due to the shallow depths and strong tidal mixing. This mixing also brings nutrients into the area from deeper offshore water and results in high levels of primary production by both phytoplankton and macroalgae (Townsend 1991; Durbin 1996).

9.2.4.0.5 Benthic-Pelagic Interactions

There are strong connections between pelagic and benthic communities, particularly in environments where water column stratification is absent. Exchange between the two communities is important for both food and nutrient supplies. Nutrients and food particles, both living and dead, that either sink or are transported by water circulation, are the primary source of nourishment for benthic plants and animals. In turn, decomposition of organic matter and resuspension of nutrients and organic matter from the benthos into the water column can be an important source of nourishment for phytoplankton and zooplankton.

In conclusion, the Bay of Fundy is a diverse and complex ecosystem. Its importance was substantiated during the community consultation meetings, meetings with regulatory agencies, panel scoping sessions and public commentary in the Public Registry. Areas of concern were raised regarding possible project interactions with components of the nearshore marine environment. Those concerns ranged from the destruction of fish habitat to direct and indirect influences of the project on specific species such as the American lobster, North Atlantic right whale, inner Bay of Fundy salmon, harlequin duck (*Histrionicus histrionicus*), and the leatherback turtle (*Dermochelys coriacea*). In particular, concerns were raised regarding specific project activities such as the proposed on-land blasting. Therefore, this section of the Environmental Impact Statement addresses possible nearshore marine ecosystem effects and effects on particular species that may be resident, seasonal, or migratory in this marine ecosystem.

9.2.4.1 Research

The coastal – nearshore waters off Digby Neck have been investigated historically, and most recently, as a result of the proposed Whites Point Quarry and Marine Terminal. Historic data includes nutrient and phytoplankton biomass from the BioChem data base maintained by the Department of Fisheries and Oceans (http://www.meds-sdmm.dfo-mpo.gc/biochem/Biochem e.htm, Ref 237)). This data spans a time period between 1979 and 2003. Chemical and nutrient data from a survey carried out between 1977 and 1980 by the Marine Ecology Laboratory of the Bedford Institute of Oceanography is also available. Also, limited data on phytoplankton primary production and macroalgal production is available from the early 1980s as a result of studies by Prouse (1983 and 1984). More recently, Bilcon of Nova Scotia Corporation had research conducted in the nearshore waters off the quarry site – see Canadian Seabed Research Ltd 2002 (Appendix 23) and Brylinsky 2004 (**Ref. Vol. II, Tab 11**).

9.2.4.1.1 Nutrients

Nutrient data from 13 sites in the Bay of Fundy off shore of the quarry site – seven representing single values typically from samples taken in the near surface layer, and six representing profiles consisting of three or less values from sample depths ranging between 5 and 50 m (16.5 and 165 ft.) in depth are shown on **Map 20** and contained in **Table NS – 1.**

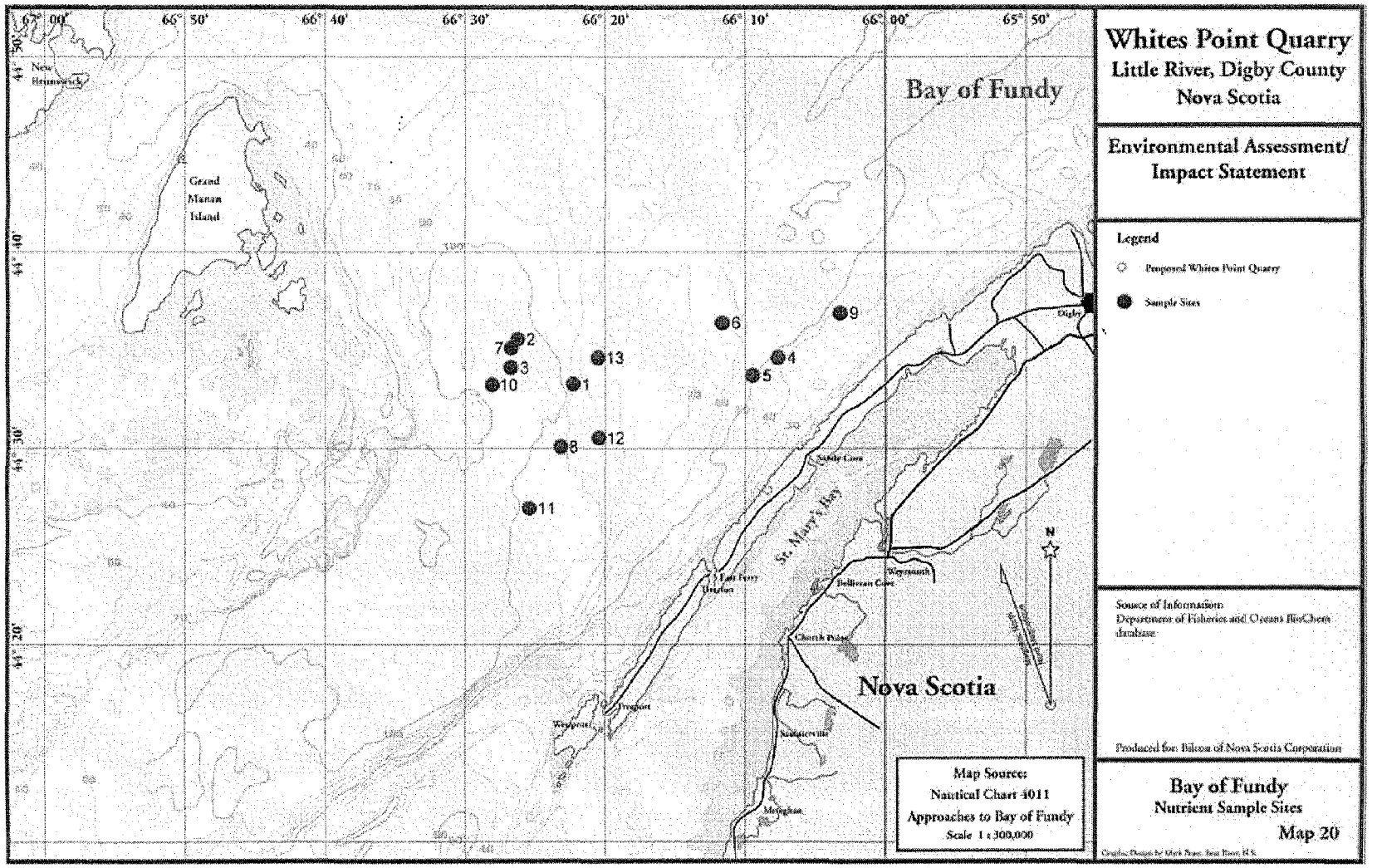


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Table NS-1 Nutrient concentration data obtained from the Department of Fisheries and Oceans BioChem database

Site*	Latitude	Longitude	Date	Depth (m)	Phosphate (ug/L)	Nitrate (mg/L)
1	44.58	66.37	10/24/79	8	1.035	9.95
1	44.58	66.37	12/1085	4	1.020	8.96
1	44.58	66.37	4/16/81	5	1.130	9.39
1	44.58	66.37	4/13/83	0	1.015	7.61
1	44.58	66.37	7/14/84	1	0.305	0.25
1	44.58	66.37	10/17/93	1	0.806	3.87
2	44.63	66.46	4/16/81	5	1.175	10.07
2	44.63	66.46	10/24/79	5	0.980	8.94
2	44.63	66.46	4/13/83	0	0.920	6.68
3	44.60	66.47	7/12/99	5	0.355	0.08
4	44.61	66.04	7/10/00	5	0.642	4.12
5	44.59	66.08	7/11/01	5	0.744	1.30
6	44.65	66.13	7/11/01	5	0.707	1.10
7	44.62	66.47	7/12/01	5	0.715	0.91
8	44.51	66.39	7/10/02	5	0.439	2.62
8	44.51	66.39	7/10/02	25	0.626	5.21
8	44.51	66.39	7/10/02	50	0.820	8.61

Table NS-1 Nutrient concentration data obtained from the Department of Fisheries and Oceans BioChem database

Site*	Latitude	Longitude	Date	Depth (m)	Phosphate (ug/L)	Nitrate (mg/L)
9	44.66	65.94	7/10/02	5	0.616	4.30
9	44.66	65.94	7/10/02	25	0.615	4.32
9	44.66	65.94	7/10/02	50	0.592	4.14
10	44.58	66.50	7/11/02	5	0.230	0.17
10	44.58	66.50	7/11/02	25	0.692	6.64
10	44.58	66.50	7/11/02	50	0.889	10.78
11	44.44	66.44	7/6/03	5	0.372	1.19
11	44.44	66.44	7/6/03	25	0.556	4.37
12	44.52	66.33	7/6/03	5	0.397	2.20
12	44.52	66.33	7/6/03	25	0.509	3.16
12	44.52	66.33	7/6/03	50	0.635	4.85
13	44.61	66.33	7/6/03	5	0.268	0.79
13	44.61	66.33	7/6/03	25	0.645	5.70
13	44.61	66.33	7/6/03	50	0.799	7.72

Chemical and nutrient data collected at stations approximately 15 km offshore of Digby Neck are contained in **Table NS – 2.**

Table NS – 2
Average concentration of chemical parameters in surface samples collected in August between 1977 and 1979 at three stations located approximately 15 km offshore of Digby Neck (from Keizer et al. 1980) are as follows:

Salinity (ppt)	32.3
Ammonia (mg/L)	0.009
Nitrite (mg/L)	0.005
Nitrate (mg/L)	2.41
Phosphate (mg/L)	0.11
Silicate (mg/L)	1.47
Dissolved Organic Carbon (mg/L)	1.72
Particulate Organic Carbon (mg/L)	0.282
Particulate Nitrogen (mg/L)	0.032

9.2.4.1.2 Phytoplankton Production

Phytoplankton primary production within the Bay of Fundy was studied by Prouse (1983). One of the sites at which primary production was measured was located approximately 15 – 20 km (9 – 12 mi.) offshore of the central portion of Digby Neck. The results are contained in **Table NS – 3.** Prouse et al. (1984) estimated the annual production in the outer Bay of Fundy to be 133gC/m^{-2} yr-^{1}. Also, this report indicates that phytoplankton production is highest in the summer and lowest in the fall, and that it does not appear to be nutrient limited.

Table NS – 3

Results of primary production measurements carried out by Prouse (1983) in the area of Digby Neck

Station	Date	Phytoplankton Production mgC/m^{-2}day^{-1}
BF 1	29 Mar 1979	114.1
BF 1	11 Aug 1979	955.4
BF 1	16 Feb 1980	64.8

Phytoplankton biomass is typically measured and expressed as phytoplankton chlorophyll *a* concentration.

The BioChem data base contains a number of chlorophyll *a* values for the Digby Neck area as contained in **Table NS-4.** Since most of the data was collected in early September, it is not possible to determine if there are any seasonal trends in chlorophyll *a* concentration. However, it is obvious that surface waters contained much higher levels than deeper waters.

Table NS – 4 Phytoplankton chlorophyll a values obtained from the BioChem database maintained by Fisheries and Oceans.

Latitude	Longitude	Date	Depth (m)	CHL *a* (ug/L)
44.60	66.47	7/12/1999	5	1.29
44.61	66.04	7/10/2000	5	5.04
44.59	66.08	7/11/2001	5	3.48
44.65	66.13	7/11/2001	5	3.96
44.62	66.47	7/12/2001	5	4.08
44.51	66.39	7/10/2002	5	1.39
44.51	66.39	7/10/2002	25	1.37
44.51	66.39	7/10/2002	50	0.42
44.66	65.94	7/10/2002	5	1.60
44.66	65.94	7/10/2002	25	1.66
44.66	65.94	7/10/2002	50	1.46
44.58	66.50	7/11/2002	5	2.09
44.58	66.50	7/11/2002	25	0.87
44.58	66.50	7/11/2002	50	0.18
44.44	66.44	7/6/2003	5	5.46
44.52	66.33	7/6/2003	5	6.65
44.52	66.33	7/6/2003	25	3.69
44.52	66.33	7/6/2003	50	0.32
44.61	66.33	7/6/2003	5	4.63
44.61	66.33	7/6/2003	25	2.60
44.61	66.33	7/6/2003	50	0.65

9.2.4.1.3 Macroalgal Production

Although no direct studies have been undertaken in the area off Whites Point, estimates of macroalgal production by Prouse et al. (1984) have been made within the Bay of Fundy. In this regard it was noted by Prouse that the Digby area contains significant stands of macroalgae with biomass of up to 20 kg/m^{-2} wet weight and estimated seaweed net production along the shorelines of the Outer Bay of Fundy to be about 845 $gCm^{-2}yr^{-1}$.

More recently, the coastal–nearshore surficial geology–see **Map 10** - and bathymetry off Whites Cove and Whites Point was investigated for Bilcon in June 2002. Canadian Seabed Research Ltd. (Appendix 23) conducted the investigations which included side scan sonar, underwater video transects, and bottom samples. Following are descriptions of the bottom characteristics as shown on **Map 12** . The majority of the area is comprised of bedrock, an extension of the land and intertidal basalt. The bedrock is a massive, irregular type with occasional joints and fractures. Boulders are also common throughout this area. A second area of bedrock is overlain with a thin veneer of sand which also has outcrops of bedrock and boulders evident. The third area of surficial sediments consists mainly of coarse to very coarse grained sand. Bottom samples taken in this area contained sand and 15% shell fragments and is characterized by a high abundance of boulders ranging in size from less than one m to 5 m (16 ft.) in diameter. No sediment bedforms (current marks) were visible indicating little current movement close to the bottom. Water depths below Chart Datum (LLWLT) in the area of investigation range to over 30 m (100 ft.).

9.2.4.1.4 Benthic Community

Bottom grab samples were taken on June 28 and 29, 2002 in nearshore waters off Whites Point by Canadian Seabed Research Ltd. The location of the grab samples are shown on **Map 13.** A Van Veen Grab Sampler was used in water depths ranging from 9.5 to 41.5 m (31 to 136 ft.). A total of twelve grab samples were attempted. Seven of the grabs resulted in no samples due primarily to rocky bottom conditions and the absence of bottom sediments. Samples G2, G5, G6, G9, and G10 produced some bottom materials. **Table GS - 2002** provides a summary of the grab sample field notes.

Laboratory analysis of the grab samples and review of the video transects were performed by Dr. Michael Brylinsky – see Brylinsky, Michael., "Interpretation of a Sublittoral Benthic Survey Along the Shoreline of Whites Point, Digby Neck, Nova Scotia". 28 February 2004. **(Ref. Vol. II, Tab 8)**. Based on these samples and video records, the subtidal substrate is composed mainly of coarse sands, gravels and mollusc shell fragments overlain in many areas by small to medium size boulders. These boulders are heavily colonized by a community consisting of epiflora and epifauna (plants and animals that live on the sediment surface). The major types of epiflora present are attached macroscopic algae with kelps and Irish moss most prominent. In some cases, small boulders are colonized by encrusting coralline red algae. The epifauna consists mainly of sessile attached anthozoans, hydroid polyps and sponges and motile starfish and crabs.

Nearshore Bottom Marine Life - Photos by Canadian Seabed Research Ltd.

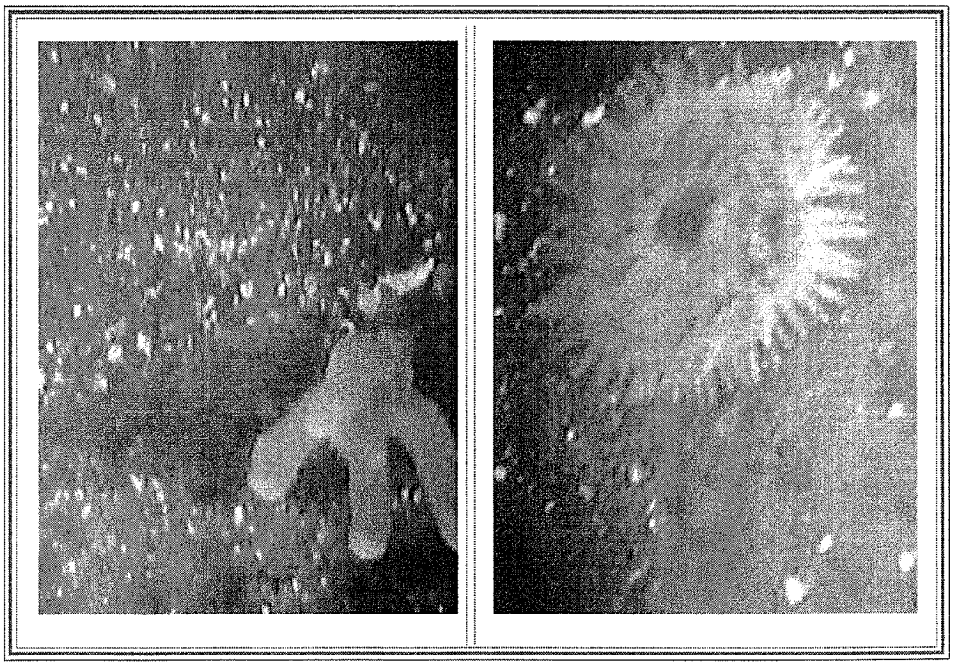

Table GS – 2002
Geophysical Survey – Whites Point, Nova Scotia
Grab Sample Field Notes

Sample ID # *28-Jun-02*	Easting/Northing	Time(local)	WaterDepth (m)	Description
G2	727057.95E 4927539.29N	16:37	9.5	Biological-kelp, various seaweed,approx 250g
G3NS	726986.09N 4927542.80E	16:40		No sample
G3	726982.19N 4927576.93E	16:43	22.5	Muddy water, no sample to bag after 2 attempts
G4	726933.73N 7927576.93E	16:48	28.0	No sample
G9	726620.98N 4927689.47E	16:55	41.5	Biological-Sea Cucumber brown approx 15cmx10cm Shell fragments (80%) and dark coloured sand mixture (20%)approx 500g
G9NS	726622.00N 4927692.47E	17:01		No sample
G8	726657.40N 4927655.95E	17:05	39.0	Biological-insignificant, nothing bagged
G7	726739.37N 4927643.91E	17:10	38.5	No sample
G6	726782.66N 4927631.11E	17:14	37.0	Shell fragments, approx 500g Single cobble, approx 5cm
G5	726859.22E 4927613.17N	17:20	33.5	Shell fragments (80%) andsand/fines (20%) approx 2kgSmall percentage of biomass-worms
G4NS	726938.25N 4927570.96E	17:30		No sample
29-Jun-02 G10	726887.79E 4927369.62N	11:37	24.0	Shell fragments (30%), very coarse sand (65%) and subrounded pebbles (5%) Approx 2kg no odour

* "NS" is an identifier for a duplicate grab sample performed at the same location as the original sample ID#
Source: Canadian Seabed Research Ltd.

Further to the nearshore benthic community research conducted in June 2002, bottom grab samples were taken in July 2005 by Dr. Michael Brylinsky. These bottom samples were taken as part of the sediment survey – see Brylinsky, Michael. "Results of a Sediment Survey in the Near Offshore Waters of the Proposed Quarry Site in the Vicinity of whites Cove, Digby Neck, Nova Scotia". September 2005 (**Ref. Vol. II, Tab 9**). The biological analysis of these samples for macrofauna and macroflora are contained in **Table GS – 2005.**

Table GS - 2005 Macrofauna and Macroflora

Sample Number	Location Northing	Easting	Depth** (m)	Physical Characteristics	Biological Characteristics
2	4927601	726878	30.0	No sediments	1 *Asterias vulgaris*
4	4927727	726854	29.2	Mainly cobble and shell fragments	1 *Astarte undata;* 1 *Ophiopholis aculeata;* 2 *Nereis* sp.
6	4927512	726922	12.4	No sediments	1 kelp stipe
8	4927717	726653	36.0	Coarse sediments and shell fragments	No living organisms
10	4927985	726378	43.9	coarse sediments, 2-3 cm cobble	*Balanus* shells attached to cobbles; 1 *Astarte undata*
11	4928259	727143	34.7	Coarse sediments and shell fragments	No living organisms
12	4928447	727225	34.7	Coarse sediments	No living organisms
13	4928601	727402	34.7	Coarse sediments and shell fragments	No living organisms
14	4928174	727563	1.8	No sediments	1 kelp and 1 brittle star
17	4928279	727560	1.8	No sediments	1 kelp w/ attached red algae
19	4928792	726983	40.2	Coarse sediments and cobble	*Balanus* shells attached to cobbles 1 *Astarte undata*
20	4928697	727021	34.7	Coarse sediments, 2 cm cobble	*Balanus* shells attached to cobbles

C0001-651

Sample Number	Location Northing	Easting	Depth** (m)	Physical Characteristics	Biological Characteristics
21	4926886	726126	38.4	Coarse sediments, 2 cm cobble	*Balanus* shells attached to cobbles
22	4926804	726104	38.4	Coarse sediments and shell fragments	*Balanus* shells attached to cobbles
27	4926589	726204	7.3	No sediments	1 *Agarum cribrosum*
30	4926497	726558	7.3	No sediments	1 *Laminaria longicruris*

Common Names of Organisms:

Agarum cribosum - sea colander (a kelp)
Astarte undata - wavy astarte
Asterias vulgaris - purple starfish
Balanus sp. - barnacle
Laminaria lonicruris - hollow-stemmed kelp
Nereis sp. - sandworm
Ophiopholis aculeata - brittle star

Source: Michael Brylinsky, September 2005

C0001-652

9.2.4.1.5 Phytoplankton and Zooplankton Community

A seasonal survey of the plankton community offshore of Whites Point was conducted by Dr. Michael Brylinsky – see Brylinsky, Michael. "Results of a Survey of the Plankton Communities Located Offshore of a Proposed Quarry Site at Whites Cove, Digby Neck, Nova Scotia". April 2005 (**Ref. Vol. II, Tab 11**). The objective of the survey was to document the phytoplankton and zooplankton communities present in terms of species composition and abundance – see Appendix 44. Further, this baseline collection was archived as a permanent reference of phytoplankton and zooplankton in the nearshore waters off the Whites Point Quarry and Marine Terminal. The location of the nearshore sample stations are shown on **Map 16.**

The phytoplankton community was dominated by diatoms (51 species). Dinoflagellates (10 species) were also present as well as other species including silicoflagellates and euglenoids. Concentrations of phytoplankton chlorophyll *a* were also measured at each station. Protozoa species were also observed in the phytoplankton samples.

The results of this survey are contained in **Table NS – 5.** The phytoplankton chlorophyll *a* values obtained were for composite samples collected within the upper 30 m (100 ft.) of the water column. These results indicate concentrations during the spring are generally within the range for upper waters obtained from the previously mentioned BioChem data base. Concentrations during summer and fall, however, are much lower and reflect a distinct seasonal trend that suggests a strong spring phytoplankton bloom.

Table NS – 5

Phytoplankton chlorophyll *a* concentrations measured at each station (Brylinsky 2004).

Station	Date	Chlorophyll *a* (ug/L)
South	04 April 2004	3.6
	28 July 2004	0.8
	21 Oct 2004	0.1
Central	04 April 2004	3.7
	28 July 2004	1.0
	21 Oct 2004	0.3
North	04 April 2004	3.4
	28 July 2004	0.6
	21 Oct 2004	0.1

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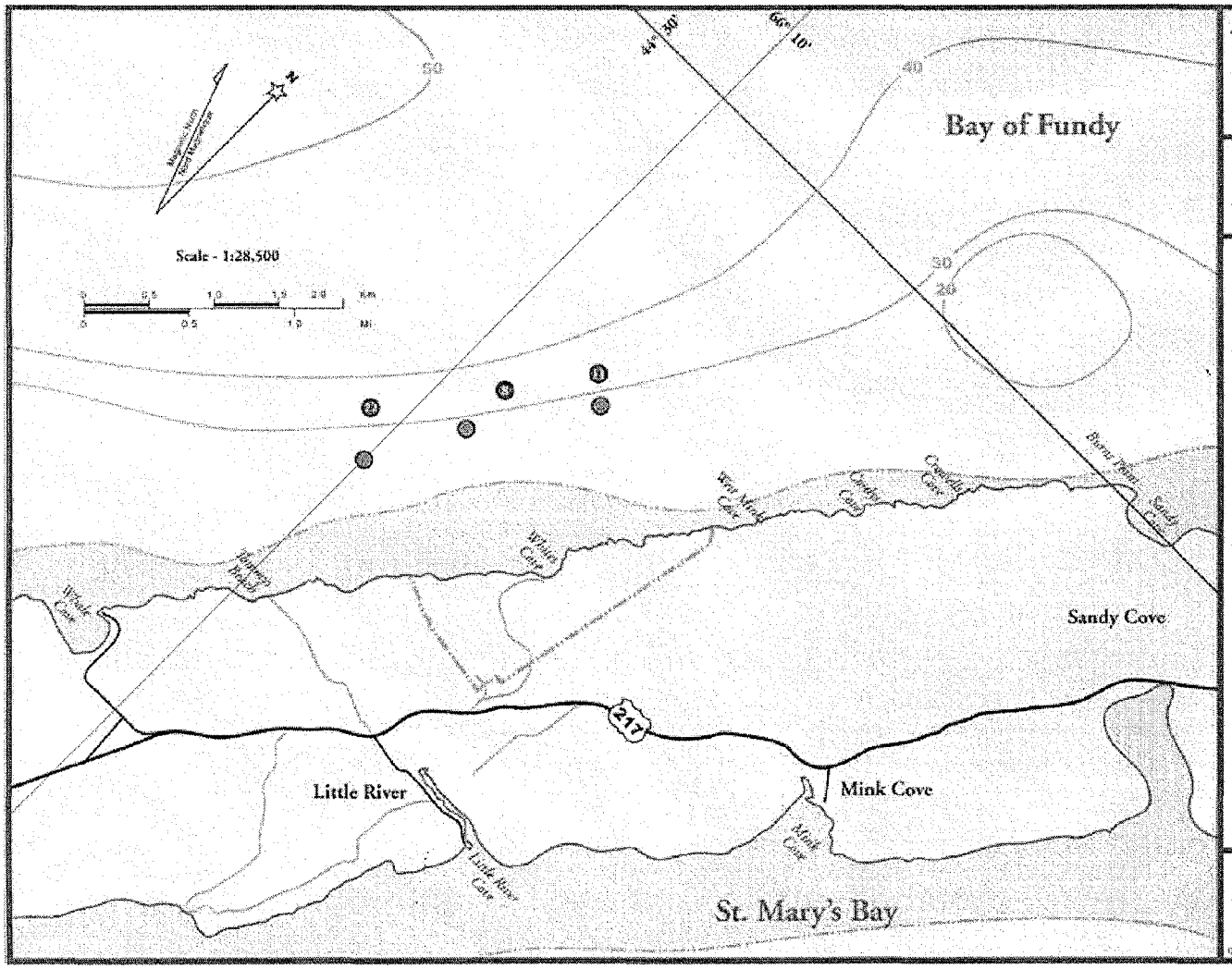

Whites Point Quarry

Little River, Digby County
Nova Scotia

Environmental Assessment/ Impact Statement

Legend

- Quarry Property Line
- Phytoplankton and Zooplankton Sample Station Location
- Sediment Sample Station Location

Produced for Bilcott of Nova Scotia Corporation

Oceanography Surveys

Map 16

Graphic Design by Mark Pinto, Bear River, N.S.

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Zooplankton species were dominated by calanoid copepods with a total of nine species observed. Two species of cladocerans were also present as well as a pteropod, a tunicate and a number of larvae of which *Balanus nauplii* (a barnacle) were the most common and abundant.

9.2.4.1.6 Fish

Potential freshwater fish habitat was investigated on and adjacent to the Whites Point quarry site. One intermittent watercourse flows through the proposed active quarry area. Two intermittent watercourses flow adjacent to the active quarry area at the north and south boundaries of the quarry property. These three watercourses were investigated (Brylinsky 2002) and it was determined that they are unlikely to contain suitable salmonid habitat. Subsequently, the Department of Fisheries and Oceans – Habitat Management Division investigated the watercourse which flows through the active quarry area and found it to be not suitable fish habitat – see Appendix 18. It should be noted that the north and south watercourses are included in the perimeter environmental preservation zone.

The intertidal and nearshore waters along the coast of the proposed quarry provide habitat for various species of fish. Demersal and pelagic finfish, shellfish and crustaceans inhabit these marine waters. Shellfish and crustaceans such as scallop and American lobster live within the benthic (bottom) community. Demersal fish such as flounder, cod, redfish etc. inhabit the lower portion of the water column and are closely associated with the benthic community. Pelagic fish such as herring, mackerel, salmon, shark etc. inhabit the middle and upper water column. Some species such as salmon are anadromous depending upon fresh and marine waters during their life cycle stages. Many of these species are commercially important and are discussed further in **paragraph 9.3.13.**

Sensitive species of marine fish at some level of risk as identified by COSEWIC and NSDNR, such as striped bass (*Morone saxatilis*) (Bay of Fundy population), Atlantic sturgeon (*Acipenser oxyrhynchus*), Atlantic cod (Maritimes population), and gaspereau (*Alosa pseudoharengus*), may possibly be present in offshore waters. A complete list of federal and provincial species at risk and the probability of their occurrence at or adjacent to the quarry and marine terminal are contained in **Table AE – 1,** Appendix 39. The inner Bay of Fundy salmon is designated as "endangered" by COSEWIC and SARA, the striped bass as "threatened" by COSEWIC; and the Atlantic cod as "special concern" by COSEWIC. Accordingly, these species will be treated as VECs and discussed in detail in **paragraph 9.2.5.6 .**

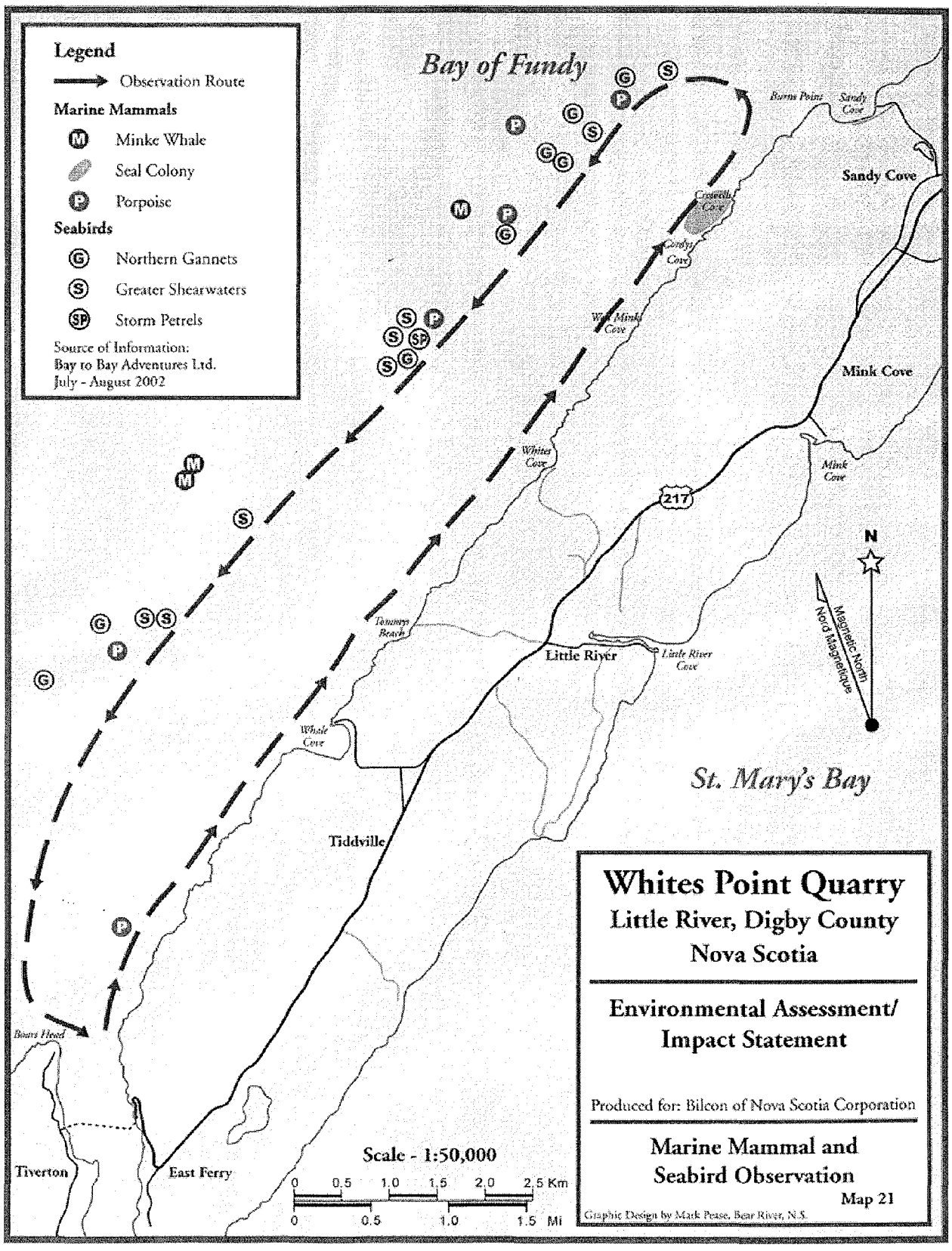
Contaminants in harvested marine organisms are discussed in **paragraph 9.3.19.**

9.2.4.1.7 Marine Mammals

Sixteen species of marine mammals (whales, dolphins, porpoises, and seals) are likely to be found in the Bay of Fundy (Beatty 1989, Ref. 100 . These include the endangered North Atlantic right whale and the blue whale (*Balaenoptera musculus*). Most whales are found in the lower Bay of Fundy, however, harbour porpoises (*Phocoena phocoena*) and seals are found in the uppermost reaches of the Bay. Generally, whales begin arriving in the Bay in late May and leave in October, with some staying into the winter. Harbour seals (*Phoca vitulina concolor*) and gray seals (*Halichoerus grypus*) are resident throughout the year. Following are the documented species of marine mammals and their occurrence in the Bay of Fundy (Beatty 1989).

Fin whale (*Balaenoptera physalus*)	Abundant (June – October)
Minke whale (*Balaenoptera acutorostrata*)	Common (June – October)
Humpback whale (*Megaptera novaeangliae*)	Common (June – October)
North Atlantic right whale	Abundant Locally (June – Sept.)
Harbour porpoise	Common
Atlantic white-sided dolphin (*Lagenorhynchus acutus*)	Common (June – October)
Pilot whale (*Globicephala melaena*)	Occasional
White-beaked dolphin (*Lagenorhynchus albirostris*)	Occasional
Harbour seal	Common (Resident)
Grey seal	Occasional
Blue whale	Extremely Rare
Sperm whale (*Physeter macrocephalus*)	Rare
Beluga whale (*Delphinapterus leucas)*	Extremely Rare
Killer whale (*Orcinus orca*)	Rare
Blue nose dolphin (*Tursiops truncates*)	Rare
Common dolphin (*Delphinus delphis*	Rare

Since there was little available information concerning the distribution of marine mammals and the summer distribution of waterbirds in the vicinity of the Whites Point Quarry, boat reconnaissances for these taxa were conducted during July and August of 2002 by Bay to Bay Adventures Ltd., an experienced, local whale and seabird tour business operating out of East Ferry, under contract to Bilcon of Nova Scotia Corporation. Weekly trips were made along the coast from Petite Passage to Sandy Cove, approximately 150 m (500 ft.) from shore, and a return trip approximately 1.9 km (1.2 mi.) from shore. Duration of the trips was approximately two hours depending on the weather and sea conditions. The observation route is shown on **Map 21.** From May to October 2003, weekly observations of the nearshore waters off Whites Point were made by David W. Kern, B.Sc. Some casual observations of marine mammals using coastal waters adjacent the Whites Point property were made during investigations of the terrestrial fauna in June


Legend
Observation Route
Marine Mammals
Minke Whale
Seal Colony
Porpoise
Seabirds
Northern Gannets
Greater Shearwaters
Storm Petrels
Source of Information:
Bay to Bay Adventures Ltd.
July - August 2002
Bay of Fundy
Burns Point
Sandy Cove
Sandy Cove
Crowells Cove
Cordys Cove
West Mink Cove
Mink Cove
Mink Cove
Whites Cove
217
N
Magnetic North
Nord Magnétique
Tommys Beach
Little River
Little River Cove
Whale Cove
St. Mary's Bay
Tiddville
Bears Head
Tiverton
East Ferry
Scale - 1:50,000
0 0.5 1.0 1.5 2.0 2.5 Km
0 0.5 1.0 1.5 Mi
Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/
Impact Statement
Produced for: Bilcon of Nova Scotia Corporation
Marine Mammal and
Seabird Observation
Map 21
Graphic Design by Mark Pease, Bear River, N.S.

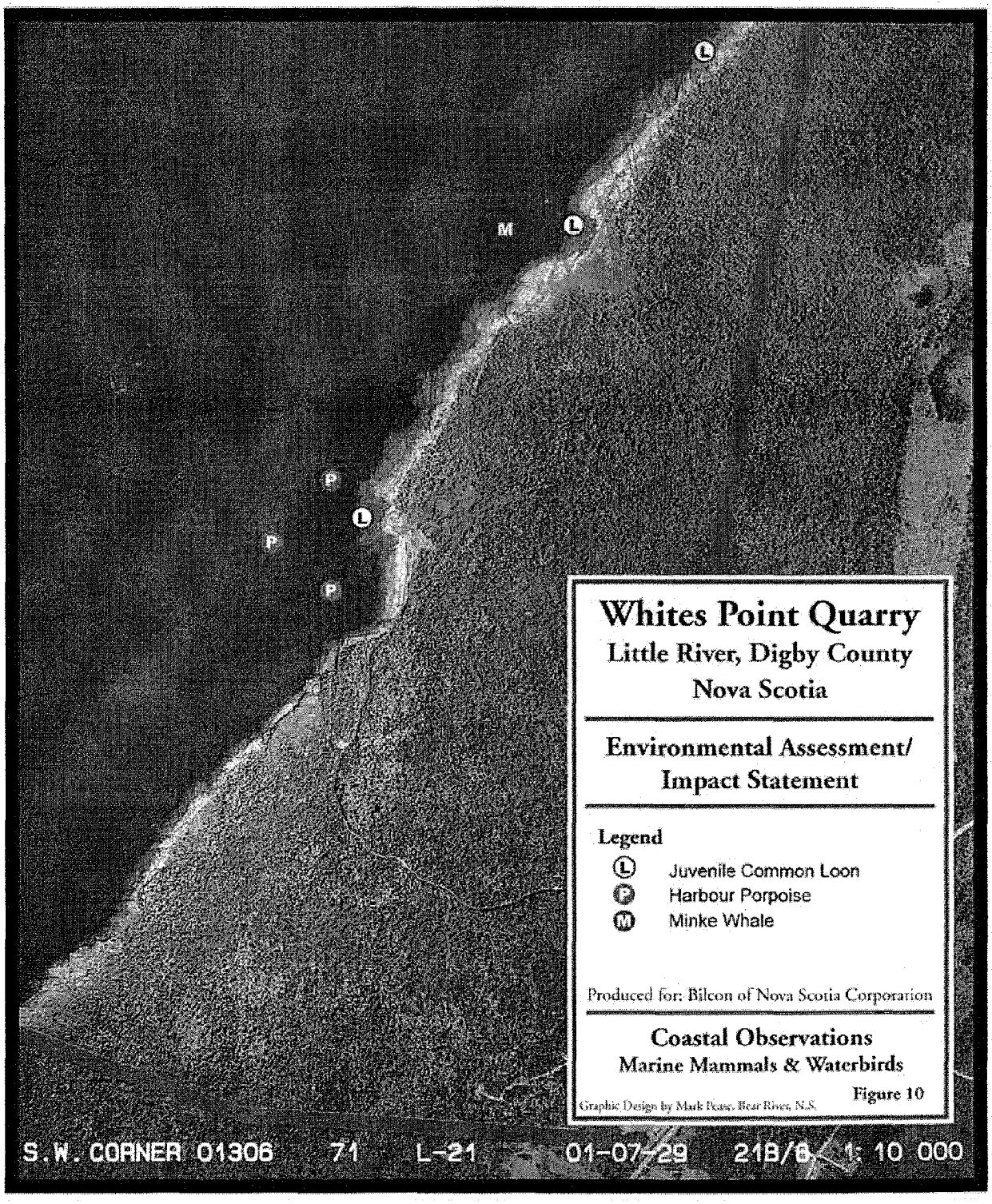
2002 and 2004 (see Alliston, 2004A; Alliston, 2004B). Following is a compilation of the species observed.

The locations where observations of marine mammals including whales, porpoises, and seals were recorded during the boat trips. Three minke whales were the only whales observed on the boat trips – one on July 6, and two on August 1. These whales were observed along the route 1.9 km (1.2 mi.) from shore. A single minke whale was observed approximately 250 m (800 ft.) from shore on June 21 2004 during terrestrial breeding bird surveys (Alliston, 2004b). No whales were observed by Mr. Kern during his weekly observations at Whites Point in 2003. The location of the sightings are shown on **Map 21.**

Groups of four to ten and an occasional lone harbour porpoise were observed during four of the nine boat trips. Occurrence of porpoises were generally along the route 1.9 km (1.2 mi.) off- shore in the area of Whale Cove and from West Mink Cove to Burns Point. A small group (2+) of harbour porpoises was observed just off Whites Point on June 22, 2002 during surveys of terrestrial fauna (Alliston, 2004a). Mr. Kern observed a single harbour porpoise feeding in Whites Cove on June 24 2003. A single harbour porpoise was observed off Whites Cove during harlequin duck surveys on February 9, 2005 (George Alliston- personal communication) The location of the sightings are shown on Figure 10. Lone and small groups of harbour seals and a colony of forty to sixty individuals were observed during every boat trip. Occurrence of seals was continuous along the immediate coast throughout the month of August and at the colony in the area of Crowells Cove. The location of the seal colony is shown on **Map 21.** It should be noted that no marine reptiles were observed during these trips.

Subsequent to the above observations, in a letter dated February 10, 2006 (Appendix 22), the Department of Fisheries and Oceans Environmental Assessment and Major Projects Division furnished comments on Bilcon of Nova Scotia Corporation's Whites Point Quarry and Marine Terminal Blasting Protocol. This letter included results from the Maritimes DFO sightings database for North Atlantic right, finback, humpback, and minke whales as well as harbour porpoises in the vicinity of Digby Neck (see Figure 3 of February 10, 2006 letter). Although not an accurate reflection of the relative density of whales and porpoises in this region, the patterns of occurrence generally reflect other research and whale watching effort in this area of the Bay of Fundy.

Sensitive species of marine mammals at some level of risk, as identified by SARA/ COSEWIC, such as the North Atlantic right whale, blue whale and fin whale, may possibly be present in nearshore waters and we know the harbour porpoise occurs there. A complete list of federal and provincial species at risk and the probability of their occurrence at or adjacent to the quarry and marine terminal are contained in **Table AE-1,** Appendix 39. The North Atlantic right whale and blue whale are designated as "endangered" by SARA/COSEWIC and the fin whale and harbour porpoise are designated as "special concern" by COSEWIC. Accordingly, these species of marine mammals will be treated as VECs and discussed in detail in **paragraphs 9.2.11 and 9.2.13.**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Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/
Impact Statement
Legend
L Juvenile Common Loon
P Harbour Porpoise
M Minke Whale
Produced for: Bilcon of Nova Scotia Corporation
Coastal Observations
Marine Mammals & Waterbirds
Figure 10
Graphic Design by Mark Pease, Bear River, N.S.
S.W. CORNER 01306 71 L-21 01-07-29 21B/6 1: 10 000

9.2.4.1.8 Waterbirds – Summer

Double-crested cormorants (*Phalacrocorax auritus*) were the most abundant bird observed during every boat trip conducted in the summer of 2002. Common eiders were observed during the July 11 trip, while black (*Melanitta nigra*) and white-winged (*Melanitta fusca*) scoters were observed during all of the August trips. Occurrence of these birds was continuous along the inshore transect with the exception of the cormorants which were also sighted on the "offshore" transect. Great blue herons (*Ardea herodius*) were also observed along the coast line during the majority of the trips. Northern gannets (*Morus bassanus*) and greater shearwaters (*Puffinus gravis*) were observed during most trips in July and early August along the "offshore" transect. Small groups of immature northern gannets were also recorded flying over and feeding in waters adjacent to the Whites Point property during terrestrial fauna surveys carried out in late June of 2002 and 2004.

Groups of five to fifteen greater shearwaters were observed actively feeding during the early August boat trips. A group of ten to fifteen were observed off Tommys Beach during the August 8 trip. Northern gannets were also observed diving during the early July trips and one large group of storm petrels was observed feeding off West Mink Cove during the August 8 trip. The location of the sightings of greater shearwaters, northern gannets and storm petrels are shown on **Map 21.**

A single immature (non-breeding) common loon (*Gavia immer*) was observed swimming and diving in the coastal waters adjacent the Whites Point property during terrestrial breeding bird surveys on 23 June 2002. Two immature common loons were observed during similar surveys conducted on 22 June 2004. The locations of these sightings are shown on Figure 10.

No waterbird nesting colonies were observed during the coastal boat surveys or during the terrestrial breeding bird surveys.

Of the waterbird species observed using coastal waters during summer, only the common loon is considered at risk by NS GSR (yellow). However, COSEWIC considers this species to be not at risk.

9.2.4.1.9 Waterbirds - Winter

On behalf of Bilcon of Nova Scotia Corporation, winter use of coastal waters by waterbirds in the Digby Neck area was investigated by W. George Alliston Ph.D. – see Alliston, W. George, "Use by Wintering Waterbirds of Digby Neck and Adjacent Coastal Waters of Southwestern Nova Scotia" 7 June 2005 (**Ref. Vol. I, Tab 3**). This study is based on a literature search, recent surveys conducted by NSDNR and CWS, and field observations.

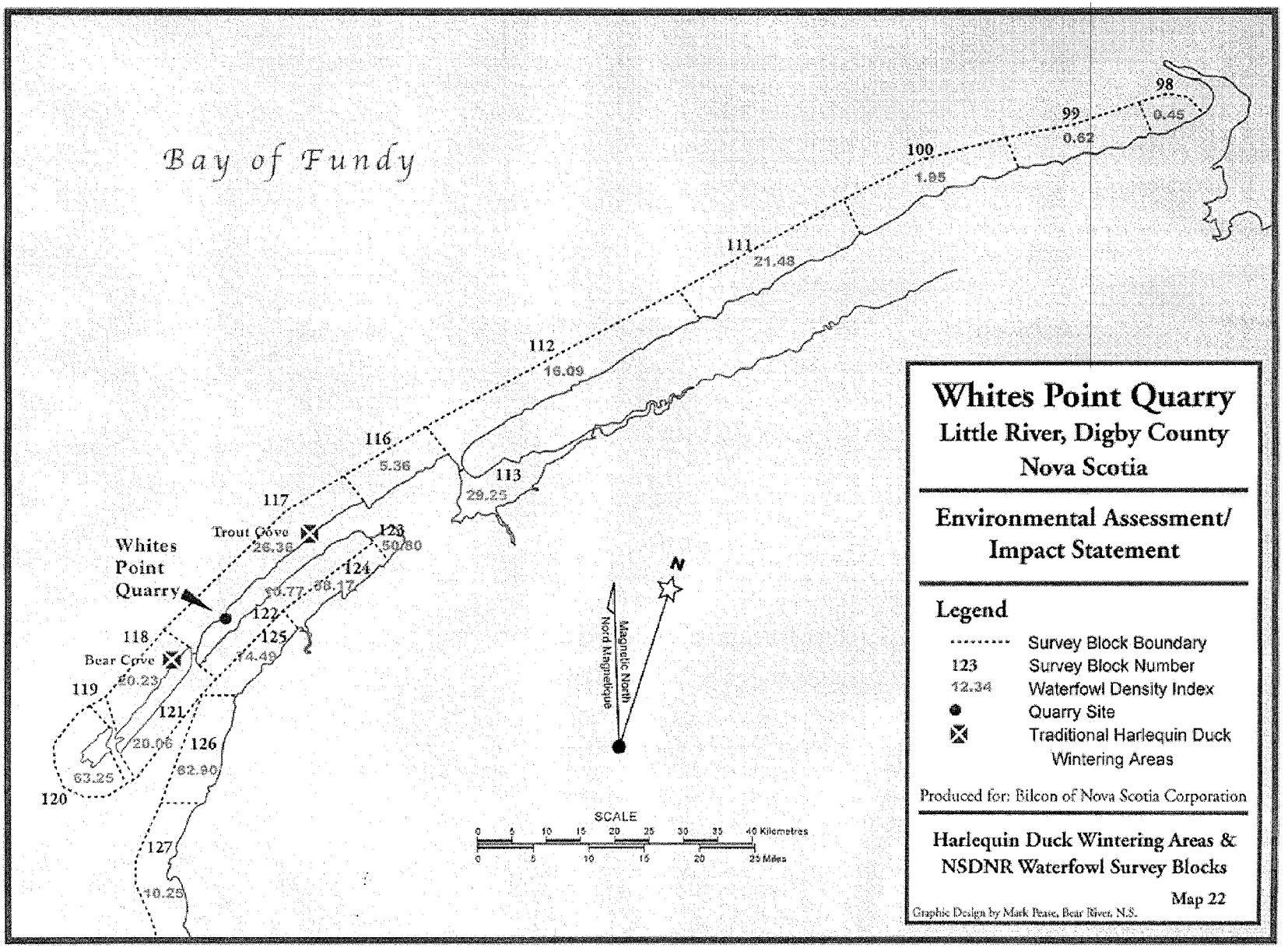
NSDNR helicopter surveys for wintering waterfowl were conducted annually, between mid January and mid February, from 1992 through 2000, along the entire coastline of Nova Scotia. Additional opportunistic surveys were conducted from fixed-wing aircraft. The surveys were broken up into blocks of varying lengths that adhered to a system previously established by CWS.

The block which contained the Whites Point property was designated as block 117 and extends a distance of 36 km (22 mi.) from Boars Head light, at the northern tip of Long Island, through the northern half of Petite Passage to Gullivers Head on Digby Neck, of which about 3 km (1.9 mi.) is the coastline of the Whites Point property. These surveys showed a great deal of variation year by year in the numbers of waterfowl using this block; from a high of 1853 in 1992 to a low of 123 in 1999 with an average of 606. Similar year by year variations were observed in other survey blocks. Although 9 species, and two species groups (scaups – *Aythya spp.* and goldeneyes – *Bucephala spp.*), were identified in block 117, by far the majority of waterfowl observed (84%) were common eiders. Moderate numbers of black ducks (4%), long-tailed ducks (*Clangula hyemalis*) (3%) and goldeneye species (3%) were recorded in this block.

By dividing the numbers of waterfowl observed in each survey block by the length of the block a "density index" (# waterfowl/km) can be obtained which permits a direct comparison among blocks of their use by waterfowl. The location and numbering system of these blocks, and the average waterfowl density index for the period 1992 to 2000, as obtained from the annual helicopter surveys, are shown for the southern Bay of Fundy – St Marys Bay areas on **Map 22.** The average density index for block 117 was 16.8 waterfowl/km (27.0 waterfowl/mi.). Other survey block density indices in the southern Bay of Fundy and Saint Marys Bay range from a low of 0.3 waterfowl/km (0.5 waterfowl/mi.) in the Scots Bay area to a high of 44.2 waterfowl/km (74.8 waterfowl/mi.) in block 125 which includes the coast of Saint Marys Bay between Weymouth Harbour and Church Point.

While aerial surveys are effective in censusing most waterfowl species, they are not particularly effective in censusing harlequin ducks, a species at risk. In 2000, CWS began an annual census of known harlequin duck wintering sites in the Maritimes, using both land based observations and observations made from boats. CWS surveys have identified harlequin duck wintering areas in the Bay of Fundy including portions of the coastline of Digby Neck, Long Island and Brier Island. Of the wintering areas that have been identified in this area, only in the areas surrounding Trout Cove, Digby Neck and Bear Cove, Long Island have harlequin ducks been found consistently and in good numbers. These two wintering areas are located approximately 12 km (7.5 mi.) north and south of the Whites Point property (see **Map 22**). Harlequins have also been observed in Deep Cove/Sandy Cove, Tommy's Beach and Whale Cove on Digby Neck, and at Peajack Cove and Western Light, Brier Island. Only small numbers have been observed at these latter sites and these sites are apparently not used consistently.

In the Digby Neck – Long Island area, known harlequin duck wintering areas were censused from land in 2000 and 2001. However, from 2002 onward, surveys were conducted by boat and extended from the Bear Cove area on Long Island to the Trout Cove area on Digby Neck thus including the coastline of the Whites Point property. In 2004 (February 24) and 2005 (February 9), George Alliston and Bernard Forsythe, on behalf of Bilcon of Nova Scotia Corporation, were guests of CWS biologist Andrew Boyne, on his winter boat surveys of this area.



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The populations of harlequin ducks wintering in the Maritimes appears to be increasing in recent years and this appears to hold true for that portion of the population wintering in the Digby Neck area. The highest number recorded during CWS surveys was in 2005 when 118 birds were recorded. The previous high count was 86 birds in 2003.

Harlequin ducks using the Digby Neck – Long Island areas are concentrated around their traditional wintering areas centered around Trout Cove, Digby Neck and Bear Cove, Brier Island. During four years of winter boat surveys, no harlequin ducks have been observed using the coastal waters adjacent the Whites Point property. Dr. Alliston and Bernard Forsythe conducted a land based survey of the coastal waters of the Whites Point property from Whites Cove to the north boundary of the property on February 7, 2005 and found no harlequin ducks.

Concerns were expressed by government agencies regarding the possible interaction of harlequin ducks with the Whites Point project if they moved between traditional wintering areas located approximately 12 km (7.5 mi.) on either side of Whites Point. In response to this concern, Bilcon of Nova Scotia Corporation contracted Dr. George Alliston to determine if there were frequent movements of harlequins between these two wintering areas. This study was carried out in the winter of 2005 (see Alliston, W. George, "Wintering Harlequin Ducks in the Digby Neck – Long Island Area, Digby County, Nova Scotia – 2005" 20 May 2005 **Ref. Vol I, Tab 2**). While this study was preliminary and relied on indirect methods, it strongly suggested that, after settling on their wintering grounds, there were no frequent movements of harlequins between these two traditional wintering areas. Indeed some of the information collected suggests that little exchange of birds occurred between these two sites over the entire winter.

During aerial surveys, common goldeneye (*Bucephala clangula*) (not at risk) and Barrow's goldeneye (*Bucephala icelandica*) (a species at risk) cannot be distinguished. These two species can generally be distinguished during boat surveys. Goldeneye species were commonly observed in moderate numbers during winter aerial surveys of block 117. The annual winter boat surveys for harlequin ducks cover more than 75% of block 117 and during the four surveys conducted between 2002 and 2005, no Barrow's goldeneye have been recorded (Andrew Boyne - personal communication). No Barrow's goldeneye were observed during a land based survey of the coastline of the Whites Point property from Whites Cove to the north boundary of the property on February 7, 2005.

Winter aerial surveys were designed to obtain information on waterfowl and provided little information on the distributions of other species of waterbirds (loons, grebes, alcids), so, unlike waterfowl, information to compare use of coastal waters by these species within the region, is not available. Participation in the CWS boat surveys of 2004 and 2005 provided an opportunity to collect information at the local level on the distribution of these species. During these boat surveys, in addition to 10 species of waterfowl, 7 other waterbird species were recorded (see **Table BB**).

Table BB. Waterbird[1] species recorded during CWS boat surveys of portions of Digby Neck and Long Island, Nova Scotia: 24 February 2004[2] and 9 February 2005[3].

DIGBY NECK

	Petite Passage [4]		Long Island		Grand Eddy Point to Whites Point Property		Whites Point Property		NE of Whites Point		Total Digby Neck		TOTAL	
Species	**2004**	**2005**	**2004**	**2005**	**2004**	**2005**	**2004**	**2005**	**2004**	**2005**	**2004**	**2005**	**2004**	**2005**
Common Loon	0	0	0	3	0	0	0	9	1	26	1	35	1	38
Red-necked Grebe	0	0	2	1	0	23	0	2	3	36	3	61	5	62
Great Cormorant	6	2	1	1	0	3	1	2	11	8	12	13	19	16
American Black Duck	0	0	0	2	0	10	0	0	2	2	2	12	2	14
Mallard	0	0	0	1	0	0	0	0	0	0	0	0	0	1
Common Eider	700	623	0	12	7	418	1	46	8	83	16	547	716	1,182
Harlequin Duck	0	0	48	49	0	2	0	0	17	67	17	69	65	118
Long-tailed Duck	0	0	21	5	12	73	0	24	39	141	51	238	72	243
Surf Scoter	0	0	0	0	0	0		4	30	40	30	44	30	44
White-winged Scoter	0	0	0	0	0	0	0	0	1	7	1	7	1	7
Common Goldeneye	0	0	0	12	0	51	2	12	0	0	2	63	2	75
Bufflehead	0	0	0	0	0	1	0	0	1	0	1	1	1	1
Red-breasted Merganser	0	2	2	0	0	17	0	0	3	26	3	43	5	45
Duck *sp.*	0	0	0	0	0	0	0	0	5	0	5	0	5	0
Purple Sandpiper	0	0	0	15	0	0	0	0	0	5	0	5	0	20
Common Murre	0	0	0	1	0	0	0	0	0	1	0	1	0	2
Murre *sp.*	0	2	0	0	0	2	0	1	1	6	1	9	1	11
Black Guillemot	0	0	6	5	0	7	0	2	1	23	1	32	7	37
Atlantic Puffin	0	0	0	0	0	0	0	1	0	1	0	2	0	2
Total	**706**	**629**	**80**	**107**	**19**	**607**	**4**	**103**	**123**	**472**	**146**	**1,182**	**932**	**1,918**
Length of coastline surveyed (km)			3.8	6.1	8.2	8.2	2.8	2.8	14.0	16.3	25.0	27.3		

[1] gulls not counted [2] sea state = Beaufort 4+ [3] sea state = Beaufort 0 [4] includes land-based observations

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Unlike wintering waterfowl that tend to be found in flocks, some of which can be quite large, other waterbird species found in these coastal waters tend to occur as individuals or in very small, loose groups. The only exception that was observed was red-necked grebes (*Podiceps grisegena*) which, when they were resting/sleeping, were sometimes found in tight flocks of up to 57 birds. These resting flocks were observed on several occasions but were only seen in the shelter of Sandy Cove and Whale Cove. Feeding red-necked grebes were distributed in a similar fashion to other non-waterfowl species. For only one of these waterbird species was a higher density recorded in the coastal waters off the Whites Point property than in other locations covered by the boat survey. That species was the common loon, a species at risk. During the February 9, 2005 boat survey, densities of common loons in the coastal waters of Digby Neck to the south of the Whites Point property were 0.0/km and to the north 1.6/km but at the property were 3.2/km.

A February 7, 2005 land based survey of the coastal waters of the Whites Point property from Whites Cove to the northern property boundary resulted in 13 species of waterbirds being identified and a total count of 672 waterbirds, 601 (89.4%) of which were waterfowl, and of these waterfowl, 467 (69.5%) were common eiders (see **Table CC**). In addition to waterfowl, significant numbers of common loons, red-necked grebes and black guillemots (*Cepphus grille*) were found using these coastal waters. Although not observed during the land-based survey, two days later, during the CWS boat survey, a single Atlantic puffin (*Fratercula arctica*) was recorded in the waters off the northern boundary of the Whites Point property.

Table CC: Numbers* of Waterbirds Observed During a Land Based Survey of the Coastal Waters of the Whites Point Property (from Whites Cove to NE Boundary on 7 February, 2005

Species	Numbers
Common Loon	14
Red-necked Grebe	32
Great Cormorant	6
American Black Duck	12
Common Eider	467
Long-tailed Duck	68
Black Scoter	4
Surf Scoter	23
White-winged Scoter	20
Bufflehead	4
Red-breasted Merganser	3
Thick-billed Murre	1
Black Guillemot	18
TOTAL	**672**

* These numbers include only birds observed swimming/diving in coastal waters. Birds observed flying past but not landing are not included. Gulls were not counted.

9.2.4.1.10 Waterbird Migration

The shores of the inner Bay of Fundy, particularly Shepody Bay, New Brunswick and Southern Bight, Minas Basin, Nova Scotia are vital staging areas for migrating shorebirds. Most notably, this area is used in autumn by between 40 and 75% of the world population (estimated wintering population of 2 to 2.5 million) of semipalmated sandpipers (*Calidris pusilla*) (Hicklin, 1987). These birds arrive in the Bay of Fundy from their arctic breeding grounds starting in mid-July. Here they feed, often doubling their weight during their two to three week stay. These fat reserves are required for their >3200 km (>2000 mi.) non-stop flight from the Bay of Fundy to South America. Flocks of as large as 350,000 birds have been recorded in Shepody Bay. Based on the fact that these areas support the largest numbers of mixed species shorebirds during fall migration in all of North America, they have been designated a Western Hemisphere Shorebird Reserve.

In the southern portion of the outer Bay of Fundy, Brier Island and the marine areas surrounding the island are staging areas for several waterbird species. Part of the coast of Brier Island provides a staging area for shorebirds (mainly semipalmated sandpipers) with peak daily numbers reaching 2000 to 3000 birds in July and August and 1000 birds in September. Atlantic brant (*Branta bernicla*) are also known to stage at Brier Island with daily numbers peaking at 4000 in March (Laviolette, 2003, Ref 132). From late July through September red phalaropes (*Phalaropus fulicaria*) and red-necked phalaropes (*Phalaropus lobatus*) gather in the waters surrounding Brier Island to feed on the copepod *Calanus finmarchicus* prior to dispersing to their wintering grounds in the offshore waters off Africa. Daily peaks of as many as 100,000 birds have been recorded (Laviolette, 2003).

Between 1994 to 2000, NSDNR conducted several opportunistic fixed-wing aircraft surveys for waterfowl in the coastal waters of Nova Scotia, including the Bay of Fundy and Saint Marys Bay, during the period between late March and late May; an interval that covers the peak spring migration period for most waterfowl (see Alliston 2005a). Six surveys of block 117, a 36 km (22 mi.) section of the coast which includes the 3 km (1.9 mi.) shoreline of the Whites Point property, were flown. The only waterfowl species recorded in block 117 was the common eider. During these surveys 30 birds were recorded on two surveys, 3 birds on one survey and no birds were recorded on three surveys.

The only location on the southern Bay of Fundy coast where significant numbers of waterfowl were recorded during spring aerial surveys was on block 100 which extends from Margaretsville to Black Rock. During a survey on May 16, 2000, 1186 scoters (1120 of which were black scoters) and 1151 common eiders were recorded in this block. Moderate numbers of common eiders (max. 173 on March 24, 1994) and Atlantic brant (max. 550 on April 26, 1994) were regularly recorded in the coastal waters of Brier Island.

Relatively little is known of the actual routes taken by waterbirds migrating through the outer Bay of Fundy. Routes could be coastal or offshore. For those birds using coastal routes to travel to and from their southern wintering grounds, it would seem more likely thatmost would travel along the north coast of the Bay, via the coasts of Maine and New Brunswick. Falardeau et al. (1998, Ref. 216) reports "thousands" of spring migrant surf scoters (*Melanitta perspicillata*) following this route. While this appears to also be the case for much of that portion of the Atlantic brant population that uses the coastal migration route (Erskine, 1988), those birds that stage at Brier Island may follow coastal migration routes along the southern Bay of Fundy. It seems likely that some other waterfowl species, as well as loons and grebes might also use such routes.

Common loons are diurnal migrants that follow migration paths that sometimes are just offshore following coastlines although they also follow offshore and overland routes. When migrating over water common loons fly at heights of e"15 m (50 ft.) (Sibley, 1993, Ref. 224).

Red-necked grebes are known to have extensive diurnal migratory movements along coastlines but overland movements are strictly nocturnal. During over water migratory flights observed at the Whitefish Bird Observatory, MI, most red-necked grebes flew at heights of from 0.5 to 50 m (1.5 to 165 ft.) above water and generally remained at least 750 m (0.5 mi.) offshore (Stout and Nuechterlein, 1999, Ref. 225).

In Alaska, migrant black scoters fly low (<100 m – 330 ft.) over marine waters and usually > 1 km (0.6 mi.) from shore (Herter et al. 1999, Ref. 218).

Barrow's goldeneye pairs, on the other hand, are believed to migrate alone and at night in a somewhat direct line from wintering to breeding areas (Savard, 1985, Ref. 223. Harlequin ducks are believed to take direct routes between wintering and breeding areas but may stage in coastal areas (Robertson and Goudie, 1999, Ref. 221).

9.2.4.1.11 Waterbird Species at Risk

Sensitive species of waterfowl at some level of risk such as the Atlantic brant, harlequin duck and Barrow's goldeneye are known to be present as regular, seasonal visitors in the region of the Whites Point property. Another waterbird species at risk, the common loon, is known to use the nearshore waters adjacent to the Whites Point property. A single sighting of another bird species at risk, the Atlantic puffin, was made in the waters off the Whites Point property. A complete list of federal and provincial waterbird species at risk and the probability of their occurrence at or adjacent to the quarry and marine terminal are contained in Table AE-1, Appendix 39.

The eastern population of the harlequin duck is designated as of "special concern" by SARA/COSEWIC, as "endangered" under NSESA and "red" under the NS GSR. The eastern population of Barrow's goldeneye is designated of "special concern" by SARA/ COSEWIC and "yellow" under the NS GSR. Accordingly, these two species will be treated as VECs and discussed in detail in **paragraph 9.2.7**. The Atlantic puffin, common loon and Atlantic brant are designated as colour rank "yellow" under the NS GSR but are not designated as being at risk by SARA/COSEWIC. These latter species are discussed below.

Atlantic Brant

The Atlantic brant nests in the Canadian low arctic near Foxe Basin and winters along the Atlantic coast from Massachusetts to North Carolina (Reed *et al*, 1998). The spring and autumn migrations take many of these birds through the Bay of Fundy (Lincoln *et al.*, 1998; Erskine, 1988). Although most of these birds follow the north coast of the Bay of Fundy, some make regular stopovers at Brier Island during their migrations. The main spring migration occurs in March when daily counts at Brier Island can reach 4000 birds (Laviolette, 2003). The peak of autumn migration occurs in early November. In recent years small numbers have wintered at Brier Island (Tufts, 1986).

Brier Island was the only location where observations were made of Atlantic brant during winter and spring aerial surveys conducted between 1992 and 2000 by NSDNR of the coasts of the southern Bay of Fundy and St Marys Bay. While these birds may fly past the Whites Point property during migration, there is no indication that they would stage in this area. Their preferred food is eelgrass (*Zostera sp.*) which does not occur in the coastal waters adjacent to this property.

Common Loon

The Province of Nova Scotia has assigned the common loon a colour rank "yellow" based mainly on the fact that the Nova Scotia breeding population appears to have a lower reproductive rate than breeding populations in other parts of eastern Canada (Kerkes, 1992). COSEWIC considers this species as "not at risk" in Canada.

There are only two lakes on Digby Neck that are large enough to provide breeding habitat for common loons; Harris Lake and Lake Midway. Harris Lake is the closer being approximately 7 km (4.5 mi.) from the Whites Point property and nesting there by common loons has been confirmed.

Very small numbers of immature, nonbreeding common loons (one in 2002; two in 2004) were observed using the coastal waters of the Whites Point property during summer. Larger numbers of wintering common loons (14 birds on February 7, 2005) were found using the coastal waters of the property between Whites Cove and the northern boundary of the property. During the CWS boat survey of February 9, 2005 from Bear Cove, Long Island to Trout Cove, Digby Neck, the highest density index (3.2/km) recorded for common loons was in the coastal waters of the Whites Point property.

Common loons are migratory and in Nova Scotia there are "definite migrations along the coast: north largely between mid-March and late April, and south between mid-September and late November" (Tufts, 1986). Since there is a general southward migration of common loons during autumn, the common loons wintering along the coasts of Nova Scotia, including the Whites Point property, are likely to be from populations that breed in more northerly areas and not from the Nova Scotia breeding population that is considered at risk. Immature common loons may remain on their wintering grounds throughout the year (Viet and Petersen,1993) so immature birds using the coastline during summer are also unlikely to be from the Nova Scotia breeding population.

Although densities of wintering common loons observed along the coast of the Whites Point property in February 2005 were higher than in adjacent areas, since common loons do not tend to aggregate in flocks but are generally widely distributed, the actual numbers that might be exposed to project activities are not large. Fourteen common loons were counted during the survey that was conducted on February 7, 2005, under perfect viewing conditions, of the Whites Point property coastline from Whites Cove to the north boundary.

Like many waterbird species, common loons have a "catastrophic" moult during which they simultaneously lose their flight feathers and become flightless for about a month. Unlike most waterbird species, adult common loons moult during winter (January to March) (McIntyre, 1988; Woolfenden, 1972). Immature common loons moult during spring and summer. Moulting common loons are less mobile and hence more vulnerable during this period.

Atlantic Puffin

Worldwide, the Atlantic puffin is a relatively common species with an estimated 6 million pairs breeding in colonies from northwest Russia to eastern North America (Chardine, 1999; Nettleship and Evans, 1985). It is because of the small number and size of these breeding colonies on islands off the Nova Scotia coast, at the southern periphery of their range, and their vulnerability, while concentrated at their breeding colonies, to accidents (e.g. oil spills), disturbance and predation, that the Province of Nova Scotia has assigned this species a colour rank "yellow".

There are no Atlantic puffin colonies in the southern Bay of Fundy - Saint Marys Bay area. The six colonies in Nova Scotia are on islands off the coast of Cape Breton and the South Shore. There are also several small colonies in the Gulf of Maine.
While gregarious during the breeding season, outside the breeding season Atlantic puffins are widely distributed in "ones and twos" generally far offshore in the North Atlantic. The two winter observations of Atlantic puffins made in the vicinity of the Whites Point property constitute uncommon occurrences of a species that is widely distributed in winter and, in general, shows a marked preference for offshore wintering areas.

9.2.4.1.12 Other Waterbirds

Red-necked grebes and black guillemots are two species that were observed in significant numbers in the coastal waters adjacent to the Whites Point property during the land based survey conducted on February 7, 2005 (see **Table CC**). Relatively low numbers of these species were recorded in the same area two days later during a boat survey (see **Table BB**). Although neither of these species is identified on the four priority lists used in the identification of species at risk for this EIS, both are identified as being at risk in Nova Scotia by ACCDC.

9.2.4.1.13 Invasive Species

Invasive species lists such as the Global Invasive Species Database for Canada include the European green crab, Common periwinkle, and Zebra mussel (Dreissena polymorpha) as invasive species inhabiting marine environments. Also, Invasive species.gov lists the European green crab and the Zebra mussel. As previously mentioned, the European green crab and common periwinkle were observed in the intertidal zone at the Whites Point quarry site. In view of the lack of baseline data specific to the marine waters at Whites Point regarding phytoplankton and zooplankton, Bilcon of Nova Scotia Corporation surveyed nearshore waters for these marine organisms (Brylinsky 2005 **Ref. Vol. II, Tab 11**). The results of the phytoplankton and zooplankton survey are included in Appendix 44.

9.2.4.2 Analyses

Potential impacts of the Whites Point Quarry and Marine Terminal on nearshore areas of the Outer Bay of Fundy will be confined to areas immediately adjacent to the Whites Point property. The primary direct disturbance of coastal – nearshore marine habitat would occur in the area of the proposed marine terminal– see **Figures 2 and 3**. Secondary direct disturbances within the nearshore waters would result from vessel arrivals, loading, and departure which is scheduled for approximately once per week throughout the year with a twenty-four hour length of stay. An 800 m radius (one half mile) seaward from the marine terminal berth would be required by the vessel as a turning radius during arrival and departure as it manoeuvres to and from the berth, depending on weather and tidal conditions. In addition to these direct disturbances, land based activities and the noise produced by construction, quarry operations and, particularly, blasting, could also affect fauna using adjacent nearshore areas. These issues are addressed in the sections that follow. Blasting is treated separately from other potential impacts (see below). The potential impacts on nearshore marine areas of runoff from the site has been addressed in a previous section (see Surface Water Drainage, **paragraph 9.1.6**).

9.2.4.2.1 Benthic Community

The bottom conditions off Whites Point in the area of the proposed marine terminal provide good habitat for American lobster which generally occur from 1 m (3.3 ft.) below low tide – seaward. Bottom samples and underwater video of this area also revealed the presence of sea cucumbers, sea urchins, starfish, and crabs, all food sources for lobster. Pelagic fish such as herring are also present in the nearshore shallow waters (less than 10 m – 33 ft.) and off shore to depths of 200 m (660 ft.).

There appears to be little or no infauna (animals that burrow into sediments) present as a result of the instability of the sediment surface and the strong erosional processes as evidenced by the 2002 bottom grab samples. This is common in high energy environments where waves and water currents are strong enough to create an unstable bottom substrate which prevents the deposition and accumulation of fine sediments. Further, analysis of the 2005 bottom sediment samples also produced few living organisms.

9.2.4.2.2 Plankton

The nearshore area of the proposed Whites Point Quarry and Marine Terminal falls within the outer Bay of Fundy and contains a distinct plankton community. Early studies of this region of the Bay over the past 60 years have reported results similar to the research cited previously (Brylinsky 2005 **Ref. Vol. II, Tab 11**). The zooplankton community along the Digby Neck shoreline is dominated by species that are common to the southwest Nova Scotia shoreline, such as *Acartia sp., Calanus finmarchicus, Oithona sp., Pseudocalanus sp., and Temora lonicornis*. This region also tends to have higher concentrations of zooplankton than the central Gulf area as a result of upwelling systems that bring in nutrient rich waters. This is reflected in this research by the high chlorophyll *a* concentrations observed during the spring survey and the relatively high zooplankton numbers observed.

Populations of euphausiids, a major food item of whales, are common within the Bay of Fundy, but are typically located in areas where water depths range between 125 – 200 m (410 – 660 ft.). Euphausiids are not commonly found in large numbers along the southwest Nova Scotia shelf, however there have been reports of populations present during the summer off Brier Island. No euphausiid species were observed in this survey and it is unlikely that they would be abundant or common to the Whites Point area because of the shallow water depth.

A number of potentially harmful algal species are common in the Bay of Fundy and were observed during this survey. The most common species are the dinoflagellate *Alexandrium sp.* and the diatom *Pseudo-nitzschia sp. Alexandrium sp.* produces a Paralytic Shellfish Poisoning (PSP) toxin. *Mesodinium rubren* is another dinoflagellate observed in this survey which can produce red tides that result in a depletion of dissolved oxygen in areas where tidal mixing is weak and flushing rates low. Red tides have occurred in Passamaquoddy Bay and resulted in mortality of cage-reared salmon.

In conclusion, the phytoplankton and zooplankton community along the Whites Point shoreline is typical of the region. In terms of species composition and abundance, numbers are similar to other surveys. Based on comparisons with the results of other plankton surveys, there does not appear to be any unique characteristics associated with the plankton community along this shoreline (Brylinsky 2005).

9.2.4.2.3 Fish

A direct loss of bottom fish habitat and alteration of water column habitat will result from the placement of pipe piles in nearshore waters. This loss and alteration of fish habitat will be compensated for with an area of bottom habitat three times the size of the area lost and with features attached to selected pipe piles in various depths in the water column to enhance food sources for pelagic fish. For a detailed discussion of the compensation plan see **paragraph 9.2.4.3** and Appendix 17. Potential effects of shading on the euphotic zone resulting from the mooring dolphins was discussed with the Department of Fisheries and Oceans – Habitat Management Division and deemed not to be a concern.

9.2.4.2.4 Marine Mammals

The most frequent species of marine mammals observed during coastline whale and waterbird boat trips conducted in the immediate area of the proposed marine terminal during July and August, 2002, were lone and small groups of harbour seals. However, a seal colony of 40 to 60 individuals was observed in the area of Crowells Cove, approximately 3 km (2 mi.) north of Whites Point.

Although during Bilcon of Nova Scotia Corporation's studies, the only whales observed along the coastline were minke whales (four sightings), historic records indicate that North Atlantic right whales have strayed toward the Digby Neck coast. Satellite – monitored movements of a North Atlantic right whale adult female with calf were recorded in the nearshore waters off west Sandy Cove (Mate, et al 1992, Ref. 71). Harbour porpoises were regularly observed in the inshore waters during summer boat reconnaissances between East Ferry and Sandy Cove. On three occasions harbour porpoises were recorded at Whites Cove; twice in summer by land based observers and once during a winter boat survey of harlequin ducks

9.2.4.2.5 Waterbirds

During the summers of 2002 and 2004 relatively few waterbirds were recorded using the coastal waters of the Whites Point property and adjacent areas. Marine bird species that breed at these latitudes are generally colonial and often nest on islands, cliffs or in talus slopes and are concentrated in the vicinity of these nesting areas. With the possible exception of some small cormorant and gull colonies, there are no colonies of marine birds in the vicinity of the Whites Point property.

Birds that use these coastal waters in summer are generally non-breeding, immature birds, post-breeding birds, or breeding birds whose nesting attempts have failed. One immature common loon in 2002 and two in 2004 were observed in the coastal waters adjacent to the Whites Point property. Small groups of immature northern gannets were also observed there. Small flocks (max. 52 birds) of common eiders were observed using the coastal waters between East Ferry and Sandy Cove, including the Whites Point property. Two pelagic seabird species/species groups were recorded during the nearshore summer boat reconnaissances; storm petrels and greater shearwaters. Both are common in offshore waters of the Bay of Fundy during summer months but are not common in nearshore areas.

In winter greater numbers of waterbirds use the coastal waters of the Whites Point property and adjacent areas than in the summer. During boat surveys conducted in February 2004 and 2005 a total of 17 species of wintering waterbirds was observed using the coastal waters of the Bay of Fundy between Bear Cove, Long Island and Trout Cove, Digby Neck (see **Table BB**). Ten of these species were waterfowl. Of the 1918 waterbirds counted on the 2005 survey (when survey conditions were optimal) 1730 (90%) were waterfowl and of these 1182 (68%) were common eiders. Of the common eiders, 623 (53%) were in Petite Passage.

From aerial surveys of wintering waterfowl conducted by NSDNR between 1992 and 2000 we know that there can be considerable annual variation in the numbers of waterfowl using various portions of the coastline of the southern Bay of Fundy and Saint Marys Bay. Despite these annual variations, it was evident that some areas are favoured over others (see **Map 22**) In relation to other coastal areas in this region, waterfowl survey block 117, in which the Whites Point property is located, would rank as having moderate significance, which may be influenced by high concentrations of common eiders that regularly occur in Petite Passage. All of Saint Mary's Bay and Petite Passage are considered significant habitat for migratory waterfowl by the NSDNR (see Significant Species and Habitat database). Other than Petite Passage, survey block 117 is not identified on this database as containing significant migratory waterfowl habitat. However, within block 117, in the area surrounding Trout Cove, and in block 118 in the area surrounding Bear Cove, are important wintering areas for harlequin ducks; a species at risk.

For waterbird species, other than waterfowl, that winter along the coasts of southwestern Nova Scotia (e.g. loons, grebes, alcids), information similar to that for waterfowl is not available, so favoured areas within a regional context, and annual and within-year variations in usage of different sections of coastline are unknown . The winter boat survey of February 9, 2005, which was conducted under exceptionally favourable weather conditions, provides a good "snapshot" of the distribution of these "non-waterfowl" waterbirds between Bear Cove, Long Island and Trout Cove, Digby Neck (see **Table BB**). Similarly, the land-based survey of February 7, 2005, also conducted under exceptionally favourable weather conditions, provides a good "snapshot" of the usage of the coastal waters of the Whites Point property between Whites Cove and the north boundary of the property by all waterbird species (see **Table CC**).

The coast of the Whites Point property does not have appropriate habitat for staging shorebirds and spring aerial surveys conducted between 1992 and 2000 revealed a general lack of waterfowl in the 36 km (22 mi.) block of coastline that contains the Whites Point property. It would seem quite unlikely that the property coastline would serve as a staging area for other waterbird species but this is not known.

Some migratory waterbirds may follow coastal routes that take them past the Whites Point quarry and terminal. The terminal and loading facility might pose a hazard to coastal migrants under poor visibility conditions. The probability of collisions would be maximum when a bulk carrier was docked, thus presenting the maximum surface area at right angles to the birds direction of travel. Although this presents a hypothetical risk, we are unaware of similar situations where bird collisions have been identified as being a problem.

Waterbirds following coastal migration routes are likely to be using mainly visual cues to determine their migration paths. Unlike land birds migrating over water, waterbirds are able to land on the water if visibility becomes poor. Observations of coastal migrants in other areas suggest that many species migrate by day and follow paths over water that are some distance from shoreline .

The eastern populations of both the Harlequin duck and Barrow's goldeneye are designated as "special concern" by SARA/COSEWIC and have been recorded in the region of the proposed Whites Point Quarry. Accordingly, these species will be treated as VECs and discussed in **paragraph 9.2.7 .**

Other waterbird species considered to be at risk (yellow) by the Province of Nova Scotia and known to occur within the region include the common loon, Atlantic brant, and Atlantic puffin. Of these three species, only the common loon is a regular inhabitant of the nearshore waters of the Whites Point property.

Common Loon

As discussed above, small numbers of immature common loons (1 in 2002; 2 in 2004) were observed using the coastal waters adjacent the Whites Point property in summer. Larger numbers (14 in 2005) of wintering birds were observed using these same waters. Since common loons are migratory, and immature loons may remain year round on their wintering grounds, the common loons that use the coastal waters of the Whites Point property in summer and winter are unlikely to be from the Nova Scotia breeding population that is considered at risk.

Common loons, as well as other waterbird species using these coastal waters, are likely to be excluded from nearshore areas immediately adjacent to where human activity and noise is being generated. Flightless, moulting birds are more vulnerable and tend to be more sensitive to disturbance. Moulting common loons tend to seek out protected areas with a reliable supply of food (fish).

It is not known whether wintering adult common loons remain along the rather exposed coastline of the Whites Point property or move to more sheltered bays during their moult.

The marine environment, particularly in the nearshore area, is a naturally noisy environment. Given the restrictions on noise levels at the property boundaries (65 dBA during the day and 55 dBA at night) the distance from the property boundary at which normal operations based noise is masked by background noise, under most circumstances, would not be great. Most animals also acclimate to some level of disturbance (noise & visual) once they learn that the disturbance does not pose a direct threat. All wintering waterbirds using the coastal waters of Digby Neck must have developed some degree of acclimation to disturbance given the level of boat activity associated with the lobster fishing season in these waters (December to May). Boats operating in the waters the birds are using would likely be perceived as a greater threat than land-based activities generating disturbances of a similar nature and magnitude.

9.2.4.3 Mitigation

The proposed construction system for the marine terminal, including the ship loader and conveyor supports, is designed to have minimal effect on the nearshore bottom habitat and water column see **Figures 2 and 3.** The marine terminal infrastructure will be supported on pipe piles anchored to the bedrock bottom. Construction in the nearshore waters below low tide will require drilling sockets and anchor holes for the pipe piles supporting the berthing dolphins, ship loader, and conveyors. Proposed pipe piles, pending detailed design, are thirty-six inch diameter resulting in a permanent displacement of sublittoral nearshore bottom habitat of 31.2 m^2 (336 ft^2) or 0.003 ha (0.008 acres) resulting in a harmful alteration, disruption or destruction (HADD) of fish habitat and will require a *Fisheries Act Subsection 35(2) Authorization.* A "Fish Habitat Compensation Plan" – see Appendix 17 - to balance this loss has been approved in principle by the Department of Fisheries and Oceans – Habitat Management Division.

Construction will be carried out from a floating platform. Socket drilling will produce aggregate size material with little fines. Anchor drilling will be carried out within the pile casing thus confining any fines. Since construction will be carried out in basalt bedrock, and no bottom sediments are present, water quality in the nearshore should experience negligible alteration with this construction process. The use of this construction technique will maintain virtually unobstructed shoreline and nearshore currents.

Although more expensive than other construction techniques, no long term loss of bottom habitat is anticipated that cannot be compensated. As part of the Compensation Plan, selected pipe piles will have increased surface area of vertical habitat in the water column to attract food sources for pelagic fish. No dredging, filling, or blasting in the coastal – nearshore waters is proposed.

Intermittent (weekly) surface water disturbance can be expected within an 800 m (0.5 mi.) radius of the marine terminal when the vessel arrives, loads, and departs. During the months of January and February vessel traffic will be reduced, possibly to zero, depending upon weather conditions. No other disturbances are proposed within the coastal marine environment along the shoreline of the property.

Ship/marine mammal and waterbird interactions within this 800 m (0.5 mi.) radius are unlikely due to the slow movement of the vessel while manoeuvring into and out of the berth. The overall duration is expected to be less than 24 hours from arrival to departure. In any event, an onshore observer, situated on the elevated ship loader, will be in place at least one hour prior to the vessel arriving and departing. The observer will wear polarized sunglasses, be equipped with pedestal mounted 7 x 50 binoculars and radio communication with the vessel captain. If marine mammals or waterbirds are sighted, communications regarding their location will be transmitted to the captain of the vessel. In the event the vessel arrives or departs at night or in times of low visibility, the work boat will be used for on water surveys of the vessel's route.

By meeting the stipulated noise requirements at the coastal property boundaries (65 dBA during the day and 55 dBA at night) the noise from land-based activities should not penetrate far into the often noisy nearshore marine environment. Animals that could potentially be affected are those that use habitats closest to shore which would be waterbirds, pinnipeds and one cetacean, the harbour porpoise. Animals often acclimate to some level of acoustic and visual disturbance once they learn that it does not constitute a direct threat.

The tallest structure proposed for the Whites Point Quarry and Marine Terminal is the ship loader, which extends to a maximum height of 30 m (100 ft.) above the ordinary high water line. Lighting on the ship loader would only be used when loading a ship at night and will be shaded so that light is directed downward. At most, loading would occur once a week. When not being used, the ship loader would not be lighted. These measures should minimize any possible attraction of coastal migrant waterbirds to the marine terminal facilities.

9.2.4.4 Monitoring

During construction of the marine terminal, especially when sockets are being drilled for the pipe piles, visual monitoring of possible turbidity will be undertaken. If excessive change occurs in the turbidity levels 100 m (330 ft.) from the construction site that differs from existing conditions (i.e. distinct colour differences) as a result of the drilling activities, the work will be stopped and turbidity levels will be assessed in relation to marine aquatic life guidelines. Assessment of turbidity levels would be conducted 100 m (330 ft.) from the construction site using a turbidity meter giving nephelometric turbidity units (NTUs).

A moored datalogger would be installed if required. A maximum allowable increase of 8 NTUs from background levels under clear flow conditions for a short-term exposure (e.g. 24-h period) would be considered to be within acceptable guideline criteria. The Department of Fisheries and Oceans representative will be notified to determine if additional mitigation measures are required if the guideline criteria is exceeded.

Due to the public and fishing industry concerns expressed regarding invasive species in the marine environment, especially as a result of ballast water discharge at the Whites Point Marine Terminal, Bilcon of Nova Scotia Corporation will conduct monitoring at the Marine terminal to document any changes from baseline conditions. Monitoring of phytoplankton and zooplankton in waters adjacent to the marine terminal will be conducted to provide an early detection of possible invasive species. For a detailed discussion of ballast water refer to **paragraph 9.2.1.4.**

Monitoring of the effectiveness of the proposed fish habitat compensation plan will also be carried out by Bilcon of Nova Scotia Corporation. Details of this monitoring program will be determined in consultation with DFO.

9.2.4.5 Impact Statements

Coastal – Nearshore Marine Habitat – Construction

Since construction in nearshore marine waters for berthing, ship loader, and conveyor supports is expected to take one year and will be conducted during periods of low biological activity, this would result in a ***short term, insignificant negative effect, of local scale.***

Coastal – Nearshore Marine Habitat – Life of Project

Since the only disturbance in the coastal – nearshore marine habitat along the entire shoreline is berthing, ship loader, and conveyor supports anchored to the bottom and loss or alteration of marine habitat is compensated, this would result in a ***long term, neutral (no) effect, of local scale.***

Marine Mammals and Waterbirds

Given the frequency (weekly), duration (24 hours), and the slow speed of the vessel within 800 m (0.5 mi.) of the marine terminal, together with the proposed visual monitoring during arrival and departure, marine mammal, or waterbird/vessel direct interactions are not anticipated. However, disturbance due to land based activities, ship loading (noise) and vessel manoeuvring could result in temporary or longer term displacement of animals from part of their home range resulting in a ***long term, insignificant negative effect, of local scale.***

9.2.5 Fish – Endangered

Introduction

Two different population assemblages of anadromous Atlantic salmon are present in the Bay of Fundy. The "outer Bay of Fundy salmon" and the "inner Bay of Fundy salmon" (iBoF) salmon. The iBoF salmon populations are found in drainages of the Bay of Fundy above a line connecting the Saint John River in New Brunswick and the Annapolis River in Nova Scotia. Historically, the iBoF salmon most likely inhabited at least 40 rivers and streams entering the Bay of Fundy. iBof salmon, except for the Gaspereau River population, all have similar life history traits that differ from the outer Bay of Fundy salmon. iBoF salmon demonstrate more localized migration, earlier age at maturity, high survival between spawning events, and a dependence on repeat spawning for population stability. Although the Gaspereau River population possesses the same genetic uniqueness common to the iBoF populations, marine migratory patterns and life history traits are similar to the outer Bay of Fundy salmon.

Since 1989, wild populations of the iBoF salmon have declined 90% or more in abundance and are currently considered at risk of extinction. Documentation of continued population declines prompted immediate actions to prevent the iBoF salmon's extinction. In May 2001, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) designated the inner Bay of Fundy Atlantic salmon as endangered. As a result, a National Recovery Strategy for the inner Bay of Fundy (iBoF) salmon populations was prepared in 2002. This recovery strategy presents actions necessary to protect, conserve and ensure the recovery of the assemblages of iBoF salmon. A national recovery team is presently in place to implement the recovery strategy.

9.2.5.1 Research

Extensive literature research on the biology, movements, and migrations of Atlantic salmon in the Bay of Fundy was conducted by M. J. Dadswell, PhD – see Dadswell, M.J. "Migration of Inner Bay of Fundy Salmon in Relation to the Proposed Quarry in the Digby Neck Region of Nova Scotia", November 2004 **(Ref. Vol. V, Tab 25)**. Research included available tag return data from the last 90 years on Atlantic salmon released from sites within and outside the Bay of Fundy.

This research indicates that the seaward migration or departure of kelts (spawned-out adult salmon) from inner and outer Bay of Fundy rivers is along the New Brunswick shore. The rate of migration is rapid (up to 50 km/day), taking only a few weeks during May and June. Spawning migration or return of adults to outer Bay of Fundy rivers occurs during May to August and return to inner Bay of Fundy rivers occurs during July to October. Salmon returning to the outer Bay of Fundy rivers (e.g., the Saint John River) appear to move directly across the Bay at its outer end. Salmon returning to the inner Bay of Fundy rivers do not appear inshore until they reach the mid-Bay region around Kings County, Nova Scotia. Migration routes of Atlantic Salmon are shown on **Map 26.**

No recapture of tagged Atlantic salmon have been recorded along the shore of Digby Neck between Brier Island and the Digby Gut even though herring weirs have been operated in the Digby Neck region for over 100 years. The only recorded tag return of an Atlantic salmon from this region was from a weir along the Kings County shore of the inner Bay of Fundy. Also, by-catch of salmon in herring weirs, herring gill nets, and groundfish gill nets along the Bay of Fundy shore of Digby Neck has been minimal for the past 100 years.

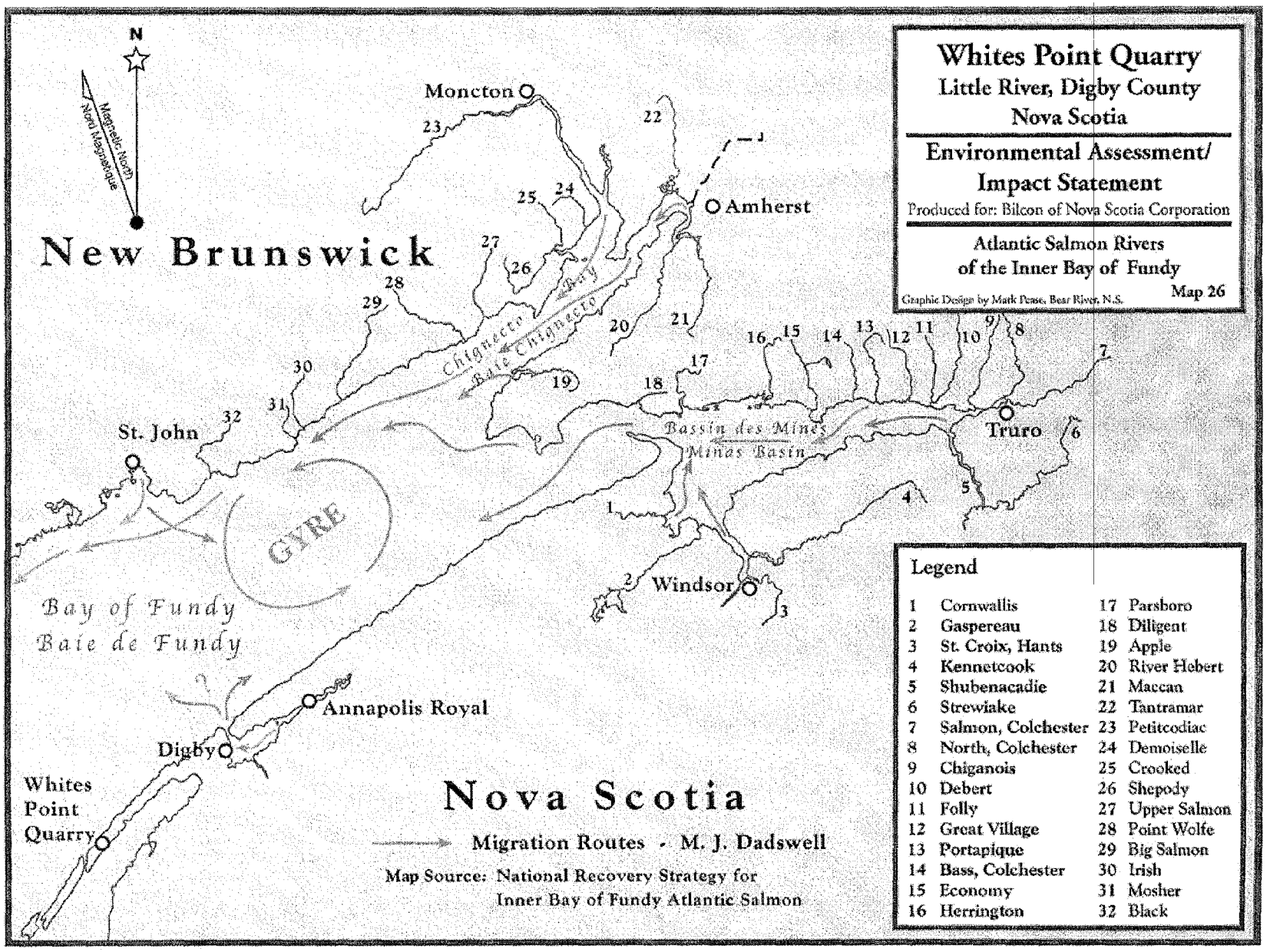
9.2.5.2 Analysis

No evidence exists that the loss of fresh water productive capacity is responsible for, or contributes to, the recent population declines of iBoF salmon. Intermittent drainages on the proposed Whites Point Quarry site have been determined to be not suitable or marginal as fish habitat by DFO Habitat Management Division. On-site drainages are also not considered suitable habitat for salmonoid populations. Also, a significant distance exists between the proposed quarry site and known iBoF salmon rivers – see **Map 26**. Evidence does indicate that the population decline of iBoF salmon could be attributed to low marine survival, for which the cause is presently unknown. Trends in marine waters including changes in physical and chemical conditions, continued commercial fishing activities, numerous tidal barriers, and the development of an extensive aquaculture industry all could have potential negative effects on salmon populations within the Bay of Fundy. Again, the manner in which these factors could be affecting marine salmon habitat is not understood and may not be resolvable.

Recreational fisheries on all iBoF rivers have been closed since 1998. However, fishing which could produce iBoF salmon bycatch was observed during 2002 and 2003. Herring seiners and herring gill nets were observed fishing in the nearshore waters off Whites Point. As well, natural predators such as seals were observed in nearshore waters in the Whites Point area and a seal colony exists at Crowells Cove.

As shown on **Map 26** , tag return data indicates that migrating iBoF salmon do not pass along the coast of Digby Neck in the proposed Whites Point Quarry area. However, their range during migration, does extend into this portion of the Bay of Fundy on the New Brunswick coast. Since the iBoF salmon is a species at risk, a precautionary approach has been taken regarding possible adverse effects from the proposed quarry and marine terminal construction and operation.

The proposed marine terminal for the Whites Point Quarry consists of three berthing dolphins located approximately 200 m (660 ft.) off-shore. Pipe piles, anchored to the nearshore bedrock, are proposed as foundation structures for the berthing dolphins. This pipe pile design is intended to allow unobstructed coastal current flows thereby maintaining any nearshore iBoF salmon migration routes/patterns along this section of the coast. During construction, turbidity will be monitored to insure that the "Guidelines for the Protection of Aquatic Life – Total Particulate Matter" are not exceeded.



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No blasting is proposed within marine waters and setbacks from marine waters to points of explosive detonations will meet the guideline criteria set forth in "Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters". Again, a precautionary approach has been taken. Based on recommendations by the Department of Fisheries and Oceans – Habitat Management Division in their November 12, 2004 letter RE: Whites Point Quarry and Marine Terminal – Blasting Activity, – See Appendix 20 , a horizontal distance from shore line to the blast location has been established at least triple that determined by application of the equations in the "Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters". Also, the size of individual charges will be minimized. Explosive charges will be "decked" if required to further reduce effects. Since the inner Bay of Fundy salmon generally spawn in streams and rivers in the upper Bay of Fundy, possible effects of blasting on spawning habitat are highly unlikely. Thus, possible effects from blasting on the iBoF salmon would be limited to possible migration occurrence on the Nova Scotia coast during July to October. The above precautionary measures would be followed when blasting is conducted during the July to October time period.

As mentioned previously, the CONWEP model was used to verify potential effects on fish habitat using site specific data and a proposed blast design. Model runs indicate that the proposed on land blasting would likely not exceed 25 kPa in the nearest marine water column. This is well below the maximum 100 kPa recommended in the guideline criteria. Further, iBoF salmon migratory routes are expected to be much further off shore. Again, a conservative approach has been taken to reduce risk to iBoF salmon during blasting operations.

9.2.5.3 Mitigation

Recovery of the iBoF salmon populations in the Bay of Fundy is expected to be a long term effort. If industrial activities such as fishing, agriculture, forestry, aquaculture or quarrying are identified as impeding recovery efforts, mitigation without conflicts with the respective industry would be the preferred resolution, as suggested in the National Recovery Strategy. In this regard, Bilcon of Nova Scotia Corporation would be prepared to participate in developing appropriate mitigation measures for their quarry operations in relation to recovery efforts for the iBoF salmon and to work with the National Recovery Team. Presently, mitigation measures being implemented by Bilcon of Nova Scotia Corporation during quarry operations include sediment and blasting controls to meet or exceed published criteria and guidelines – e.g. "Canadian Water Quality Guidelines for the Protection of Aquatic Life", "Ambient Water Quality Guidelines (Criteria) for Turbidity, Suspended and Benthic Sediments" and "Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters".

9.2.5.4 Monitoring

9.2.5.4.1 Water Quality

During the period 2002 and 2003, Bilcon of Nova Scotia Corporation has developed a water and sediment monitoring program for the four hectare quarry site at Whites Point. Background water sampling for ph and Total Suspended Solids (TSS) in freshwater drainages and the intertidal zone was conducted during the spring and summer of 2002, before quarry operation. This sampling documented a range of TSS of less than 0.5 mg/L to 2.2 mg/L in drainages entering the Bay of Fundy from the quarry site. Concurrently, ph ranged from 5.7 to 7.2 units. Background intertidal TSS ranged from 9.6 mg/L to 19.2 mg/L.

Operations at the 4 ha (10 acre) quarry began in the spring of 2003. Erosion control measures including a sediment retention pond with a capacity of 1 ha-m (8 acre-ft.) were constructed. Drainage channels, silt fences, and check dams were installed prior to and during clearing and grubbing the four hectare quarry site. Weekly grab samples during the initial construction phase indicated TSS of less than 0.5 mg/L to 4.2 mg/L. The latter occurred after a heavy rainfall and during construction of a sediment retention pond dyke. Concurrently, ph ranged from 6.4 to 7.0 units. The Nova Scotia Department of Environment and Labour's approval permit for the four hectare quarry requires TSS not to exceed 50 mg/L (grab sample) and pH to be in the range of 5.0 to 9.0 units. Although not a requirement of the 4 ha (10 acre) quarry approval, tide pools within and beyond the influence area of the four hectare quarry were monitored. Sediment samples were taken from tide pools above and below the ordinary high water line. No elevated inorganic sediment accumulation in tide pools located within the influence of the operating four hectare quarry was evident.

The guidelines for aquatic life in fresh, marine and estuarine waters indicate that when background is less than or equal to 25 mg/L, the maximum induced suspended sediment load is not to exceed 25 mg/L in twenty-four hours. Results of ongoing water monitoring for pH, TSS and sediments in tide pools indicates no significant increases are occurring based on the above criteria in waters entering the receiving waters of the Bay of Fundy from ongoing quarry operations.

For long term periods (30 days or more) average TSS levels should not be increased by more than 5 mg/L over ambient levels. Before quarrying begins beyond the four hectare site, the average ambient clear flow levels (clear flow periods refer to "normal" flow periods and specifically exclude both low and high flow conditions) will be established. Similar monitoring procedures are proposed to be continued over the life of the Whites Point Quarry project.

9.2.5.4.2 Blasting

Monitoring of blasting activities would include video documentation of each blast event and land monitoring for concussion and ground vibration for each blast event. The latter would be done in accordance with the Nova Scotia Department of Environment and Labour's regulatory requirements. Also, monitoring of the initial blast event will be conducted at selected locations within nearshore marine waters.

9.2.5.5 Impact Statements

Inner Bay of Fundy Atlantic Salmon – Water Quality

Water quality and sediment monitoring during construction work on the four hectare quarry indicates Nova Scotia Department of Environment and Labour regulatory requirements and the Canadian Water Quality Guidelines are not being exceeded resulting in a ***long term, neutral (no) effect, of national/international scale.***

Inner Bay of Fundy Atlantic Salmon – Blasting

Modeling of peak pressure in the marine environment as a result of blasting indicates that it is well within guideline criteria contained in the "Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters" and as a further precautionary measure during July to October, the set back distance from the shore line to the blast site will be tripled and if required, explosive charges will be decked within the holes to further reduce over pressure effects resulting in a ***long term, neutral (no) effect, of national/international scale.***

Inner Bay of Fundy Atlantic Salmon – Migration

The method of construction for the marine terminal allows free flow of nearshore currents without major obstruction resulting in a ***long term, neutral (no) effect, of national/ international scale.***

9.2.6 Fish – Threatened and Special Concern

9.2.6.1 Research

Striped Bass

The striped bass (*Morone saxatilis*), Bay of Fundy population was designated as "threatened" by COSEWIC in November 2004. A COSEWIC assessment and status report was prepared in 2004 **(Ref. 53)**.

The striped bass is an anadromous species which spawns in three rivers of the Bay of Fundy including the Annapolis and Shubenacadie in Nova Scotia and the Saint John in New Brunswick. Canadian striped bass populations occur in the northern portion of their range and overwinter in rivers to escape the cold ocean waters. The probable extent of occurrence in the Bay of Fundy does not extend toward the mouth of the Bay beyond a line from the Digby Gut across the Bay to the mouth of the Saint John River. However, striped bass catch records are not enough to define the extent of occurrence as the Bay is also used by bass from U.S. rivers. During the past 20 years, no evidence of spawning has been observed and no catches of local bass have been authenticated in the Annapolis and Saint John Rivers. The Shubenacadie River population still appears to produce new individuals.

Spawning failures have led to the disappearance of the Annapolis and Saint John River populations. The primary causes of population decline are thought to be due to changes in flow regime and poor water quality. In the case of the Annapolis River, the river closest to the Whites Point site, obstruction by the Annapolis causeway, agricultural pollution, and low pH are thought to be primary causes. Also, by-catch of striped bass from various commercial fisheries and recreational fishing pressure are also contributing factors.

Atlantic Cod

The Atlantic cod Maritimes population was designated as " special concern" by COSEWIC in May 2003. A COSEWIC assessment and status report was prepared in 2003 (Ref. 56).

Declines in Atlantic cod Maritimes populations vary according to region. The region including the Bay of Fundy identified for the purpose of stock management is the Bay of Fundy/Western Scotia Shelf (NAFO Division 4X). This is the southern end of the Canadian range on the east coast which extends from Georges Bank and the Bay of Fundy north to Labrador. Overall, the Maritime population has declined 14% in the past 30 years.

From a spawning perspective, it is not known if cod have specific habitat requirements. They are known to spawn in various habitats throughout the inshore, nearshore and offshore waters.

The primary cause of decline is attributed to overfishing. Sensitivities of the species to human activities include direct fishing, by-catch in other fisheries, natural predation, and natural and fishing-induced changes to the ecosystem. Cod continues to be a major species landed by the Digby Neck/Islands fishery (Gardner Pinfold 2005 **Ref. Vol. VI, Tab 32**).

9.2.6.2 Analysis

Construction, operation and maintenance, reclamation and closure of the Whites Point Quarry and Marine Terminal will not contribute to further population declines in striped bass or Atlantic cod. In the case of striped bass, no productive spawning estuaries or rivers exist in the region. No coastline barriers will be created at the marine terminal. Quarry land uses will not produce acid runoff or increases of Total Suspended Solids above acceptable levels.

Loss of bottom habitat which could affect food sources for cod and alteration of water column habitat for striped bass are proposed to be compensated for at three times the loss. Construction of the marine terminal will not require dredging or dredge spoil disposal, or fill which could produce adverse effects on both striped bass and Atlantic cod.

9.2.6.3 Mitigation

Implementation of the proposed Fish Habitat Compensation Plan will provide three times the bottom habitat lost by construction of the marine terminal. Enhanced pelagic fish habitat is also part of the compensation plan. The design of the marine terminal on pipe piles will allow unobstructed flow of tides and currents.

9.2.6.4 Monitoring

Monitoring in the marine environment will be conducted during construction to ensure turbidity levels do not exceed acceptable levels – see **paragraph 9.2.3.4.** Nearshore waters will also be monitored during operation of the quarry and marine terminal for noise and water quality – see **paragraph 9.2.4.4 .**

9.2.6.5 Impact Statement

Fish – Threatened and Special Concern Species

Compensation for loss of bottom habitat and alteration of pelagic fish habitat are planned and blasting will be conducted in accordance with the "Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters" resulting in a ***long term, neutral (no) effect, of national/international scale.***

9.2.7 Waterfowl – Special Concern

9.2.7.1 Research

Harlequin Duck

There are two separate, major populations of harlequin ducks in North America; a relatively large western population and a much smaller eastern population. The eastern population was designated as "Endangered" by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in 1990, but was subsequently (May 2001) downgraded to "Special Concern". Presently, its status under SARA is "special concern" on Schedule 1. In 2000 the eastern population of harlequin ducks was designated as "Endangered" under the NSESA.

The eastern population is further divided into two sub-populations that are defined by their wintering areas; one in Greenland and the other along the eastern seaboard of North America. The population that winters in Greenland breeds in northern Québec and northern Labrador. The population that winters along the eastern seaboard breeds in northern New Brunswick, the Gaspé Peninsula, Newfoundland and southern Labrador. Preliminary genetic studies appear to confirm reproductive isolation between these two eastern North American "sub-populations". Of the two eastern populations, the eastern seaboard population is the smaller with a wintering population currently (pre-2005) estimated at between 1800 and 2000 birds. Annual winter censuses indicate that this population has been increasing in recent years.

Wintering harlequin ducks generally feed in tight flocks along rocky shorelines where the surf breaks against rocks and ice buildup is minimal. Common food items include crabs, amphipods, gastropods, limpets, chitons, blue mussels, and fish eggs. Harlequins, particularly females, exhibit a very high fidelity to their traditional wintering areas.

Approximately half the population of harlequin ducks that winter along the eastern seaboard seek refuge in New England, primarily in Penobscot Bay, Maine with smaller concentrations occurring south to Chesapeake Bay, Virginia. In Canada, wintering areas also exist in Newfoundland, Nova Scotia and New Brunswick. Surveys conducted by the Canadian Wildlife Service (CWS) have identified harlequin duck wintering areas in the Bay of Fundy including portions of the coastline of Digby Neck, Long Island and Brier Island. Of the wintering areas that have been identified in this area, only in the areas surrounding Trout Cove, Digby Neck and Bear Cove, Long Island have harlequin ducks been found consistently and in good numbers. These two traditional harlequin duck wintering areas are centered approximately 12 km (7.5 mi.) on either side of the Whites Point Quarry. Harlequins have also been observed in Deep Cove/Sandy Cove, Tommy's Beach and Whale Cove on Digby Neck, and at Peajack Cove and Western Light, Brier Island. Only small numbers have been observed at these latter sites and these sites are apparently not used consistently.

Since 2000, CWS biologists have been monitoring the numbers of wintering harlequin ducks in the Maritime provinces. In the Digby Neck – Long Island area land-based surveys of known harlequin wintering areas were conducted in 2000 and 2001. Beginning in 2002, annual boat surveys of the entire coastline between the Bear Cove and Trout Cove areas have been conducted. During the 2004 (February 24) and 2005 (February 9) boat surveys, Dr. George Alliston and Mr. Bernard Forsythe, on behalf of Bilcon of Nova Scotia Corporation, were guests of CWS wildlife biologist Andrew Boyne. During the 2005 boat survey a total of 118 harlequin ducks was counted; the largest number recorded for this area since surveys were initiated.

In response to concerns expressed by government agencies regarding the possibility of harlequin ducks traveling between their traditional wintering areas to the north (Trout Cove) and south (Bear Cove) of the project, in 2005 Bilcon of Nova Scotia Corporation contracted Dr. George Alliston to conduct a study to determine if frequent movement of harlequin ducks occurred between these two wintering areas. A study of the possible movements of harlequin ducks between their traditional wintering grounds in the Bear Cove and Trout Cove areas was conducted in early February, 2005 (see Alliston, W. George, "Wintering Harlequin Ducks in the Digby Neck – Long Island Area, Digby County, Nova Scotia – 2005" 20 May 2005, **Ref. Vol. I, Tab 2**). The study consisted of three elements;

1. Simultaneous land based monitoring of harlequin ducks at their two traditional wintering grounds in an attempt to a) establish total numbers using each of these areas and b) observe if changes in numbers at one site were correlated negatively with changes at the other site.
2. Conduct observations at Whites Point to determine if harlequin ducks were flying between the two wintering areas via these nearshore waters.
3. Using the annual CWS survey of wintering harlequin ducks to provide an independent estimate, after some time had elapsed from the land based studies, of the total numbers and distribution of harlequin ducks using the coastline from the Bear Cove to the Trout Cove areas.

Simultaneous land based monitoring of the harlequin numbers in the Trout Cove and Bear Cove areas revealed no correlation between any apparent changes in the numbers at the two sites. Under perfect observation conditions, no observations were made of harlequin ducks flying over nearshore waters adjacent Whites Point (February 7). The CWS boat survey produced results that were nearly identical to the land based monitoring study:

Survey Method	Date	Trout Cove	Bear Cove	Other	Total
Land-based	February 1-2	68	51	-	119
Boat	February 9	66	49	3	118

These results suggest that there was little or no movement of harlequin ducks between the two traditional wintering areas during the study period (February 1-9). Furthermore, both surveys indicated that sex ratios differed between the two areas with females outnumbering males at Trout Cove (0.79M:1F) and the opposite situation (1.55M:1F) at Bear Cove while the ratio for the two populations taken together was close to equal (1.05M:1F). Harlequin ducks form pairs on their wintering grounds and most would have been paired by the time surveys were conducted. Had there been substantial movement of birds between these two areas over the winter period it would be expected that more pairing would have occurred and the sex ratios of the Bear Cove and Trout Cove populations would be much closer to equal than what was observed.

Barrow's Goldeneye

Like the harlequin duck, there are two major populations of Barrow's goldeneye in North America; a large western population and a much smaller eastern population. The Barrow's goldeneye, eastern population, was designated as a species of "special concern" by COSEWIC in November 2000 and is given a "yellow" (sensitive) status under the NS GSR.

The distribution, numbers and habitat requirements of the eastern population of Barrow's goldeneye are not well understood (Savard and Dupuis, 1999). Their breeding grounds have not been well defined but are believed to be entirely within Canada with the only confirmed breeding in southeastern Québec. The total wintering population is estimated at about 4,500 birds of which about 4,000 winter in the St. Lawrence estuary and Gulf of St Laurence. An estimated 400 Barrow's goldeneye winter in the Atlantic Provinces and Maine. Currently, there are no known winter concentrations of this species anywhere in Atlantic Canada (Sea Duck Joint Venture, Continental Technical Team, 2003; CWS Waterfowl Committee, 2002).

The closest area to the Whites Point property that wintering Barrow's goldeneye can be regularly found is in the Annapolis Basin. Only a few birds are found there. Migratory bird observations at Brier Island indicate daily peaks of one to two Barrow's goldeneye in December. No Barrow's goldeneye have been recorded during annual winter boat surveys conducted by CWS since 2002, of coastal waters from Bear Cove, Long Island to Trout Cove, Digby Neck (Andrew Boyne – *pers. comm.*). These surveys included the entire coastline of the Whites Point property.

9.2.7.2 Analysis

Whites Point is situated midway between two traditional harlequin duck wintering areas; one centered around Trout Cove, Digby Neck, approximately 12 km (7.5 mi.) to the northeast, and another centered around Bear Cove, Long Island, a similar distance to the southwest.

Canadian Wildlife Service's boat surveys during the past four winters have included the shoreline of the proposed Whites Point Quarry site and no harlequin ducks have been observed in these waters. A land based search of the Whites Point property shoreline from Whites Cove to the northern boundary was conducted on February 7, 2005 and no harlequin ducks were observed. These observations suggest that the coastal waters of the Whites Point property are probably not traditional wintering areas for this species.

The closest to the Whites Point property that harlequin ducks have been recorded was near Tommys Beach, approximately 1 km (0.6 mi.) south of the southern boundary of the property, where a single pair was observed during the February 9, 2005 CWS boat survey.

Observations from studies conducted in 2005 suggest that, once settled, there is little movement of harlequin ducks between these two traditional wintering areas. It would therefore appear that currently the chances of harlequin ducks interacting with the Whites Point Quarry operations appear small and likely limited mainly to the migration periods. The project recognizes that harlequin duck populations appear to be increasing, and with increasing populations, these birds could extend the areas of coastline used for wintering.

Very small numbers of Barrow's goldeneye winter in the Annapolis Basin and very small numbers (3 records) have been reported as late autumn migrants at Brier Island. CWS winter boat surveys over the past four years, which include the coastline of the Whites Point property, have not produced any sightings of Barrow's goldeneye. Indeed there are no known areas in the province of Nova Scotia where concentrations of wintering Barrow's goldeneye are found. It would appear most unlikely that the coastal waters of the Whites Point property would support a concentration of wintering Barrow's goldeneye. It is possible that very small numbers of Barrow's goldeneye might pass by the quarry site during migration.

9.2.7.3 Mitigation

None proposed.

9.2.7.4 Monitoring

Bilcon of Nova Scotia Corporation proposes to continue coordination and cooperation with the CWS in monitoring waterfowl of special concern (harlequin duck and Barrow's goldeneye). If direct effects of shipping or on site activities on these species become evident, adaptive management procedures will be discussed with CWS.

9.2.7.5 Impact Statement

Migratory Waterfowl – Species of Special Concern

Since traditional wintering areas for the harlequin duck and Barrow's goldeneye do not exist in the nearshore marine waters of the quarry coastline and only occasional occurrences are expected with no loss of habitat, this would result in a ***long term, neutral (no) effect, of national/international scale.***

9.2.8 Marine Reptiles – Endangered Species

9.2.8.1 Research

The Leatherback turtle was listed by COSEWIC as endangered in 2001 and is presently on the SARA species list. It is one of only two marine turtles that are regularly found in Canadian waters, the other is the loggerhead turtle (*Caretta caretta*) for which a COSEWIC Status Report is presently in progress and will be assessed at the May 2006 COSEWIC meeting. Currently, there is no status under COSEWIC assigned to this species. A recent screening document prepared by the Nova Scotia Museum (July 19, 2005) for the Whites Point quarry indicates another marine turtle – the Ridleys (*Lepidochelys kempi*) has been reported or recorded in the adjacent marine waters. This species is not presently listed by COSEWIC and does not presently appear on either a candidate or status report list. During the weekly observations of marine mammals and seabirds in July and August 2002 in the nearshore waters from Petite Passage to Sandy Cove, no marine turtles were sighted

The leatherback turtle is unique in that it is the only marine turtle that does not have scales. Leatherbacks are wide ranging from the warm tropics where they nest, to temperate waters of Canada on the Atlantic coast. Sightings have been recorded in waters off New Brunswick in the Bay of Fundy. Their migration to temperate waters and Canada's Atlantic coast is to forage on seasonally abundant populations of jelly fish. Thus, these waters provide important seasonal foraging habitat for these turtles.

A primary limiting factor on land for survival is the destruction of nests on beaches by human activities and natural processes such as flooding and erosion. In the marine environment, principle threats include entanglement in different types of fishing gear (fixed and mobile) such as long lines, buoy anchor lines and other ropes and cables. Marine debris such as plastic bags, tar balls, plastic sheeting and fishing gear may lead to blockages in the digestive tract and subsequent starvation. Another threat could be contaminants in marine waters such as metals and polychlorinated biphenyls (PCBs). However, tissue samples derived from leatherbacks in European waters revealed no significant chemical contamination (COSEWIC 2001, Ref. 52f).

Leatherbacks are globally endangered and endangered in Canada. They are listed as critically endangered by the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES). Canada is a signatory country of this convention. The Convention on the Conservation of Migratory Species of Wild Animals (CMS) has some provisions regarding harvest of endangered species, however Canada is not currently a party to this convention (2001). Since then, the federal *Species at Risk Act* has been passed in Canada thus providing protection.

9.2.8.2 Analysis

Records of leatherback turtles in Nova Scotia waters are primarily along the Atlantic coast (James 1999, Ref. 67). Occasional records for the Bay of Fundy have been recorded by the Nova Scotia Leatherback Turtle Working Group, 1998. These records for the Bay of Fundy are shown on **Map 23** . Four records from the mouth of the Bay of Fundy were recorded by the Nova Scotia Leatherback Turtle Working Group. Three records are indicated in the area of Brier Island and Long Island and an individual record north of Digby Gut. Aerial surveys conducted by East Coast Ecosystems, Freeport, NS —1998 recorded no leatherbacks in the Bay of Fundy (James 1999) . A check of stranding records by the Marine Animal Response Society back to 1990 indicates no records of sea turtles in the Bay of Fundy (personal communication – Tonya Wimmer). No sightings of marine reptiles were noted by a local whale and seabird cruise operator during the past ten years (personnel communication – Bay to Bay Adventures). Also, no sightings of marine reptiles were recorded during the whale and waterbird observation trips contracted by Bilcon of Nova Scotia Corporation in 2002 along the Digby Neck coast from East Ferry to Sandy Cove.

Leatherback turtles are fast and deep swimmers. The design of the Whites Point Marine terminal allows free passage of tides and currents and will not obstruct pelagic movement. Also, the characteristic movements of this turtle in the water would not make it susceptible to possible ship interactions due to the slow speed of the bulk carriers to and from the shipping lanes and marine terminal.

Major factors in the population decline of leatherbacks in marine waters is the ingestion of anthropogenic debris and incidental capture in fishing gear. The development at the Whites Point Quarry and Marine Terminal will not contribute to these factors.

9.2.8.3 Mitigation

None proposed.

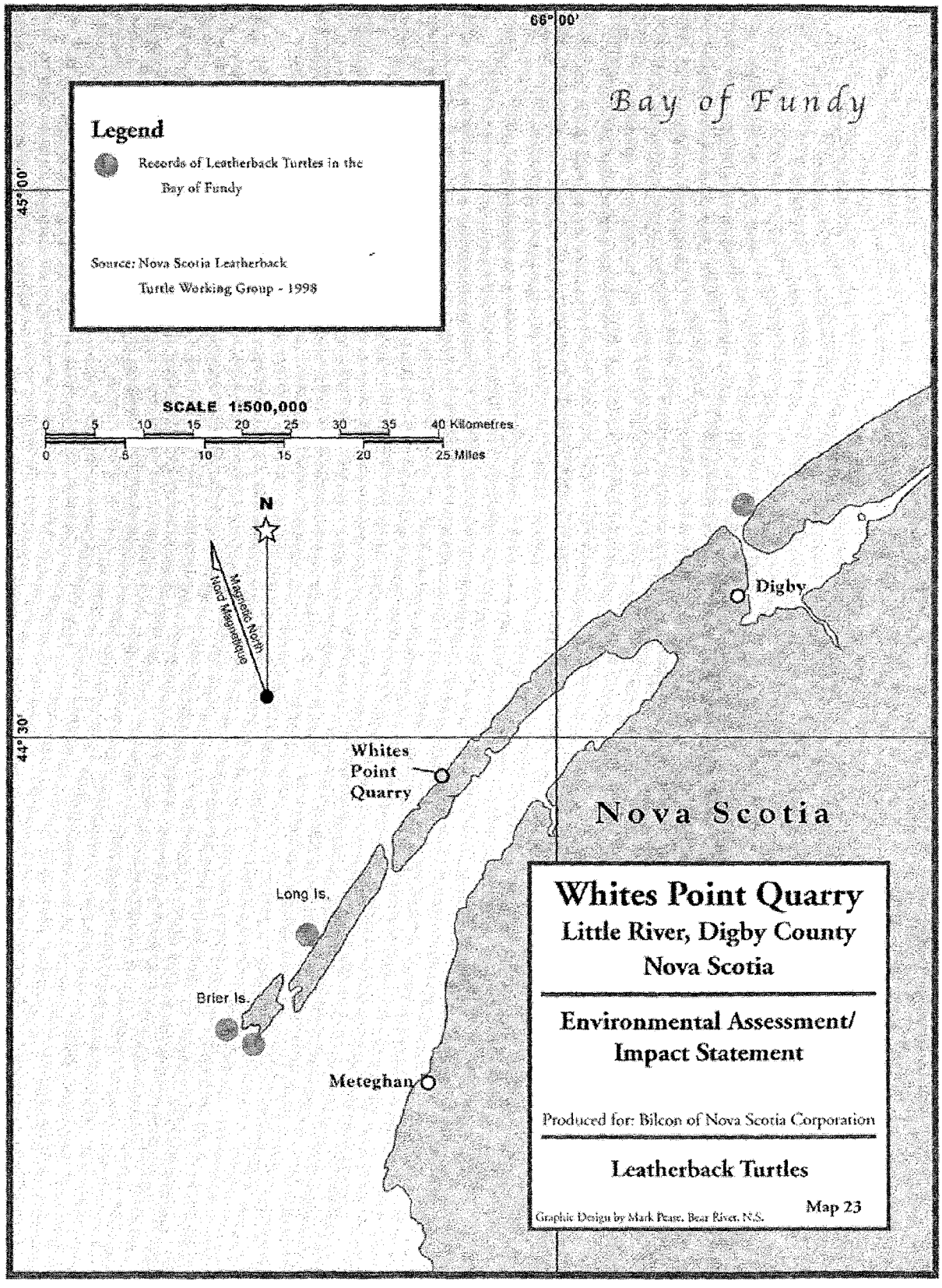
9.2.8.4 Monitoring

During routine monitoring of the weekly arrival and departure of the vessel at the marine terminal, observations for marine reptiles will be conducted. Any sightings will be recorded and coordinated with the Nova Scotia Leatherback Turtle Working Group and the Nova Scotia Museum of Natural history.

9.2.8.5 Impact Statement

Marine Reptiles – Endangered Species

The occasional occurrence of leatherback turtles during the summer, no impediment from nearshore construction, and no project induced factors that would contribute to population declines, would result in a ***long term, neutral (no) effect, of national/international scale***



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9.2.9 Fish Habitat - Blasting

9.2.9.1 Research

When an explosive is detonated, pressure changes and vibrations generally result. Sudden rises to high peak pressure occur followed by rapid decay to below ambient hydrostatic pressure. Most effects on fish result from the resultant pressure deficit which can cause lethal and sub-lethal damage. Also, vibrations may cause damage to incubating eggs and noise may cause changes in behavioural patterns. Lethal, sub-lethal, and behavioural effects on crustaceans and shell fish are believed to be negligible, although little information exists on these aspects. It is, however, reasonable to assume that the unmitigated detonation of explosives in or adjacent to fish habitat can cause harmful effects on fish and fish habitat.

The Canadian Technical Report of Fisheries and Aquatic Sciences 2107, (Wright and Hopky 1998 Ref. 92) contains "Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters". These Guidelines set forth guideline criteria to the effect that no explosive is to be detonated in or near fish habitat that is likely to produce an instantaneous pressure change greater than 100 kPa (14.5 psi) in the swim bladder of a fish. Also, no explosive is to be detonated that is likely to produce a peak particle velocity greater than 13 mm/s in a spawning bed during the period of egg incubation. Tables 1 and 2 contained in the aforementioned Technical Report provide setback distances from the centre of detonation of a confined explosive to fish and spawning habitat. These setback distances are essentially based on the weight of explosive charge and type of substrate. Further, formulas are presented upon which setback distances can be calculated.

Modeling, based on physical data specific to the Whites Point site was used to determine possible effects on fish and fish habitat from blasting during quarry operations. These investigations concentrated on the marine environment since no freshwater fish habitat exists in the area of active quarry operations. (The freshwater watercourse shown on **Map 12** flowing east to west from a small pond/wetland through the northern portion of the quarry property was visited by the Department of Fisheries and Oceans, Habitat Management Division. In their September 18, 2002 letter – see Appendix18, they concluded that "this watercourse cannot be categorized as 'Fish Habitat', therefore the *Fisheries Act* does not apply").

Shock wave propagation from the proposed blast sites to the marine water column were modeled. This investigation was conducted by JASCO Research Limited and LGL Limited – see Hannay, David E. M.Sc. and Thomson, Denis M.Sc. "Peak Pressure and Ground Vibration Study for Whites Cove Quarry Blasting Plan". August 2003 (Hannay and Thomson 2003 **Ref. Vol. V, Tab 27**). Site specific topography, bedrock composition, and bathymetry were used to illustrate a "worst case" situation for quarry blasting in relation to the marine water column. Also, specifications outlined in Bilcon of Nova Scotia Corporation's Blasting Protocol – see Appendix 9 - were input into the model – e.g., weight and type of

explosive, shot pattern and spacing, shot hole depth and diameter, and delay sequence. The blast effects model CONWEP (Hyde 1992) was then run to predict the shape of the shock wave pressure at various distances from the detonation site.

9.2.9.2 Analyses

The floor of the quarry is proposed to be at or above the 10 m (33 ft.) land elevation. Essentially, no blasting is proposed to take place between the 10 m elevation and the ordinary high water line – see **Figure 1.** More specifically, the weight and type of explosive, shot pattern and delay sequence for proposed detonations will be designed to be less than the 100 kPa pressure change in the water column and less than 13mm/s peak ground velocity in a potential spawning bed as required by the "Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters". These values (100 kPa and 13 mm/s) therefore establish the threshold criteria for adverse effects on fish habitat and fish spawning areas respectively.

Results from the CONWEP model indicate that the proposed 73 m (240 ft.) setback from the detonation of a confined explosive to the nearest fish habitat (the ordinary high water line) are not expected to exceed pressures of 50 kPa. Blasting is proposed to take place within the period of three hours before to three hours after low tide to further reduce pressure change to less than approximately 25 kPa in the water. This is significantly below the 100 kPa guideline/threshold criteria as required by the "Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters". Further, a conservative water depth of one metre at the ordinary high water line was assumed rather than a zero depth.

Also, the CONWEP model predicts peak velocity of 13 mm/s corresponding with the ordinary high tide line. As proposed, blasting will be conducted from three hours before to three hours after low tide or at low tide if weather and marine mammal observation conditions permit. The setback distance from the detonation site to the water column within three hours of low tide would be 118 m (387 ft.). This is within the 100.5 m (330 ft.) at the point of producing 13 mm/s in the guideline/threshold criteria. Again, a conservative approach has been taken to reduce risk to potential spawning areas. In summary, proposed setback distances are within the guideline/threshold criteria of 100 kPa peak pressure and 13mm/s ground vibration for fish, fish habitat, and spawning areas.

9.2.9.3 Mitigation

The timing of blasting activities is proposed to be within 3 hours of low tide. When no atmospheric inversions exist, blasting will be conducted at low tide whenever possible. This will result in a conservative setback distance from the marine water column and within the guideline/threshold criteria set forth in the " Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters".

The explosive ANFO will be used whenever possible. ANFO has a lower yield per equivalent weight than TNT which was presumably used to derive the Department of Fisheries and Oceans Guidelines. The use of ANFO will further reduce pressure and vibration in fish habitat when Guideline criteria are applied. Although ANFO will be used on site, the residual products of ANFO will not enter either the fresh water or marine environments.

The frequency of blasting is proposed to be once per week initially and once every two weeks during full quarry operation with an event duration of less than one second. Thus the frequency and duration of blasting will have minimal effects on fish behaviour, fish health or movements.

9.2.9.4 Monitoring

To ensure that the proposed mitigation is having the expected effect, monitoring of blasting activities will include on land video documentation of each blast event. Land monitoring for concussion and ground vibration for each blast event will be done in accordance with the Nova Scotia Department of Environment and Labour regulatory requirements. Also, monitoring of the initial series of blasts is proposed at three stations located within near-shore marine waters. Monitoring for peak pressure and ground vibration will be conducted at locations in one metre of water depth in the tidal zone and at approximately 170 m (560 ft.) and 500 m (1640 ft.) from the detonation site. All monitoring data (video, concussion, and vibration) will be prepared for Bilcon of Nova Scotia Corporation and will be made available to regulatory agencies.

9.2.9.5 Impact Statement

Fish Habitat – Blasting.

Considering the frequency, duration, meeting of threshold criteria, (as required in the "Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters") and proposed setbacks from fish habitat and spawning areas, effects on marine fish habitat from blasting would result in a ***long term, insignificant negative effect, of local scale.***

9.2.10 American Lobster - Blasting

9.2.10.1 Research

The nearshore area along the coast of the proposed Whites Point Quarry supports a commercial lobster fishery. As mentioned previously, construction of the marine terminal and intermittent ship approaches and departures would have an insignificant negative effect on the lobster and lobster fishing in this particular area. Additionally, the potential interactions between blasting and the American lobster were investigated – see Christian, John M.Sc. "Whites Cove Quarry Blasting: Potential Impacts on American Lobster" 8 October 2003 (Christian 2003 **Ref. Vol. V, Tab 24**).

American lobster typically exhibits seasonal inshore – off shore movements and tend to move into shallower areas in the summer and back to deeper areas in the winter. Molting, mating, egg extrusion and fertilization, and larval hatch generally occur during the summer months when they are in the shallower nearshore waters. Juvenile and adult lobsters would likely only occur below the low tide mark. However, the larvae and early benthic stages could possibly be present for short periods within the intertidal area. This is typical of lobster activity in the waters off Whites Point.

The limited scientific research and information available regarding the sensitivities of various decapod crustaceans to acoustic stimuli and waterborne vibrations does not pertain specifically to the American lobster. Due to the general lack of data on decapod crustaceans and specifically lobster, recent research on snow crabs *(Chionoecetes opilio)* may provide the best data for establishing threshold criteria for adverse effects on the American lobster from blasting activities. Reported studies on Dungeness crab (*Cancer magister*) larvae exposed to peak pressures as high as 231 dB re 1 μPa from seismic air gun arrays indicated no statistically acute or chronic effects (Pearson et al 1994).

More recently, Christian et al. (2003) studied the effects of seismic energy on snow crabs. This study involved the exposure of snow crabs, including adults and one fertilized egg mass, to approximately 220 dB re 1 μPa. Exposed and control animals were then examined for acute effects of seismic energy on their health with no significant differences found between the exposed and control crabs. With respect to effects of seismic energy on the fertilized eggs, there is some indication that those eggs exposed to 0 – P (zero to peak) received levels of approximately 220 db re 1 μPa were affected negatively during this study.

Based on experiments relating to the commercial snow crab fishery, there is some evidence that noise may affect catch rates of crustaceans. Snow crabs receiving less than 182 dB re 1 μPa 0-P were more easily caught than those receiving more than 185 dB re 1 μPa 0-P. The blast could temporarily affect lobster activity patterns thereby resulting in less lobster movement and possible lower catches.

9.2.10.2 Analyses

As stated in the "Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters", the number of shellfish and crustaceans killed by the detonation of explosives is believed to be negligible, however, few data are available. Sub-lethal effects of explosives on shellfish and crustaceans including behavioural modifications are little known or understood (Wright 1982, Wright in prep.).

Based on the CONWEP modeling previously discussed, no American lobster life stage would be exposed to peak pressure levels exceeding 210 – 216 dB re 1 μPa if blasting is conducted at ordinary high tide. Blasting at the Whites Point Quarry is proposed to be conducted within 3 hours of low tide resulting in peak pressure levels of less than 204 – 210 dB re 1 μPa 0-P. Also, quarry blasting will consist of explosions of less than 0.5 seconds in duration as compared to the 33 minutes of seismic exposure experienced by the snow crab eggs used in the study by Christian et al (2003). Both of the above blasting scenarios would therefore result in peak sound pressure levels less than those measured when the snow crab fertilized eggs were exposed to seismic energy. Regarding behaviour patterns relative to catchability, there could be temporary effects. However, considering the short duration (less than 0.5 seconds) and infrequency of the blasts (once per week during construction and once per two weeks during operation), possible behavioural effects would likely be negligible.

The possibility of producing triploid eggs due to overpressure was investigated. Triploids are organisms that contain three, rather than two, sets of chromosomes. They are usually sterile and are also larger than their diploid counterparts, because little energy is expended on the development of sexual characteristics. Triploidy can be induced by subjecting newly fertilized eggs to temperature or pressure shock or to chemicals. At this stage, prevention of the second polar body in the cell nucleus results in the presence of a third set of chromosomes in all cells subsequently formed in that organism. The third set interferes with the normal pairing of chromosomes during meiotic cell division thereby disrupting gametogenesis. Triploid females are 100% sterile or "non-maturing". Triploid males do mature, and produce small numbers of functional but aneuploid sperm. While they may go through the spawning process and compete with normal males, their progeny are not viable. Although times may vary as pressure increases, production of triploid eggs can occur at pressure/time of 10,000 psi for 5 minutes. At Whites Point, overpressure will be below 100 kPa or 14.5 psi and the duration of the blast will be less than 1 second and no production of triploid eggs is expected.

A precautionary approach has been taken to reduce risk to all life cycle stages of the American lobster. Proposed setback distances exceed the general guideline/threshold criteria for 100 kPa peak pressure and 13 mm/s ground vibration for fish, fish habitat, and spawning areas. Specifically, based on available research data on other decapod crustaceans, blasting at Whites Point Quarry would likely have insignificant negative physical and behavioural effects on all life cycle stages of the American lobster.

9.2.10.3 Mitigation

The timing of blasting activities is proposed to be within 3 hours of low tide, and when atmospheric inversions are not present, blasting will be conducted as close as possible to low tide. This will result in the maximum setback distance from the marine environment and be within the guideline criteria set forth in the "Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters". The frequency of blasting is proposed to be once per week initially and once every two weeks during full quarry operation. Duration of the blast event will be less than one second. Thus, the frequency and duration of the blasting will be transitory and should have minimal effect on the American lobster.

9.2.10.4 Monitoring

To ensure that the mitigation is having the expected effect, monitoring of blasting activities will include on land video documentation of each blast event and land monitoring for concussion and vibration in accordance with the Nova Scotia Department of Environment and Labour's regulatory requirements. Also, monitoring of the initial series of blasts is proposed at three stations located within near-shore marine waters. Monitoring for peak pressure and ground vibration will be conducted at locations in one metre tidal zone depth and at approximately 170 m (560 ft.) and 500 m (1640 ft.) from the detonation site.

9.2.10.5 Impact Statement

American Lobster – Blasting

Considering the frequency, duration, adherence to threshold criteria, (as required in the "Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters") and proposed setbacks from American lobster habitat and spawning areas, effects from blasting would result in a ***long term, insignificant negative effect, of local scale.***

9.2.11 Marine Mammals - Blasting

9.2.11.1 Research

The sixteen species of marine mammals (whales, dolphins, porpoises, and seals) that are likely to be found in the Bay of Fundy (Beatty 1989) have been previously listed. Further to the above general list, more specific data regarding the status of marine mammals under the *Species at Risk Act*, was provided by the Department of Fisheries and Oceans – Habitat Management Division.

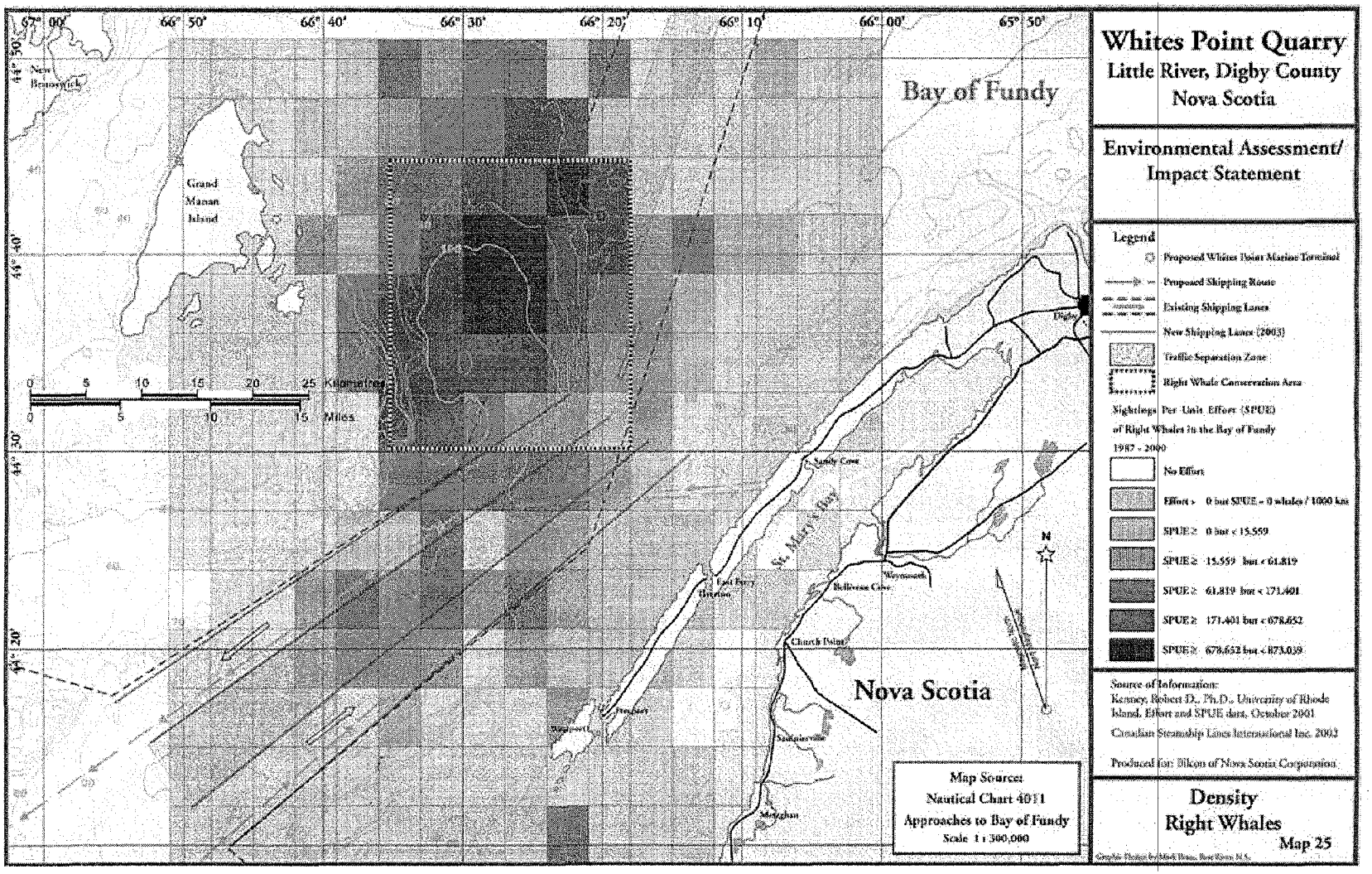
Species	Found in Bay of Fundy	Status Assigned by COSEWIC	Listed on SARA
North Atlantic right whale	June-Nov.	Endangered	Yes
Blue whale (occasional)	June-Nov.	Endangered	Yes
Harbour porpoise	All year	Special Concern	Oct. 2005 (earliest)
Fin whale	All year	Special Concern	July 2006 (earliest)
Minke whale	All year	Not yet Assigned	2007 (earliest)
Humpback whale	June – Nov.	Not yet Assigned	No

9.2.11.1.1 North Atlantic Right Whale

The North Atlantic right whale was designated as "endangered" by COSEWIC in 2003 and is presently listed on the SARA registry. A COSEWIC assessment and update status report was prepared in 2003 (COSEWIC 2003, Ref.51).

The total population of North Atlantic right whales currently numbers about 322 animals (about 220-240 mature animals) and has been decreasing during the last decade. The western North Atlantic population is distributed from Florida to Newfoundland and the Gulf of St. Lawrence. They are abundant in the Bay of Fundy from June to November and congregate in the lower Bay of Fundy mainly east of Grand Manan Island – see **Map 25**. Their primary food source is the zooplankton copepod *Calanus finmarchicus*.

Limiting factors and threats influencing population decline are serious injury and mortality from collisions with ships and from entanglement in fishing gear. Other contributing factors include the genetic and demographic effects of small population size, habitat loss and degradation, infectious disease, contaminants, marine biotoxins, an inadequacy of prey resources as a result of changes in ocean climate and circulation, and disturbance from tourism (COSEWIC 2003).



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9.2.11.1.2 Fin Whale

The fin whale, Atlantic population, was designated as "special concern" by COSEWIC in 2005. A COSEWIC assessment and update status report was prepared in 2005 (COSEWIC 2005, Ref.54).

Sightings remain relatively common off Atlantic Canada. They are found in the Bay of Fundy all year and are abundant from June to October. Although the fin whale faces a number of current threats including ship strikes and entanglement in fishing gear, human-generated underwater noise may also degrade fin whale habitat and impair communications, but details are uncertain (COSEWIC 2005).

9.2.11.1.3 Blue Whale

The blue whale, Atlantic population, was designated as "endangered" by COSEWIC in May 2002 and is listed on the SARA registry. A COSEWIC assessment and update status report was prepared in 2002 (COSEWIC 2002, Ref. 57).

The blue whale is extremely rare in the Bay of Fundy (Beatty 1989). Threats influencing the population of blue whales include ship strikes, increased whale watching activity, entanglement in fishing gear and pollution (COSEWIC 2002).

9.2.11.1.4 Harbour Porpoise

The harbour porpoise, northwest Atlantic population was designated as "special concern" by COSEWIC in 2003. A COSEWIC assessment and update status report was prepared in 2003 (COSEWIC 2003, Ref.55).

The harbour porpoise is common in the Bay of Fundy and sightings have been made in all months and they are abundant during summer months. Harbour porpoises have been observed in nearshore waters off Whites Point. The most important recent threat to harbour porpoises is bycatch in bottom-set gill nets used to catch groundfish such as cod. However, due to recent depletion of the groundfish stocks and reduction of fishing effort, there has been a notable decrease in bycatch mortality. The relatively secure status of harbour porpoises in eastern Canada at present is in large part due to reduced ground fish stocks and associated fishing effort (COSEWIC 2003).

During July and August of 2002, weekly reconnaissances of marine mammals and waterbirds were conducted by boat along the Bay of Fundy coast from Petite Passage to Sandy Cove and return. The outbound survey route was within approximately 150 m (500 ft.) of the coast and the return trip approximately 1.9 km (1.2 mi.) from shore. These reconnaissance trips were conducted under contract to Bilcon of Nova Scotia Corporation

by Bay to BayAdventures Ltd., an experienced, local whale watching tour business operating out of East Ferry. Duration of the trips was approximately two hours depending on the weather and sea conditions. The observation route is shown on **Map 21.**

Groups of four to ten and the occasional lone harbour porpoise were observed during four of the nine surveys. Occurrence of porpoises were generally along the route one mile off shore in the area of Whale Cove and from West Mink Cove to Burns Point. The closest sighting to the proposed Whites Point Quarry was approximately 2 km (1.25 mi.) from shore. The location of the sightings are shown on **Map 21.**

Weekly observations of near-shore waters by David W. Kern B.Sc. were conducted from the shore at Whites Point from May to October 2003. Mr. Kern observed a lone harbour porpoise feeding in Whites Cove on June 24, 2003. Casual observations of harbour porpoises were made during other faunal investigations. On June 22, 2002 a small group (2+) of harbour porpoises was observed just off Whites Point during breeding bird surveys (Alliston, 2004a). On February 9, 2005, during a CWS boat survey for harlequin ducks, a single harbour porpoise was observed off Whites Cove (George Alliston - personal communication) - **See Figure 10**

The detonation of explosives may be lethal to marine mammals and may cause auditory damage under certain conditions. The detonation of explosives in the proximity of marine mammals has also been demonstrated to induce changes in behaviour (Wright in prep., Wright 1982, Wright and Hopkey 1998, Ref. 92). The Canadian Technical Report of Fisheries and Aquatic Sciences 2107 – 1998 contains "Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters" (Wright and Hopkey 1998) and establishes guidelines for blasting in relation to fish and fish habitat.

Noting that the guideline criteria contained in this Technical Report, especially Tables 1 and 2 is generalized, site specific data was used to model shock wave propagation from the proposed blast sites to the marine water column. This investigation was conducted by JASCO Research Limited and LGL Limited – see Hannay, David E. M.Sc. and Thomson, Denis M.Sc. "Peak Pressure and Ground Vibration Study for Whites Cove Quarry Blasting Plan" August 2003 (**Ref. Vol. V, Tab 27** – Hannay and Thomson 2003). Site specific topography, bedrock composition, and bathymetry were used to illustrate a "worst case" situation for quarry blasting in relation to the marine water column. Also, a proposed blast design including the weight and type of explosive, shot pattern and spacing, shot hole depth and diameter, and delay sequence was included. The blast effects model CONWEP (Hyde 1992) was then run to predict the shape of the shock wave pressure at various distances from the detonation site.

9.2.11.2 Analysis

The floor of the quarry is proposed to be at or above the 10 m (33 ft.) land elevation. Essentially, no blasting is proposed to take place between the 10 m elevation and the ordinary high water line. No blasting is proposed within the water column. General guideline criteria as published in Fisheries and Oceans Canada – Newfoundland Region "Factsheet – Blasting – Fish andFish Habitat Protection" 1999 (Ref. 58) indicates blasting activities are not to be carried out in the marine environment within 500 m (1640 ft.) of marine mammals. This 500 m setback radius was then used as the distance to assess possible harassment to marine mammals during modeling procedures.

The Department of Fisheries and Oceans has in the past, adapted guidelines on a case by case basis to more accurately reflect actual site conditions. Recently they accepted safety standoff thresholds of 180 db RMS for toothed whales and 190 dB for pinnipeds in the vicinity of air gun systems used for seismic explorations (Hannay and Thomson 2003 **Ref. Vol. V, Tab 27**). These thresholds represent received levels at which marine mammals could sustain temporary threshold shift (TTS). TTS is a temporary and recoverable increase in hearing threshold, similar to what a human would experience at a loud rock concert. The distance at which TTS could occur is commonly used as a distance for a safety radius around a noise source. The pulse raise times for air gun signals and the explosive blast pressure wave at this range will be similar for these two types of noise source. As a result, a 180 dB RMS threshold for whales and a 190 dB threshold for pinnipeds has been established.

CONWEP model results indicate peak pressure at 500 m (1640 ft.) will be approximately 5kPa in the basalt which corresponds with a peak level in the water of approximately 2 kPa or equivalently 186 dB re 1 μPa peak. Root – mean – square (RMS) levels are typically 5 – 10 dB less than peak level as a result of signal spreading in time due to multi path propagation.

Therefore the proposed 500 m (1640 ft.) distance from the point of detonation for a safety radius appears appropriate for whales. The safety range for pinnipeds presumably could be approximately one third this range or approximately 170 m (550 ft.) if inverse distance (1r) acoustic spreading transmission loss is assumed. It should be noted that during seismic operations, air guns are shot every 20 seconds for hours on end. In the case of the proposed blasting at the Whites Point Quarry, the entire event will be over in less than 1 second. The National Marine Fisheries Service in the United States, responsible for implementation of the Marine Mammal Protection Act, has ruled that a single, short, noise pulse, such as that caused by an under water explosion, does not constitute disturbance (U.S. Federal Register 61 (#234, 4 Dec. 1996, page 64, 337).

Subsequently, in a letter dated February 10, 2006 (Appendix 22), the Department of Fisheries and Oceans Environmental Assessment and Major Projects Division furnished comments on Bilcon of Nova Scotia Corporation's Whites point Quarry and Marine

Terminal Blasting Protocol. This letter provides an analyses of the potential impacts of blasting on fish species, particularly the inner Bay of Fundy Atlantic Salmon population and an analyses of the potential impact of blasting on marine mammals. It was concluded that: "While the zone of disturbance of marine organisms by sound may extend beyond the 500 m suggested in the Whites Point Quarry proposal, it is considered unlikely that blasting would result in physical effects on marine mammals, endangered or otherwise, beyond 500 m. However, there is a high level of uncertainty associated with this conclusion. If the project proceeds, an initial blast prior to project initiation would help to validate the sound propagationmodelling used to reach this conclusion and would significantly increase the level of certainty in short-range impact estimations."

Subtle behavioural effects on marine mammals are expected to extend beyond 2500 m from the blast site. However, these are not expected to result in overall changes to the distribution of the population or other population-scale impacts. There is a moderate level of uncertainty associated with this conclusion. An initial blast as described above would also help to increase the level of certainty in long-range impact estimations.

Proposed mitigation, i.e. the 500 m safety zone for marine mammals and the 2500 m safety zone for endangered marine mammals, is expected to reduce the potential for harmful impacts of blasting on marine mammals under good visibility conditions".

9.2.11.3 Mitigation

Blasting will be executed using the minimum weight of explosives and greatest safety radius in relation to the marine environment as conditions warrant. Blasting will not be conducted if pinnipeds (seals) are present within 170 m (550 ft.) of the point of detonation or if cetaceans (whales, porpoises, dolphins) are within 500 m (1640 ft.) of detonations. If endangered marine mammal species such as North Atlantic right whales, blue whales, or fin whales are sighted in the near-shore area of Whites Point, the safety radius will be increased to 2,500 m (1.55 mi.).

An experienced onshore observer will be in place at least one hour prior to the start of the scheduled blasting to identify the possible presence of marine mammals within the safety radii mentioned above. The observer will be equipped with pedestal mounted 7x50 laser range finder binoculars with a plus or minus 1 m (3.3 ft.) accuracy and have communications with the blast coordinator. If marine mammals are sighted within the safety zones, the blast coordinator will be notified and the detonation will not take place until the animals move out of the safety radius under their own volition and an "all clear" signal is given by the observer. If the animal(s) are not sighted a second time, the blast would resume thirty minutes after the last sighting. The observer will remain in place until at least one half hour after detonations are complete to observe post blast conditions.

An additional, more conservative, setback radius of 2,500 m (1.55 mi.) will be used if endangered marine mammals such as the North Atlantic right whale have been sighted in the immediate near-shore area.

This setback or safety radius for endangered marine mammals would be based on the formula r = 260 (cube root of w)(7.28) where r = radius in feet, w = weight of explosive (TNT equivalent in pounds) as outlined in the Florida Fish and Wildlife Conservation Commission "Endangered Species Conservation Conditions for Blasting Activities" (Ref. 61 2001). Communications will be maintained with local whale and seabird cruise operators operating in the Digby Neck area. If these operators report right whale sightings in these near-shore waters, verification of right whale activity within the 2,500 m (1.55 mi.) safety zone will be conducted prior to any blasting activity. If endangered species are verified within the 2,500 m safety zone, detonations will be delayed until the endangered marine mammals move out of the safety radius under their own volition and an "all clear" signal is given by the observer. A written report indicating the time of observation, sightings of any marine mammals, and time of detonation will be prepared by the observer for each blast. These reports will be prepared for Bilcon of Nova Scotia Corporation and will be made available to regulatory agencies.

A conservative approach is proposed to protect marine mammals in accordance with published guideline/threshold criteria. In summary, the proposed 170 m (550 ft.) safety radius for pinnipeds, a 500 m (1640 ft.) safety radius for cetaceans, and an increased safety radius of 2,500 m (1.55 mi.) if endangered marine mammals are sighted in the immediate area, meet and are within accepted guideline/threshold criteria for the protection of marine mammals during proposed blasting activities at the Whites Point Quarry.

9.2.11.4 Monitoring

Monitoring of the initial series of blasts is proposed on land and in the near-shore waters- **see Map 31**. Three monitoring stations are proposed in the water column adjacent to the land detonation site. Monitoring for peak pressure and ground vibration will be conducted at locations in one m of water depth in the tidal zone and at approximately 170 m (550 ft.) and 500 m (1640 ft.) from the detonation site. This data will be used to verify the model results and as a baseline for any future adaptive management practices.

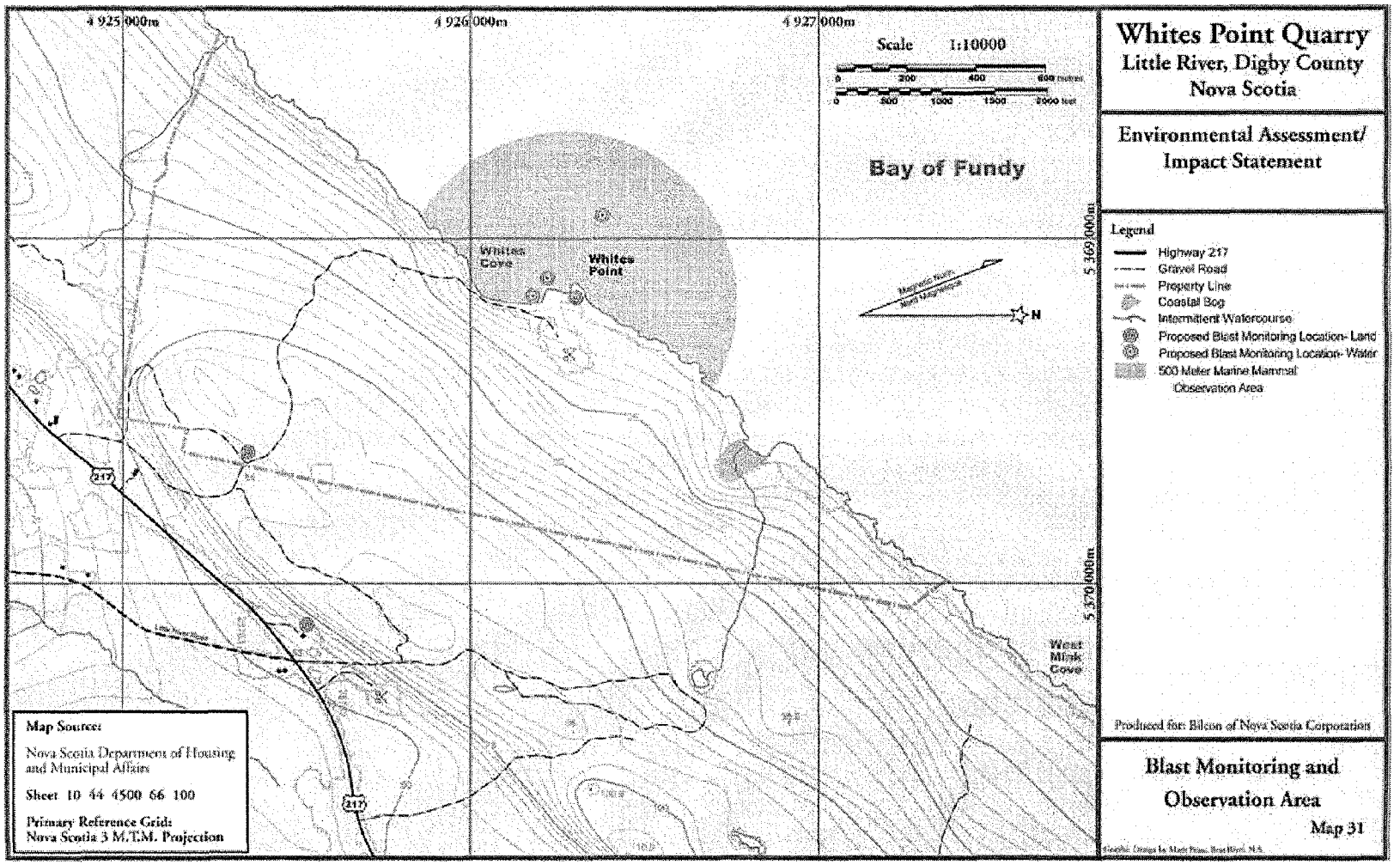
9.2.11.5 Impact Statement

Marine Mammals – Blasting

Considering the adequacy of the proposed safety zone radii for specific marine mammal species in relation to the on land blast site, meeting threshold criteria, and short duration of the blast event, effects on marine mammals from blasting would result in a ***long term, insignificant negative effect, of local scale.***

Marine Mammals Species at Risk – Blasting

Considering the adequacy of the proposed safety zone radii for endangered marine mammals in relation to the on land blast site, meeting threshold criteria, and the short duration of the blast event, effects on endangered marine mammals from blasting would result in a ***long term, insignificant negative effect, of national/international scale.***



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9.2.12 Waterbirds – Blasting

9.2.12.1 Research

While 14 species of waterbirds have been recorded in the nearshore waters adjacent to the Whites Point property, only two of these species, the common loon and the Atlantic puffin are considered to be at risk in Nova Scotia. Of these two species, only the common loon would be regularly found in these waters. While common loons might be present in these waters year round, they are more numerous during winter months. Numbers of common loons using the waters adjacent the property are not large. In surveys conducted between Whites Cove and the northern boundary of the property one common loon was observed during the survey conducted on June 23, 2002, two were observed on the survey of June 22, 2004 and 14 were observed during the survey of February 7, 2005. Furthermore, it is unlikely that loons using these waters during summer and winter are from the Nova Scotia breeding population that is considered to be at risk.(For more information see above sections on common loons and Atlantic puffins.)

During winter, waterfowl species, particularly common eiders, can be quite abundant in the waters adjacent the Whites Point property. During the February 7, 2005 survey of coastal waters between Whites Cove and the northern boundary of the property, 601 waterfowl of 8 species were counted, 467 of which were common eiders (see Table CC).

9.2.12.2 Analysis

Sounds of high intensity and or long duration are known to have physiological effects on the auditory system of terrestrial birds. Permanent effects may involve damage to sensory hair cells in the inner ear. Unlike mammals, replacement of damaged sensory hair cells occurs in birds although it is not clear if hearing returns to normal. In general, birds appear to be less susceptible to both TTS and PTS than are mammals (Saunders and Dooling, 1974, Ref 222).

There are almost no data on the effects of intensive sounds on the hearing of waterbirds. Furthermore, gas voids within waterbirds (e.g. lungs, sinuses, gastrointestinal tract etc.) and other aquatic fauna are susceptible to the effects of underwater sound. The most dramatic effects occur during exposure to blasts and high energy impulse noise. Yelverton et al. (1973, Ref. 226), as reported in Gisiner (1998, Ref. 217), using submerged mallard ducks (*Anas platyrhynchos*) as a surrogate for diving birds, observed that with a shock wave impulse of 35.2 psi-msec there was no eardrum rupture but there was extensive lung haemorrhage, and liver and kidney damage was observed in 50% of the test birds.

We are unaware of any guidelines for blasting in relation to use of aquatic habitats by diving birds.

9.2.12.3 Mitigation

Results of the CONWEP model indicate that with the proposed 73 m setback from the blast site, pressures not exceeding 50 kPa would be experienced at normal high water line. Blasting is to take place within three hours of low tide which further reduces maximum pressure change at shoreline to approximately 25 kPa (3.7 psi). This is substantially below the maximum pressure change criteria of 100 kPa (14.5 psi) for fish with swim bladders as put forward in the Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters (Wright and Hopkey, 1998). The swim bladders of fish are gas filled voids that may be somewhat analogous to the lungs in waterbirds. Although it would seem that pressure levels in the nearshore waters resulting from land based blasting are unlikely to cause physiological damage in waterbirds, lacking any firm guidelines, the project proposes to apply the same separation requirements for waterbirds as are being used for pinnipeds; a minimum 170 m (550 ft.) separation between waterbirds and the blast site.

An experienced onshore observer will be in place at least one hour prior to the start of the scheduled blasting to identify the possible presence of waterbirds within 170 m (550 ft.) of the blast site. The observer will be equipped with pedestal mounted 7x50 laser range finder binoculars with a plus or minus 1 m (3.3 ft.) accuracy and have communications with the blast coordinator. If waterbirds are sighted within the 170 m (550 ft.) radius, the blast coordinator will be notified and the detonation will not take place until the birds move out of the safety radius under their own volition and an "all clear" signal is given by the observer. The observer will remain in place until at least one half hour after detonations are complete to observe post blast conditions.

9.2.12.4 Monitoring

Monitoring will be conducted as proposed for marine mammals.

9.2.12.5 Impact Statement

Waterbirds – Blasting

Given the absence of guidelines for waterbirds, by the application of a proposed safety zone radius derived for pinnipeds (170 m or 550 ft.) in relation to the on land blast site, the meeting of threshold criteria, and the short duration and low frequency (once every one or two weeks) of the blast event, effects on waterbirds from blasting would result in a ***long term, insignificant negative effect, of local scale.***

9.2.13 North Atlantic Right Whale – Ship Interactions

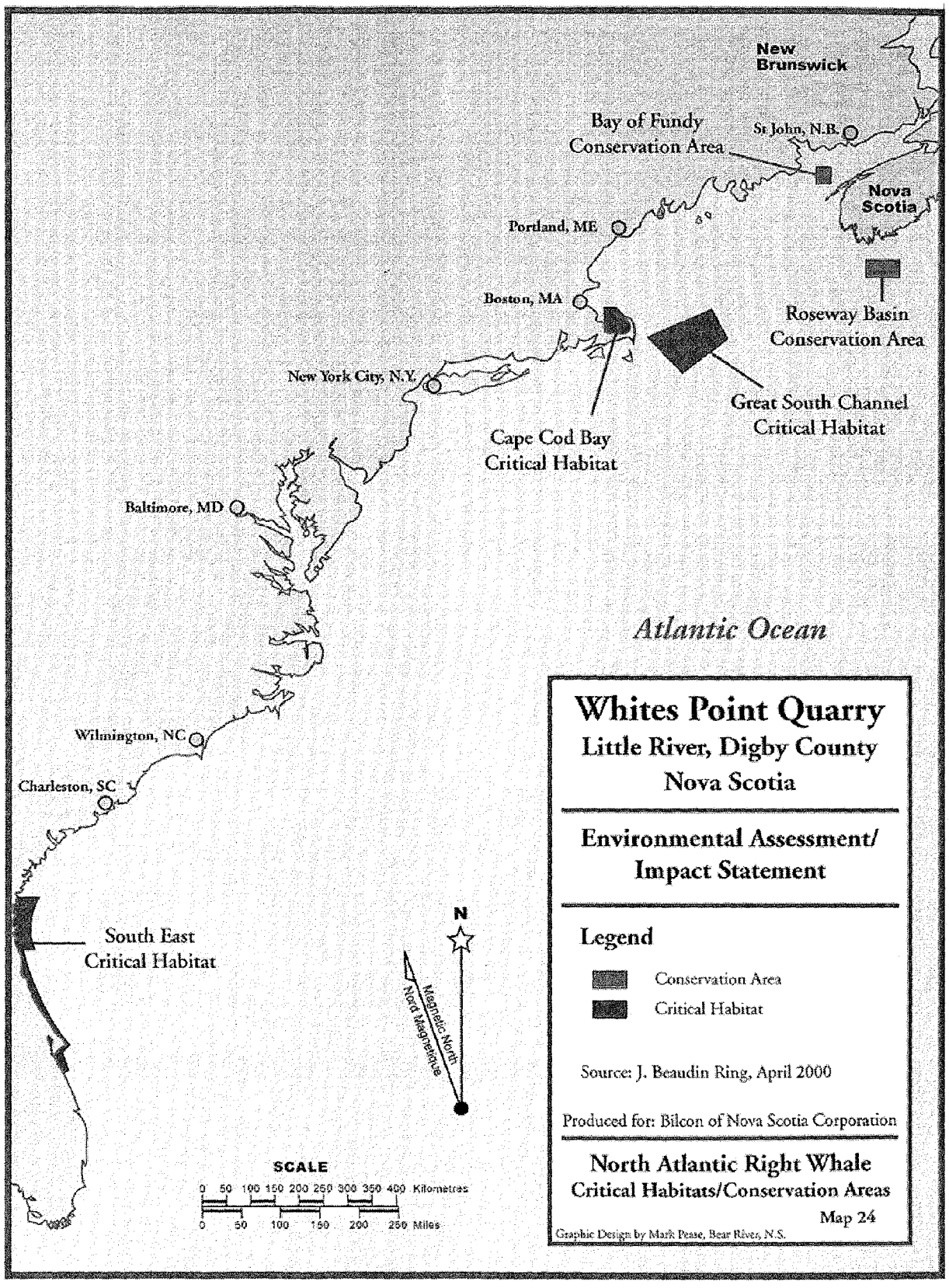
9.2.13.1 Research

The North Atlantic right whale is an endangered species with an estimated population of 300 – 350 individuals remaining. Three critical habitat areas are identified in U.S. waters and two conservation areas in Canadian waters – see **Map 24 .** The South East critical habitat is along the coastline of Georgia and Florida and is the only known calving ground for the population. Right whales are present in this area from December throughout March. The Cape Cod Bay critical habitat is a winter feeding area while the Great South Channel critical habitat, and the Roseway Basin and Bay of Fundy conservation areas are primarily summer and fall feeding grounds. The Bay of Fundy conservation area and its relation to the inbound and outbound shipping lanes is shown in greater detail on **Map 25.**

After significant research effort by the New England Aquarium et al. using transect surveys from 1987 – 2000, density mapping of right whale occurrence was compiled for the Lower Bay of Fundy/Grand Mannan Channel (Ring 2001). This was completed by developing an index of sightings per unit effort (SPUE whales per 1000 km of survey track) per three minute quadrats. This index was created by dividing the number of whales sighted by the total length of survey track. This resulted in 248 quadrats with non-zero effort but no right whale sightings (SPUE = 0) and 111 quadrats with SPUE > 0. The latter quadrats were classified into quartiles, and the upper quartile further subdivided into two classes to show more detail. Data from this research effort is displayed on **Map25.**

Effective June 1st, 1983, the International Maritime Organization adopted a traffic separation scheme (TSS) in the Bay of Fundy. This traffic separation provides for specific inbound and outbound shipping lanes through an extensively used fishing area. These lanes also significantly infringed on the Bay of Fundy right whale conservation area. The right whale is especially susceptible to ship interactions due to its slow movement and extended periods at or near the surface. Approximately 800 vessels use the shipping lanes annually with more than 600 of the largest vessels, mainly tankers, going to the port of Saint John. Other ports such as Bayside, New Brunswick, Eastport, Maine and Hantsport, Nova Scotia account for an additional 200 ships per year. In addition to the large tankers and bulk carriers; container ships, government research vessels, tugs, cruise ships, ferries, fishing vessels, whale watching boats, and recreational craft also operate throughout the Bay of Fundy.

As a result of the potential for ship interactions with the right whale, a change in the TSS and designated inbound and outbound shipping lanes was proposed. This change was intended to reduce the occurrence of ship strikes by moving the shipping lanes toward the Nova Scotia side of the Bay and further from the right whale conservation area, a primary summer and fall feeding area with the greatest density of right whales. As a result, effective July 2003, the proposed lane changes came into effect.


New Brunswick
Bay of Fundy Conservation Area
St. John, N.B.
Nova Scotia
Portland, ME
Boston, MA
Roseway Basin Conservation Area
New York City, N.Y.
Great South Channel Critical Habitat
Cape Cod Bay Critical Habitat
Baltimore, MD
Atlantic Ocean
Wilmington, NC
Charleston, SC
South East Critical Habitat
N
Magnetic North
Nord Magnétique
SCALE
0 50 100 150 200 250 300 350 400 Kilometres
0 50 100 150 200 250 Miles
Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/ Impact Statement
Legend
Conservation Area
Critical Habitat
Source: J. Beaudin Ring, April 2000
Produced for: Bilcon of Nova Scotia Corporation
North Atlantic Right Whale
Critical Habitats/Conservation Areas
Map 24
Graphic Design by Mark Pease, Bear River, N.S.

The existing shipping lanes location (pre July 2003) and the new shipping lanes location (post July 2003) in the lower and upper Bay of Fundy adjacent to the proposed Whites Point Quarry are outlined on **Map 4** .

Bulk carriers are proposed to transport basalt rock products from the marine terminal at Whites Point. These vessels will depart the inbound shipping lane, follow a designated route to the marine terminal and return to the outbound shipping lane along the same designated route. The location of the proposed route to and from the shipping lanes to the marine terminal is shown on **Map 4.** Approximately 50 inbound/outbound bulk carrier trips are anticipated at the Whites Point Quarry annually. The primary destination of the rock products is the New York/New Jersey area and more specifically the ultimate destination is South Amboy, New Jersey.

In September 2000, the "Canadian North Atlantic Right Whale Recovery Plan" was prepared by the North Atlantic Right Whale Recovery Team (Ref. 87). This plan identifies five strategies to improve the species chances of survival and recovery.

1. Reduction of Vessel Collisions. Ship strikes are thought to be the principal immediate threat to the North Atlantic right whale population.

2. Reduction of the Impacts of Encounters with Fishing Gear. Entanglement and entrapment in fishing gear is another clearly defined threat.

3. Reduction of Disturbance from Human Activities. Disturbance resulting from acoustic deterrent devices, loud underwater sounds, and vessels operating in the vicinity of right whales also pose potential threats to existing populations.

4. Reduction of Exposure to Contaminants and Habitat Degradation. Although difficult to directly associate, pollution and habitat degradation were also identified as potential threats.

5. Population Monitoring and Research. This strategy is critical to provide base information and to assess the effectiveness of the recovery plan.

9.2.13.2 Analyses

The Whites Point Quarry will generate additional ship traffic in the Bay of Fundy and the eastern seaboard of the U.S. consisting of approximately 50 bulk carriers annually. These vessels are required to use the designated inbound/outbound shipping lanes. This constitutes a 6% increase in this category of vessel traffic in the Bay of Fundy. It should be noted that this increase is based only on the estimated number of large vessels (primarily bulk carriers and tankers) and not on total vessels (fishing boats, container ships, cruise ships, ferries etc.).

If based on the latter total vessel traffic, the per cent increase is miniscule.The probability of right whale and vessel interactions was investigated by C. Taggart and A. Vanderlaan using the SPUE data previously mentioned. Vessel traffic data was then combined with the abundance distribution data to estimate a standardized probability index of a whale and a vessel being in the same place at the same time. The results of the analysis indicate the greatest probability of interaction occurs in the area of highest right whale density. Secondly, the highest relative probability of encounter increases markedly WNW of a line that extends from 44°28.5'N x 66°30.00'W to 44°36.00'N x 66°21.00'W and to 44°45.00'N x 66°16.50'W. In areas of the Bay ESE of this line, the relative probability of encounter decreases markedly (rapidly) toward zero **Map 25.**

The proposed ship route from and to the inbound/outbound shipping lanes from the proposed Whites Point marine terminal is through two quadrats of SPUE = 0 whales/ 1000km and one quadrat of SPUE >0 but<15.559 whales/1000km. The low occurrence of right whales in this area is also verified by Bilcon of Nova Scotia Corporation's Marine Mammal and Seabird Observations in 2002 which recorded no sightings of right whales in this nearshore area. Another indicator of low probability for right whales or other species of whales is the lack of whale sightings from whale watching boats frequenting this particular area of the Bay.

A factor contributing to whale mortality or severe injury as a result of ship/whale interaction is the size and speed of ships. Although all ships can cause injury, most lethal or severe injuries are caused by ships 80 m (260 ft.) or longer and traveling 26 kph (14 knots) or faster (Laist et al 2001 Ref. 130). In 33 cases of collisions causing lethal or severe injuries, 89% involved vessels moving at 26 kph or faster. The remaining 11% involved vessels moving at 18.5 to 26 kph (10 to 14 knots). No lethal or severe injuries occurred at speeds below 18.5 kph (Laist et al 2001).

Vessels arriving and departing the Whites Point marine terminal are "rule" vessels (vessels > 20 m (66 ft.) in length and > 300 gross registered tonnes (330 tons)). Therefore, for the purpose of this EIS, the possible area of effects regarding ship/whale interactions is defined as the spatial area between the designated inbound/outbound shipping lanes and the Whites Point marine terminal. Presently, there are no speed limits on vessels traveling in the Bay of Fundy waters. As mentioned previously, the location of the marine terminal in close proximity to the designated shipping lanes is considered a primary mitigation measure.

Taggart et al. (2003, Ref. 171) investigated the probability of a mortal collision of a "rule" vessel with a right whale over the 400 grid-cell domain in the Bay of Fundy over the June through October 2000 period.

Rule vessel speeds were calculated from existing data. The overall daily mean (mean of the daily means) for "rule" vessels in the shipping lanes ranged from 22 kph to 26 kph (12 to 14 knots). Vessel speeds during this time in nearshore waters between the shipping lanes and the proposed marine terminal ranged from 11 to 22 kph (6 to 12 knots) (Taggart et al. 2003 Figure 11,). Also, the relative probability of whale mortality based on "rule" vessel speed and right whale SPUE distributions for this time period is practically zero (Taggart et al. 2003 Figure 21).

Further, the overall daily mean probability of a mortal collision (if there was a right whale/vessel encounter), based on vessel speed (knots) for "rule" vessels across the 400 grid-cell domain in the Bay of Fundy over the June through October 2000 period in the area between the shipping lanes and the marine terminal is 0.0 – 0.2 (Taggart et al 2003 Figure 14). Since vessel speeds in this area already range from 11 to 22 kph (6 – 12 knots), this probability would be generally applicable to the proposed vessel traffic as a result of the Whites Point marine terminal. As a further precautionary measure, vessel speed upon departing the inbound lane would begin to be reduced. Also, upon departing the marine terminal to the outbound shipping lane, vessel speed would be gradually increased. It should be noted that the vessel's speed is the responsibility of the ships captain and dependent in part upon prevailing sea conditions.

In conclusion, the probability of a right whale/vessel encounter in the area between the inbound/outbound shipping lanes and the marine terminal at Whites Point as a result of quarry activities i.e. shipping, is highly unlikely.

It should be noted that the Roseway Basin conservation area between Browns and Baccaro Banks on the southern Scotian Shelf, has no traffic separation scheme for large vessels. The route of the bulk carrier to and from the Whites Point marine terminal will, at the ships captain's discretion, treat this as an "area to be avoided".

9.2.13.3 Mitigation

Although not a specific responsibility of Bilcon of Nova Scotia Corporation, the following mitigation measures are currently in place by Transport Canada and Fisheries and Oceans Canada. Vessels transporting rock materials from the Whites Point Quarry will use the designated inbound/outbound shipping lanes shown on the Canadian Hydrographic Chart. Also, there is presently a vessel traffic services system in operation for the Bay of Fundy and participation is mandatory for all ships more than 20 m (66 ft.) in length. The Canadian Notices to Mariners annual edition also provides detailed information about right whales in the Bay of Fundy and Roseway Basin. Vessel captains operating in the Bay of Fundy also receive regular advisories on right whale locations through Saint John vessel traffic services (Fundy Traffic).

Mitigation measures specific to the proposed ship route to and from the inbound/outbound shipping lanes may be more effectively implemented by Bilcon of Nova Scotia Corporation through direct communication with the vessel captain. This would require cooperation and communication between whale research vessels and local whale watching boats to reportsighting locations of right whales to Bilcon of Nova Scotia Corporation. Any sightings of right whales in the area would then be relayed to the vessel captain before he exits the inbound lane or leaves the marine terminal for the outbound shipping lane. This type of communication is proposed to reduce possible risk of ship/right whale interaction along that portion of the proposed shipping route. As mentioned earlier, this route will be designated.

Bilcon of Nova Scotia Corporation is also committed to cooperating with the North Atlantic Right Whale Recovery Team to improve the right whales chances for recovery.

9.2.13.4 Monitoring

Shipping activity will be monitored through existing regulatory requirements of Transport Canada. Additionally, Bilcon of Nova Scotia Corporation along with the shipping company will keep records of arrival and departure of bulk carriers to and from the marine terminal.

9.2.13.5 Impact Statement

Right Whale/Vessel Interaction – Conservation Area

Since ship traffic will avoid the Bay of Fundy conservation area, this would result in a ***long term, neutral (no) effect, of national/international scale.***

Right Whale/Vessel Interaction – Whites Point Marine Terminal

Considering the low density of right whales, the slow speed of vessels, and low probability of interactions along the route from the shipping lanes to the marine terminal, this would result in a ***long term, insignificant negative effect, of national/international scale.***

Species at Risk/Vessel Interaction – Whites Point Marine Terminal

Considering the low density of marine mammals at risk, the slow speed of vessels, and the proposed mitigation measures, this would result in a ***long term, insignificant negative effect, of national/international scale.***

9.2.14 Ballast Water

Introduction

The introduction and establishment of "invasive", "non-indigenous", "exotic" etc. marine species may adversely affect marine ecosystems. Invasive species can be transported long distances by various carriers including wildlife (migratory waterfowl and marine mammals) and various types of boats and ships. Many types of vessels from various ports of origin including fishing boats, cruise ships, ferries, tankers, bulk carriers, and container ships presently frequent Bay of Fundy waters. Species such as the now common and commercially valuable periwinkle, the European green crab, and certain species of rockweed and other marine plants were probably all introduced at some point in time to the Bay of Fundy waters.

9.2.14.1 Research

Realizing the potential for harmful effects on marine ecosystems from ballast water discharge, the International Maritime Organization (IMO) adopted RESOLUTION A. 868 (20) on 27 November 1997 entitled "Guidelines for the Control and Management of Ships' Ballast Water to Minimize the Transfer of Harmful Aquatic Organisms and Pathogens" (Ref. 66). An important aspect of these guidelines is that every ship that carries ballast water have a Ballast Water Management Plan. Also, the guidelines include management options for ballast water exchange at sea in relation to ship safety.

Subsequently, Transport Canada issued "Guidelines for the Control of Ballast Water Discharge from Ships in Waters Under Canadian Jurisdiction" as amended June 8, 2001 (Ref. 88). More specifically, Annex V of the guidelines addressing east coast waters is presently in draft form and under review (April 7, 2003). Recommended procedures in this Annex are intended to protect the integrity of all waters in the Atlantic Canadian region from risk of species introductions. Annex V strongly recommends that ballast water originating from the eastern seaboard of the U.S. south of Cape Cod or south of 42° 00' north latitude should not be released in defined vulnerable areas. The Bay of Fundy is considered a vulnerable area.

Subsequently, on June 11, 2005, proposed "Ballast Water Control and Management Regulations" were placed in the Canada Gazette (Ref. 38). These proposed regulations, in general with exceptions, apply to every ship in waters under Canadian jurisdiction that is designed or constructed to carry ballast water. Compliance with these regulations lies with the owner of a ship and the master of a ship. Items of compliance include ballast water management, ballast water exchange – transoceanic navigation, ballast water exchange – non-transoceanic navigation, ballast water exchange standard, ballast water treatment standard, sediment disposal, ballast water management plan, and exceptional circumstances and reporting procedures.

The "Ballast Water Control and Management Regulations" are proposed to come into effect early in 2006 (personal communication M. Balaban, Transport Canada – Marine Safety). These regulations would be administered by Transport Canada under the *Canada Shipping Act.*

To more clearly define the risk of introducing invasive marine species during shipping of aggregate products by bulk carrier to and from Whites Point, Bilcon of Nova Scotia Corporation engaged Mallet Research Services Ltd. to perform a risk assessment – see Carver, C.E. and Mallet, A.L. "A Preliminary Assessment of the Risks of Introducing Non-indigenous Phytoplankton and Zooplankton Species or Pathogens/Parasites from South Amboy, New Jersey (Raritan Bay) into Whites Point, Digby Neck, Nova Scotia" October 6, 2003 (**Ref. Vol. II, Tab 13**). This risk assessment is based on available information from the scientific literature and personal communications. The objective of the assessment is to evaluate the potential for transferring non-indigenous and possibly invasive species in ballast water taken on at a port in South Amboy (Raritan Bay) to the proposed port at Whites Point, Nova Scotia. First, the assessment focuses on species of concern in the South Amboy (Raritan Bay) region and secondly on evaluating the factors which may affect the risk of introduction into the Bay of Fundy at Whites Point. Further, phytoplankton and zooplankton present in Raritan Bay which are of greatest immediate concern were reviewed. These include phytoplankton associated with harmful algal blooms, non-indigenous invertebrate species (zooplankton) with a pelagic larval phase, and pathogens or parasites responsible for disease.

Additionally, Bilcon of Nova Scotia Corporation contracted a seasonal baseline survey of phytoplankton and zooplankton in the area of the proposed Whites Point Marine Terminal – see Brylinsky 2005, (**Ref. Vol. II, Tab 11**). This comprehensive baseline data collection, including larval stages, was collected as a precautionary measure and is maintained by Bilcon of Nova Scotia Corporation for future reference.

9.2.14.2 Analyses

As presented in the "alternate means" section of this EIS, the selected method of aggregate transportation is by a "common", reputable, bulk carrier such as Canadian Steamship Lines at this time. It is likely that the ship will not be a "dedicated" ship traveling to and from the Whites Point Terminal to Perth Amboy in northern New Jersey on a weekly schedule. Scheduling and ship selection would rest with the shipping company.

Therefore, Bilcon of Nova Scotia Corporation will have no control over what port ballast water is taken on or where exchanged en route to the Whites Point Terminal.

Clearly, the responsibility for ballast water management is with the shipping company, to either follow the current guidelines or comply with the pending regulations. Bilcon of Nova Scotia Corporation will contract reputable shipping companies that are following prescribed guidelines and complying with any regulations regarding ballast water control and management.

9.2.14.3 Mitigation

None proposed.

9.2.14.4 Monitoring

Due to the public and fishing industry concerns expressed regarding invasive species in the marine environment, especially as a result of ballast water discharge at the Whites Point Marine Terminal, Bilcon of Nova Scotia Corporation will conduct monitoring at the marine terminal. Monitoring in waters adjacent to the marine terminal will be conducted to provide an early detection of possible invasive species. A written report of findings will be submitted to Environment Canada upon completion of the investigations.

9.2.14.5 Impact Statement

Ballast Water

Since the responsibility for ballast water management lies with the shipping company to comply with existing guidelines and pending regulations, and ballast water exchange in designated areas, this would result in a ***long term, neutral (no) effect, of regional scale.***

9.2.15 Noise and Vibration - Marine

9.2.15.1 Research

Historical background noise levels in the Bay of Fundy were unavailable until a pilot study of 29 July 1999 in the North Atlantic right whale Conservation Area was conducted (Desharnais 2000 Ref. 108). Eleven sonobuoys were deployed in the area of the overlap of the Conservation Area and the shipping lanes. The sonobuoys were deployed to a depth of 30 m in the water column. Noise levels measured during this pilot study were in the order of 75 --80 dB re 1 mPa^2/Hz at 500 Hz and 81 – 93 dB re 1 $\mu Pa^2/Hz$ at 100 Hz.

9.2.15.2 Analysis

The 100 Hz levels are representative of moderate to heavy shipping and are similar to levels measured near the Halifax harbour approaches. Aerial surveys on the same date as the pilot project, indicate a high density of shipping in the area. The noise levels at 500 Hz were very high considering the calm conditions (light wind, sea state 1 and fog). It was therefore assumed that shipping noise was contaminating the normally wind-dominated noise levels above 200 Hz.

The frequency of shipping aggregate products by bulk carrier is once per week. Presently, only fishing boats are known to frequent the waters between the inbound/outbound shipping lanes and the Whites Point shoreline. Arrival and departure of the bulk carrier once per week during operation of the quarry will add to existing sound and vibration levels in these marine waters. Due to the close proximity of the marine terminal to the inbound/ outbound shipping lanes, the vessel will be traveling at low speed. Background noise levels are therefore expected to be less than noise levels recorded in the North Atlantic right whale Conservation Area study previously mentioned.

9.2.15.3 Mitigation

None proposed.

9.2.15.4 Monitoring

Sound and vibration level monitoring in the water column is proposed in the vicinity of the marine terminal moorings. This monitoring station will be used to record background noise levels and noise and vibration levels during arrival and departure of the bulk carrier. This background data will be used to establish baseline conditions and for any future adaptive management practices.

9.2.1.15.5 Impact Statement

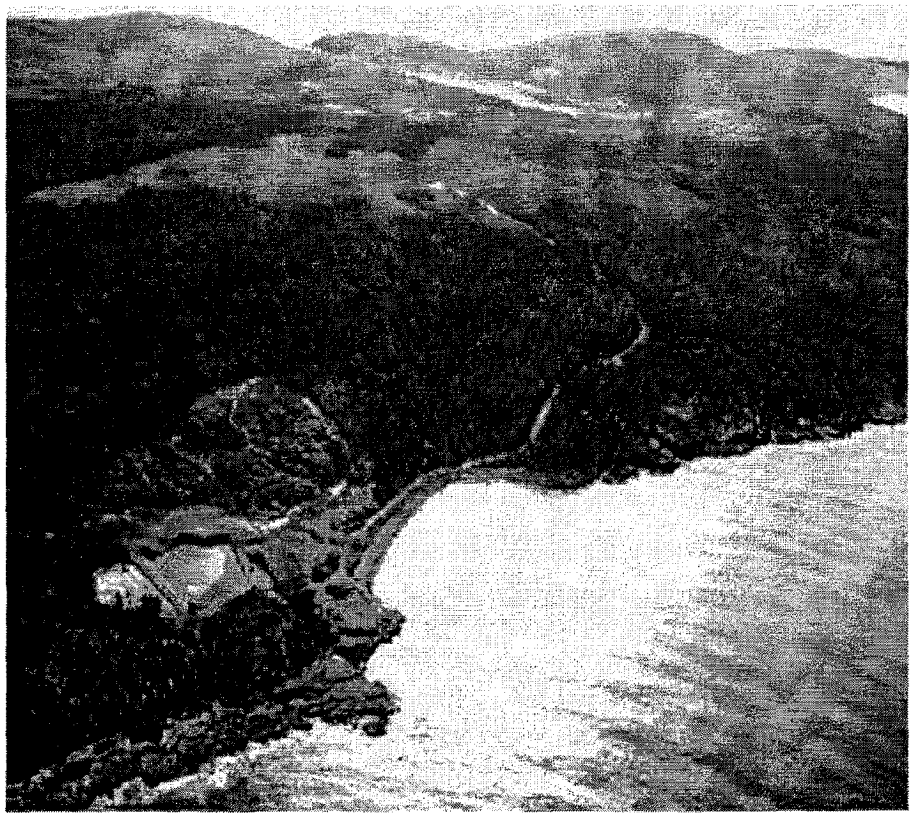
Noise and Vibration - Marine

Considering the infrequent arrival and departure, reduced speeds of the bulk carrier and existing background marine noise, effects on marine organisms from ship noise levels would result in a ***long term, insignificant negative effect, of local scale.***

VOLUME VII
CHAPTERS 9.3 To 11

WHITES POINT QUARRY & MARINE TERMINAL

ENVIRONMENTAL IMPACT STATEMENT



BILCON OF NOVA SCOTIA

March 31, 2006

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9.3 HUMAN ENVIRONMENT AND IMPACT ANALYSIS

9.3.1 Heritage Resources – Marine Archaeology

Introduction

The land area of the proposed Whites Point Quarry site is approximately 380 acres with over 9 miles of coastline along the Bay of Fundy. The property is steeply sloping to the Bay of Fundy. Basalt bedrock outcrops are evident and overlain with a thin soil layer and a dominant softwood forest cover. The basalt bedrock extends into the intertidal zone and nearshore waters of the Bay. Most of the shoreline is massive basalt outcrops, except for Whites Cove which has a cobble beach. An abandoned pit/quarry exists on land near Whites Cove and approximately 60 acres of forest was recently clear cut along the southeast property line. The remains of a boat skidway exists in the intertidal zone at Whites Cove. No buildings or other structures presently exist on the property (PID 30161160).

Heritage resource investigations on the Whites Point Quarry property were conducted during the summer and fall of 2002. Investigations included both literature and on-site research. On-site land and nearshore water survey locations are shown on **Map 27**. The principal investigator was Charles R. Watrall, Ph.D., Archaeologist assisted by Barry Moody, Ph.D. Historian. Nearshore underwater surveys were conducted by Canadian Seabed Research Ltd. with data interpretation by Robbie Bennett, Marine Geophysicist. Data compilation and assessment was performed by Charles R. Watrall and carried out under Heritage Research Permit No.A 2002NS36 – Category C (Watrall 2003 **Ref. Vol. VI, Tab 35**).

9.3.1.1 Research

Literature and on-site investigations were conducted regarding possible marine archaeology in the nearshore waters at Whites Cove/Whites Point in the area of the proposed marine terminal. The Maritime Archaeological Resource Inventory site files indicate Paleo – Indian and Archaic material (i.e. pre 600 B.C.E.) materials have been recovered from below water levels in the Bay of Fundy. More specifically, a stone implement called an ulu, which stands in Inuktituk for "women's knife" was found in 1977 in the Bay of Fundy near Sandy Cove. Both David Christianson of the Nova Scotia Museum and David Keenlyside of the Canadian Museum of Civilization have examined the ulu.

Subsequent to the discovery, further investigation of the Bay of Fundy bottom using multibeam bathymetric imaging has been conducted. This investigation confirms the presence of a large underwater ridge extending into the Bay from the Sandy Cove shoreline. Based on historic sea level interpretation, this ridge was a land mass during the time period of the ulu. With such a major morphological feature protruding from the coast, an excellent haul-out location for early humans would be provided. The discovery of walrus tusks and other bones by scallop fishermen in this area supports the idea that this ridge may have been a natural haul-out location for walrus and a prime hunting ground for early peoples.

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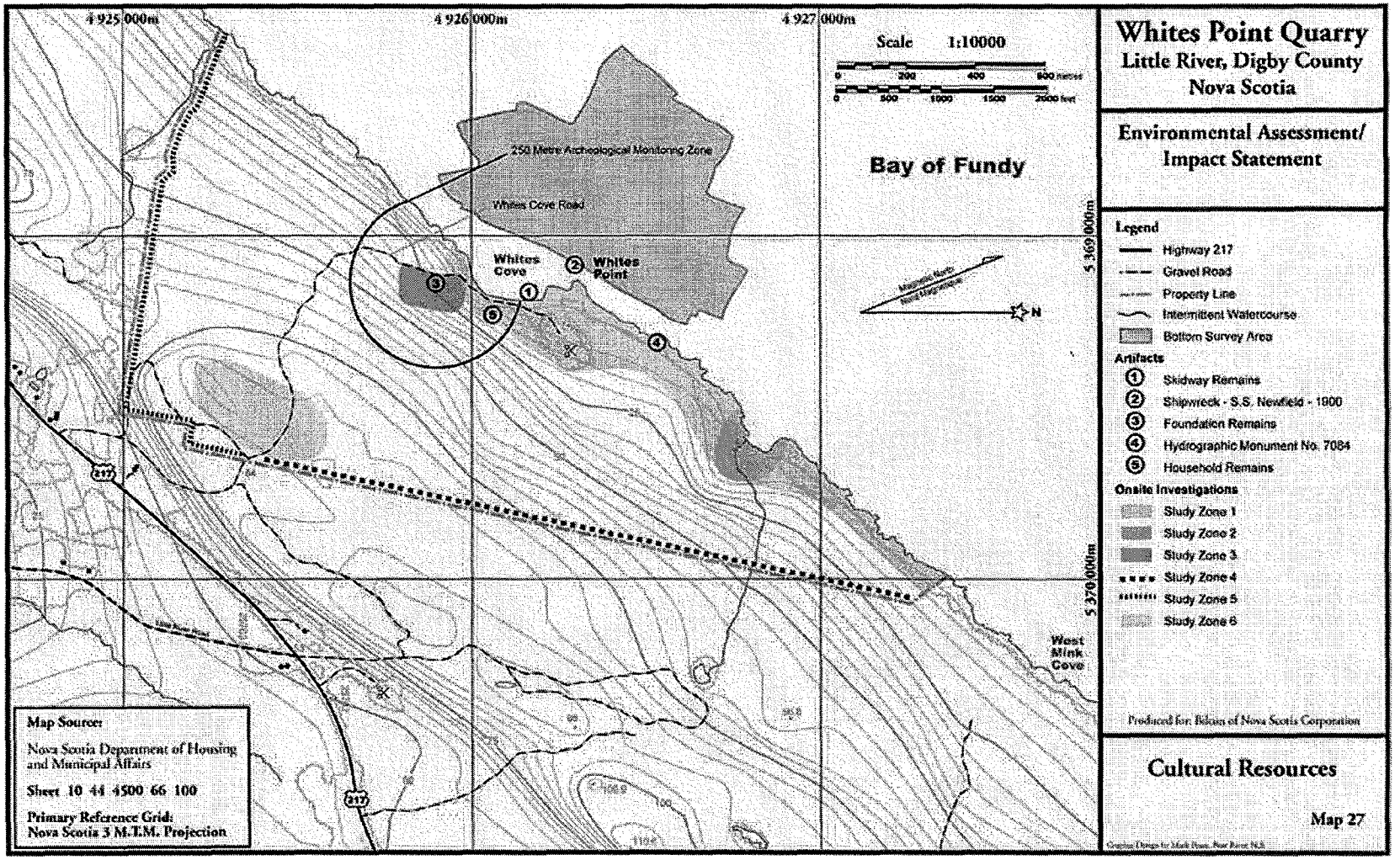

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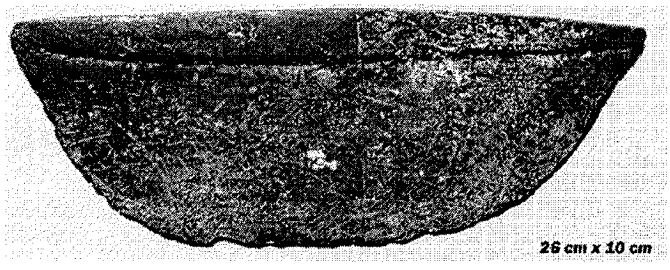
More detailed explanations concerning the ulu discovery are contained in the following reference (Atlantic Marine Geological Consulting Ltd. 2005 **Ref.Vol. III, Tab 14**). Generally however, early settlement patterns are reported in more sheltered areas of the Bay of Fundy and Saint Marys Bay rather than the exposed Whites Cove/Whites Point coastline.

Review of available lists of shipwrecks in Nova Scotia waters turned up only one wreck in the Whites Cove area. On September 22, 1900, the Canadian government steamer Newfield, while provisioning lighthouses along the Fundy coast, ran aground in heavy fog at the entrance to Whites Cove. The Newfield was an iron vessel built in Sunderland in 1871, of 500 tons net and 785 tons gross and was 206 feet in length.

During the summer of 2002, underwater marine investigations of the nearshore at Whites Cove/Whites Point were conducted by Canadian Seabed Research Ltd. The extent of the underwater geophysical survey is shown on **Map 12** and includes the nearshore area of the proposed marine terminal. Side scan sonar data was collected within this area using a Klein 595 system operating at 100 kHz. Also, two seafloor video transects were taken in this area using a Sony DCR-TRV20 video camera.

9.3.1.2 Analysis



The discovery of a rare artifact, an ulu, to the north of the proposed Whites Point Quarry and Marine Terminal suggests other artifacts may occur in this region. Also, the discovery of the unusual seabed ridge and sea level history provides a morphological and temporal framework for understanding the paleogeography of the region. As stated in the reference document prepared by Atlantic Marine Geological Consulting Ltd. (**Ref. Vol. III, Tab 14**) "The large ridge (former beach) that occurs to the north of the proposed marine terminal offers the highest potential in the region for the discovery of marine artifacts. It is unlikely that artifacts will be discovered at the marine terminal location as the seabed is uniform and presents no unique morphological or sedimentological characteristics".

The Newfield shipwreck on September 22, 1900 was the only recorded wreck in the area of the proposed marine terminal. On September 28, 1900, the wreck was sold at public auction, and purchased by Edward Lantalum of Saint John, New Brunswick for $250.00.

The public auction and salvage indicates the vessel and remaining contents were removed from the site. Also, analysis of the side scan sonar and video of this bottom area, which was done in association with geophysical investigations, revealed no shipwreck-like features (personal communication – Robbie Bennett, Canadian Seabed Research Ltd.).

9.3.1.3 Mitigation

Prior to construction of the marine terminal and after pile footprint seabed areas are finalized, an application for archaeological investigation of the nearshore waters will be made to the Nova Scotia Museum. Professional divers trained in archaeological techniques will conduct the investigations. The proposed methodology for the investigation will be coordinated with the Nova Scotia Museum and include a systematic, grid based, diver observation and photographic assessment. If any evidence of marine artifacts is observed, the Nova Scotia Museum or other appropriate authorities will be notified. Construction will not commence until mitigation measures are determined in consultation with the Nova Scotia Museum and implemented by Bilcon of Nova Scotia Corporation.

9.3.1.4 Monitoring

After any required mitigation measures are completed, no monitoring will be undertaken.

9.3.1.5 Impact Statement

Marine Archaeology

Since it is unlikely that artifacts similar to the ulu exist in the construction area of the marine terminal and no shipwrecks are known to exist in the nearshore waters of Whites Point, and feasible mitigation measures will be undertaken by Bilcon of Nova Scotia Corporation, this would result in a ***short term, neutral (no) effect, of local scale.***

9.3.2 Heritage Resources - Land Archaeology

9.3.2.1 Research

Review of "Protected Sites" administered by the Nova Scotia Department of Tourism, Culture, and Heritage under the Special Places Protection Act includes five sites designated in Nova Scotia to date. None of these sites are located in Digby County.

Regional and local background research consisted of consultation with archaeologists and the Algonquin ethnographic specialist on staff at the Nova Scotia Museum of Natural History. The Maritime Archaeological Resource Inventory site files at the Museum were also examined. Literature review of an ethnographic and archaeological nature included Erskine's "Memoirs on the Prehistory of Nova Scotia 1957 – 1967", ed. by Michael Deal.

An archaeological field reconnaissance strategy for the Whites Point Quarry site was developed by the principal heritage resource investigator (Dr. Charles Watrall) in consultation with archaeologists on staff at the Nova Scotia Museum. This strategy identified six zones within the proposed quarry site having a higher probability of potential cultural materials. These six study zones are shown on **Map 27**.

On-site field reconnaissance involved surficial visual examination of each zone and shovel testing of areas exhibiting potential soil disturbance or artifact presence. In general, the study zones included:

Study Zone #1 – the beach zone north and south of Whites Cove

Study Zone #2 – the stream north of Whites Cove

Study Zone #3 – the "Hersey House" foundation area

Study Zone #4 – the eastern property line

Study Zone #5 – the southern property line

Study Zone #6 – the southeastern upland area

9.3.2.2 Analysis

More specifically, on-site investigations of the six study zones revealed the following:

Study Zone #1 which included the coastal zone north and south of Whites Cove is comprised primarily of basalt boulders and outcrops of basalt rock shelves. This area was examined for prehistoric cultural materials such as lithic materials for prehistoric stone tool manufacture and the presence of pictographs and/or petroglyphs.

Subsoil examination of the cut bank along most of the northern beach area allowed for search of buried soil horizons, possible midden materials (i.e. shellfish remains, and/or fish and sea mammal remains), and prehistoric cultural remains. No faunal remains, cultural artifacts, potential lithic materials, or the presence of pictographs and/or petroglyphs, or buried soil horizons were found. In summary, no evidences of either surficial or subsurface cultural activity were found in Study Zone #1. In this regard, no further archaeological investigation is warranted in this area.

Study Zone #2 concentrated on the intermittent stream entering the Bay of Fundy north of Whites Cove. Surface examination and shovel tests revealed no evidence of prehistoric materials in this area. In this regard, no further archaeological investigation is warranted in this area.

Study Zone #3 concentrated in and around the possible "Hersey House" foundation. The surface area was examined for artifacts including any possible nearby refuse disposal area. A series of twelve shovel tests were conducted near the boulder foundation, within the pit area, and in the surrounding area. No artifact materials were found during visual and shovel test investigations. However, along the cut bank of the Whites Cove Road near the possible foundation site, four artifacts (2 broken glass fragments and 2 ceramic fragments) were recovered. The artifacts would all seem to date from the latter part of the 19th century. Based on the information available, the foundation site probably also dates to the latter part of the same century. The possible house feature is lacking in significant historical association, significant artifact or structure recovery and any unique functional interpretations. In this regard, no further extensive archaeological investigation is warranted in this area.

Study Zone #4 comprises the eastern property line of the proposed quarry site. Field reconnaissance along this property line transect consisted of visual search for soil surface irregularities indicating cultural activity and surface artifactual materials. Also, a series of shovel tests were performed along the transect at paced ten to fifteen m intervals. No cultural remains or artifact materials were found during these investigations. In this regard, no further archaeological investigation is warranted in this area.

Study Zone #5 comprises the southern property line of the property. Field reconnaissance along this property line transect consisted of surficial visual examination for cultural activities, disturbed soil profiles and artifact materials. Also, a series of shovel tests were performed along the transect at paced ten to fifteen m intervals. No archaeologically relevant materials were noted during any of these investigations. In this regard, no further archaeological investigation is warranted in this area.

Study Zone #6 comprises a relatively flat upland area at the southeastern portion of the property which was recently clear cut. This area was visually examined and a random pattern of shovel tests was performed. No cultural features or artifacts materials were found during this examination. In this regard, no further archaeological investigation is warranted in this area.

As stated in the reference document prepared by Dr. Charles R. Watrall **(Ref. Vol. VI, Tab 35)**:

"No paleontological materials were found during this investigation".

"No prehistoric cultural materials were found on the development site during this investigation. This included an absence of any recorded sites in pre-existing data files (i.e. Maritime Archaeological Resource Inventory Nova Scotia Museum) located on or in the immediate vicinity of the development site".

"No prehistoric or historic period aboriginal materials were found during the field investigation of this study. This included a total absence of lithic artifacts or the presence of suitable materials for their production, the absences of any pictographic or petroglyph materials, and the absence of faunal materials constituting either prehistoric midden activities or later historic sea mammal hunting (i.e. late historic porpoise oil extraction activities)".

" It should be further stated that while the Whites Point/Whites Cove property did not in this study evidence any aboriginal materials, the pattern of sites in this region would indicate an aboriginal preference for locations having significantly different characteristics (i.e. calmer marine estuaries and bay and or shallow water shellfish resources)".

The Archaeological Resource Impact Assessment of the Whites Point Quarry site under the terms of the Heritage Research Permit (A2002NS36) was reviewed by the Nova Scotia Museum. Their letter of May 14, 2003 (Appendix 28) accepts this report "as an acceptable archaeological impact assessment of the location for the proposed quarry". Further, in response to an addendum to the original document, the Nova Scotia Museum in their letter of April 20, 2004 (Appendix 28) indicates "This additional information completes the requirements for the report and no further information is required". Recommendations made by the Nova Scotia Museum are included in the following sections under "Mitigation" and "Monitoring".

9.3.2.3 Mitigation

As recommended by the Nova Scotia Museum, if the "Hersey House" foundation cannot be avoided during quarry operations, further archaeological recording and limited testing will be done prior to any impacts. The "Hersey House" foundation is located within the proposed 30 m environmental preservation zone for the quarry project. Other possible structure locations such as "fish shacks" are also presently located within the environmental preservation zone proposed along the coastline.

Before construction of the quarry infrastructure and operation, an educational briefing concerning archaeological/historical resources will be conducted for quarry employees. If any evidence of archaeological materials or human remains is discovered during construction or operation, the Nova Scotia Museum or other appropriate authorities such as the local detachment of the Royal Canadian Mounted Police will be notified. Construction will not recommence until the artifacts are evaluated by the Museum and permission is granted by the Museum to resume work. Additionally, a local site archaeologist is on call if immediate situations arise.

9.3.2.4 Monitoring

As recommended by the Nova Scotia Museum, archaeological monitoring within a 250 m zone around the "Hersey House" foundation will be undertaken by Bilcon of Nova Scotia Corporation as part of their overall environmental monitoring program. The Nova Scotia Museum recommends this 250 m zone since any family plot burials, if present, would probably be within this zone. Since the "Hersey House" foundation is within 250 m of the four hectare quarry area, this zone has already been implemented by Bilcon of Nova Scotia Corporation.

If significant heritage resources are discovered, an appropriate monitoring or recovery program will be developed in consultation with the Nova Scotia Museum.

9.3.2.5 Impact Statement

Land Archaeology

Since no archaeological/cultural resources are known to exist on or near the Whites Point quarry site, this would result in a ***long term, neutral (no) effect, of local scale.***

9.3.3 Aboriginal Land and Resource Use

9.3.3.1 Research

Bear River First Nation – L'setkuk – in Annapolis County, and also known as Muin Sipi, is composed of Bear River #6, 633.8 hectares in size, located 17.6 kms southeast of Digby and established on March 3rd, 1820; Bear River #6A, 31.2 hectares in size, located 9.6 kms southeast of Annapolis Royal and established March 3rd, 1938; and Bear River #6B, 24.3 hectares in size and located 6.4 kms southeast of Annapolis Royal and established October 1st, 1962.

As of April 2004, the population was 272 with 101 living on-reserve and 171 living off-reserve. From December 7th, 2003 to December 7th, 2005, the Chief is Frank Meuse and the Band Councillors are Stephen Edward Meuse and Dawn McEwan.

Very early in the environmental assessment process, and before an application was made under the Navigable Waters Protection Act triggering federal involvement, Bilcon recognized that Aboriginal Traditional Knowledge should be considered in any environmental impact assessment of the Whites Point project.

Accordingly, contact was made in October 2002 with the Confederacy of Mainland Mi'kmaq with respect to a Mi'kmaq Knowledge Study (MKS). Bilcon was advised by Michael Cox, Director of Lands, Environment and Natural Resources, that the current staff were fully booked at that time, but that a start could be made in the early part of 2003. However, Mr. Cox also advised that he would have to seek permission from the Ethics Committee in order to proceed.

In late 2002, Mr. Cox advised Bilcon that a conflict had arisen and the Confederacy were no longer willing to carry out the MKS for Bilcon, but that the Confederacy were in fact carrying out an MKS on behalf of the Bear River First Nation and that he would make this study available to Bilcon at the end of March 2003. Numerous attempts were made to contact the Chief of Bear River First Nations in an attempt to identify and resolve any conflict but these attempts were unsuccessful and the issue remains unresolved.

Contact was maintained with Mr. Cox to discuss timing, since by January 6th, 2003, Bilcon has been advised that a Comprehensive Study Report would be required for the project which would certainly include the requirement for an MKS.

Correspondence from the NSDEL on March 13th, 2003, indicated that they had had a request on behalf of First Nations' interests with respect to a botanical survey which led Bilcon to believe that an MKS was underway. This was confirmed by Mr. Cox who further indicated that he would make the study available to Bilcon by the end of March 2003.

In June of 2003, Bilcon was advised that it would be required to undergo a Panel Review of the project, confirming the requirements for an MKS.

In April 2004, contact was made with the Bear River First Nations and an information session took place at the Bilcon office in Digby on April 16th, 2004. Councillors Meuse and McEwan and the Economic Development Manager, Robert McEwan, respecting the Bear River First Nations and Bilcon project staff, including William Clayton Sr. and William Clayton Jr., the Project Manager, Paul Buxton, and Kristy Herron (Communications) were in attendance. The Chief was not able to attend but there was an excellent exchange of views, with the Councillors being particularly interested in job opportunities and training programs. Agreement was also reached that Bilcon could hold an information session at the Bear River First Nation Cultural and Heritage Centre.

This information session took place on January 11th, 2005, and following prayers and a smudging ceremony, a brief presentation was made by the Project Manager, followed by a lengthy question and answer session. Jobs and training were major topics, along with the issue of reclamation, the size of the development, and the potential impact on whales.

Following the release of the "Draft Guidelines for the Preparation of the Environmental Impact Statement for the Whites Point Quarry and Marine Terminal Project" in November, 2004, an undated letter (Appendix 15) was received from Donald M. Julien, O.N.S., of the Confederacy of Mainland Mi'kmaq and copied to the Panel Manager inter alia. This letter refers to the requirement to "identify the lands and resources of specific social, cultural, or spiritual value to Aboriginals of Nova Scotia with focus on current use of lands and resources for traditional purposes" and indicates that the Confederacy would look forward to discussing the possibility of submitting a full proposal to Bilcon for an MKS for the project.

Bilcon immediately responded to this letter indicating that it would be very pleased to discuss such a proposal.

On January 10th, 2005, Mr. Julien replied that the Confederacy had been made aware of a potential conflict that would not allow the Confederacy to prepare the MKS (Appendix 15).

On January 21st, 2005, Bilcon was provided with information by the Confederacy on two other groups who could be approached regarding an MKS.

In February 2005, contact was made with Thomas Johnson, Director of Operations, Eskasoni Fish and Wildlife Commission, who indicated that they could prepare an MKS for Bilcon and requested digital files to be forwarded in order that they could prepare an estimate. Follow-up discussions indicated that a problem had arisen over the issue of a Cape Breton group becoming involved with an MKS on the mainland and no proposal was submitted.

Contact was again made with Mr. Cox in March 2005, and it became apparent that an MKS was being prepared by the Confederacy and it was indicated that Bilcon would be provided with a copy upon its completion. As of November 2005, no copy has been received by Bilcon.

The above abbreviated chronology indicates that Bilcon has pursued the preparation of an MKS for three years, but has not had success in producing such a reference document. Nor has any consultation taken place with Aboriginal First Nations in the project area, althoughtwo information sessions did take place. In discussions with Eric Zscheile of the new organization Kwilnuk Maw-klusaqn (Mi'kmaq Rights Initiation) in the spring of 2005, Bilcon was advised that the position being taken was that consultation with First Nation groups could only be undertaken by the federal government with Kwilnuk Maw-klusaqn.

Bilcon assumes that the completed MKS will be presented to the panel at which time it will be available to Bilcon. Bilcon will review the MKS and respond to any concerns raised.

Addendum to 9.3.5.1

On January 10th, 2006, a report entitled "*The Mi'kmaq Use of Oositookum (Digby Neck), Its Surrounding Waters, and The Mainland Shore of St. Mary's Bay*" (Appendix 16) was submitted to the Panel by the Confederacy of Mainland Mi'kmaq (CMM). Participant funding was received by CMM for the preparation of this report.

The Background section of the report notes:

"This study is not consultation for justification of the infringement of constitutionally protected aboriginal and treaty rights."

The study Summary is as follows:

The Mi'kmaq have used Oositookum (the Neck), and its surrounding waters, and the mainland shore of St. Mary's Bay since before the arrival of Europeans and continue to use the area for traditional purposes to this day.

Some Mi'kmaq land and resource-use sites have taken place and continue to take place in close proximity to the proposed project, including the historic Indian Hill Camp, situated at the northeast section of the present Whites Cove lot where moose and porpoise were hunted, and the heavy present day fishing in the waters surrounding the Neck.

It is also important to note that because of the high degree of use that has taken place in the area over the centuries, the possibility of pre-contact burial sites in the project area should not be ruled out.

Anecdotal information regarding the use of the Indian Hill Camp was received from Debbie Smith (granddaughter of George Washington Hersey) regarding use of the area by Mi'kmaq in the hunting season.

Archaeological sites in the area (Digby Neck and the mainland of St. Mary's Bay) are noted. Specific to the Project area are the site near Tiddville and the site off Sandy Cove where an ulu was discovered (see **Ref. Vol. III, Tab 14**).

Under Current Mi'kmaq Land and Resource Use, it is noted that:

There is significant traditional current Mi'kmaq use in Oositookum (Digby Neck) and its surrounding waters.

In the waters surrounding Digby Neck in the Bay of Fundy and in St. Mary's Bay, haddock, lobster, halibut, trout, pollack, mackerel, herring, scallop, and crab are harvested. Current fishing activities are heavy in all waters surrounding the Neck, but are particularly concentrated in the northern waters of St. Mary's Bay and along the mainland shore near Meteghan.

There are group campsites and an overnight site at several locations on the Neck, including in the north near Waterford and near Sandy Cove.

Harvesting on the Neck has taken place for wood, stones and clay, food plants, berries, wild fruit, quills and seashells.

Duck, and deer have been hunted on the Neck, and there is one moose kill site near Lake Midway.

9.3.3.3 Project Impacts

An archaeological survey was carried out on the specific quarry site (**Ref. Vol. VI, Tab 35**) under a permit from Nova Scotia Museum and no evidence was discovered with respect to aboriginal camp sites or other aboriginal use.

However, notwithstanding the lack of evidence, Bilcon has agreed that, should any artifact be discovered during the clearing and grubbing operation, all work will be stopped in the area until an investigation is carried out by a qualified archaeologist under the direction of Nova Scotia Museum.

It is acknowledged that the waters of the Bay of Fundy and St. Mary's Bay are fertile fishing grounds and that there is considerable use of these areas by fishers. However, Bilcon has noted elsewhere in this EIS that the only impact on the fishery will be to the lobster fishers in close proximity to the marine terminal with respect to possible trap loss. Compensation for trap loss has been proposed.

9.3.4 Heritage Resources - History

9.3.4.1 Research

Literature research was conducted to establish early European settlement patterns on Digby Neck and the Little River area (Moody 2002 **Ref. Vol. VI, Tab 33**). There is no indication of settlement during the first century of French occupation of Nova Scotia as the Acadians generally sought the low tidal marshes on which to build their dykes and establish their farms. Digby County, especially the exposed Fundy shore offered little opportunities to the French settlers. Likewise, the first waves of English-speaking settlers bypassed the Digby Neck. It was not until 1783 – 1784 with the influx of the United Empire Loyalists, refugees of the American Revolution, that the communities of Digby and Weymouth were established and became the main Loyalist centres in the region.

Among the more prominent of the Loyalists to settle in Digby at this time was Lieutenant – Colonel Joseph Barton of New Jersey. However, Joseph Barton died in 1788 shortly after his settlement in Digby. Thereafter, his heirs gained the land originally granted to their father in 1784 plus an additional 1250 acres including a 300 acre lot on the Fundy shore, near Little River, designated Farm Lot 11 in Division N. Thus, the Barton property comprises the bulk of the present quarry site while the remaining portion was originally part of the grant to William Addington, who was also a Loyalist, from the Carolinas.

It would appear that at least for the first half of the 1800's, no permanent homes existed on the property. This is essentially born out by Church's Map of Digby County circa 1864 which shows no houses in the vicinity of Whites Cove. However, during the latter part and to the end of the 1800's, there is evidence of possibly four families residing at Whites Cove and of lands with "fishing privileges". These families probably included an extended Hersey family and that of Alonzo Morehouse. It would appear that by the early 1900's, permanent human occupation ended in the Whites Cove area. Whites Cove probably continued to be used by fishermen up to the 1950s as evidenced by the remains of a skidway and a concrete slab possibly used to mount a winch to haul boats up on shore. Also, an undated photo presumably of a fish shed at Whites Cove with buoys is possibly of the early to mid 1900s time period.

9.3.4.2 Analysis

Newspaper reports indicate deaths of Whites Cove residents occurred in the late 1800's. However, research indicates no order relating to the proposed quarry property had been made or is on deposit at the registry of deeds indicating the property was set apart or used as a place for the burial or permanent placement of human remains. Also, review of the cemetery registry for Digby County revealed no cemetery located on the property. Intensive on-site investigations indicated no evidence of tombstones, grave markers, or other monuments located on the property. This is not to say that unmarked graves could not exist on the property.

Research to date indicates that there is no evidence of a "cemetery" or an "abandoned cemetery", as defined in the Cemeteries Protection Act on the proposed quarry property.

Historic materials dating from the late 1800s to mid 1900s including the possible "Hersey House" foundation, two fish sheds and a boat skidway, the latter identified on a 1933 survey plan, indicate little permanent settlement on the site. Any permanent human occupation of the site probably occurred briefly during the 1860 – 1900 time period and consisted of possibly four families. Based on this information, land use during the above time period would not constitute a "village" context.

As stated in the reference document prepared by Dr. Barry Moody, "This brief examination of the history of the piece of land under consideration (the proposed Whites Point Quarry site) would indicate that it possesses no special historical significance. Its history, while interesting, is similar to that of many other such properties in the county".

9.3.4.3 Mitigation

As previously mentioned, before construction and operation of the quarry, an educational briefing concerning archaeological/historical resources will be conducted for quarry employees. More specifically, if any resources are uncovered such as potential human remains, procedures outlined in the Cemeteries Protection Act will be followed. Also, a local archaeologist is on call if immediate situations arise. In particular, if the "Hersey House" foundation area is disturbed by quarry operations, further archaeological recording and limited testing will be done in consultation with the Nova Scotia Museum. Also, photographic documentation of the skidway will be completed.

9.3.4.4 Monitoring

If significant heritage resources are discovered, an appropriate monitoring or recovery program will be developed in consultation with the Nova Scotia Museum.

9.3.4.5 Impact Statement

Historical Resources

Since only limited historical/cultural resources of local interest are known to exist on the Whites Point Quarry site, this would result in a ***long term, insignificant negative effect, of local scale.***

9.3.5 Heritage Resources - Heritage Properties

9.3.5.1 Research

Two categories of heritage properties exist in Digby County. Provincially registered properties and municipally designated properties. Review of the Municipality of the District of Digby's Heritage Properties indicates no registered or designated heritage properties exist on the Whites Point quarry property. Several provincially registered properties are located in nearby communities (Sandy Cove and Little River). Also, review of Digby Municipal Heritage Properties indicates a number of heritage properties have been designated on Digby Neck, the closest to the Whites Point Quarry property being located in Little River, Mink Cove, and Sandy Cove.

9.3.5.2 Analysis

Registered and designated heritage properties are located on Digby Neck. Since the quarry operation is not visible from Highway #217, no negative visual influences on heritage/cultural tourism travelers would result. Also, view planes from existing heritage properties would not be affected since the quarry is not visible from any of the registered or designated heritage properties.

9.3.5.3 Mitigation

The entrance road (Whites Cove Road) to the quarry property from Highway #217 is proposed to be upgraded and landscaped to maintain existing rural aesthetic qualities. Upgrading of the Whites Cove Road, since it is a public road, would be coordinated with the Nova Scotia Department of Transportation and Public Works.

9.3.5.4 Monitoring

Since no visual effects will result from the quarry operation in relation to heritage properties or cultural/heritage tourists traveling along Highway #217, monitoring is not proposed.

9.3.5.5 Impact Statement

Heritage Properties

Since there are no registered or designated heritage properties located on the quarry property and the quarry is not in a view plane from an existing heritage property, this would result in a ***long term, neutral (no) effect, of regional scale.***

9.3.6 Aesthetics

9.3.6.1 Research

Several years ago Highway #217 was designated the "Digby Neck and Islands Scenic Drive" from Digby to Brier Island. The two-lane highway is generally located down slope and east of the ridge along Digby Neck with the Bay of Fundy to the west and St. Mary's Bay to the east. Views of the Bay of Fundy are not present from Highway #217 while St. Mary's Bay is visible from a few locations along the highway as it passes through Digby Neck. Many large tracts of forest have been clear-cut on Digby Neck and are visible along the highway as spruce trees infested with the spruce bark beetle have been harvested.

The site of the proposed Whites Point Quarry property lies between Highway #217 and the Bay of Fundy – see **Map 2**. Highway #217 generally parallels the 50-m contour elevation in this area and lies east of the Digby Neck ridge. Residences are located on either side of the highway in a rural setting. The horizontal distance between the highway and the quarry property varies from 150 m to over 700 m. A vertical change in elevation from the highway upslope to the top of the ridge and the quarry property line varies from 15 m to over 40 m. The working area of the quarry will be located on the western slope of Digby Neck and down slope from the ridge to the Bay of Fundy shore.

The highest density of residential development adjacent to the proposed quarry is in the community of Little River. The approximate number of residences in zones of 500 m from the quarry property is presented below.

	0-500m	500-1000m	1000-1500m	1500-2000m
Residences	9	38	40	5

North and south along Highway #217 beyond the 2000 m zone there is sparse residential development typical of the 1500 – 2000 m zone.

Whale and seabird cruises have become popular ecotourism attractions on the Bay of Fundy and St. Mary's Bay. Presently, cruises originate from East Ferry, Tiverton, Freeport, and Brier Island during the tourist season. The peak tourist season (June – September) generally coincides with the season when the most whales appear in the Lower Bay of Fundy. Operators offer daily cruises during the summer months. Popular whale and seabird watching areas are shown on **Map 4.** Other than whale and seabird cruises, the Lower Bay of Fundy experiences little recreational boating activities such as sea kayaking, sailing, or pleasure cruising, when compared to the Atlantic coast.

The nearest pleasure craft marina is in Digby, approximately 40 km from the Whites Point Quarry site. However, the Digby marina does host pleasure craft from the United States and the Saint John, New Brunswick area. Most of the water use in the vicinity of Whites Point is by commercial fishermen.

Investigations regarding the popular whale watching areas on the Bay of Fundy during the summer of 2002 revealed little activity from the whale and seabird cruises in the Whites Point near shore area. Weekly observations during July and August for whale sightings conducted from Petite Passage to Sandy Cove indicated little whale activity in this area of coastline and near shore. Actually, only three Minke whales were sighted during these observation trips. The endangered North Atlantic right whale is a big attraction for whale watchers with the greatest concentration of right whales occurring in the Right Whale Conservation Area immediately southeast of Grand Manan Island – see **Map 25.**

The working area of the quarry will be located on the western slope of Digby Neck and down slope to the Bay of Fundy shore. The quarry property extends approximately 2.6 km along the Bay of Fundy coastline. A marine terminal will be located at the quarry site and will provide mooring for bulk carriers to transport the quarry products to export markets. The marine loading facilities will extend approximately 200 m from the shoreline into the Bay waters. On shore support facilities include buildings, crushers, fuel tanks, load out conveyors, and quarry operating equipment.

9.3.6.2 Analysis

Due to the horizontal set back and vertical change in elevation, the quarry will not be visible from Highway #217 nor from residential dwellings located along the highway. Additionally, a 30 m wide environmental preservation zone will be located within the quarry property along all property lines adjoining the quarry property. This will act as a further visual buffer zone in relation to existing adjoining properties as well as for environmental purposes – see **Figure 7.** It should also be noted that there will be an approximate 1000 m separation from the quarry processing plant to the nearest residence within the 0 – 500 m property boundary zone.

However, the proposed onshore infrastructure and marine terminal development will be visible from the Bay of Fundy waters. The onshore infrastructure required for the quarry operation will be located on approximately 10 hectares of land area. Nearshore infrastructure required for the marine terminal will require an additional 3 hectares. Permanent land infrastructure will comprise about 7 % of the total 152-hectare quarry site and be in place over the life of the project. A minimum 30-m environmental preservation zone will be located landward from the ordinary high water level of the Bay along the entire 2600-m water frontage thus maintaining the natural character of the landward shoreline. The marine facility will not be the typical massive sheet pile wharf structure common to container terminals but a less intrusive system of three independent mooring dolphins and individual conveyor support systems – see **Figure s 2 and 3.**

Since whale and seabird cruise operators tend to take tourists to where whales are most frequent, views of the quarry from the water by visitors would be infrequent. Also, since this area of the Bay is not a high use recreational boating area, views of the quarry from the water by recreational boaters or pleasure craft would be infrequent. Therefore, the group of Bay of Fundy water users most affected by views of the quarry operation would be the local commercial fishermen.

9.3.6.3 Mitigation

Specific mitigation measures are not proposed regarding aesthetic enhancement along Highway #217 since the quarry is not in a view plane from the highway. However, a minimum 30-m environmental preservation zone around the perimeter of the property will be maintained. This will include a preservation zone along the Bay of Fundy shoreline. Also, the operational schedule proposes to limit site disturbance to approximately 2.5 hectares per year thus minimizing visual site disturbance. Reclamation of previously disturbed land areas will be implemented on a five-year schedule to further reduce visual impacts when viewed from the Bay of Fundy waters. This reclamation effort would give priority to enhancing the aesthetics in the area between the shoreline and the land-based infrastructure – see **Figure 5.**

9.3.6.4 Monitoring

Monitoring measures proposed regarding aesthetics would include the maintenance of a healthy environmental preservation zone and the maintenance of a healthy land restoration. As mentioned in subsequent sections of this report, a land management program will be implemented by Bilcon of Nova Scotia Corporation.

9.3.6.5 Impact Statement

Highway #217 Aesthetics

Since the quarry is not visible from Highway #217, no view plane disturbance will be evident resulting in a ***long term, neutral (no) effect, of regional scale.***

Bay of Fundy Aesthetics

Since the quarry will be visible from the Bay of Fundy waters and considering operational and restoration plans, minimal view plane disruption is expected resulting in a ***long term, insignificant negative effect, of regional scale.***

9.3.7 Community Profile

Introduction

An assessment of demography, employment, education and income was conducted in order to establish a baseline of social and economic indicators for the region. While the primary geographic area of concentration was the local community of Digby Neck & Islands, the assessment also incorporated statistical analysis of the broader statistical regions of Digby County and the Southern Region (24) of Nova Scotia where possible. Moreover, an attempt was made to reflect the level of change that has occurred over time and the analysis, and, where meaningful, incorporates statistical data over a twenty-year time period. This level of analysis was conducted in order to establish a sufficient level of information from which to base assumptions on existing conditions, future trends and potential impacts the project may or may not have on the social and economic conditions of the region.

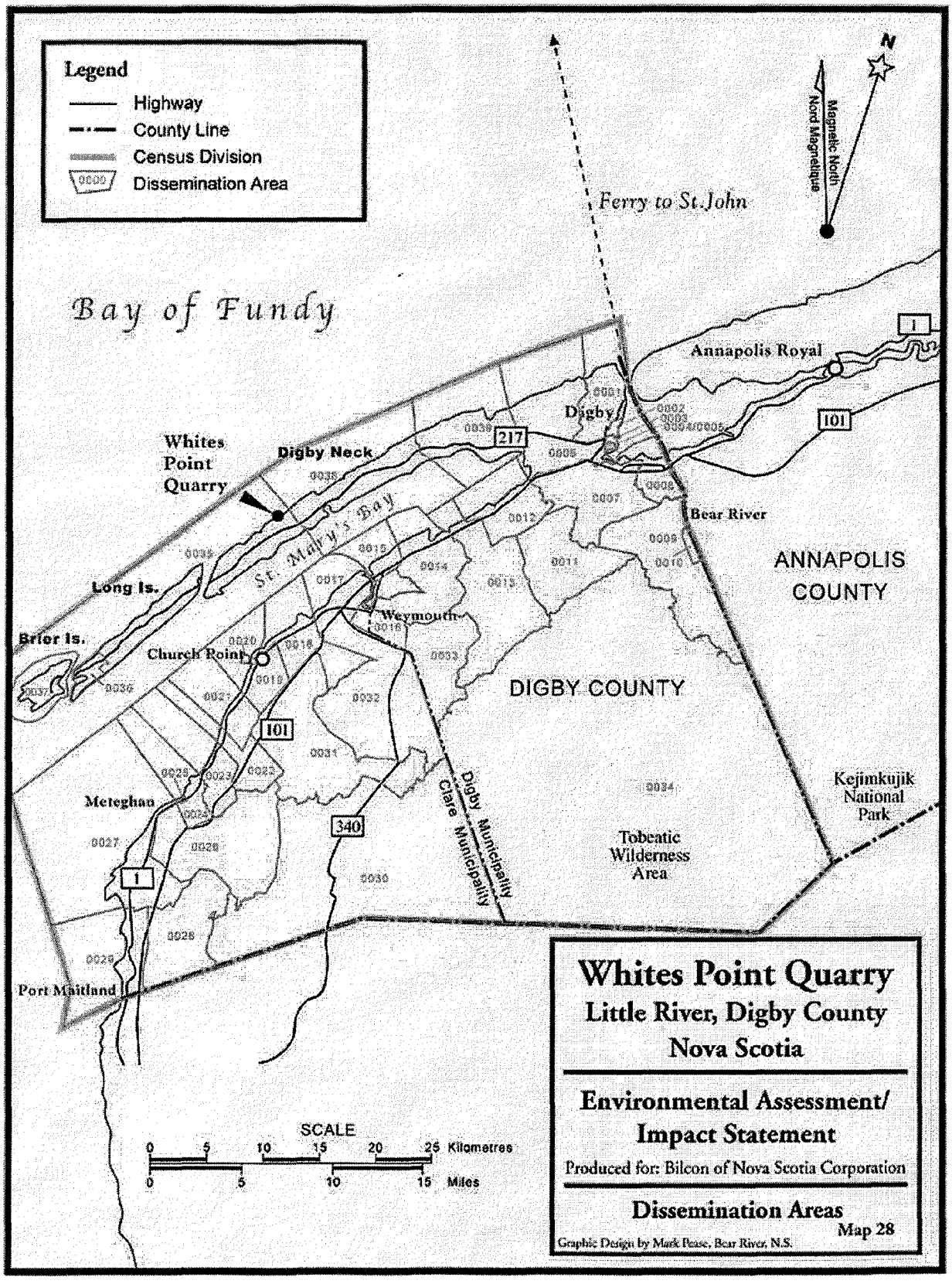
The analysis is based primarily on information readily available from official federal and provincial data sources. Statistics Canada Census data from 1981 to 2001 was reviewed in order to examine the region's demography, employment and education. The Census profiles were refined to the Dissemination Area level, which allowed for a more acute community specific analysis to be conducted. Tax filer information from 1989-2003, specific to Digby Neck and Islands, was reviewed in order to assess the region's income patterns over time. In addition to these two main sources of information, numerous other resources were reviewed in order to gain a better understanding of the social and economic dynamics of the region. These resources included other statistical records such as labour force surveys, provincial statistical reviews and literature resources specific to the region.

9.3.7.1 Demographic Profile

It should be noted that Statistics Canada made some modifications to its dissemination boundaries from 1981 to 2001 within the Digby Neck and Islands region. In order to maintain continuity of statistical information with regard to geographic representation, only the dissemination areas identified as 0035, 0036 & 0038 on **Map 28** were used to represent the local community. These dissemination areas represent a geographic distance of approximately 20 to 30 kilometres either side of the proposed Whites Point quarry and Marine Terminal. The communities of Freeport, Central Grove, Tiverton, Tiddville, Little River, Mink Cove, Sandy Cove, Lake Midway, Centreville and Waterford are included within this defined region.

9.3.7.1.1 Population Diversity

A review of census data from 1981 to 2001 indicated that the majority of the population within the defined area of Digby Neck was English speaking and mainly of British descent. In 1981, ninety-nine percent of the population identified English as their first language and in 2001 this figure was roughly 98%.


Legend
Highway
County Line
Census Division
Dissemination Area
Ferry to St. John
Magnetic North
Nord Magnétique
N
Bay of Fundy
Annapolis Royal
Digby
Whites Point Quarry
Digby Neck
St. Mary's Bay
Bear River
ANNAPOLIS COUNTY
Long Is.
Brier Is.
Church Point
Weymouth
DIGBY COUNTY
Meteghan
Port Maitland
Digby Municipality
Clare Municipality
Tobeatic Wilderness Area
Kejimkujik National Park
SCALE
0 5 10 15 20 25 Kilometres
0 5 10 15 Miles
Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/ Impact Statement
Produced for: Bilcon of Nova Scotia Corporation
Dissemination Areas
Map 28
Graphic Design by Mark Pease, Bear River, N.S.

The 2001 Census reflected that the majority of the population (79%) was third-generation or over and that there was a very small percentage of the population that considered themselves of aboriginal (Métis) descent (1.5%), Acadian descent (1.5%) or African Canadian/black (0%). A further review of census data from 1981 through to 1996 revealed similar proportions of diversity. However, the 1991, 1986 and 1981 censuses did not indicate that there were any persons of aboriginal descent within the area during those periods. As an aside, there were proportionately more individuals that identified that they were of German (3.8%), Dutch (4.5%) and Italian (2.7%) origin in 2001.

9.3.7.1.2 Population Growth

The 2001 Census indicates that this defined area within the Digby Neck and Islands region had a population of 1,325. The population within this area has declined 28.4% or an absolute decline of approximately 525 persons since 1981, a fairly significant decline (see **Table CP-1**). Moreover, the rate of decline between census years has been fairly consistent and if anything has accelerated slightly. Digby County experienced an absolute drop in population of 2,144 persons or a decline of 9.9% over the same time period. This decline is far less dramatic and more in line with the typical population trends experienced by rural communities in Nova Scotia. The Southern Region, which includes the counties of Lunenburg, Queens, Shelburne, Yarmouth and Digby, experienced a much lower overall decline in population of only 1.8%. Lunenburg and Yarmouth counties experienced some moderate growth in their relative populations from 1981 to 2001 (refer to **Table CP-2**)

Table CP - 1
Demographics
Population by 5 - 10 year Age Groups
Selected Region - Digby Neck & Islands

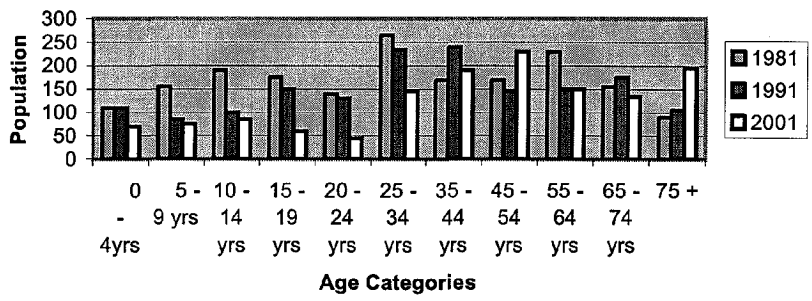
	1981 Census Total		1991 Census Total		2001 Census Total		Percentage Change
	#	%	#	%	#	%	1981 - 2001
Total Reporting	1,850		1,590		1,325		-28.4
By 5 to 10-year Age Groups							
0 - 4yrs	110	5.9	110	6.9	70	5.2	-36.4
5 - 9 yrs	155	8.4	85	5.3	75	5.7	-51.6
10 - 14 yrs	190	10.3	100	6.3	85	6.4	-55.3
15 - 19 yrs	175	9.5	150	9.4	60	4.5	-65.7
20 - 24 yrs	140	7.6	130	8.2	45	3.4	-67.9
25 - 34 yrs	265	14.3	235	14.8	145	10.9	-45.3
35 - 44 yrs	170	9.2	240	15.1	190	14.3	+11.8
45 - 54 yrs	170	9.2	145	9.1	230	17.4	+35.3
55 - 64 yrs	230	12.4	150	9.4	150	11.3	-34.5
65 - 74 yrs	155	8.4	175	11.0	135	10.1	-12.9
75 +	90	4.9	105	6.6	195	14.7	+116.7

Source: Statistics Canada Profile Information, EA & DA's 1981-2001

9.3.7.1.3 Population Distribution

Table CP-2 and **Figure CP-1** profile the change in population by age category. The table reflects a sharp decline in the number of youth and younger labour force aged population within the "Digby Neck" region from 1981 to 2001 and a significant increase in the senior population over the same period. The greatest percentage decline was within the 20 to 24 age group, which experienced a decline in population of 67.9 percent. The largest increase was in the category of those aged 75+, which experienced a growth of 116.7 percent. A similar pattern of change, although less pronounced, was experienced in Digby County and the Southern Region over the same period (refer to **Table CP-2**).

Figure CP- 1
Age Distribution - Digby Neck Area (1981- 2001)



Source: 1981,1991,2001 Census Data

Table CP - 2
Change in Age Groups 1981 - 2001
Digby Neck, Digby County, Southern Region, Nova Scotia

Age Groups	Digby Neck 1981	Digby Neck 2001	Digby Neck Change %	Digby County 1981	Digby County 2001	Digby County Change %	Southern Region 1981	Southern Region 2001	Southern Region Change %	Nova Scotia 1981	Nova Scotia 2001	Nova Scotia Change %
Total	1,850	1,325	-28.4	21,689	19,545	-9.9	124,179	121,935	-1.8	847,442	932,389	10.0
0 - 14yrs	455	230	-49.5	4,850	3,130	-35.5	27,690	20,445	-26.2	198,654	166,582	-16.1
15 - 24 yrs	315	105	-66.7	4,075	2,095	-48.6	22,480	13,910	-38.1	163,942	123,469	-24.7
25 - 34 yrs	265	145	-45.3	3,090	2,315	-25.1	18,999	13,865	-27.0	139,400	123,332	-11.5
35 - 44 yrs	170	190	11.8	2,240	3,100	38.4	13,535	19,850	46.7	96,592	156,853	62.4
45 - 64 yrs	400	380	-5.0	4,350	5,310	22.1	24,340	32,905	35.2	155,954	234,607	50.4
65+	245	330	34.7	3,120	3,600	15.4	17,135	20,905	22.0	92,898	127,546	37.3

Source: Statistics Canada, Census of Canada

The percentage of dependent youth, those aged 0 to 14 years of age has declined 49.5% in the "Digby Neck" region. A similar level of decline is evident in the "young workforce" aged population of 15 to 34 years of age. This age group experienced an absolute decline of 330 persons or 56.9 percent from 1981 to 2001. The primary labour force population aged 20 to 64 has declined 22.1 percent. There has been an increase of 34.7 percent of those aged 65+, refer to **Table CP-3** below.

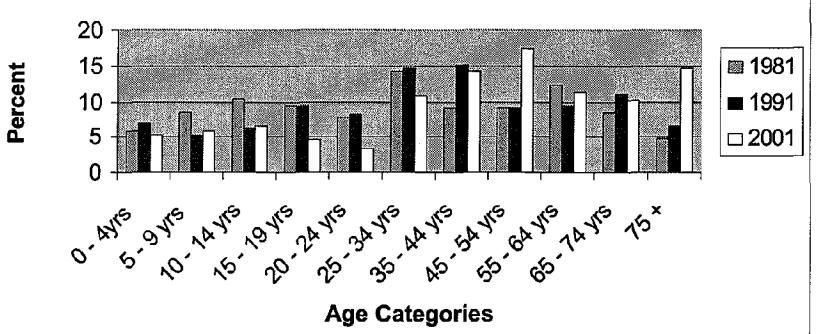
Table CP - 3
Demographics
Changes in age groupings

	Age Category	1981 #	2001 #	Percent Change 1981- 2001
Youth (Dependent)	0 - 14	455	230	-49.5
Young Workforce	15 - 34	580	250	-56.9
Young Family	20 - 44	575	380	-33.9
Primary Working	20 - 64	975	760	-22.1
Retired (Dependent)	65+	245	330	+34.7

Source: 1981, 2001 Census Data

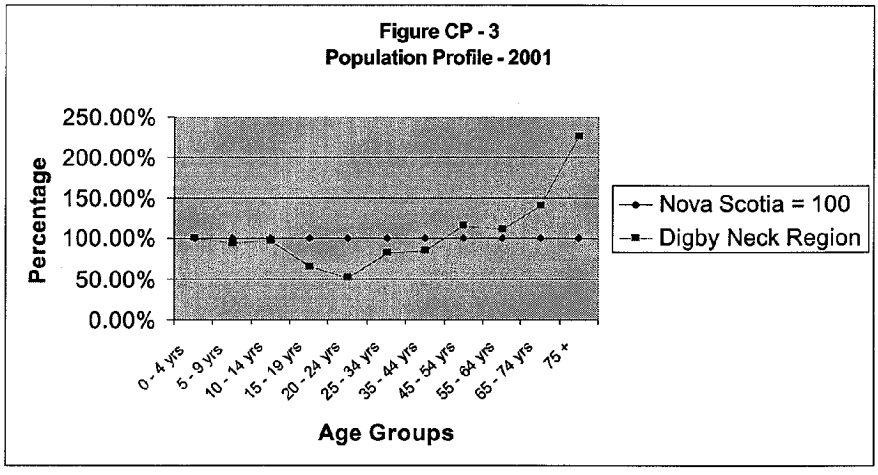
While the absolute growth or decline in population is an important measure of demography so too is the overall change in distribution. The following figure reflects the percentage change in distribution that occurred within the Digby Neck area from 1981-2001.

Figure CP- 2
Percentage Age Distribution - Digby Neck Area (1981- 2001)



Source: 1981,1991,2001 Census Data

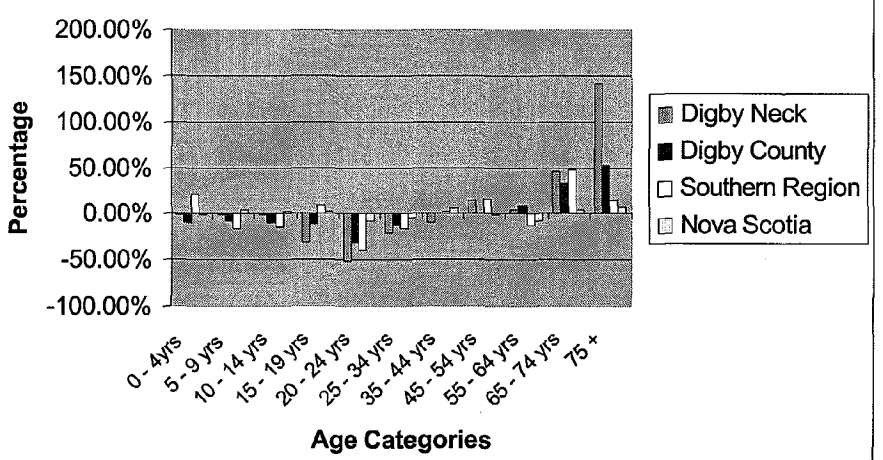
The area is experiencing a shift from a fairly evenly proportioned population with respect to age, to one that has shifted significantly toward a growing older, dependent population. Digby Neck, relative to Nova Scotia has a shortage of persons in the active age category, age 15 though 64. **Figure CP-3** represents an index of the proportion of population per age group within the Digby Neck Region relative to the province. Nova Scotia represents the base or 100 percent, anything below this line indicates a shortage relative to Nova Scotia and above a surplus. There is clearly an abundance of individuals above the age of 64 or senior, dependent population, relative to the provincial proportion. Moreover, and maybe more importantly, there is a shortage in the "active age" categories through ages 15 to 54. The significance of this latter statistic is that growth or stability within the "active age" categories is typically indicative of the strength of an economy as it pertains to an economy's ability to retain labour force. There is usually a direct correlation between job opportunities and mobility of labour force. The fact that the region has a shortage in this "active age" category may indicate that there has been a loss of job opportunities within the region and this has prompted individuals within this age category to seek employment elsewhere.



The following figure, **Figure CP-4** is based on the national proportion from the 2001 Census and reflects the percentage deviation per age group from the national levels. The baseline or national proportion is represented as zero and a lower relative proportion falls below this line and a higher proportion above. What is apparent from this, is that the provincial population distribution mirrors fairly closely that of the national proportions with the exception of some subtle deviations. However, this can not be said of the Digby Neck area, Digby County or the Southern Region.

Analysis of the Digby Neck, Digby County and the Southern Region each reveal a similar pattern of deviation from the national level. Proportionally, there are fewer young adults aged 15 to 34 and a greater proportion of adults over the age of 64. Digby Neck and Digby County have a disproportionate level of adults over the age of 75. This basically reaffirms the areas trend toward an aging population, however while this is not a symptom specific to Digby Neck and is experienced in most rural coastal communities across Nova Scotia and the Maritimes, it does appear to be a somewhat more critical issue.

Figure CP- 4
Comparison to National Proportions - 2001



Source: Statistics Canada 2001 Census

The decline in growth that is occurring in rural populations in Nova Scotia is thought to be primarily the product of a couple of factors, weak growth due to low birthrates and migration, two factors that have a cumulative effect. According to a discussion paper entitled ("Rural Population in Atlantic Canada" prepared for the Pan Atlantic Repopulation Committee, Rural Secretariat – Atlantic Region, Ref. 164), there are very few rural communities and small towns in Atlantic Canada that are "non-metro-adjacent" that are growing. These are growing slowly, but most are suffering from population loss due to death rates exceeding birth rates, communities receiving little of the migration of adults from urban to rural communities and communities experiencing out-migration of youth and young adults. A similar pattern is befalling the coastal communities of the Southern Region of Nova Scotia.

9.3.7.1.4 Vital Statistics

In 1965, the province of Nova Scotia had a live birth rate of 24.9 births per 1000 population and a death rate of 8.5 per thousand. The gap had narrowed significantly by the turn of the new millennium and in 2003 the live birth rate was only 9.1. The death rate has remained fairly consistent averaging about 8.5 since 1965. The province is quickly approaching a point of decline in natural population growth, a point that Digby County and the Southern Region of Nova Scotia reached some time ago.

Table CP- 4 shows the vital statistics characteristics for live births and deaths for Digby County, the Southern Region and Nova Scotia from 1997 to 2003. Digby County and the Southern Region experienced a net natural loss in population in each year due to birth rates being below the replacement rate. In 2003, Digby County had a net loss of 111 persons or 5.6 persons per thousand with the Southern Region experiencing a similar decline of roughly 3.0 persons per thousand. The significance of this is that the region is not able to maintain a natural level of replacement and therefore becomes far more dependent on immigration in order to sustain population levels. However, as is evidenced in the following sections, the region is also experiencing net losses in migration due to an exodus of youth and younger aged workers and this is exasperating the region's declining population problem.

9.3.7.1.5 Mobility

The following table **(CP-5)** presents mobility patterns of the population aged five-years and older within the Digby Neck Region derived from Census of Canada information from 1981 to 2001.

Table CP - 4
Vital Statistics - Birth and Death Rates (1997 - 2003)

	Digby				Southern Region				Nova Scotia			
Year	Live Births	Rate	Deaths	Rate	Live Births	Rate	Deaths	Rate	Live Births	Rate	Deaths	Rate
2003	159	8.1	270	13.7	971	7.8	1,342	10.8	8,536	9.1	7997	8.5
2002	149	7.2	197	9.6	998	7.9	1,231	9.7	8,545	9.0	7921	8.4
2001	178	8.6	210	10.2	1,051	8.3	1,276	10.1	8,757	9.3	7803	8.3
2000	191	9.2	239	11.6	1,101	8.7	1,232	9.8	8,977	9.5	7813	8.3
1999	158	7.6	239	11.5	1,095	8.6	1,227	9.7	9,427	10.0	7568	8.1
1998	161	7.8	247	11.9	1,166	9.2	1,267	10.0	9,448	10.1	7995	8.6
1997	212	10.2	225	10.8	1,185	9.3	1,331	10.5	9,952	10.6	8044	8.6

Source: NS Vital Statistics Summary 1998 - 2005

Mobility The following table **(CP-5)** presents mobility patterns of the population aged five-years and older within the Digby Neck Region derived from Census of Canada information from 1981 to 2001.

Table CP - 5
Mobility
Digby Neck Area (1981- 2001 Census Data)
Prior 5 years

	1981	%	1986	%	1991	%	1996	%	2001	%
Persons 5 yrs & over	1,775	100.0	1,570	100.0	1,490	100.0	1,365	100.0	1,235	100.0
Non Movers	1,295	72.9	1,210	77.1	1,245	83.6	1,145	83.9	965	78.1
Movers	475	26.8	375	23.9	240	16.1	225	16.5	260	21.1
Moved within Municipality	315	17.8	290	18.5	165	11.1	150	11.0	140	11.3
Moved within Province	55	3.1	15	1.0	20	1.3	25	1.8	85	6.9
Moved within Canada	80	4.5	40	2.5	60	4.0	40	2.9	45	3.6
Moved outside Canada	20	1.1	10	0.6	0	0.0	0	0.0	0	0.0

Source: Statistics Canada Census Data 1981 - 2001

The data indicates a relatively consistent pattern of mobility within the Digby Neck area from 1976-2001. The relative proportions of non-movers to movers did not change substantially over this period, however this does not necessarily suggest a level of stability. There has been a consistent pattern of decline in the number of persons moving to the area (-45.3%) and this, in concert with a declining population due to out-migration, has been why the proportional balance between non-movers and movers has been maintained. The decline in the number of movers to the area is significant, because the area is becoming more and more dependent on immigration to stabilize its population in order to compensate for losses due to low birth rates verses replacement and out-migration.

The 2001 Census data does indicate an increase in the level of movers to the area from the previous census. This may be a sign that the area has "rounded the corner" and is experiencing an increased level of immigration. Unfortunately, there is no way to speculate whether this is indeed a change from the consistent pattern of decline the area has been experiencing or an anomaly until new census data is available.

Another notable change that has occurred is the make-up of movers to the area. According to census data collected in 1981, approximately 475 persons moved to the area within the preceding five years. The estimate reflects that a large proportion of the "movers" (66.3%) originated from within the municipality of Digby (non-migrant) and that there were very few movers from other municipalities in Nova Scotia (intra-provincial), other provinces (inter-provincial) or from outside Canada. The recent census data (2001) reflects some subtle changes in the origin of movers to the area. There were proportionally fewer movers that originated from within the municipality (53.8%) and an increase in the proportion of intra-provincial movers to the region.

9.3.7.1.6 In-Out Migration

A review of tax filer data from 1991 to 2004 was conducted to assess migration patterns within Digby County, the Southern Region and Nova Scotia. Unfortunately, Statistics Canada does not refine tax filer migration estimates to a level where the community of Digby Neck and Islands could be specifically looked at. Nevertheless, there are similarities in the migration patterns present among the geographic regions analyzed, which in general are most likely applicable to the Digby Neck area. A caveat to this assumption though is that rural areas tend to be very heterogeneous and migration flows of individual communities within the same region can be vastly different.

Table CP-6 outlines migration estimates by age category from 1991-1992 to 2003-2004 for Digby County, the Southern Region and Nova Scotia. The table is broken down into three sub-categories reflecting migration estimates between census periods. Digby County experienced a net loss in population due to higher levels of out-migration in each period analyzed.

The losses were mainly in the younger age groups with the highest losses occurring within the age categories of 18-24 and 25-44. The Southern Region also experienced a net outflow during each period with a similar demographic pattern albeit proportionally less pronounced. Provincially, there was a net gain overall, however it too experienced a net out-migration in the 18-24 age category.

Tables CP-7 & CP-8 provide a year by year comparison of migration estimates within Digby County from 1999-2000 to 2003-2004, which is the latest tax filer information available. Table CP-7 breaks down migration by age group and Table CP-8 is broken down by gender and geographic movement. Table CP-7 reflects a continued trend toward a loss of young, primary workforce aged persons. Between 1999 and 2004, the age group 45-64 was the only category to experience a net gain from migration, 127 persons. All other age groupings experienced a net loss over this period with the 18-24 group experiencing the greatest loss. There was an estimated difference (loss) of 240 persons in the 18-24 year age category due to a higher level of out-migration.

Table CP- 6

**Migration Estimates
by Age Group
County, Region, Nova Scotia
1991 - 1992 to 2003 - 2004**

	1991 - 1992 to 1995 - 1996					
	0 - 17	18 - 24	25 - 44	45 - 65	65+	Total
In Migrants						
Digby County	660	492	980	407	195	2,734
Southern Region(24)	4,032	2,729	6,159	2,721	1,028	16,669
Nova Scotia	43,943	33,099	70,507	19,815	6,962	174,326
Out Migrants						
Digby County	779	712	1,077	308	196	3,072
Southern Region(24)	4,218	3,872	6,382	1,889	1,064	17,425
Nova Scotia	40,460	36,026	69,865	16,253	6,480	169,084
Net - Migration						
Digby County	-119	-220	-97	99	-1	-338
Southern Region(24)	-186	-1,143	-223	832	-36	-756
Nova Scotia	3,483	-2,927	642	3,562	482	5,242

	1996 - 1997 to 2000 - 2001					
	0 - 17	18 - 24	25 - 44	45 - 65	65+	Total
In Migrants						
Digby County	691	508	1,069	562	253	3,083
Southern Region(24)	3,941	2,700	6,161	3,285	1,278	17,365
Nova Scotia	38,774	31,095	68,320	21,671	8,385	168,245
Out Migrants						
Digby County	673	660	1,165	395	267	3,160
Southern Region(24)	3,845	3,978	6,078	2,194	1,356	17,451
Nova Scotia	36,615	35,048	66,928	18,999	7,951	165,541
Net - Migration						
Digby County	18	-152	-96	167	-14	-77
Southern Region(24)	96	-1,278	83	1,091	-78	-86
Nova Scotia	2,159	-3,953	1,392	2,672	434	2,704

	2001 - 2002 to 2003 - 2004					
	0 - 17	18 - 24	25 - 44	45 - 65	65+	Total
In Migrants						
Digby County	455	289	698	354	177	1,973
Southern Region(24)	2,588	1,663	3,965	2,293	844	11,353
Nova Scotia	22,208	20,037	41,211	15,112	5,506	104,074
Out Migrants						
Digby County	479	475	748	309	179	2,190
Southern Region(24)	2,453	2,587	3,889	1,692	960	11,581
Nova Scotia	21,457	21,424	39,958	13,574	5,450	101,863
Net - Migration						
Digby County	-24	-186	-50	45	-2	-217
Southern Region(24)	135	-924	76	601	-116	-228
Nova Scotia	751	-1,387	1,253	1,538	56	2,211

Source: Statistics Canada; Small Area Administrative Data

A comparison by gender and movement reflects that a slightly higher proportion of men migrated from Digby County than women and that predominately migration was to other areas within the province.

Table CP- 7

Migration - Digby County (1999-2004)

In-Migration

	0-17 years	18-24 years	25-44 years	45-64 years	65+ years	Total
1999-2000	154	121	220	118	50	663
2000-2001	138	92	222	140	57	649
2001-2002	153	100	226	122	60	661
2002-2003	175	103	271	106	53	708
2003-2004	127	86	201	126	64	604
Total	747	502	1140	612	284	3285

Out-Migration

	0-17 years	18-24 years	25-44 years	45-64 years	65+ years	Total
1999-2000	118	130	213	88	59	608
2000-2001	168	137	251	88	54	698
2001-2002	166	178	283	100	72	799
2002-2003	156	148	229	112	50	695
2003-2004	157	149	236	97	57	696
Total	765	742	1212	485	292	3496

Net-Migration

	0-17 years	18-24 years	25-44 years	45-64 years	65+ years	Total
1999-2000	36	-9	7	30	-9	55
2000-2001	-30	-45	-29	52	3	-49
2001-2002	-13	-78	-57	22	-12	-138
2002-2003	19	-45	42	-6	3	13
2003-2004	-30	-63	-35	29	7	-92
Total	-18	-240	-72	127	-8	-211

Source: Statistics Canada; Small Area Administrative Data

Table CP - 8

Migration - Digby County (1999-2004)

In-Migrants

	Intraprovincial		Interprovincial		International		Total
	Males	Females	Males	Females	Males	Females	Both genders
1999-2000	187	221	114	129	7	5	663
2000-2001	217	245	85	88	10	4	649
2001-2002	203	248	91	104	9	6	661
2002-2003	204	240	120	128	8	8	708
2003-2004	198	207	95	96	4	4	604
Total	1009	1161	505	545	38	27	3285

Out-Migrants

	Intraprovincial		Interprovincial		International		Total
	Males	Females	Males	Females	Males	Females	Both genders
1999-2000	200	230	84	87	3	4	608
2000-2001	222	271	106	92	3	4	698
2001-2002	276	288	110	108	9	8	799
2002-2003	225	269	99	98	2	2	695
2003-2004	250	284	78	78	6	2	696
Total	1173	1342	475	463	23	20	3496

Net-Migrants

	Intraprovincial		Interprovincial		International		Total
	Males	Females	Males	Females	Males	Females	Both genders
1999-2000	-13	-9	30	42	4	1	55
2000-2001	-5	-26	-21	-4	7	0	-49
2001-2002	-73	-40	-19	-4	0	-2	-138
2002-2003	-21	-29	21	30	6	6	13
2003-2004	-52	-77	19	18	-2	2	-92
Total	-164	-181	30	82	15	7	-211

Source: Statistics Canada; Small Area Administrative Data

9.3.7.1.7 Analyses

"Rural depopulation has been a problem and a challenge for the Atlantic region and its provinces and municipalities for several decades now. However, in recent years the problem has been much more acute as it has been coupled with a seemingly long-term period of economic adjustment and decline. A handful of rural places, within close proximity to the largest urban centres within the region, have been growing and changing rapidly, while most other rural parts of the region have suffered slow and steady population decline...A naturally aging population, youth out-migration, a falling birth rate below replacement rates, and a lack of immigration to the region as a whole and to the rural parts of Atlantic Canada more specifically are the demographic realities..."(Rural Repopulation in Atlantic Canada, prepared for the Pan Atlantic Repopulation Committee, Rural Secretariat – Atlantic Region : 1, Ref. 164).

The excerpt from the above discussion paper suitably describes, from a demographic perspective, what has taken place in the community of Digby Neck over the past couple of decades. The area appears to be a community in decline. Its population declined 28.4% between census years 1981 and 2001 and there is no evidence to suggest that this trend of decline has abated. A recent study entitled "Between the Land and the Sea (2004)" commissioned by the Coastal Communities Network, identified Digby Neck as one of few communities in Nova Scotia with "severe population losses". It further went on to say that, "It is assumed that such areas may lose their social and economic viability in terms of maintaining services and supporting healthy, independent communities".

This is an inherent problem in communities that have experienced a large level of population decline. It creates somewhat of a "vicious circle" resulting in fewer and fewer opportunities to sustain economic viability and maintain social identity. "The impacts of continued population loss have been well documented in a number of studies and reports. The list is lengthy, and includes:

- Fewer opportunities for economic development, new business development, and job creation;
- Depression of the resale housing market;
- Rising vacancy rates in rental properties (including social housing properties in some areas);
- Diminished access to and provision of social services (healthcare, education etc.) as population levels fall below demand thresholds; and
- Diminished municipal capacity to provide critical and necessary municipal infrastructure due to an eroding tax base"(Rural Repopulation in Atlantic Canada :5).

9.3.7.2 Education

"Some informants saw school as a place where things just didn't fit with the world as they knew it. Nebulous, frightening or unattractive "opportunities" were offered in school and school learning tasks were often constructed as "invisible" and related to skills and materials which had no tangible place in the community" (Corbett, 2000: 180, Ref. 238).

This section provides a general overview of the level of education attained within the defined area of Digby Neck and the level of enrolments at Digby Neck and Island schools over the past 20 to 25 years.

9.3.7.2.1 Level of Attainment

Education attainment levels show the potential an area has to diversify its economy (**Gardner Pinfold, Ref. Vol. VI, Tab 32**). **Table CP-9** reflects the levels of attainment reported in the 1981, 1991 & 2001 censuses. The censuses indicate that there has been a general trend toward a higher level of attainment. In 1981, approximately 69% of the population reported that they had not graduated from high school and a large proportion of these, 27.6%, had less than a grade nine education. Seven point six percent (7.6%) reported that they had graduated from high school. By 2001, the number of people reporting an attainment less than high school had dropped to 52.2%. However, there was actually very little improvement made between 1991 and 2001. The percentage of those reporting less than a grade nine education actually increased over this period.

The percentage of the population reporting post secondary completion increased significantly from 1981 to 2001 from 15.3% to 27% respectively. Some caution should be used in interpreting this data. The data is based on a hierarchy of attainment, where completion of college has higher standing than completion of high school etc. However, it should not be assumed that an individual reporting that they had some or completed a post secondary education necessarily completed high school. For this reason, it is very difficult to make any definitive comment on whether there has actually been a higher level of attainment. The percentage reporting having attained a university bachelor degree or higher has remained about the same in both absolute and relative terms.

Table CP - 9

Educational Attainment - Digby Neck Area (1981 - 2001)

	1981	%	1991	%	2001	%
Total Reporting	1375	100.0	1320	100.0	1015	100.0
Less than High Scool	950	69.1	830	62.9	530	52.2
Less than Gr. 9	380	27.6	205	15.5	190	18.7
Without secondary certificate	570	41.5	625	47.3	340	33.5
High School Graduate	105	7.6	145	11.0	120	11.8
Some Post Secondary						
College	55	4.0	50	3.8	15	1.5
University	30	2.2	10	0.8	30	2.9
Post Secondary						
College	170	12.4	145	11.0	245	24.1
University	40	2.9	70	5.3	30	2.9
University Bachelor or Higher	45	3.3	70	5.3	50	4.9

Source: Censuses 1981, 1991 & 2001

The table that follows shows attainment levels for the province as a whole, the Southern Region, Digby County and the defined area of Digby Neck based on 2001 Census data. It is interesting to note that while there is a significant difference between the relative level of attainment when comparing Digby Neck to provincial levels, there is very little difference when comparing it to the Southern Region or Digby County.

Table CP - 10

Educational Attainment - Nova Scotia, Southern Region, Digby County (2001)

	Nova Scotia 2001	%	Southern Region 2001	%	Digby County 2001	%	Digby Neck Area 2001	%
Total Reporting	670,930	100.0	92,170	100.0	14,965	100.0	1015	100.0
Less than High Scool	212,670	31.7	38,280	41.5	7,015	46.9	530	52.2
Less than Gr. 9	63,640	9.5	15,120	16.4	2,785	18.6	190	18.7
Without secondary certificate	149,030	22.2	23,160	25.1	4,230	28.3	340	33.5
High School Graduate	65,435	9.8	9,055	9.8	1,460	9.8	120	11.8
Some Post Secondary								
College	27,160	4.0	3,825	4.1	480	3.2	15	1.5
University	35,710	5.3	2,980	3.2	395	2.6	30	3.0
Post Secondary								
College	209,395	31.2	27,870	30.2	3995	26.7	245	24.1
University	17,965	2.7	2,150	2.3	415	2.8	30	3.0
University Bachelor or Higher	102,590	15.3	8,040	8.7	1215	8.1	50	4.9

Source: 2001 Census Data

The similarities are most likely due to the economic opportunities available within these regions. The economies of coastal and non-coastal rural communities are still relatively dominated by primary industries (agriculture, fishery, forestry) and there is little requirement or use for that matter for formal education. The skills required to work in these industries are learned through "on the job training" or apprenticeships typically passed down from family members that have worked in these industries.

" Real education did not happen in school; it often was understood as the ability to watch what people did locally and learn from them and apply that learning" (Corbett, 2000: 238).

A thesis entitled "Learning to Leave: The Irony of Schooling in a Coastal Community" by Michael Corbett provides an in-depth account of how education was viewed and the role it played over time within the community of Digby Neck. Corbett's study addressed a very complex set of economic and social influences that occurred within the community from the 1960's through to the late 1990's. Corbett conducted interviews with people that stayed and those that had moved away from the community in order to gain insight into the dynamics of the decision by those to stay or move and the function of education in this decision process. Interviewees were broken down into three cohort groups. The first cohort group was those that had attended classes between 1963-1974, the second between 1975-1986 and the third 1987-1998.

The intent of this section is not to provide a dissertation of the thesis, but simply to acknowledge some of its findings as they relate to educational attainment. The following passage is from the conclusion portion of Mr. Corbett's thesis and while it represents an oversimplification of his findings, it does provide a level of insight as to why the community of Digby Neck may have a lower level of educational attainment as compared to the provincial average.

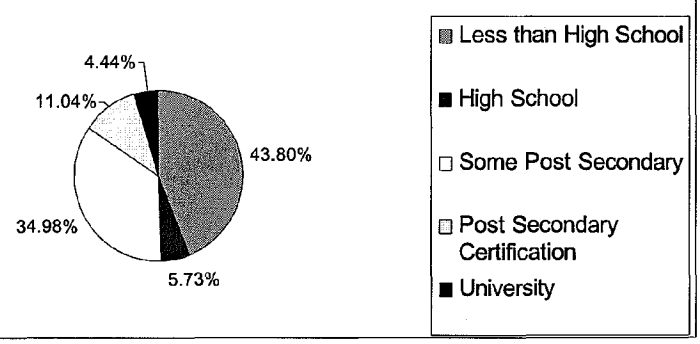
> "Through the 1970's and 1980's, the industrial fishery boomed providing a strong economic reason for young men and for some young women to resist formal education." In this context, it comes as no surprise that out-migration rates fell in this period. But, the late 1980's and 1990's was a period in which the prevalent discourse was that of fish stocks collapsing, communities dying and general decline in coastal communities. This discourse of decline though, was received by Digby Neck youth in tandem with an equally pessimistic discourse of diminished urban opportunities, "downsizing" and industrial decay. Urban opportunities were made available principally through the acquisition of mobile educational capital. The Basic Data Bank and the Community, Schooling and Migration Survey show that mobile out-migrant Digby Neckers who settled in the area outside the 50 kilometre "around here" zone, have indeed acquired significantly higher levels of post secondary credentials. On the other hand, those who remained inside the 50 kilometre circle seem very able to negotiate their lives with relatively low levels of formal education. The "around here" area and its occupational and social structure continues to provide a context within which resistance to higher education is supported, particularly for men" (Corbett: 311).

It was a very conscious decision for those to leave school and pursue a career in the fishery. "The pursuit of formal education did not relate experientially to financial success; in fact, it was perceived to be just the opposite" (Corbett: 208). The attainment of higher education was in some respects viewed as counter productive to the sustainability of Digby Neck. Those that sought higher levels of education were typically the same individuals that ultimately migrated from the area in pursuit of employment opportunities outside those offered by the fishery or other primary industries in the region. "Most men who got any education beyond high school or vocational training without high school completion left the community" (Corbett: 175).

The following figures reflect a comparison of the level of attainment by gender and the change in levels from 1991-2001.

Figures CP-5 and CP-6 show the percentage level of attainment by males in 1991 and 2001 respectively. The percentage reporting having completed less than high school increased from 43.80 percent in 1991 to 45.59% by 2001 and the percentage total reporting some post secondary and secondary completion, including the completion of university, decreased from 50.46% to 46.59%.

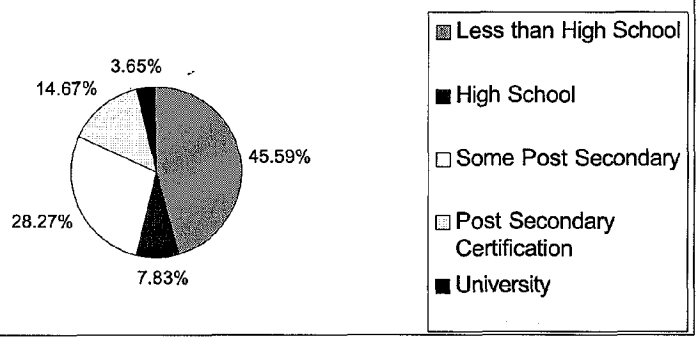
Figure CP- 5
Male - Level of Educational Attaiment (1991)



Source: Nova Scotia Community Counts

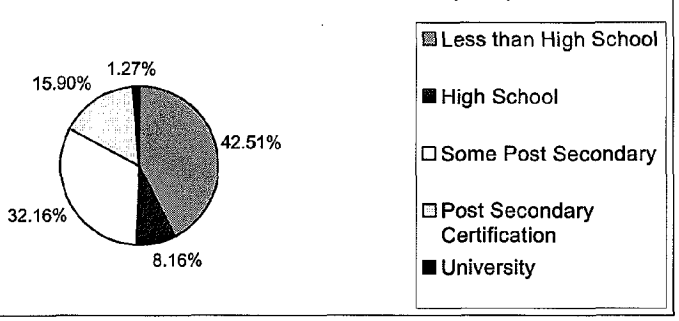
Source: Nova Scotia Community Counts

Figure CP- 6
Male - Level of Educational Attainment (2001)



The attainment levels reported by females on Digby Neck reflected in figures CP-7 and CP-8, show a somewhat different trend. The level of those reporting less than high school dropped significantly from 42.51% in 1991 to 33.93% by 2001 and the total reporting attainment of some post-secondary and greater increased from 49.33% to 53.59% over the same period. Interestingly, both genders experienced a drop in the percentage reporting a university degree or higher. This may be a factor whereby students have relocated to urban areas to obtain specialized education or those with higher education sought work outside the community and this has impacted the overall level of attainment. Another consideration as to why this has occurred may be due to the decline in the economic base on Digby Neck, which has made it increasingly difficult to afford higher education as described in Corbett's thesis. "...yet the paradox is that into the 1990's the economic base of Digby Neck has declined making it increasingly difficult for most young Digby Neckers to access the financial resources needed to acquire higher education and to migrate with any sort of security or reasonable chance of finding a living wage off the Neck"(Corbett, 2000:326).

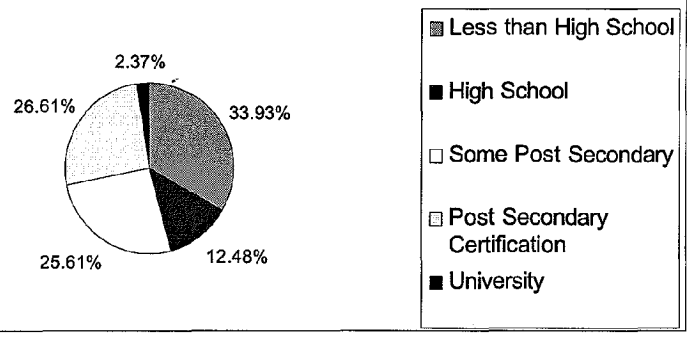
Figure CP - 7
Female - Level of Educational Attainment (1991)



Source: Nova Scotia Community Counts

Source: Nova Scotia Community Counts

Figure CP - 8
Female - Level of Educational Attainment (2001)



9.3.7.2.2 Schools and School Enrolments

There are three schools in the Digby Neck and Islands region, Digby Neck Consolidated, Islands Consolidated and the Westport Village School. These schools are all under the Tri-County Regional School Board. Digby Neck Consolidated is an elementary school located in Sandy Cove. The school teaches grades primary through 6 and the level of enrolment based from the 2004-2005 school year was 47 students. Islands Consolidated, located in Freeport, is the largest school in the Digby Neck area with a reported enrolment of 142 students. Grades taught at Islands Consolidated are primary to grade 12. The Westport Village School, located in Westport, is an elementary school catering to grades primary through five. The school's current enrolment is 16 students, the smallest enrolment of any school under the Tri-County School Board.

Table CP-11 and Figure CP-9 reflect the level of student enrolments at the three schools from the 1980-81 school year to the 2004-05 year. As the table indicates, total enrolments have declined by 49.6% at Digby Neck & Islands schools over the past twenty-five years. Individually, enrolment at Digby Neck Consolidated declined 69.9%, Islands Consolidated declined by 26.4% and Westport Village declined 60.9% from 1980-81 to 2004-05. While school enrolments have continued to decline over the past decade it has been at a continually diminishing rate.

Table CP - 11

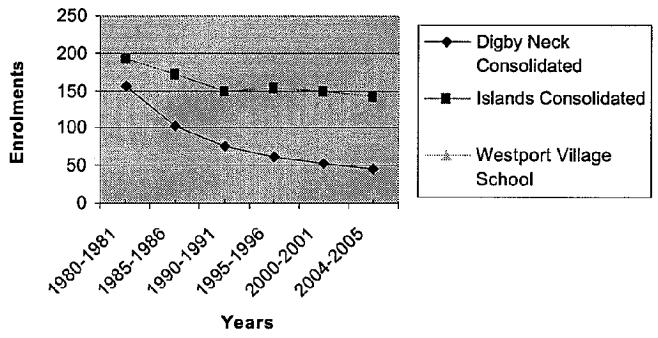
School Enrolments for Digby Neck & Islands Schools
1980-81 to 2004-2005

Schools	Enrolments						
	1980-1981	1985-1986	1990-1991	1995-1996	2000-2001	2004-2005	Change %
Digby Neck Consolidated	156	103	75	62	53	47	-69.9
Islands Consolidated	193	172	149	153	148	142	-26.4
Westport Village School	58	48	40	26	21	16	-60.9
Total	407	323	264	241	222	205	-49.6

Source: Nova Scotia Department of Education, Statistical Division

Source: Nova Scotia Department of Education, Statistical Division

Figure CP - 9
Enrolments for Digby Neck & Islands Schools
1980-1981 to 2004- 2005



Declining enrolments is not a phenomenon specific to Digby Neck and Islands. As is shown in **Table CP-12**, provincial enrolments also declined (21.7%) over the same period 1980-81 to 2004-05, albeit proportionately much less.

Table CP - 12

Provincial School Enrollments
1980-81 to 2000-2001

Schools	Enrolments						
	1980-1981[2]	1985-1986	1990-1991	1995-1996	2000-2001	2004-2005	Change %
Elementary	99,502	89,736	87,303	86,180	80,418	71,394	-28.2
Junior	46,118	44,460	39,069	38,317	37,130	36,537	-20.8
Senior[1]	39,965	38,418	39,367	39,523	38,325	37,465	-6.3
Total	185,585	172,614	165,739	164,020	155,873	145,396	-21.7

Source: Nova Scotia Department of Education, Statistical Division
[1] Senior includes High School Vocational programs
[2] Includes Auxiliary & Special Education Students from all levels

9.3.7.2.3 Senior High Withdrawal Rates

Table CP-13 compares the level of Senior High School withdrawal rates for Islands Consolidated, Digby Regional High School and provincial levels from 1990-91 to 2000-01. The figures indicate that Islands Consolidated steadily reduced its withdrawal rate over the period and it had a much lower rate of withdrawal relative to Digby Regional High School and the provincial average.

Table CP - 13

Senior High Withdrawal - Comparative 1990-1991 to 2000-2001

	Enrollments	Withdrawals	Rate[1]
			%
1990 -1991			
Islands Consolidated	38	3	7.9
Digby Regional	287	41	14.3
Province	36,445	4,402	12.1
1995 -1996			
Islands Consolidated	36	2	5.6
Digby Regional	247	19	7.7
Province	36,869	4,024	10.9
2000 -2001			
Islands Consolidated	48	1	2.1
Digby Regional	256	22	8.6
Province	37,355	3,724	10.0

Source: Nova Scotia Department of Education; Statistical Division
[1] is the percentage of students who withdraw compared to total enrollment

9.2.7.2.4 Analyses

The level of formal education on Digby Neck and Islands is typical of many rural regions in Nova Scotia. The level of attainment is lower on average than urban regions and this is due in part to the area's resource based economy, which for the most part demands less formal education skills of its workforce. However, inaccessibility to higher levels of education whether it is based on affordability or having to leave the community has also played a part in lower levels of attainment. As is pointed out in a report entitled, "Painting the Landscape of Rural Nova Scotia, 2003" (Ref. 97, "there are many reasons for this disparity in education levels. Although two-thirds of post-secondary campuses are located in rural communities, there are more programs and opportunities for specialization in urban than in rural Nova Scotia. Thus, many rural Nova Scotians relocate to urban areas to obtain a specialized education, thereby contributing to the out-migration of youth from rural Nova Scotia." This out-migration of youth from the Neck and Islands is compounded by a lack of industries requiring formal education within the community, which has perpetuated this circle of seemingly low levels of educational attainment.

It should not be construed that a lower level of educational attainment is synonymous with an unskilled workforce. The economy of Digby Neck and Islands has flourished in the past with its "informal" education of on-the-job training and the area is somewhat dependent on the continuation of this means of training.

9.3.7.3 Income

A key indicator of the economic health of a region is the growth and level of income. The following section looks at the growth and characteristics of income within the Digby Neck and Islands region, providing comparative analysis of provincial and national benchmarks where applicable. The analysis relies heavily on tax filer information and special tabulations by the Small Area Administrative Data Division of Statistics Canada. Tax filer data from 1989-2003 was reviewed in order to reflect the trend in income within the area.

9.3.7.3.1 Tax Filer Growth

Digby Neck and Islands experienced virtually no growth in the number of tax filers from 1989 to 2003. In 2003 there were 1,090 tax filers on Digby Neck and Islands slightly less than in 1989. In comparison, the percentage growth in tax filers provincially and nationally was 18% and 29% respectively over this time period. Table CP-14 provides a breakdown of the number of tax filers per category and an index of growth.

9.3.7.3.2 Average Income

According to the 2001 Census total average individual income on Digby Neck and Islands was $22,507, approximately 84% of the provincial average. However, tax filer data for the same year suggests that average income on the Neck and Islands exceeded the provincial average. Table CP-15 and Figure CP-10 provide a breakdown of average income for Digby Neck and Islands and comparative provincial and national averages.

Table CP-14

Tax Filer Growth - Digby Neck, Nova Scotia, Canada

	Number of Tax Filers			Index of Growth		
Year	Digby Neck Area	Nova Scotia	Canada	Digby Neck Area	Nova Scotia	Canada
1989	1,100	589,160	17,888,750	100%	100%	100%
1990	1,130	604,330	18,407,120	103%	103%	103%
1991	1,150	610,450	18,711,310	105%	104%	105%
1992	1,200	642,400	19,649,400	109%	109%	110%
1993	1,220	663,110	20,423,400	111%	113%	114%
1994	1,160	651,610	20,350,860	105%	111%	114%
1995	1,170	656,470	20,675,760	106%	111%	116%
1996	1,130	658,670	20,918,670	103%	112%	117%
1997	1,130	660,960	21,218,070	103%	112%	119%
1998	1,140	665,600	21,453,800	104%	113%	120%
1999	1,110	672,610	21,805,870	101%	114%	122%
2000	1,080	677,890	22,131,680	98%	115%	124%
2001	1,090	689,520	22,709,910	99%	117%	127%
2002	1,090	690,090	22,798,980	99%	117%	127%
2003	1,090	692,750	23,070,200	99%	118%	129%

Source: Small Area Administrative Data Division

Average Income

According to the 2001 Census total average individual income on Digby Neck and Islands was $22,507, approximately 84% of the provincial average. However, tax filer data for the same year suggests that average income on the Neck and Islands exceeded the provincial average. Table CP-15 and Figure CP-10 provide a breakdown of average income for Digby Neck and Islands and comparative provincial and national averages.

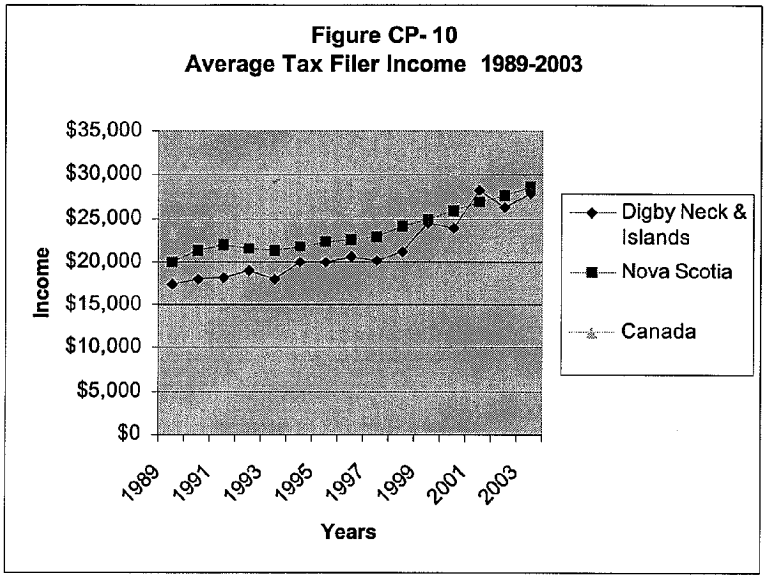
Table CP - 15

Total Average Tax Filer Income (1989-2003)

Year	Digby Neck[1]	Nova Scotia	Canada	Index Provincial	Index National
1989	$17,328	$19,981	$23,414	86.7	74.0
1990	$18,070	$21,410	$24,698	84.4	73.2
1991	$18,284	$21,938	$25,127	83.3	72.8
1992	$19,030	$21,607	$24,772	88.1	76.8
1993	$18,023	$21,262	$24,393	84.8	73.9
1994	$19,910	$21,807	$25,066	91.3	79.4
1995	$20,020	$22,254	$25,783	90.0	77.6
1996	$20,658	$22,478	$26,271	91.9	78.6
1997	$20,121	$23,016	$27,084	87.4	74.3
1998	$21,254	$24,033	$28,085	88.4	75.7
1999	$24,439	$24,959	$28,966	97.9	84.4
2000	$23,863	$25,968	$30,541	91.9	78.1
2001	$28,242	$26,846	$31,692	105.2	89.1
2002	$26,326	$27,711	$32,306	95.0	81.5
2003	$27,884	$28,585	$33,117	97.5	84.2

Source: Small Area Administrative Data Division
[1] Denotes Digby Neck & Islands

Source: Small Area & Administrative Data Division, Statistics Canada



Digby Neck and Island's average tax filer income has been on par with the provincial average since 1999. Average individual income in 2003 was $27,884 or 97.5% of the provincial average and 84.2% of the national average. The area actually experienced somewhat better relative and absolute growth in average income over the period 1989 to 2003 relative to provincial and national averages. Average income grew from $17,328 in 1989 to $27,884 in 2003, an increase of 60.9%. Relative growth provincially and nationally was 43.1% and 41.4% respectively over this period.

While overall average income on Digby Neck and Islands is relatively similar to the provincial average, there are stark differences in income levels when comparing genders. Male earners on the Neck and Islands tend to have a disproportionately higher average income than that of female earners. Tables CP-16 & CP-17 and corresponding Figures CP-11 & CP-12 reflect average incomes of male and female earners with averages broken down by Digby Neck, Nova Scotia and Canada.

The average income of male earners on Digby Neck and Islands has been on par with or exceeded the provincial average since about 1999. Male earners actually attained a level of parity in 2001 with their male counterparts nationally. Income growth from 1989 to 2003 has significantly outpaced both provincial and national trends. While male earners in the area have made significant strides with regard to the growth of their levels of income, female earners have struggled to maintain status quo. Table CP-17 & Figure CP-12 reflects average incomes of female earners. Average earnings by females in 2003 were 74.7% of the provincial level and only 64.7% of the national average. Moreover, unlike the male earners, it doesn't appear that the income gap is narrowing, as the area's female income growth has been moderately weaker than the provincial and national income growth rates of female earners.

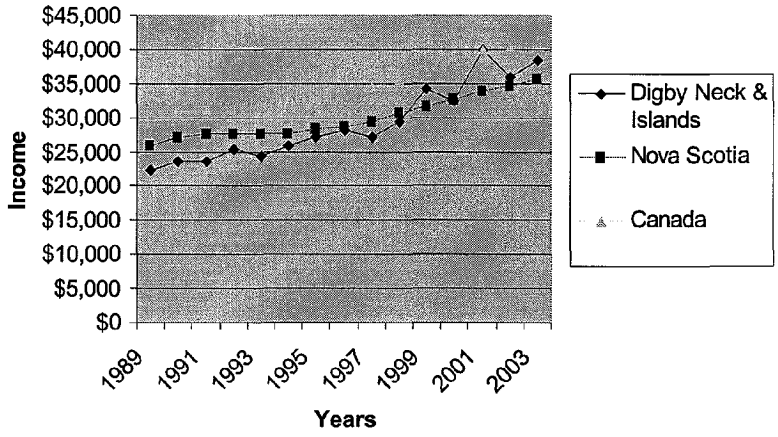
Table CP - 16

Total Average Tax Filer Income (1989-2003)
(Male)

Year	Digby Neck[1]	Nova Scotia	Canada	Index Provincial	Index National
1989	$22,410	$25,920	$30,044	86.5	74.6
1990	$23,607	$27,118	$30,930	87.1	76.3
1991	$23,742	$27,586	$31,052	86.1	76.5
1992	$25,460	$27,626	$31,240	92.2	81.5
1993	$24,416	$27,728	$31,247	88.1	78.1
1994	$25,922	$27,735	$31,557	93.5	82.1
1995	$27,107	$28,384	$32,429	95.5	83.6
1996	$28,203	$28,608	$33,109	98.6	85.2
1997	$27,214	$29,356	$34,320	92.7	79.3
1998	$29,416	$30,692	$35,603	95.8	82.6
1999	$34,116	$31,776	$36,640	107.4	93.1
2000	$32,496	$32,781	$38,566	99.1	84.3
2001	$40,049	$33,860	$39,854	118.3	100.5
2002	$35,926	$34,731	$40,391	103.4	88.9
2003	$38,379	$35,610	$41,297	107.8	92.9

Source: Small Area Administrative Data Division
[1] Denotes Digby Neck & Islands

Figure CP - 11
Average Tax Filer Income - Males



Source: Small Area & Administrative Data Division, Statistics Canada

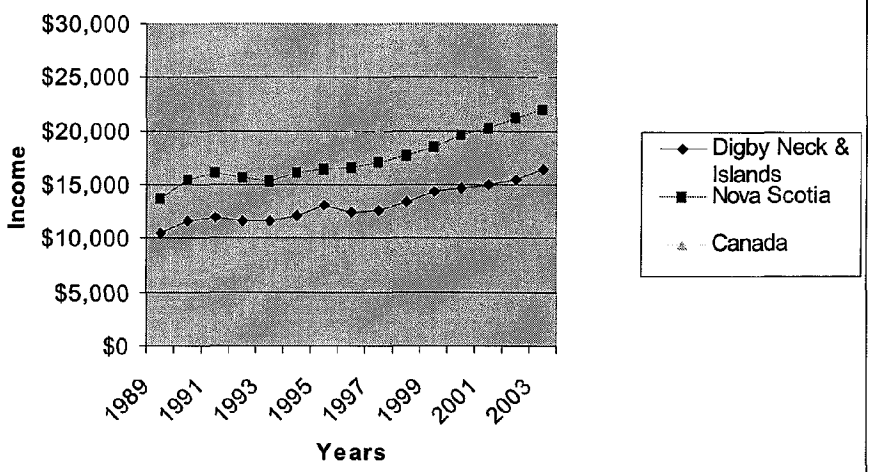
Table CP - 17

Total Average Tax Filer Income (1989-2003)
(Female)

Year	Digby Neck[1]	Nova Scotia	Canada	Index Provincial	Index National
1989	$10,519	$13,689	$16,544	76.8	63.6
1990	$11,575	$15,444	$18,325	74.9	63.2
1991	$11,904	$16,081	$18,955	74.0	62.8
1992	$11,717	$15,626	$18,540	75.0	63.2
1993	$11,614	$15,340	$18,184	75.7	63.9
1994	$12,079	$16,067	$18,868	75.2	64.0
1995	$13,018	$16,369	$19,452	79.5	66.9
1996	$12,473	$16,640	$19,783	75.0	63.0
1997	$12,644	$17,015	$20,239	74.3	62.5
1998	$13,325	$17,789	$21,018	74.9	63.4
1999	$14,325	$18,568	$21,751	77.1	65.9
2000	$14,631	$19,619	$23,013	74.6	63.6
2001	$15,011	$20,282	$24,012	74.0	62.5
2002	$15,504	$21,149	$24,717	73.3	62.7
2003	$16,483	$22,064	$25,464	74.7	64.7

Source: Small Area Administrative Data Division
[1] Denotes Digby Neck & Islands

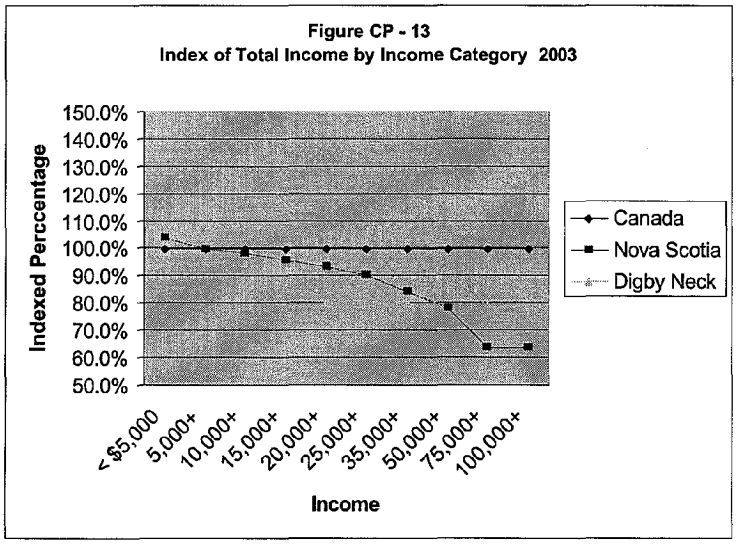
Figure CP - 12
Average Tax Filer Income - Females



Source: Small Area & Administrative Data Division, Statistics Canada

9.3.7.3.3 Income by Gender and Age

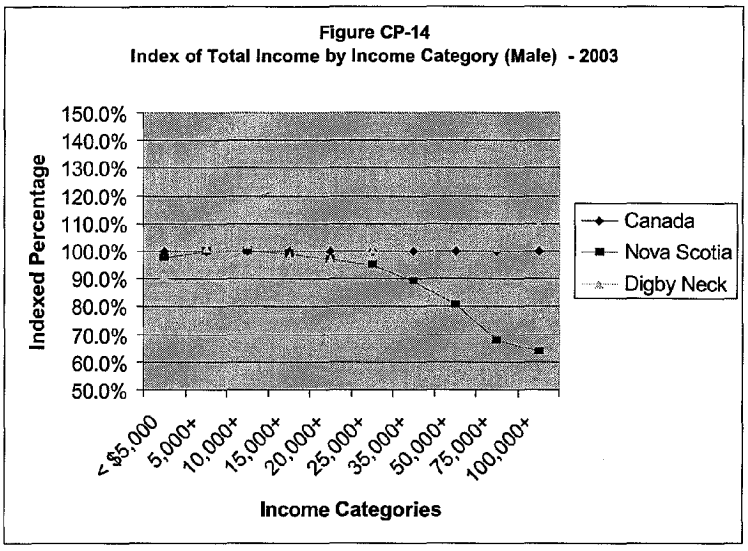
The following figures are based from Tables CP-18 through 20 and reflect an indexed comparison of the percentage of income reported in 2003 by income category for Digby Neck and Islands, Nova Scotia and Canada where Canada is the base or equal to 100. Figure CP-13 shows that the Digby Neck area had a significantly higher proportion of individuals who reported income below $5,000 than either the provincial or national proportion. It also indicates that there was a lower proportion of persons in the middle income categories of $15,000 to $35,000 and a greater proportion in the higher income brackets of $50,000 to $100,000 relative to the provincial level, with the percentage of people in the highest income level almost on par with the national level. This suggests that there may possibly be a divide between low and high income earners on the "Neck".



Source: Small Area & Administrative Data Division, Statistics Canada

Male earners, as shown in Figure CP-14, have a similar proportional spread to the national baseline and reflect a far higher percentage of male earners in the higher income categories compared to the province. Female earners on the other hand reflect a much lower level of earners across all categories with the exception of the lowest income category of below $5,000, refer to Figure CP-15.

These figures once again indicate a disparity between male and female earners on Digby Neck and Islands.



Source: Small Area & Administrative Data Division, Statistics Canada

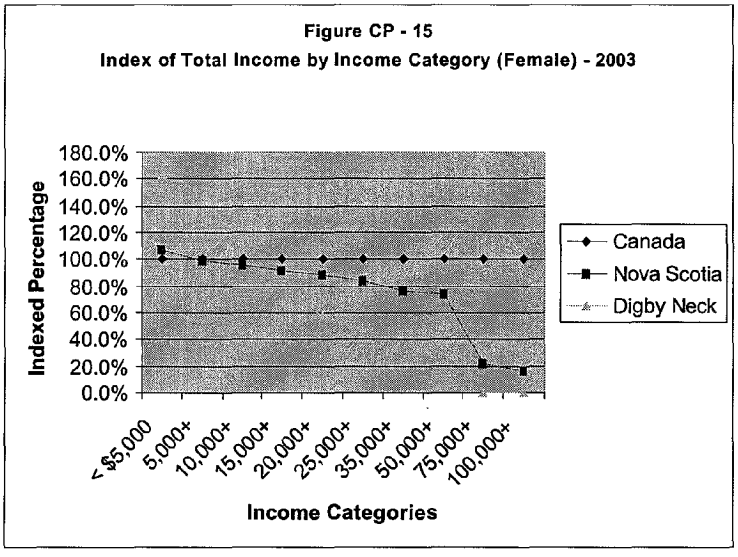


Table CP - 18
Taxfilers and Dependents with Income by Total Income, Sex & Age Group - 2003
(Canada)

Males

Total Income	0-24	25-34	35-44	45-54	55-64	65-74	75+	Total
< $5,000	420,840	125,850	118,480	108,850	83,760	22,360	7820	887,960
5,000+	1,088,250	1,739,740	2,219,000	2,069,000	1,446,240	1,000,560	699,600	10,262,390
10,000+	732,190	1,594,330	2,068,910	1,920,790	1,316,560	969,880	685,130	9,287,790
15,000+	502,360	1,452,100	1,931,460	1,793,270	1,196,600	824,490	572,920	8,273,200
20,000+	348,020	1,307,260	1,803,370	1,683,990	1,102,050	650,660	412,510	7,307,860
25,000+	236,570	1,153,490	1,664,520	1,568,340	1,002,930	530,570	316,050	6,472,470
35,000+	98,570	823,050	1,339,160	1,301,090	778,210	325,230	179,870	4,845,180
50,000+	26,540	423,620	869,550	899,360	487,390	156,310	85,970	2,948,740
75,000+	3,570	120,030	355,710	412,890	223,210	57,440	32,340	1,205,190
100,000+	860	41,040	155,630	192,930	116,810	31,780	16,700	555,750
Total	1,509,090	1,865,590	2,337,480	2,177,850	1,530,000	1,022,920	707,420	11,150,350

Females

Total Income	0-24	25-34	35-44	45-54	55-64	65-74	75+	Total
< $5,000	441,960	228,930	276,240	240,700	239,290	43,740	16,250	1,487,110
5,000+	1,063,130	1,767,750	2,189,140	1,959,010	1,262,510	1,086,980	1,104,250	10,432,770
10,000+	641,530	1,553,000	1,959,890	1,746,510	1,024,920	897,110	1,008,640	8,831,600
15,000+	371,490	1,320,280	1,722,020	1,539,610	843,560	609,940	690,650	7,097,550
20,000+	216,810	1,084,640	1,480,490	1,347,070	705,120	399,620	384,710	5,618,460
25,000+	127,570	872,070	1,253,410	1,169,230	589,480	290,100	267,480	4,569,340
35,000+	39,410	510,710	831,300	811,940	380,220	151,620	136,350	2,861,550
50,000+	7,280	189,740	402,850	429,470	184,720	63,530	59,540	1,337,130
75,000+	1,010	36,960	114,810	131,700	58,450	20,520	20,650	384,100
100,000+	360	11,970	43,830	48,610	23,220	10,530	10,120	148,640
Total	1,505,090	1,996,680	2,465,380	2,199,710	1,501,800	1,130,720	1,120,500	11,919,880

Total

Total Income	0-24	25-34	35-44	45-54	55-64	65-74	75+	Total
< $5,000	862,800	354,780	394,720	349,550	323,050	66,100	24,070	2,375,070
5,000+	2,151,380	3,507,490	4,408,140	4,028,010	2,708,750	2,087,540	1,803,850	20,695,160
10,000+	1,373,720	3,147,330	4,028,800	3,667,300	2,341,480	1,866,990	1,693,770	18,119,390
15,000+	873,850	2,772,380	3,653,480	3,332,880	2,040,160	1,434,430	1,263,570	15,370,750
20,000+	564,830	2,391,900	3,283,860	3,031,060	1,807,170	1,050,280	797,220	12,926,320
25,000+	364,140	2,025,560	2,917,930	2,737,570	1,592,410	820,670	583,530	11,041,810
35,000+	137,980	1,333,760	2,170,460	2,113,030	1,158,430	476,850	316,220	7,706,730
50,000+	33,820	613,360	1,272,400	1,328,830	672,110	219,840	145,510	4,285,870
75,000+	4,580	156,990	470,520	544,590	281,660	77,960	52,990	1,589,290
100,000+	1,220	53,010	199,460	241,540	140,030	42,310	26,820	704,390
Total	3,014,180	3,862,270	4,802,860	4,377,560	3,031,800	2,153,640	1,827,920	23,070,230

Small Area & Administrative Data Division, Statistics Canada

Table CP - 19
Taxfilers and Dependents with Income by Total Income, Sex & Age Group - 2003
Nova Scotia

Males

Total Income	0-24	25-34	35-44	45-54	55-64	65-74	75+	Total
< $5,000	13,580	3,330	3,130	3,190	2,400	340	80	26,050
5,000+	28,220	48,360	65,360	63,620	47,620	31,860	22,420	307,460
10,000+	17,910	44,250	60,730	58,330	42,770	31,060	22,080	277,130
15,000+	11,570	39,950	57,010	54,540	38,650	25,820	17,570	245,110
20,000+	7,350	34,590	52,450	50,450	35,080	19,980	12,040	211,940
25,000+	4,560	28,810	47,070	46,070	31,290	16,220	9,290	183,310
35,000+	1,820	18,390	35,230	36,100	22,560	9,660	5,200	128,960
50,000+	400	8,380	21,040	22,670	12,250	4,070	2,260	71,070
75,000+	60	1,770	6,660	8,620	5,170	1,270	740	24,290
100,000+	0	570	2,650	3,790	2,710	660	350	10,730
Total	41,800	51,690	68,490	66,800	50,020	32,200	22,500	333,500

Females

Total Income	0-24	25-34	35-44	45-54	55-64	65-74	75+	Total
< $5,000	14,310	6,010	8,450	8,100	8,970	1,350	550	47,740
5,000+	28,320	51,290	64,970	58,440	38,430	33,880	36,190	311,520
10,000+	15,750	44,580	57,300	50,410	29,390	26,410	32,600	256,440
15,000+	8,260	36,510	49,020	43,220	23,450	16,880	19,520	196,860
20,000+	4,330	27,900	40,350	36,560	18,720	10,660	10,390	148,910
25,000+	2,270	20,740	32,690	30,780	15,120	7,510	7,050	116,160
35,000+	610	10,340	19,030	19,620	8,750	3,790	3,560	65,700
50,000+	150	3,580	8,670	10,320	4,060	1,400	1,540	29,720
75,000+	0	490	1,820	2,100	1,050	370	460	6,290
100,000+	0	150	680	790	430	180	220	2,450
Total	42,630	57,300	73,410	66,540	47,400	35,230	36,740	359,250

Total

Total Income	0-24	25-34	35-44	45-54	55-64	65-74	75+	Total
< $5,000	27,890	9,340	11,580	11,290	11,360	1,690	630	73,780
5,000+	56,540	99,650	130,320	122,060	86,050	65,740	58,610	618,970
10,000+	33,660	88,830	118,030	108,740	72,160	57,470	54,680	533,570
15,000+	19,830	76,460	106,030	97,760	62,100	42,700	37,090	441,970
20,000+	11,680	62,490	92,800	87,010	53,800	30,640	22,430	360,850
25,000+	6,830	49,550	79,760	76,850	46,410	23,730	16,340	299,470
35,000+	2,430	28,730	54,260	55,720	31,310	13,450	8,760	194,660
50,000+	550	11,960	29,710	32,990	16,310	5,470	3,800	100,790
75,000+	60	2,260	8,480	10,720	6,220	1,640	1,200	30,580
100,000+	0	720	3,330	4,580	3,130	840	570	13,170
Total	84,430	108,990	141,900	133,350	97,410	67,430	59,240	692,750

Source: Small Area & Administrative Data Division, Statistics Canada

Table CP - 20
Taxfilers and Dependents with Income by Total Income, Sex & Age Group - 2003
Digby Neck

Males

Total Income	0-24	25-34	35-44	45-54	55-64	65-74	75+	Total
< $5,000	20	0	0	0	0	0	0	40
5,000+	40	70	90	100	80	60	60	510
10,000+	30	70	90	90	80	60	60	470
15,000+	20	70	80	90	70	40	40	400
20,000+	0	60	80	80	60	20	30	350
25,000+	0	60	70	70	50	20	30	320
35,000+	0	50	50	60	40	0	0	230
50,000+	0	40	30	30	30	0	0	130
75,000+	0	0	20	0	20	0	0	60
100,000+	0	0	0	0	0	0	0	30
Total	60	80	100	110	80	60	60	550

Females

Total Income	0-24	25-34	35-44	45-54	55-64	65-74	75+	Total
< $5,000	30	0	20	20	20	0	0	110
5,000+	20	60	80	80	60	60	80	420
10,000+	0	50	60	60	40	40	70	350
15,000+	0	30	40	50	30	20	40	220
20,000+	0	20	30	40	20	20	20	150
25,000+	0	0	20	30	20	0	20	100
35,000+	0	0	0	20	0	0	0	60
50,000+	0	0	0	0	0	0	0	30
75,000+	0	0	0	0	0	0	0	0
100,000+	0	0	0	0	0	0	0	0
Total	50	70	100	90	80	60	80	540

Total

Total Income	0-24	25-34	35-44	45-54	55-64	65-74	75+	Total
< $5,000	50	20	30	20	30	0	0	160
5,000+	60	130	170	180	140	120	140	930
10,000+	40	120	150	160	120	100	130	810
15,000+	20	100	120	140	100	60	80	620
20,000+	20	80	100	120	90	40	50	490
25,000+	20	70	90	100	70	30	40	420
35,000+	0	60	60	80	50	20	20	290
50,000+	0	40	40	40	30	0	0	170
75,000+	0	0	20	0	20	0	0	60
100,000+	0	0	0	0	0	0	0	30
Total	110	150	200	200	160	120	150	1,090

9.3.7.4 Growth and Distribution of Income by Source

9.3.7.4.1 Growth

The rate of growth in total income for Digby Neck and Islands has been moderately slower paced than the relative provincial and national income growth rates. Table CP-21 shows the level of total income and distribution for Digby Neck and Islands, Nova Scotia and Canada over a ten-year period from 1994 to 2003. Total income for Digby Neck and Islands grew roughly $7.3 million or 31.6% from 1994 to 2003 to a level of $30,394,000. Comparative growth rates provincially and nationally were 39.4% and 49.8% respectively over this period.

9.3.7.4.2 Distribution of Income

The following section is based on Table CP-22, which reflects the percentage distribution of income by source and is derived from figures presented in Table CP-21.

Wages & Salaries

Wages and Salaries on Digby Neck and Islands account for a somewhat smaller percentage of total income as compared to the relative provincial and national proportions. The percentage of income derived from wages, salaries and commissions changed substantially from 1994 to 2003 on Digby Neck. In 1994, only 34.9% of income was attributed to paid earnings, however, by 2003 the percentage had increased to 53.3%. While this was a significant increase, the percentage was still far less than the provincial and national averages of 65.1% and 69.5% respectively.

Self-employment Income

The percentage of income derived from self-employment dropped significantly from 1994 to 2003. Income derived from self-employment in 1994 was $5,844,000 or 25.3% overall. By 2003 self-employment income had dropped to $3,305,000 or 10.9% of total income. This decline is contrary to the national trend where the percentage of income derived from self-employment has remained stable. Provincially though, a slight downward shift has been experienced.

While self-employment still remains a relatively important component of total income on Digby Neck and Islands as compared to provincial and national proportions, its recent decline suggests that a significant shift has occurred within the economy with regard to the dynamics of the distribution of income. This shift may be the result of the sell off of fishing licenses and related assets in recent years resulting in a less diversified and independent fishing fleet. This in-turn may have very negative ramifications as opportunities to earn income become increasingly dependent on employment in an area that has a shrinking industrial base.

Employment Insurance Benefits

Income derived from employment insurance benefits declined over the period from 1994 to 2003. In 1994, employment insurance benefits made up 12.3% of total income on the Neck and Islands, the percentage fell to 7.2% by 2003. However, employment insurance still remains a very important source of income for the region. As is shown in Table CP-20, the area is still relatively more dependent on employment insurance benefits as compared to Digby County, the Southern Region, Nova Scotia and Canada.

Other Transfer Payments

The percentage level of government transfers received within the area, excluding employment insurance, for such transfers as the Canada Child Tax Benefit, Old Age Security, Canada Pension Plan etc., predominately fell within similar proportions to that of provincial and national levels. However, the levels paid out in Old Age Security and Canadian Pension benefits, relative to total income, are somewhat higher than the provincial and national figures and this is to be expected given the relatively higher level of population over the age of sixty-five in the Digby Neck area.

9.3.7.5 Economic Dependency

The following section provides a comparison analysis of levels of dependency of government transfers for Digby Neck and Islands, Digby County, the Southern Region, Nova Scotia and Canada. The level of dependency is measured by a simple ratio comparing the level of transfer payments received in an area as they relate to employment income. The section entitled "Economic Dependency Ratio" in Table CP-20 provides a breakdown of the various ratios based on 2002 tax filer information for the regions defined above.

The overall dependency ratio of government transfers was 34.8 on Digby Neck and Islands according to tax data for 2002. This is relatively high in comparison to the Southern Region, the province and Canada. However, the ratio was slightly lower than that of Digby County and overall, the ratio is fairly typical of what you would see in the coastal and non-coastal rural regions of Nova Scotia.

The dependence on employment insurance benefits is relatively high in comparison to the other regions identified, however the area is far less dependent than some of the northern regions of Nova Scotia and Cape Breton.

Table CP - 21

Distribution of Income by Source
Digby Neck & Islands, Nova Scotia & Canada

Year	Total Income	Employment Income: Wages, Salaries Commissions	Employment Income: Self-Emp.	Investment	Social: Employment Insurance	Social: Old Age Security	Social: CPP	Social: Child Tax Benefit	Social: Other	Private: Other Pensions, RRSP
	'000	'000	'000	'000	'000	'000	'000	'000	'000	'000
Digby Neck & Islands										
1994	$23,096	$8,057	$5,844	$849	$2,833	$1,587	$1,242	$317	$491	$1,876
1995	$23,423	$7,781	$5,972	$1,204	$2,527	$1,788	$1,313	$287	$536	$2,015
1996	$23,344	$7,031	$6,526	$1,396	$2,303	$1,770	$1,382	$262	$421	$2,253
1997	$22,737	$8,943	$3,467	$1,168	$2,318	$1,847	$1,430	$282	$428	$2,854
1998	$24,229	$10,989	$3,037	$1,149	$2,386	$1,881	$1,496	$289	$397	$2,605
1999	$27,127	$12,737	$4,643	$1,092	$2,335	$1,752	$1,556	$284	$360	$2,368
2000	$25,773	$12,425	$3,515	$1,423	$2,296	$1,689	$1,497	$323	$367	$2,238
2001	$30,784	$17,177	$3,631	$1,644	$2,142	$1,778	$1,499	$327	$396	$2,190
2002	$28,695	$14,954	$3,403	$1,674	$2,241	$1,835	$1,583	$340	$392	$2,273
2003	$30,394	$16,211	$3,305	$1,837	$2,195	$1,944	$1,658	$378	$518	$2,348
Nova Scotia										
1994	$14,209,916	$8,790,397	$734,848	$495,441	$729,489	$619,739	$654,977	$175,807	$494,155	$1,515,063
1995	$14,608,990	$8,880,452	$781,558	$598,594	$604,576	$677,522	$686,805	$169,959	$501,612	$1,707,912
1996	$14,805,869	$8,940,974	$784,106	$606,699	$566,757	$700,707	$725,895	$172,183	$500,121	$1,808,427
1997	$15,212,882	$9,310,364	$801,990	$567,085	$506,842	$720,198	$755,197	$174,494	$472,861	$1,903,851
1998	$15,996,555	$9,971,536	$789,702	$572,717	$503,393	$752,873	$787,777	$177,861	$470,342	$1,970,354
1999	$16,787,822	$10,714,567	$844,183	$691,605	$489,061	$756,324	$815,772	$186,849	$456,749	$1,832,712
2000	$17,603,339	$11,340,983	$831,979	$743,839	$508,194	$778,529	$841,649	$212,623	$449,643	$1,895,900
2001	$18,510,856	$12,047,242	$830,345	$716,776	$549,033	$813,579	$878,165	$236,303	$445,152	$1,994,261
2002	$19,123,132	$12,455,302	$852,797	$698,002	$580,881	$833,550	$929,009	$248,338	$432,911	$2,092,342
2003	$19,802,295	$12,895,505	$858,733	$725,937	$595,175	$867,206	$961,594	$255,158	$505,067	$2,137,920
Canada										
1994	$510,105,691	$343,416,294	$24,508,864	$24,187,007	$14,357,913	$17,438,918	$17,811,510	$5,259,174	$19,909,727	$43,216,284
1995	$533,090,440	$355,653,750	$26,549,261	$29,103,581	$12,403,730	$18,967,039	$18,719,180	$5,213,284	$20,270,087	$46,210,528
1996	$549,562,295	$364,979,727	$28,591,341	$29,281,508	$11,830,127	$19,688,259	$19,824,898	$5,215,504	$19,586,954	$50,563,977
1997	$574,660,496	$385,672,033	$31,862,590	$26,800,515	$10,282,111	$20,422,406	$20,733,173	$5,297,082	$19,101,071	$54,489,515
1998	$602,535,719	$406,735,118	$32,589,549	$27,150,796	$10,182,345	$21,303,248	$21,372,416	$5,411,343	$19,109,972	$58,680,932
1999	$631,625,086	$432,579,116	$34,852,847	$31,079,910	$9,664,141	$21,693,838	$22,273,874	$5,654,572	$18,391,660	$55,435,128
2000	$675,921,102	$468,523,901	$36,978,276	$32,972,184	$9,158,183	$22,578,734	$23,047,765	$6,566,008	$17,702,084	$58,393,967
2001	$719,728,639	$498,908,545	$39,342,801	$34,412,269	$10,718,758	$23,867,729	$24,217,056	$7,352,621	$17,970,287	$62,938,573
2002	$736,538,862	$510,011,589	$40,550,545	$30,643,252	$12,375,522	$24,679,207	$26,007,618	$7,736,546	$17,785,410	$66,749,173
2003	$764,005,577	$530,875,930	$41,051,537	$31,008,629	$12,611,872	$25,906,266	$27,149,428	$8,014,124	$17,656,228	$69,731,563

Source: Small Area Administrative Data, Statistics Canada

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Table CP - 22

Percentage Distribution of Income by Source
Digby Neck & Islands, Nova Scotia & Canada

Year	Total Income	Employment Income: Wages, Salaries Commissions	Employment Income: Self-Emp.	Investment	Social: Employment Insurance	Social: Old Age Security	Social: CPP	Social: Child Tax Benefit	Social: Other	Private Pension, RRSP, Other
	%	%	%	%	%	%	%	%	%	%
Digby Neck & Islands										
1994	100.0	34.9	25.3	3.7	12.3	6.9	5.4	1.4	2.1	8.1
1995	100.0	33.2	25.5	5.1	10.8	7.6	5.6	1.2	2.3	8.6
1996	100.0	30.1	28.0	6.0	9.9	7.6	5.9	1.1	1.8	9.7
1997	100.0	39.3	15.2	5.1	10.2	8.1	6.3	1.2	1.9	12.6
1998	100.0	45.4	12.5	4.7	9.8	7.8	6.2	1.2	1.6	10.8
1999	100.0	47.0	17.1	4.0	8.6	6.5	5.7	1.0	1.3	8.7
2000	100.0	48.2	13.6	5.5	8.9	6.6	5.8	1.3	1.4	8.7
2001	100.0	55.8	11.8	5.3	7.0	5.8	4.9	1.1	1.3	7.1
2002	100.0	52.1	11.9	5.8	7.8	6.4	5.5	1.2	1.4	7.9
2003	100.0	53.3	10.9	6.0	7.2	6.4	5.5	1.2	1.7	7.7
Nova Scotia										
1994	100.0	61.9	5.2	3.5	5.1	4.4	4.6	1.2	3.5	10.7
1995	100.0	60.8	5.3	4.1	4.1	4.6	4.7	1.2	3.4	11.7
1996	100.0	60.4	5.3	4.1	3.8	4.7	4.9	1.2	3.4	12.2
1997	100.0	61.2	5.3	3.7	3.3	4.7	5.0	1.1	3.1	12.5
1998	100.0	62.3	4.9	3.6	3.1	4.7	4.9	1.1	2.9	12.3
1999	100.0	63.8	5.0	4.1	2.9	4.5	4.9	1.1	2.7	10.9
2000	100.0	64.4	4.7	4.2	2.9	4.4	4.8	1.2	2.6	10.8
2001	100.0	65.1	4.5	3.9	3.0	4.4	4.7	1.3	2.4	10.8
2002	100.0	65.1	4.5	3.7	3.0	4.4	4.9	1.3	2.3	10.9
2003	100.0	65.1	4.3	3.7	3.0	4.4	4.9	1.3	2.6	10.8
Canada										
1994	100.0	67.3	4.8	4.7	2.8	3.4	3.5	1.0	3.9	8.5
1995	100.0	66.7	5.0	5.5	2.3	3.6	3.5	1.0	3.8	8.7
1996	100.0	66.4	5.2	5.3	2.2	3.6	3.6	0.9	3.6	9.2
1997	100.0	67.1	5.5	4.7	1.8	3.6	3.6	0.9	3.3	9.5
1998	100.0	67.5	5.4	4.5	1.7	3.5	3.5	0.9	3.2	9.7
1999	100.0	68.5	5.5	4.9	1.5	3.4	3.5	0.9	2.9	8.8
2000	100.0	69.3	5.5	4.9	1.4	3.3	3.4	1.0	2.6	8.6
2001	100.0	69.3	5.5	4.8	1.5	3.3	3.4	1.0	2.5	8.7
2002	100.0	69.2	5.5	4.2	1.7	3.4	3.5	1.1	2.4	9.1
2003	100.0	69.5	5.4	4.1	1.7	3.4	3.6	1.0	2.3	9.1

Source: Tabulation from Table CP-18, Small Area and Administrative Data, Statistics Canada

Table CP - 23

Distribution of Income by Source - 2002
Digby Neck & Islands, Digby County, Southern Region, Nova Scotia & Canada

Geography	Year 2002	Total Income '000	Employment Wages, Salaries Commissions '000	Income Self-Emp. '000	Investment '000	Employment Insurance '000	Old Age Security '000	Social CPP '000	Child Tax Benefit '000	Other '000	Private, Other '000
Digby Neck		$28,695	$14,954	$3,403	$1,674	$2,241	$1,835	$1,583	$340	$392	$2,273
Digby County		$381,421	$218,731	$21,950	$14,954	$22,599	$28,291	$22,869	$6,131	$8,868	$37,029
Southern Region		$2,428,176	$1,453,486	$144,919	$109,250	$110,317	$147,401	$135,672	$14,300	$52,990	$241,005
Nova Scotia		$19,123,132	$12,455,302	$852,797	$698,002	$580,881	$833,550	$929,009	$248,338	$432,911	$2,092,342
Canada		$736,538,862	$510,011,589	$40,550,545	$30,643,252	$12,375,522	$24,679,207	$26,007,618	$7,736,546	$17,785,410	$66,749,173

Percentage Distribution of Income by Source - 2002
Digby Neck & Islands, Digby County, Southern Region, Nova Scotia & Canada

Geography	Year 2002	Total Income %	Employment Wages, Salaries Commissions %	Income Self-Emp. %	Investment %	Employment Insurance %	Old Age Security %	Social CPP %	Child Tax Benefit %	Other %	Private, Other %
Digby Neck		100.0	52.1	11.9	5.8	7.8	6.4	5.5	1.2	1.4	7.9
Digby County		100.0	57.3	5.8	3.9	5.9	7.4	6.0	1.6	2.3	9.7
Southern Region		100.0	59.9	6.0	4.5	4.5	6.1	5.6	0.6	2.2	9.9
Nova Scotia		100.0	65.1	4.5	3.7	3.0	4.4	4.9	1.3	2.3	10.9
Canada		100.0	69.2	5.5	4.2	1.7	3.4	3.5	1.1	2.4	9.1

Economic Dependency Ratio
Digby Neck & Islands, Digby County, Southern Region, Nova Scotia & Canada - 2002

Geography	Year 2002	Employment Income	Government Transfers	Ratio	Employment Insurance	Ratio	Old Age Security	Ratio	Social CPP	Ratio	Child Tax Benefit	Ratio	Other	Ratio
Digby Neck		$18,357	$6,391	34.8	$2,241	12.2	$1,835	10.0	$1,583	8.6	$340	1.9	$392	2.1
Digby County		$240,681	$88,758	36.9	$22,599	9.4	$28,291	11.8	$22,869	9.5	$6,131	2.5	$8,868	3.7
Southern Region		$1,598,405	$460,680	28.8	$110,317	6.9	$147,401	9.2	$135,672	8.5	$14,300	0.9	$52,990	3.3
Nova Scotia		$13,308,099	$3,024,689	22.7	$580,881	4.4	$833,550	6.3	$929,009	7.0	$248,338	1.9	$432,911	3.3
Canada		$550,562,134	$88,584,303	16.1	$12,375,522	2.2	$24,679,207	4.5	$26,007,618	4.7	$7,736,546	1.4	$17,785,410	3.2

Source: Tabulation from Table CP-18, Small Area and Administrative Data, Statistics Canada

9.3.5.7.1 Analyses

Income levels on Digby Neck and Islands are relatively high in some respects in comparison to other areas of the province. However, there appears to be a significant disparity between male and female incomes, far beyond the provincial and national levels. Much of the difference is probably attributable to the types of job opportunities available in the two dominant industries on the Neck and Islands, the fishery and tourism. The lucrative part of the fishery is still relatively a male dominated industry as females are typically relegated to menial, low paying processing jobs. Similarly, employment opportunities in the tourism industry, which are typically dominated by females, are low paying on average as well.

9.3.7.5.2 Structures

Buildings by type within 4 km of the quarry property are shown on **Maps 3A, 3B, 3C, 3D, 3E and Maps 6A and 6B**. The 4 km zone extends from Tiddville north to Sandy Cove. In this zone, there are approximately 197 residences including seasonal residences and residences with commercial signage. Other building types include residential out-buildings (67), commercial/industrial (12), fisheries related (40), government/community (8), and abandoned buildings (3). The source of information is: Service Nova Scotia and municipal Relations 2004, 1:10 000 base map and on-site reconnaissance July 2005.

9.3.8 Transportation – Land and Marine

Introduction

The present land use in the area of the proposed Whites Point Quarry is primarily forestry with interspersed rural residential. Collector Highway #217 is the only transportation route serving Digby Neck between the Town of Digby and the community of East Ferry. Highway #217 is located east of the ridge on the Digby Neck peninsula between the Bay of Fundy and Saint Marys Bay. As a result, residential and limited commercial/industrial development has been established on either side of the highway on the more level lands.

Small fishing communities such as Little River, Whale Cove, Mink Cove, and Sandy Cove have also been established at points of easy access to the waters of either the Bay of Fundy or Saint Marys Bay. Historically and today, the fishing industry has been the economic mainstay for permanent residents on Digby Neck. Other resource industries such as agriculture, have generally declined. The forest industry has been declining due in part to infestations of the spruce bark beetle which has affected the dominant softwood forest. As a result, the once cleared agriculture lands have become overgrown and diseased forests have been left to die or have been clear cut.

9.3.8.1 Research

Collector Highway #217, a two lane, paved road is the only land transportation route serving Digby Neck and the proposed Whites Point Quarry. Heavy commercial traffic on Highway #217 consists mainly of trucks involved with either the fishing or forest industries. The majority of vehicular use is the private auto as residents from Brier Island, Long Island, and Digby Neck travel to gain goods and services in the Town of Digby and area. Direct access to the Whites Point Quarry property is via the Whites Cove Road No. 442, an unimproved public gravel road, with steep gradients and in places severely eroded. Traditionally, Whites Cove Road has provided local residents with access to the Bay of Fundy shore.

The most applicable traffic counts for Digby Neck and the area of the Whites Point quarry were taken on Highway #217 by the Nova Scotia Department of Transportation and Public Works (Ref. 153). Average daily traffic counts for the section of Highway #217 from Waterford to East Ferry – see **Maps 6A and 6B**, were taken in 1996, 1997, and 2000. The average number of vehicles passing the count location (1.5 km east of East Ferry) in a 24 hour period based on a short temporary count was 658 on September 24, 1996, 983 on August 26, 1997 and 877 on June 28, 2000. Due to the time of year for the recorded counts, tourist and resident vehicles would be included. However, seasonal variation on this section of Highway #217 is considered to be low. Since a temporary counter was used, trucks as a percent of the annual average daily traffic is not provided.

Average daily traffic counts on sections of Highway #217 were also taken north and south of Digby Neck. These counts were taken 1 km east of Rossway and just west of Central Grove on Long Island. The count between the Town of Digby and Waterford is over double that of Digby Neck between Waterford to East Ferry. Also, the count for Long Island between the Tiverton Ferry Terminal and the Freeport Ferry Terminal is approximately the same as recorded for Digby Neck.

Digby Neck Consolidated School, a small, rural elementary school is located in Sandy Cove on Highway #217 approximately 4 km from the Whites Point quarry. This school zone will experience some increased truck traffic during quarry construction from trucks delivering materials, equipment, fuel, and explosives. During operation of the quarry, truck traffic will generally be reduced to fuel deliveries by tanker truck and explosives every two weeks. These trucks would be licensed for their appropriate material transport. All traffic through the designated school zone would be expected to adhere to the 50 km speed limit when children are present. As mentioned previously, no quarry products will be transported on public roads.

Designated shipping lanes (inbound and outbound) – see **Map 4,** in the Bay of Fundy exist approximately 13 km off shore from the proposed marine terminal at Whites Point. Large vessels presently visit the ports of Saint John and Bayside, New Brunswick, Eastport, Maine, and Hantsport, Nova Scotia using these shipping lanes. Approximately 800 large vessels per year enter and leave the designated shipping lanes. Traffic to Saint John is primarily tankers transporting crude and refined oil products and represents the majority of traffic and the largest ships. Bayside and Eastport, New Brunswick represent approximately 100 vessels and Hantsport, Nova Scotia 110 vessels per year. Additionally, vessels not required to report upon entering the shipping lanes such as bulk carriers, tugs, cruise ships, container ships, government vessels, the Saint John – Digby Ferry, and fishing vessels comprise the greatest majority of total commercial vessel traffic in the Bay of Fundy.

9.3.8.2 Analyses

Transportation of rock products produced at the Whites Point Quarry is proposed to be exclusively by water. This will effectively eliminate heavy truck traffic from the quarry on rural Highway #217, for the 50 year life of the project. As a result, the perceived inconvenience of heavy truck traffic on a rural two lane highway will not be experienced by local residents. Nor will noise, vibration, or increased emissions from trucks hauling heavy loads be experienced by residents living along Highway #217. An increase in truck traffic and private automobile will likely be experienced during the proposed one year construction phase of the project.

Machinery, equipment, and materials delivery by land will take place. However, much of the construction materials and equipment for the marine terminal may be delivered by water. Truck traffic from delivery of fuel and explosives will occur approximately once every two weeks during operation of the quarry.

To ensure safe access to the quarry property from Highway #217, the Whites Cove Road will require upgrading. This would include upgrades to the intersection at Highway #217 and widening of Whites Cove Road. Presently, no residential dwellings are served by the Whites Cove Road.

Shipment of quarry products is proposed exclusively by water from the Whites Point Marine Terminal. Traditional fisheries such as lobster, herring and sea cucumbers presently occur in the nearshore waters. It is anticipated that the frequency of shipments by water will be once per week throughout the year. Approximately 40,000 tons of product will be loaded into the holds of a bulk carrier similar to the Canadian Steamship Lines "Spirit", a Panamax – class vessel. Some inconvenience of the nearshore lobster and sea cucumber fishery may be experienced during these weekly shipments. The duration of the vessel in nearshore waters during approach, loading, and departure is expected to be less than 24 hours. A half mile radius from the terminal may be required for manoeuvring and docking of the vessel depending on weather and tides.

Presently, marine traffic such as recreational/tourism boating and commercial fishing boats is not managed in the area of the marine terminal or in most other areas of the Bay of Fundy. These boats are all licensed for their particular use. For marine accidents and spills and other marine emergencies, refer to **Paragraph 11.2**.

9.3.8.3 Mitigation

A primary mitigation measure involves the shipping of quarry products directly from the site by water, thereby eliminating heavy truck traffic on rural, two lane highways. This method of product transportation will also eliminate associated noise, vibration, and inconvenience to residents living and traveling along Highway #217. Fuel storage capacity, on-site, will be sufficient to minimize frequent tanker truck deliveries, again reducing the frequency of truck traffic. No explosives will be stored on-site and deliveries are planned once every two weeks by certified vehicles. To minimize road deliveries of machinery, equipment, and construction materials during the anticipated one year construction period, whenever possible, deliveries will be made by water, especially the major marine terminal components.

Upgrading of the Whites Cove Road will meet current Department of Transportation and Public Works standards. As mentioned previously, an alternate location for the access road to the quarry property is presently being investigated. Whichever option is selected, the access road will be paved to reduce dust that could affect nearby residences.

Shipping of quarry products may occur a total of twenty-four days during the six month lobster fishing season. Arrival and departure of the bulk carrier will potentially affect a one half mile radius of nearshore fishing waters in the vicinity of the Whites Point Marine Terminal. To minimize inconvenience to local fishermen, advance notice of shipment schedules will be provided to fishers who traditionally fish these waters. Also, a designated ship route and docking radius requirements will be provided to the fishermen.

Consultation with the lobster fishers fishing the nearshore waters indicates a reasonable solution can be reached. Bilcon of Nova Scotia Corporation proposes a "lobster trap fund" which would be contributed to by Bilcon and administered by the lobster fishers fishing the Whites Cove area.

9.3.8.4 Monitoring

Monitoring of any loss of fishing gear as a result of the bulk carrier transporting aggregates would be the responsibility of the local lobster fishermen's group. A seasonal report would be furnished by them to Bilcon of Nova Scotia Corporation.

Public participation is proposed to continue during quarry construction and operation. Bilcon of Nova Scotia Corporation intends to re-establish the Community Liaison Committee (CLC) that was established as a result of the permitting of the 4 hectare quarry site in 2002. In this regard, a fisherman who fishes the Whites Point area will be invited to participate on this committee and monitor shipping activities.

9.3.8.5 Impact Statements

Land Transportation – Construction

During the one year construction phase of the quarry and marine terminal, increased vehicular traffic from delivery of materials and equipment, and the work force can be expected resulting in a ***short term, insignificant negative effect, of regional scale.***

Land Transportation - Operation

Since transportation of quarry products will be by water, disruption of existing land transportation networks and residential quality of life by heavy truck traffic is expected to result in a ***long term, neutral (no) effect, of regional scale.***

Marine Transportation

Potential inconvenience for local fishers during construction and vessel arrival and departure, especially lobster fishermen, may occur in nearshore waters once a week during the six month lobster fishing season resulting in a ***long term, insignificant negative effect, of regional scale.***

9.3.9 Economy – Whites Point Quarry and Marine Terminal

Introduction

Rural Canadians consider economic challenges as among the most pressing challenges facing their communities (Government of Canada 2001 Ref. 118). "In particular, a lack of permanent and well-paying jobs, and the corresponding impact on incomes, places considerable pressure on the sustainability of rural communities. Many of the economic issues facing rural communities are common throughout rural Canada, but are exacerbated in Nova Scotia by its relatively weak economic performance in relation to the Canadian average" (RCIP Project 2003 Ref 96).

The proposed Whites Point quarry and Marine Terminal is located on Digby Neck in Digby County, Nova Scotia. Digby Neck constitutes the local economic area of influence for the quarry which lies within the broader regional economic area of Digby County. Digby Neck is a narrow peninsula between the Bay of Fundy and Saint Mary's Bay leading to two islands (Long Island and Brier Island). Traditionally, the Digby Neck and Islands economy has been highly dependent upon the fishing industry as its primary source of economic activity.

Many coastal communities in Nova Scotia are facing changing economic conditions, Digby Neck/Islands are no exception. These changes are being induced by several factors including a rationalization of the fishing industry, a general lack of economic diversification and growth, an aging population and deteriorating service infrastructure, especially community wharves. Further complicating these structural industry factors are two general population trends: increasing migration to urban areas and a low birth rate. As a result, rural areas are becoming hard-pressed to retain youth and to rejuvenate stagnating economies.

9.3.9.1 Research

An economic profile of the regional and local area of the Whites Point quarry and Marine Terminal was compiled in 2005 – see – Gardner Pinfold Consulting Economists Ltd. "Digby Neck/Islands Economic Profile". December 2005 **Ref. Vol. VI, Tab 32.** This study investigated general economic indicators and focused on two industry sectors – the fishery and tourism. The fishery and tourism were identified as key industries throughout the community consultation process. These two sectors will be discussed in detail in subsequent sections of this EIS.

The economic impact of the proposed quarry and marine terminal utilized the EcoTec Economic Impact Model. This state of the art model is a privatized version of the Statistics Canada Interprovincial Input-Output Model. Input-Output analysis simulates how various sectors of the economy interact through the purchase or supply of goods and services. The model provides a means to estimate economic changes that result from new economic activity. In this case, the establishment of a quarry at Whites Point is assumed to be the economic change.

Industries

Overall economic activity by industry during 1991 - 2001 on the Digby Neck/Islands is shown in Table E – 1 – Labour Force by Industry.

Table E - 1 Labour Force by Industry - Digby Neck and Islands

INDUSTRIES	1991 Census		1996 Census		2001 Census	
	#	%	#	%	#	%
All industries	910	100.0	885	100.0	860	100.0
Agriculture and related services	0	0.0	0	0.0	0	0.0
Fishing and trapping	295	32.4	270	30.5	310	36.0
Logging and forestry	10	1.1	0	0.0	0	0.0
Mining, quarrying, and oil well	0	0.0	0	0.0	0	0.0
Manufacturing	305	33.5	190	21.5	130	15.1
Construction	0	0.0	20	2.3	10	1.2
Transportation and storage	25	2.7	40	4.5	40	4.7
Communication and other utility	10	1.1	10	1.1	0	0.0
Wholesale trade	10	1.1	75	8.5	40	4.7
Retail trade	90	9.9	80	9.0	75	8.7
Finance and insurance	20	2.2	0	0.0	10	1.2
Real estate operator & insurance agent	0	0.0	10	1.1	10	1.2
Business services	0	0.0	10	1.1	20	2.3
Government services	40	4.4	10	1.1	20	2.3
Educational services	35	3.8	10	1.1	25	2.9
Health and social services	20	2.2	30	3.4	50	5.8
Accommodation, food and beverage services	10	1.1	40	4.5	90	10.5
Other services	10	1.1	65	7.3	45	5.2
Industry – non applicable	10	1.1	30	3.4	15	1.7

Detailed data are suppressed for communities with population less than 100.
Source: Nova Scotia Community Counts web page – data modeled from Statistics Canada, Census of Population 1991, 1996, 2001.

The previous table is inclusive of the population 15 years of age and over, excluding institutional residents, who worked at some time since January 1 the year prior to Census. Respondents were not necessarily employed on Census Day.

Please note that a value of 0 may represent a true zero count, unavailable data, or suppressed data.

Labour Force

Labour force trends for Digby Neck/Islands were also investigated and reflect shifts in the overall economic circumstances of the area. Between 1991 and 2001, the number of people employed on Digby Neck/Islands dropped by almost 10% while over the same period the unemployment rate rose from 12.0% in 1991 to 18.7% in 1996 and then to declined to14.4% in 2001. In Digby County during 1991 – 2001, the number of people employed dropped by 3.8% while the unemployment rate was 13.0% (Gardner Pinfold 2005 **Ref. Vol. VI, Tab 32.**

Participation Rate

The participation rate in the labour force is also an indicator of an economy's overall strength with the higher percentage indicating the stronger economy. In 2001 the provincial participation rate was about 61% while Digby County was 58.8% and Digby Neck/ Islands was 56.5%. The lower participation rate generally indicates fewer employment opportunities available and a smaller portion of the working age group population is drawn into the labour force. The lower participation rate is also an indicator that the effective unemployment rate in an economy is higher than official statistics indicate. This is commonly referred to as the "discouraged worker effect" where a certain proportion of the population has given up looking for work and thus have not joined the labour force.

The number of women who consider themselves "in the labour force" is substantially lower than men in rural areas, thus indicating that a greater number of rural women remain outside the labour force due to limited employment opportunities in rural areas (RCIP Project 2003 Ref. 96). The under employment of women is apparent on Digby Neck and Islands.

House Construction

Another indicator of community economic health is new house construction and related development. Construction is generally a signal of a rising population, an expanding economy and increased consumer confidence. Census data on housing indicates the number of occupied dwellings on Digby Neck/Islands decreased from 841 in 1991 to 790 in 2001. Also, indications are that the age of the housing stock on Digby Neck// Islands (pre 1946) is greater than the province as a whole and new construction (post 1980) is less than the province as a whole (Gardner Pinfold 2005 **Ref. Vol. VI, Tab 32).**

Employment

As indicated in Table E – 1, the fishing industry has and continues to dominate all industry sectors including both primary sector activity and fish processing. The manufacturing sector on Digby Neck/Islands primarily represents the fish processing sector. In 2001, data indicates accommodation, food and beverage service accounts for the third largest industry and retail trade the fourth.

Employment in many of these industry sectors is part-time and seasonal, including fishing and fish processing, tourism including whale and seabird cruises, and accommodation, food and beverage services. Also, as identified during the community business survey (Elgin Consulting and Research 2005 **Ref. Vol. IV, Tab 21**), many businesses are owner/ family operated. The location of existing businesses and services in the community of Digby Neck and area are shown by type on **Maps 6A and 6B**. As shown on these maps, employment patterns are generally local and clustered around the various small harbours on Digby Neck and Islands.

Resources

Renewable land-based resource industries such as agriculture and forestry have shown little growth on Digby Neck/Islands during the past years. Some activity in the forest industry was evident as large stands were clear-cut in order to salvage timber as a result of softwood decline. There are no "supply managed" agricultural commodities on Digby Neck/Islands and few commercial agriculture operations. Three "registered" farms were operating on Digby Neck in 2005. Non-renewable resources such as sand, gravel, and quarry rock products are extracted on a local and regional demand basis. A water bottling plant is proposed for the Gullivers Cove area and is presently under regulatory process review. An ecotourism centre (Discovery Centre) is presently under consideration on Long Island. Waterfront land subdivision is also beginning to take place on Digby Neck.

Marine-based activities include a new small craft harbour at Tiverton and a proposed water based aquaculture site at West Mink Cove which is presently under regulatory process review.
Local and regional economic development goals identified during public consultation focused on the fishery and ecotourism. These economic activities will be discussed in detail in **paragraphs 9.3.10 to 9.3.14.**

In summary, the economy of Digby Neck/Islands is highly dependent upon one industry – the fishery. As a result, the labour force is also highly dependent upon the fishery. An unemployment rate of 14.4% in 2001 was evident on Digby Neck/Islands with a low participation rate in the labour force and below that of the province which indicates fewer employment opportunities on Digby Neck/Islands. Although ecotourism and aquaculture have helped to diversify economic activity during the past fifteen years, a lack of year round employment, economic diversity and resultant economic stability continues to plague Digby Neck/Islands and other coastal communities in Nova Scotia.

9.3.9.1.1 Local and Regional Economic Development Goals and Objectives

Public Consultation

With respect to local development, the main issues raised were with regard to the fishery and tourism. Both of these industries have suffered setbacks in recent years, although the lobster component of the fishery has seen an increase in revenues, and both industries are seen to be vulnerable. The fishery has seen a significant decline in the ground fishery and, hence, the processing sector while the tourism industry has seen several poor years due to the high Canadian dollar and the termination of the ferry service between Portland and Yarmouth.

Any development in the area not associated with the fishery and tourism is seen by some in these two sectors as a potential negative rather than a potential benefit from increased employment opportunities in the local area. Unfortunately, as noted elsewhere in this document, neither of the groups representing these industry sectors in the local area agreed to consult with the proponent. However, consultation was carried out with many individuals involved in these sectors and the degree of concern was lessened as it was explained that the quarry was not visible from Highway #217, that no product was to be shipped by road, that no sediment from the quarry operations would be discharged to the Bay of Fundy, that a fish habitat compensation plan was in place, and that an agreement had been reached with the lobster fishers of Whites Cove with respect to potential damage to gear.

Community Economic Development Plans and Strategies

Local

There are two organisations on Digby Neck and Islands promoting community development. "The Partnership for Sustainable Development of Digby Neck and Islands Society" and "The Digby Neck Community Development Association". Neither organization agreed to meet with Bilcon. From web sites it would appear that their development thrust is toward eco-tourism and the fishery.

Regional Economic Development Plans and Strategies

Up to the mid 1990's, Annapolis County and the Town of the Municipality of Digby operated industrial or development commissions. The Town and Municipality of Digby concentrated on increasing occupancy of its industrial park in Seabrook and attracting new business to the area whereas the County of Annapolis took the view that increasing the attractiveness of the County to new business would in itself take care of interesting employment opportunities. The closure of CFB Cornwallis in the mid 1990's with the loss of almost a thousand civilian jobs imposed new stresses on the area.

Under a new policy directive from the provincial government, the Towns and Counties of Annapolis and Digby (including Clare) combined to create the Western Valley Development Authority (WVDA) and in 1995, the WVDA produced a Development Plan for the Western Valley (title). Until very recently, the WVDA with significant funding and staff levels promoted the Western Valley, particularly as a Smart Community. The emphasis, as with the original Annapolis County Development Commission, was to induce new business by creating an attractive environment. However, new business failed to materialize and the various municipal units removed their support for the WVDA in 2005, and collapsed the organization. Discussions are now underway to revive the industrial commission philosophy and actively pursue new business.

The Cornwallis Industrial Park created to utilize the Base infrastructure, however, actively pursued business and with provincial and federal support, has created more jobs than were lost with the military base closure (Shaw Wood, Converges, Pearson Peacekeeping Centre, etc.).

Infrastructure in the tourist market was greatly expanded in the 1980's and 90's with the Annapolis Royal project, Upper Clements Theme Park, Digby Marina, and significant expansion in the private sector with the addition of bed and breakfasts, country inns, craft stores and restaurants, and up until the past two years, the area has maintained and improved its share of the market. The WVDA promoted ecotourism and there is no question that the expansion of whale watching activities and the expansion of Brier Island Lodge increased numbers of ecotourists who visited the Neck and Islands.

There is no question, however, that the philosophy in the regional area has changed in the recent past and the Municipal governments are now calling for more aggressive recruitment of business to the area in an attempt to stem the tide of out-migration which is affecting all of rural Nova Scotia. Jobs in the traditional rural industries, fishing, agriculture, and forestry continue to be lost and this is impacting the ability of rural communities to survive. The out-migration is almost all in the 19 – 39 year age group and immigration is almost all in the 55+ age group which is causing an imbalance in the Western Valley, i.e., less family sustaining jobs, but the same demand for rural services.

The ability of Municipal governments to respond to the new rural paradigm is now being further complicated by the difference in aspirations of the immigrants in the older age groups. In general, they move to rural Nova Scotia having built up assets in urban centres, and do not necessarily want industrial development to take place. They have no need for jobs and tend to resist development on the grounds that rural peace and tranquillity will be damaged. This trend is apparent in the Western Valley area. While the preference is for "clean" industry, such as Convergys, the realty is that the pressure will always be for these industries to gravitate to low income areas with a high density population.

Provincial Economic Development Plans

Economic planning at the provincial level is the responsibility of the Department of Economic Development. This Department has regional officers who coordinate with the regional development authorities.

In terms of strategy, the provincial government issued "Opportunities for Prosperity" in 2001, and the view on Land Resources, Exports, and Investments is as noted below:

"LAND RESOURCES

Our land-based natural resources, including forests, minerals, and wildlife, have been the foundation of the economy for generations. These sectors provide about 10,000 direct well-paid jobs and $1.5 billion in annual sales; they account for about one-third of the Province's exports. Resource-based industries and businesses will continue to provide considerable economic value, especially in rural areas. Major challenges facing these sectors are the need to manage resources to ensure sustainability and to meet increasingly stringent environmental standards in export markets. Pressures on the land base are increasing for both consumptive and protection-oriented uses, such as resource extraction, hunting, and other outdoor recreation, wildlife and habitat, ecotourism, and conservation of natural areas. The appropriate balance can provide both economic and quality-of-life advantages to Nova Scotians. These sectors should also continue efforts to add more value to resources to provide greater economic benefits. To remain competitive and to meet increasingly stringent environmental requirements, the resource industries will have to continue to adopt new technologies, which, in turn, will have training implications for those employed in these sectors.

EXPORTS

We cannot make ourselves better off by selling to each other within the province. Exporting allows us to tap markets much larger than our own. Exports generate wealth and jobs. According to the Atlantic Provinces Economic Council, for every $68,000 increase in exports, another Nova Scotian goes to work.

However, in the mid-1990's, Nova Scotia exports were growing more slowly than those of most of the other provinces. In 1999, we had the second-lowest level of exports per person among the provinces. (Fig 2, Exports per Person, 1999).

INVESTMENT

Nova Scotia's economic performance in recent years relates directly to big investments in forestry, tire making, and natural gas production and distribution. Nova Scotia led all provinces in investment growth in the late 1990's. These investments play a big part in the province's current export boom.

But we have to do better. Nova Scotia currently has the second-lowest rate of investment per person in Canada. Nova Scotian companies need continued investment to compete in world markets. New investment boosts productivity and competitiveness. In today's dynamic environment, if companies are not investing in new technology that builds competitiveness, they are probably shrinking – in size, employment, and market share. Working with Nova Scotian companies to expand their investment in our province and put down deep roots is vital. (Figure 4, Investment per Person Expected in 2000)

Attracting new foreign investment is also important. Foreign-owned firms account for 75 percent of Canadian manufacturing exports and 1 out of every 10 jobs directly. Also nationally, 89 percent of foreign-owned firms conduct research and development, compared with 67 percent of Canadian-owned firms. Multinationals bring new technology and new management approaches. Most regions covet so-called anchor companies that hire and train new graduates, strengthen important industrial clusters, and create supply opportunities for a host of service companies."

The Mineral Policy for the Province of Nova Scotia (2005) also notes:

"The Government of Nova Scotia recognizes mineral exploration and mining as a key sector contributing to jobs, wealth and a high quality of life for Nova Scotians. MINERALS - A Policy for Nova Scotia is the Government's blueprint to foster continued growth of the mineral industry and careful management of our mineral resources. This policy defines responsibilities for Government, industry and the public, and advocates change in the way they work together. It is a framework for mineral resource development that is economically and environmentally sustainable.

The Government will provide leadership by implementing the policy and ensuring that the necessary conditions are maintained for the mineral industry to create wealth for present and future generations of Nova Scotians.

The Government is committed to implementing this policy to the best of its ability subject to the availability of funds and resources.

Minerals are indispensable in our modern world. Mineral-based products are used in virtually every aspect of our daily lives. Through history the human ability to function as hunter, farmer, explorer, scientist and artisan has relied on the use of minerals. Experience tells us that society will continue to rely on mineral resources for the foreseeable future. Constant improvements in methods for discovering, mining and processing minerals have provided society with a substantial variety of indispensable materials.

Most mineral resources are hidden from view and difficult to find, which makes the process of discovery both financially expensive and risky. Mineral exploration efforts are often conducted over many years and even decades. Generally, only one in ten thousand mineral occurrences has the rich ore grade and quantity to be brought into production. The search for new mineral deposits must continue because the world's population requires an increasing supply of metals, fuels, minerals and mineral-based products.

The Government of Nova Scotia is working to improve the economic well-being of Nova Scotians by creating more opportunities for investment and long-term employment. This effort includes value-added production and job opportunities with an increasing emphasis on cooperation and partnerships. The mineral industry is an important participant in the province's economic strategy, especially with its contribution to value-added production and export revenue. Over the last ten years the value of Nova Scotia's mineral production (including petroleum) has grown at an average annual rate of 8 percent in current dollars. Over the same period minerals have contributed to the province's total foreign exports at an average annual rate of 10.5 percent.

Another, often overlooked, source of economic development is the use of rocks, ores, minerals and semi-precious stones for tourism and cottage craft industries. Encouraging rock and mineral collecting helps to promote tourism and to assist visitors and residents, as well as school groups, learn about Nova Scotia's geology and mineral resources. Likewise, cottage craft industries based on the use of minerals, rocks and ores contribute to the economic development of local communities.

Future supplies of minerals from Nova Scotia will continue to contribute to economic development and a growing global demand for metallic and non-metallic minerals. At the same time there is an urgency to find ways to adapt mineral resource initiatives to changing social, economic and environmental commitments.

Mining in Nova Scotia faces some important challenges. Primary among them is a loss of exploration and mining capital, much of which originates in Canada, to foreign countries which aggressively pursue these investment dollars. To increase the competitive position of Nova Scotia's mineral industry the province must create a positive business climate and promote the province's attributes and strengths. The Government will encourage support for and recognition of the mineral industry by including exploration and mining activity as part of its overall industrial strategy.

A competitive business climate will be supported with the following strategies.

Policy

2.0 Provide a competitive business climate

2.1 Support for the mineral industry

The Government will support the mineral industry by:

a.. facilitating and stimulating research and development in mining and product development;
b.. facilitating technology transfer to improve cost effectiveness, production efficiencies and environmental performance;
c.. encouraging higher value-added production to enhance the economic value of mineral resource extraction; and
d.. providing market information to help identify niche markets and export opportunities for mining-related technologies and mineral products.

2.2 Maintain an efficient and effective mineral rights administration

The Department will improve efficiency in mineral rights administration and improve the administrative process through the use of information technology. Use of the Internet, geographic information systems, wide area networks and regional offices will enable remote access to the Registry of Mineral and Petroleum Titles.

2.3 Minimize the effort and cost required to meet regulatory requirements

The Department of Natural Resources will support government-wide efforts to streamline and speed-up regulatory review processes. A "one-window" service for companies wishing to undertake exploration and mining activities will be provided to facilitate a more efficient process for administering regulations and assisting the industry. The Government will explore, with industry, opportunities for more self-regulation and performance monitoring

2.4 Ensure that the regulatory regime is developed through consultation, stable over time, and easy to understand

The Department of Natural Resources will continue to consult with the mineral industry and other stakeholders where needs arise for developing new regulations. The mineral industry and other stakeholders will be invited to participate in proposed amendments and periodic reviews of the regulatory regime to ensure that the rules are necessary, effective and easy to understand."

9.3.9.1.2 Consistency of the Project with Goals and Objectives Identified in Economic Plans and Strategies

Provincial

The project fits the policies of the Government's blueprint – "Minerals – A Policy for Nova Scotia" which outlines a policy to foster continued growth of the mineral industry and careful management of Nova Scotia's mineral resources. In addition, the current Minister of Natural Resources has stated that Nova Scotia (Mining Matters Conference 2004 and Annual Meeting of the Nova Scotia Chamber of Mineral Resources 2004) is "Open for Business" in the mining field.

Regional

In a 2000 evaluation of the progress of the WVDA, PRAXIS Research noted the WVDA goals with respect to natural resources as "Develop a community-based plan for natural resources management that includes the processing of those resources in the local area". Forestry, fisheries, and agriculture are noted but there is no mention of any mineral resource extraction. In fact, it is clear that the staff of the WVDA did not support the project and refused to consult with the proponent on any of the issues raised by the community.

As noted above, the approach to community economic development adopted by the staff of the WVDA did not reflect the community's approach as expressed by the various councils in the area and the organization has been disbanded. The project certainly fits with the desire to bring meaningful employment and investment to the area which is the target of the proposed new Industrial Commission.

Local

Local development plans and strategies appear to centre on the fishing industry and on the tourism sector and particularly ecotourism. Plans are in the works for a Discovery Centre but there is still significant dispute as to its location. While the consensus appears to favour Freeport, there are significant objectives from the tourism industry in Westport who feel that Brier Island has a much better claim to the Centre.

In any event, the fact that the quarry cannot be seen from Highway #217 and that similar operations in Nova Scotia have not affected the tourism industry in those areas, mitigate the influence the quarry may have on tourism on Digby Neck or the Islands. The effects noted elsewhere in this report with respect to the fishing industry are being mitigated or compensated and, hence, no conflict is seen with the local planning strategy.

9.3.9.1.3 Capacity of Renewable Resources That are Likely to be Significantly Affected by the Project to Meet Present and Future Needs

The primary renewable resources on Digby Neck are the fishery and forestry with the tourism sector, in dollar terms, a low ranked third (Ref. Gardner Pinfold).

Reference to the section in this report on the fishery will show that the only impact on the fishing industry is the impact on the lobster fishery caused by the once-a-week passage of the bulk carrier to and from the shipping lanes to Whites Cove. This effect will occur only during the lobster season and compensation has been agreed upon with the fishers affected, by means of compensation to damaged lobster gear. There will be no affect with respect to increased sedimentation in the waters adjacent to Whites Cove.

The impact of the destruction of fish habitat by the placement of pipe piles will be mitigated by the compensation plan for fish habitat which has been approved in principle by DFO.

The impact on the forestry is generally positive. As noted elsewhere in this report, many areas of forest on Digby Neck have been recently clear cut due to the impact of the spruce bark beetle, including a section of the quarry site which was clear cut in 2001-2002. While the remainder of the forestry resource on the quarry site will be clear cut over the next fifty years, the entire quarry area will be remediated and much improved from a forestry standpoint over this period. In addition, areas peripheral to the quarry site itself acquired by Bilcon will undergo a silviculture program to improve the forest resource on this land and provide a much more pleasing aspect from Highway #217.

The tourism industry on Digby Neck and Islands has grown significantly over the past fifteen years, but the more recent two years have been disappointing, as they were for Nova Scotia as a whole. The demise of the Portland to Yarmouth ferry service, the high Canadian dollar, and competition generally in the industry, have all contributed to a significant downturn in tourism revenues. Nonetheless, the industry is an important contributor on the Neck and Islands and provides seasonal employment to a significant number of people.

The impact of the quarry and marine terminal, as noted elsewhere in this report, is seen to be insignificant. The quarry is not visible from Highway #217, the only road traversing Digby Neck, nor will traffic on Highway #217 be significantly increased since no product will be moved by road. The main factor appears to be the view that the presence of a quarry on Digby Neck will be a negative influence on those tourists who are visiting as ecotourists. In this regard, it should be noted that two existing quarries are visible from the road, at Rossway and Tiverton, and these are not seen as a negative influence. Further, the large quarry at Auld's Cove, which has been operating for over fifty years, is highly visible to all tourists entering Cape Breton and from the tourist bureau in Port Hastings, yet is not seen as a negative influence on the Cape Breton tourist industry. The Whites Point quarry can be observed from the Bay of Fundy but, as noted elsewhere in this report, the vast majority of whale-watch tours do not frequent this area.

9.3.9.2 Analysis

Two major phases of the Whites Point quarry and Marine Terminal project were analyzed to determine potential effects on the local, regional, provincial and national economies. The construction phase is expected to take approximately one year to complete for a total capital cost of $40.6 million. Operation and maintenance is expected to continue for the fifty year life of the rock reserves with an annual expenditure of approximately $20.0 million. Final decommissioning will take place during the final year of operation. High-quality basalt rock reserves are estimated to be in excess of 100 million tonnes within the active quarry area on the site. Bilcon of Nova Scotia Corporation intends to construct and operate the quarry and marine terminal without public monies.

Economic impacts of the quarry and marine terminal have been estimated for both construction and annual operation. Direct and spin-off impacts from expenditures made to develop and operate the new facility are defined as follows:

- Direct impact is defined to include expenditures made by Bilcon of Nova Scotia Corporation and resulting in an economic impact

- Spin-off impacts include both indirect and induced impacts. Indirect impacts are those gained by firms supplying goods and services to Bilcon's activities and induced impacts are those attributable to income and employment generated by consumer spending at the direct and indirect impact stages

Construction

Capital construction expenditures are estimated to be $40.6 million with $7.5 million for mobile equipment, $14.0 million for plant infrastructure, and $19.1 million for a marine terminal and loading system.

Total construction employment resulting from construction of the Whites Point quarry and Marine Terminal in Nova Scotia amounts to 225.4 person-years of employment including all direct and spin-off impacts. Forty-five of these person years will be attributable to Digby County. At an annual average salary of $35,000.00, over $1.5 million would be attributable to Digby County construction workers.

Gross Domestic Product (GDP) is an important measure of economic activity. The total construction GDP for Nova Scotia is $14.5 million including direct and spin-off impacts of which $2.4 million are attributable to Digby County.

Federal and Provincial tax revenues will be generated from construction activities at the quarry and marine terminal. Total Federal tax revenue for both direct and spin-off will be almost $2.0 million with an additional provincial tax revenue of $1.6 million. Of this total, Federal tax revenue from Digby County would amount to $.31 million and $.27 million for provincial tax revenues from Digby County.

Operation

Total annual employment, including direct and spin-off is estimated to be 91 person-years in Nova Scotia. Of this total employment, almost 52 person-years of employment will be attributed to Digby County. Over the fifty year life of the project, total employment will exceed 4,550 person-years. At an annual average salary of $30,000.00, over $1.5 million would be attributable to the Digby County work force associated with the quarry and marine terminal each year.

A full-time work force of 34 persons working two shifts will be employed for approximately 44 weeks per year. Wages will range from $12.50 to $20.00 per hour. It should be noted that quarry employment is one of the highest paying industries. Skill requirements and training will be discussed in **paragraph 9.3.23.**

Gross Domestic Product (GDP) associated with annual operations is estimated to total $6.3 million in Nova Scotia. Over the fifty year life of the quarry project, a total GDP of over $315.5 million is estimated.

Federal, Provincial, and Municipal tax revenues will be generated from quarry operations each year. Total Federal tax revenues attributable to the quarry would be about $1.0 million, total provincial tax revenues about $.8 million and municipal taxes payable to the Municipality of Digby to be approximately $400,000.00. Tax revenues to be paid by Bilcon of Nova Scotia Corporation to the Municipality of Digby alone would amount to $20.0 million over the fifty year life of the quarry.

In conclusion, the Whites Point Quarry and Marine Terminal will provide direct, full-time employment at the quarry for 34 persons working two shifts for approximately 44 weeks per year. Wages will range from $12.50 to $20.00 per hour. Skill requirements and training are discussed in **paragraph 9.3.23.** Incremental tax revenues for municipal, provincial, and federal levels of government will result without expenditures of public monies. The Whites Point quarry and Marine Terminal will be privately financed and no government wage subsidies are applied for. A community opportunity will result which will include direct, stable, full-time employment and indirect supply of local goods and services. In broader economic context, the quarry project will provide alternative, sustainable choices to existing seasonal industries presently operating on Digby Neck/ Islands. Economic diversification, stability and resiliency will result in more favourable long term economic conditions for this coastal community.

9.3.9.3 Mitigation

None proposed

9.3.9.4 Monitoring

None proposed

9.3.9.5 Impact Statements

Construction – Employment

Total employment (direct and spin-off) during construction of the quarry and marine terminal is estimated to be 45 person-years in Digby County resulting in a ***short term, significant positive effect, of county scale.***

Construction – Gross Domestic Product

Total Gross Domestic Product (direct and spin-off) during construction of the quarry and marine terminal is $14.5 million in Nova Scotia resulting in a ***short term, insignificant positive effect, of provincial scale.***

Operation – Employment

Total annual employment (direct and spin-off) from quarry operation is estimated to be 51.8 person-years in Digby County resulting in a ***long term, significant positive effect, of county scale.***

Operation – Gross Domestic Product

Total annual Gross Domestic Product (direct and spin-off) from quarry operations is estimated to be $6.3 million in Nova Scotia resulting in a ***long term, insignificant positive effect, of provincial scale.***

Operation – Tax Revenue

Total annual Federal and provincial tax revenue (direct and spin-off) from operations at the quarry will be over $1.8 million resulting in a ***long term, insignificant positive effect, of provincial/national scale.***

Operation – Municipal Tax Revenue

Total annual Municipal tax revenue (direct and spin-off) from quarry operations payable to the Municipality of Digby will be approximately $400,000.00 resulting in a ***long term, significant positive effect, of county scale.***

9.3.10 Economy - Fishery

Generally, during the past years, the number of fishers and the number of vessels in the province have both declined. However, the value and tonnage of commercial landings have risen substantially since 1995. This indicates that after the recent rationalization in the fishing industry, the economic benefits of the industry are now being shared by fewer people (RCIP Project 2003 Ref. 96). One exception to the above trend is the lobster fishery. During the past 10 to 15 years, the landed value and number of lobster fishers have maintained a similar pattern. This indicates there has been a constant distribution of benefits over time. Moreover, at present, this industry sector has maintained economic stability.

The Bay of Fundy supports a fixed and mobile gear commercial fishery for groundfish (the more common species include cod, haddock, and pollock); pelagic species such as herring and mackerel; crustaceans (primarily lobster); molluscs (primarily scallop); and local harvesting of sea plants in the area of the proposed Whites Point Quarry and Marine Terminal. Localized harvesting of periwinkles, sea urchins, and more recently an experimental sea cucumber fishery is also carried out in this area of the Bay. Without question, the fishery represents the mainstay of the economy on Digby Neck/Islands. Although the fishery is not as dominant as it once was, it still accounts for the largest source of employment and income for fish harvesters and fish processing workers. The most lucrative sector is the lobster fishery.

Commercial fishing activities are presently occurring on land and water in the vicinity of the proposed Whites Point Quarry. Lobster, herring and sea cucumbers were observed being harvested during the spring and summer of 2002 in the near shore waters in the Bay of Fundy. Traditional community knowledge investigations indicate the once popular herring weir fishery has experienced a steady decline. Historically, a weir was located at Whites Cove but is presently non-existent. Eleven weirs presently exist along the coast of Digby Neck (Bay of Fundy and Saint Mary's Bay) however, only six are active. Again, traditional community knowledge attributes the demise of the herring weir fishery is due to changing technology and the large herring seiner boats that "stalk" the mouth of the Bay of Fundy. The nearest weir is located at Sandy Cove West, approximately four kilometres from Whites Point. Local harvesting of periwinkles was also observed in the intertidal zone. No commercial sea plant harvesting leases are presently issued for this particular section of coastline, (personal communication: Justin Houston, Coastal Zone Coordinator, Nova Scotia Department of Fisheries and Agriculture – June 2005). Traditional community knowledge consultations indicate local harvesting of dulse does occur. Commercial fisheries in the Bay of Fundy for Atlantic salmon were closed after the 1984 season. However, local commercial fisheries for shad, herring and gaspereau in gillnets and herring weirs; and interprovincial herring seiners have remained open and are required to release any Atlantic salmon by-catch dead or alive. Land and water based aquaculture operations are also present on Digby Neck and in the adjacent waters of the Bay of Fundy and Saint Mary's Bay.

Historically, settlement patterns within the community of Digby Neck evolved around natural harbour locations. According to traditional community knowledge, most coves, including Whites Cove, at one time, supported fishing activities. A number of "dorey" fisherman used the cove in the early to mid 1900s. Soon after the 1950s, the engine-powered "Cape Islander" became the primary fishing vessel and wharf structures began to replace the skidways and haul-ups.

This era marked the beginning of the influence of the small boat dragger on the Neck and Islands fishery. Conflicts arose between the "fixed" (hook and line fishers) and "mobile" (drag net fishers) gear fishers, which in some cases continues today. It was contended that the draggers killed small fish, destroyed ocean bottom habitats, broke up fish shoals and overexploited stocks. As one fisher argued:

"The draggers have fished themselves out of business, and with themselves lots of others. Ya can't just dip, dip, dip and hope there'll always be fish to replace the ones ya take. After awhile it's got to catch up with ya" (Davis, 1991 p. 47, Ref. 107).

It should be noted that this technological change in fleet structure dramatically impacted local communities. From 1957 to 1983 the small boat fleet declined by 40% with 35.7% fewer fishers in 1983 than reported in 1957 (Davis 1991). With the shift from line fishing to drag net fishing the overall productivity per fisher increased almost two and one half times during this time period. However, the increased catch did not translate into more employment in the processing sector as technological changes were also occurring in fish processing. The increased productivity per worker reduced the number of workers required. As Davis states about Digby Neck and Islands:

"Those communities most affected by these changes in employment opportunities are profoundly threatened in terms of their future participation in the fishing industry. Currently, they do not contain many employment opportunities for their residents. Young people, especially, have no choice but to leave in pursuit of work. These developments raise very important questions concerning the socio-economic future of many communities".

Today, fishing villages such as Little River and Sandy Cove support the larger population concentrations on the Neck. Presently, approximately 200 people reside in Little River and Sandy Cove has a summer population of approximately 150 and a winter population of 100 (Lee 2002 Ref. 133). Other fishing villages on the Neck include Rossway, Gullivers Cove – pop. ±40, Centreville – pop. ±50, Whale Cove – pop. ±40, and East Ferry – pop. ±55. The location of these villages is shown on **Maps 6A and 6B.**

Lobster has traditionally been and is today the primary fishing industry sector on Digby Neck with boats fishing out of the above mentioned ports. Although Little River supports mostly lobster boats (13), three weir/aquaculture boats, one trawler, and four draggers fish out of Little River. Of the approximately 63 people employed in fishing out of Little River, 75% live nearby in the community of Digby Neck. The Sandy Cove wharves also support lobster boats and draggers for a total of 24 boats.

Although few captains live in Sandy Cove, some of the crew members reside in Sandy Cove. Fishing activities at Rossway are limited and mainly consist of weir fisherman in Saint Mary's Bay. Two commercial fishing boats at Gullivers Cove mainly harvest periwinkles and dulse. Employment at these two villages is predominately from the immediate area. The fishing industry at Centreville consists of twelve fishing boats and employs from Centreville to Little River. Whale Cove consists of five to six fishing boats with employment from Centreville to Tiddville. Finally, East Ferry supports seven fishing boats and employs from Digby Neck with only a few employees living in East Ferry (Lee 2002).

In summary, with the exception of Sandy Cove, employment in fishing is from the various villages within the community of Digby Neck. Direct employment in this primary industry sector is approximately 172 people (Lee 2002). Three industry sectors – aquaculture, intertidal, and nearshore – of the local fishing industry are presented in the following sections.

9.3.11 Economy – Fishery/Aquaculture

9.3.11.1 Research

Review of the Nova Scotia Department of Agriculture and Fisheries: Aquaculture Site Mapping (2002) indicates several aquaculture licenses have been issued in the Digby Neck area for both land and water based aquaculture operations – see **Map 6B.**

These operations include species such as Bay Quahogs, Sea Urchins, Atlantic and Steelhead Salmon, Halibut, and Flounder. The nearest land based license issued is for an Atlantic salmon hatchery in Mink Cove while the nearest water based license issued is for Atlantic and Steelhead Salmon in Saint Mary's Bay, southwest of Tiddville. These operations are approximately 2.5 km and 8 km respectively from the proposed quarry site.

9.3.11.2 Analyses

During Community Liaison Committee meetings, potential effects on area aquaculture operations were raised, primarily from the aspect of noise from the quarry site. Presumably, the effects from blasting (vibration and pressure changes) are of greatest concern, and more specifically the possible effects on land based hatchery operations and water based rearing operations. Generally, overpressure in excess of 100 kPa will result in adverse effects on pelagic fish including eggs and larvae. Little information is known concerning lethal and sublethal effects on shellfish and crustaceans.

In this regard and in accordance with the criteria contained in "Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters" (Wright and Hopky 1998) Ref 92, potential effects were assessed. More specifically, the proposed set back distance contained in Table 2 of the previously referenced document is used in relation to spawning habitat, or in this case, a land based fish hatchery. Also, the proposed set back distance contained in Table 1 will be used in relation to rearing/general fish habitat from the centre of detonation of a confined explosive in rock substrate for water based aquaculture.

For example, the setback distance from spawning habitat recommended in Table 2 for the weight of explosive charge of 100 kg is 150.9 m. The nearest licensed aquaculture hatchery is approximately 2,500 m away. The setback distance from fish habitat recommended in Table 1 for a similar weight of explosive charge (100 kg) in rock substrate is 50.3 m. The nearest licensed fin fish aquaculture site in Saint Mary's Bay is approximately 8,000 m away.

For a more detailed explanation of blasting at the Whites Point quarry – see Bilcon of Nova Scotia Corporation "Whites Point Quarry Blasting Protocol" Appendix 9.

It should be noted that some commercial fishing operations, including aquaculture in the Bay of Fundy have historically used acoustic harassment devices (AHD). These "acoustical alarms" are used to deter, primarily seals, from approaching finfish aquaculture sites. Some of these alarms are advertised to have a source level rating of 200 dB. Effective sound levels in the water of 128 dB at 3.5 km and 132 dB at 2.5 km from the aquaculture sites have been recorded.

9.3.11.3 Mitigation

Even though the setback distances from the proposed quarry and existing licensed aquaculture sites in the area are substantially greater than those outlined in the referenced guidelines, the following precautions will be taken.

1. Weights of the explosive charge will be kept to a minimum.
2. For multiple charges, time-delay detonators will be used to create a series of single explosions.
3. Larger charges will be subdivided into a series of smaller charges in the blast holes.
4. Blast holes will be back-filled with sand or gravel to grade.
5. Set-back distances from the blast site to the fishery will be based on the maximum weight of explosive charge to be detonated at one instance in time and the type of fish habitat (rearing/general fish habitat or spawning habitat where eggs or early fish development are occurring) in the area of the blast in accordance with the "Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters".

9.3.11.4 Monitoring

Monitoring of noise, including blasting, will be conducted by Bilcon of Nova Scotia Corporation in accordance with the Nova Scotia Department of Environment and Labour requirements. All blasts will be monitored for noise and ground vibration at the east and west property lines to ensure noise is less than 128 dBA and ground vibration is less than 12.5 mm/s peak particle velocity. A monthly summary of monitoring results will be submitted to the Nova Scotia Department of Environment and Labour.

9.3.11.5 Impact Statement

Licensed Aquaculture Sites

Noise, including blasting from quarry operations, on existing land and water based off-site licensed aquaculture sites would result in a ***long term, neutral (no) effect, of regional scale.***

9.3.12 Economy – Fishery/Intertidal

9.3.12.1 Research

On-site investigations during the spring and summer of 2002 confirmed local harvesting of periwinkles along the intertidal zone of the Whites Point Quarry property. This was also confirmed through traditional community knowledge (personal communication – Wanda Van Tassel) that this portion of the intertidal zone is used for harvesting periwinkles and dulse.

9.3.12.2 Analysis

Existing access, generally for all terrain vehicles, to the intertidal zone for harvesting periwinkles is via the public Whites Cove Road and then in a northern direction along the coast over private land. Access in a southerly direction from Whites Cove is difficult due to the rugged terrain and apparently is not presently being attempted. When the quarry becomes operational, an access road from the quarry property line to the coastline will be maintained. Existing all terrain vehicle trails along the coast may be altered to avoid the sensitive areas of the proposed environmental preservation zone, associated environmental control structures, and conveyor systems. Also, access to certain coastal areas may be restricted during blasting for safety reasons.

9.3.12.3 Mitigation

Access to the coast and northerly along the coastline through quarry property for local harvesters is proposed upon appropriate arrangements.

9.3.12.4 Monitoring

To ensure the safety of the harvesters, especially during periods of blasting, a "check in" procedure at the quarry will be initiated. Registration at the quarry office would be required before harvesters cross quarry property to the intertidal zone.

9.3.12.5 Impact Statement

Intertidal Fishery

Access over quarry property for harvesters working in the intertidal zone would be maintained resulting in a ***long term, neutral (no) effect, of local scale.***

9.3.13 Economy - Fishery - Nearshore

9.3.13.1 Research

The modern day fishing fleet on Digby Neck/ Islands operates out of thirteen ports located on Saint Mary's Bay and the Bay of Fundy. In 2005, there were 132 registered vessels active in the fishery. The dominant vessel class length is the 35 – 44.9 foot category with 95 vessels accounting for 72% of the Neck/Islands fleet. Thirteen vessels are registered in the 45 – 64.9 foot class. For a vessel summary by home port and length class for 2005 – see Gardner Pinfold 2005, **Ref. Vol. VI, Tab 32, Table 8.**

In total, there are 309 licensed fishermen on Digby Neck/Islands comprised of 103 core fishermen and 206 non-core (a core fisherman is a person who holds two or more key fishing licenses or one vessel based Licence and has earned $25,000. or more from their fishing enterprise for two or more years). The ports of Little River, Tiverton, Freeport, and Westport account for 71% of the fishermen. For a breakdown of the number of core and non-core licensed fishermen by home port – see Gardner Pinfold 2005 **Ref. Vol. VI, Tab 32 Table 9.**

The fishermen on Digby Neck/Islands hold a wide variety of licenses. These licenses by species and type are presented below.

Species Licence	Licence Type
Alewives/Gaspereau	Bait (variety of species)
Groundfish	Non-vessel (clams)
Clams	Fixed gear groundfish
Herring	Lobster (Category A)
Herring/Mackerel	Mobile (groundfish)
Lobster	Scallop (recreational)
Mackerel	Herring (vessel-based)
Sea Scallop	Mackerel (vessel-based)
Marine Plants	Squid
Sea Urchin	Swordfish
Eel	Herring fixed gear
Shark	Sea Scallop (vessel-based)
Squid	Crab rock (exploratory)
Swordfish	Seal skin predator
Oysters	
Seal Skins	
Shrimp	
Marine Worm	

On-site observations during 2002 and 2003 confirmed nearshore fishing activities with fixed and mobile gear. Species being fished included lobster, herring and sea cucumbers. The nearshore waters of the Bay of Fundy adjacent to the proposed Whites Point Quarry and Marine Terminal are located within Lobster Fishing Area (LFA) 34. This area extends from Prim Point near Digby around to Baccaro Point in Shelburne County. LFA 34 is a six month fall season which begins the last Monday of November to May 31. As of December 31, 2002, this area had 1,171 licenses with the capability of setting 400 traps per license. LFA 34 is approximately 11,500 square miles in area. The nearshore area adjacent to the Whites Point Quarry property is a traditional lobster trap setting area used by local lobster fishermen. Herring fishermen also set gill nets in these nearshore waters starting in June and continuing until late September. No herring gill nets were observed in nearshore waters in the vicinity of Whites Point in 2003. Also, herring and mackerel are fished by mobile gear purse seiners. These waters have also attracted fishers partaking in a recently established experimental sea cucumber fishery. No diving for sea urchins was observed in this particular area of the Bay.

Additionally, the following First Nations have LFA 34 lobster licenses.

Acadia	13 licenses
Glooscap	2 licenses
Indian Brook	9 licenses
Native Council of NS	4 licenses

Also, the following First Nations have Full Bay of Fundy scallop licenses.

Tobique	5 licenses
Millbrook	2 licenses
Eskasoni	1 license
Acadia	1 license
Annapolis	1 license
Oromocto	1 license
Woodstock	1 license
Indian Brook	1 license

9.3.13.2 Analysis

The value of fish landings by species for the years 1998 – 2004 is presented below in **Table NF – 1.** During this period (1998 – 2004), the total value of landed species on Digby Neck/ Islands increased from $14.8 million to $22.9 million, a 65% increase. As can be seen in **Table NF – 1,** lobster landings have the highest value followed by cod, scallop, and haddock.

Table NF - 1 Value of Fish Landings by Species - Digby Neck and Islands 1998-2004

Table 10
Digby Neck/Islands by Species 1998 - 2002
($ 000)

Name of Species	Species Code	1998	1999	2000	2001	2002
Cod	100	1,205.2	1148.3	1,159.4	967.8	716.9
Haddock	110	1,251.4	1,505.3	1,800.8	1,483.9	1,281.9
Redfish	120	88.0	91.4	303.6	225.2	82.2
Halibut	130	94.6	83.2	64.4	131.0	141.0
American Plaice	140	0.2	10.6	33.2	6.2	1.4
Yellowtail	141	3.0	7.9	10.5	0.0	0.2
Greysole/Witch	142	19.2	16.5	13.6	4.6	14.1
Winter Flounder	143	84.0	57.5	76.4	83.3	41.9
Greenland Halibut/Turbot	144	0.0	0.0	0.0	0.0	0.0
Flounder, Unspecified	149	19.6	39.9	74.3	26.7	11.5
Skate	160	0.0	0.0	0.0	0.4	0.0
Dogfish	161	15.6	126.6	286.7	396.6	300.8
Pollock	170	806.3	607.1	249.3	241.7	192.9
White Hake	171	92.3	47.0	121.9	98.9	96.0
Silver Hake	172	0.1	0.1	0.1	0.0	0.0
Cusk	173	4.1	1.3	2.2	4.2	2.8
Catfish	174	7.5	6.9	6.6	1.5	0.4
Monkfish	177	17.6	17.6	24.7	6.9	2.0
Red Hake	180	0.0	0.0	0.0	0.0	0.0
Sculpin	181	2.0	1.0	9.0	6.2	8.8
Tilefish	190	0.0	0.0	0.0	0.0	0.0
Groundfish, Unspecified	199	2.3	1.9	1.2	1.1	0.0
Herring	200	31.2	29.8	2.4	151.1	101.3
Mackerel	250	0.0	0.2	0.0	0.3	0.6
Eel	352	0.0	0.0	0.1	0.1	0.0
Shad	355	0.0	0.0	0.0	0.0	0.0
Sturgen	359	3.5	0.0	0.0	0.0	0.0
Shark, Porbeagle/Mackerel	369	2.5	0.0	0.0	0.7	0.0
Shark, Blue	372	0.0	0.0	0.0	0.0	0.0
Shark, Mako	375	0.2	0.0	0.0	0.3	0.2
Shark, Unspecified	379	1.6	1.7	1.0	0.2	1.2
Clams, Bar	600	0.0	0.0	0.7	0.0	0.0
Clams, Soft Shell	601	0.0	0.1	276.0	0.0	629.0
Quahaugs	602	0.0	0.0	12.1	0.0	15.0
Clams, Littleneck	605	0.0	0.0	0.0	0.0	695.4
Scallop, Sea	612	762.2	1,080.6	615.9	715.7	636.2
Sea Urchins	650	120.3	526.2	604.4	551.3	398.8
Lobster	700	10,115.1	14,935.4	15,522.4	18,003.1	19,528.1
Crab, Jonah	703	38.9	11.6	98.0	195.0	249.6
Crab, Rock	704	12.0	17.4	15.2	64.3	73.5
Crab, Snow	705	9.8	0.0	0.0	0.0	0.0
Crab, Unspecified	707	4.9	3.2	27.6	2.8	1.6
Dulse	900	0.0	0.0	1.8	3.1	0.0
Rockweed	906	13.0	31.1	0.0	7.3	0.0
Livers, Unspecified	944	0.1	0.0	0.0	0.0	0.0
Other						
Overall Total		**14,828.3**	**20,407.4**	**21,415.5**	**23,381.5**	**25,225.3**

The summary **Table NF – 2** shows the changes in the relative importance of various species groups between 1998 – 2004. Lobster landings increased from $10.1 million in 1998 to $19.2 million in 2004, an increase of 90%. In 1998, lobster accounted for 68.2% of the total landings and increased to 83.9% by 2004. Groundfish, the second most valuable group landed on Digby Neck/Islands, declined during this period from $3.7 million in 1998 to $2.2 million in 2004. Groundfish species percentage share also dropped from 25.0% in 1998 to 9.6% in 2004. Shellfish such as scallop, clam, crab, and sea urchin have increased in value from $0.9 million in 1998 to $1.4 million in 2004.

Table NF - 2

Relative Value of Fish Landings on Digby Neck/Islands by Major Species Category1998 vs. 2002

	1998		2004	
	$000	% of Total	$000	% of Total
Total Groundfish	3,713.0	25	2,204.7	9.6
Total Other Finfish	39.0	0.3	39.2	.2
Lobster	10,115.1	68.2	19,262.0	83.9
Total Other Shellfish	948.1	6.4	1,452.9	6.3
Total Other	13.1	0.1	0.0	.0
TOTAL	**14,828.3**	**100.0**	**22,958.8**	**100.0**

In terms of value, Digby Neck/Islands accounts for between 6.8 and 8.6% of total value for LFA 34 over the period 1998 – 2002 – see **Table NF – 3.**

Table NF - 3

Lobster Landings LFA 34 Compared with Landings on Digby Neck/Islands 1998 - 2004

	LFA 34		Digby Neck/Islands		
	Tonnes	Value($)	Tonnes	Value($)	% of LFA 34 Values
1998	11,360	149,446	757	10,115	6.8
1999	14,599	201,644	1,082	14,935	7.4
2000	14,431	192,790	1,176	15,522	8.1
2001	18,940	242,768	1,406	18,003	7.4
2002	17,577	252,786	1,352	19,528	7.7
2003	17,879	266,638	1,494	22,463	8.4
2004	16,465	224,298	1,423	19,262	8.6

Construction of the marine terminal and shipping activities may inconvenience the traditional lobster and herring fishery adjacent to Whites Point. The berthing dolphins of the marine terminal extend approximately 200 m from the ordinary high water line and are located at a depth of approximately 16 m below chart datum. Although the physical location of the marine terminal is not expected to disrupt lobster trap setting areas, vessel traffic will occur through these water depths. Vessels to be loaded with quarry products will approach and depart from the terminal through these nearshore waters. The expected frequency of ship loading is one per week throughout the year with an expected duration of 24 hours (including approach, loading, and departure). An estimated one half mile radius (.8 square mile) of nearshore surface waters around the marine terminal could be influenced by the vessel once per week for a 24 hour period. This potential area of disruption amounts to approximately .007% of LFA 34. A defined course to and from the shipping lanes and the marine terminal is proposed as indicated on **Map 4.**

During the six month lobster season, vessels will approach and depart the terminal through a traditional lobster fishing area and possibly disrupt lobster trap buoys. This possible disruption could occur on twenty four days during the lobster season. However, it should be noted that the frequency of ship arrival and departure will be reduced during the mid-winter period of the lobster fishing season. This reduction will occur during the months of January and February. Herring nets were observed near the proposed location of the marine terminal. Nets set within the one half mile radius of the terminal could also be affected during arrival and departure of the vessel. However, these herring nets are generally set closer to the coastline than the course of the vessel.

9.3.13.3 Mitigation

Recognizing the potential disruption of lobster buoys, lines, and traps and herring nets, set in nearshore waters, specific ship lanes will be designated. Several consultation meetings have been held with lobster fishermen presently setting traps in the Whites Cove/Whites Point waters. In addition to a designated ship route from the inbound/outbound shipping lanes to the marine terminal at Whites Point, local lobstermen requested a wider ship approach/departure in the vicinity of the terminal. A wider approach/departure area in the vicinity of the marine terminal would allow traps to be set in an area presently being fished. This area will be determined in consultation with the lobstermen in accordance with marine safety and marked with buoys or delineated by longitude/latitude. Upon request, advance notice of shipment schedules will be provided to fishers who traditionally fish these nearshore waters. Discussions are presently in progress concerning a lobster trap fund to be established by Bilcon of Nova Scotia Corporation, and administered by the local lobster fishermen, to provide compensation for lost traps and related gear due to shipping activities.

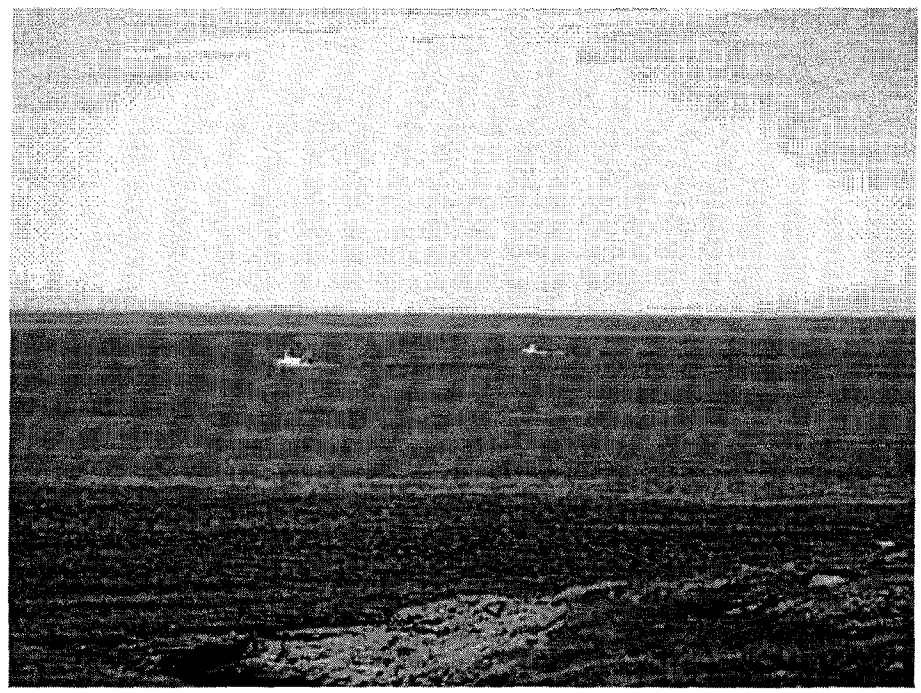
9.3.13.4 Monitoring

Shipment records will be kept by Bilcon of Nova Scotia Corporation documenting the frequency and duration of vessels throughout the year.

9.3.13.5 Impact Statement

Nearshore Fishery

Considering the extent of nearshore water area for lobster and gill net herring fishing, permanent disruption by construction of the marine terminal, and induced, intermittent ship approaches and departures could result in a ***long term, insignificant negative effect, of regional scale.***



9.3.14 Economy - Tourism

9.3.14.1 Research

The Digby Neck/Islands tourism industry is primarily natural resource based including land, coastal, and marine attractions. In 2003 and 2004 individuals and businesses were contacted by a local consulting firm to develop a list of tourism businesses on Digby Neck/Islands – see Elgin Consulting and Research 2004 **Ref. Vol. IV, Tab 22.** At the time this list was compiled there were 7 grocery/convenience stores, 7 craft/gift/gallery establishments, 17 accommodations and restaurants, 3 campgrounds, and 10 adventure tour operators. Most of these businesses are operated seasonally and many are operated on an owner-operator basis.

The seventeen accommodation businesses accounted for a total of 84 rooms available on Digby Neck/Islands. The Brier Island Lodge is the largest and accounts for almost 50% of the total with 40 rooms. The Olde Village Inn in Sandy Cove has the next largest number of rooms with thirteen. All other accommodation businesses reported offering no more than three rooms. The number of rooms available per accommodation in five year intervals from 1985 to 2005 are shown in **Table TO-1.**

TABLE TO - 1

DIGBY NECK ACCOMODATIONS & CAMPGROUNDS - ACTIVE/NON-ACTIVE

YEAR	NAME	LOCATION	# of ROOMS	OPEN	STATUS	YEAR EST.
2005						
	Graham's Pioneer Retreat	Centreville	3	Apr. - Dec.	Active	1998
	Innisfree Cottage	Lake Midway	1	Year-round	Active	2004
	Lake Midway Cottage	Lake Midway	1	Year-round	Active	-
	Olde Village Inn	Sandy Cove	13	June - Oct.	Active	1976
	Gulliver's Cove Ocean View Cottage	Gulliver's Cove	1	NOT KNOWN	Active	2005
	Rambling Rowes B&B	East Ferry	-	May - Oct.	Not Active	1999
	Direct Descendants Guest House	Tiverton	3	June - Oct.	Active	2000
	Fisherman's Needle Guest House	Tiverton	3	May - Oct.	Active	2002
	Seacliff B&B	Tiverton	2	June - Sept.	Active	1998
	Island Mist Guest Cottage	Tiverton	-	May - Oct.	Not Active	2002
	Ruggles Guest Cottage	Tiverton	1	May - Oct.	Active	1999
	Tiny Tattler Accommodation	Tiverton	3	Year-round	Active	1986
	Freeport House B&B	Freeport	3	Apr. - Oct.	Active	1997
	Cottage on Beautiful Cove	Freeport	1	May - Oct.	Active	2003
	Summer Solstice B&B	Freeport	3	May - Oct.	Active	2004
	Sunset Over the Bay B&B	Freeport	-	June - Sept.	Not Active	1996
	Bay of Fundy Inn	Westport	3	Year-round	Active	2002
	Brier Island Backpackers Hostel	Westport	-*	Year-round	Active	1997
	Brier Island Lodge	Westport	40	May - Oct.	Active	1989
	Dock & Doze Motel	Westport	3	May - Oct.	Active	1985
		Total	84			
	Whale Cove Campground	Tiddville	15 WE	May - Oct.	Active	1996

* Brier Island Backpackers Hostel offers 12 beds.

YEAR	NAME	LOCATION	# of ROOMS	OPEN	STATUS	YEAR EST.
1996						
	Olde Village Inn	Sandy Cove	13	May - Oct.	Active	1976
	Sandy Cove B&B	Sandy Cove	3	June - Oct.	Not Active	1985
	Wingberry House B&B	Sandy Cove	3	June - Nov.	Not Active	1981
	Brier House	Westport	3	Apr. - Oct.	Not Active	-
	Brier Island Lodge	Westport	24	Apr. - Dec.	Active	1989
	Westport Inn	Westport	3	May - Oct.	Not Active	1989
		Total	49			
	Moby Dick Campground	Central Grove	15 WE	May - Oct.	Not Active	1993

YEAR	NAME	LOCATION	# of ROOMS	OPEN	STATUS	YEAR EST.
1991						
	Olde Village Inn	Sandy Cove	15	May - Oct.	Active	1976
	Sandy Cove B&B	Sandy Cove	3	June - Oct.	Not Active	1985
	Wingberry House B&B	Sandy Cove	3	June - Nov.	Not Active	1981
	Brier House	Westport	3	Apr. - Oct.	Not Active	-
	Brier Island Lodge	Westport	10	May - Oct.	Active	1989
	Westport Inn	Westport	3	May - Oct.	Not Active	1989
			37			

YEAR	NAME	LOCATION	# of ROOMS	OPEN	STATUS	YEAR EST.
1985						
	Olde Village Inn	Sandy Cove	17	May - Oct.	Active	1976
	Wingberry House B&B	Sandy Cove	3	June - Nov.	Not Active	1981
			20			
	Digby Neck-Champlain Trailer Park	Sandy Cove	72 WE, 9Sew, 25U	June - Sept.	Not Active	-

Source: (Compilation of information from Doer's & Dreamer's Guides, WVDA Business Database, Reistry of Joint Stock)

Further, a comparison of the accommodation sector for Digby County and Digby Neck/ Islands for the past five years (2000 – 2004) is shown in Table TO-2.

Table TO - 2

Accommodation Data

Rooms Sold	Digby Neck/Islands	Digby County	Digby Neck as % of Digby County
2000	5,115	79,362	6.9%
2001	4,931	77,002	6.4%
2002	5,697	78,059	7.3%
2003	5,363	74,856	7.2%
2004	5,629	76,484	7.3%

The most recent analysis of the potential tourism opportunities on Digby Neck/Islands is contained in the "Concept Plan and Feasibility Assessment for a Bay of Fundy Discovery Centre" prepared for the Western Valley Development Authority in May 2002. In this study, whale watching is considered the number one tourism activity with the following whale-watching statistics:

Year	Statistics
1997	15,453
1998	17,516
1999	19,917
2000	19,048
2001	21,834

This study indicates that 56% of the whale-watching tours originated from Brier Island and 30% from the Petite Passage area and, that Digby Neck/Islands accounts for about 15% of the total Maritime market of 140,000 participants or 21,834 persons. In 2001, this would translate into about $562,000. in tourism expenditures at $25.00 per person or $875,000. at $40.00 per person in 2005. Other ecotourism activities include bird watching, hiking, and fishing.

The 2000 Nova Scotia Visitor Traffic Flow Report analyzes non-resident visitor traffic for Digby and Brier Island – see Table TO-3, and trip purpose and region of origin – see Table TO-4.

Table TO - 3

Visitor Traffic

2000[6]	Brier Island	Digby
Party pass-throughs	1,700	57,600
Party stops	1,300	5,200
Party visits	13,000	23,700
Overnight party trips	2,400	27,800
Total party trips	18,400	114,300
Parties	18,100	94,200
Party nights	5,100	57,500
Capture rate	91%	50%

Definitions

Party Pass Throughs: Represents the number of non-resident party trips passing through or by a specific community without stopping.

Party Stops: Represents the number of non-resident party trips involving a stop of less than one-half hour in a specific community.

Party Visits: Represents the number of non-resident party trips involving a stop one-half hour or more, but not overnight, in a specific community.

Overnight Party Trips: Represents the number of non-resident party trips involving a stop of one or more nights in a specific community.

Total Party Trips: Represents the sum of party pass throughs, party stops, party visits and overnight party trips for a specific community.

Parties: Represents the total number of unique, non-resident parties passing through, stopping, visiting or staying overnight in a specific community.

Party Nights: Represents the total number of nights stayed by non-resident parties in a specific community.

Capture Rate: Percent of total party trips through a community that involved a stop, a visit or an overnight stay.

Table TO - 4

Visits by Trip, Purpose and Region

	Brier Island	
	Total Party Trips	**Party Nights**
Trip Purpose		
Business	200	0
Pleasure (purchased accommodation)	13,700	2,500
Visiting friends & relatives	4,200	2,500
Other	400	0
Region of Origin		
Atlantic Canada	1,600	1,200
Other Canada	6,400	1,500
International	10,400	2,400

The third source of visitor information available in 2001 is the number of passengers taking the two ferries that operate on Digby Neck/Islands. This data is shown in Table TO-5 and indicates a total visitor traffic of 43,509 persons.

Table TO - 5

Estimate of Visitors to Digby Neck/Islands Based on Average Ferry Traffic2002 - 2004

	Total Vehicles	Resident Vehicles	Visitor Vehicles
January	3,792	3,792	0
February	3,760	3,760	0
March	4,408	4,408	0
April	4,928	4,928	0
May	5,820	4,500	1,320
June	7,123	4,500	2,623
July	9,789	4,500	5.289
August	11,027	4,500	6,527
September	7,917	4,500	3,417
October	6,043	4.500	1,543
November	4,769	4,769	0
December	4,812	4,812	0
Total	**74,188**	**53,469**	**20,719**
Average Jan-Apr 4,411 and Nov/Dec Say 4,500			2.1 people /party
Total			**43,509**

A final indicator of tourist visitation is the Visitor Information Centre Statistics published by the Evangeline Trail Tourism Association for the Visitor Information Centre at Tiverton.

Year	Statistics
1999	4,994
2000	3,698
2001	4,388
2002	14,268
2003	2,946
2004	2,606

This data shows an anomalous year in 2002 which is not supported by other data presented previously.

9.3.14.2 Analysis

The above tourism statistics provide insight into the scale of the existing tourism industry on Digby Neck/Islands. During the past ten years (1996-2005) the number of rooms available on Digby Neck/Islands has almost doubled from 49 in 1996 to 84 in 2005. A major indicator of the performance of the tourism industry is the number of rooms sold. On Digby Neck/ Islands, the number of rooms sold during the peak tourist season (June – September) averaged about 5,000 room nights during 2000 to 2004 as compared to 59,000 for the whole of Digby County. This number of room nights sold during peak season has remained fairly constant during the past five years in Digby County and on Digby Neck/Islands. Digby Neck/Islands represents 6.9% of the room nights sold in Digby County.

Another indicator of performance of the accommodation sector of the tourism industry is occupancy rate. The average occupancy rate for Digby Neck/Islands (2000 – 2004) during peak season was 54.2% as compared to 64.9% for Digby County. This would indicate a lower capture rate on Digby Neck/Islands which could be due to a variety of reasons.

A primary tourist attraction on Digby Neck/Islands is whale and seabird cruises (adventure tours). In the early 1990s, the fishing industry was undergoing a rationalization due to the decline of the groundfish industry. A government funded program – the TAGS program – was put in place to encourage fishermen to seek other types of employment and leave the fishing industry to reduce capacity. For many coastal communities the TAGS program offered alternatives to fishing while creating opportunities for people in the fishing industry to use their skills, knowledge, and equipment in a "new" sustainable business. The tourism sector fit this new opportunity specifically whale and seabird cruises as well as campgrounds and fixed roof accommodations. Adventure tours by the mid 1990s began its own rationalization and by 1997 an over supply of adventure tour operators versus demand came into question – see – The Economic Planning Group of Canada 1997, Ref. 173. In 2004 there were ten adventure tour operators on Digby Neck/Islands. This number of operators has remained fairly constant for the previous five years. Although one whale and seabird cruise operator has

an office in Little River, the closest departure port to the proposed Whites Point quarry for tours is East Ferry, which is approximately 8 km away from the quarry property. Further, the majority of ports of departure for tours are on Long Island at Tiverton and Freeport and on Brier Island at Westport – see **Map 4.**

Quantitative Assessment

An order of magnitude of the economic impact of tourism for both Digby County and Digby Neck/Islands for 2004 was estimated. Data from the Department of Tourism, Culture, and Heritage was used – see Table TO-6 for provincial (Nova Scotia), sub-provincial (Annapolis Valley), regional (Digby County), and local (Digby Neck/Islands).

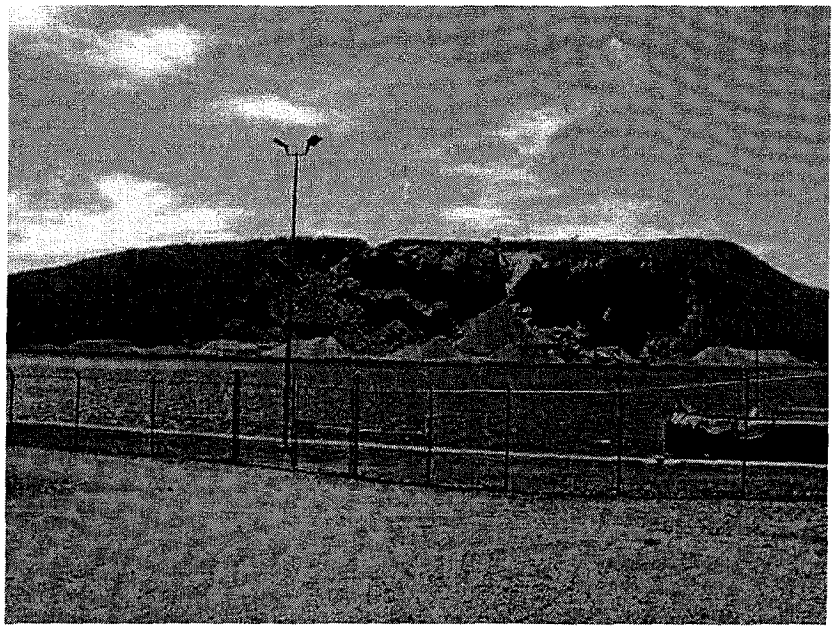
Table TO - 6 - Economic Impact Attributable to Tourism - 2004

	Province of NS	Annapolis Valley	Digby County(1)	Digby Neck /Islands(2)
Tourism Revenue (000,000)	$1,314.0	$170.8	$42.0	$3.1
Payroll (Direct & direct) (000,000)	$513.6	$66.8	$16.5	$1.2*
Employment (Direct & Indirect)	33,900	4,400	1,086	80*
Room Nights Sold	2,2569,600	309,900	76,484	5,629

Room nights sold are used as the basis for estimating tourism expenditures at the county and local levels. Using this approach and as shown in Table TO-6, tourism revenue for Digby County is estimated at $42 million and $3.1 million for Digby Neck/Islands. Digby Neck/Islands would account for 7.4% of all tourism expenditures in Digby County. Of this total revenue of $3.1 million for Digby Neck/Islands, a total payroll of approximately $1.2 million would be paid to 80 tourism sector workers for an average annual salary of $15,000. This total payroll of $1.2 million paid to 80 workers in the tourism industry is approximately equal to the $1.2 million payroll that will be paid to operate the Whites Point quarry annually.

Qualitative Assessment

A similar quarry project, directly visible from a tourist destination area was investigated. Martin Marietta operates a major aggregate quarry at Cape Porcupine near the Canso Causeway. Aggregate from this quarry is exported to the United States by ocean-going vessels similar to those proposed for the Whites Point quarry. The Martin Marietta quarry is located at the gateway to Cape Breton Island, a world-renowned tourism destination. The quarry operation is directly visible, about 2 km across the Strait of Canso, from the Nova Scotia Visitor Centre located on Cape Breton Island.



View of Martin Marietta Quarry from the Nova Scotia Tourism Office - in Cape Breton

This Visitor Centre at Port Hastings is the busiest in Nova Scotia and has the highest visitor traffic flow of 430,000 person trips in Nova Scotia.

To assess the potential impact the quarry operation at Cape Porcupine may have on the tourism industry in Cape Breton, the manager of the Nova Scotia Visitor Centre was consulted. Questions from visitors about the quarry are raised. It is estimated that on a typical busy day with 2,000 visitors, approximately 40 may ask a question about the quarry. The nature of the questions varies greatly. About half are general curiosity – where the product goes, etc. The other half could concern questions related to the environment. This is especially the case if dust levels are visibly high. Commentary by the Visitor Centre manager indicated they have not heard anyone express a view that the quarry operation has ruined their opinion of Cape Breton and will deter them from making a return visit.

In summary, the proposed Whites Point quarry is not visible from the "Digby Neck and Islands Scenic Drive" (Hwy #217) or from any tourist accommodations (fixed roof or campgrounds), adventure tour ports, designated heritage buildings or the proposed sites for the "Discovery Centre". Also, since the greatest concentration of whales and whale watching effort does not occur along the Digby Neck coast of the Bay of Fundy, views of the quarry and marine terminal from tour boats will not be common.

9.3.14.3 Mitigation

The majority of the coastline of the quarry site will be maintained in its natural state with an environmental preservation zone. Along the coast, expanded preservation zones are proposed at sensitive areas. This zone will provide some visual buffer along the coast. Since the quarry will be developed in increments, the land south of Whites Cove Road along the Bay will remain undisturbed for many years. The land north of Whites Cove Road will be initially developed with the construction of environmental control structures. This area is also the first priority for reclamation, especially inland from the coast between the environmental preservation zone and the sediment retention ponds berms.

9.3.14.4 Monitoring

Public participation is proposed to continue during quarry construction and operation. Bilcon of Nova Scotia Corporation intends to re-establish the Community Liaison Committee (CLC) that was established as a result of the permitting of the 4 hectare quarry at the Whites Point site in 2002. In this regard, a tourism industry representative from the area will be invited to participate on this committee and monitor industry activities.

9.3.14.5 Impact Statement

Tourism

Since the quarry operation will not be visible from surrounding land tourist attractions and views from the water from adventure tour boats are anticipated to be infrequent, this would result in a ***long term, insignificant negative effect, of regional scale.***

9.3.15 Economy - Land Use and Value

9.3.15.1 History of the Land Uses of the Site

Past

The archaeological assessment carried out by Dr. Watrall **(Ref. Vol. VI, Tab 35)** found no evidence of land use at Whites Cove by aboriginal peoples nor was there any settlement by the Acadians as they expanded outward from the Annapolis area. The first waves of English-speaking settlers bypassed Digby Neck, although what is now Digby County did receive its first European settlers with the arrival of the New England Planters beginning in 1760.

All of Digby Neck was granted to a group of Halifax officials in 1765 but non-fulfillment of the terms under which the grant was made led to the land being escheated. In 1783-84, much of present day Digby County was granted to the refugees of the American Revolution. Much of Digby Neck was laid out in plots for the refugees and much of the subject property was granted to Joseph Barton. This grant was confirmed to the heirs of Joseph Barton but it appears that long before the new grant, Barton's children had moved back to New Jersey (**Barry Moody , Ref. Vol. VI, Tab 33).**

The grants to the heirs of Joseph Barton and others in 1801 were made with certain stipulations, primarily concerning the clearing of land, the building of a house, and the establishment of a farm. One of the terms of the grant was that if the land was not suitable for farming, the grantee was to establish a stone quarry and employ at least one man to work it for every fifty acres granted (Barry Moody).

In 1648, the two remaining Barton heirs sold the subject parcel to Robert Timpany and the property would be held by Digby Neck families for the next 150 years. Various deeds mention houses and other buildings at Whites Cove **(Barry Moody, Ref. Vol. VI, Tab 33)** and it would appear that in 1877, four families lived in Whites Cove and that Whites Cove was occupied on a year-round basis from approximately the 1860's to the end of the 19th century.

The subject property would have been very difficult for the practice of agriculture (but not impossible as traditional knowledge of farming on the site shows) due to the slopes and poor soil conditions but the proximity to the Bay of Fundy would have enabled fishing activities and at some time in the 19th century "Fishing Privileges" at Whites Cove came into existence. Even after Whites Cove was abandoned by the last family, the Cove continued to be used as a launch and haul out facility for fishing boats up until the late 1940's with access being provided by the Whites Cove road.

In the early 1950's, the area parallel to the shore line was extensively used as a gravel pit and apparently much of the material taken from the pit was used in the construction of Highway #217. From the 1950's to the present time, the property has seen little activity apart from the clear cutting of the timber on the higher ground in 2001. However, the Cove was used for recreational walking and picnics during this period and the Whites Cove road gave access to beach harvesters for dulse and periwinkles. No dulse or periwinkle harvesting has been observed during the past three years.

Current

There are no current activities taking place on the subject property other than the activities of the Proponent. In 2002, a permit was granted by the NSDEL for a less than 4 Ha quarry. Approximately half the 4 Ha was cleared and grubbed and environmental control structures constructed. There is little merchantable timber left on the property following the clear cut operation of 2001 and as noted above, no dulse or periwinkle harvesting has been observed over the past three years.

Discussions with the periwinkle harvesters (personal contact Ms. Wanda VanTassel) indicates that they are still anxious to access the beach areas from Highway #217 along the Whites Cove road and Bilcon has committed to providing beach access to harvesters at locations to be designated by the harvesters.

9.3.15.2 Land Uses Within the Project Site and In Other Areas That May be Affected By the Project Development

Planned

Planned uses by Bilcon within the quarry site are the subject of this EIS, but in brief, they comprise a crushing and screening operation, a quarry face, a shiploading facility, and a maintenance facility.

The abandoned road currently owned by the NSDTPW has not been maintained by the Department for many years and is severely eroded. The Department's plans for this road do not include maintenance but there is an issue of the extensive flow of sediment into the Bay of Fundy that needs to be addressed. The road, however, does provide access for beach harvesters though none have been observed over the past four years.

The small 50' x 50' parcel in private hands is apparently planned as a cottage lot. It is understood that while the owners have a permit for an on-site sewage disposal system, a building permit has been denied on access issues for emergency vehicles. There is also an additional problem due to the lack of a right-of-way to the lot which is the basis of an unresolved action currently in the courts.

Existing

At the present time, no use is being made of the project site other than the activities of Bilcon in assembling data for the EIS.

9.3.15.3 Existing Land-based Infrastructure Likely To Be Affected By The Project

Wells

Reference to the Hydrogeology section of the EIS (**paragraph 9.1.3**) shows that nineteen wells are sufficiently close to project activities that they could be affected. However, given that the wells are all located on the eastern site of the watershed at significant distance from the project and that they are all located in the till layer or in the middle or lower flow unit of basalt (and that quarrying will take place only in the upper flow unit) the risk of affecting these wells is extremely unlikely.

Six new monitoring wells have been drilled in strategic locations, including the eastern portion of the watershed, to supplement the original four core holes and these will be monitored on a continuous basis to determine if any changes to the water table are taking place due to the quarrying activities on the western portion of the watershed. Should any well be determined to have been affected by quarrying activities, Bilcon has committed to drilling a new well (**Paragraph 9.1.3**)

Waste Management Areas

Neither the Village of Little River nor any of the other communities along the length of Digby Neck have waste water management systems and, hence, none will be affected by the project. Individual buildings rely on on-site sewage disposal systems. These systems were approved by the Regional Health Board before the responsibility was transferred to the NSDEL when the On Site Sewage Disposal Regulations came into force.

Individual on-site systems are installed wither/whether? close to the surface in a field or contour type system when the soils are suitable or above ground in locations of poor soils or high water table. These systems will not be affected by the project.

9.3.15.4 Activity Areas Or Trails That May Be Affected By The Project

The only trail on the proposed quarry and marine terminal site is the unmaintained Whites Cove Road from Highway #217 to Whites Cove. At the time that Whites Cove was the site of a boat haul up and fishing activities were carried out at Whites Cove, this road was relatively well used. When fishing activities ceased in the early 1950's and Whites Cove was the site of a pit operation, the road was used to haul gravel for the reconstruction of Highway #217. Since the mid 1950's, the road has fallen into disrepair and is no longer maintained by the NSDTPW (NSDTPW).

Whites Cove Road, however, was used since the mid 1950's as an access road to the Whites Cove beach, both for beach harvesting and as a recreational trail. In the more recent past, the road has been used as an ATV trail and severe erosion now prevents access for most four-wheel drive vehicles.

Whites Cove Road

If Bilcon is unable to acquire Whites Cove Road from NSDTPW, the road right-of-way will be fenced to prevent access to the quarry or marine terminal property. Access will still be provided across quarry property to traditional beach harvesting areas as noted elsewhere in this report and to the beach adjacent to the road.

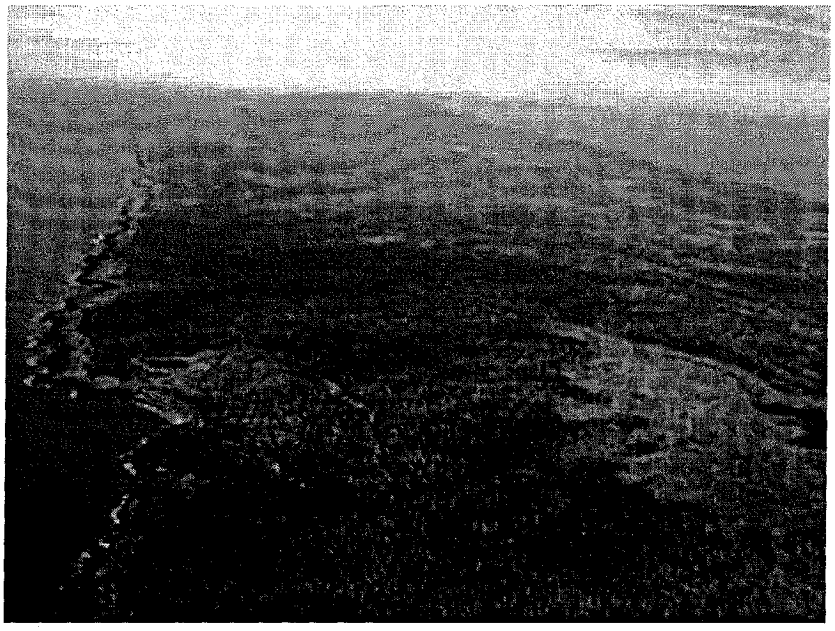
9.3.15.5 Coastline Patterns

The Digby Neck coastline pattern along the Bay of Fundy is relatively unobstructed and homogeneous. Basalt bedrock dominates the beach, intertidal zone and nearshore waters except for the sandy beach and waters at Sandy Cove west. This area of coastline is straight and interspersed with numerous small coves. Many of these coves were historically used for launching and hauling out small fishing boats. Presently, only a few coves along Digby Neck and the Bay of Fundy support active fishing operations, those at nearby Whale Cove, Sandy Cove west, Centreville, and Gullivers Cove. The previously used coves, like Whites Cove, have been abandoned as harbor improvements have been made at the larger, more accessible sites. The coastline of the Whites Point quarry and Marine Terminal property extends approximately 3.1 km (1.9 mi.) along the Bay of Fundy.

Digby Neck/Bay of Fundy Coastline South from Whites Cove - Photo by Ron Cooper

No designated protected areas, special harvesting sites, transportation corridors, recreation areas, ecologically important areas, or movement areas are known to exist along the Digby Neck/Bay of Fundy coastline.

A critical wildlife habitat for wintering harlequin ducks is known to exist at Trout Cove adjacent to the Centreville Harbour. Also, critical plant habitat is known to exist along the south branch of the Little River in the Tiddville/East Ferry area. A provincial picnic park is located at Lake Midway.



Digby Neck/Bay of Fundy North from Whites Cove - Photo by Ron Cooper

9.3.15.6 Property Values in the Area Affected by the Project

Since the granting of a Permit by the NSDEL to construct and operate a 4 Ha quarry at Whites Point in April 2002, there has been extensive coverage of the project by the local press and through the Panel Review Process for the larger quarry and marine terminal. In fact, one of the key findings of the Attitude Survey (Appendix 3) was the exceptionally high awareness of the project – 96% and constant across all age categories.

It can be assumed, therefore, that persons in the area covered by the Attitude Survey (Municipality of the District of Digby and the western portion of Annapolis County) buying property on Digby Neck and the Islands would be aware of the proposed larger quarry and marine terminal. Persons from outside of the area covered by the Attitude Survey would have had much less exposure to the project. However, prospective purchasers of property on Digby Neck and the Islands could hardly be unaware of the project as signs opposing the quarry are dotted along Highway #217 and most realtors would disclose the proposed project to prospective purchasers, particularly if the property in question were in Sandy Cove, Mink Cove, Little River, or East Ferry areas.

It is reasonable to assume, therefore, that purchasers of properties on Digby Neck and the Islands since the Spring of 2002 would have been aware of the proposed project. A review of the real estate sales statistics(Appendix 35) from 1999 to mid 2005 for Digby Neck and the Islands reveals the following:

1. From 1999 to 2002, 40 properties were sold
   From 2002 to mid 2005, 90 properties were sold

2. From 1999 to 2002, 45% of the properties sold in 1-3 months
   From 2002 to mid 2005, 58% of the properties sold in 1-3 months

3. From 1999 to 2002, 4 properties were sold in Sandy Cove and 2 in Little River
   From 2002 to mid 2005, 9 properties were sold in Sandy Cove and 8 in Little River.

Note that Sandy Cove and Little River are the closest communities to the proposed quarry and marine terminal.

Due to the variable nature of the individual properties sold, it is not possible to compare values in the two time periods, but anecdotally property values on Digby Neck and the Islands are said to have risen in value during these two time periods in the same relative amount as one would expect given the rise in values in the rest of the Municipality of the District of Digby.

There is no question that there has been considerable interest in Digby and Annapolis County properties over the past five years from buyers outside of the local area (Halifax, Ontario, Western Canada, the U.S., and the U.K.) and this interest appears to be still growing. The values of properties in the Digby and Annapolis areas are still seen as bargains relative to the areas noted above, even with the significant increase in value of the Canadian Dollar over the past two years. Generally speaking, buyers from outside of the local area are interested in waterfront or at least water-view properties and prices have risen significantly for these properties. A very significant percentage of properties on Digby Neck and the Islands are now held by non-residents, primarily from the U.S.

It would appear from the real estate statistics for Digby Neck and the Islands referenced above, there is no general perception among buyers that the proposed quarry and marine terminal at Whites Point is likely to negatively affect property values on Digby Neck and the Islands. However, given the permitting and construction of the quarry and marine terminal, it is possible that the property values in the immediate area of the project could be affected.

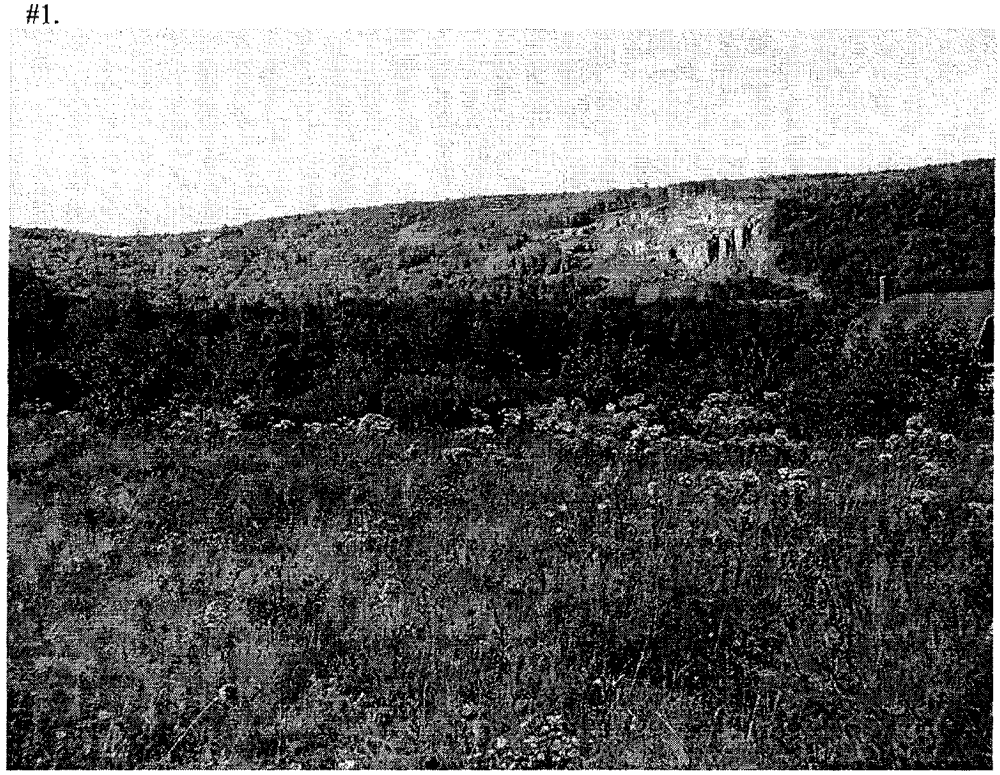
Reference to three quarries or marine terminals in Nova Scotia and British Columbia (Auld's Cove, Hantsport, and Sechelt) noted in the Gardner Pinfold Report (**Ref. Vol VI, Tab 32**) shows that the effect may not necessarily be negative. Having the marine terminal in the view plane certainly appears to negatively affect waterfront land values but this effect is not apparent in Hantsport or Auld's Cove.

As noted earlier in this report, Bilcon has been acquiring properties adjacent to the proposed project as they become available. These acquisitions will provide an extensive buffer zone around the active site which will tend to mitigate perceived diminution of property values. It is also possible that if the Proponent is successful in hiring local people, there may be a positive effect on property values in the local area as some employees may wish to relocate closer to the project location.

9.3.15.7 Comparative Quarries

9.3.15.7.1 Parker Mountain Aggregates

Investigation of land development activities in proximity to a basalt rock quarry in neighbouring Annapolis County were conducted (Kern 2004 ,Ref. 27). The Parker Mountain Aggregates quarry is located on Parker Mountain Road in Granville Ferry adjacent to the Town of Annapolis Royal. The quarry has been in operation for approximately twenty years. Parker Mountain Road is a connector road between Highway #1 and the Shore Road along the Bay of Fundy. Development consists of various land uses including residential, industrial, institutional, commercial/retail, and tourism. The quarry operation is highly visible when proceeding toward the Bay of Fundy from Highway #1.



Parker Mountain Aggregates Quarry - Annapolis County - Photo by David W. Kern

To assess the effects the quarry has had on surrounding development patterns for the previous 15 years, the Municipality of Annapolis County Development and Building Permit Reports were reviewed. Analysis of development within three 2 km zones of the quarry by type and value was performed. The greatest amount of estimated construction value over the past 15 years occurred in the zone most affected by the quarry from a visual (view plane) and operational standpoint (heavy truck traffic).

This development zone within 2 km of the quarry included new residential housing, housing additions, new institutional development, new residential recreation, craft shop, and various accessory buildings. Most recently, a new residential unit was constructed within 300 m of the active quarry area.

In the case of the Parker Mountain Aggregates quarry, a greater amount of development occurred within the 2 km zones of the quarry than within the 2 – 4 km zone. More specifically it was concluded that:

- The community living and working along Parker Mountain Road continued to invest in new development opportunities and to enhance their quality of life within a 2 km radius of the operating quarry over the past 15 years.
- Institutional, residential, and tourism development continued to make significant investment within a 2 km radius of the operating quarry over the past 15 years.
- A greater diversity of type of development occurred in the area most effected visually and by quarry operation than in the control area (the 2 – 4 km zone) and
- A greater amount of investment in development occurred in the area most affected visually and by quarry operation than in the control area (the 2 – 4 km zone).

9.3.15.7.2 Tilcon Quarry

The Tilcon trap rock quarry in North Branford, Connecticut is located immediately adjacent to Lake Gaillard which supplies 45% of the water for the New Haven metropolitan area via a tunnel beneath the quarry. There are three schools located within 800 m of the quarry and all were built after the quarry had been in operation for many years. Some of the houses and most of the commercial buildings that are within 800 m of the quarry have been built recently. Crushed rock is transported by rail to the marine terminal in Pine Orchard which is set close to a significant number of expensive houses. Both the quarry and railroad are seen as good neighbours to Branford(Appendix 41).

9.3.15.8 Mitigation

There appears to be no general perception among buyers that the quarry and marine terminal is likely to affect property values generally on Digby Neck and Islands. However, there is a possibility that property values may be affected in areas immediately adjacent to the operation. It is proposed that an evaluation by a qualified real estate appraiser take place on residential properties within 800 m of the active quarry prior to construction and a re-evaluation be carried out five years later to determine whether value has been lost. Any loss so determined would be compensated by Bilcon.

9.3.15.9 Monitoring

Monitoring would be in the form of comparing property values prior to construction and after a period of five years. Valuations would be conducted by a qualified real estate appraiser

9.3.15.10 Impact Statement

Property Values

While property values in general on Digby Neck and Islands are unlikely to be affected, those properties within 800 m of the active quarry could be marginally affected resulting ***in an insignificant negative effect in the local area.***

9.3.16 Recreation

9.3.16.1 Research

Historically, the Whites Cove Road has provided local residents with access to the Bay of Fundy coastline for recreational purposes. Traditional community knowledge consultations indicate the Whites Cove area was used by the local people for social/cultural/recreational activities. These activities included family picnics, lobster/corn boils, and leisure afternoons at the shore. Also, children enjoyed picking berries (cranberries and gooseberries) as treats for the family (Elgin Research 2005 **Ref. Vol. IV, Tab 23**). Other recreational/resource use of the quarry site by local people have included hunting and trapping.

Over the years, the Whites Cove Road has deteriorated. Severe erosion on the steep gradients makes it presently accessible primarily by four-wheel drive and all terrain vehicles. Presently, no recreation facilities exist on the proposed quarry site. However, a small parcel of private land, approximately 50 feet by 50 feet, exists near the Whites Cove shore. A trail from the terminus of the Whites Cove road leads in a northerly direction across the quarry property. This trail is presently used by all terrain vehicles and presumably has limited hiking use.

Nearby recreation facilities exist at a Provincial Picnic Park at Lake Midway. This park is located approximately 10 km north of the quarry site on Highway #217. Improved access to the Bay of Fundy shore also exists at the nearby villages of Whale Cove and Sandy Cove approximately 4 to 5 km south and north of the quarry site respectively.

9.3.16.2 Analysis

Existing access, via the public Whites Cove Road, presently exists from the southeast property line of the proposed quarry to the Bay of Fundy shore. In essence, Whites Cove Road provides access to Crown owned land below the ordinary high water line. This section of road is accessible by all terrain vehicles or by foot. The present trail leading in a northerly direction along the coast is over private land. Also, as previously mentioned, access to certain coastal areas may be restricted during blasting for safety reasons. Again, for public safety, access to the proposed industrial quarry site would be restricted for recreational use without permission of Bilcon of Nova Scotia Corporation.

9.3.16.3 Mitigation

Access to Crown lands via the public Whites Cove Road cannot be restricted. Unrestricted access along the shoreline on Crown lands below the ordinary high water line would be maintained. As with other private lands within the province, permission to trespass across the quarry property could be granted by Bilcon of Nova Scotia Corporation.

9.3.16.4 Monitoring

To ensure the safety of recreational users, especially during periods of blasting, a "check in" procedure at the quarry would be initiated. Registration at the quarry office would be required before any recreational user is permitted on quarry property.

9.3.16.5 Impact Statement

Recreational Use

Access to Crown owned lands via the public Whites Cove Road and access along the shoreline below the ordinary high water line would continue resulting in a ***long term, neutral (no) effect, of local scale.***

9.3.17 Human Health and Community Wellness

9.3.17.1 Introduction

Human health and community wellness in the region of the proposed Whites Point quarry and Marine Terminal was investigated by AMEC Earth and Environmental Limited – see AMEC, 2005,**Ref. Vol. VI, Tab 34**. This study addresses human health and community wellness issues raised by the public and those required by the Environmental Impact Statement Guidelines issued in March 2005. The population health approach is used to describe existing conditions found in the region prior to construction and operation of the proposed project.

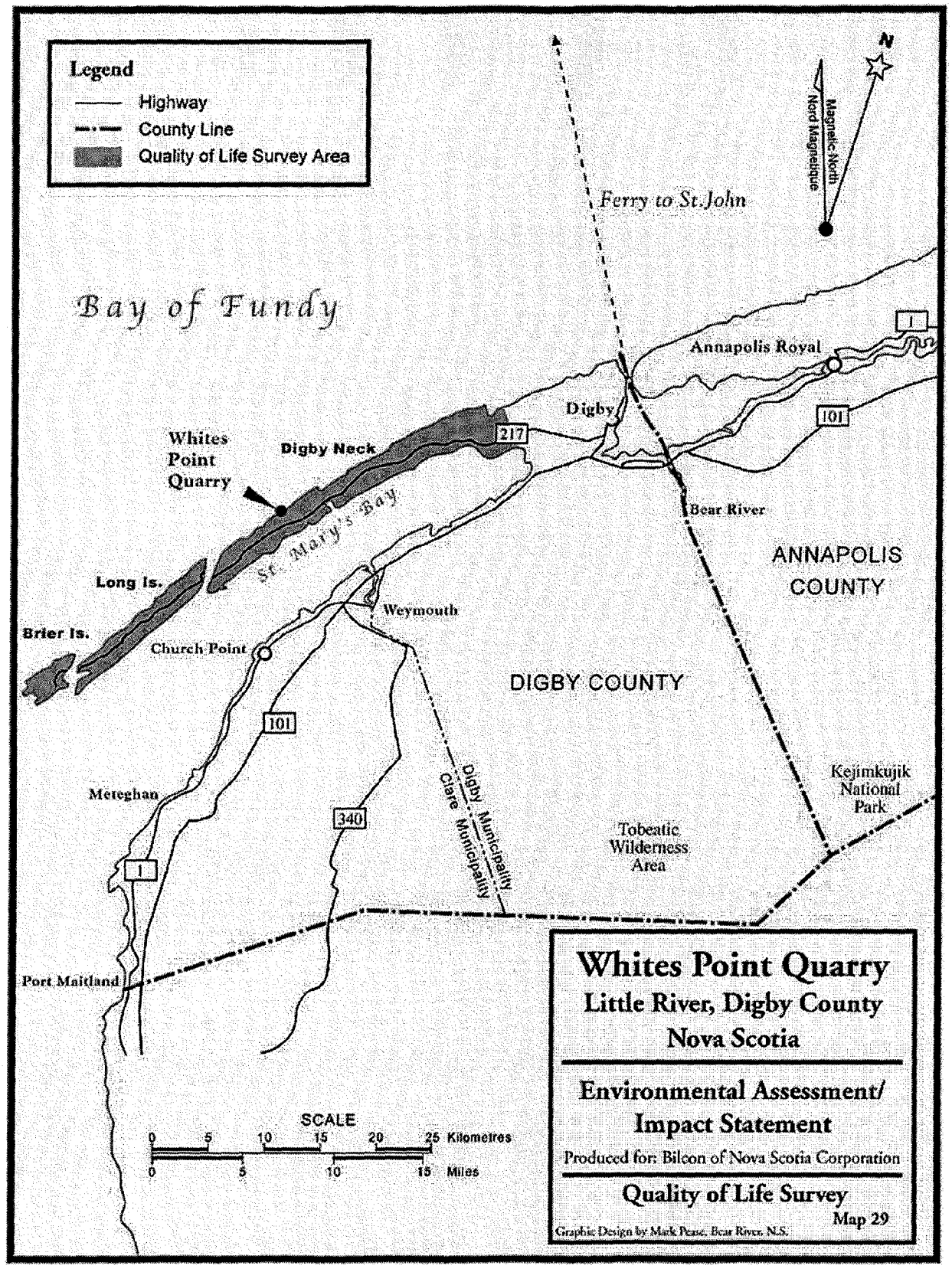
The following definitions of health have been adopted: "health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity" (World Health Organization 1948) and " the extent to which an individual or a group is able to realize aspirations and to satisfy needs to cope with changes or cope with the environment" (World Health Organization 1984). Many of the issues concerning community wellness are addressed in **paragraph 9.3.22** "Socio-cultural Patterns".

Three community health components were selected as health determinants.

- Social and economic environmental components e.g. demographics, population health, employment, income, education, and social status
- Physical environmental components e.g. air, water, and soil quality; contaminants; noise and vibration; and light
- Individual factors e.g. personal health and coping skills

The use of determinates to understand the health of a population is also known as the population health approach which was officially endorsed in 1994 by the Canadian Federal/Provincial/Territorial Advisory Committee on Population Health. Recently, the Public Health Agency of Canada (2005), the Nova Scotia Department of Health (summer 2002), and the South West Nova District Health Authority (2005) are all promoting the population health approach. This approach is also suitable in the context of environmental impact assessment (Health Canada, 2005).

Baseline data was collected for the region. Primary data sources included interviews and surveys. Two surveys were conducted – an "Attitude Survey" in the Digby/Annapolis region with additional emphasis on the community of Digby Neck which is within close proximity of the proposed quarry – see **Map 7** and a "Quality of Life Survey" of the Digby Neck and Islands community – see **Map 29**. The results of these surveys are contained in AMEC, 2005 (**Ref. Vol. VI, Tab 34**).


Legend
Highway
County Line
Quality of Life Survey Area
Ferry to St. John
Magnetic North
Nord Magnetique
N
Bay of Fundy
Annapolis Royal
1
Digby
101
217
Whites Point Quarry
Digby Neck
St. Mary's Bay
Bear River
ANNAPOLIS COUNTY
Long Is.
Brier Is.
Weymouth
Church Point
DIGBY COUNTY
101
Meteghan
340
Digby Municipality
Clare Municipality
Kejimkujik National Park
Tobeatic Wilderness Area
1
Port Maitland
SCALE
0 5 10 15 20 25 Kilometres
0 5 10 15 Miles
Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/ Impact Statement
Produced for: Bilcon of Nova Scotia Corporation
Quality of Life Survey
Map 29
Graphic Design by Mark Pease, Bear River, N.S.

Secondary data sources included statistical information from the Nova Scotia Department of Health, the South West Health District Health Authority (DHA 2), and Statistics Canada (Canadian Community Health Survey and General Social Survey). In several instances, customized statistical data at the community level was prepared by Statistics Canada, for Bilcon, as contained in the "Community Profile" **paragraph 9.3.7.**

Regional data indicators of health status of a population (medical determinates of health) included the following: (AMEC, 2005 **Ref. Vol. VI, Tab 34**).

- Body mass index
- Population with arthritis/rheumatism
- Diabetes
- Asthma
- High blood pressure
- Healthy child development and
- Cancer occurrence

9.3.17.2 Mental and Social Health

Mental health issues have been reported as rather high in Digby County (SWHDHA 2005). Six percent of the population of the SWHDHA is estimated to be suffering from mood disorders and 12.2% from anxiety disorders (SWHDHA 2004). The following brief of the research carried out in the "Stirling County" studies summarizes and provides further insight into this condition.

For over fifty years, unique research has been on going in the regional and local study area for the Whites Point Quarry and Marine terminal in the field of Psychiatric Epidemiology/Community Mental Health. In 1948, Dr. Alexander Leighton, through the Department of Psychiatry, Faculty of Medicine, Dalhousie University, Halifax, Nova Scotia, assembled a premier research team that included multiple disciplines to conduct this research. Known as the "Stirling County Studies", it is considered by mental health professionals to be one of the most important bodies of research in the field. ("Stirling County" is the fictitious name given to the area of Digby County for the purpose of the study).

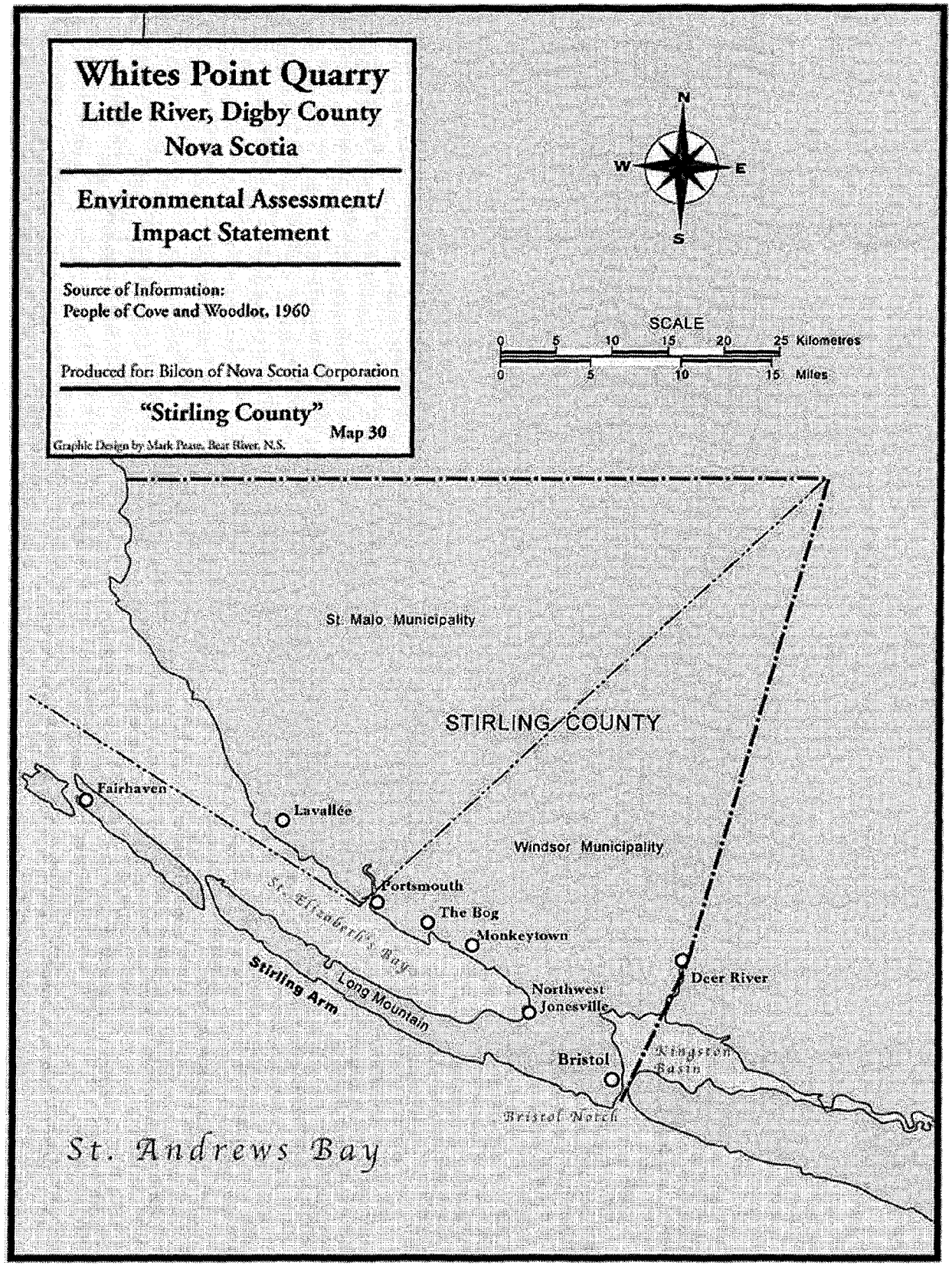
It should be recognized that this study has been controversial in Digby County. Great care has been taken to preserve identities, but the long-term residents were initially very distressed that their community was portrayed in the study. It has only been in recent years that the residents of Digby County realize the magnitude of the constructive contribution the county has made to the field of mental health. The recent data has been published with little or no acknowledgment from the general population. Therefore, as requested in paragraph 9.3.7 Human Health and Community Wellness of the Environmental Impact Statement Guidelines for the Whites Point Quarry and Marine Terminal (Ref. 37) pertinent findings of the study are presented as a part of this EIS to provide temporal context in this aspect of human health.

This study was the first time that the social contexts were examined with reference to their association with persistent psychiatric etiologies. Dr. Leighton's pioneering work on such a vast scale in psychiatric epidemiology and cross-cultural psychiatry has yet to be fully assessed. We know however, that many scientists working in psychiatric research have been strongly influenced in their research design, methodological procedures and measuring instruments by Dr. Leighton's perspective. Many of the evaluative and psychometric tools that were developed for this study have become pivotal in the diagnosis and treatment of mental illness. Considered to be the gold standard for longitudinal studies in community epidemiology, (in particular the concept of community mental health), the studies are based on a comprehensive health survey designed by Cornell University that has been replicated for over fifty years. This is a legacy that is likely to become still more important in that it is rooted in scores of institutional settings. The current research chair is Dr. Jane Murphy (Leighton). Dr. Murphy, the spouse of Dr. Alexander Leighton, is a professor affiliated with Harvard Medical School and the Massachusetts General Hospital, where she is Chief of Psychiatric Epidemiology. In recent correspondence with her, Dr. Murphy stressed that the research is ongoing, and she is in the process of publishing the data from 2002. Hence, for well over half a century, the field of mental health has benefited from the research in the Stirling County Studies.

The site for the Stirling County Studies is Digby County, Nova Scotia – see **Map 30** . The studies, based on data collected from 1952 to 2002, is a long term epidemiological investigation of psychiatric disorders. Pertinent references include: Leighton 1959, Ref. 134, Hughes 1960, Ref. 122, Leighton 1963, Ref. 135, Murphy 1988, Ref. 143, Murphy 1991, Ref.143, Murphy 1994, Ref 145, and Murphy 1998, Ref.144.

Research methods included the Diagnostic Interview Schedule (DIS) which was employed to gather information from a representative sample of the residents of the county to assess the prevalence of the different types of depressive symptoms defined as major depressive episode (MDE) and/or dysthymic disorder (DysD). Eighteen depressive symptoms were identified. Focusing on the associated symptoms enumerated through symptom groups, the strongest associations were for "feeling worthless" and "thought disturbance", followed by "sleep disturbance". A somewhat different profile of associations pertained for the individual symptoms. After "feeling worthless", next strongest was "trouble concentrating", followed by "insomnia". The weakest associations were for "weight gain", "thoughts of death", and "hypersomnia".

With "feelings of worthlessness" especially prominent in the Stirling findings, such self-disparaging symptoms support the view that psychological symptoms are significant forerunners of depression. Self-disparagement may be particularly crucial in the progression toward clinical depression because it reflects loss of the idea that the "self" is a worthy person. It was noted in the studies that feelings of personal inadequacy deserve particular attention in the population at large because they are strongly associated with lifetime diagnoses and forecast the incidence of depression when people are followed over time.


Whites Point Quarry
Little River, Digby County
Nova Scotia
Environmental Assessment/
Impact Statement
Source of Information:
People of Cove and Woodlot, 1960
Produced for: Bilcon of Nova Scotia Corporation
"Stirling County"
Map 30
Graphic Design by Mark Pease, Bear River, N.S.
N
W
E
S
SCALE
0 5 10 15 20 25 Kilometres
0 5 10 15 Miles
St. Malo Municipality
STIRLING COUNTY
Fairhaven
Lavallée
Windsor Municipality
Portsmouth
St. Elizabeth's Bay
The Bog
Monkeytown
Stirling Arm
Long Mountain
Northwest
Jonesville
Deer River
Bristol
Kingston
Basin
Bristol Notch
St. Andrews Bay

The Stirling County studies estimated that 20% of the general population had an unaddressed need for psychiatric attention. The stability of the prevalence rates contrasts sharply with the fact that numerous social changes took place in the county over the 50 year study. There were, however, trends in the distribution of depression and anxiety by sex and age, especially an increased similarity in the overall rates for men and women in the age range of 40 to 69 years. While there are yet to be statistics published for the 2000 to 2002 data, it appears that there has been a consistency over time associated with the mental health status of the Stirling County participants. It is evident, however, that the studies show the rate of depression and depressive etiologies in the general population has increased, and it is paramount to note that the largest demographic group experiencing the increase in mental illness is the group aged 25 to 55. This age group is a primary component of a community's work force. It should also be noted that, according to Statistics Canada, the numbers of people in this demographic age group has declined in Digby County. Digby County has the second oldest aggregate age in the Province of Nova Scotia.

The reason for the above is that there is apparently a strong relationship between what is defined as "occupational position and psychopathology" (Leighton 1963, Ref. 135 and Murphy 1991, Ref 143). This appears to have remained a constant in that the group which consists of the chronically unemployed throughout the course of the study has consistently exhibited a significantly higher level of psychopathology as compared to persons who are employed in any capacity.

9.3.17.3 Framework

Potential physical environmental effects of the operation of the proposed quarry and marine terminal are the focus of the following human health assessment. Concerns expressed by the public during scoping sessions, comments on the public registry and on the Draft EIS Guidelines and by regulatory agencies will be addressed. Where health guidelines, standards, or thresholds exist, potential positive or negative effects of the quarry will be assessed in relation to these guideline criteria. If activities of quarry operations are expected to be within human health guideline criteria or regulatory requirements contained in the Nova Scotia Department of Environment and Labour's Pit and Quarry Guidelines or CCME guidelines, a significant effect on human health would not be expected.

Some physical environmental component health determinants have previously been included as VECs e.g. air quality (**paragraph 9.1.8**), noise and vibration (**paragraphs 9.1.9, 9.1.10, 9.1.11**), and light (**paragraph 9.1.12**). Following are additional VECs including drinking water quality, marine contaminants, land contaminants, and country foods. Quality of life components follow later in **paragraph 9.3.22** and assess determinants such as social relations, social capital, commercial patterns, and environmental quality of life.

9.3.18 Human Health – Drinking Water Quality

9.3.18.1 Research

The "Guidelines for Canadian Drinking Water Quality" set forth threshold criteria for various parameters. These guidelines are updated and published every spring in the form of a summary table. The April 2004 "Summary of Guidelines for Canadian Drinking Water Quality""(Ref. 64) are referred to for the purpose of assessing existing ground water quality at the Whites Point Quarry site. The guidelines for physical and chemical parameters are presented using three evaluation criteria.

MACs – maximum acceptable concentrations
IMACs – interim maximum acceptable concentrations and
AOs – aesthetic objective

It should be noted that some chemical and physical parameters have been identified as not requiring a numerical guideline – Ref. 64.

Ground water samples were taken from bore hole #1 – see **Map 12** in the basalt bedrock at the Whites Point Quarry site in September 2002. The samples were taken by Jacques Whitford Environment Limited and analyzed by PSC Analytical Services- see Appendix 42.

9.3.18.2 Analysis

All chemical and physical parameters met the MACs and IMACs guidelines as stated in the "Summary Guidelines for Canadian Drinking Water Quality (04/04) except manganese. Manganese exceeded the aesthetic objective (AOs) of less then or equal to 0.05 mg/L and is considered insignificant from a human health standpoint. Thus the existing baseline ground water quality data from the quarry site meets existing drinking water guidelines for MACs and IMACs and on-site wells, for domestic use are expected to provide good quality drinking water.

9.3.18.3 Mitigation

No mitigation is considered necessary. All wells constructed on-site for domestic water supply will meet the Nova Scotia Department of Environment and Labour's regulations for the construction of water wells.

9.3.18.4 Monitoring

Chemical, physical, and biological well water parameters will be monitored both on-site and off-site at the specially constructed monitoring wells – see **Map 12.** Water samples will be taken from a monitoring well located on the quarry property line Monitoring at this well will provide an early warning of any highly unlikely changes to the quality of drinking water at the quarry property line. Off-site monitoring will be conducted in the same ground water source as existing deep, domestic wells located in the immediate area along Highway #217. Monitoring in this ground water source will provide an early warning of any changes induced by off-site land uses that may affect the domestic water supply at adjacent residences.

As mentioned previously, public participation is proposed to continue during quarry construction and operation. Bilcon of Nova Scotia Corporation intends to re-establish the Community Liaison Committee (CLC) that was established as a result of the permitting of the 4 hectare quarry at the Whites Point site in 2002. In this regard, two neighbours with wells, adjacent to the quarry property will be invited to participate on this committee and be involved with the water well monitoring program.

9.3.18.5 Impact Statement

On-Site Drinking Water Quality

Since the ground water from on-site sources meets the "Summary Guidelines for Canadian Drinking Water Quality" for MACs and IMACs parameters, this would result in a ***long term, neutral (no) effect, of local scale.***

Off-Site Drinking Water Quality and Quantity

Quarry activities will be conducted in the upper basalt flow unit. Adjacent residential and industrial wells are either dug in till or drilled in the middle flow unit or deeper resulting in a ***long term, neutral (no) effect, of local scale.***

9.3.19 Human Health – Marine Contaminants

9.3.19.1 Research

The harvesting of marine organisms for human consumption is an important economic activity in the Bay of Fundy. As mentioned previously, heavy metal concentrations in sediments in the nearshore region of Whites Point were low as compared to other areas of the Bay. However, absorption and more importantly accumulation of metals in aquatic organisms is possible and could result in higher concentrations than those existing in the environment.

Contaminants such as metals have been measured in two important invertebrate fisheries – scallop and lobster – in the Bay of Fundy. Scallop from most of the Bay generally had metal levels comparable to those from uncontaminated areas (Bay of Fundy Ecosystem Partnership 2004, Ref. 99). Copper measurements in the tissues of lobster in the upper Bay of Fundy, predominately in a non-industrialized area, had levels as much as 30 – 100 times higher than industrialized areas. Copper concentrations of over 800 ug/g from upper Bay of Fundy lobster is unusually high. As with many other metals, Health Canada has no thresholds for copper levels in fishery products and implications to human health are uncertain.

The consumption of fish is a major pathway for heavy metals, such as mercury to transfer from the environment to humans. Since as much as 95% of the mercury present in fish is in the form of biologically active methylmercury, a great deal of attention has been placed in monitoring mercury in fish in the Maritimes. In this regard, Health Canada has set 0.5 ppm as a guideline threshold level for mercury in fish and fish products intended for human consumption. Higher levels trigger an advisory to limit the consumption of fish from the contaminated area. Mercury levels higher than the Health Canada guidelines have been detected in fish that inhabit the Bay of Fundy. Generally, fish from coastal waters have lower levels of mercury than fish in freshwater systems. Monitoring of mercury in fish such as herring has typically resulted in almost 1000 times lower levels than the Health Canada guideline.

The "Gulfwatch" mussel monitoring program is on going in the Gulf of Maine and the Bay of Fundy. Contaminants including several heavy metals are monitored. Since mussels are attached permanently to bottom substrate, they provide an indicator of site specific contaminants as compared to mobile species such as lobster or fish. After over a decade of monitoring, a baseline for contaminants is being established. Some locations are influenced by anthropogenic sources, while others by natural sources. The "Gulfwatch" monitoring indicates that in most of the Bay of Fundy, heavy metal concentrations in blue mussels are near natural levels (Bay of Fundy Ecosystem Partnership 2004).

The closest site to the Whites Point quarry that has been monitored for contaminants in the blue mussel (*Mytilus edulis*) is at Broad Cove located approximately 30 km north of Whites Point. The contaminants being monitored at this site include 9 trace metals, 24

polychlorinated biphenyl's (PCBs), 24 polycyclic aromatic hydrocarbons (PAHs), and 16 chlorinated pesticides. Mussels at this site have been monitored during 1993, 1996, and 1999 (Wells et al. 2005, Ref. 175). **Table MC – 1** presents contaminant data reported for blue mussels.

Table MC – 1

Levels of heavy metal and organic contaminants reported for blue mussels (*Mytilus edulis*) collected at Broad Cove, Digby Neck as part of the Gulf of Maine Gulfwatch Contaminants Monitoring Program (values are micrograms per gram dry weight for metals and nanograms per gram dry weight for organics).

Contaminant	1993			1996			1999		
	Min	Max	Median	Min	Max	Median	Min	Max	Median
Aluminium	201.83	262.71	213.66	230.00	260.00	260.00	100.00	360.00	255.00
Cadmium	2.75	3.31	2.89	2.40	2.70	2.60	2.10	3.00	2.40
Chromium	1.95	3.04	2.57	1.90	2.00	1.95	1.70	2.00	1.90
Copper	6.88	8.07	7.17	5.30	6.20	5.90	5.50	5.90	5.70
Iron	516.95	623.85	559.54	410.00	430.00	420.00	120.00	530.00	405.00
Lead	3.31	4.40	3.80	2.60	3.00	2.85	0.30	3.10	2.15
Mercury									
Silver	0.05	0.05	0.05	0.05	0.05	0.05	0.10	0.10	0.10
Zinc	110.09	137.61	123.05	82.00	110.00	94.00	48.00	97.00	76.00
Total PCBs	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Total PAHs	300.5	494.0	368.5	213.0	341.5	267.9	133.2	273.8	185.2
Total DDT	<2.0	<2.0	<2.0	2.46	<2.0	<2.0	<2.0	<2.0	<2.0

Contaminant levels in harbour porpoises in the Bay of Fundy were sampled in 1989 (Johnston 1995). Copper, cadmium, zinc and total mercury concentrations were determined for liver, kidney, and muscle tissue. Copper and zinc in Bay of Fundy porpoises were similar to values previously published from other locations and to other cetaceans in Canadian waters (Falconer et al. 1983 Ref 114).

Further, traditional community knowledge indicates the Whites Point quarry shoreline has been used for local harvesting of sea plants (dulse) and shellfish (periwinkles). In this regard, Bilcon of Nova Scotia Corporation has taken the following precautionary measures. On-site investigations in October 2005 revealed no harvestable quantities of dulse in the Whites Cove area. However, shellfish (periwinkles) were plentiful and samples were collected for laboratory analysis to determine baseline metal levels. The samples were sent to Maxxam Analytics Inc for analysis. Results of this analysis are presented in Appendix 31 .

9.3.19.2 Analysis

In the case of copper levels in the upper Bay of Fundy lobsters, it is likely that this could be attributed to the natural background copper content from the rivers flowing into the upper Bay. These rivers flow primarily through exposed sedimentary rock and have higher copper content as compared to the volcanic rock in southwestern Nova Scotia and the basalt rock at the Whites Point quarry site. Copper levels in the soil at Whites Point was low (39 mg/kg at EQL 2). Also, copper levels in surface water entering the Bay from the Whites Point site is extremely low (2 – 3 ug/L at EQL 2). Likewise copper in the intertidal marine waters was extremely low (0.8 mg/L at EQL 0.1). Copper content in the basalt rock to be processed at the quarry site was also low (27 – 61 mg/kg, depending on depth at EQL 2). Runoff from the quarry site will be contained in a series of sediment retention ponds before entering the Bay of Fundy where sediments and their metal content will be allowed to settle out. Disposal of these sediments will be on-site in dyked disposal areas for future use during land reclamation. Therefore, considering the low background copper and proposed sediment controls, it is extremely unlikely that the proposed quarrying of basalt rock will contribute to any increase in copper levels in the Bay of Fundy and marine organism receptors that may be used for human consumption.

Although mercury levels vary from freshwater to saltwater, the source is assumed to be from both natural and anthropogenic inputs. This could mean the mercury input is from natural geological sources and from long-range atmospheric transport. Background data on mercury concentrations in the intertidal waters off Whites Point were 0.06 ug/L at EQL 0.05 in the spring of 2002 and total mercury was not detected at DL 0.05 in July 2005 – see Appendix 43. Background data on total mercury concentrations in freshwater from the recently disturbed four hectare quarry site were not detected at DL 0.05 in July 2005 – see Appendix 45. Therefore, considering the low background levels of mercury from freshwater sources and proposed sediment controls, it is extremely unlikely that quarrying basalt rock will contribute to any increase in mercury in the Bay of Fundy.

Metal levels in the basalt rock to be processed at the Whites Point quarry were taken at depths of 5, 33, and 61 m - see Appendix 4. All background concentrations of metal contaminants were within the maximum allowable concentration identified for residential/ parkland land use (Ref. 41). Several metals identified in the "Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health" were not detected in the basalt rock including arsenic and cadmium, others such as chromium, copper, and lead were well below the human health soil quality guideline for residential/parkland land use. It should be noted that not all metals have guidelines identifying maximum allowable concentrations of contaminants. Considering the low background levels of metals in on-site rock resources, and identified metals are within limits of the human health soil quality guideline, it is extremely unlikely that quarrying basalt rock will contribute to any increase in metal contaminants in the Bay of Fundy.

Laboratory analysis of metal levels in the periwinkle tissue by Atomic Spectroscopy from samples collected in the intertidal zone at Whites Cove was conducted by Maxxam Analytics Inc. Many metals were not detected and others generally reflect concentrations of naturally occurring background conditions. Aluminium (41.9 mg/kg), Copper (22.1 mg/kg) and Iron (114 mg/kg) are relatively low. As mentioned previously, the Summary of Existing Canadian Environmental Quality Guidelines – December 2003 have no guidelines for metals in tissue residue.

In conclusion, from a human health perspective it is extremely unlikely that the quarrying of basalt rock will result in increases of contaminants. Analysis of the on-site basalt rock, surface water, and sediments indicate no excessive levels of contaminants presently exist. Also, background studies of various marine organisms indicate contaminant levels are typical for this region. Therefore, it is highly unlikely that there will be any effects on marine receptors from quarrying resulting in human health risks.

9.3.19.3 Mitigation

The primary mitigation measure to control any on-site contaminants from quarry activities entering marine waters, is the on-land environmental control structures and operating procedures. A system of drainage channels and sediment retention ponds are proposed. Also, a closed circuit recycling of aggregate wash water is proposed. The source of the wash water will be from surface runoff collected in the sediment ponds. Disposal of sediments from the ponds will be on-site for future use during reclamation. Reclamation will proceed incrementally to stabilize areas disturbed by quarrying activities and reduce areas susceptible to erosion.

9.3.19.4 Monitoring

Monitoring of outflow from the sediment retention ponds will be conducted as described in the section on Surface Water (**para 9.1.6.4**).

9.3.19.5 Impact Statement

Marine Contaminants – Human Health

Considering the low background levels of metals in on-site rock, and that surface water runoff and sediments from quarry operations will be contained in on-land environmental control structures, and sediments for future use during reclamation will be placed in dyked disposal areas on-site, these precautionary measures will reduce the possibility of contaminants entering the marine environment and effecting marine organisms harvested for human consumption and result in a ***long term, neutral (no) effect, of local scale.***

9.3.20 Human Health – Land Contaminants

9.3.20.1 Research

For the past fifty years or more, land use of the privately owned Whites Point quarry site has been predominately unmanaged forest resource. During the late 1940s and 1950s, a gravel pit was active on the site for extraction of construction materials for building Highway #217. The Whites Cove Road, a public road from Highway #217 to the Bay of Fundy shore was used as a haul road to and from the pit. This is the only known industrial use of the site during this time. Traditional community knowledge indicates some fish shacks and a summer camp occupied an area adjacent to Whites Cove (Elgin Research 2005 **Ref. Vol. IV, Tab 23**). However, after the 1950s, there was little mention of the site. After many years of no maintenance, the Whites Cove Road was upgraded by the present land owners of the surrounding land for community use and enjoyment. Later in 2002, approximately 60 acres of timber on the site was harvested by clear cutting. Today, the Whites Cove Road is again in disrepair due in part to all terrain vehicle use and only accessible to off-road vehicles.

In June 2003, water samples were taken for sediment analysis at a number of stations within the Whites Point quarry area – see **Map 13**. Laboratory analysis for Total Suspended Solids (TSS) for both organic and inorganic components were performed by PSC Analytical see – Brylinsky 2003, **Ref. Vol. II, Tab 12.**

9.3.20.2 Analysis

Past land use of the site, primarily as a forestry resource with little industrial and residential use, indicates that previous use of herbicides or pesticides on the site is highly unlikely. As mentioned, the public Whites Cove Road is presently in need of improvements and is currently eroding and contributing silt and gravel into the Bay of Fundy waters. Total Suspended Solids data in close proximity to the Whites Cove Road indicated TSS of almost four times greater than other sample sites in the immediate area and exceeded the TSS four hectare quarry permit requirement of 50 mg/L (Brylinsky 2003 **ref3**). On-site chemical analysis of soil, rock, and water – see Appendices 4, 38, 42, and 45, indicate low background levels of chemical or metal parameters that could affect human health. Critical parameters are within the guidelines and regulations.

9.3.20.3 Mitigation

Bilcon of Nova Scotia Corporation does not intend to use pesticides or herbicides during quarry construction or operation. Only chemical agents registered for their particular use and their application by licensed persons will be used. The handling of hazardous materials, such as explosives, will be carried out by qualified persons in accordance with provincial and federal

regulatory requirements. No explosives will be stored on site. Diesel fuel, oils, greases, and coolants will be stored on site in spill containment areas. Vehicle fuelling, oil and coolant changing will be done using closed systems with dry break quick disconnect couplings, thereby minimizing spills with effective contamination control. Automatic greasing systems will be used on off-road mobile equipment and use grease that does not contain heavy metals. Also, the use of electricity as the primary power source for operation of the physical plant and ship loading reduces the overall use of fuel, oils, and greases thereby reducing the risk of leaks or spills. Sewage disposal will be by an on-site sewage disposal system designed and maintained in accordance with the NSDOE&L guidelines. Solid waste disposal will be contracted to a local hauler and disposed of in an approved landfill site.

9.3.20.4 Monitoring

Water and air are the most likely pathways for contaminants and will be monitored as discussed in previous sections of this EIS. If unforeseen contaminants affect any part of human food resources, adaptive management will be initiated in consultation with Health Canada or other regulatory agencies.

9.3.20.5 Impact Statement

Land Contaminants – Human Health

Considering the low background levels of metals in on-site soil, rock, and water, the proposed design considerations for spill containment, hazardous material handling, and proposed precautionary measures, the possibility of contaminants entering human food resources is extremely unlikely and would result in a ***long term, neutral (no) effect, of local scale.***

9.3.21 Human Health - Country Foods

Introduction

The Whites Point quarry comprises approximately 380 acres of private land. Public access through the quarry site is presently provided by the Whites Cove Road from Highway #217 to the shore of the Bay of Fundy. The Whites Cove Road has a 66 foot right-of-way and the shoreline along the Bay of Fundy is accessible to the public. For safety reasons, the private lands will not be accessible to the public and will be fenced along the Whites Cove Road right-of-way. As previously stated in this EIS, access to the shoreline will be provided for beach harvesters (e.g. harvesting of dulse and periwinkles)

Fresh water fish habitat does not exist within the active quarry site negating the need for access to fresh water fishing. Hunting and trapping will not be permitted on the quarry site. Considering these factors, the most likely country foods to be harvested on public lands (Whites Cove Road right-of-way and shoreline) would consist of berries, dulse, and periwinkles. Traditional knowledge indicates that berries were harvested and hunting and trapping occurred on the quarry lands of the previous owners. Berry picking and the harvesting of dulse has not recently been observed on the site or adjacent shore. Harvesting of periwinkles was observed in 2002.

9.3.21.1 Research

Using the precautionary approach and to ensure a level of confidence to verify the protection of the health and well being of residents in the area, in the context of consumption of country foods, a site-specific risk assessment was undertaken by Bilcon of Nova Scotia Corporation. The objective of this assessment was to establish pre-construction background levels of contaminants.

In August 2005, samples of edible berries were collected at the Whites Point quarry site to establish baseline metal levels. Dewberry (*Rubus pubescens*), Lowbush Blueberry (*Vaccinium angustifolium*), and Wild Raspberry (*Rubus strigosus*) were collected according to prescribed laboratory procedures. Atlantic Metals in Terrestrial Biota (Tissue) were determined by Maxxam Analytics Inc. The analytical report is contained in Appendix 5. A control, off-site sample of raspberries was also taken and is presently archived in storage at Maxxam Analytics Inc.

Further, in October 2005, samples were collected of periwinkles from the intertidal zone adjacent to the proposed Whites Point quarry to establish baseline metal levels. These samples were collected according to prescribed laboratory procedures and analyzed by Maxxam Analytics Inc. The analytical report is contained in Appendix 31.

9.3.21.2 Analysis

It should be noted that "mining" operations can basically be divided into two groups: metals, which include gold, lead, copper, zinc etc. and non-metals, which include gypsum, salt, sulphur, peat, etc. Also, a third group classified as construction or "quarry" materials which include granite, limestone, sand, gravel, basalt, etc.

The Whites Point quarry project is classified as a quarry and will not produce an ore (a rock containing a high concentration of useful minerals or metals). Therefore, no ore processing such as separation of metal or minerals from the gangue by gravity, magnetic or flotation, or final conditioning or stockpiling gangue will be a part of the Whites Point quarry operation. Since these operations will not take place at the Whites Point quarry, the potential for pollutants and effects on human health are highly unlikely.

As indicated in Chapter 8 – Food Issues in Environmental Impact Assessment (Ref. 50), the contaminants commonly associated with an industrial operation such as a quarry are metals and pH changes. In this regard, water, soil, and air are considered possible pathways from the Whites Point quarry to potential receptors. Potential receptors could be humans who may frequent the public areas to gather and consume country foods.

Production of contaminants of potential concern (COPS) are highly unlikely at an industrial operation such as a basalt rock quarry and marine terminal, either during construction or during operation.

Surface water monitoring has been ongoing since 2002 when the four hectare quarry on the site was cleared and grubbed. Surface water runoff from the four hectare quarry was directed into a sediment retention pond. Monitoring at the outfall of this pond in 2002 , 2003, and 2004 indicates total suspended solids (TSS) and pH did not exceed the thresholds established in the terms and conditions of the permit issued by the Nova Scotia Department of Environment & Labour. Also, all metals were within the CCME guidelines for aquatic life except aluminums which has high naturally occurring levels in this region. Fresh water analysis indicates total mercury was not detected in 2005.

Land sediment analysis of samples taken in the existing sediment retention pond in 2005 indicates no PCBs, PAHs, or oganochlorinated pesticides were detected. Also, all metals were within CCME guidelines except copper. Copper has high naturally occurring levels in this region. Also, background concentrations of metals, at various depths in the bedrock indicated all levels were within CCME guidelines for residential/parkland land use.

Marine sediment analysis of samples taken in nearshore bottom areas indicate no PCBs, PAHs, organochlorinated pesticides or contaminants (metals) exceed CCME guidelines for marine aquatic life. Seawater analysis also indicates total mercury was not detected.

Since the intertidal and nearshore zones are predominately bedrock with little or no sediments, construction of the marine terminal is expected to produce minimal sediments. No dredging or marine disposal is proposed.

Ambient air quality within the Whites Point quarry region generally meets the maximum total suspended particulate (TSP) of 120 $\mu g/m^3$ over a twenty-four hour averaging period. TSP has been the air quality parameter of most concern for quarry operations in Nova Scotia. The Whites Point quarry will be designed to reduce particulates at the source by enclosing most of the rock crushing and screening processes. External sources of particulates (stockpiles and roads) will be controlled by water spray applications as needed.

Contaminants (PCBs, PAHs, pesticides, herbicides or metals) are not expected to exceed CCME guideline levels at the Whites Point quarry and Marine Terminal site during construction or as a result of operations. Processing will involve the crushing of a naturally occurring basalt rock with inherent background characteristics as previously documented. Smelting, refining, or further manufacturing of the basalt rock will not be undertaken at the quarry site. All material extracted from the quarry will be utilized for various sized aggregate and fine sediments will be used during the reclamation process. It is therefore expected that contaminant levels will not exceed water, soil, or air CCME guidelines for an industrial site, and it is highly unlikely that harvestable country foods would be contaminated by quarry construction or operation.

9.3.21.3 Mitigation

Detailed mitigation measures regarding potential pathways (air, water, and soil) for country food contaminants are presented in previous sections of this EIS – see **paragraphs 9.1.8.3, 9.3.18 and 9.3.20**).

9.3.21.4 Monitoring

In addition to monitoring air, water, and soil pathways as presented in previous sections of this EIS, Bilcon of Nova Scotia Corporation proposes to monitor country foods. Every five years, laboratory analysis of the metal content in wild raspberries and periwinkles will be conducted. A report comparing background levels to present levels will be compiled and made available to Health Canada if requested.

9.3.21.5 Impact Statement

Country Foods – Human Health

Since the only processing at the proposed Whites Point quarry involves the naturally occurring basalt rock, and background levels of metals in the rock are within human health soil quality guidelines for residential/parkland land use, and this rock has no acid producing capability, effects on country food gathering and human consumption would result in a ***long term, neutral (no) effect, of local scale.***

9.3.22Soc io-Cultural Patterns

9.3.22.1 Research

The Whites Point quarry and Marine Terminal is located near the village of Little River and within the broader community context of Digby Neck and Islands, Digby County . Socio-cultural activities of area residents were investigated through quantitative and qualitative investigations. A Quality of Life Survey (AMEC 2005 **Ref. Vol. VI, Tab 34**), an Attitude Survey (AMEC 2005 **Ref. Vol. VI, Tab 34**), a Community/Business Consultation Report (Elgin Consulting and Research 2005 **Ref. Vol. IV, Tab 21**), an Individual Consultation Report (Elgin Research and Consulting 2005 **Ref. Vol. IV, Tab 22**), and a Traditional Knowledge Report (Elgin Research and Consulting 2005 **Ref. Vol. IV, Tab 23**).

The Quality of Life Survey was a telephone survey conducted in October 2005. The objective of this survey was to gather additional information on Digby Neck residents' social environment in the community of Digby Neck. AMEC developed the questionnaire and Market Quest Research Group Inc. administered the survey to 150 respondents over 18 years of age living on Digby Neck and Islands – see **Map 29**. The margin of error of the Quality of Life Survey is ±7.3%, 19 times out of 20 or at the 95% confidence level.

The Attitude Survey was also a telephone survey conducted in October 2005. The objective of this survey was to gather information on regional concerns about the Whites Point quarry and Marine Terminal project. AMEC developed the questionnaire in consultation with Mr. Keith Story, a highly regarded social scientist working with Memorial University. ASDE Survey Sampler, Hull, Quebec, randomly selected the telephone numbers ensuring a balanced representation from all communities. Market Quest Research Group Inc. administered the survey to a sample size of 546 with 405 completed surveys. The areas selected – see **Map 7**, were based on the zone of influence of the project based on submissions that were brought forth by residents and interest groups at the public hearings conducted by the Review Panel and those on the Public Registry. Subsequent to the initial survey, a greater focus on Digby Neck and Islands, the immediate community; was conducted to increase the reliability of the results. Thus, an additional 71 telephone surveys were completed in the 834 telephone exchange – see **Map 7**. The sampling for the Attitude Survey provides a high level of reliability: plus or minus 5.0% at the 96% confidence level.

The Community/Business Consultation Report (**Ref. Vol. IV, Tab 21**) was conducted in December 2003 through January 2004. Fifty-two businesses were approached. An initial approach was made by letter, which resulted in very few responses. This was then followed –up with drop-in or telephone interviews. These were one-on-one interviews, held at the interviewees place of business whenever possible or by telephone. In several cases, the interviewee was not willing to meet. The primary objective of this consultation was to catalogue the concerns, problems and the perceptions of the stakeholders with respect to the Whites Point project.

Five open-ended questions were informally presented. In addition to the one-on-one interviews, group presentations/discussions were held with the following groups:

- Fishermen – Whites Cove/Whites Point
- Weymouth Falls Community Development Society (Black Community)
- Bear River First Nation (Aboriginal Community)
- Digby Municipal Council
- Digby and Area Board of Trade
- Crime Prevention Committee

The Individual Consultation Report was conducted in a very casual and informal manner. Contacts with interested individuals consisted of "drop ins" at the Bilcon office and with individuals in the community. In most cases, these contacts were employment related or for general information about the Whites Point quarry. Twenty-five personal consultations within the primary area of Digby Neck and Islands and twenty-nine outside the primary area were conducted.

The Traditional Knowledge Report, was conducted in order to gather information associated with cultural and past economic uses of the community and project site. Bilcon of Nova Scotia Corporation felt it was important to have an understanding of past influences on the community in order to better gauge the potential impacts the quarry may have. Traditional knowledge consultations focused on the "oral history" from older citizens with knowledge of the community of Little River and the Whites Point quarry property. Fifty-seven interviews were conducted in 2005. Since the project has been the subject of strong feelings and some controversy, confidentiality and privacy of the participant was assured and all identities are withheld. These consultations could best be described as "kitchen table" discussions with the participant directing the interview. However, three open ended questions were asked in order to engage discussion. These questions were:

1. What are your memories of the Neck/home community from your childhood to present day?
2. What are your memories of Whites Cove and what influence did it have on the adjacent communities?
3. What is your impression of the proposed Whites Cove project?

The traditional community knowledge consultation provided insight into community patterns of family and community life over past generations. Many of the older citizens described societal changes that have taken place as a result of improved access to the community, technological changes, especially in the fishing industry, and how these changes affected their way of life. The attitude and quality of life surveys provided a quantitative, contemporary, point in time picture of the community and region as influenced by the proposed Whites Point quarry project.

As well, the community/business and individual consultation provided qualitative opinions concerning the proposed project.

Investigations through traditional knowledge indicated major changes have affected the social and work patterns of the community during the past 75 years. These influences include:

- The construction of Highway #217 in the 1950s increased accessibility from the Neck and Islands to the Town of Digby. Prior to the road construction, families on the Neck were self-sufficient and their lives were dependent on the land and sea. This access to Town led to a shift from shopping at the local general store in the villages to shopping at the supermarket. Thus the traditional general store has practically vanished on the Neck as in most of rural Nova Scotia. With this accessibility, behaviour patterns associated with recreation/entertainment have shifted from family picnics and community suppers to movies and eating out at a restaurant as a treat. Access also brought new people – tourists, which some elderly citizens expressed resentment as an intrusioninto their lives.
- Technology in traditional industries, primarily the fishery had profound influences on this primary industry on the Neck. Many blame the increase in the size of boats andincreased efficiency of the gear as contributing factors to the decline and in some minds, the collapse of the fishery which so many on the Neck relied upon for their livelihood. Although not unique to the Neck, other technologies such as refrigerators, radio, television, and computers have changed life in rural areas.
- Many elderly citizens express a feeling of loneliness associated with not having their children or grandchildren close at hand. The downturn in the fishery, many elders believe, was the cause of their children and grandchildren having to move away. Increased mobility, educational opportunities and the lack of viable employment opportunities are all contributing factors to this situation.
- Changes in social structure are evident over time on the Neck. An increasing number of older and retired individuals are now living in the community. In the past, many of the older people would be cared for by their family and continue to live in a family home. Now, some elders lament the fact that they have to live in a seniors home away from their families. They attribute this to the busy life style of the younger generation and many of the children having to work away. Also, there has been a shift in community leadership. Whereas in the early 1900s community leaders were perceived to be the pastor/minister and those well educated such as physicians and teachers, today, leaders are more strongly associated with personal wealth. To this end, the employment opportunities that exist on the Neck are generally controlled by a small number of individuals. As in many rural communities, the position of the church as the centre of the

community has diminished. This is evidenced by the declining number of parishioners and the closing of numerous rural churches. Many of these trends are typical of the Neck, and rural areas in general. To quote from Dr. Jane Murphy (Harvard Public Health Review 2002) in speaking of a rural community, "Its standard of living has risen, its health care delivery improved, and its primary industries declined. Reliance on family and religion is down, and crime and drug use is up".

Realizing community specific data did not exist to fully assess the perceived quality of life of residents on Digby Neck and Islands, Bilcon of Nova Scotia Corporation contracted to have a Quality of Life Survey conducted (AMEC 2005b). The survey instrument and quantification of statistical data are contained in (**Ref. Vol. VI, Tab 34**). The objective of this survey was to gather additional information on Digby Neck resident's social environment and establish baseline data.

9.3.22.2 Analysis

Quality of life can be defined as a physical and psychological human state that gives the feeling of being satisfied in a particular environment (Andre and Bitondo 2001). Quality of life results from a social construct developed over time and is based on a sense of place, experience and expectations. The social construct is forged through perceptions and attitudes relating to quality of life (Andre and Bitondo 2001). Therefore, quality of life varies for each individual.

The quality of life survey asked 150 Digby Neck and Islands residents to rate their overall quality of life. The following results were recorded indicating various levels in perceptions of residents existing quality of life (AMEC, 2005b).

- Excellent – 22.0%
- Very good – 29.3%
- Good – 30.0%
- Fair – 14.7%
- Poor – 4.0%

As can be seen in Table QOL-1, quality of life was rated differently for various age groups. In this Table, no individuals between 18-30 years of age rated their quality of life as excellent, whereas 41% of people aged 51-60 rated their quality of life as excellent.

Table QOL – 1
Rate of Overall Quality of Life in Digby Neck by Age Group (%)
Digby Neck and Islands – 2005

Age Group	Poor	Fair	Good	Very Good	Excellent
18-30 (12)	8.3	8.3	41.7	41.7	0
31-40 (22)	9.1	27.3	27.3	27.3	9.1
41-50 (34)	0	17.6	38.2	26.5	17.6
51-60 (39)	5.1	10.3	25.6	17.9	41.0
61-70 (22)	4.5	13.6	31.8	36.4	13.6
Over 70 (21)	0	9.5	19.0	42.9	28.6
Total (150*)	**4.0**	**14.7**	**30.0**	**29.3**	**22.0**

Source: AMEC, 2005b
*Considering age weighting

In the same survey, the residents were asked to identify the importance of various quality of life factors. As can be seen in Table QOL – 2, the following factors ranked as "really important".

- Healthy environment – 89.7%
- Safe environment – 88.9%
- Access to health care – 88.0%
- Good income and financial security – 84.6%
- Presence of family – 83.6%

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Table QOL - 2 Importance of Factors on Quality of Life

Statement	Don't know/ No answer	Not at all important	Somewhat unimportant	Neither important nor unimportant	Somewhat important	Really important
Access to education	-	12.7	2.5	8.9	8.6	67.3
Access to healthcare	-	-	-	4.1	7.9	88.0
Access to recreational activities	-	4.7	6.9	27.4	22.4	38.6
A strong network of community services	-	.9	.5	9.4	20.3	68.9
A healthy environment	-	-	.5	5.2	4.6	89.7
An environment that is safe	-	-	-	2.5	8.6	88.9
Respect for your culture	-	2.3	1.3	8.5	12.8	75.1
Ability to preserve your culture	-	2.5	0.5	10.4	17.1	69.7
Presence of family	0.5	0.9	1.1	5.5	8.4	83.6
Good income and financial security	-	-	0.5	5.3	9.6	84.6
A network of friends	-	-	-	5.6	14.2	80.1
A good working environment	3.2	8.4	.5	7.7	12.9	67.3
Ability to achieve personal goals	0.5	2.8	2.3	4.4	18.9	71.1

Source: AMEC, 2005

Further in the same survey, the residents were asked to rate how satisfied they were with these factors in their daily life. As can be seen in Table QOL – 3, the following factors were ranked as "very satisfied" in order of importance.

- Network of friends
- Presence of family
- Safe environment
- Healthy environment
- Respect for your culture

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Table QOL - 3 Satisfaction with factors that can have an effect on Quality (%) (2005)

Statement	Don't know/ No answer	Not at all satisfied	Somewhat unsatisfied	Neither satisfied nor unsatisfied	Somewhat satisfied	Very satisfied
Access to education	9.7	1.7	4.4	29.8	28.7	25.7
Access to healthcare	0.5	11.2	11.9	28.5	26.7	21.2
Access to recreational activities	4.9	14.1	26.0	33.3	11.0	10.7
A strong network of community services	3.0	6.7	7.3	30.4	28.2	24.4
A healthy environment	-	0.5	2.8	16.2	24.7	55.8
An environment that is safe	-	3.2	4.4	7.8	28.1	56.4
Respect for your culture	1.5	1.9	0.6	18.9	27.2	49.9
Ability to preserve your culture	1.5	2.5	3.8	18.2	28.4	45.6
Presence of family	0.9	1.4	2.9	11.2	22.3	61.2
Good income and financial security	-	5.9	5.4	18.9	29.1	40.6
A network of friends	-	0.5	1.7	8.3	27.0	62.5
A good working environment	17.8	4.4	4.9	13.7	27.8	31.5
Ability to achieve personal goals	6.7	0.9	8.1	21.8	29.9	32.7

Source: AMEC, 2005

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Social Relations

As a result of interviews and surveys, some indication of social relations among generations are revealed. Traditional knowledge interviews indicated some elderly citizens are dismayed that their children and grandchildren were not nearby. Also, "presence of family" and "good income and financial security" ranked in the top five quality of life factors according to importance. Declines in population on Digby Neck and Islands have been especially dominant in the working age group, which is also the group most likely to have children. Some of this decline is due to a lack of employment opportunities in the community. In this regard, Bilcon of Nova Scotia Corporation is committed to hire local people. Also, it is quite likely that young families that have moved away may return if employment and good income opportunities are available. The quarry can provide financial security to its employees through full-time employment, pension plans, etc., thereby improving some individuals' quality of life.

Access to health care ranked in the top five quality of life factors for residents surveyed on Digby Neck and Islands. In addition to provincial health programs, Bilcon of Nova Scotia Corporation will be providing its employees with supplemental health programs at company expense. These programs will cover health care such as dental plans etc. which are not covered by provincial programs. Thus, the quarry can provide supplemental health programs to its employees thereby broadening accessibility to health care.

Social Capital

Social capital is defined as the characteristics of social organization such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefits (Putman 1995 Health Canada, 2003). Indicators or criteria that can be used to measure social capital are trust, social cohesion, social support, civic engagement, income distribution, and health status (Health Canada, 2003). Of these six indicators for social capital, income distribution and health status are addressed elsewhere in the EIS.

Social cohesion involves the sense of belonging to one's community. In general, people living in rural areas and having lived in their area for longer periods of time exhibit stronger social cohesion. This is evident for residents of Digby Neck and Islands. The quality of life survey asked residents to describe their sense of belonging to their local community. As can be seen in Table QOL – 4, residents 60 years and older expressed "very strong" sense of belonging to their community.

TABLE QOL- 4 - Sense of Belonging to Local Community, by Age Group (%) (2005)

Age group	Very weak	Somewhat weak	Neither weak nor strong	Strong	Very strong
18-30 (12)	-	25.0	16.7	25.0	33.3
31-40 (22)	-	4.5	4.5	59.1	31.8
41-50 (34)	-	.0	17.6	50.0	32.4
51-60 (39)	-	5.1	15.4	41.0	38.5
61-70 (22)	-	9.1	9.1	18.2	63.6
Over 70 (21)	-	4.8	.0	19.0	76.2
Total (150)*	**-**	**6.0**	**11.3**	**38.0**	**44.7**

Source: AMEC, 2005
* Considering age weighting

Overall, all age group respondents rated their sense of belonging as follows (AMEC,**Ref. Vol. VI, Tab 34**).

- Very Strong – 44.7%
- Strong – 38.0%
- Neither weak nor strong – 11.3%
- Somewhat weak – 6.0%

This indicates a fairly high level of social cohesion and could be attributed to the fact that the communities on Digby Neck and Islands are small in size.

A sense of place can also be linked to people's attachment to the local area (e.g. where they have been born, raised, or have experienced valuable times). This value placed on Digby Neck and Islands and in some cases Whites Cove, was evident in some of the traditional community knowledge interviews (Elgin Consulting and Research 2005 **Ref. Vol. IV, Tab 23**), Panel scoping sessions, and the public registry. In some people's opinion, the proposed quarry could disturb that sense of place for those who previously conducted some activities there.

The Digby Neck and Islands population is divided over the quarry project. Some would welcome the employment and others would rather keep the Neck as is. As in the case with large scale projects in rural communities, the reasons for and against a project are numerous and often contentious. This has recently been exhibited by the local opposition to the Hyatt Water Bottling Plant proposed at Gullivers Cove and the Cooke Aquaculture expansion at Mink Cove. Both of these developments are by proponents "from away". In contrast, a quarry at Tiverton, highly visible from Highway #217 and by tourist traffic waiting for the ferry at Petit Passage received no local opposition.

This particular quarry supplied rock for the construction of the Tiverton Harbour project which directly benefits the local community. In some cases when change is not initiated from within a rural area, where people have a higher sense of community cohesion, and when decisions are made outside the community networks, a community can feel a loss of control over their territory.

During the pre-project planning phase of the Whites Point quarry and Marine Terminal, including the environmental assessment/Panel Review, disruption of the communities' social cohesion has been evident. Individuals with different objectives are interacting and discussing potential effects of the project. Therefore, the pre-project planning phase and the environmental assessment will temporarily create an adverse effect on social cohesion. However, the project activities (construction and operation) which are on private land, "are not expected to have an adverse effect on social cohesion" (AMEC 2005 **Ref. Vol. VI, Tab 34**) as it relates to social capital.

Other than an occasional comment of mistrust of tourists expressed in the traditional knowledge interviews, no direct commentary concerning seasonal and full-time residents was expressed. Even though a direct question concerning this was not asked in the quality of life survey, a question regarding people's trust in each other and in institutions was asked. As can be seen in Table QOL – 5, trust levels regarding people's trust in each other and the provincial government was fairly low. Trust levels in the federal government were very low.

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TABLE QOL - 5 Agreement on Statement of Trust (%) (2005)nor

Statement	Don't know/ No answer	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
Most people can be trusted	-	4.5	4.8	32.9	28.1	29.7
The federal government acts in everybody's best interest	3.1	35.1	20.5	27.5	12.3	1.4
It's best to be careful when dealing with people	-	1.6	4.2	18.0	29.2	46.9
The Nova Scotia government acts in people's best interests	-	23.4	23.6	28.1	21.7	3.1

Source: AMEC, 2005

Social organization as being part of social networks provides various benefits to individuals including exchange of information and emotional support (Statistics Canada 2004). Results from the quality of life survey indicated residents of Digby Neck and Islands spend the highest percentage of social contact with close family or other relatives and with friends. Table QOL – 6 indicates responses regarding social contacts.

TABLE QOL - 6 Social Contacts (%) (2005)

Statement	Each Week	Once or twice a month	A few times a year	Never
Spending time with close family or other relatives	75.4	13.0	9.7	1.9
Spending time with friends	82.5	12.8	4.2	.6
Spending casual time with co-workers or colleagues	32.8	15.0	8.2	44.0
Spending casual time with people in in recreational and community activities	31.9	28.4	22.6	17.0

Source: AMEC

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Involvement in organizations, political or religious activities is an indicator of civic engagement (Statistics Canada 2004). In this regard, the quality of life survey (AMEC, 2005b) reported almost a 50 –50 split of those residents involved in volunteer and/or service organizations. This level of volunteerism in organizations is somewhat lower than the 61% of Canadians belonging to organizations in 2003 (Statistics Canada 2004).

Most individuals on Digby Neck and Islands maintain good social networks. Again, it is expected that pre-project planning, including the environmental assessment/Panel Review will temporarily have an adverse effect on some individuals' networks because of conflicting interests (for or against the project). However, in the long term "it is not expected that the project activities will have an effect on social support and individual networks" (AMEC 2005 **Ref. Vol. VI, Tab 34**). A greater level of volunteerism may be evident as a result of new people employed at the quarry wishing to become active in community organizations.

Commercial

Detailed research, analysis, mitigation, monitoring and predicted effects on harvested resources (fishery, forestry, and agriculture) are presented in **paragraph 9.2**. Similar details for tourism are presented in **paragraph 9.3**. Insignificant negative effects are predicted to occur during the lobster fishing season in the vicinity of the marine terminal. Neutral (no) effects are predicted to occur on harvesting in the intertidal zone. The remainder of the quarry lands is in private ownership and only land uses associated with the quarry are planned. Insignificant negative effects are predicted to occur on the tourism industry from visual disruption when the quarry is viewed from the water.

Environmental

The most important factor contributing to their quality of life expressed by the residents of Digby Neck and Islands was a "healthy and safe environment". Throughout public consultation, public hearings, and commentary on the Public Registry, concerns about environmental degradation have been a major concern expressed by the public. Assessment of environmental components such as water quality, air quality, noise, and aesthetics as a result of quarry operations are detailed in **paragraphs 9.1, 9.2 and 9.3** . Neutral (no) or insignificant negative effects are predicted for these environmental components.

Individual needs and perceptions are different among individuals, and inherently subjective in nature. As indicated above, the residents of Digby Neck had different perceptions of their quality of life. What is acceptable to one person, may not be acceptable for someone else. Even with environmental components being within regulatory standards, regulations, or guidelines, effects of quarry operations could impact some individuals' quality of life. This may be especially true for noise levels and aesthetics.

Investigations of comparable quarry projects indicated an environmental component such as noise from quarry operations at Sechelt, British Columbia were generally considered to be "background noise". For the most part, quarry operations sounds are masked by other common daily noises such as road noise or wind or waves crashing on the shore. Issues that were raised at comparable quarry projects such as at Sechelt, Hantsport, and the Strait of Canso was visible dust and noise. These issues were commonly dealt with and resolved by communication with quarry operators.

9.3.22.3 Mitigation

Noise and dust are the most common citizen complaints raised by neighbours of quarry operations. Even though noise and dust control will be primary considerations and be maintained within regulatory requirements, mitigation measures are proposed. To insure adjacent property owners concerns are resolved, public participation is proposed to continue during construction and operation of the quarry. Bilcon of Nova Scotia Corporation intends to re-establish the Community Liaison Committee (CLC) that was established as a result of the permitting of the 4 hectare quarry at the Whites Point site in 2002. In this regard, a neighbour adjacent to the quarry property will be invited to participate on this committee and be involved with a complaint process to be established by Bilcon so that public concerns regarding environmental matters are addressed in a timely manner and to resolve any quality of life effects.

Continuing efforts will be made by Bilcon of Nova Scotia Corporation to meet with interested groups and individuals during the pre-project planning/environmental assessment phase of the project. The intent will be to provide information about the project, the opportunities of the project, involve the community in the project, and to resolve any outstanding issues.

9.3.22.4 Monitoring

Environmental components such as water quality, air quality, and noise will be monitored as outlined in **paragraphs 9.1.3, 9.1.8, 9.1.9, 9.1.10, 9.1.11.**

9.3.22.5 Impact Statements

Quality of Life – Social Relations

Increased health programs, income and financial security and presence of family opportunities for employees will all result from quarry construction and operations resulting in a ***long term, insignificant positive effect, of community scale.***

Social Capital – Pre-project Planning

Differences of opinion about the project among residents of the community presently exist creating a disruption of social cohesion resulting in a ***short term, insignificant negative effect, of community scale.***

Social Capital – Life of Project

Once a decision of whetherr or not to proceed with the project is made, project activities (construction and operation) are not expected to disrupt social capital indicators (trust, social cohesion, social organization, or civic engagement) resulting in a ***long term, insignificant positive effect, of community scale.***

Commercial Patterns

Nearshore fishing patterns will experience some inconvenience as a result of the marine terminal and shipping activities as well as some visual degradation if tourism cruises venture along this section of Digby Neck coastline resulting in a ***long term, insignificant negative effect, of community scale.***

Quality of Life – Environmental

Perceptions of quality of life vary among individuals and what may be acceptable to one person may be unacceptable to another even though quarry activities are within regulatory requirements resulting in a ***long term, insignificant negative effect, of local scale.***

9.3.23 Education, Training and Skills

9.3.23.1 Research

The fixed and mobile equipment for the project will be modern and state of the art. This will mean that, while experience is an essential asset, upgrading will almost certainly be required for all employees.

For the electrical and welding trades, a journeyman status will be required for employment. A significant portion of the training program for these trades will be accomplished during the construction and fitting-out process by working with the subcontractors during this period. The tradesmen will thus be familiar with the drawings, equipment details, and operational protocols by being hands-on involved in the construction and testing of the equipment. It will, however, be necessary to provide the electrician with the training for the maintenance of the computer system which will control the crushing process and this will be arranged by Bilcon with the supplier of the system.

For the mobile equipment mechanics, a journeyman status will be a requirement and experience in the type of equipment to be used will be seen as an advantage. For specific upgrading on the site equipment, the mechanics will be enrolled in the equipment manufacturers training program at Bilcon's expense.

For the crusher equipment, experience will be required and an on-site training program will be conducted by the Operations Manager.

For mobile equipment operators, some experience will be required on heavy equipment but all operators will be upgraded for the specific equipment at Bilcon's expense.

For the Environmental and Occupational Health and Safety position, a fully-qualified and experienced person will be sought, since responsibilities will be in place from day one of operations.

All on-site staff will receive safety and occupational health training on an initial and ongoing basis in accordance with regulations and corporate policy (for example: Fall Protection, Workplace Hazardous Materials Infomation System (WHMIS), First Aid, Cardiopulmonary Resuscitation (CPR). These courses are available in the local areas (Digby) and in some cases, on site.

Programs are generally available for trades at both Middleton and Yarmouth Campuses of the Nova Scotia Community College (NSCC), in addition to the remote campus in Digby. However, for mobile equipment operators, the programs are available at both NSCC and at the Dexter Institute.

9.3.23.2 Analysis

As noted elsewhere in this report, one of the reasons for selecting Whites Cove was the availability of a trained or at least partially-trained work force. As of 1998, there were 87 identified quarry sites in Digby County (source WVDA), although many are inactive; and in 2003, there were 1171 permitted quarries in Nova Scotia (source NSDEL). The general skills for a quarry operation are clearly available in Digby County and Nova Scotia as a whole. Further, although no job applications have been solicited by Bilcon, 148 applications have been submitted to the Digby office indicating significant interest in the positions available, which were made available through the CLC.

A breakdown of applications submitted to date shows the following areas of interest:

Labourer	57
Truck Trade qualification	29
Office	22
Heavy Equipment Certification	11
Heavy Equipment with Crane Certification	2
Welder (Journeyman)	8
Forestry Certification	4
Environmental Biology & Environmental Management	3
Electrical Trade Certification (Journeyman)	3
Journeyman Mechanic	3
Auto Mechanic with Heavy Equipment Operation	2
Carpenter	2
Heavy Equipment Mechanics Certification	1
Heavy Equipment and Welder	1

The upgrading of skills for specific equipment will be the challenge and Bilcon will primarily carry this out on-site or with the assistance of specific equipment suppliers.

As far as timing and duration of training activities, these will vary from perhaps four months for electricians and welders being trained during construction operations to several days for WHMIS, CPR, and other safety courses. All personnel will have received the training necessary to perform the specific job in a safe and efficient manner before their first shift. This is critical not only from a safety and occupational health perspective, but from an efficiency and protection of assets basis. In addition, training will be ongoing for all personnel throughout the life of the project.

9.3.23.2.1 Extent to Which Skills of Available Workers Match the Job Requirements

Although no advertising for quarry positions has taken place, a listing of jobs available with typical wage rates was released to the CLC, and applications have been submitted over the past three years. To this date, 148 applications are on file at Bilcon's Digby Office.

These applications have been reviewed to determine what skill levels are available in the local area, since it is the stated policy of Bilcon to hire in the local area. This review leads the Proponent to believe that, with training, all positions, with the exception of the senior environmental and occupational health position, can be filled from the local area. It is possible that this exception can be overcome with advertising in the local area. The policy with respect to training is set out in in this section.

Subcontractors used in the construction phase will be engaged in the local area where possible, and priority will be given to local subcontractors.

Impacts of Project Employment on the Local Economy

See 9.3.9.2 Construction and Operation

9.3.23.3 Mitigation

None Proposed

9.3.23.4 Monitoring

The Operations Manager will be responsible for all hiring and the stated corporate policy is to hire locally, where possible, and train, where necessary. An annual review will be carried out to assess the success of this strategy.

9.3.23.5 Impact Statement

Education, Training and Skills

Bilcon is committed to a local hiring policy with training provided for all employees at Bilcon's expense over the life of the project. This training will be portable and will ***result in a long-term, insignificant positive impact of regional scale.***

9.3.24In frastructure and Institutional Capacity

9.3.24.1 Research

Baseline of Existing Services and their Capacity to Meet New Needs

Fire services

Fire Departments on Digby Neck, the Islands, and Digby were interviewed as to their existing capacity (Elgin Consulting and Research, **Ref. Vol. IV, Tab 22**).

- **Digby Neck Fire Department (Sandy Cove)** – This Department does not have sufficient volunteer resources and are undertaking a personnel drive. The Department is barely able to manage flood calls and would have great difficulty in responding to a major fire. They do have a mutual aide agreement with Tiverton, Digby, and Freeport, but Digby and Tiverton are 30 minutes away and Freeport longer still.

- **Tiverton Fire Department** – This Department has 19 volunteers which is seen as adequate but they have some equipment concerns.

- **Freeport Fire Department** – This Department has an adequate number of volunteers but at the present time their building is being replaced due to structural issues.

- **Digby Fire Department** – This Department has adequate equipment and a good volunteer base (47).

All fire departments noted a concern during lobster season as a number of volunteers are fishermen. The main concern raised was the possibility of forest fires in the large clear cut areas on Digby Neck.

The issue of volunteers on Digby Neck is seen as stemming from the out-migration of younger people due to the decline in the fishery and the absence of new industry to keep displaced fishermen on the Neck.

Waste Service

There is a private C&D site just outside the Town of Digby. Industrial producers of waste pay dumping fees and the operators indicate that they have adequate capacity to handle further volume.

EMO Fundy Ground Search and Rescue

This organization has an adequate volunteer base. The current search masters, John Ivens and Mac Bishop, together with the President, Clifton Moore, see the development of an access road to the Fundy Shore at Whites Cove as a positive. At this time, any ground search and rescue on the Fundy Shore is difficult due to the poor state of the Whites Cove Road. The organization also noted that there is no Helipad on the Neck for emergency airlift.

Ferry Services

The ferry services between East Ferry and Tiverton and Freeport and Brier Island have adequate capacity and would only be impacted by workers living on the Islands.

EHS Expanded Capacity Program

The main concern of EHS is site access and since all quarry roads will be fully maintained, this is not an issue. The organization presently has sufficient capacity to deal with a quarry activity.

Health Services

Digby General Hospital is a twenty-bed facility with full emergency capacity. Six physicians rotate on coverage with support from locums. However, as with most rural areas of Nova Scotia, there is a physician shortage and this has lead to the closure of the emergency room on some occasions. The hospital is also equipped with diagnostic labs for x-ray, ultrasound, and blood work. Other services covered are palliative care, physiotherapy, a specialist clinic, home care, hospice society, VON offices, alcohol and drug dependency, and dieticians. The third floor of the hospital is an eighteen-bed Senile Dementia nursing home facility affiliated with the Tideview Terrace complex adjacent to the hospital. The Digby Hospital no longer has obstetrics or surgery facilities.

In 2000, the NSDOH , through Emergency Medical Care, established the Expanded Capacity Island Health Initiative, the first of its kind in North America. Paramedics were given additional training within their scope of practice to assume Primary Care functions associated with wellness and injury. A nurse practitioner (NP) was added to the program in 2002. The NP working in collaboration with off-site physicians can review prescriptions, conduct regular physicals, and provide treatment for most non-critical/ acute medical needs. The service is also involved in immunization, well baby, well elderly, public health, occupational health and safety, injury care, flu and cold care, and health promotion programs. Bilcon has supported the Annual Health Fair on two occasions. Secondary care in the area is provided at Yarmouth Regional Hospital, Valley Regional Hospital in Kentville, and Soldiers Memorial Hospital in Middleton. Tertiary care is provided at the QE II Hospital in Halifax.

Rehabilitation

In the event of an industrial accident involving long-term supportable physical rehabilitation, the Nova Scotia Rehabilitation Centre in Halifax is the only site in Nova Scotia.

Mental Health Services

There are in-patient units at the Yarmouth Regional Hospital and the Valley Regional Hospital, and there is an out-patient clinic in Digby. Long-term psychiatric rehabilitation is provided by Kings Regional Rehabilitation Centre in Waterville.

Schools

Schools in Digby County have experienced a 27% decline in enrollment over the last decade (Nova Scotia Department of Education). Digby Elementary, Digby High, Digby Neck Consolidated, and Islands Consolidated Schools (administratively includes Westport Village School) were all constructed to provide education to more students than are currently enrolled. There is adequate capacity to handle any influx due to quarry employment.

9.3.24.2 Analysis

A quarry project supplying the local market can have a significant effect on infrastructure and particularly the roads. Heavy truck traffic can significantly shorten the life expectancy of the road structure causing a financial burden on the Provincial Government through increased maintenance. The Whites Point project will increase traffic to some extent during the construction phase, but it is anticipated that the majority of heavy equipment will be brought in by ship. Further, there will be no delivery of crushed product to the local market and, hence, no significant increase of heavy truck traffic during the operational phase. No significant effect on road infrastructure is anticipated.

The Whites Point project will require a significant quantity of electricity which will necessitate upgrading the supply line from Digby to Little River. The Proponent will be required by Nova Scotia Power Inc. to fund this upgrade and the upgrade itself will be of positive benefit to residents of Digby Neck.

Given the relatively small workforce anticipated during the operational phase of the project, and the fact that the majority will be hired in the local area, no increase in institutional capacity is anticipated.

Incremental Costs to Government Resulting from the Project

As noted elsewhere in this report, the Proponent has made no application for government assistance at either the Municipal, Provincial, or Federal levels. It is the Proponent's intent to fund the construction, operations, training, and reclamation programs totally from its own funds.

It should also be noted that as cited in the introduction, the cost of the Panel Review process is wholly recoverable by the senior levels of government and the Proponent has been contributing incrementally in this regard.

It is acknowledged that some costs are borne by the senior levels of government and are not recoverable from the Proponent, for example, the funding set aside to assist the public to participate in the assessment process. This is, however, more than offset by the taxes generated by the project for government at all levels. Reference to the report prepared by Gardner Pinford **(Ref. Vol. VI, Tab 32)** shows that taxes received by government are estimated to be at the following levels:

1) Construction Activity

Federal Tax Revenue	$2.0 Million
Provincial Tax Revenue	$1.6 Million

2) Operational Activity

Annual Federal Tax Revenue	$1.0 Million
Annual Provincial Tax Revenue	$0.8 Million
Annual Municipal Tax Revenue	$0.4 Million

Measures Proposed to Reduce the Financial Burden Caused by the Project on Infrastructure and Institutional Capacity

As noted above, the Proponent has made no application for financial assistance to any level of government for any phase of the project. All infrastructure costs, including the upgrading of the Whites Cove road, should this be determined to be the primary access point to the quarry, will be funded by the Proponent. There is, therefore, no anticipated financial burden on infrastructure.

With respect to institutional capacity, it will be the policy of the proponent to hire the workforce in the local area and judging by the number of job applications received, it would appear that this is possible. There will, therefore, be no significant influx of workers into the area requiring housing, schools, and other services.

It is Bilcon's intent to provide basic fire-fighting and first-aid services on site. There may be occasions when external assistance is required, but this will be infrequent and there is sufficient capacity in the local area to handle any service requirement.

Portions of the required infrastructure for the project may result in enhanced services in the local area. For example, the power supply to the Little River area will need to be upgraded to provide the necessary capacity for the quarry operation and all residents of Digby Neck would benefit from this upgrading.

A quarry project supplying the local market can have a significant effect on infrastructure and particularly the roads. Heavy truck traffic can significantly shorten the life expectancy of the road structure causing a financial burden on the Provincial Government through increased maintenance. The Whites Point project will increase traffic to some extent during the construction phase, but is anticipated that the majority of heavy equipment will be brought in by boat. Further, there will be no delivery of crushed product to the local market and, hence, no significant increase of heavy truck traffic during the operational phase. No significant effect on road infrastructure is anticipated.

The Whites Point project will require a significant quantity of electricity which will necessitate upgrading the supply line from Digby to Little River. The Proponent will be required by Nova Scotia Power Inc. to fund this upgrade and the upgrade itself will be of positive benefit to residents of Digby Neck.

Given the relatively small workforce anticipated during the operational phase of the project, and the fact that the majority will be hired in the local area, no increase in institutional capacity is anticipated.

9.3.24.3 Mitigation

None Proposed

9.3.24.4 Monitoring

Follow-up with local providers of services will be carried out on an annual basis to determine whether the quarry operations are affecting the provision of services.

9.3.24.5 Impact Statement

Infrastructure and Institutional Capacity

Little or no additional burden on local services is anticipated and some upgrades may be necessary by Bilcon (for example the power supply) which may improve capacity resulting ***in a short term neutral (no) impact, of regional scale.***

Incremental Costs to Government Resulting from the Project

Since Bilcon would not seek public funds for any aspect of the project and tax revenues will be substantial, ***there will be a significant positive impact on a local scale and an insignificant positive impact on a regional and national scale.***

9.3.25 Other Undertakings in the Area

The Digby Neck and Islands have historically evolved around the primary fishing activity and the fish processing industry. As a result, most development has centered on this industry on land and in the marine environments. Two fish processing plants are located in Little River approximately 2.5 km from the quarry site. For a listing of industries by category see **Table E - 1.** Small harbours are located along the Bay of Fundy and Saint Mary's Bay with varying degrees of facilities. A new harbour at Tiverton was recently constructed. The location of existing businesses and services on Digby Neck are shown on **Maps 6A and 6B.**

More recently, the tourism industry has experienced minimal development of ecotourism attractions such as the Balancing Rock Trail in Tiverton. Also, a Discovery Centre at Freeport is presently in the planning stages which would provide an additional ecotourism attraction. Presently, the primary ecotourism attraction is whale watching and adventure tour cruises which operate from existing wharves or other structures.

Limited marine and land undertakings are occurring in this area. Land development such as subdivision and housing construction is limited. Between 1996 and 2001 only 25 housing units were constructed on Digby Neck and Islands. Evidence of past forestry clear-cutting is evident along Digby Neck. Forestry is the primary resource land use as the majority of past agricultural land use has been abandoned. Two small basalt rock quarries have been in operation in the Digby Neck area supplying rock for local demand. The rock quarry at Tiverton supplied rock for the Tiverton Harbour Project and the quarry at Seabrook supplies rock for local construction of roads and other uses. Other small sand and gravel pits exist along Digby Neck supplying products for local use.

Few new industrial developments are planned for Digby Neck. A land-based aquaculture facility at West Mink Cove has recently expanded and presently has a water-based site under going regulatory approval. Another planned industry at Gullivers Cove, a water bottling plant, has recently withdrawn its regulatory application for a water withdrawal permit. Many local wharves are in need of maintenance, however, declining use of these facilities makes justification of repairs difficult. In general, land and water based development at the present and in the future is apparently not in an expansionary mode in the community of Digby Neck. Little ongoing or proposed future development reduces the possibility of developmental cumulative effects in conjunction with the proposed Whites Point quarry and Marine Terminal project.

In a broader county or regional spatial context, the proposed quarry and marine terminal development at Whites Point is not anticipated to be incremental to other similar undertakings. No similar undertakings are known to be planned in the near future. Competition with other quarries or marine development is not expected since the Whites Point quarry is an export product operation. Also, the marine terminal is dedicated to shipments of products from the quarry. A more detailed analysis of possible direct cumulative effects resulting from development of the Whites Point quarry and Marine Terminal is contained in **Chapter 10.**

9.4 Summary Table of Impacts

The following **Table 2** presents a Valued Environmental Component Impact Summary for the Whites Point quarry and Marine Terminal project.

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Valued Environmental Component Impact Summary

Whites Point Quarry and Marine Terminal
Environmental Impact Statement

Table 2, Part 1

	Time		Type/Significance of Effect					Scale			
	Short Term	Long Term	Significant Positive	Insignificant Positive	Neutral	Insignificant Negative	Significant Negative	Local	Regional	Provincial	National/International
Physical Environment											
Climate - Greenhouse Gas		◕				●			R		
Geology - Basalt rock		◕				●		L			
Hydrogeology - Residential Well Water Yield		◕			●			L			
Hydrogeology - Residential Well Water Quality		◕			●			L			
Surficial Geology and Soils		◕		●				L			
Little River Watershed		◕			●				R		
On-site Surface Water Drainage - Wetlands		◕			●			L			
On-site Surface Water Drainage - Quality		◕			●			L			
Physical Oceanography - Turbidity	◔					●		L			
Physical Oceanography - Tides and Currents		◕				●		L			
Air Quality - Particulate Emmissions		◕			●			L			
Noise and Vibration - Blasting		◕			●			L			
Noise and Vibration - Processing Plant		◕			●			L			
Noise and Vibration - Shiploading		◕			●			L			
Light - Night		◕				●		L			

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Valued Environmental Component Impact Summary

Whites Point Quarry and Marine Terminal
Environmental Impact Statement

Table 2, Part 2

	Time			Type/Significance of Effect					Scale			
	Short Term	Long Term	Significant Positive	Insignificant Positive	Neutral	Insignificant Negative	Significant Negative		Local	Regional	Provincial	National/International
Biological Environment												
Terrestrial Ecology - Habitat Alteration		◕				●			L			
Terrestrial Ecology - Habitat Diversity		◕		●					L			
Terrestrial Floral Species at Risk		◕	●								P	
Terrestrial Vertebrate Species at Risk		◕				●			L			
Terrestrial Odonata Species at Risk		◕		●					L			
Terrestrial Lepidoptera Species at Risk		◕				●			L			
Terrestrial Wetlands		◕		●					L			
Migratory Land Birds		◕				●			L			
Aquatic Ecology - Freshwater Fish Habitat		◕			●				L			
Aquatic Ecology - Marine Intertidal Habitat	◔					●			L			
Aquatic Ecology - Marine Intertidal Habitat		◕			●				L			
Aquatic Ecology - Marine Nearshore Habitat	◔					●			L			
Aquatic Ecology - Marine Nearshore Habitat		◕			●				L			
Marine Mammals and Waterbirds - Nearshore		◕				●			L			
Fish - Endangered (Inner Bay of Fundy Salmon)		◕			●							N

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Valued Environmental Component Impact Summary

Whites Point Quarry and Marine Terminal
Environmental Impact Statement

Table 2, Part 3

	Time		Type/Significance of Effect						Scale			
	Short Term	Long Term	Significant Positive	Insignificant Positive	Neutral	Insignificant Negative	Significant Negative		Local	Regional	Provincial	National/International
Fish - Threatened and Special Concern		◕			●							Ⓝ
Waterfowl - Special Concern		◕			●							Ⓝ
Marine Reptiles - Endangered		◕			●							Ⓝ
Blasting - Fish Habitat		◕				●			Ⓛ			
Blasting - American Lobster		◕				●			Ⓛ			
Blasting - Marine Mammals		◕				●			Ⓛ			
Blasting - Marine Mammals - Species at Risk		◕				●						Ⓝ
Blasting - Waterbirds		◕				●			Ⓛ			
Ship Interactions - North Atlantic Right Whale Conservation Area		◕			●							Ⓝ
Ship Interactions - North Atlantic Right Whale Nearshore		◕				●						Ⓝ
Ballast Water		◕			●					Ⓡ		
Noise and Vibration Marine		◕				●			Ⓛ			
Human Environment												
Heritage Resources - Marine Archaeology	◔				●				Ⓛ			
Heritage Resources - Land Archaeology		◕			●				Ⓛ			

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Valued Environmental Component Impact Summary

Whites Point Quarry and Marine Terminal
Environmental Impact Statement

Table 2, Part 4

	Time			Type/Significance of Effect					Scale			
	Short Term	Long Term	Significant Positive	Insignificant Positive	Neutral	Insignificant Negative	Significant Negative		Local	Regional	Provincial	National/International
Heritage Resources - History		◕				●			Ⓛ			
Heritage Resources - Heritage Properties		◕			●					Ⓡ		
Aesthetics - Highway #217		◕			●					Ⓡ		
Aesthetics - Bay of Fundy		◕				●				Ⓡ		
Economy - Quarry Construction Employment	◔		●							Ⓡ		
Economy - Quarry Construction GDP	◔			●							Ⓟ	
Economy - Quarry Operation Employment		◕	●							Ⓡ		
Economy - Quarry Operation GDP		◕		●							Ⓟ	
Economy - Quarry Operation Tax Revenue		◕		●							Ⓟ	Ⓝ
Economy - Quarry Operation Mun. Tax Revenue		◕	●							Ⓡ		
Economy - Fishery - Aquaculture		◕			●					Ⓡ		
Economy - Fishery - Intertidal		◕			●					Ⓡ		
Economy - Fishery - Nearshore		◕				●			Ⓛ			
Economy - Tourism		◕				●				Ⓡ		
Economy - Land Value		◕				●			Ⓛ			
Recreation		◕			●				Ⓛ			

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Valued Environmental Component Impact Summary

Whites Point Quarry and Marine Terminal
Environmental Impact Statement

Table 2, Part 5

	Time		Type/Significance of Effect					Scale			
	Short Term	Long Term	Significant Positive	Insignificant Positive	Neutral	Insignificant Negative	Significant Negative	Local	Regional	Provincial	National/International
Socio-Cultural - Quality of Life - Social Relations		●		○					R		
Socio-Cultural - Social Capital - Pre-project	◔					○			R		
Socio-Cultural - Social Capital - Life of Project		●		○					R		
Socio-Cultural - Commercial Patterns		●				○			R		
Socio-Cultural - Quality of Life - Environmental		●				○		L			
Community Infrastructure		●			○				R		
Community Institutional Capacity		●			○				R		
Education Training and Skills		●		○					R		
Transportation - Land - Construction	◔					○			R		
Transportation - Land - Operation		●			○				R		
Transportation - Marine - Construction and Operation	◔	●				○		L			
Human Health - Offsite Drinking Water Quality		●			○			L			
Human Health - Onsite Drinking Water Quality		●				○		L			
Human Health - Marine Contaminates		●			○			L			
Human Health - Land Contaminates		●			○			L			
Human Health - Country Foods		●			○			L			

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Whites Point Quarry and Marine Terminal
Table ECM - 2 SUMMARY TABLE
Environmental Component Follow-up Monitoring

Environmental Component	Project Phase		Frequency	Description/EIS Paragraph	Regulatory Requirement
	Construction	Operation			
Noise & Vibration					
Blasting - Land	Yes	Yes	Weekly	•Concussion and ground vibration measurements at 3 land monitoring stations **(para. 9.1.9.4)**	Yes-NSDEL
Plant Operations - Land	No	Yes	Daily	•Sound level measurements at property line **(para. 9.1.10.4)**	Yes-NSDEL
Light					
Night Light	Yes	Yes	Monthly	•Visual observations by a CLC member **(para. 9.1.12.4)**	No
Biological Environment					
Terrestrial Ecology					
Flora Species at Risk					
Glaucous Rattle-snake Root	Yes	Yes	Annually	•Visual population appraisal and photographic documentation **(para. 9.2.1.4)**	No
Mountain Sandwort	Yes	Yes	Annually	•Visual population appraisal and photographic documentation **(para. 9.2.1.4)**	No
Hemlock Parsley	Yes	Yes	5 Years	•Visual population appraisal and photographic documentation **(para. 9.2.1.4)**	No
Invasive Plants	No	Yes	5 Years	•Visual population appraisal and photographic documentation **(para. 9.2.1.4)**	No
Vertebrate Fauna	No	Yes	5 Years	•On-site vertebrate survey including a breeding bird survey **(para. 9.2.1.4)**	No
Odonata/Wetlands	No	Yes	5 Years	•Visual odonata population appraisal and wetland habitat appraisal **(para. 9.2.1.4)**	No
Lepidoptera	No	Yes	5 Years	•Visual lepidoptera and host plant appraisal **(para. 9.2.1.4)**	No
Aquatic Ecology					
Marine Intertidal Zone	Yes	No	Monthly	•Visual monitoring and turbidity measuremnts if required during marine construction **(para. 9.2.3.4)**	No
Coastal-Nearshore	Yes	No	Daily	•Visual monitoring and turbidity measuremnts if required during marine construction **(para. 9.2.4.4)**	No
Fish Habitat Compensation	No	Yes	Annually - 5 yrs	•Video documentation of pre & post compensation conditions, biological sampling **(para. 9.2.4.4)**	Yes-DFO
Fish and Fish Habitat-Blasting	Yes	No	Initial Blast	•Peak pressure and ground vibration at 3 stations in marine environment **(para. 9.2.9.4)**	Yes-DFO
Marine Mammals-Blasting	Yes	No	Initial Blast	•Peak pressure & ground vibration at 3 stations in marine environment **(para. 9.211.4)**	No
Marine Mammals-Blasting	Yes	Yes	Initial Blast	•Noise measurement and video documentation of seal colony at Crowells Cove **(para. 9.2.11.4).**	No
Noise and Vibration-Marine	Yes	Yes	Weekly	•Noise and vibration in water column at marine terminal **(para. 9.2.15.4)**	No

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Whites Point Quarry and Marine Terminal
Table ECM - 2 SUMMARY TABLE
Environmental Component Follow-up Monitoring

Environmental Component	Project Phase		Frequency	Description/EIS Paragraph	Regulatory Requirement
	Construction	Operation			
Human Environment **Heritage Resources** Land Archaeology	Yes	Yes	NA	•Visual investigation if land disturbances within 250m of Hersey house foundation **(para. 9.3.2.4)**	Yes - NS Museum
Aesthetics Reclamation	Yes	Yes	5 years	•Inspection of environmental preservation zone and reclamation procedures **(para. 9.3.6.4)**	No
Transportation Marine	Yes	Yes	Annually	•Lobster fishermen monitor trap or gear loss resulting from shipping activities **(para. 9.3.8.4)**	No
Fishery Intertidal	Yes	Yes	Daily	•Registration at the quarry office when harvesting in the coastal zone **(para. 9.3.12.4)**	No
Nearshore	Yes	Yes	Daily	•Recording of frequency and duration of vessels at marine terminal **(para 9.3.13.4)**	No
Tourism Bay of Fundy	Yes	Yes	Monthly	•Tourism representative to participate on Community Liaison Committee **(para. 9.3.14.4)**	No
Recreation Outdoor	Yes	Yes	Daily	•Registration at the quarry office when accessing the coastal zone **(para. 9.3.16.4)**	No
Human Health Drinking Water Quality Country Foods	Yes No	Yes Yes	Annually 5 years	•Chemical, physical, and bacteriaology parameters **(para. 9.3.18.4)** •Metal content in periwinkles and wild raspberries **(para. 9.3.21.4)**	Yes - HC No

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11.0 ENVIRONMENTAL MANAGEMENT

Corporate Philosophy

The Proponent commits to the highest of standards in all aspects of its operations, including environmental protection, health, and safety. The company undertakes to act responsibly as a steward of the resources and work for the wellbeing of its employees and the community in which it operates.

The Proponent will:

- Carry out training programs for all its employees to ensure that they have the skills to maintain an environmentally safe and a healthy and injury-free workplace;
- Implement site-specific health, hygiene, safety, environment and emergency response policies, management programs, and practices;
- In all quarry and marine terminal activities, minimize risks to the environment, health, and safety and ensure compliance with the requirements of all regulatory authorities;
- Require all contractors and subcontractors to adhere to practices consistent with Bilcon's environmental, health, and safety programs;
- Maintain a monitoring program to ensure compliance with this policy and laws and regulations; and
- Communicate regularly with the public, employees, and other stakeholders on activities involving the environment, health, and safety.

11.0.1 The Approach to Environmental Management and Strategies for Implementation

General Strategy

The Proponent will follow the principles of its parent company and involve all employees in Environmental Management. Training programs will be carried out and sound work procedures will be established and enforced for all work stations.

A specific Environmental Management team under the overall direction of the Operations Manager will be established prior to the commencement of construction and will operate throughout the life of the quarry. This team will be responsible for ensuring that all mitigation measures and monitoring programs described in this document are followed and monthly meetings of the team will review each of the mitigation and monitoring elements to ensure compliance with the corporate commitment and with all thresholds established by regulatory agencies.

A senior health, safety, security, and environment (HSSE) supervisor will be engaged and provided with the appropriate staff work space and equipment to carry out the various health, safety, and monitoring programs and to ensure that mitigation procedures are being followed. Weekly reports will be provided to the Operations Manager and these reports will be reviewed by the Environmental Management team at its monthly meetings. The effectiveness of mitigation measures will be reviewed each month and, if necessary, adaptive management techniques (developing improved techniques while conducting management activities) will be employed in consultation with the appropriate regulatory authority. Action, where necessary, will be the responsibility of the Operations Manager.

Monitoring reports, where required by regulatory agencies, will be forwarded at the time intervals required by the agencies.

The Operations Manager will be responsible for follow up on any issues identified in the weekly meetings of the Environmental Management team and to ensure the accuracy of impact predictions.

Specific Procedures and Programs

An operations manual will be prepared which will set out for each of the valued environmental components, the conditions of approval, the commitments of the company, the mitigation measures, and the monitoring program.

At each monthly meeting of the Environmental Management team, each of the elements of each of the valued environmental components will be reviewed using the weekly reports submitted by the senior HSSE supervisor. An assessment will be made and recorded for each of the components so that conditions can be tracked for specific time periods and over the life of the project.

Each of the valued environmental components will be reviewed to verify the impact predictions and to determine the effectiveness of the mitigation measures being carried out. Where necessary, consultants will be engaged to verify the effectiveness of mitigation measures; for example, for the protection of the *Prenanthes racemosa* (Glaucous Rattlesnake-root) identified in the Plant Survey of Whites Cove Property prepared by Ruth Newell. Consultants' reports will be filed with the appropriate regulatory authority.

Regulatory Authorities

As noted above, regulatory authorities will be furnished with monitoring reports at the intervals stipulated by the authorities and the consultant reports for specific valued environmental components. In addition, the appropriate regulatory authorities will be updated on a regular basis on the success or otherwise of mitigation measures and , where necessary, asked to become involved in adaptive management.

Records

Records of all monitoring, assessments of mitigation measures, consultants' reports, and assessments carried out by the Environmental Management team will be maintained on site for inspection by regulatory authorities throughout the life of the project. Those monitoring reports required to be submitted on a periodic basis will be submitted by the Quarry Manager at the required time intervals.

Public Involvement

It is the intent of the company to establish a new Community Liaison Committee to ensure that the community is made aware of the effectiveness of the mitigation measures and to discuss any ongoing concerns raised by the community. It is proposed that this committee meet on a quarterly basis at the on-site quarry offices, and that a tour of the operation be given so that members can observe first-hand the measures being undertaken.

The committee would be made aware of monitoring results on an ongoing basis and an annual review of monitoring results would be prepared by the company for review by the committee and for distribution to the residents of the local community.

It would also be the intent to hold an open house for the general public at the quarry site once the construction process is complete and the quarry operational. This event would provide an opportunity to anyone interested to ask questions of the quarry staff and to see first-hand the work of a quarry and the environmental management plan in operation.

Compensation

The Environmental Management team will also deal with the issue of compensation. A compensation plan has been discussed with lobster fishers who traditionally fish in Whites Cove and it is acknowledged that some lobster traps may be lost as a result of ships entering and leaving the marine terminal, even with the ship maintaining a pre-designated route and notification of ships movements to the lobster fishers. It is agreed that the lobster fishers will form a committee which will assess damage and that a compensatory sum will be provided by the company to be administered by the committee.

The Environmental Management team will meet with the committee on an annual basis to review the results and to make any adjustments where necessary.

The company has also made the specific commitment that it will compensate any drilled- well owner whose well has failed due to quarry activities (Appendix 47) The Environment Management team will review such claims and, where appropriate, ensure that new wells are drilled.

A compensation plan has been approved with the Department of Fisheries and Oceans with respect to destruction of fish habitat. Part of the monitoring program which will be developed in consultation with the Department will be to assess the level of success for the compensation plan.

Partnerships

Bilcon would welcome the opportunity to participate in partnerships with academe or others to further practical research and the Clayton companies have a history of such participation (See Appendix 13, Rutgers University). Bilcon sees such opportunities arising, particularly in the reclamation process which, after the first five years of operation, will be carried out on a continuous basis.

Adaptive Management

As noted in 3.5 in this document, Bilcon will apply the precautionary principle to all phases of the project through its approach to environmental risk management. Where there is uncertainty with respect to the effectiveness of measures that are used to prevent serious or irreversible environmental effects, Bilcon will take an adaptive management approach. Adaptive management uses monitoring results to accommodate uncertainty. This will permit early intervention through the use of additional mitigation or avoidance to control potential environmental damage.

The use of an adaptive management approach, based on scientifically defensible performance-based standards, will be Bilcon's strategy throughout the life of the project.

Quality Assurance and Quality Control Measures

a) Environmental Quality Assurance Plan

As noted under the section Environmental Criteria 11.1, the Proponent is committed to developing and implementing an environmental quality assurance plan to the ISO 14001, or similar standard, to ensure compliance with corporate philosophy and Federal and Provincial Regulations and Guidelines.

b) Product Quality Control

The sole produce from the quarry operation will be crushed rock of various sizes which will be wholly used for the Clayton concrete and block operation. The quality of the product produced at Whites Point will, therefore, directly impact the quality of Clayton's finished product. Quality control is, therefore, imperative at the crushing, screening, and washing operation, and the various stockpiles will be continuously monitored for quality. All products, as noted, will be exported and will meet the requirements of the finishing process (concrete or block) in the markets in which they are distributed. No regulatory approval of the product is required prior to its shipment.

11.1 Management Criteria

The philosophy and approach to Environmental Management is set out in 11.0. The criteria for Environmental Management is set out for each VEC in the EIS and tabulated in the Mitigation Table, the Monitoring Table, and the Commitment Table, set out in 11.4, 11.5, and the Executive Summary. Specific VECs are dealt with under 11.8, Compensation.

As noted under 11.0, an Operations Manual will be prepared which will set out for each of the VECs, the conditions of approval, the commitments of the Company, the mitigation measures and the monitoring program. All Environmental Management will be carried out under an environmental quality assurance plan to the ISO 14001, or similar standard.

11.2 Accidents and Malfunctions

The concept of accidents and malfunctions must be considered in terms of both likelihood of an event and the exposure time over which that event could occur. To that extent, exposure to accident risks during a relatively brief construction activity must be considered separately and differently from a longer-term exposure for example, from routine production operations over a 50-year term. Similarly, the effect of an accident on the ecology will differ with each eco–receptor. As a consequence, the proponents approach to the potential accident will differ for each case.

The Proponent's safety culture, approach to site operation and management is critical to avoidance and mitigation of adverse effects due to accidents and malfunctions. Bilcon of Nova Scotia and parent Company Clayton corporate philosophy in this matter is clear, and is characterized in the statement " ***Clayton Companies has had longstanding corporate policies of providing a safe and healthful work place, protecting the environment, and conserving energy and natural resources. Clayton companies are committed to environmental compliance and stewardship in all of its business activities."***

Accidental events can lead to injury to the biophysical environment as well as effects on human health and safety. The severity of effects from accidental events is dependent upon the magnitude of the event, location of the event, and the time of year.

Accidental events can be generally categorized as either spills or releases to the environment of such materials as fuel, hazardous materials and wastewater, or the failure of engineered designs that may result in material spills or releases to the environment, vehicular accidents and fire. Although this section of the EIS will identify potential accidents and malfunctions that could occur at the Whites Point Quarry and Marine Terminal project site, such accidents and malfunctions are notably rare occurrences.

The reader must bear in mind that all aspects of the Whites Point Quarry and Marine Terminal project, from construction activities to full quarry and ship loading operations and cargo vessel transits are already in progress at numerous locations in Nova Scotia, elsewhere in Atlantic Canada, along the Eastern Seaboard and throughout the world. Many similar operations can be viewed operating within environmental compliance and safety on a routine daily basis. As examples, a few similar operations located within the Atlantic area are identified below for the convenience of the reader.

Water Side Quarry and Ship Loading

Martin Marietta	Aulds Cove, NS
Little Narrows Gypsum	Little Narrows, NS
Atlantic Minerals	Port au Port Peninsula, NL

Ship Loading Terminals

Fundy Gypsum	Hantsport, NS
National Gypsum	Dartmouth, NS
Georgia Pacific	Point Tupper, NS
Savage CANAC Corp.	Point Tupper, NS
Sydney Coal Pier	Sydney, NS

Large Scale Quarry Operations

Fundy Gypsum	Wentworth Creek, Miller Creek, NS
National Gypsum	Milford, NS
Georgia Pacific	Kingsville, NS
Conrad Bros.	Dartmouth, NS
Municipal	Waverley, NS

The Bilcon approach to management of potential accidental events that could cause adverse environmental effects is imbedded within corporate culture. The key elements include:

- Effective design of the workplace facilities and equipment.
- Hazards controlled to prevent unsafe and unhealthful exposures.
- Monitoring of hazard condition
- Elimination or control accomplished in a timely manner.
- Application of Corporate resources
- Provide adequate surety to fund cleanup

The following text of this section addresses some key background project information; Valued Environmental Components (VEC) definition, and the proponents approach to each perceived risk relating to potential accidents and malfunctions.

11.2.1 Project Background

The Proponent

Bilcon has described the Whites Point Quarry and Marine Terminal (WPQMT) project elsewhere in this document; however, it is outlined here within the context of accidents and malfunctions and project phases.

Construction Phase

Duration 12 to 18 months

Activities

- Site infrastructure development and construction of site access and service roads, electrical power distribution, fuel storage, water supply, site water management and drainage structures, sediment retention ponds.
- Quarry and terminal site clearing - 27 acres
- Construction of site offices, stores warehouses and mechanical maintenance shops.
- Installation of crushing, screening and wash plant facilities.
- Construction of product lay down, reclaim and materials handling and transfer facilities.
- Construction of the marine shipping terminal including mooring dolphins and related mooring buoys, pile support structures, installation of aggregate handling conveyors and ship loader.

Operational Phase

Duration 50 Years

Activities
- Routine basalt aggregate production operations:

Quarry
- Clearing and quarry face development

Drill and blast

- Aggregate production

Erosion and siltation control

- Processing
- Crushing, screening and wash plant operations
- Aggregate stockpiling

Shipping

- Aggregate reclaim and ship loading operations
- Vessel size 50,000 tons
- Vessel transit to international waterway

Quarry Reclamation

- Slope reduction, erosion stabilization, revegetation
- Completion of 25 acre segments each 5 years

Shutdown and Reclamation

Duration 2 Years

Activities

Removal of all:

- Quarry plant and buildings
- Site infrastructure
- Reclamation of site to render it stable to erosion and of safe access

11.2.2 Valued Environmental Components

Bilcon has identified the site VEC's any of which could be adversely affected by accidental or malfunction occurrences. Listed below are those components of the VEC that could most likely be adversely impacted in the event of an accident.

Physical Resource Components

Ground Water

- Water Quantity
- Water Quality

Surficial Geology

- Soils

Surface Water

- Chemical Water Quality

Biological Resource Components

Terrestrial Ecology

- Habitat Alteration
- Habitat Diversity
- Floral Species at Risk
- Faunal Species at Risk
- Odonata and Lepidoptera Species at Risk
- Wetlands
- Migratory Land Birds

Aquatic Ecology

- Little River Watershed
- Freshwater Fish Habitat

Marine Intertidal Zone

Coastal – Nearshore Marine Habitat

- Migratory Waterfowl
- Fish Habitat
- Marine Mammals
- Marine Reptiles
- Marine Species at Risk
- North Atlantic right whale – Noise and Vessel Interaction

Human Resource Components

Water Use

- Intertidal Fishery
- Tourism
- Recreation

Human Health

- Air Quality
- Drinking Water Quality
- Noise and Vibration

11.2.3 Employee and Community Safety

Employee and community safety ranks very high on Bilcon and parent company Clayton, management priority. Corporate governance, policies and practices place high emphasis on these matters.

Clayton Companies have longstanding corporate policies of providing a safe and healthful work place, protecting the environment, and conserving energy and natural resources. Clayton companies are committed to environmental compliance and stewardship in all of its business activities.

A selection of portions of Clayton Corporate Policies is attached as an addendum as a sample of the corporate environment and culture under which Bilcon will operate. The attachments include documents relative to Corporate Policy; Health, Safety, and Environment, Facility Security Plan, Spill Prevention Control and Countermeasure (SPCC) Plan, and a Shipboard Oil Pollution Emergency Plan for a supplier under contract. Full documents can be made available for viewing at the request of the panel to the extent that requirements of corporate and regulatory confidentiality will permit. These documents are provided as indication that such provisions are familiar to Bilcon and are in the norm of everyday business. Documents and plans similar to the above mentioned plans specifically tailored to the WPQMT project will be prepared as required by the relevant legislation as the project advances.

Management commitment and employee involvement is complementary. Management commitment provides the motivating force and the resources for organizing and controlling safe work activities within the Clayton organization.

Ongoing work site analysis is done through a visual inspection process to identify not only existing hazards but also conditions and operations in which changes might occur that would create hazards. Industrial hygiene surveys are conducted as warranted. Employees are encouraged to take part in the inspection and/or work site improvement process. All injuries and incidents are investigated; causes and means for their prevention are identified.

Where feasible, hazards are prevented by effective design of the workplace facilities and equipment. Where it is not feasible to eliminate hazards, they are controlled to prevent unsafe and unhealthful exposures. Where a determination of a hazard condition is made, elimination or control is accomplished in a timely manner. Personal protective equipment is provided for by the Clayton organization. Medical monitoring is conducted in compliance with Federal Standards. A drug-free workplace policy is in effect in all areas of employment.

An introduction to safety and health programs is given at the time of hire. Training is conducted on a regular basis encompassing safety and health practices relative to the specific work site. Training in safe work habits encompassing programs mandated by various governmental agencies

Where necessary, correction of unsafe personal practices is enforced and clearly communicated through a disciplinary system.

A workers' compensation medical program, which includes available first aid measures and emergency medical care, is clearly established to minimize any injury or illness that does occur.

The Whites Point Quarry and Marine Terminal site will necessarily operate in accordance with provincial labour, health and safety and environmental legislation. The operating site will have controlled access to limit the possibility of access by unauthorized personnel. Standardized procedures and warning signals will sound in advance of blasting operations. Fire watches and alarms and suppression system will be employed where appropriate. The operating site will be equipped with adequate first aid personnel, in the event of accident involving injury to personnel. The site will have necessary equipment; trained personnel and a ready supply of early action environmental cleanup materials such as silt fencing and absorbents available for rapid use.

In the case of an accident, internal corporate resources will provide first order mitigation to reduce any adverse impacts. Arrangements will be made with external agencies to call up additional emergency resources when necessary to attend to on site conditions that exceed the capacity of site personnel and supplies. In addition, sufficient surety arrangements will be made to provide for cleanup financial resources to backstop corporate sources.

11.2.4 Hazardous Materials

Bilcon has identified a number of consumable materials to be used in relation to the WPQMT project that could if spilled, cause adverse environmental impact. Such materials include:

- Diesel fuel
- Gasoline
- Motor oil
- Lube oil
- Engine coolant
- Hydraulic fluid
- De-icing compound (glycol based)
- Explosives: ANFO, emulsions, primers
- Flocculent
- Cleaning solvents and paints
- Propane
- Acetylene
- Cement and concrete additives

All petroleum storage facilities will conform to the requirements of the Nova Scotia Standards for Construction and Installation for Petroleum Storage Tank Systems as issued under the Nova Scotia Petroleum Management Regulations.

Explosives will be stored offsite and delivered to the site in day use quantities. In summary, the procedures and requirements of the WHMIS program and other applicable government regulations will be enforced. If a spill does occur, the severity of the environmental consequences depends on the location of the spill, the volume of the spill, and the time of year. The volume of a hazardous material is dependent on the size and number of containers.

Accidental spillage of fuels or hazardous materials probably represents the highest probability of occurrence during both the construction and operating phase of the WPQMT project. Uncontained, such spills could impact the near shore environment. Proper design of facilities, careful management of operating procedures and advanced planning and preparedness for such potential events, will mitigate any adverse environmental impacts.

In the event of a liquid the spill will flow with the surface water and be captured within the drainage path or ultimately within surface water and sediment containment pond. At these locations actions can be taken to contain the spill, remove the offending materials and or treat the contaminated water.

Both the ground water and surface water divide is along the crest of the topographic high near the east boundary of the project. Both regimes will flow to the west into the Bay of Fundy. There is little risk of contamination of the ground water flows to the east. See section9.1.3 on groundwater.

While there is some risk of accidental spillage, both the operations and also the materials are in very common use throughout Nova Scotia on a daily basis. Established sound management, operating and environmental practices will assure environmental compliance.

11.2.5 Accidental or Malfunction Events

Land Site Environment

Blasting

The use of explosives as a part of the quarrying process could be a source of an accidental explosion. The commonly used explosives are known as blasting agents ANFO (Ammonia Nitrate Fuel Oil) prill mixtures used under dry conditions and Emulsions used for wet conditions. This class of explosives is not easily detonated with out a "booster" charge to initiate the charge. As a consequence, the explosives are not considered an explosive risk while in transit or handling. The quantities of explosives handled will depend upon the size of the blast design; however, will be in the order of 0.4 kg per tonne blasted or approximately 7,500 kg for a 20,000-ton blast.

The record for accidental detonation in a Canadian mine / quarry controlled environment is free of incidents. At the WPQMT site all personnel will be removed from close proximity to the blast and blast warning and access restrictions will be strictly enforced. Fly rock from blasting operations can be problematic but in this case, a risk only to site property. From an accident point of view the village of Little River is not at risk for a blast accident.

Due to their physical nature spills of both the explosive prills and emulsions do not represent significant environmental hazards. Spills of both materials can be easily contained and readily cleaned up. Arrangements are normally made with commercial spill recovery firms to attend to large spills.

Vehicle Accident and Fuel Spill

Vehicular movements will be one of the most common activities on site in relation to personnel movements, aggregate excavation, loading, hauling, service activities etc. Vehicular accidents on site roads and in the quarry could result in spill of pit run aggregate, spill of fuel, or spill of hazardous materials depending on the service of the vehicle. The severity of the consequences would depend on the location (e.g. spill into a watercourse) and the time of year (e.g., spawning of fish, fishing seasons, seasonal occupations).

Spillage of pit run aggregate would not create a serious environmental hazard and can be readily contained and cleaned up. However; fuel spillage from large off road haulage units could cause environmental damage. Containment and recovery of fuel and hazardous materials will be a concern. The volume of any spill of oil or hazardous materials will be dependent on the size of the trucks and containers.

Fuel tanks on large off highway haulage units, excavators and dozers contain 500 L to 1200 L of diesel fuel. Other vehicles will have fuel tanks similar to commercially available industrial equipment less than 500 L capacity. Should the accident involve a fuel transfer vehicle, the quantity could be larger – in the order of 6000L.

In the case of spillage of gasoline and diesel fuels, lubricants and other equipment fluids; these materials in these quantities can easily be captured and retained by site facilities. Absorption materials will be readily available for clean up.

Oil Spill at Fuel Storage Facilities

Above surface fuel storage for project vehicle and equipment use is planned, situated between the proposed office and shop locations. There will be no fuel for bulk carrying ships stored on site. Storage for heating fuels for the offices, warehouse, shops and the enclosed sectors of the aggregate wash plant will be located at the respective facilities. All of these locations are within the permanent site drainage collection system that will direct drainage to the site water and sediment retention pond.

Oil spills can occur at the fuel storage facilities or during the delivery of oil to the storage facilities at the project site. The oil storage tanks could fail as a result of spontaneous rupture or explosions. Spills could also result from human error during delivery of fuel to the oil storage tanks (e.g., overfilling, leaving valves open). Fuel storage tanks and facilities will be designed to conform to the NSDEL regulations for petroleum storage tank installations. Key design features include the installation of impervious mats, containment dykes, and the installation of sump and collection systems.

Permit applications require submission of information such as:

- Name, address of owner and type of facility.
- Name of operator, if different from storage tank owner.
- Name of landowner, if different from storage tank owner.
- Location of storage tank system, if different from address of owner, unless the system is intended to be in place for less than 60 days, whereupon the system may be registered as having one of multiple temporary unspecified locations.
- Capacity of storage tank, or combined capacity of storage tanks if there is more than one in the storage tank system.
- Type of petroleum product or allied petroleum product.
- Year of installation of each storage tank system.
- Type of storage tank and piping material for each storage tank in the system.
- Corrosion protection provided, if applicable.
- Type of pump or pumps.
- Type of leak detection.
- Internal linings, if any.
- Type of secondary containment.
- Number and locations of monitoring wells.
- Type of overfills protection and volatile organic compound (VOC) emission control.
- Manufacturer of each storage tank in the system.
- Type of storage tank, whether horizontal or vertical and diking (for AST only).

In the case of a tank rupture or leak, emergency response and clean-up procedures will be implemented. The likelihood of any oil escaping to the environment as a result of a tank failure is considered very low. Spills of hazardous substances including fuels are required to be reported to NSDEL when the quantity of the spill exceeds the amounts shown in the following table.

Schedule "A" - Spill Report Requirements

Item No.	TDGA Class	Description of Contaminant	Amount Spilled
1.	1	Explosives	any amount
2.	2.1	Compressed gas (flammable)	100 L
3.	2.2	Compressed gas (non-corrosive, non-flammable)	100 L
4.	2.3	Compressed gas (toxic)	any amount
5.	2.4	Compressed gas (corrosive)	any amount
6.	3	Flammable liquids	100 L
7.	4.1	Flammable solids	25 kg
8.	4.2	Spontaneously combustible solids	25 kg
9.	4.3	Water reactant solids	25 kg
10.	5.1	Oxidizing substances	50 L or 50 kg
11.	5.2	Organic peroxides	1 L or 1 kg
12.	6.1	Poisonous substances	5 L or 5 kg
13.	6.2	Infectious substances	any amount
14.	7	Radioactive substances	any amount
15.	8	Corrosive substances	5 L or 5 kg
16.	9.1 (in part)	Miscellaneous products or substances, excluding PCB mixtures	50 L or 50 kg
17.	9.1 (in part)	PCB mixtures of 50 or more parts per million	0.5 L or 0.5kg
18.	9.2	Environmentally hazardous substances	1 L or 1 kg
19.	9.3	Dangerous wastes	5 L or 5 kg
20.	none	Asbestos waste as defined in the Asbestos Waste Management Regulations	50 kg
21.	none	Used oil as defined in the Used Oil Regulations	100 L
22.	none	Contaminated used oil as defined in the Used Oil Regulations	5 L
23.	none	A pesticide in concentrated form	5 L or 5 kg
24.	none	A pesticide [in] diluted form	70 L
25.	none	Unauthorized sewage discharge into fresh water or sensitive marine water	100 L
26.	none	Ozone depleting substances as defined in the Ozone Layer Protection Regulations	25 kg

Facility Fire

The potential for fire at the WPQMT project could be a concern for project managers. The most obvious locations for fire potential will be; vehicles, fuel storage facilities and buildings,mechanical shops, processing plants, and materials handling facilities particularly conveyor systems. From an environmental impact perspective, the most critical of these is the fuel storage where there may be sufficient fuel to sustain a fire event. Generally, the quantities of combustibles in vehicles, processing plants, and materials handling facilities will not sustain fires for long periods of time.

Fire detection and protection systems will be provided in critical locations such as fuel and lubricant storage tanks. Bilcon employees will be trained for rapid first response to fire events until local fire fighting crews arrive on site. The emergency response procedure will be implemented immediately upon the detection of a fire. Fire fighting equipment will be deployed immediately.

Containment Ponds

Sediment retention ponds are planned on the WPQMT plant site. Competent engineering professionals will design and supervise the construction of these facilities. The dams, containment berms and discharge structures, will be designed and constructed to stringent engineering standards in accordance with probable maximum precipitation events. Routine monitoring and operational inspections will be conducted by Bilcon to assure proper operation and continued stability.

The earthen sediment retention ponds for runoff water and sediment can be subject to failure and have potential to become a source of adverse environmental impact. Failure of the structures can result from design inadequacy, component failure due to accident or act of nature. In any case, the result of the failure can be an unscheduled discharge of the ponds contents into the receiving environment.

The two main accidental events considered are:

1. Dam failure, resulting in the release of settled solids and surface waters covering the sludge that may contain contaminants downstream; and

2. Untreated overflow, as a result of storm events.

A total dam failure scenario is considered as a worst-case event. It should be recognized that perimeter dam failures are avoidable by proper design, routine inspection, and maintentance. Storm events will vary widely in duration and intensity. It is therefore difficult to predict the extent of water quality effects resulting from the release of a worst-case storm event.

Each facility will be designed such that normal discharge is possible at one perimeter dam location only. This location is selected based on environmental criteria and accessibility for maintenance and inspection purposes.

Sediment Storage Area

This area, which is shown on Plan OP - 1, will store sediment from the washing process as well as sediment removed from the sediment retention ponds.

Initially, these sediments will be in an unstable condition and will need to be contained by a berm system to prevent slumping and migration down slope towards the Bay of Fundy. These berms will be engineered to prevent failure and will be inspected on a regular basis. It should be noted that as the sediment drains and dries it becomes stable and the danger of slumping diminishes. With proper design of the berms there is little risk of sediment migrating down slope to the Bay of Fundy.

The sediments stored in the storage area are planned for reclamation use. Sediment will be mixed with the reclaimed topsoil which will also be stored in a bermed area, and used to reclaim areas where quarrying has been completed

Because the solids are planned for reclamation use, all solids will be removed on a five-year cycle and redistributed as vegetation substrate over the reclaimed site. As a result, the WPQMT will produce no accumulated fine wastes.

Marine Terminal and Ship Loader

The marine terminal more fully described elsewhere in this document will have the following key features:

- Concrete and steel pile supported conveyor bridge 200 m long
- Radial motion quadrant ship loader operating at 4,000 tph
- Three berthing dolphins providing 140 m berth at water draft of 16 m
- Two mooring buoys

This structure and materials operation does not present any particular accidental environmental hazard beyond those already discussed for the land based facilities. Potential for accidental events between the marine terminal and the cargo ship is discussed in the next sections.

Marine Environment

Shipping Vessel

Large self-unloading vessels will be used to transport aggregate product from the WPQMT site to markets in the USA. All ships operate under strict TC Regulations and ISM (marine version of ISO) standard practices from which corporate governance protocols, policies and operating manuals are drafted. Similar ships transit NS waterways on a daily basis hauling coal, aggregate, and gypsum.

Navigational assist equipment employing GPS systems, radar surveillance, weather forecasting and a variety of communication devices allows for reliable and safe ship operations under all weather conditions. Only the most severe weather conditions would interfere with ship operations.

Annual design production for the project is 2.0 M tons per annum. With a 40,000 tonne capacity vessel, approximately 50 vessel transits are required per year. Larger vessels will require fewer transits. Shipping schedule at the design rate and transit times to the NY destination may favour a dedicated vessel. In the unlikely event that a ship is damaged, fuel oil or aggregate product may be released into the marine environment.

A typical ship will be a 40,000 ton to 70,000 ton self-unloader. A double hull design of modern carriers offers particular environmental advantages that will not release fuel or product if holed. In addition, most ships are also equipped with bow thrusters to assist in docking. Such ships carry a fuel load of 800 to 1000 tons bunker "C" for ship propulsion fuel and 100 tons Marine Diesel Oil (MDO) which is consumed at 4 tons per day at dock side for ship power service. Modern ships all posses fire detection and fighting equipment to be used by trained crews.

The sailing speed for the vessels in open water is 13.5 knots (nautical miles) per hour slowing to less than 3 knots during transit to berth area and less than 1 knot to approach the dock. The vessels will navigate the Bay of Fundy along established shipping lanes exiting to transit to the Bilcon dock along pre-established routes a distance of 14 km.

For docking purposes, ship operators do not consider this location to be significantly different than other locations such as Atlantic Minerals, Port au Port, NL, and Belledune, NB. Tug assisted docking will not normally be required. If storm conditions are forecast, the master has other options; to stay at sea, go to anchor, to delay docking or departure awaiting more favourable conditions.

Vessel Accidental Hazards

Modern vessels operating under strict corporate and regulatory protocols do not present significant environmental hazards. Highly valuable shipping assets, costly cleanup fees and possibly fines for environmental accidents cause ship operators to operate with high levels of care and prudence.

Product Spillage

One of the more common events is the accidental spillage of product during loading operations. In this case the material spilled, non-reactive basalt aggregate, is not considered a great hazard to the environment. Any spills will be within the immediate vicinity of the dock. Large spills can easily be recovered allowing the affected area to return to pre spill conditions.

Oil Spills

No vessel fuelling operations are planned at the WPQMT dock; therefore, there is very little opportunity for fuel oil spill at dockside. A supply of oil absorbent materials will be available on site for immediate deployment in the case of a spill. Spill response teams are available in Digby, Yarmouth, St. John, NB, and Halifax. Arrangements for the provision of emergency response will be made with the closest available service provider. Initial response by Bilcon crews can be immediate followed by off site response in a matter of hours.

Fire on Board

Fire on board these vessels is not a common event and is not considered a major environmental hazard. One commercial shipper recalls two on board fire events in the past 20 years operating a fleet of 40 ships. Those two events both related to on board conveyor belts and were brought under control by ships crew. In the case of a mineral aggregate cargo, the fuel for a conveyor fire would be very limited.

The fuel for these vessels, bunker "C" and MDO require flame source to start and are not easily sustained. All ships are equipped with fire fighting system operated by trained crews.

Vessel Collision with Dock and Grounding

While not rare, these events do not represent a major environmental hazard except in the case of a vessel break-up. With the use of with double-hulled vessel, the exterior hull can be ruptured without jeopardizing the integrity of safe vessel operations.

Vessel fuel tanks are positioned in safe locations within the interior of the ship. In any event, thebunker 'C" product requires heating to allow the fuel to be moved. In the worst case event of the vessel sinking, the bunker "C' would stay contained within the fuel tanks. The cool water temperature would not permit the bunker 'C' to migrate far if at all.

The MDO would flow in the case of a tank rupture. In the worst-case scenario, 100 tons of the MDO fuel would be discharged to the environment. In calm seas this can be contained by booms and collected by absorbent materials. In the more likely case of rough seas causing the hypothetical accident, dispersal of the MDO would be extensive particularly in the wave zone near the shoreline. The MDO like diesel oils will evaporate quickly.

Ballast Water

The introduction and establishment of "invasive", "non-indigenous" or "exotic" species may adversely affect marine ecosystems. To combat this potential effect, the International Maritime Organization (IMO) adopted resolution A. 868 (20) on the 27th of November 1997 entitled "Guidelines for the Control and Management of Ships' Ballast Water to Minimize the Transfer of Harmful Aquatic Organisms and Pathogens". Subsequently, Transport Canada issued "Guidelines for the Control of Ballast Water Discharge from Ships in Waters Under Canadian Jurisdiction" as amended June 8th, 2001.

Annex V of the Transport Canada Guidelines addressing east coast waters is in draft form and under review. On June 11th, 2005, proposed "Ballast Water Control and Management Regulations" were gazetted and are proposed to come into effect early in 2006 and would be administered by Transport Canada under the *Canada Shipping Act*.

While the responsibility for adhering to the new regulations, when they come into force, lies with the shipping company, Bilcon will contract only reputable shipping companies.

For further details on the Management of Ballast Water, please refer to 9.2.14 in this document.

Fish Gear

There is some risk of vessel collision with and damage to stationary fishing gear. Vessels will transit along pre-established routes that will be made known to the local fishers. In the event that some gear is damaged, Bilcon has committed to a damage fund to be administered by local fishers. Similar arrangements between shippers and fishers elsewhere in the province function quite effectively to compensate fishers for loss of fishing gear in case of accidental damage or loss. It is not expected that the fishers or their communities will sustain any significant economic impact.

Whale Watching operations

Whale watching operations are in progress in this area of the Bay of Fundy from mid spring to mid fall. Ship transit routes will be made known to the whale watching operators. The ship arrival and departure schedules will be fairly regular and communication with the WPQMT will confirm the approximate shipping movement schedule. The ship operating at slow speed equipped with radar can easily see or detect the whale watching vessel and give adequate warning to stand clear even in dense fog conditions. It is not expected that the whale watching operators or their communities will sustain any significant adverse economic impact due to the shipping operations.

Collision with Marine Mammals

The Whites Point Quarry will generate additional ship traffic in the Bay of Fundy consisting of approximately 50 bulk carriers annually or a 6% increase in this category of ship traffic. Marine mammals and specifically the North Atlantic right whale, inhabit the Bay of Fundy and there is consequently the possibility of ship/whale interaction.

To diminish the risk of ship strikes, the shipping lanes were moved toward the Nova Scotia side of the Bay and further, from the right whale conservation area in July 2003. Ships serving the Whites Point Quarry will not pass through the conservation area either inbound or outbound.

While the impact assessment concludes that the risk of a whale/ship encounter between the terminal and the shipping lanes is small, this EIS sets out mitigation measures which will be carried out.

For further details on Collision with Marine Mammals, please refer to 9.2.13 in this document.

Addendum 1

Corporate Policy; Health, Safety, and Environment

Clayton Companies has longstanding corporate policies of providing a safe and healthful work place, protecting the environment, and conserving energy and natural resources. Clayton companies are committed to environmental compliance and stewardship in all of its business activities.

These fundamental business practices provide the foundation for the following corporate policy objectives:

- Provide a safe and healthful workplace and ensure that personnel are properly trained and have appropriate safety and emergency equipment.
- Be an environmentally responsible neighbour in the communities where we operate, act promptly and responsibly to correct incidents or conditions that endanger health, safety, or the environment. Report them to authorities promptly and inform affected parties as appropriate.
- Conserve natural resources by reusing and recycling materials.
- Develop, manufacture, and market products that are safe for their intended use, efficient in their use of energy, protective of the environment, and that can be reused, recycled or disposed of safely.
- Use development and manufacturing processes that do not adversely affect the environment, including developing and improving operations and technologies to minimize waste, prevent air, water, and other pollution, minimize health and safety risks, and dispose of waste safely and responsibly.
- Participate in efforts to improve environmental protection and understanding and share appropriate pollution prevention technology, knowledge and methods.
- Meet or exceed all applicable government requirements and voluntary requirements to which Clayton Companies subscribes.
- Strive to continually improve Clayton Companies environmental management system and performance.
- Conduct audits and self-assessments of Clayton Companies compliance with applicable rules and regulations.

Every employee and every contractor on Clayton Companies premises is expected to follow this policy and to report any environmental, health, or safety concern to Clayton Companies management. Managers are expected to take prompt action.

Clayton Corporation Safety Program

The health of our employees and the safety of our operations and products, from manufacturing through transportation and product use, are the paramount reasons why we conduct and give high priority to numerous training, awareness and other safety-related programs throughout the year. Our commitment to the health and safety of our employees, customers and the communities in which we operate is among the core principles upon which Clayton Corporation bases its business operations.

Our safety culture is characterized by five key principles:

- All injuries are preventable
- Safety is good business
- Management is accountable
- Employees are the key
- Safety must be managed through a structured process

We promote the development and administration of comprehensive health and safety programs to minimize hazards and to prevent injury or loss to our employees.

The Director of Health and Safety is responsible for the development of these safety programs and policies. Each plant supervisor or manager is responsible for the implementation of the programs and policies at their specific facility. Employees are charged with adhering to the safety policies and procedures at all times.

The Director of Health and Safety makes regular site inspections, conducts compliance audits, and evaluates the safety program annually. He/she also meets with management to plan and implement further improvements in the safety program. Common sense and personal interest in safety are still the greatest guarantees of employee safety at work, on the road, and at home. We take employee safety and health seriously and any wilful or habitual violation of safety rules will be considered cause for dismissal. The cooperation of every employee is necessary to make this company a safe place in which to work.

Employees are encouraged to report safety violations, industrial hygiene concerns and suggestions for improvement to the overall safety and health program to either their direct supervisor and/or directly to the Director of Health and Safety. All suggestions are taken seriously, receive prompt response; results of any actions or industrial hygiene surveys are reported to all concerned.

Addendum 2

FACILITY SECURITY PLAN (Sample selection)

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1.0 Security Administration and Organization of the Facility

1.1 **, will assume duties of the Facility Security Officer (FSO),** 08879. He can be contacted at the following numbers:

Cell Phone: ___ hours a day
Beeper:
Fax:

In addition, the onsite shift supervisor can be reached at:

The FSO shall be qualified through experience or training to perform the following;

1. Security administration and organization of the company vessel (s)

2. Vessel, facility and port operations relevant to the passenger vessel industry

3. Vessel and facility security measures, including the meaning and the consequential requirements of the different MARSEC Levels

4. Emergency preparedness and response and contingency planning

5. Security equipment and systems and their operational limitations (as it applies to his/her operation)

6. Methods of conducting audits, inspection and control and monitoring techniques

7. Techniques for security training and education including security measures and procedures

8. Relevant regulations

9. Methodology of security assessments, surveys and inspections

10. Handling of SSI (Security Sensitive Information) and related communications

11. Knowledge of current security threats and patterns

12 . Recognition and detection of dangerous substances, dangerous devices, and characteristics and behavioural patterns of persons who are likely to threaten security

13. Techniques used to circumvent security measures

14. Methods of screening

15. Security drills and exercises and their assessment

1.1.1. FSO shall conduct or ensure that a Facility Security Assessment, an initial comprehensive security survey of the terminal has been conducted.

1.1.2. FSO shall retain all responsibility for full implementation of this FSP although he may delegate certain specific tasks to other individuals.

1.1.3. Have experience or training to carry out the function of FSO as stated in 33 CFR 105.205;

2.1.4. Oversee the development, revision and implementation of the facility security plan and the integration of such with the facility security plan and ship security plan.

1.1.5. Ensure the FSP is submitted to the COTP for approval as well as informing the COTP of any plans to change the facility.

1.1.6 Any proposed amendments to FSP shall be submitted to the COTP for review 30 days before the amendment is to take effect. All relevant documentation to support such amendment shall be included.

1.1.7. Ensure that an annual audit is conducted and if necessary update or revise FSA and FSP.

1.1.8. The facility security officer must maintain the records required in this section for at least two years unless otherwise noted. These records will be made available to Coast Guard Officers or Petty Officers upon request.

1.1.9. Approve modifications to the facility security plan, when necessary, in order to correct any deficiencies and ensure consistency with the ship security plans.

1.1.10. Encourage security awareness, through formal as well as informal training sessions, and vigilance; and ensure that adequate training has been provided for personnel.

1.1.11. Ensure that facility personnel are briefed of changes in security conditions at the facility. This will be done in person through verbal as well as written communication. Any security changes that will have an immediate effect upon operations shall be made via phone, fax, and/or email by FSO.

1.1.12. Ensure that all proper signage regarding security awareness is posted and that visitors are informed of security procedures. In addition signage should read, "Failure to consent to screening or inspection will result in denial or revocation of authorization to enter."

1.1.13. Regular inspections of the terminal;

1.1.14. Ensure that FSP is exercised per 33 CFR 105.220

1.1.15. Propose modifications to the security plan to correct deficiencies and when necessary to satisfy the security requirements as specified in the facility security plan;

1.1.16. Ensure that all occurrences that threaten the security of the facility are recorded and reported to the owner or operator. Ensure notification to law enforcement and other emergency service providers to permit timely response to any transportation security incident.

1.1.17. Coordinate implementation of facility security functions with ship/vessel security officer;

1.1.18. Develop and maintain relationships with appropriate law enforcement, security professionals, and other government officials.

1.1.19. Ensure preparation and submission of required reports.

Addendum 3

SPILL PREVENTION CONTROL AND COUNTERMEASURE (SPCC) PLAN

CLAYTON BLOCK COMPANY, INCORPORATED
METUCHEN, NEW JERSEY

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1.0 Introduction

This Spill Prevention, Control and Countermeasure (SPCC) Plan, hereinafter referred to as the "Plan", is required by Title 40, Code of Federal Regulations Part 112 (40 CFR 112). Facilities covered under the SPCC regulations must establish procedures and methods to minimize the Potential for the discharge of oil into the navigable waters of the United States. The regulations apply to facilities possessing either: (1) total aboveground petroleum storage capacity greater than 1,320 gallons, (2) a single aboveground container having petroleum storage capacity greater than 660 gallons, or (3) total underground petroleum storage capacity greater than 42,000 gallons and, which due to location could reasonably be expected to discharge oil into or upon navigable waters. The Clayton Block, Metuchen, New Jersey facility has an aboveground storage capacity of 24,425 gallons. No petroleum products are presently stored underground. Procedures and countermeasures specified in this plan are primarily intended to prevent the discharge of petroleum products into nearby storm sewers.

In preparing the SPCC Plan for the Clayton Block, Metuchen facility, the following reference documents were utilized. These documents are provided in Appendices A and B, respectively.

- Title 40, Code of Federal Regulations Part 112 (40 CFR 112).
- Suggested Procedure for Development of SPCC Plans, American Petroleum Institute, Second Edition, August 1, 1989.

The oil storage facilities covered in this Plan are those that were identified to the preparers of the Plan by Clayton Block personnel during a site inspection on June 19, 1991 and follow-up site inspections conducted on April 21, 1992 and July 2, 1992. Drawings and specifications for oil storage facilities were not available to the inspectors; therefore all information contained in this plan is based on the visual site inspections.

2.0 General Facility Information

Name of Facility: Clayton Block Company

Type of Facility: Cinder building block manufacturer

Name of Facility Operator: Mr. Doug Clayton

Address: 515 Lakewood-New Egypt Road
Lakewood, New Jersey 08701

Telephone: (908) 363-1800

Location of Facility: 1025 Route One South
Metuchen, New Jersey

Date of Initial Operation at this Facility: 1946

USEPA I.D. No.: NJD-982743111

Number of Reported Petroleum Product Spill Events Within Past 12 Months:
None

Designated Person Accountable for Spill Prevention:

Name: Mr. Douglas Clayton
Title: Corporate Operations Manager
Telephone: (908) 363-1800

Petroleum Product Storage Regulated Under 40 CFR 112:

Aboveground:

Fuel Oil

(2) 10,000 gallon
(1) 1,000 gallon
(1) 500 gallon

Unleaded Gasoline

(1) 1,000 gallon
Motor Oil
(2) 275 gallon

Hydraulic Oil
(2) 275 gallon

Gear Oil
(1) 275 gallon

Waste Oil
(2) 275 gallon

Underground: None

Total Petroleum Product Storage Capacity:
24,425 gallons

3.0 Designation of Responsibility

The Corporate Operations Manager, Mr. Douglas Clayton, has been designated with the responsibility for spill prevention control and countermeasures recommended in this plan. His responsibilities include:

- Initiate storage facility inspections and proper record keeping as described in this Plan;
- Initiate corrective actions for deficiencies found during inspections.
- Revise and update drawings which show existing equipment and/or structures in place for spill prevention control and countermeasure purposes;
- Update the Plan as necessary to assure that it is current and responsive to the activities and operations performed at the facility;
- Review all plans and drawings related to oil storage, handling or transfer facilities for any new construction, maintenance, or remodelling to determine if amendment of this Plan is required, and all federal, state, and local regulations are being complied with;
- Initiate the personnel training as discussed in this Plan;
- Identify the number and types of personnel needing training. New employees shall be trained within six months from the date of employment;
- Conduct facility surveys at least once every three years to determine if modifications are required to achieve compliance with 40 CFR 112;
- Inspect security systems such as access control, locked storage areas, lighting, f encing, traffic control and others, to minimize the potential of a spill resulting from vandalism or unauthorized entry;
- Visually inspect vehicles that are delivering fuels to the facility for leaks and any obvious mechanical deficiencies which could cause a spill event or accident;

The Operations Manager may delegate some of the above responsibilities to Mr. Dan Clayton, Site Operations Manager, if necessary.

4.0 Certification and Management Approval

Name of Facility: Clayton Block Company

Location of Facility: 1025 Route One South, Metuchen, New Jersey

Name and address of owner or operator:

Name: Mr. Douglas Clayton
Address: 515 Lakewood-New Egypt Road
Lakewood, New Jersey 08701

Designated Person Accountable for Oil Spill Prevention at Facility:

Name: Mr. Douglas Clayton
Title Corporate Operations Manager

MANAGEMENT APPROVAL

This SPCC Plan will be implemented as described herein.

Signature:
_____ Date: _____

Name: Douglas Clayton

Title: Corporate Operations Manager

CERTIFICATION

I hereby certify that I am familiar with the facility and with the provisions of 40 CFR, part 112 and attest that this SPCC Plan has been prepared in accordance with good engineering practices.

Daniel D. Chen
Printed Name of Registered Professional Engineer

(Seal)

_____
Signature of Registered Professional Engineer

Date _____ Registration No. 26059 State: New Jersey

Addendum 4

Extracted from

GREAT LAKES DREDGE & DOCK CO.

* FLEET OF VESSELS *

SHIPBOARD OIL POLLUTION

EMERGENCY PLAN

As defined by

MARPOL 73 / 78
Annex I
Regulation 26

Prepared by:

ECM/HUDSON MARITIME SERVICES, LLC
Connecticut Philadelphia Houston New Orleans Oslo

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FOREWORD

This Shipboard Oil Emergency Pollution Plan is provided to assist shipboard and shore side personnel in dealing with an unexpected discharge of oil. Its primary purpose is to set in motion the necessary actions to stop or minimize the discharge and to mitigate its effects. Effective planning ensures that the necessary actions are taken in a structured, logical and timely manner.

The plan makes use of flowcharts and checklists to guide the Master, Barge Captain or Person in Charge (PIC) through the various actions and decision that will be required in an incident response. The charts and checklists provide a visible form of information, thus reducing the chance of oversight or error during the early stages of dealing with an emergency situation.

With regard to tank plans, pipeline diagrams, capacity plans and general arrangement plans, reference is made in Chapter 6.2.

The plan is designed to link into the Company's corporate plan for dealing with oil pollution emergencies. The Master, Barge Captain or PIC will be backed up on-scene by management-appointed personnel as the circumstances and the position of the vessel at the time of the incident require.

- For any plan to be effective, it has to be:
- Familiar to those with key functions on board the vessel;
- Reviewed and updated regularly; and
- Tested for viability in regular practices.

Training and exercises in implementation of the onboard mitigation procedures must be held at regular intervals. Similarly, exercises in communication procedures are necessary to verify that the Company's corporate plan is also effective.

ENVIRONMENTAL POLICY

Great Lakes Dredge & Dock Company manages business in a socially, environmentally and economically responsible manner. Quality is an integral part of the Company's operating philosophy. Quality is reflected in the approach to all aspects of business policy in vessel owning, management and operations. Focus on Quality in turn fosters safe and ethical behaviour in the use of Company equipment and assets.

It is Great Lakes Dredge & Dock Company's policy, therefore, to avoid all types of pollution and to conduct operations with the utmost regard for the safety of its employees, the public and the environment- in accordance with sound business practice and in compliance with environmental regulations.

- All Great Lakes Dredge & Dock Company personnel will adhere to this policy and will correct or identify to appropriate supervisory levels situations that run counter to this policy. Specific guidelines to the SOPEP are set forth below:
- Vessel-specific Shipboard Oil Emergency Plans have been developed and distributed in accordance with Chapter 1.5 -Distribution.
- Plans will be updated as necessitated by good operating practice, trade modifications and requirements at international, national, state and province levels.
- SOPEPs will be maintained and updated on board and at corporate headquarters. Plans will be reviewed as outlined in Chapter 0.4 -Record of Changes and Chapter 1.4 - Administration and Updating.
- A Pollution Response Officer aboard each vessel will be designated in writing.
- The Pollution Response Officer will maintain an up-to-date library of oil spill prevention and response publications on board.
- An aggressive program of onboard pollution prevention and response to emergencies will be carried out, including training and exercises.
- Notification (alerting) shall be aggressively carried out in accordance with Section 2 - Reporting Requirements, Section 5 National and Local Coordination and Appendices 1 and 2. If doubt exists, the notification procedures shall be carried out.
- Both vessel and shore-based personnel shall extend all reasonable courtesy and
- cooperation to federal, state and local authorities consistent with the safety of the vessel.
- Public Affairs (meeting with the press) will not normally be undertaken by ship personnel. However, appropriate measures will be undertaken to favourably affect public opinion whenever possible.
- In the event of a discharge, prevention and minimization of the spillage are priority concerns - consistent with the safety of the vessel, crew and shore side personnel.
- Cleanup on board the vessel will proceed without delay. If dispersants or degreasers are utilized on deck care shall be taken that they do not migrate overboard.
- If a spill occurs that discharges, migrates or spreads overboard, the cleanup will be conducted by shore side personnel under a standing engagement, or as otherwise arranged.
- Over – the – side cleanup activities by the ship's crew shall not normally be undertaken.
- Compliance with the provisions of this Shipboard Oil Pollution Emergency Plan is the responsibility of the Master or Barge Captain/PIC and the Emergency Response Team Leader.

Section 7 of the Canadian -Oil Pollution Prevention Regulations (SOR/93-3) and Regulation 26 of Annex I of MARPO L 73/78 require every oil tanker of 150 gross tons and above, and every vessel other than a tanker of 400 gross tons and above, to have a shipboard emergency plan with four elements;

1 procedures for reporting of pollution incidents;
2 a listing of authorities to be notified;
3 a detailed description of actions to be taken by a vessel's crew to reduce or control an oil discharge and
4 Procedures for coordinating on board activities with national and local authorities.

This Shipboard Oil Pollution Emergency plan meets the MARPOL requirements.

The plan required by Regulation 26 of Annex 1 0f MARPOL 73/78 will **not** fully meet the US regulations under the Oil Pollution Act of 1990 (OPA 90). However, OPA 90 regulations only pertain to tankers and other-vessels that carry oil either as primary or secondary cargo. They do not apply to dry cargo vessels such as freighters, containerships, RO/ROs, etc. While there is no requirement to do so, operators of these vessels are encouraged to develop Vessel Response Plans in the unlikely event of a pollution incident as the result of bunker transfer operations or other incidents involving fuel. The OPA 90 Vessel Response Plan for these vessels meets the intent of OPA 90 for operations in US navigable waters.

Under OPA each state is allowed to develop more stringent regulations for spill prevention and spill response activities. As such some states also require owners and operators of dry bulk vessels to develop and maintain Vessel Response Plans. One state also requires owners and operators of tank and dry cargo vessels to develop and maintain Spill Prevention Plans.

RESPONSE PLAN REQUIREMENTS

This Shipboard Oil Pollution Emergency Plan has been prepared to meet the requirements in MARPOL 73 annex 1, Regulation 26 with later amendments and particular requirements from various countries. This plan contains all information and operational instructions required by the IMO Guidelines (MEPC Circ. 256).

This plan has been examined by the Canadian Board of Steamship Inspection and, except as provided below" no alterations or revisions shall be made to any part of it without prior approval of the Board.

Changes to Section 5 and the Appendices will not be required to be reviewed by the Board. This Section and the Appendices shall be maintained according to the procedures in Section 1.4.

11.3 Environmental Protection

The Environmental Protection Plan encompasses the approach to environmental management and strategies for implementation set out in 11.0.1, management criteria set out in 11.1, and accidents and malfunctions, set out in 11.2.

11.4 Monitoring

Bilcon of Nova Scotia Corporation will develop and conduct monitoring programs for various environmental components. The objective of the monitoring programs will be to determine the accuracy of impact predictions, effectiveness of mitigation measures, and to determine if any adaptive management actions should be taken. The goal would be to ensure that the major phases of the project (construction and operational activities) meet regulatory requirements and environmental management objectives.

Monitoring program outlines have been presented previously in the EIS for valued environmental components. Where quantifiable threshold criteria exists for an identified environmental component or permit requirements indicate thresholds, these thresholds will be used as indicators of compliance. For environmental components without quantifiable threshold criteria, qualitative professional judgement will be used. If monitoring data indicates non-compliance with permit requirements, adaptive management procedures will be discussed with the appropriate regulatory authorities.

Bilcon of Nova Scotia Corporation will be responsible for all monitoring activities including funding of data collection, data analysis including laboratory work, and report preparation. A similar scientific approach as previously conducted for pre-project baseline data collection and analysis will be followed. Scientific methods will be followed. Monitoring results will be made available to interested regulatory agencies. Public access to the results will be made available through the Community Liaison Committee.

Following is **Table ECM - 2** which summarizes the environmental components identified to be monitored, the timing, frequency, and reference to the particular paragraph of the EIS which describes the proposed monitoring program.

11.5 Mitigation Measures

As noted under 4.2 Format, Bilcon has dealt with each physical, biological, or human VEC under the various sections in this EIS and has set out the discussion under Research, Analyses, Mitigation, Monitoring, and Impact Statement. This methodology was felt to provide more continuity to the reader.

However, all mitigation measures have been extracted from each of the VECs and are set out in **Table ECM - 1.**

Bilcon will be responsible for all mitigation measures set out in **Table ECM - 1** and the effectiveness of the mitigation will be checked through the follow-up monitoring program set out under each VEC and in **Table ECM - 2.**

Bilcon's Operations Manager will be specifically responsible to ensure that mitigation programs are estabalished at the appropriate times and to ensure that the monitoring program is carried out and reporting procedures observed.

11.6 Follow-up Program

For each of the VECs identified and examined which, following research and analysis, demonstrated the potential for a negative impact, a strategy for mitigation of the negative effect was established. This mitigation is shown in the section for each VEC and for the project as a whole, the mitigation measures are set out in **Table ECM - 1**

Each of these mitigation measures will be established by Bilcon at the appropriate time. However, it is critical to ensure that mitigation measures are having the desired effect. Accordingly, for each of the VECs where mitigation has been proposed, a program of follow-up monitoring is set out under the various VEC's and tabulated in the follow-up monitoring **Table ECM - 2.**

The procedures for ensuring that the monitoring regime is established and executed is set out under 11.0, Environmental Management, as are the strategies for reporting to both the Regulatory Agencies, where required, and to the community.

The proposed environmental monitoring program is designed to detect potential project impacts measured against an established baseline or threshold as described under each VEC. Exceeding a baseline or a threshold is a trigger for action and requires the Operations Manager to undertake adaptive management (developing improved techniques while conducting management activities) to reduce or eliminate environmental impacts. Adaptive management procedures are set out in para. 3.5 and 10.0.1.

11.7 Residual Impacts

Each identified VEC is examined in the EIS and the same methodology has been employed in each case. The parameters of the VEC are researched; the research is analyzed; where appropriate, mitigation measures are established; a monitoring program is specified to ensure that the mitigation measures are successful and, finally, the residual impact following mitigation is specified.

The impact statement in each case sets out the characteristics of the impact with respect to time, significance of the impact, and the scale of the impact following mitigation. The Impact Summary Table 2 in 9.4, sets out all the VEC's and the residual impacts.

Each VEC was selected as set out in 8.3 Section of the Valued Environmental Components, and Spatial and Temporal Boundaries are defined in 8.4.1 and 8.4.2. Further information on the Impact Assessment Methodology is contained in 8.0, as are definitions of temporal, magnitude, type, scale, signficance, and possibility.

11.8 Compensation

Although no significant negative effects of the project were identified, there were several insignificant negative effects in which compensation is proposed as part of the mitigation plan:

i) A small area of fish habitat will be lost in the footprint of the piles supporting the ship berthing dolphins and a compensation plan has been proposed by the Proponent and accepted in principle by the Department of Fisheries and Oceans Canada.

ii) The bulk carrier will leave the shipping lanes and travel to Whites Cove through an area where lobster fishing is carried out from December through May. Typically in the early winter months, traps are set some distance from shore but in the spring, lobsters move closer inshore and there will be an issue with respect to damage to lobster gear. Meetings with the fishermen who traditionally fish in Whites Cove have resulted in a basic agreement that the bulk carrier will travel the same route, both inbound and outbound each trip, and advance notice will be given to fishers. The Proponent will additionally give a sum of money to a committee of Whites Cove fishers each season which will be administered by the committee to compensate for damage to traps and other fishing gear.

iii) While it is considered highly unlikely that any domestic water well in the vicinity of the quarry operation will be affected, the Proponent will compensate any property owner whose well does become affected, as a result of quarry operations, by drilling a new well at the Proponent's expense.

iv) There apears to be no general perception among buyers that the quarry and marine terminal is likely to affect property values generally on Digby Neck and Islands. However, there is a possibility that property values may be affected in areas immediately adjacent to the operation. It is proposed that an evaluation by a qualified real estate appraiser take place on residential properties within 800 m of the active quarry prior to construction and a re-evaluation be carried out five years later to determine whether value has been lost. Any loss so determined would be compensated by Bilcon of Nova Scotia Corporation.

There is also no evidence that communities in the area of the quarry operation will suffer damages or losses due to the operation of the project. To the contrary, there is evidence that family sustaining jobs will be gained in local communities which will in part counter recent out-migration. However, it is the Proponent's corporate policy to support local communities and local organizations. This has been demonstrated over the past four years and will continue throughout the life of the project.

The fish habitat compensation plan will be implemented upon the Proponent receiving approval for the project, while other compensation agreements will be honoured on an annual basis in the case of the Whites Cove fishers and on an as-required basis in the case of well problems. The Proponent is the subsidiary of a well established New Jersey family-held company which will provide funding for the construction of the Whites Point project ($40.6 CAD million) from its own resources. No specific mechanism is proposed to finance the proposed compensation plans, other than from on-hand resources.

Faunal Analysis of the Proposed White's Point Quarry Site

Digby Neck, Digby County, Nova Scotia

prepared for

Paul G. Buxton

by

W. George Alliston, Ph.D.

Revised 12 January 2004

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Faunal Analysis of the Proposed White's Point Quarry Site
Digby Neck, Digby County, Nova Scotia
W. George Alliston, Ph.D. – Revised 12 January 2004

INTRODUCTION

This report assesses the use of the 155 ha "White's Point" property by terrestrial species of amphibians and reptiles, breeding birds, and mammals currently considered at risk in Nova Scotia.

SITE DESCRIPTION

This property is located on Digby Neck, Digby County, just north of the community of Little River on the west facing slope of the North Mountain. The western boundary of the property extends for 2.8 km along the Bay of Fundy shoreline (Figure 1). Until 2002, the property was almost entirely forested. Forests are heavily dominated by coniferous species: Balsam Fir, White, Red and Black Spruce. Deciduous species present include Red Maple, White Birch, Mountain Ash and Moose Maple. (For a botanical study of this site, see report by R. Newell.) Trees, particularly those along the coast, are stunted and wind sculpted. A significant proportion of the coniferous species (particularly White Spruce) are diseased, dead or dying. Many of the dead trees have fallen making the forest a dense tangle. In early 2002, a large section of forest along the property's east line was clear cut. On the 4 ha site at White's Cove, for which a quarrying permit has already been granted, trees were felled in 2002 but had not been removed at the time of this study.

The entire coastline of the property is basaltic rock. To the south of White's Point are areas with small (< 10 m) coastal cliffs, rock outcrops and large boulders. In this area there are small coastal barrens dominated by prostrate junipers. North of White's Point the shoreline is more gentle. Immediately east of the cove north of White's Point is a small (1.5 ha) freshwater wetland.

Four very small, and presumably seasonal, streams flow from or across the property into the Bay of Fundy. In the southeast corner of the property, there are a very small cattail marsh and several seasonal "sky ponds".

The forests on this property, and the habitats they provide, appear to be typical of the area and of the coastal forests of the North Mountain Basalt Ridge Natural Landscape. The same can be said of the coastal barrens. However, the small wetland north of White's Cove constitutes an uncommon habitat within this Natural Landscape.

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Figure 1. The White's Point Quarry property (2001 aerial photo).

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METHODS

The White's Point property was visited by the author on four occasions between 4 June 2002 and 23 June 2002. While information was gathered on all taxa of interest during each visit, the primary focus varied among visits.

4 June 2002 - (9:15 a.m. to 5:00 p.m.; sunny, very light breeze, temperature ~18°C) - The author, accompanied in the morning by David Kern, conducted a reconnaissance of the entire coastline of the property and selected woodland areas. All coastal cliffs and rock outcrops were inspected, habitats were noted and information was gathered on herptile, bird and mammal species present. Mammals were identified mainly by sign (tracks, scat, browse).

15 June 2002 - (10:30 a.m. to 12:30 p.m.; overcast, light winds, temperature ~20°C) - A second brief reconnaissance of parts of the property was conducted by the author and Mr. Bernard Forsythe, a very experienced amateur ornithologist and naturalist.

22 June 2002 - (7:30 p.m. to 10:30 p.m.; clear, calm, temperature ~18°C) - The main focus of this visit was to conduct a census of nocturnal birds as well as mammals and amphibians. The author was again accompanied by Mr. Bernard Forsythe. The surveyors walked to the north side of the cove north of White's Cove and returned via the coastal ATV trail and the road to White's Cove. During the return trip, in an attempt to identify any owl species using the area, calls of Great Horned Owls, Barred Owls, Long-eared Owls and Northern Saw-whet Owls were made periodically in the hope of getting a response should any of these species be present.

23 June 2002 - (5:15 a.m. to 11:08 a.m.; clear, winds calm to light, temperature ~15°C.) - The main focus of this visit was to conduct a census of breeding birds using the property. Again the author was accompanied by Mr. Bernard Forsythe. The surveyors traversed various habitats on the property identifying and recording bird species and numbers. Birds were identified primarily by their songs and calls. The survey was conducted in the early morning hours when the frequency of bird song is the greatest.

In this report "species at risk" refers to any amphibian, reptile, breeding bird and mammal species that is designated as colour rank red (at risk) or yellow (sensitive to human activities) by the Province of Nova Scotia or those that are ranked as being "extremely rare" (S1), "rare" (S2) or "uncommon" (S3) in the Province of Nova Scotia by the Atlantic Canada Conservation Data Centre (ACCDC) and those species that occur in Nova Scotia that have been designated as "endangered", "threatened", or of "special concern" by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). The definitions of the various rankings of these three systems

are presented in another section of this report (see **Amphibian, Reptile, Breeding Bird and Mammal Species At Risk in Nova Scotia**).

An assessment of the possible use of this area by species at risk was based on the census work conducted on the property, the availability of suitable habitat for these species, and their known ranges as determined from personal knowledge, the literature, the Atlantic Canada Conservation Data Centre database, and communications with knowledgeable individuals. Lists of the amphibians and reptiles, breeding birds, and mammals currently considered at risk in Nova Scotia and assessments of their actual or potential occurrence at this site are presented.

The common names of plants and animals are used in this report. The common and scientific names are listed alphabetically in Appendix 1.

SPECIES OF FAUNA RECORDED DURING SITE VISITS (June 2002)

Amphibians and Reptiles

No amphibian or reptile species at risk was recorded during our site visits.

The four amphibian species and two reptilian species recorded during the site visits are listed in Table 1.

A few Northern Spring Peepers were heard at several locations on the property. Several Green Frogs were heard in the small pond containing Common Cattails in the southeast corner of the property. Polliwogs and tadpoles, believed to be Eastern American Toads and Northern Spring Peepers, were observed in several of the small transient ponds in this area. An adult Eastern American Toad was also seen in this area.

A large Eastern Smooth Green Snake was observed sunning itself on the roadway at White's Cove. A large Maritime Garter Snake was observed in the wetland area adjacent to the cove north of White's Point. Pickerel Frogs were also seen in this wetland area.

Table 1. Amphibians and Reptiles

	How Recorded	
Species	Seen	Heard
Eastern American Toad	1	
Northern Spring Peeper		several
Green Frog		several
Pickerel Frog	2	
Maritime Garter Snake	1	
Eastern Smooth Green Snake	1	

Breeding Birds

One bird species at risk, the Boreal Chickadee, was found using the property. An immature Common Loon, another species at risk, was observed feeding in the coastal marine waters adjacent to the property.

The route taken during the 23 June 2002 bird survey is mapped in Figure 2. The route was divided into five sections: one (A) through an area that had been clear cut this year; one (C) along the coastline from White's Cove to near the northern extremity of the property; and three (B, D and E) through woodland areas. The three woodland sections are not markedly different although much of section D is closer to the coast than the other two and the trees are smaller and more stunted. Except for section D and part of section E, existing roadways and ATV trails were followed while conducting this survey. (For the coordinates associated with these sections, see Appendix 2.)

The nocturnal survey conducted on the evening of 22 June 2002 followed a course starting at a point on section C defined by the southern extremity of section D (see Figure 2) and proceeded in a southerly direction along sections C, B and A.

Table 2 presents the information collected on bird species and their distribution on the property (also see Figure 2). The data in Table 2 was primarily obtained from the 23 June 2002 breeding bird survey. When a species was observed only, or in greater numbers, on another visit, these data are also included in Table 2 and the inclusions noted.

A total of 47 bird species was recorded during our four visits to the property. Several are marine species and do not nest on the property. These species are colonial and nest mainly on islands and/or cliffs. They include Great Black-backed Gull, Herring Gull, Double Crested Cormorant, Northern Gannet and Common Eider. No nesting birds were found during our 4 June 2002 search of the small cliffs and rock outcrops on the property, presumably because the habitat available is inadequate. The one Common Loon and all the Northern Gannets seen in the coastal waters were immature plumaged (non-breeding) birds. (The closest active Northern Gannet colonies are in the Gulf of St. Lawrence.) Two small flocks of Common Eiders consisted mainly of males (probably post breeding) with a few females (probably either non-breeding or whose nesting attempts had failed). The single male Black Scoter observed in White's Cove is a rare summer visitor to this area, far from its breeding grounds in subarctic and arctic regions.

Two additional species were observed flying over the property but showed no particular affinity to it. An Osprey was seen flying over the property on our 4 June 2002 visit but was not observed on any subsequent visits. No Osprey nest was

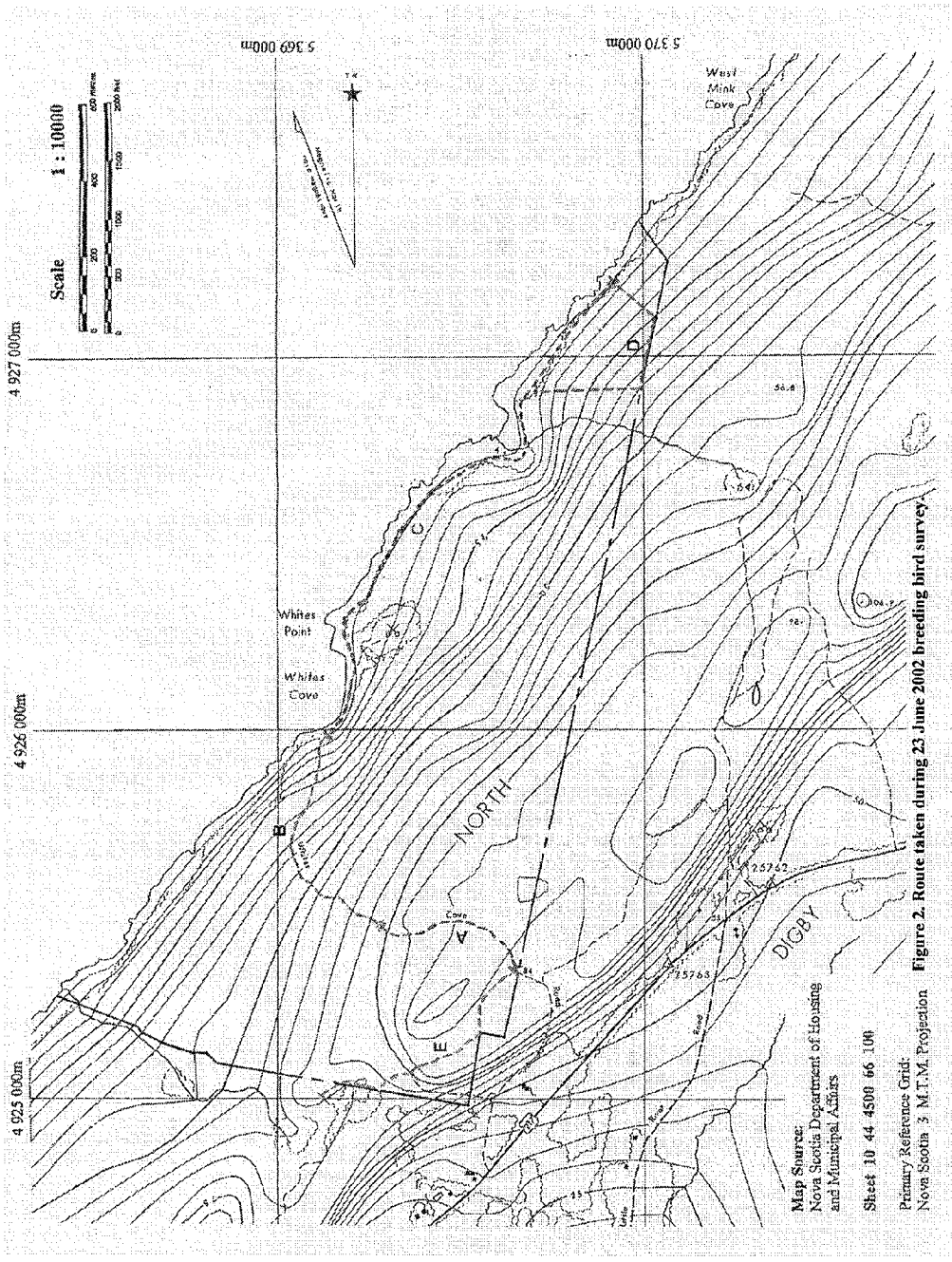

Figure 2. Route taken during 23 June 2002 breeding bird survey.

Table 2. White's Point Breeding Bird Survey – 23 June 2002

	Section					
Species	**A**	**B**	**C**	**D**	**E**	**Total**
Common Loon			1 Φ			1
Northern Gannet			15 Φ			15
Double-crested Cormorant			3			3
Common Eider			28			28
Black Scoter			1 **			1
Osprey		1 *				1
Broad-winged Hawk					3	3
Red-tailed Hawk			2 *			2
American Kestrel					1 **	1
Spotted Sandpiper			2			2
American Woodcock		2 ***				2
Herring Gull			15			15
Great Black-backed Gull			18	9		27
Barred Owl			2 ***			2
Ruby-throated Hummingbird					1	1
Northern Flicker		1		1	4	6
Yellow-bellied Flycatcher			1	1		2
Alder Flycatcher			3			3
Blue-headed Vireo		2				2
Red-eyed Vireo		1	1		1	3
American Crow	1		7	1	4	13
Common Raven		1	1	2		4
Black-capped Chickadee		1		1	1	3
Boreal Chickadee		2				2
Brown Creeper		1				1
Winter Wren	2	2			2	6
Golden-crowned Kinglet		2	1	2	2	7
Swainson's Thrush	7	8	12	8	3	38
Hermit Thrush		1				1
American Robin	4	4	1		1	10
Cedar Waxwing					4	4
Nashville Warbler				1		1
Northern Parula					1	1
Magnolia Warbler	2	3	7	7	4	23
Yellow-rumped Warbler	1	2	6	6	4	19
Black-and-white Warbler	1	2	2	3	1	9
Black-throated Green Warbler	2	9	7	2	4	24
Ovenbird		1	2	2		5
Common Yellowthroat			2	1		3
American Redstart		1	3		2	6
Savannah Sparrow			3			3
Song Sparrow			10	3		13
Swamp Sparrow			3			3
White-throated Sparrow	8	4	8	6	11	37
Dark-eyed Junco	10	7	12	1	3	33
Purple Finch			2		1	3
American Goldfinch					1	1
TOTAL	**38**	**58**	**181**	**57**	**59**	**393**

Φ immature
* recorded on 4 June 2002
** recorded on 15 June 2002
*** recorded on 22 June 2002 nocturnal survey

documented on the property. Three Broad-winged Hawks (two adult and one immature) were observed during the breeding bird survey; however, these birds were soaring together using the air currents along the ridge on the east boundary of the property and soon passed over the property following a northerly course.

Therefore, of the 47 bird species observed, it appears that 38 were using terrestrial habitats on the property and may have nested there in 2002.

The most frequently recorded species of breeding birds were Swainson's Thrush; Magnolia, Yellow-rumped and Black-throated Green Warbler; White-throated Sparrow and Dark-eyed Junco. These species include those whose habitat preferences include closed coniferous (or mixed) forests (Swainson's Thrush, Yellow-rumped Warbler, Black-throated Green Warbler); those that prefer younger more open forests (Magnolia Warbler) and those that prefer edges or forest openings (White-throated Sparrow, Dark-eyed Junco).

White-throated Sparrows, Dark-eyed Juncos and Winter Wrens had established territories within the clear cut area (Section A). Although other species were recorded in this section, their songs were heard coming from woodlands beyond the clear cut.

The three Swamp Sparrows recorded on the coastal section (C) were all found in the wetland adjacent to the cove north of White's Point. The only pair of Spotted Sandpipers seen on the property (and they were seen at the same location on three visits) were on the coastal "barrens" adjacent to the wetland. The three Savannah Sparrows were all recorded in the coastal "barrens" adjacent to this cove. Dark-eyed Juncos, Song Sparrows and White-throated Sparrows were common in this section and associated with the forest edge. Most other songbird species recorded in this section were heard singing in the woodlands adjacent to the coast.

Of the three species of raptorial birds that used the site it was the pair of Barred Owls that demonstrated the greatest territoriality. These birds, which were in the woodland immediately east of White's Cove, responded to our Barred Owl calls and continued their calling for at least twenty minutes. A "pair" of Red-tailed Hawks, consisting of one adult and one immature plumaged bird, was observed twice on 4 June at White's Cove: once in the early morning and again in the late afternoon. These birds were not seen on the property during the 23 June survey; however, after completing the survey a similar adult-immature "pair" was observed adjacent to the property along Highway 217. The third raptor species seen using the property, the American Kestrel, was observed only once (15 June).

Mammals

No mammal species at risk was observed during our site visits.

Table 3 lists the ten mammal species whose presence on the site was confirmed either by observation or by sign (tracks, scats, browse).

Two marine mammal species, the Harbour Seal and the Harbour Porpoise, were observed in the coastal waters adjacent to the property. An abundance of sign suggested reasonable populations of Varying Hare, Coyote, Raccoon, Striped Skunk and White-tailed Deer on the property. American Red Squirrel and American Porcupine were also present. A single Mink was observed on the shoreline of the cove north of White's Point.

Table 3. Mammals and Mammal Sign Observed

	How Detected	
Species	Seen	Sign
Varying Hare		√
American Red Squirrel	2	√
American Porcupine	2	√
Coyote		√
Raccoon		√
Mink	1	
Striped Skunk		√
Harbour Seal	3	
White-tailed Deer		√
Harbour Porpoise	2+	

ASSESSMENT OF OCCURRENCE AND USE OF THE WHITE'S POINT PROPERTY BY FAUNAL SPECIES AT RISK IN NOVA SCOTIA

Derivation of Species at Risk Lists

As indicated above, I have derived species at risk lists for amphibians, reptiles, breeding birds and mammals from three sources: the General Status of Wild Species in Nova Scotia as defined by the Province of Nova Scotia, the Nova Scotia (sub-national) rankings defined by the Atlantic Canada Conservation Data Centre (ACCDC), and the Canadian rankings as defined by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC).

I have considered all species designated by the Province of Nova Scotia as colour ranks Red and Yellow as "species at risk". The definitions of the Province of Nova Scotia colour rankings are as follows:

"**BLUE** (Extirpated/Extinct) – Species that are no longer thought to be present in the province or in Canada, or that are believed to be extinct. Extirpated species have been eliminated from a given geographic area but may occur in other areas. Extinct species are extirpated worldwide (i.e. they no longer exist anywhere). Species listed by COSEWIC as extinct or nationally extirpated automatically receive an Extirpated/Extinct general status rank. This rank applies at the national level and in whichever province or territory the species formerly existed. Nationally Extirpated/Extinct species are not considered part of Nova Scotia's species richness.

RED (At Risk or Maybe at Risk) – Species for which a formal detailed risk assessment has been completed (COSEWIC assessment or a provincial equivalent) and that have been determined to be at risk of extirpation or extinction and are therefore candidates for interim conservation action and detailed risk assessment by COSEWIC or the Province.

YELLOW (Sensitive) – Species that are not believed to be at risk of immediate extirpation or extinction, but which may require special attention or protection to prevent them from becoming at risk.

GREEN (Secure) – Species that are not believed to be at risk, or sensitive. This category includes some species that have declined in numbers but remain relatively widespread or abundant.

UNDETERMINED – Species for which insufficient data, information, or knowledge is available to reliably evaluate their status."
(http://www.gov.ns.ca/natr/wildlife/genstatus/background.htm)

For further information on the Province of Nova Scotia status assessment process, see the above Government of Nova Scotia web site.

I have also considered all species designated by the Atlantic Canada Conservation Data Centre as sub-national (S) ranks S1, S2, S3 for the Province of Nova Scotia as "species at risk". The sub-national rank definitions used by ACCDC are as follows:

"**S1** – Extremely rare throughout its range in the province (typically 5 or fewer occurrences or very few remaining individuals). May be especially vulnerable to extirpation.

S2 – Rare throughout its range in the province (6 to 20 occurrences or few remaining individuals). May be vulnerable to extirpation due to rarity or other factors.

S3 – Uncommon throughout its range in the province, or found only in a restricted range, even if abundant in some locations. (21 to 100 occurrences).

S4 – Usually widespread, fairly common throughout its range in the province, and apparently secure with many occurrences, but the Element is of long-term concern (e.g. watch list). (100+ occurrences).

S5 – Demonstrably widespread, abundant, and secure throughout its range in the province, and essentially ineradicable under present conditions.

S#S# - Numeric range rank: A range between two consecutive numeric ranks. Denotes uncertainty about the exact rarity of the Element (e.g., S1S2).
SH - Historical: Element occurred historically throughout its range in the province (with expectation that it may be rediscovered), perhaps having not been verified in the past20 - 70 years (depending on the species), and suspected to be still extant.

SU – Unrankable: Possibly in peril throughout its range in the province, but status uncertain; need more information."

Qualifiers for these ranks include:

"**B** – Breeding: Basic rank refers to the breeding population of the element in the province.

? – Inexact or uncertain: for numeric ranks, denotes inexactness, e.g. SE? denotes uncertainty of exotic status. (The ? qualifies the character immediately preceding it in the S rank)." (http://www.accdc.com/products/lists/ranks).

In addition, the ACCDC provides both national (N ranks) and global (G ranks) for those species. The N and G rank definitions are similar to the S ranks but applied at a national or global level. For more information on the ACCDC ranking system, see the above web site.

I have also considered those species which occur in Nova Scotia that have been designated by COSEWIC as being endangered (E), threatened (T) or of special concern (SC). The definitions for the designations used by COSEWIC are as follows:

Extinct (X)	A species that no longer exists.
Extirpated (XT)	A species no longer existing in the wild in Canada, but occurring elsewhere.
Endangered (E)	A species facing imminent extirpation or extinction.
Threatened (T)	A species likely to become endangered if limiting factors are not reversed.
Special Concern (SC)	A species of special concern because of characteristics that make it particularly sensitive to human activities or natural events.
Not at Risk (NAR)	A species that has been evaluated and found to be not at risk.
Data Deficient (DD)	A species for which there is insufficient scientific information to support status designation.

(http://www.cosewic.gc.ca/eng/sct0/index_e.cfm)

COSEWIC's mandate is at the national level so its rankings may vary from the other two sources that take a provincial viewpoint. Further information can be obtained regarding COSEWIC at the above web site.

The following lists include the common name of each species at risk, their status rankings by the Province of Nova Scotia, the ACCDC and COSEWIC, and an assessment of their possible occurrence at or immediately adjacent to the quarry property. Assessments of the occurrence of each species is based on our survey work, the known distribution of the species and its habitat preferences.

Amphibians and Reptiles

	Status			
	Prov. of N.S.	ACCDC	COSEWIC	
Amphibian Species	Colour Ranking	N.S. S Ranking	Canadian Ranking	Possible Occurrence At or Adjacent to Sites
Four-toed Salamander	yellow	S3	NAR	unlikely

The only amphibian species at risk in Nova Scotia is the Four-toed Salamander (yellow, S3). The very small streams and ponds on the property do not have the sphagnum borders required by this species for breeding. The Nova Scotia Herpetofaunal Atlas database indicates that no observations of this species have been reported in Digby, Annapolis or Yarmouth Counties. I therefore think it highly unlikely that this species occurs on this property.

	Status			
	Prov. of N.S.	ACCDC	COSEWIC	
Reptile Species	Colour Ranking	N.S. S Ranking	Canadian Ranking	Possible Occurrence At or Adjacent to Sites
Blanding's Turtle	red	S1	T	highly unlikely
Wood Turtle	yellow	S3	SC	unlikely
Northern Ribbon Snake	yellow	S2S3	T	highly unlikely

Two of the reptile species at risk, Blanding's Turtle (red, S1T) and the Northern Ribbon Snake (yellow, S2S3, T), are relic disjunct populations confined to southwestern Nova Scotia. The third species, the Wood Turtle (yellow, S3, SC), is widely dispersed with most records coming from the central and northeast mainland and southwestern Cape Breton. Wood Turtles have not been recorded in Digby County. Furthermore the very small and rapidly flowing small streams on the property would not provide adequate habitat for this species.

I therefore believe that it is highly unlikely that any amphibian or reptile species at risk in Nova Scotia would occur on this property.

Breeding Birds

	Status			
	Prov. of N.S.	ACCDC	COSEWIC	
Breeding Bird Species	**Colour Ranking**	**N.S. S Ranking**	**Canadian Ranking**	**Possible Occurrence At or Adjacent to Site**
Peregrine Falcon	red	S1B	T	highly unlikely
Piping Plover	red	S1B	E	n/a
Roseate Tern	red	S1B	E	n/a
Common Loon	yellow	S4B	NAR	highly unlikely
Black-crowned Night Heron	yellow	S1B	-	highly unlikely
Northern Goshawk	yellow	S3B	NAR	unlikely
Common Tern	yellow	S3B	NAR	n/a
Arctic Tern	yellow	S3B	-	n/a
Razorbill	yellow	S1B	-	n/a
Atlantic Puffin	yellow	S1B	-	n/a
Long-eared Owl	yellow	S1S2B	-	unlikely
Short-eared Owl	yellow	S1S2B	SC	highly unlikely
Purple Martin	yellow	S1S2B	-	highly unlikely
Eastern Bluebird	yellow	S2S3B	NAR	highly unlikely
Bicknell's Thrush	yellow	S1S2B	SC	highly unlikely
Vesper Sparrow	yellow	S2S3B	-	highly unlikely
"Ipswich" Savannah Sparrow	yellow	S1S2B	SC	highly unlikely
Nelson's Sharp-tailed Sparrow	yellow	S2S3B	NAR	possible
Bobolink	yellow	S3B	-	highly unlikely
Eastern Meadowlark	yellow	S1S2B	-	highly unlikely
Least Bittern	green	S1B	T	highly unlikely
Northern Pintail	green	S2B	-	highly unlikely
Northern Shoveler	green	S2B	-	highly unlikely
Gadwall	green	S2B	-	highly unlikely
Common Goldeneye	green	S2B	-	highly unlikely
Red-breasted Merganser	green	S2S3B	-	highly unlikely
Cooper's Hawk	green	S1?B	NAR	highly unlikely
Merlin	green	S3S4B	-	unlikely

continued on next page

	Status			
	Prov. of N.S.	ACCDC	COSEWIC	
Breeding Bird Species (*cont.*)	**Colour Ranking**	**N.S. S Ranking**	**Canadian Ranking**	**Possible Occurrence At or Adjacent to Site**
Virginia Rail	green	S2B	-	highly unlikely
Common Moorhen	green	S1B	-	highly unlikely
American Coot	green	S2B	-	highly unlikely
Semipalmated Plover	green	S2B	-	highly unlikely
Greater Yellowlegs	green	S2B	-	highly unlikely
Solitary Sandpiper	green	S1B	-	highly unlikely
Upland Sandpiper	green	S1B	-	highly unlikely
Least Sandpiper	green	S1B	-	highly unlikely
Wilson's Phalarope	green	S1B	-	highly unlikely
Black-legged Kittiwake	green	S2B	-	n/a
Black Tern	green	S1B	NAR	highly unlikely
Black-billed Cuckoo	green	S3B	-	highly unlikely
Boreal Owl	green	S1?B	-	highly unlikely
Whip-poor-will	green	S2B	-	highly unlikely
Willow Flycatcher	green	S1B	-	highly unlikely
Eastern Phoebe	green	S2S3B	-	highly unlikely
Great Crested Flycatcher	green	S2S3B	-	highly unlikely
Horned Lark	green	S2B	-	highly unlikely
Boreal Chickadee	green	S3S4B	-	observed
Marsh Wren	green	S2B	-	highly unlikely
Wood Thrush	green	S2B	-	unlikely
Northern Mockingbird	green	S3B	-	highly unlikely
Brown Thrasher	green	S1S2B	-	highly unlikely
Loggerhead Shrike	accidental	SHB	E	highly unlikely
Warbling Vireo	green	S2B	-	highly unlikely
Philadelphia Vireo	green	S2B	-	highly unlikely
Scarlet Tanager	green	S3B	-	highly unlikely
Northern Cardinal	green	S3B	-	highly unlikely
Indigo Bunting	green	S2S3B	-	highly unlikely
Rusty Blackbird	green	S3S4B	-	possible
Baltimore Oriole	green	S3B	-	highly unlikely

The only bird species at risk observed using terrestrial habitats on the proposed quarry property was the Boreal Chickadee. This species is not designated as being at risk by the Province of Novas Scotia (colour ranking green); however, the ACCDC ranking for this species is S3S4. The global ranking for this species is "secure" (G5) as is the Canadian national ranking (N5). Nova Scotia is the only province where this species is considered potentially at risk.

As the name implies, the Boreal Chickadee is a bird of the coniferous, particularly spruce, forests across Canada (Erskine, 1992). The Newfoundland and Nova Scotia populations exhibit some genetic differentiation from the continental populations (Gill *et al.*, 1993). Erskine (1992) estimated the Nova Scotia breeding population at 34,000 ± 12,000 pairs. He also suggests that, in recent years, Boreal Chickadee populations seem to be in decline throughout the Maritimes. Erskine (1992) also suggests that one of the reasons for the recent decline is, "Extensive clear-cutting of pure softwood stands including "salvage" after major budworm kills….".

In recent years the Spruce Beetle has killed large numbers of conifers in the Digby Neck area. The wide-spread "salvage" clear-cutting of the forests in this area is undoubtedly reducing the available habitat for Boreal Chickadees.

Two Boreal Chickadees were recorded during our 2002 site visits. I consider it most likely that Boreal Chickadees do nest on the property, but probably in relatively low numbers.

Another bird species at risk observed during our site visits was the Common Loon (yellow, S4B). The single bird observed was a subadult that was feeding in the coastal marine waters adjacent to the site. Non-breeding Common Loons regularly use coastal marine waters to summer and moult. Breeding Common Loons, however, require large freshwater lakes on which to nest. On Digby Neck, Harris Lake and Lake Midway are the only lakes of sufficient size to support breeding Common Loons and these lakes are 7 and 9 km, respectively, from the White's Point property.

Although none was found during our 2002 census, there is a small possibility that Nelson's Sharp-tailed Sparrows (yellow, S2S3B) might nest in the small coastal wetland on this property.

Nelson's Sharp-tailed Sparrow is generally a coastal species most often associated with salt marshes and other coastal and estuarine wetland habitats. It has been estimated that the breeding population of the entire Maritime provinces is less than 2,500 pairs (Erskine, 1992). A volunteer-based study of coastal wetlands of the Maritime provinces, initiated in 2000, suggests that even relatively small coastal wetlands can be important nesting habitat for this species.

On our three visits to the small (~ 1.5 ha) coastal (freshwater) wetland in the cove north of White's Point, no Nelson's Sharp-tailed Sparrows were observed. Swamp Sparrows were found in this marsh and Savannah Sparrows, with which Nelson's Sharp-tailed Sparrows are often associated, were found in the adjacent coastal barrens. While I believe that this habitat would be at best marginal, further information from the ongoing study of coastal wetlands might help clarify this situation.

Although our site visits and nocturnal survey did not reveal its presence, there is a remote possibility that Long-eared Owls (yellow, S1S2B) could nest on the site. This secretive and generally quiet species, which confines its hunting until after dark and roosts in dense conifers during the day, is very difficult to detect. Long-eared Owls tend to nest in "thick evergreen woods" generally in nests constructed by another bird species (American Crow or hawk) or on thick growths of "witches broom" that afflict spruces and Balsam Fir (Tufts, 1986). In Mr. Forsythe's experience (he has been working with owls for almost 30 years) and as suggested by Tufts (1986), Long-eared Owls prefer nest sites immediately adjacent to a "cleared space" (fields, pastures, meadows) that can support high densities of their primary food, mice. Since there are such habitats available along the Digby Neck, it seems likely that such habitats would be favoured over the strictly woodland habitat of this property. An additional factor that might affect use of the property by Long-eared Owls is competition with the pair of Barred Owls that use this property as part their home range.

Another species at risk, the Northern Goshawk (yellow, S3B), might include habitat such as this property within its home range, which can exceed 2,000 ha and can contain a variety of habitats. Northern Goshawk nest sites, however, are generally confined to more specific habitat. Their preferred nesting habitat is in large tracts of mature forests containing tall trees and having a somewhat open understory in which they can hunt. The dense stands of stunted trees that dominate this property would not provide preferred nesting habitat for the Northern Goshawk. I therefore consider it unlikely that Northern Goshawks would nest on this property.

A review of information from the ACCDC database indicates that two bird species at risk had been previously recorded nesting in the vicinity of the proposed quarry site: the Wood Thrush (green, S2B) and the Rusty Blackbird (green, S3S4B).

The Wood Thrush appears to be extending its range north and east and in recent years there have been several breeding records, mainly in central southwestern Nova Scotia (Erskine, 1992). Since this species breeds in the eastern deciduous forest, its presence as a breeding bird on Digby Neck is surprising. It seems quite unlikely that breeding Wood Thrushes would use the predominantly coniferous woodlands that dominate this property.

The Rusty Blackbird, on the other hand, approaches the southern limits of its range in Nova Scotia. It is a boreal species and breeds in spruce bogs, swamps and alder swales. The small coastal wetland on this property could provide potential nesting habitat for Rusty Blackbirds although none was observed during our 2002 site visits.

Mammals

	Status			
	Prov. of N.S.	ACCDC	COSEWIC	
Mammal Species	**Colour Ranking**	**N.S. S Ranking**	**Canadian Ranking**	**Possible Occurrence At or Adjacent to Site**
Eastern Cougar	undetermined	SU	DD	highly unlikely
American Marten	red	S1	-	highly unlikely
Lynx	red	S1	NAR	highly unlikely
Moose	red	S1	-	highly unlikely
Eastern Pipistrelle	yellow	S1?	-	unlikely
Fisher	yellow	S2	-	unlikely
Gaspé Shrew	yellow	S2	SC	highly unlikely
Hoary Bat	yellow	S2?	-	unlikely
Little Brown Bat	yellow	S4	-	possible
Long-tailed Shrew	yellow	S1	-	highly unlikely
Northern Long-eared Bat	yellow	S2	-	possible
Red Bat	yellow	S2?	-	unlikely
Silver-haired Bat	yellow	S1?	-	unlikely
Southern Flying Squirrel	yellow	S1	SC	unlikely
Southern Bog Lemming	green	S3S4	-	unlikely
Rock Vole	green	S2	-	highly unlikely

There is relatively little information available concerning the distribution, numbers and habitat use by bats in Nova Scotia. While no bats were observed during our nocturnal survey, it is conceivable that bat species at risk could frequent the property during their nocturnal foraging.

Recent work by Hugh Broders *et al.* (2003) confirms that, in southwestern Nova Scotia, the two *Myotis* species, Little Brown Bat (yellow, S4) and Northern Long-eared Bat (yellow, S2), are the most common species and the Eastern Pipistrelle (yellow, S1?) may be locally common. Broders *et al.* suggest that the small numbers of observations recorded for the other three species (Hoary (yellow, S2?), Red (yellow, S2?) and Silver-haired (yellow, S1?)) might represent extralimital occurrences.

Three of these bat species (Silver-haired, Red and Hoary) are migratory. Broders *et al.* (2003), reasoning that if these species were to occur in Nova Scotia, like avian migrants, they might become concentrated in staging areas such as Brier Island, before and after their migratory flights over the Gulf of Maine. During 2001 they conducted echolocation and trapping studies of bats in southwestern Nova Scotia during the spring and fall migration period as well as in the late spring and early summer when the young are born and reared. Only 0.02 % of the echolocation sequences recorded could be attributed to these three bat species. On Brier Island (presumably migratory bats summering on Digby Neck and the adjacent mainland would migrate via Brier Island) of these three migratory species, only the Hoary Bat was detected and only two echolocation sequences of this species were recorded. It would therefore appear most unlikely that any of these species would be found at the proposed quarry site or indeed anywhere in the Digby Neck area. These species are all solitary during June and July when the young are born and reared and roost singly in trees during daylight hours.

The females of the two *Myotis* species often form maternity colonies where the young are reared. Although maternity colonies of both species can be in tree cavities, female Little Brown Bats show a decided preference for buildings (Peterson, 1974; Schowalter *et al.*, 1979). In southern New Brunswick, Broders and Forbes (*in press*) found that female Northern Long-eared Bats that had maternity colonies in tree cavities showed a very marked preference for shade-tolerant hardwood trees in mature hardwood-dominated stands. Conversely, the males of both the Long-eared Bat and the Little Brown Bat showed a marked preference for roosting sites in softwood trees in softwood-dominated mixed stands. Since there are no mature, shade-tolerant hardwood stands on or adjacent to this site, it would appear that the quarry site and adjacent woodlands would provide much better roosting habitat for male *Myotis* bats than for maternity colonies of females.

Female Eastern Pipistrelles are known to form maternity colonies; in other parts of North America, maternity colonies have been found in buildings, tree foliage and rock crevices. Current thinking is that maternity colonies are "often (hidden) inside a clump of dead leaves in an otherwise healthy (deciduous) tree" (Kurta, 2001). While there are rock crevices and some deciduous trees on the property, it is unlikely that maternity colonies of Eastern Pipistrelles would be found here. While censusing bats

by capture and echolocation in 2001, Broders *et al.* (2003) were unsuccessful in detecting this species on nearby Brier Island. Furthermore, Eastern Pipistrelles that were detected on the mainland were always found in association with fresh water: 90 % rivers, 10 % still waters.

There are no known caves on the property that could provide roosts or hibernacula for any of the resident bat species.

Although three other mammal species at risk (American Marten (red, SU), Moose (red, S1),Fi sher(yellow, S2)) are known to occur in Digby County, and the property could provide marginal habitat for all three, there is no evidence that these species occur here. It is possible to be quite unequivocal concerning the presence of Moose on the property, and indeed in the general area, but it is more difficult in the cases of these two small and mobile mustelid species.

By the 1930's the Fisher was considered extirpated from Nova Scotia. In the late 1940's a first attempt was made at reintroducing this species into the province by releasing 12 ranch raised animals in the general area of the Tobeatic Wildlife Management Area. This release is believed to have resulted in the establishment of sparse Fisher populations in Annapolis, Digby, Queens, Shelburne and Yarmouth Counties. Mike Boudreau (*pers. comm.*) examined over 1,000 harvest records for the province going back to 1981 and found 63 records for Digby County, none from Digby Neck. The closest reported trapping of this species was a single animal taken in 1996 around Henderson's Brook at the head of St. Mary's Bay.

The Fisher reintroduction program resumed in the late 1990's and reintroductions in Hants, Halifax and Kings Counties are in progress in an attempt to link the sparse Fisher populations of southwestern Nova Scotia with the more recent (mid-1960's), and more successful, reintroductions in the northeastern mainland. No releases are planned for the Digby Neck area.

The American Marten has a history quite similar to the Fisher having been virtually extirpated from mainland Nova Scotia by the early 1900's. A reintroduction program was begun in 1986 with the release of animals, trapped in northern New Brunswick, in Kejimkujik National Park. This program continued until 1994. This reintroduction program appears to have been successful and American Marten are believed to have become established and spread from their initial release sites. However, the status of the mainland population is not well known. Given that the reintroduction program is relatively recent, that the American Marten is slow to reproduce (sexual maturity at 3 years), and its preferred habitat is old forest, it seems unlikely that this species would have now expanded its range to the far end of the Digby Neck.

Mark Elderkin (*pers. comm.*) suggest that climatic factors, such as lack of winter snow pack in the Digby Neck and other coastal areas, could also contribute to making these areas a less favourable habitat for American Marten.

SUMMARY

1) Four visits were made to the 155 ha White's Point property in June 2002 to census reptile and amphibian, breeding bird and mammal populations and to assess habitat potential for these species at risk in Nova Scotia.

2) One species at risk, the Boreal Chickadee, was documented using this property.

3) An analysis of habitat use and known distributions of species at risk concluded:

- **a) It is highly unlikely that any reptile or amphibian species at risk occur on this site.**
- **b) Although the woodlands of this property could provide marginal nesting habitat for one bird species at risk, the Long-eared Owl, given that better potential nesting habitat exists in adjacent areas, it is unlikely that these owls would be found here.**
- **c) A small coastal wetland on the property might provide marginal nesting habitat for Nelson's Sharp-tailed Sparrow and/or Rusty Blackbird although none was recorded at the site.**
- **d) Although two bat species at risk, the Little Brown Bat and the Northern Long-eared Bat, might use this property for foraging, it is unlikely that these species would have maternity colonies on this property and certainly are no more likely to occur here than on similar adjacent properties.**

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Nova Scotia Museum of Natural History - http://museum.gov.ns.ca/mnh/

University of Michigan, Museum of Zoology - http://www.ummz.lsa.umich.edu/

U.S. Forestry Service - http://www.fs.fed.us/database/feis/

Herptofaunal Atlas - database - http://landscape.acadiau.ca/herpatlas/

APPENDIX 1
COMMON AND SCIENTIFIC NAMES OF PLANTS AND ANIMALS CITED IN THIS ANALYSIS

Plants

Common Name	Scientific Name
Balsam Fir	*Abies balsamea*
Black Spruce	*Picea mariana*
Common Cattail	*Typha latifolia*
Junipers	*Juniperus spp.*
Moose Maple	*Acer pensylvanicum*
Mountain Ash	*Sorbus americana*
Red Maple	*Acer rubrum*
Red Spruce	*Picea rubens*
White Birch	*Betula papyifera*
White Spruce	*Picea glauca*

Insects

Common Name	Scientific Name
Spruce Beetle	*Dendroctonus rufipennis*

Amphibians

Common Name	Scientific Name
Eastern American Toad	*Bufo americanus americanus*
Four-toed Salamander	*Hemidactylium scutatum*
Green Frog	*Rana clamitans melanota*
Northern Spring Peeper	*Hyla crucifer crucifer*
Pickerel Frog	*Rana palustris*

Reptiles

Common Name	Scientific Name
Blanding's Turtle	*Emydoidea blandingi*
Northern Ribbon Snake	*Thamnophis sauritus septentrionalis*
Wood Turtle	*Clemmys insculpta*
Maritime Garter Snake	*Thamnophis sirtalis pallidula*
Eastern Smooth Green Snake	*Opheodrys vernalis vernalis*

Birds

Common Name	Scientific Name
Alder Flycatcher	*Empidonax alnorum*
American Coot	*Fulica americana*
American Crow	*Corvus brachyrhynchos*
American Goldfinch	*Carduelis tristis*
American Kestrel	*Falco sparverius*
American Redstart	*Setophaga ruticilla*
American Robin	*Turdus migratorius*
American Woodcock	*Scolopax minor*
Arctic Tern	*Sterna paradisaea*
Atlantic Puffin	*Fratercula arctica*
Baltimore Oriole	*Icterus galbula*
Barred Owl	*Strix varia*
Bicknell's Thrush	*Catharus bicknelli*
Black Scoter	*Melanitta nigra*
Black Tern	*Chlidonias niger*
Black-and-white Warbler	*Mniotilta varia*
Black-billed Cuckoo	*Coccyzuz erythropthalmus*
Black-capped Chickadee	*Poecile atricapilla*
Black-crowned Night-Heron	*Nycticorax nycticorax*
Black-legged Kittiwake	*Rissa tridactyla*
Black-throated Green Warbler	*Dendroica virens*
Blue-headed Vireo	*Vireo solitarius*
Bobolink	*Dolichonyx oryzivorus*
Boreal Chickadee	*Poecile hudsonica*
Boreal Owl	*Aegolius funereus*
Broad-winged Hawk	*Buteo platypterus*
Brown Creeper	*Certhia americana*
Brown Thrasher	*Toxostoma rufum*

Birds (continued)

Common Name	**Scientific Name**
Cedar Waxwing	*Bombycilla cedrorum*
Common Eider	*Somateria mollissima*
Common Goldeneye	*Bucephala islandica*
Common Loon	*Gavia immer*
Common Moorhen	*Gallinula chloropus*
Common Raven	*Corvus corax*
Common Tern	*Sterna hirundo*
Common Yellowthroat	*Geothlypis trichas*
Cooper's Hawk	*Accipiter cooperii*
Dark-eyed Junco	*Junco hyemalis*
Double-crested Cormorant	*Phalacrocorax auritus*
Eastern Bluebird	*Sialia sialis*
Eastern Meadowlark	*Sturnella magna*
Eastern Phoebe	*Sayornis phoebe*
Gadwall	*Anas strepera*
Golden-crowned Kinglet	*Regulus satrapa*
Great Black-backed Gull	*Larus marinus*
Great Crested Flycatcher	*Myiarchus crinitus*
Greater Yellowlegs	*Tringa melanoleuca*
Hermit Thrush	*Catharus guttatus*
Herring Gull	*Larus argentatus*
Horned Lark	*Eremophila alpestris*
Indigo Bunting	*Passerina cyanea*
"Ipswich" Savannah Sparrow	*Passerculus sandwichensis princeps*
Least Bittern	*Ixobrychus exilis*
Least Sandpiper	*Calidris minutilla*
Loggerhead Shrike	*Lanius ludovicianus*
Long-eared Owl	*Asio otus*
Magnolia Warbler	*Dendroica magnolia*
Marsh Wren	*Cistothorus palustris*
Merlin	*Falco columbarius*
Nashville Warbler	*Vermivora ruficapilla*
Nelson's Sharp-tailed Sparrow	*Ammodramus nelsoni*
Northern Cardinal	*Cardinalis cardinalis*
Northern Flicker	*Colaptes auratus*
Northern Gannet	*Morus bassanus*
Northern Goshawk	*Accipiter gentilis*
Northern Mockingbird	*Mimus polyglottos*
Northern Parula	*Parula americana*

Birds (continued)

Common Name	**Scientific Name**
Northern Pintail	*Anas acuta*
Northern Shoveler	*Anas clypeata*
Osprey	*Pandion haliaetus*
Ovenbird	*Seiurus aurocapillus*
Peregrine Falcon	*Falco peregrinus*
Philadelphia Vireo	*Vireo philadelphicus*
Piping Plover	*Charadrius melodus*
Purple Finch	*Carpodacus purpureus*
Purple Martin	*Progne subis*
Razorbill	*Alca torda*
Red-breasted Merganser	*Mergus serrator*
Red-eyed Vireo	*Vireo olivaceus*
Red-tailed Hawk	*Buteo jamaicensis*
Roseate Tern	*Sterna dougallii*
Ruby-throated Hummingbird	*Archilochus colubris*
Rusty Blackbird	*Euphagus carolinus*
Savannah Sparrow	*Passerculuc sandwichensis*
Scarlet Tanager	*Piranga olivacea*
Semipalmated Plover	*Charadrius semipalmatus*
Short-eared Owl	*Asio flammeus*
Solitary Sandpiper	*Tringa solitaria*
Song Sparrow	*Melospiza melodia*
Spotted Sandpiper	*Actitis macularia*
Swainson's Thrush	*Catharus ustulatus*
Swamp Sparrow	*Melospiza georgiana*
Upland Sandpiper	*Bartramia longicauda*
Vesper Sparrow	*Pooecetes gramineus*
Virginia Rail	*Rallus limicola*
Warbling Vireo	*Vireo gilvus*
Whip-poor-will	*Caprimulgus vociferus*
White-throated Sparrow	*Zonotrichia albicollis*
Willow Flycatcher	*Empidonax trailii*
Wilson's Phalarope	*Phalaropus tricolor*
Winter Wren	*Troglodytes troglodytes*
Wood Thrush	*hylocichla mustelina*
Yellow-bellied Flycatcher	*Empidonax flaviventris*
Yellow-rumped Warbler	*Dendroica coronata*

Mammals

Common Name	**Scientific Name**
American Marten	*Martes americana*
American Porcupine	*Erethizon dorsatum*
American Red Squirrel	*Tamiasciurus hudsonicus*
Coyote	*Canis latrans*
Eastern Cougar	*Felis concolor*
Eastern Pipistrelle	*Pipistrellus subflavus*
Fisher	*Martes pennanti*
Gaspe Shrew	*Sorex gaspensis*
Hoary Bat	*Lasiurus cinereus*
Little Brown Bat	*Myotis lucifugus*
Long-tailed Shrew	*Sorex dispar*
Lynx	*Lynx canadensis*
Mink	*Mustela vison*
Moose	*Alces alces*
Northern Long-eared Bat	*Myotis septentrionalis*
Raccoon	*Procyon lotor*
Red Bat	*Lasiurus borealis*
Rock Vole	*Microtus chrotorrhinus*
Silver-haired Bat	*Lasionycteris noctivagans*
Striped Skunk	*Mephitis mephitis*
Southern bog Lemming	*synaptomys cooperi*
Southern Flying Squirrel	*Glaucomys volans*
White-tailed Deer	*Odocoileus virgianus*

APPENDIX 2
CO-ORDINATES OF SECTIONS OF BREEDING BIRD SURVEY
(23 JUNE 2002)

A	Start (E extremity)	N44°27.390'	W66°08.285'
	End (W extremity)	N44°27.452'	W66°08.556'
B	Start (S extremity)	N44°27.452'	W66°08.556'
	End (N extremity)	N44°27.723'	W66°08.682'
C	Start (S extremity)	N44°27.723'	W66°08.682'
	End (N extremity)	N44°28.395'	W66°08.091'
D	Start (S extremity)	N44°28.237'	W66°08.257'
	Intersection with E boundary	N44°28.243'	W66°08.034'
	Intersection of E boundary and stream	N44°28.347'	W66°08.006'
	End (mouth of stream)	N44°28.395'	W66°08.091'
E	Start (E extremity)	N44°27.390'	W66°08.285'
	Intersection with E boundary	N44°27.209'	W66°08.571'
	Survey marker on E boundary	N44°27.218'	W66°08.649'
	End (W extremity)	N44°27.194'	W66°08.688'

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2004 Breeding Bird Surveys of the Proposed White's Point Quarry Site, Digby Neck, Digby County, Nova Scotia

A Supplemental Report

prepared for

Paul G. Buxton

by

W. George Alliston, Ph.D.

6 December 2004

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2004 Breeding Bird Surveys of the Proposed White's Point Quarry Site,
Digby Neck, Digby County, Nova Scotia
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2004 Breeding Bird Surveys of the Proposed White's Point Quarry Site,
Digby Neck, Digby County, Nova Scotia
A Supplemental Report
W. George Alliston, Ph.D. – 6 December 2004

INTRODUCTION

This report assesses the use of the 155 ha White's Point proposed quarry site near Little River, Digby Neck, Digby County, by breeding birds in 2004 and compares these data with similar information gathered in 2002. This report is a supplement to the more extensive work conducted in 2002 and presented in a report entitled "Faunal Analysis of the Proposed White's Point Quarry Site, Digby Neck, Digby County, Nova Scotia".

SITE DESCRIPTION

A general description of the property as it was in the summer of 2002 can be found in my previous report. At White's Point a 4 ha site, where quarrying has been approved and where trees had been felled at the time of our 2002 surveys, has subsequently had all vegetation and overburden removed and a settling pond constructed. The rest of the property remains essentially as it was in the summer of 2002.

METHODS

In 2004, the author and Mr. Bernard Forsythe visited the site on two occasions: during the evening of 21 June (1924h to 2207h, overcast, winds estimated @ 5 - 10 kph) to conduct a census of nocturnal nesting birds and during the morning hours of 22 June (0520h to 1150h, clear, winds calm to an estimated 5 kph) to census diurnal nesting birds. The timing (22 & 23 June in 2002), methods (see previous report), personnel, survey routes (see "BREEDING BIRDS RECORDED: 2002 and 2004" below for minor exceptions) and the sequence in which these routes were surveyed were essentially identical for the two years.

The common names of plants and animals are used in this report. The common and scientific names of those species not included in my previous report are listed alphabetically in Appendix 1.

BREEDING BIRDS RECORDED: 2002 and 2004

During both the 2002 and 2004 breeding bird surveys only one bird species at risk, the Boreal Chickadee, was found using the property. In both years, immature (non-breeding) Common Loons, a species for which the breeding cohort of the Nova Scotia population is considered at risk, were observed feeding in the coastal marine waters adjacent to the property.

The routes taken during the 22 June 2004 diurnal breeding bird survey were the same as those taken in 2002 (see previous report, Figure 2) with the following exceptions:

a) in 2004 a new transect was added that traversed the 4 ha site at White's Cove that had been prepared for quarrying (see Figure 1);
b) a short (~ 70m) section at the southern extremity of Section E (the portion that extended beyond the boundaries of the property being studied) was not censused (see previous report, Figure 2).

The route taken during the nocturnal survey on the evening of 21 June 2004 was identical to that taken on 22 June 2002 (see previous report, Figure 2).

Table 1 presents the information collected on bird species and their distribution on the property (also see Figure 2 in previous report) in June of 2002 and 2004.

A total of 40 bird species was recorded during our surveys of 21 and 22 June 2004. Of these species, Common Loon, Northern Gannet, Double-crested Cormorant, Common Eider, Northern Harrier, Herring Gull and Great Black-backed Gull were not believed to nest on the property. In my previous report, I have discussed why I believe all of these species, except the Northern Harrier, would not nest on the property.

During our two seasons of study and six visits to the property a (male) Northern Harrier was observed on only one occasion: during our evening survey of 22 June 2004. This bird was observed flying over the area that had been clear-cut in 2002. Northern Harriers nest in relatively large open areas: marshes, wet meadows, coastal heaths, bogs and sometimes upland hayfields and abandoned fields. Duebbert and Lokemoen (1977) found no Northern Harriers nesting in fields smaller than 11 ha. The only potential nesting habitat for Northern Harriers on this property is the small (~ 1.5 ha), boggy marsh adjacent to the cove north of White's Point; however, this habitat is far too small to support a nesting pair. Northern Harriers, particularly males, are known to have large home ranges which average of the order of 7 km^2 but have been recorded up to 90 km^2.

Therefore, of the 40 bird species observed during our 2004 surveys, 33 species were using terrestrial habitats on the property and may have nested there in 2004. In 2002 we identified 38 bird species that may have been nesting on the property.

During 2002 and 2004 the most common breeding bird species recorded during our surveys remained the same. These were Swainson's Thrush, Magnolia Warbler, Yellow-rumped Warbler, Black-throated Green Warbler, White-throated Sparrow and Dark-eyed Junco.

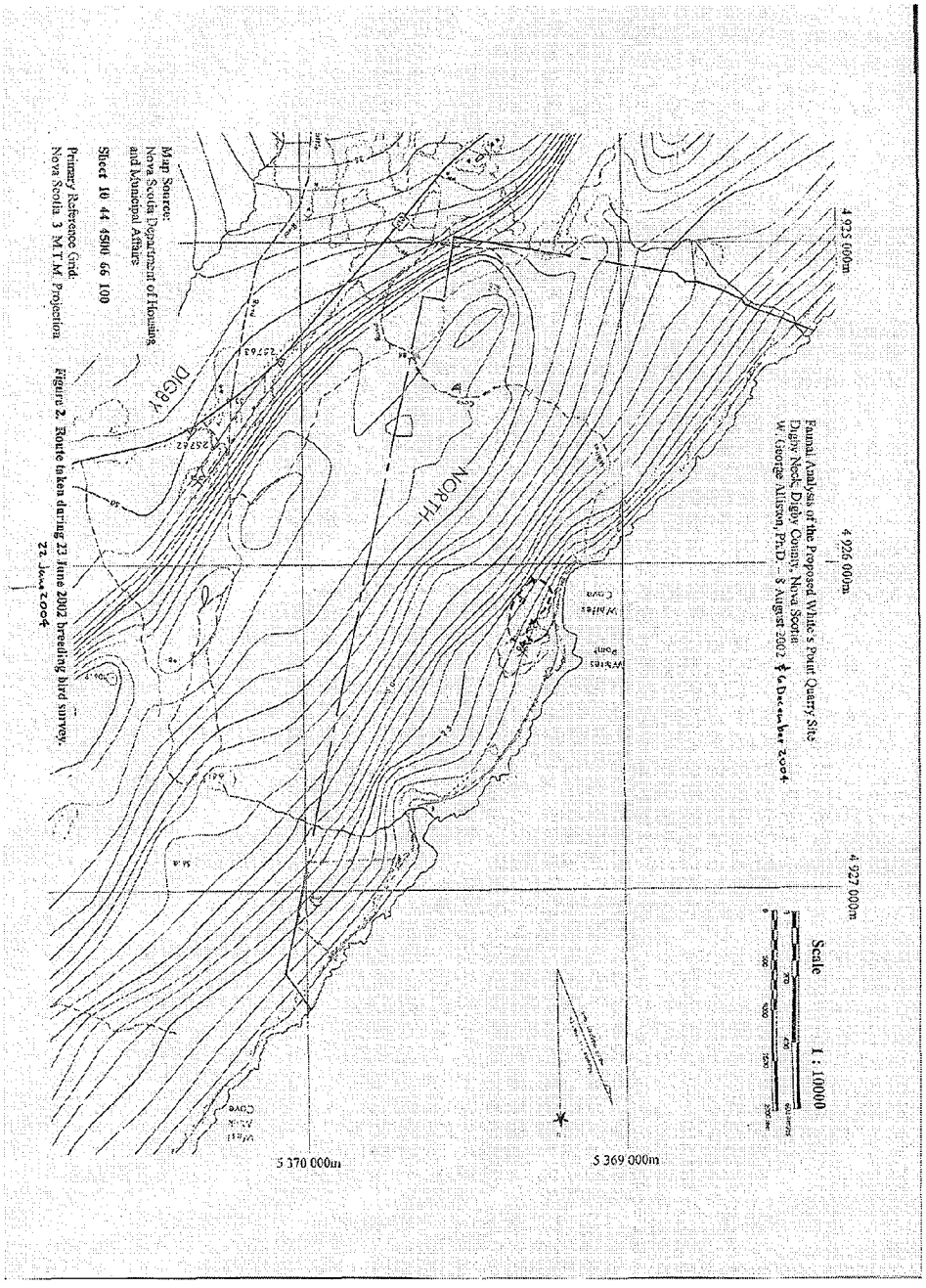

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Table 1
White's Point Breeding Bird Surveys - 22/23 June 2002 (2002) and 21/22 June 2004 (2004)

Species	Section A		Section B		Section C		Section D		Section E		4 ha Site	Total 2002	Total 2004
	2002	2004	2002	2004	2002	2004	2002	2004	2002	2004	2004		
Common Loon					1 Φ	2 Φ						1	2
Northern Gannet					15 Φ	7 Φ						15	7
Double-crested Cormorant					3	1						3	1
Mallard						1 Ψ						0	1
Common Eider					28	53						28	53
Black Scoter					1 **							1	0
Osprey			1 *									1	0
Northern Harrier		1 Ψ										0	1
Broad-winged Hawk									3			3	0
Red-tailed Hawk					2 *							2	0
American Kestrel									1 **			1	0
Spotted Sandpiper					2	1						2	1
American Woodcock			2 Ø									2	0
Herring Gull					15	5				4	2	15	11
Great Black-backed Gull					18	23	9				1	27	24
Barred Owl					2 Ø							2	0
Ruby-throated Hummingbird									1			1	0
Northern Flicker			1				1		4			6	0
Hairy Woodpecker				3						2		0	5
Eastern Wood-Pewee		1										0	1
Yellow-bellied Flycatcher					1		1	2				2	2
Alder Flycatcher		1			3					1	2	3	4
Least Flycatcher						1 Ψ						0	1
Blue-headed Vireo		1	2	1								2	2
Red-eyed Vireo			1		1				1			3	0
Gray Jay		1						2		4		0	7
American Crow	1	5		8	7	4	1		4			13	17
Common Raven		1	1		1	2	2					4	3
Black-capped Chickadee		3	1			3	1		1			3	6
Boreal Chickadee			2	2								2	2
Brown Creeper			1	1								1	1
Red-breasted Nuthatch		1										0	1
Winter Wren	2	1	2	2				1	2			6	4
Golden-crowned Kinglet			2		1		2		2			7	0
Swainson's Thrush	7	8	8	9	12	3	8	6	3	3	4	38	33
Hermit Thrush		1	1	1				2				1	4
American Robin	4	11	4	3	1	1			1	4		10	19
Cedar Waxwing									4			4	0
Nashville Warbler		1					1					1	1
Northern Parula									1	1		1	1

continued on next page

Table 1
White's Point Breeding Bird Surveys - 22/23 June 2002 (2002) and 21/22 June 2004 (2004)

Species	Section A		Section B		Section C		Section D		Section E		4 ha Site	Total 2002	Total 2004
	2002	2004	2002	2004	2002	2004	2002	2004	2002	2004	2004		
cont. from previous page													
Magnolia Warbler	2	4	3	4	7	3	7	3	4	3	1	23	18
Yellow-rumped Warbler	1		2	3	6	5	6	4	4	1	1	19	14
Black-and-white Warbler	1	1	2		2		3	1	1	2	1	9	5
Black-throated Green Warbler	2		9	4	7	3	2	2	4	7	1	24	17
Ovenbird			1		2		2					5	0
Common Yellowthroat		2			2	7	1			1	1	3	11
American Redstart			1	3	3				2		2	6	5
Savannah Sparrow					3							3	0
Song Sparrow					10	13	3				2	13	15
Swamp Sparrow					3							3	0
White-throated Sparrow	8	12	4	4	8	3	6	3	11	9	1	37	32
Dark-eyed Junco	10	14	7	7	12	7	1	4	3	6	2	33	40
Purple Finch		1			2	1			1	1	1	3	4
White-winged Crossbill										4		0	4
American Goldfinch		2		2		5			1		3	1	12
TOTAL # OF SPECIES	**10**	**21**	**22**	**16**	**31**	**23**	**18**	**11**	**22**	**16**	**15**	**47**	**40**
TOTAL # OF BIRDS	**38**	**73**	**58**	**57**	**181**	**154**	**57**	**30**	**59**	**53**	**25**	**393**	**392**

Φ immature
* recorded on 4 June 2002
** recorded on 15 June 2002
Ø recorded on 22 June 2002 nocturnal survey
Ψ recorded on 21 June 2004 nocturnal survey

The number of species observed in each section of the survey route was lower in 2004 with the exception of Section A where the number of species and individual birds recorded were double those recorded in 2002. Section A passes through an area that had been clear-cut in the winter and early spring of 2002 and, when the 2002 surveys were conducted, wood that had been stockpiled on site was in the process of being removed. It would appear that after the disruptions of 2002, species that occupy openings or edge habitats were able to occupy this area or, if already present, increase their numbers (e.g. American Robin, White-throated Sparrow and Dark-eyed Junco; see Table 1).

It is difficult to know why fewer breeding birds species were recorded in other sections of the survey route in 2004. The only habitat modification that had occurred on the property subsequent to 2002 was the removal of overburden and construction of a settling pond on a 4 ha site at White's Point. These activities occurred in 2003 and would have impacted only a very small portion of Section C of the survey route.

A total of 15 bird species, 13 of which probably nested on the property, were recorded on our new transect that covered the 4 ha site at White's Point. All breeding birds recorded on this transect were seen or heard in areas immediately adjacent to the prepared site; no birds were recorded on the prepared quarry site.

Of the 33 bird species identified as possibly nesting on the property in 2004, seven of these were not recorded on the property in 2002, namely: Mallard, Hairy Woodpecker, Eastern Wood-Pewee, Least Flycatcher, Gray Jay, Red-breasted Nuthatch and White-winged Crossbill. These observations bring the total number of bird species that might have nested on the property in 2002 and 2004 to 45.

It should be noted, however, that two of the passerine (perching bird) species recorded for the first time in 2004, the Gray Jay and the White-winged Crossbill, have very different breeding schedules than most passerines and would not have been nesting when our surveys were conducted. The White-winged Crossbill is a species that is well known for its propensity to wander and to nest at any time of the year. Tufts (1986) indicates that in Nova Scotia this species "has two distinct breeding seasons; early January to late April and early July to late September". While the coniferous forests on the property could provide nesting habitat for this species, they were observed at a time they are not normally nesting. The fact that the four adult birds seen were together in a small flock further suggests that these birds were not nesting.

The Gray Jay normally nests in March or April (Tufts, 1986) and by mid- to late June family groups are beginning to break up. Although this species is generally "sedentary in its habits and usually seen in pairs (or family groups particularly during

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May and June), it does on rare occasions gather in flocks that wander aimlessly about the countryside showing up in places it has not been seen in years" (Tufts, 1986). Tufts (1986) further indicates that this species is "decidedly uncommon along the North Mountain range bordering the Bay of Fundy" although this area, including the property being studied, supports the boreal forests that are the preferred breeding habitat for this species. The seven Gray Jays were recorded as three groups of two, including at least one adult/young duo, and a single adult. It is difficult to believe that this large, tame and sometimes noisy species would not have been recorded during our four visits to the property in 2002 had it been present.

Ten potentially nesting species that were recorded during the breeding bird surveys of 2002 were not recorded during the 2004 surveys. These birds were American Woodcock, Ruby-throated Hummingbird, Barred Owl, Northern Flicker, Red-eyed Vireo, Golden-crowned Kinglet, Cedar Waxwing, Ovenbird, Savannah Sparrow and Swamp Sparrow. While some of these species may indeed have been absent in 2004, others may have been present but escaped detection. Species that escaped detection may have done so because of sampling error (were present on the property but, by chance, not in the area sampled by our surveys) or because environmental conditions were such as to inhibit singing, thereby reducing the detectability of the birds. Weather conditions (e.g. wind, rain) can also affect the observers' ability to detect birds. While we considered weather conditions to be "good" during our 2004 surveys, they were inferior to the near perfect conditions we experienced in 2002; winds up to an estimated 10 kph were experienced during parts of the 2004 surveys.

I can state with some confidence that the Swamp Sparrow and the Savannah Sparrow, which had nesting territories on the property in 2002, were not present on territory when surveys were conducted in 2004. I can make this statement since their preferred habitats (wetlands and coastal barrens, respectively) on this property are limited and our survey routes covered all available habitat thereby eliminating sampling error. Furthermore, the area in which these birds were observed in 2002 (in and adjacent to the small boggy marsh adjacent to the cove north of White's Point) was identified as potentially providing marginal habitat for two breeding bird species at risk: Nelson's Sharp-tailed Sparrow (in the boggy marsh area) and Rusty Blackbird (in the forest immediately adjacent to the boggy marsh). Because of the potential presence of these species at risk, we modified our survey methods when surveying this area in 2004 and resorted to calling (in birder's terms "pishing") in an attempt to get a response from these species. While our calling brought out seven Common Yellowthroats (thereby biasing upward our 2004 count for this species), there was no response from the two species at risk that we speculated might use this area or Swamp Sparrows or Savannah Sparrows, species that were recorded there in 2002.

For the remaining eight species that were recorded as potentially nesting on the property in 2002 but not recorded in 2004, I cannot be as certain of their actual absence as I am for the Savannah and Swamp Sparrows.

Other species like the Golden-crowned Kinglet are known to show great year-to-year variation in numbers in their breeding habitats. Species like the Ruby-throated Hummingbird (only one observed in 2002) are easily overlooked and birds, like the Barred Owl, with large territories may not have been in the surveyed portion of their territories at the time of the surveys. It is somewhat surprising that neither of two species that were relatively abundant in 2002 and are generally quite vocal, the Northern Flicker and the Ovenbird, was recorded during the 2004 survey.

OTHER WILDLIFE OBSERVATIONS: 2004

In addition to the reptiles, amphibians and mammals recorded during our more comprehensive surveys of 2002, **three additional mammal and one amphibian species were recorded during our 2004 bird surveys. None of these species is considered to be at risk.**

Two of the three mammal species observed were marine mammals. In the coastal waters near the shoreline of the cove immediately north of White's Point during both our evening (21 June) and morning (22 June) surveys a single Gray Seal, with a rope wrapped around its body and cutting deeply into its flesh, was observed. At the same location and about 250m offshore at about 2100h on 21 June, a Minke Whale was observed traveling in a southerly course parallel to the coast. The one "new" terrestrial mammal observed was the Eastern Chipmunk. Two individuals were observed near the southern extremity of Section E.

On 22 June near the northern extremity of Section D, a Wood Frog was recorded.

ASSESSMENT OF OCCURRENCE AND USE OF THE WHITE'S POINT PROPERTY BY BREEDING BIRD SPECIES AT RISK IN NOVA SCOTIA: 2002 and 2004

Derivation of Breeding Bird species at Risk List

The reader is referred to my previous report for the breeding bird species at risk list and its derivation.

Breeding Birds Considered at Risk Using the Property

As in our 2002 breeding bird census, the only terrestrial bird species at risk recorded in our 2004 studies was the Boreal Chickadee (green, S3S4). As in 2002, two birds were recorded on Section B of our survey route. These observations support our contention thatB oreal Chickadees probably nest on the property but likely in relatively low numbers. There is no indication that this property would support greater densities of this species than similar adjacent properties (for further discussion, see previous report).

Another bird species at risk, the Common Loon (yellow, S4B) was observed during both our 2002 and 2004 surveys. All three birds observed (two in 2004, one in 2002) were non-breeding sub-adults feeding in the coastal waters adjacent to the site. Non-breeding Common Loons regularly use coastal waters to summer and moult. It is the breeding cohort of the Nova Scotia Common Loon population that is considered at risk. Breeding Common Loons require large freshwater lakes on which to nest. The closest lakes of sufficient size to support breeding Common Loons are Harris Lake and Lake Midway which are 7 km and 9 km, respectively, from the White's Point property.

In my previous report I suggested that there was a small possibility that Nelson's Sharp-tailed Sparrow (yellow, S2S3B) might nest in the small coastal wetland north of White's Point. None was observed in 2002 and a more concerted effort in 2004 when birds were called (see above) also produced no results. I continue to believe that the likelihood of Nelson's Sharp-tailed Sparrows breeding in this wetland is small.

In my previous report I identified two raptor species at risk, the Long-eared Owl (yellow, S1S2B) and the Northern Goshawk (yellow, S3B), for which there was a small possibility that they might use the White's Point property. As in 2002, our nocturnal survey of 2004 was unsuccessful in confirming the presence of the secretive Long-eared Owl on the property. Similarly our diurnal surveys of 2002 and 2004 provided no observations of Northern Goshawks, a species that is normally very aggressive toward any intruders near its nest sites. I explained in my previous report why I believed it unlikely that either of these species would nest on the property. Our lack of observation of these species after a second year of surveys would tend to support that view.

Information from the Atlantic Canada Conservation Data Centre (ACCDC) database indicates that two bird species at risk have been recorded nesting within 5 km of the proposed quarry: the Wood Thrush (green, S2B) and the Rusty Blackbird (green, S3S4B).

No Wood Thrushes were recorded on the property in either the 2002 or 2004 surveys. As I have indicated in my previous report, it would seem quite unlikely that this species, which breeds in eastern deciduous forests, would be found in the predominantly coniferous forests that dominate this property.

The forest adjacent to the small coastal wetland on this property could provide potential nesting habitat for Rusty Blackbirds although none was observed during our 2002 and 2004 surveys of this site.

SUMMARY

1) **Two visits were made to the 155 ha White's Point property in June 2004 to replicate and compare the results with breeding bird surveys conducted in June 2002. In addition, a breeding bird survey was conducted on the 4 ha site that, in 2003, had been prepared for quarrying activity.**
2) **Although seven additional potential breeding bird species were recorded in 2004, none is considered to be at risk in Nova Scotia. One bird species at risk, the Boreal Chickadee, was recorded using the property in 2002 and 2004. This species is believed to nest in small numbers on the property but is not believed to occur here in greater densities than on similar adjacent properties.**
3) **After an analysis of habitat use and the known distributions of breeding bird species at risk, it was concluded in my previous report that:**
    a. ***"Although the woodlands of this property could provide marginal nesting habitat for one species at risk, the Long-eared Owl, given that better potential nesting habitat exists in adjacent areas, it is unlikely that these owls would be found there."*** **Our failure to confirm the presence of this species on the property again in 2004 would tend to support this conclusion.**
    b. ***"A small coastal wetland on the property might provide marginal nesting habitat for Nelson's Sharp-tailed Sparrow and/or Rusty Blackbird although none was recorded at the site (in 2002)."*** **A more concerted attempt to identify these species in 2004 was also unsuccessful.**

ADDITIONAL SOURCES OF INFORMATION
(see previous report for complete list of sources)

Literature

Duebbert, H.G. and J.T. Lokemoen. 1977. Upland nesting of American bitterns, marsh hawks and short-eared owls. Prairie Nat. 9:33-40.

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APPENDIX 1
COMMON AND SCIENTIFIC NAMES OF ANIMALS CITED ONLY IN THIS REPORT
(not in previous report)

Amphibians

Common Name	Scientific Name
Wood Frog	*Rana sylvatica*

Birds

Common Name	Scientific Name
Eastern Wood-Pewee	*Contopus virens*
Gray Jay	*Perisoreus canadensis*
Hairy Woodpecker	*Picoides villosus*
Least Flycatcher	*Empidonax minimus*
Mallard	*Anas platyrhynchos*
Northern Harrier	*Circus cyaneus*
Red-breasted Nuthatch	*Sitta canadensis*
White-winged Crossbill	*Loxia leucoptera*

Mammals

Common Name	Scientific Name
Eastern Chipmunk	*Tamias striatus*
Gray Seal	*Halichoerus grypus*
Minke Whale	*Balaenoptera acutorostrata*

Wintering Harlequin Ducks in the Digby Neck – Long Island Area, Digby County, Nova Scotia – 2005

prepared for

Paul G. Buxton

by

W. George Alliston, Ph.D.

20 May 2005

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Wintering Harlequin Ducks in the Digby Neck – Long Island Area,
Digby County, Nova Scotia - 2005
W. George Alliston, Ph.D. – 20 May 2005

1.0 INTRODUCTION

There are two major populations of Harlequin Ducks in North America – a relatively large western population and a much smaller eastern population. The eastern population was designated as "Endangered" by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in April of 1990 but was downgraded to "Special Concern" in May 2001.

The eastern population is further divided into two sub-populations that are defined by their wintering areas: one in Greenland and the other along the eastern seaboard of North America. The population that winters in Greenland breeds in northern Québec and Labrador. The population that winters along the eastern seaboard of North America breeds in northern New Brunswick, the Gaspé Peninsula, Newfoundland and southern Labrador. It is not known if the breeding grounds of these two populations have some overlap (Sea Duck Joint Venture, Continental Technical Team, 2003; Canadian Wildlife Service Waterfowl Committee, 2002). Preliminary genetic studies appear to confirm reproductive isolation between these two eastern North American populations (Scribner *et al.*, 1999). Of the two eastern populations, the eastern seaboard population is believed to be the smaller with a wintering population currently (pre-2005) estimated at between 1,800 and 2,000 birds (A. Boyne, *pers. comm.*).

Prior to 2005 the estimated numbers of Harlequin Ducks wintering along the coast of Nova Scotia was about 600. There are indications that the numbers of Harlequin Ducks wintering along Nova Scotia's coast have increased during the past five years (A. Boyne, *in press*).

Wintering Harlequin Ducks have been recorded at several locations along the northern coasts of Digby Neck and Long Island and the coast of Brier Island. The Canadian Wildlife Service (CWS) began annual winter surveys in this area in 2000, conducting land-based surveys in 2000 and 2001 and boat surveys in subsequent years. The highest count prior to 2005 was 86 Harlequin Ducks recorded in 2003, a significant portion (~ 14 %) of the Nova Scotia wintering population.

At only two locations, Bear Cove, Long Island, and the vicinity of Trout Cove, Digby Neck, are wintering Harlequin Ducks found consistently and in good numbers. Harlequins have also been recorded at Sandy Cove and Whale Cove on Digby Neck and at Peajack Cove and Western Light on Brier Island. Only very small numbers of Harlequins have been recorded at these latter sites and these sites are apparently not used consistently.

2.0 HARLEQUIN DUCKS AND THE PROPOSED WHITES POINT QUARRY

As indicated above, winter surveys conducted by CWS since 2000 have established that there are two major wintering areas for Harlequin Ducks in the Digby Neck, Long Island, Brier Island area (Bear Cove on Long Island, Trout Cove area on Digby Neck). These two sites are about 25 km apart with the proposed Whites Point quarry site being almost midway between. Since 2002, the annual CWS boat surveys for Harlequin Ducks conducted in this area included the shoreline of the proposed quarry site. There were no sightings of Harlequins using the shoreline of the proposed quarry site during these surveys. Concern has been expressed that if Harlequins move between the two major wintering areas, there is the potential for this species at risk to be impacted by quarry activities. Whether such movements occur and, if they do, how frequently and what routes are taken (coastal, offshore) are completely unknown. To obtain definitive answers to these questions might require a major study involving radio marking and tracking. This study attempts to obtain some insight into the possible movements of Harlequin Ducks without resorting to intensive and potentially disruptive procedures.

3.0 STUDY PLAN

Observations made by CWS during their annual surveys suggested that:

1) there were only two major wintering areas for Harlequin Ducks in the Digby Neck and Islands;
2) the wintering area on Long Island was confined to Bear Cove;
3) the wintering area on Digby Neck consisted of three adjacent coves: First Cove, Trout Cove and Shingle Cove;
4) there was only infrequent use by small numbers of Harlequin Ducks of select coastal waters between these two major wintering sites.

If the above model was correct and if the populations at each of the major wintering sites could be kept under simultaneous surveillance, then, if movements occurred between these two sites, a major exodus from one site would be followed by a similar increase in the population at the other site.

Surveillance of the two sites for two or three consecutive days could confirm whether the underlying premises of the model are correct and, if so, establish whether there are short-term movements of Harlequins between the two sites. Should the underlying assumptions of the model hold true and no short-term movements of Harlequins were detected, then additional surveillance of the two sites at about one week and two to three weeks after the initial surveillance should indicate whether there might be longer term movements between sites.

If frequent movements between the sites were suspected, then one or two days of observations at the Whites Point property might verify if these movements occurred along the coastline of the property.

The annual boat survey conducted by CWS could serve as an independent check, using a different methodology, on the numbers of Harlequins as determined by our studies as well as providing information on the possible presence of birds outside the areas under surveillance.

All observations should be conducted in the January or February period when migrational movements of Harlequins would not be expected. For results to be credible, observations should be taken only when sea state and visibility conditions are as close to optimal as possible.

4.0 STUDY AREAS

During this investigation, studies were carried out at three separate locations. For the purposes of this report, these locations will be referred to as the "Bear Cove study area", which included both Bear Cove and Little Bear Cove; the "Trout Cove study area", which included First Cove, Trout Cove and Shingle Cove; and the "Whites Point property", which is the parcel of land owned by Bilcon of Nova Scotia Corporation where the proposed quarry site is to be established. The relative locations of these study areas are shown in Figure 1. Aerial photographs of these three study areas are shown in Figures 2, 3 and 4, respectively. All three study areas have rocky (basalt) shorelines.

4.1 Bear Cove Study Area

Bear Cove is relatively isolated although it is accessible by a woods road that is navigable by off-road vehicles. There is one small cabin in Little Bear Cove that is in poor repair and appears to be abandoned. There are no buildings in Bear Cove although there is a cottage to the southwest of the cove. Except for a small rock outcrop at the southwest extremity of the cove and a larger outcrop near the centre of the cove, the shoreline is gentle tide-worn rock. The southern half of Little Bear Cove is also "gentle" tide-worn rock; however, the northern half of the cove shoreline is rock outcrops and boulders. About 1.8 km of the shoreline of these two coves was under surveillance.

4.2 Trout Cove Study Area

The south of Trout Cove is dominated by a breakwater, wharves and associated buildings. The road to the wharf is lined with houses. A gravel road extends from Trout Cove to the lobster plant near the northeast extremity of Shingle Cove. An

ATV trail runs parallel to the coast from Trout Cove to First Cove. The headlands at Trout Cove are rock outcrops rising perhaps 5 to 10 m above the high tide mark. Shingle Cove and most of the First Cove shoreline is low surf-worn basalt with some rock outcrops at the southwestern extremity of First Cove. About 2.2 km of shoreline in this area was under surveillance.

4.3 Whites Point Property

The Whites Point property has been described elsewhere (Alliston, 2004). It extends for 2.8 km along the Bay of Fundy shoreline (see Figure 4). The coastline to the southwest of Whites Cove consists of small (< 10 m) coastal cliffs, rock outcrops and large boulders. To the northeast of Whites Cove, the coast line is much more gentle. A road that is passable by off-road vehicles links Whites Cove to Highway 217. An ATV trail runs along the coastline northeast of Whites Cove. There are currently no buildings on this property. A 4-ha area surrounding an old mine site at Whites Cove was cleared in 2002 and, in preparation for quarrying, a settling pond was subsequently constructed. There are no buildings on the property and no quarrying activities had been conducted at the time of this study.

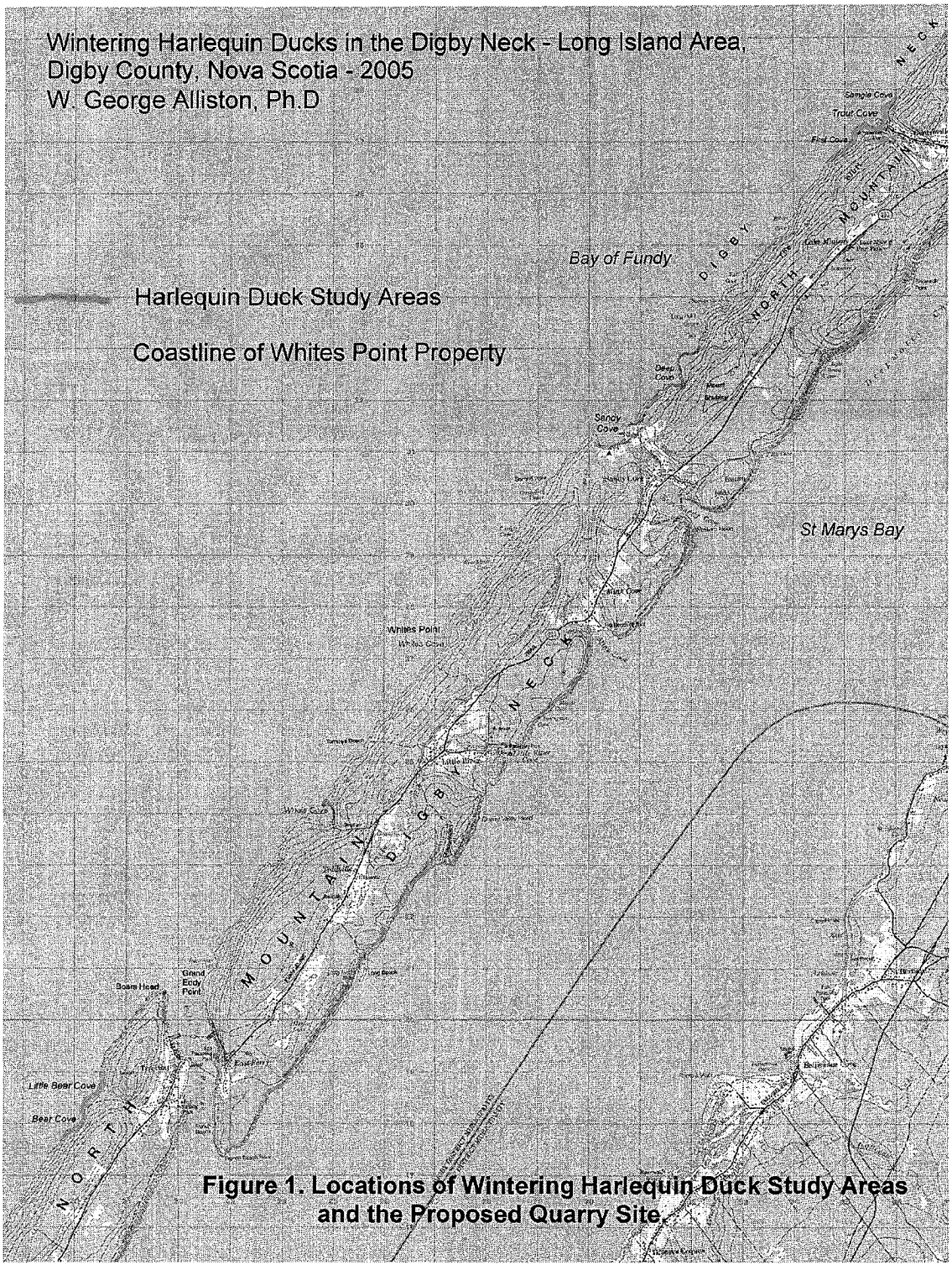

Figure 1. Locations of Wintering Harlequin Duck Study Areas and the Proposed Quarry Site.

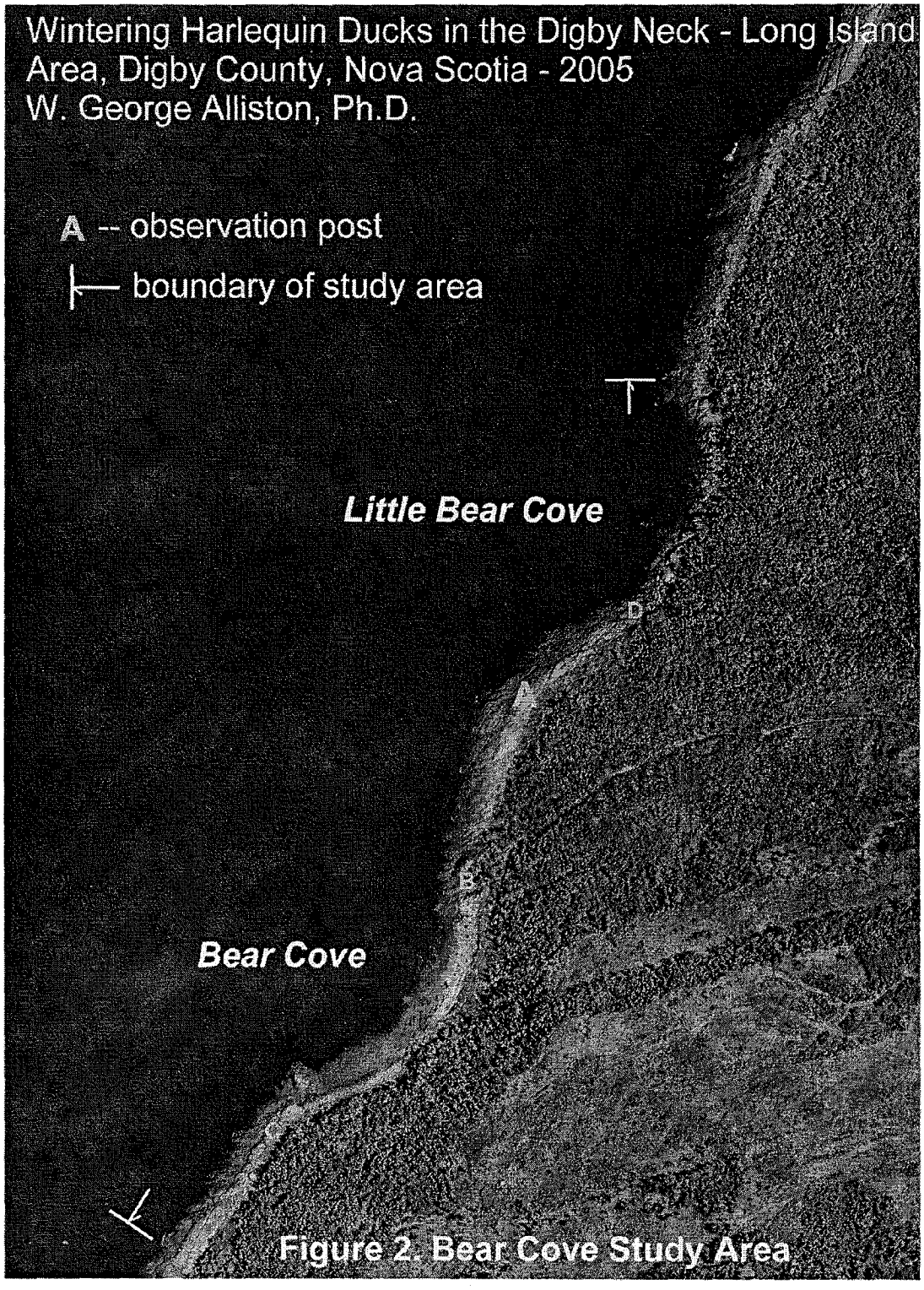

Figure 2. Bear Cove Study Area

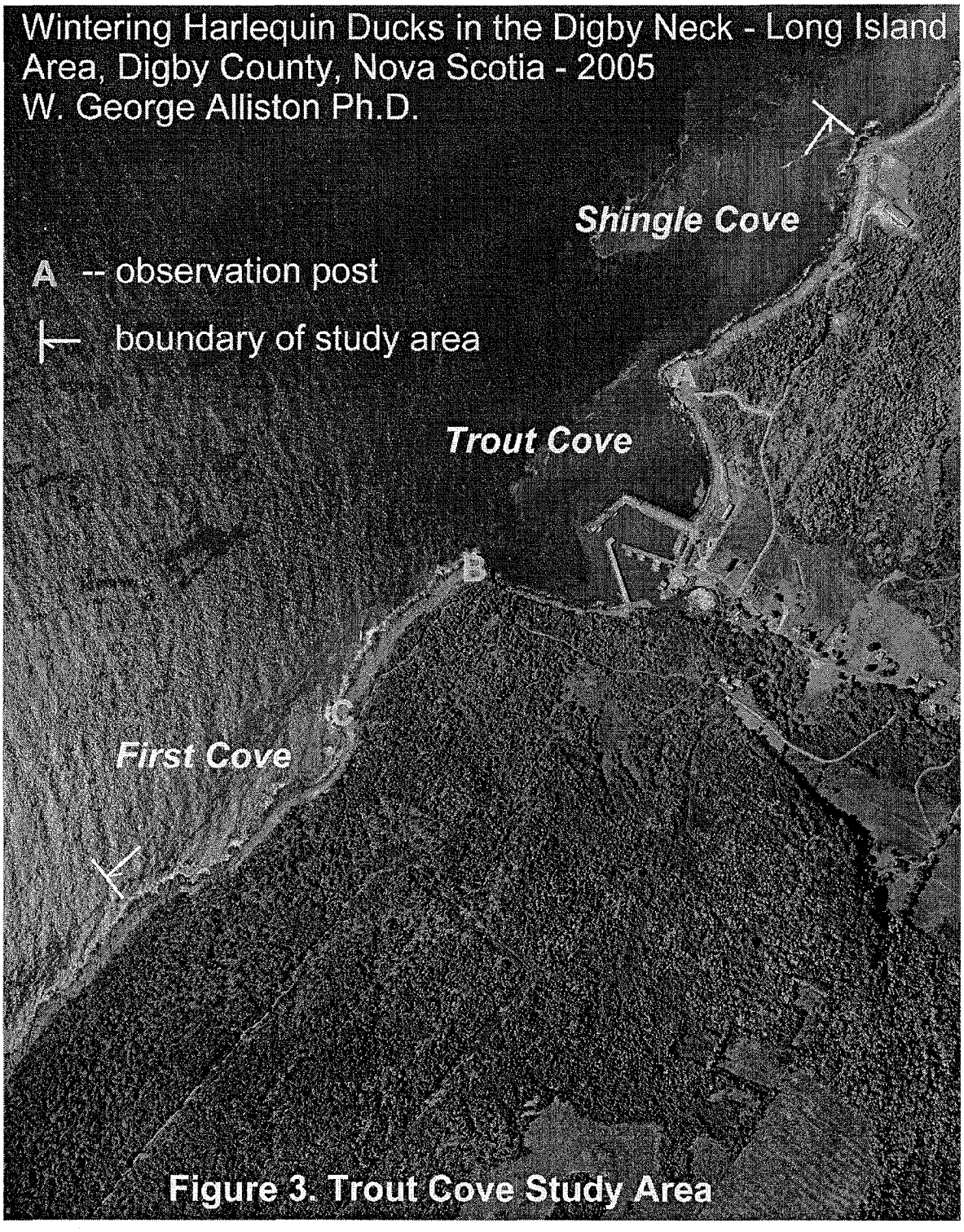

Figure 3. Trout Cove Study Area

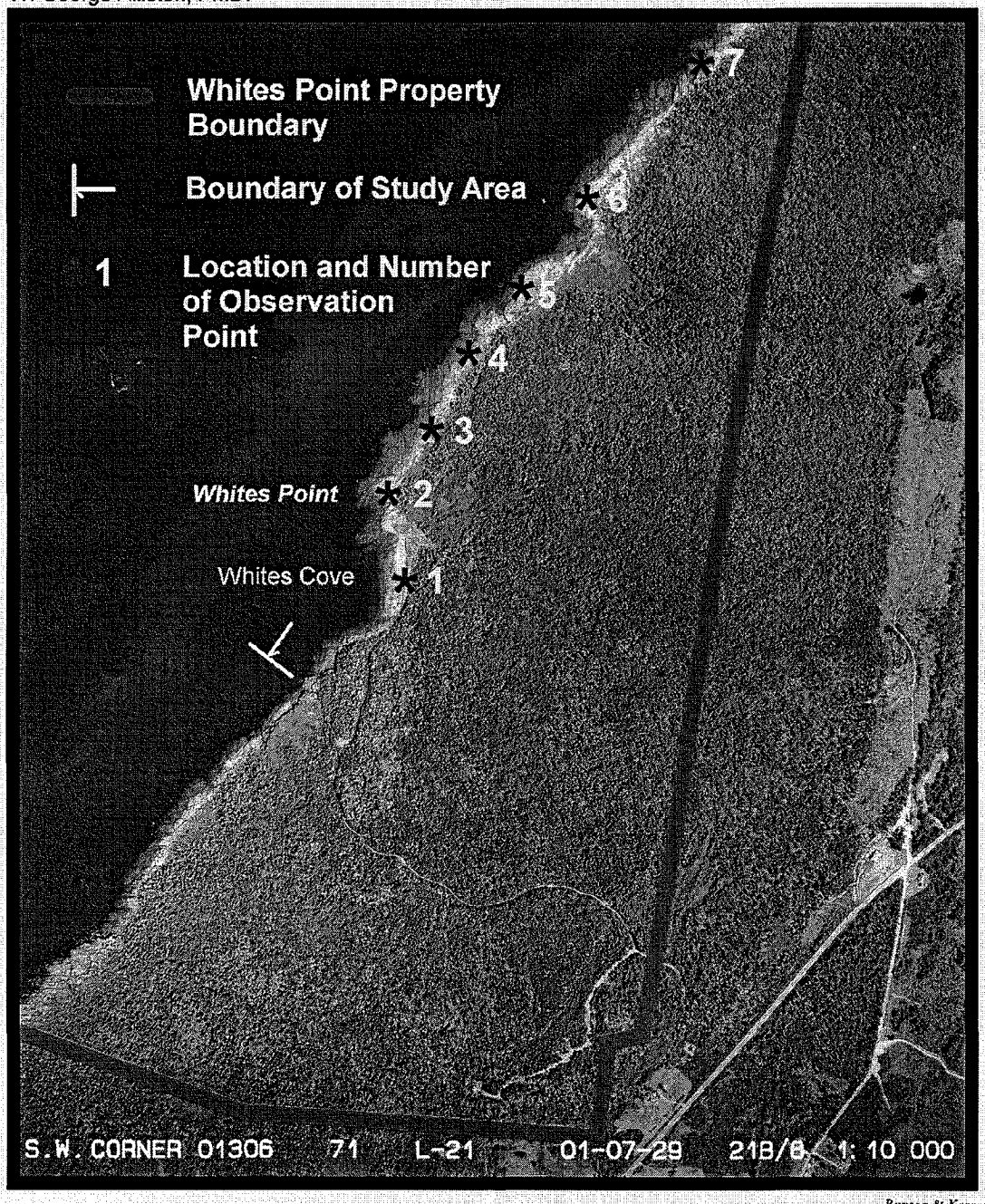

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Figure 4. Area under observation and observation points used during Harlequin Duck monitoring at Whites Point property, 7 February, 2005.

5.0 BEAR COVE AND TROUT COVE MONITORING

5.1 Methods

It was the intent of this study to keep all Harlequin Ducks in the two study areas under more or less continuous surveillance. If continuous surveillance was not possible, then a complete count of all Harlequin flocks using the study areas was to be attempted at half-hour intervals on the hour and half hour.

On 16 January 2005, Mr. Bernard Forsythe and I visited the Bear Cove and Trout Cove study areas to plan the logistics of the population monitoring study. It was determined that one observer could adequately cover the Bear Cove study area. An observer stationed at observation point A (Figure 2) could see both Bear Cove and Little Bear Cove. Although observation point A was the primary site from which surveillance of the study area was to be conducted, observation points B, C and D could be accessed on occasions when a closer approach was needed to observe Harlequin flocks. For safety reasons (snow- and ice-covered rock outcrops and boulders), travel to the northeast of observation point D in Little Bear Cove was not possible.

Logistical considerations at the Trout Cove study area required two observers to adequately monitor Harlequin populations. An observer stationed at observation point A (Figure 3) could survey all of Shingle Cove and all but the southeast corner of TroutC ove. From observation point C a second observer could survey all of First Cove and a portion of the shoreline between First Cove and Trout Cove. This observer would also have to "commute" regularly to observation point B to assure coverage of all of the shoreline between the southwest tip of Trout Cove and First Cove and the southeast corner of Trout Cove.

Blinds were not used and the observers made no attempt to conceal themselves. Each observer was equipped with binoculars (10x) and a telescope (20x, 20→45x zoom, 38x). The two observers in the Trout Cove study area were equipped with two-way radios and one had a 35 mm camera with a 210 mm telephoto lens to obtain photographic records should large (hence difficult to count) flocks of Harlequins be encountered.

Each observer was provided with copies of aerial photographs on which to plot the locations of flocks under observation. General notes on the behaviours of the flocks were also taken (e.g. feeding, resting, hauled out, alert, flushed, etc.).

In addition to counting the flocks and the numbers of birds within each flock, the numbers of males and females (sex ratio) were to be determined and, if possible, the ages of the birds (first-year vs. adult). A close examination of plumages will show

differences between first-year and adult birds; however, the differences are subtle, particularly with females.

5.2 Results

5.2.1 Preliminary Observations

On 16 January 2005, under overcast skies, and with calm winds and seas and very good visibility, Bernard Forsythe and I visited the two study areas to evaluate the logistics of conducting a surveillance of Harlequin Ducks in these areas. During our morning visit to Trout Cove and Shingle Cove, flocks of 19 (10 males, 9 females) and three (2 males, 1 female) Harlequins were recorded, respectively. In the afternoon we visited First Cove and recorded a flock of seven Harlequins there.

In late morning we visited Bear Cove and Little Bear Cove. A flock of 33 Harlequins was observed in Bear Cove but none was seen in Little Bear Cove.

In the afternoon we visited Whale Cove and Sandy Cove, locations where small numbers of Harlequins had been reported previously. No Harlequins were observed at either of these sites.

5.2.2 Personnel and Timing

Surveillance of the Trout Cove and Bear Cove study areas was conducted on 1 February 2005 and 2 February 2005. Observations were conducted at the Trout Cove study area between approximately 0800 h and 1700 h and at the Bear Cove study area between approximately 0900 h and 1600 h on each day.

Mr. Bernard Forsythe, a well respected naturalist and amateur ornithologist, conducted the surveillance of the Bear Cove study area. The author and Dr. Larry Bogan conducted the surveillance of the Trout Cove study area. I covered Shingle Cove and the northern portion of Trout Cove and Dr. Bogan covered First Cove and the southern portion of Trout Cove. While Dr. Bogan's Ph.D. is in physics, he is an avid naturalist, a founding and honorary life member of the Blomidon Naturalists Society and currently Vice-President of the Federation of Nova Scotia Naturalists.

5.2.3 Weather

The weather was cold on both mornings of the survey (between -15°C and -20°C) but warmed through the day to just a few degrees below zero. Both days were sunny and in the early morning there was a light breeze off the land; the breeze soon subsided. Other than the light land breeze in the early morning, winds were calm on 1 February as was the sea state. Visibility was excellent. The morning of 2 February began the

same as 1 February; however, by late morning a breeze had developed from the northeast and persisted until late afternoon. Although by the afternoon of 2 February the seas were no longer calm, they were not sufficiently rough to significantly impair visibility.

5.2.4 Human Activity

In the Digby Neck, Long Island, Brier Island area, the lobster fishing season extends from late November to the end of May. The buoys of lobster traps were liberally scattered throughout the inshore waters along this coastline. On 1 February 2005 lobster boats were attending their traps in both study areas. In addition, on three occasions between 1146 h and 1415 h, a fishing boat either entered or exited the harbour at Trout Cove. On 2 February 2005 there was no boat activity adjacent to Bear Cove and only a single boat passed by Trout Cove.

Land-based human activities at the Bear Cove study area during the two days of observations were confined to those of the observer. In the Trout Cove study area, other than the loading and unloading of the fishing boats at the wharf in Trout Cove on 1 February, there was relatively little human activity. The road between Trout Cove and the lobster plant in Shingle Cove was used by a few vehicles (including ATV's) each day. There was no land-based human activity in the First Cove area other than that of the observer.

5.2.5 Harlequin Ducks

5.2.5.1 Behaviour

Harlequin Ducks on their wintering grounds tend to form tight flocks. When feeding they tend to dive almost synchronously, followed by a somewhat less synchronous return to the surface, followed by a brief "pause" period when they recover from their dive (during which social interactions also occur), followed by another dive. Goudie (1999) recorded mean dive times of 21.7±7.4(SD) seconds and a mean pause time of 12.0±6.3(SD) seconds (n=368) for Harlequins wintering in the Queen Charlotte Islands. Goudie (1999) also found that the Harlequins he was observing in February spent just over 60 % of daylight hours feeding. In Maine, Goudie and Ankney (1986) recorded mean dive durations of 25.7±0.3(SE) seconds (n=513) and pause durations of 15.6±0.3(SE) seconds (n=513). Goudie and Ankney (1986) also found that the average proportion of the time spent feeding was 68.9 % and this increased in cold weather and in the evening. This study did not attempt to quantify the behaviours of Harlequin Ducks and while the dive times and pause periods are probably similar to those observed by Goudie (1999) and Goudie and Ankney (1986), the portion of the period over which the birds were observed that was spent feeding was much higher in our study areas: probably exceeding 90 %. This might be a reflection of the relatively cold conditions under which the observations were made.

In addition to their major activity, feeding, Harlequins were observed to take some brief rest periods when birds would preen, flap their wings and, in some cases, haul out on the rocky shoreline or rocks protruding from the water. These infrequent rest periods were brief, generally lasting for no more than one or two minutes. On only two occasions was an entire flock observed to haul out; these lasted for less than one minute. The longest rest period recorded during this study lasted for nine minutes. We made no observations of Harlequin Ducks sleeping.

When a perceived threat was encountered the Harlequins would cease feeding and become very attentive with heads erect and swim away from the source. Threats that elicited this response included the close approach of a boat, human presence on adjacent land and gulls landing amongst a feeding flock. Overall the Harlequins were not particularly skittish and few incidences of this behaviour were observed.

Harlequin flocks flushed in response to fishing boats entering or leaving Trout Cove and, on one occasion only, to a boat attending traps. In the former case, both American Black Ducks and Common Eiders in the area flushed before Harlequins. The three entries and exits of fishing boats at Trout Cove over a 2.5-hour period on 1 February displaced all (24) Harlequin Ducks from this cove and they had not returned by the time observations ceased at about 1700 h, even though boat activity had ended at 1415 h. In the only case where a flock was observed to have been flushed by a lobster boat attending traps, the Harlequins flew about 200 m, landed and immediately resumed feeding. A similar reaction was observed when a small plane flew over at about 700 m. On one occasion a pair of Common Ravens circling over a flock of Harlequins appeared to elicit flushing of the flock; however, we are not certain that the Ravens were the causal agent.

On one occasion a lone courting pair of Harlequin Ducks was observed to attempt copulation.

5.2.5.2 Use of Study Areas

As indicated above, Harlequin Ducks were involved in feeding activities for almost the entire time they were being observed in the two study areas. During our two days of observations, Harlequin Ducks fed in areas adjacent to the entire shorelines of both study areas. Feeding flocks were generally active within 50 m of shoreline. However, on the afternoon of 2 February, a flock of 40 Harlequins spent almost two hours feeding in waters estimated to be 100 m to 200 m from the shoreline of Shingle Cove. When feeding, flocks tended to move slowly on a course parallel to shoreline. It did appear, however, that Harlequins spent a disproportionate amount of time feeding off the "headlands" of the coves.

5.2.5.3 Use of Areas Adjacent to Study Areas

It was observed that Harlequin Ducks also used areas immediately to the southwest and northeast of the two study areas. On four occasions feeding flocks were recorded to have "disappeared" into areas beyond the study area. In three cases, what were believed to the same feeding flocks (similar numbers) later reappeared from whence they had gone. Absences from view were a maximum of 1.5 hours so it is unlikely that these feeding birds had moved large distances beyond the study area.

At Bear Cove flocks of Harlequins were observed flying into the study area from both the northeast and southwest. On one occasion when the observer was stationed at the southwestern extremity of Bear Cove, a flock of four Harlequins flew into Bear Cove from the northeast, past a feeding flock of Harlequins, and continued flying to the southwest until they could no longer be seen. In the Trout Cove study area, only a pair of Harlequins was observed flying into the study area from the southwest and no birds were observed flying in from the northeast. However, two observations were made of flocks flying from the study area to the northeast. Both of these observations were made late in the afternoon (1640 h and 1701 h) so these birds may have been moving to a roosting area. At night Harlequin Ducks roost in open water farther from shore (> 1 km) (Fleischner, 1983 *in* Robertson and Goudie, 1999).

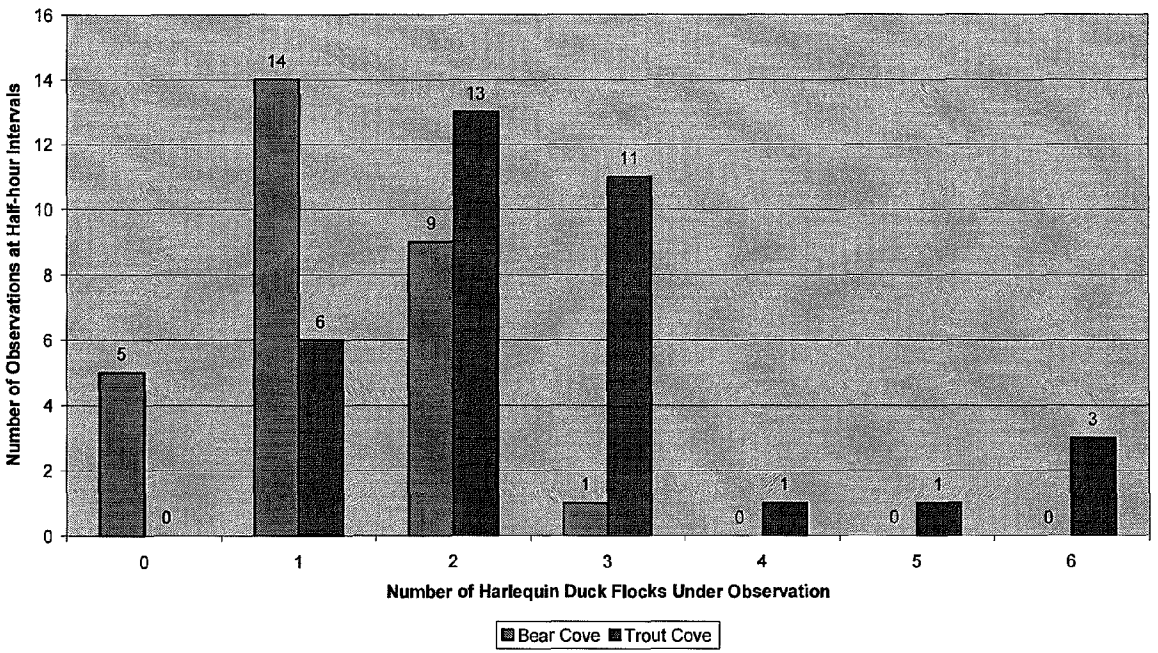
5.2.5.4 Flocks

A "sampling" of the number and size of feeding Harlequin Duck flocks under surveillance was obtained at half-hour intervals (on the hour and half hour) in each of the study areas for the duration of our two days of observations.

5.2.5.4.1 Flock Numbers

The frequency with which a given number of flocks was being observed simultaneously in each of the study areas is presented in Figure 5. The number of flocks under surveillance at the Bear Cove study area varied from none (in five "samples") to three (in one sample) (n=29). At the Trout Cove study area there was no time when no Harlequin Duck flocks were under surveillance. The number of flocks under surveillance varied from one (in six "samples") to six (in three "samples") (n=35). The mean and median numbers of flocks under observation were 1.2 and 1 respectively in the Bear Cove study area while at the Trout Cove study area these numbers were 2.6 and 2 respectively.

Figure 5: Number of Harlequin Duck flocks under observation at half-hour intervals in the Bear Cove and Trout Cove study areas, Digby County, Nova Scotia 1 February 2005 and 2 February 2005



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5.2.5.4.2 Flock Size

The tight flocks of almost constantly feeding birds, their high activity levels and the short "pause" period when the entire flock was at the surface made counting and sexing of flocks of more than 25 birds rather challenging. However, multiple counts of each flock and, in the case of one large flock, a series of photographs, made estimation of flock size necessary on only five occasions.

The frequency with which flocks of various sizes were "sampled" in each of the study areas is presented in Figure 6. The range in flock size observed in the two study areas is identical with minimum size being two birds (always pairs) to a maximum of 44 birds. Similarities end there. The mean flock size observed at the Trout Cove study area (10.9) was almost half that recorded at the Bear Cove study area (19.4). A better metric for comparison would be the median flock size which was 8 in the Trout Cove study area and 22 in the Bear Cove study area.

5.2.5.4.3 Discussion

While the range of flock sizes observed in both study areas was identical, flock size was considerably greater in the Bear Cove area while the number of (smaller) flocks under observation in the Trout Cove study area was considerably greater than in the Bear Cove study area. The reasons for these apparent differences are not at all clear. Although Harlequins using the Trout Cove study area are subjected to more human activity, during the period of observation this level of activity was not high and on only one occasion was observed to lead to a major rearrangement of the flocks present. This rearrangement actually led to a consolidation of flocks. I can only speculate that these apparent differences may relate to differences in the distribution of food resources in the two areas.

5.2.5.5 Populations Using the Study Areas

The total numbers of Harlequin Ducks under observation in each of the study areas is presented in Figure 7 (1 February) and Figure 8 (2 February).

During the first day of observations (1 February) the numbers of Harlequin Ducks in the Trout Cove study area showed some variation in the early morning but, by 1100 h, had stabilized and remained more or less constant (varying between 21 and 24 birds) for the remainder of the day. In the Bear Cove study area, the numbers of Harlequins under surveillance were fairly stable (varying between 22 and 26 birds) between 1000 h and 1345 h at which time the numbers doubled to 51. By 1500 h most of the Harlequins under surveillance in the Bear Cove study area were in a large flock off the northeast headland of Little Bear Cove and some birds were moving out of sight beyond the headland. Because of large flock size and difficulties in viewing the

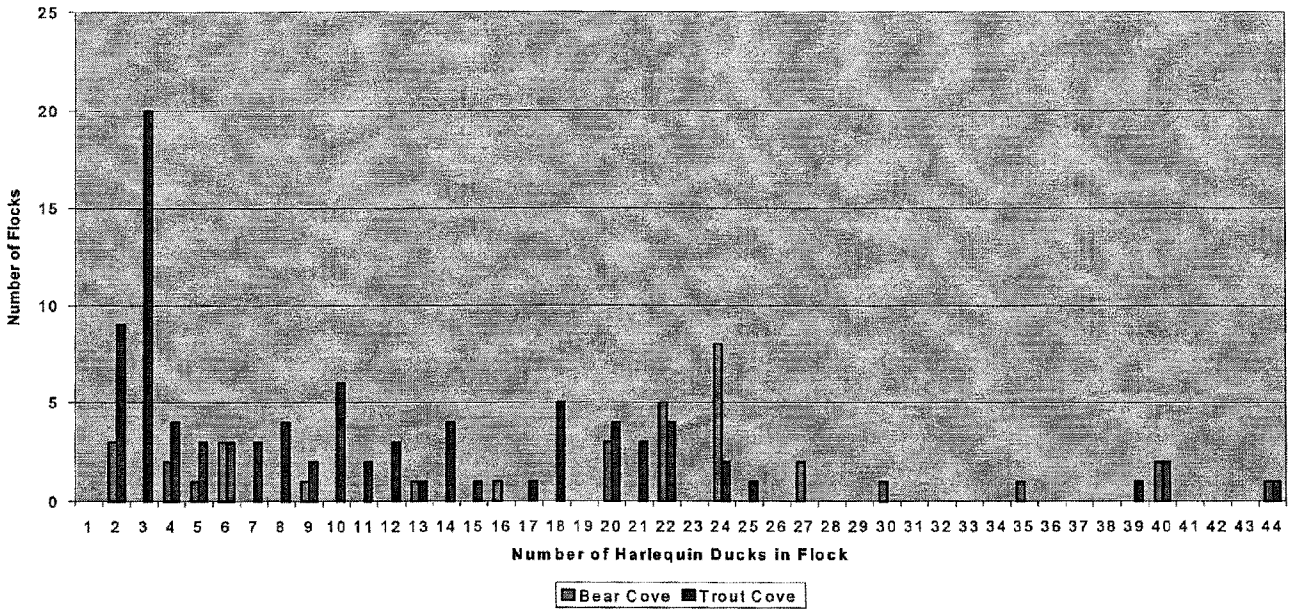
birds in the area of the headland, the numbers recorded after 1415 h include estimates (vs. counts) of flock size.

During the second day of observations (2 February) in the Trout Cove study area, Harlequin numbers built from the low 20's at 0830 h to about 30 by noon. There was a drop in numbers at noon when a flock of 12 birds swam beyond the southwest limits of the study area; however, a flock of 11 birds flew into the study area at 1335 h bringing the population under surveillance to the low 30's (32). At 1420 h a large flock had flown into the study area more than doubling the total number of birds under surveillance (67). At 1640 h this large flock (now numbering 40 birds) flushed from near the northeastern extremity of the study area and flew out of the study area toward the northeast.

The second day of observations (2 February) at the Bear Cove study area produced some very erratic results (Figure 8). During that day most Harlequins under surveillance were using Little Bear Cove, particularly the northeastern half of the cove. On two occasions, between 1130 h and 1440 h, all flocks that had been feeding in Little Bear Cove continued feeding while moving past the northeast headland of the cove and out of sight of the observer. The flocks reappeared briefly at about 1245 h but soon disappeared beyond the headland and were not observed again until 1440 h. By 1530 h they had reached numbers (~ 44) similar to those recorded in the morning (40).

The maximum numbers of Harlequin Ducks counted at the Trout Cove study area on 1 February was 32 and on 2 February was 68. The maximum numbers seen in the Bear Cove study area was 51 on 1 February and 44 on 2 February. The maximum numbers of birds observed simultaneously in both study areas occurred on the afternoon of 2 February when there were 44 birds under observation in the Bear Cove study area and 68 in the Trout Cove study area for a total of 112 Harlequin Ducks.

Figure 6: Size of Harlequin Duck flocks under observation at half-hour intervals in the Bear Cove and Trout Cove study areas, Digby County, Nova Scotia 1 February 2005 and 2 February 2005



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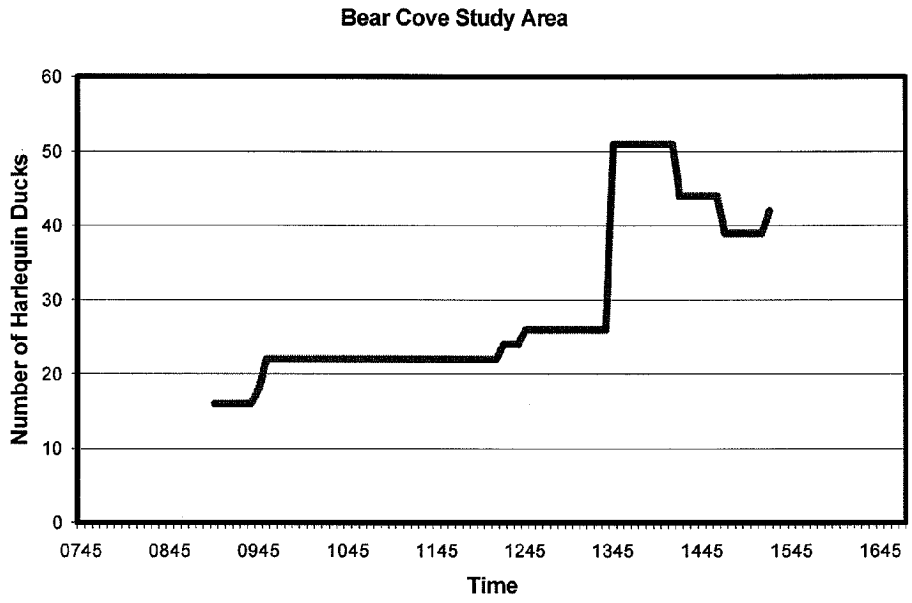


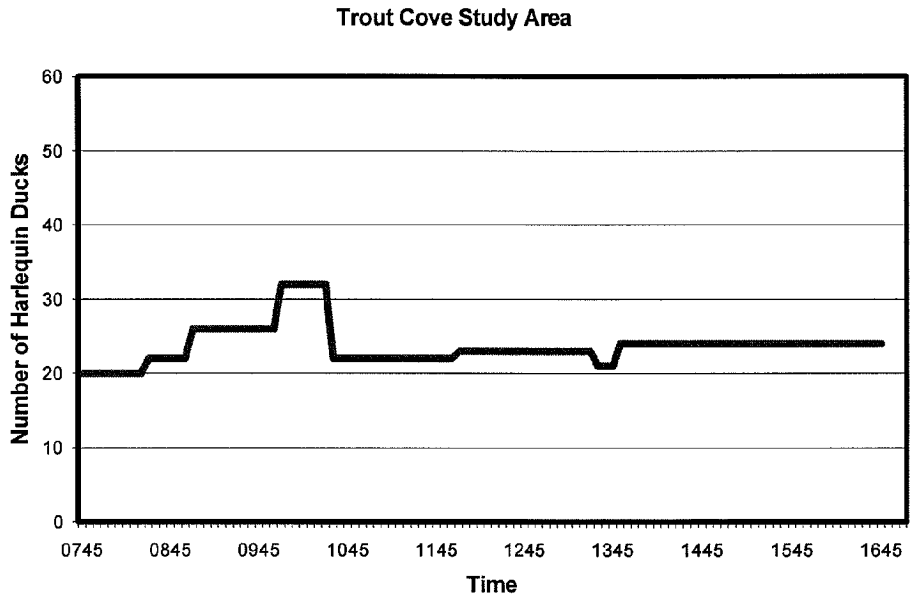
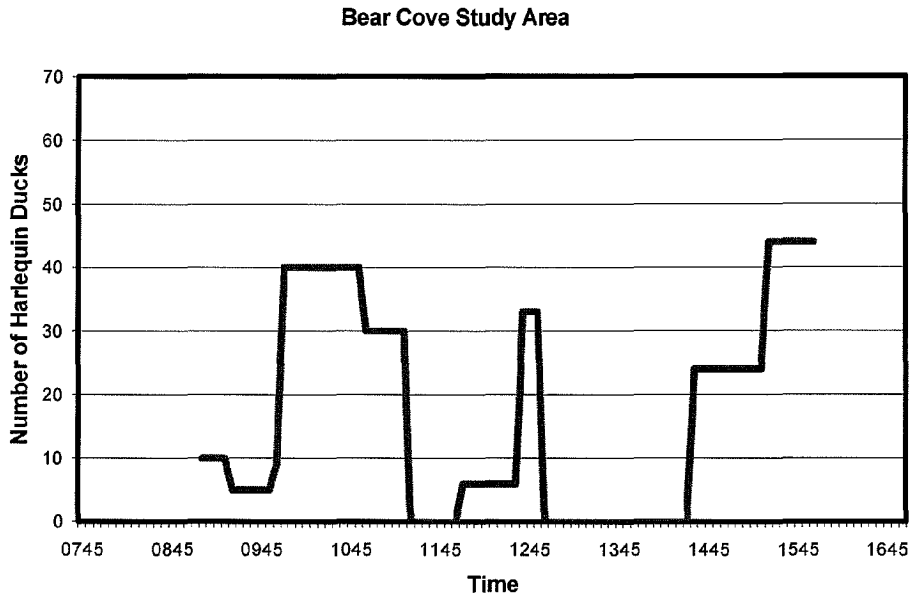


Figure 7. Number of Harlequin Ducks under observation in the Bear Cove and Trout Cove study areas: 1 February 2005.



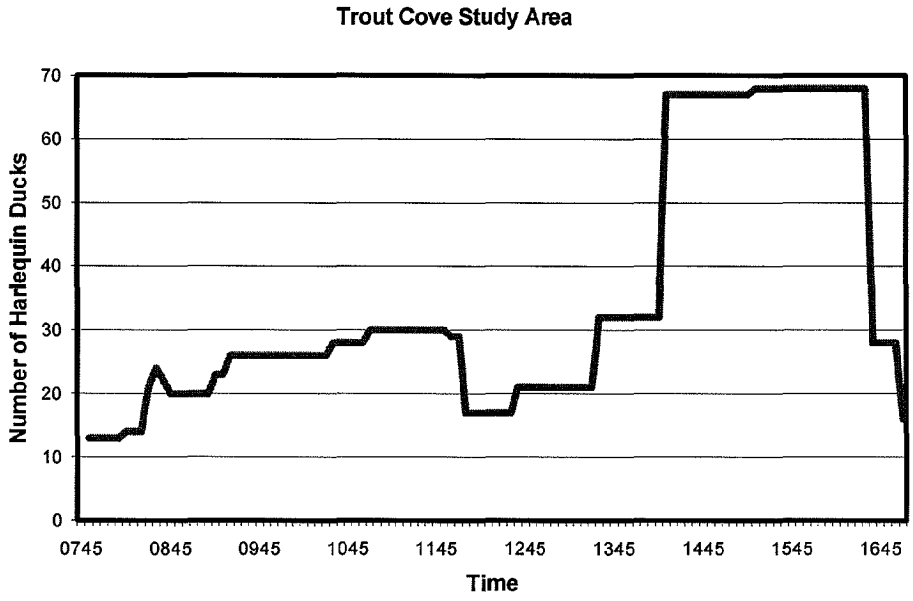


Figure 8. Number of Harlequin Ducks under observation in the Bear Cove and Trout Cove study areas: 2 February 2005.

5.2.5.5.1 Sex Ratios

The sex ratios of Harlequin Ducks using the two study areas at the time maximum numbers were observed in each area is presented in Table 1.

Table 1 Sex Ratios of Harlequin Ducks at Time of Maximum Count

Study Area	Date	Max. Count	Males	Females	Male/Female Ratio
Bear Cove	1 Feb	51	31	20	1.55:1
Trout Cove	2 Feb	68	30	38	0.79:1
Total		119	61	58	1.05:1

In the Bear Cove study area, sex ratios were heavily weighted toward males while in the Trout Cove study area there was a distinct weighting toward females. The totals for the two study areas suggest a balanced sex ratio.

5.2.5.5.2 Age Composition

No quantitative data was collected concerning the age composition of the Harlequin Duck populations using the two study areas. Differences between the plumages of first-year and adult males can be determined when examined at close range; however, the differences between first-year and adult females are quite subtle. Close approach was often not possible from our observation sites. For the flocks that could be examined closely we identified no first-year birds.

5.3 Discussion

The main reason for conducting this study was to obtain an indication of whether there were frequent and significant movements of Harlequin Ducks between their two known major wintering areas in the Digby Neck and Islands. If such movements were to occur and our efforts at monitoring populations at the two sites were successful, then a major influx of birds into one site would be accompanied by a similar decrease in birds at the other site with the total population of the two areas remaining constant.

Major influxes of Harlequins into the Bear Cove study area occurred on the afternoon of 1 February when the population under surveillance doubled (Figure 7) and into the Trout Cove study area on the afternoon of 2 February when the population more than doubled (Figure 8). It is clear from Figures 7 and 8 that neither of these influxes was accompanied by a similar decrease in the numbers of Harlequins at the other site. Indeed, on the days that major influxes were recorded at one study area, the populations under surveillance at the other study area remained relatively constant (see above). We must therefore conclude that the source or sources of the major influxes of birds witnessed in both study areas lie outside the two study areas.

During the study it became quite evident that the study areas did not encompass the entire area being used by Harlequin Ducks at each of these sites; Harlequins were observed to use adjacent areas to the northeast and southwest of each of these study areas. It would seem most likely that the influxes of Harlequins witnessed in each of the study areas originated from the areas immediately adjacent to the study areas that this study revealed were used by Harlequins, but were not under surveillance. However, this portion of the study cannot rule out the possibility that these birds originated from parts of the other site that were not under surveillance.

Recognizing that the study areas did not, as hoped, cover the entire area used by Harlequins at either of these sites, the data collected for the purpose of estimating populations using these two areas are likely to be biased (low), the degree being dependent upon how great a portion of the areas used by Harlequins the study areas encompassed and the amount of movement of these birds within the sites. We observed that feeding flocks did not generally stay at a single location for extended periods of time but tended to move slowly along the shorelines as they fed and, infrequently, to fly to different portions of the study area.

Estimates of Harlequin Duck populations using the two sites can be derived from our data using two different assumptions: that no movement occurred between the sites during the study or that movement may have occurred between the two sites. If no movement occurred between the sites, then the best estimates of the Harlequin populations using these sites would be the maximum numbers observed at each site during the two days of observation i.e. 51 birds in the Bear Cove study area on 1 February and 68 birds in the Trout Cove study area on 2 February for a total of

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119 birds using the two sites. If, however, there were frequent movements of Harlequins between these two sites, then the best estimate of the total size of Harlequin Duck populations using the two sites would be the maximum numbers of birds observed simultaneously at both sites which was 112 birds: 68 birds in the Trout Cove study area and 44 in the Bear Cove study area on the afternoon of 2 February. These two estimates are not substantially different (~ 6 %).

6.0 WHITES POINT PROPERTY MONITORING

Observations were made at the Whites Point property to determine if Harlequin Ducks were:

1) using the inshore waters adjacent to the property as a travel route between their two major wintering areas in this region and/or
2) using the shoreline of this property for feeding.

6.1 Methods

To detect what could well be just a single flock of Harlequin Ducks flying past the Whites Point property over the course of a day would require both good viewing conditions and constant vigilance. So that the latter was achieved, two observers were used to assure that at all times at least one was searching the coastal waters for flying flocks of Harlequins. To simultaneously achieve our second objective, surveying the shoreline for the possible presence of feeding Harlequin Ducks, searches were conducted from a series of observation points along the shoreline of the property. While one observer was en route to a "new" observation point, the second observer remained at the "old" observation point maintaining a seaward watch for flying flocks of Harlequin Ducks. When one observer was established at the "new" observation point then this observer would assume the seaward watch for flocks of flying Harlequins while the second observer would make his way to the "new" observation point. Both observers would remain at the "new" observation point with one watching for flying flocks while the other searched the shoreline and coastal waters for feeding flocks of Harlequins as well as other waterbird species. This process was continued until all the shoreline that was safe to survey was completed. The two observers then returned, in the same manner, to Whites Point where both conducted continuous monitoring for flying flocks of waterbirds.

Both observers were equipped with binoculars (10x) and spotting scopes (Bushnell 20x and Bushnell 20 to 45x zoom). All observations were recorded on a digital voice recorder. Records of all observation points were taken with a GPS (Garmin GPS76).

6.2 Results

6.2.1 Personnel and Timing

Bernard Forsythe and I conducted the survey on 7 February 2005 between 0810 h and 1705 h.

6.2.2 Weather

The temperature in the morning was about -7°C rising to the freezing point during the day. The day was sunny and winds and sea were calm. In fact, the sea was so calm that the sky was reflected in it giving a mirror-like appearance against which swimming and flying birds were highly observable. Viewing conditions could not have been better.

6.2.3 Human Activity

The coastal waters adjacent to the Whites Point property contained many lobster traps. When we arrived at Whites Point at 0810 h there were three fishing boats pulling lobster traps along the coastline of the property to the southwest of Whites Cove. These boats worked their way in a northeasterly direction along the coast of the property throughout the morning hours and, indeed, fishing boats were continuously present (generally two or three) in these coastal waters until 1630 h.

6.2.4 Harlequin Ducks

The observation points from which we searched the shoreline for feeding and/or flying flocks of Harlequin Ducks are shown in Figure 4. The time from our arrival at Whites Cove at 0810 h to 1223 h was spent working our way from observation point to observation point to near the northeastern boundary of the property. We returned to the Whites Point observation point (# 2) at 1321 h and spent the remainder of the afternoon observing from that location. Since the shoreline of the property to the south of Whites Cove consisted of cliffs, rock outcrops and boulders that were snow- and ice-covered, safe travel in this area was not possible. A portion of this shoreline could be viewed using spotting scopes from the Whites Point observation site. However, coverage of this portion of the property was incomplete.

There were many waterbirds using the coastal waters of the Whites Point property on the day of our survey (see Alliston, 2005); however, no Harlequin Ducks were observed either feeding along the shoreline or flying past.

6.3 Discussion

Lobster boats were actively hauling traps in the waters adjacent to the Whites Cove property during most of the time observations were being made on 7 February. Their activities resulted in major movements of sea ducks using this area during the time our survey for Harlequin Ducks using the coastal waters between Whites Cove and the northeast boundary of the property was being conducted (0810 h to 1223 h); however, it was only during the last hour (after 1121 h) that boats were close enough to the observers to cause waterfowl adjacent to the observers to flush. Harlequins generally use the shallow waters immediately adjacent to the shoreline and are further from the lobster boats than other sea ducks that tend to use deeper waters for foraging. Our observations at the Trout Cove and Bear Cove study areas indicated little reaction by Harlequins to lobster boats hauling traps (see above). It was also clear from the CWS boat surveys that Harlequins were less inclined to flush than other sea ducks upon the close approach of a fishing boat. I therefore believe that lobster boat activity adjacent to the Whites Cove property was not a factor that influenced our lack of observation of Harlequin Ducks using the coastal waters adjacent to the property. Our observations are consistent with the results of the winter boat surveys conducted by CWS which, to date, have not revealed any use of the coastline of the Whites Cove property by Harlequin Ducks.

While we did not observe any Harlequin Ducks flying along the coastline of the Whites Point property, and our observations were conducted under ideal weather and sea state conditions, this task is a difficult one with a real risk of failure. Firstly, the opportunity to detect a flock flying past the observers and within range of vision would be short, probably not more than a minute. Our observations at Bear Cove and Trout Cove indicated only one major influx (a single flock) into either of these areas each day. So, if our observations at Bear Cove and Trout Cove were representative, then, if movements between these two areas were occurring, we could expect to have only one flock per day fly past. Secondly, there was considerable "background noise" during our observation period. This "noise" consisted of the fairly large numbers of waterbirds present in the area and the activity of lobster boats which resulted in the flushing of many waterbirds, mainly waterfowl. Since all flying waterbirds had to be identified (at least as not being Harlequins) then if, as all did, they turned out not to be Harlequins, the time spent identifying these birds was time diverted from our main task. The presence of two observers helped this situation somewhat.

Thus, while the lack of observation of Harlequin Ducks flying past the Whites Point property along its inshore waters is consistent with the view of Harlequin movements that we have derived from these studies, these data are perhaps the least compelling of those collected.

7.0 CANADIAN WILDLIFE SERVICE BOAT SURVEY

Since 2002, the CWS has conducted annual winter surveys for Harlequin Ducks using the Bay of Fundy shoreline in the Digby Neck – Long Island area. These surveys have been conducted from a boat which, for Harlequin Ducks, is considerably more effective than the standard aerial surveys used to census most waterfowl species (see Alliston, 2005).

7.1 Methods

As in previous years the 2005 Harlequin Duck survey of the Digby Neck – Long Island area was conducted from a Cape Islander lobster boat which proceeded at speeds of from 12 to 18 km/hr parallel to and within about 150 m of shoreline. When Harlequin Ducks were observed, if a closer approach was required to count, sex and age the flock, then the boat was slowed and the Harlequins cautiously approached. When approached, Harlequins cease their activities (feeding, resting) and assume an alert pose. Although it is easier to obtain the required statistics from an "alert" flock than from a feeding flock, "alert" flocks can remain compact making larger flocks still quite difficult to count. If obtaining the required metrics from an alert flock proves excessively difficult, then a still closer approach will cause the flock to flush. The flying birds are more easily counted. However, the flushed flock may break up, head off in different directions and/or join other flocks thereby making extraction of the required metrics challenging. Flushing the flock is generally a method of last resort.

All observers were equipped with binoculars. One observer also had a gunstock-mounted 20x Bushnell telescope. Tracks of the survey route were taken using a GPS (Garmin GPS76). All observations were recorded by the author on a digital voice recorder with time stamping so that observations could readily be associated with GPS positions.

Prior to the CWS boat survey I advised Andrew Boyne, the CWS Wildlife Biologist in charge of the Harlequin Duck surveys, that during our land-based studies we had learned that Harlequin Ducks were using areas adjacent to, but outside, our study areas at Bear Cove and Trout Cove and beyond the extremities of the area normally covered by the boat survey. However, it was agreed that the population estimates obtained from our land-based work would not be shared until the boat survey had been completed.

7.2 Study Area

The southwestern and northeastern boundaries of the 34 km of coastline that was surveyed by boat in 2005 are shown in Figure 9. In 2005, each of the boundaries was extended about 2.3 km beyond the boundary of the 2004 survey. In 2004 the boundaries were the southwestern tip of Bear Cove and the northeastern tip of Shingle Cove.

7.3 Results

7.3.1 Personnel and Timing

The annual CWS Harlequin Duck survey was conducted on 9 February 2005. Andrew Boyne and Julia McKnight of CWS conducted the survey and were accompanied by the author and Bernard Forsythe. The same boat, the "Georgie Porgie", and skipper, Tim Crocker, had participated in this survey since the boat surveys began in 2002. We sailed out of Tiverton and first surveyed the coastal waters of Digby Neck starting at Grand Eddy Point at 0903 h and finishing at Little Deep Cove at 1150 h. We then deadheaded back to Petite Passage where we began the survey of the Long Island shoreline at Boar's Head at 1310 h and completed this survey at 1352 h.

7.3.2 Weather

9 February 2005 was a clear day with calm winds and seas and temperatures a few degrees below the freezing point. Survey conditions could not have been better.

7.3.3 Human Activity

We encountered no other boats using the coastal waters during our survey.

7.3.4 Harlequin Ducks

7.3.4.1 Numbers and Distribution

A total of 118 Harlequin Ducks was counted on the boat survey on 9 February 2005. The locations and numbers of birds observed are presented in Figure 9. Although Harlequins were concentrated around the Bear Cove and Trout Cove study areas, significant numbers were observed in areas immediately adjacent to but outside the study areas. At Bear Cove, 15 birds were observed 1.9 km to the northeast and another 13 birds 1.8 km to the southwest of the study area. At Trout Cove a pair of Harlequins was observed 0.8 km to the southwest and a flock of 44 birds 1.0 km to the northeast of the study area.

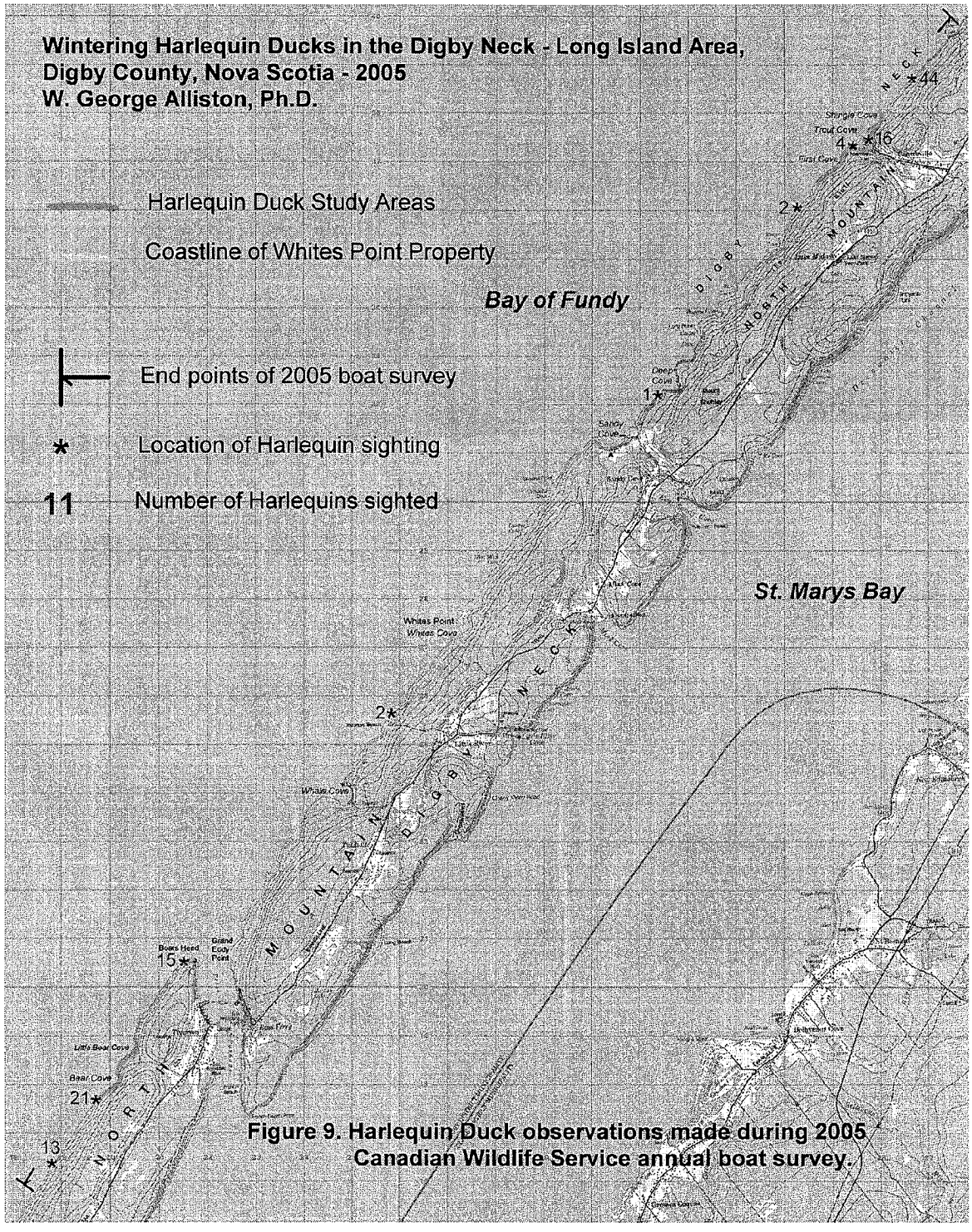

Figure 9. Harlequin Duck observations made during 2005 Canadian Wildlife Service annual boat survey.

Outside these two areas only three Harlequin Ducks were found. A pair of Harlequins was observed hauled out on the shore about 1 km southwest of the southwest boundary of the Whites Point property. Three hours and twenty minutes after they were first observed (when we were deadheading back to Petite Passage), this pair was still in the same location. A single female was observed near the southwest point of Deep Cove.

7.3.4.2 Sex Ratios

The numbers of Harlequin males, females and birds whose sex was not determined during the boat survey are presented in Table 2.

Table 2 Sex Ratios of Harlequin Ducks Observed During Boat Survey

	Males	Females	Undetermined	Sex Ratio M:F
Bear Cove Area	23	21	5	1.10:1
Trout Cove Area	20	24	22	0.83:1

These data suggest a slight bias toward males in the Bear Cove area and a somewhat more pronounced bias toward females in the Trout Cove area.

7.3.4.3 Age Composition

Again, no quantitative data was collected on the age composition of the Harlequin Ducks. However, it was noted that for those birds that were seen at close range no first year birds were identified.

7.4 Discussion

The 118 Harlequin Ducks recorded in the 2005 boat survey was the highest population level recorded since CWS initiated its annual surveys of this area in 2000, eclipsing the 2004 count of 67 birds. The highest previous count was in 2003 when a total of 86 Harlequins was observed. The highest previous count for the Bear Cove area was 48 Harlequins in 2004 (49 in 2005) and, for the Trout Cove area, 40 birds in 1999 (66 in 2005) (A. Boyne, *pers. comm.*.). (Note: The 1999 observation was made during an oil spill investigation prior to the initiation of annual surveys.)

Whether the apparent dramatic increase in the total population between 2004 and 2005 is real cannot be determined with certainty. An additional 4.6 km of coastline (2.3 km at each extremity) was surveyed in 2005 and, although this amounts to an increase of only 16 %, within these new areas 57 Harlequin Ducks were counted (48 % of total count). In addition, the sea state (Beaufort 4) at the time of the 2004 survey was far less favourable for making observations.

Boyne (*in press*) has, however, noted an apparent upward trend in total populations of Harlequins wintering in Nova Scotia over the period that annual surveys have been conducted. Indeed, the results of the 2005 winter surveys conducted by CWS indicate a wintering population closer to 1,100 Harlequins (A. Boyne, *pers. comm.*.) – up sharply from previous estimates of about 600 birds (A. Boyne, *in press*). If, as it seems, this upward trend applies to the populations wintering in the Digby Neck area, then it is likely that increasing populations of Harlequins - birds that exhibit a very high degree of faithfulness to traditional wintering areas (Robertson and Cooke, 1999; Robertson *et al.*, 1999) - would extend their use into areas immediately adjacent to their traditional wintering areas should suitable habitat exist in these areas.

The 2005 boat survey also confirmed what the land-based survey had indicated: that Harlequins in the two major wintering sites were not restricting their activities to the study areas where we had previously believed they were confined. At Trout Cove, the area being used extended at least 1 km on either side of the study area and, at Bear Cove, at least 2 km on either side. The numbers of Harlequins observed in these areas were sufficient to account for the influxes of birds into each of the study areas observed during the land-based study.

8.0 DISCUSSION

A comparison of estimates of Harlequin Duck populations derived from boat and land-based studies is presented in Table 3.

Table 3 Comparison of Harlequin Duck Population Estimates: boat survey and land-based survey

Survey Method	Trout Cove	Bear Cove	Other	Total
Boat	66	49	3	118
Land-based				
a) Maximum counts[1]	68	51	-	119
b) Maximum simultaneous count[2]	68	44	-	112

[1] Best population estimator assuming no or infrequent travel between sites.
[2] Best population estimator if there is frequent travel between sites.

The agreement between these independent estimates is quite remarkable: particularly between the boat survey and the land-based survey that assumes no movement between the two major wintering areas. The similarity in estimates was achieved even though a basic premise of the original design, that the entire wintering grounds at both sites fell within the study areas, proved to be incorrect. The fact that these independent estimates were made one week apart strongly suggests that there was little or no movement of Harlequin Ducks between the two sites during that period.

It is possible, although highly unlikely, that while the total numbers of Harlequins remained the same at the two sites over the study period, there may have been an "equal exchange" of birds between sites. It was noted in our land-based survey that sex ratios differed quite markedly between the two study areas. If a substantial "exchange" occurred between the sites, unless the "exchange" consisted only of groups having the same sex ratio, then a difference in sex ratios might be detectable between the two surveys. A comparison of sex ratios obtained from the land- and boat-based surveys is presented in Table 4.

Table 4 Comparison of Harlequin Duck Sex Ratios: boat survey and land-based survey

	Bear Cove				Trout Cove				Total			
	M	F	U	M/F Ratio	M	F	U	M/F Ratio	M	F	U	M/F Ratio
Land Survey	31	200		1.55:1	30	38	0	0.79:1	61	58	0	1.05:1
Boat Survey	23	215		1.10:1	20	24	22	0.83:1	43	45	27	0.96:1

M = Male F = Female U = Undetermined

Both data sets indicate unequal sex ratios at the two sites with females being more prevalent at the Trout Cove site and males being more prevalent at the Bear Cove site. At the Trout Cove site the results for the two surveys were nearly identical with 0.79:1 being the M:F ratio derived from the land-based survey and 0.83:1 the ratio derived from the boat survey. Sixty-seven percent of the Harlequins observed at the Trout Cove site during the boat survey were sexed. At the Bear Cove site, where 90 % of the Harlequins counted during the boat survey were sexed, the sex ratio was 1.10:1, notably lower than that recorded from the land-based survey (1.55:1). Given that both the sex ratios and total numbers of Harlequins at the Trout Cove site appeared to remain constant, and there are no other known sources of Harlequins in this area, I would interpret the apparent differences in sex ratio at the Bear Cove site to be due to sampling error. This would infer that, while the boat and land-based population estimates are very similar, both may be low and the actual population of Harlequins using the Bear Cove site is somewhat larger than our estimates would indicate.

The very fact that, in February, these two sites support populations which together have a sex ratio that is near 1:1 but, individually, have unequal sex ratios, in itself would suggest that there is little movement of Harlequins between these two sites. Harlequins arrive on their wintering grounds in autumn. Pairing occurs on the wintering grounds and commences with their arrival. Robertson *et al.* (1998) found that, in his western study population, 60 to 80 % of female Harlequins were paired by mid-December and by March almost 100 % of females were paired. Young birds were the last to form pairs. Our impression was that there were few first-year birds in the populations using the Digby Neck area in 2005. (Andrew Boyne (*pers. comm..*) found a general lack of first-year birds in all wintering areas surveyed in Nova Scotia in 2005.) If the pairing regime of eastern populations of Harlequins is similar to that of western populations then, by the time our study was conducted, pair formation should have been nearly complete, particularly so if our impressions about the lack of first-year birds in the population were correct.

Harlequins are known for their fidelity to wintering areas (Robertson and Cooke, 1999). This is particularly true for females. Females have been shown to prefer particular locations within locally favourable habitat. Males exhibit a greater tendency to move amongst sites looking for mates; however, once paired, males tend to stay with their mates (Breault and Savard, 1999; Robertson *et al.*, 1999). It is likely that, if movements between the Bear Cove and Trout Cove sites were to occur, then males searching for and taking mates would tend to equalize the sex ratios at the two sites given that the combined sex ratios at the two sites are essentially 1:1. That nearly equal sex ratios had not been achieved at these two sites by early February suggests that movements between these two sites may be minimal even over longer time periods.

9.0 CONCLUSIONS

1) Boat surveys conducted by CWS since 2002 and our own on-site survey in 2005 indicated no use of the coast of the Whites Point property by wintering Harlequin Ducks.
2) The closest observation of wintering Harlequin Ducks to the Whites Point property was recorded during the CWS boat survey in 2005 when a single pair was observed approximately 1 km to the southwest of the property.
3) Although our information was obtained by indirect methods and was not extensive, all information obtained by three separate approaches indicated that there was little or no movement of Harlequin Ducks between the Bear Cove and Trout Cove wintering areas during the study period (1 February 2005 to 9 February 2005). Furthermore, dissimilar sex ratios in the populations using the two study areas suggests that, even over longer periods of time, movement of Harlequins between the two wintering sites may be limited. With limited movements of Harlequins between the two wintering areas, there would be limited opportunities for these birds to interact with quarry operations.

10.0 ACKNOWLEDGEMENTS

I would especially like to thank Andrew Boyne, Wildlife Biologist - Species at Risk, Canadian Wildlife Service, for his generosity in sharing insights and information regarding Harlequin Ducks and allowing Bernard Forsythe and I to accompany him on his 2004 and 2005 winter boat surveys of the Digby Neck – Long Island area.

11.0 SOURCES OF INFORMATION

11.1 Literature

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11.2 Personal Communications

Boyne, Andrew, Wildlife Biologist - Species at Risk, Canadian Wildlife Service, Endangered Species and Protected Areas Section, Dartmouth, Nova Scotia.

11.3 Websites

Atlantic Canada Conservation Data Centre – http://www.accdc.com

Committee of the Status of Endangered Wildlife in Canada – http://www.cosewic.ca

Environment Canada - http://www.speciesatrisk.gc.ca/

Environment Canada - http://www.on.ec.gc.ca/wildlife/wildspace/

Nature Serve – http://www.natureserve.org

Nova Scotia Department of Natural Resources - http://www.gov.ns.ca/natr/wildlife/

Odonata Survey 2005:
(Damselflies and Dragonflies)
Whites Point Property,
Digby County, Nova Scotia

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Summary and Comments

I spent two days, August 6th and 7th, surveying for Odonata (Damselflies and Dragonflies) on the Whites Point Property, accompanied by my son Michael, and on the morning of the 6th by David Kern. We visited all freshwater and brackish habitats at the appropriate time of day and weather condition for effective sampling of these insects.

I documented all aquatic habitats, and we took 51 records of 21 species. Only one species we encountered is of some conservation concern - *Lestes forcipatus*, which is ranked as undetermined due to past confusion with the similar and common *L. disjunctus* -the balance being species common in Nova Scotia.

Isug gest in Table 1 other Odonata species which may be found in the aquatic habitats of the property, depending upon season of survey.

The principal Odonata diversity on the property occurs in man-made habitats. Whether this diversity will persist through active industrial activities will be dependent upon the nature of those activities.

During the reclamation phase of the project, efforts should be made to ensure that the freshwater aquatic habitats recover their diversity in Odonata. This may be beneficial, as small still-water habitats are rare along North Mountain, and that area of the province may host migratory Odonata (*Anax junius* in particular) which would benefit from the presence of those habitats. At this time, there is no indication of rare Odonata in the natural bog and stream habitats present on the property, and hence no particular concern that the still-water species will compete with them. If rare Odonata are discovered in the future outside of the man-made habitats, consideration should be given to removing the constructed still-water habitats during the reclamation phase.

The Property

The Whites Point Property is located on Digby Neck, Digby County, Nova Scotia. It is on NTIS 1:50,000 map 21B08, and 70y1 of The Nova Scotia Atlas.

The property extends from the top of North Mountain to the shore of the Bay of Fundy.

North Mountain is a basalt formation extending from Long Island to the Blomidon Peninsula. On Digby Neck it has a shallow over-burden of plant material and in places glacial till.
There are few natural habitats on the slopes of the mountain - some intermittent streams of very short catchment and a coastal bog -a nd most aquatic habitats on the property are man-made, or heavily man-influenced.

Past impacts include a gravel pit at Whites Cove, and logging on the top of the mountain - with attendant road construction.

Methods

We collected and documented all Odonata to species at each specific site within the property, and are depositing all voucher specimens with this report. We encountered no exuivae or larvae.

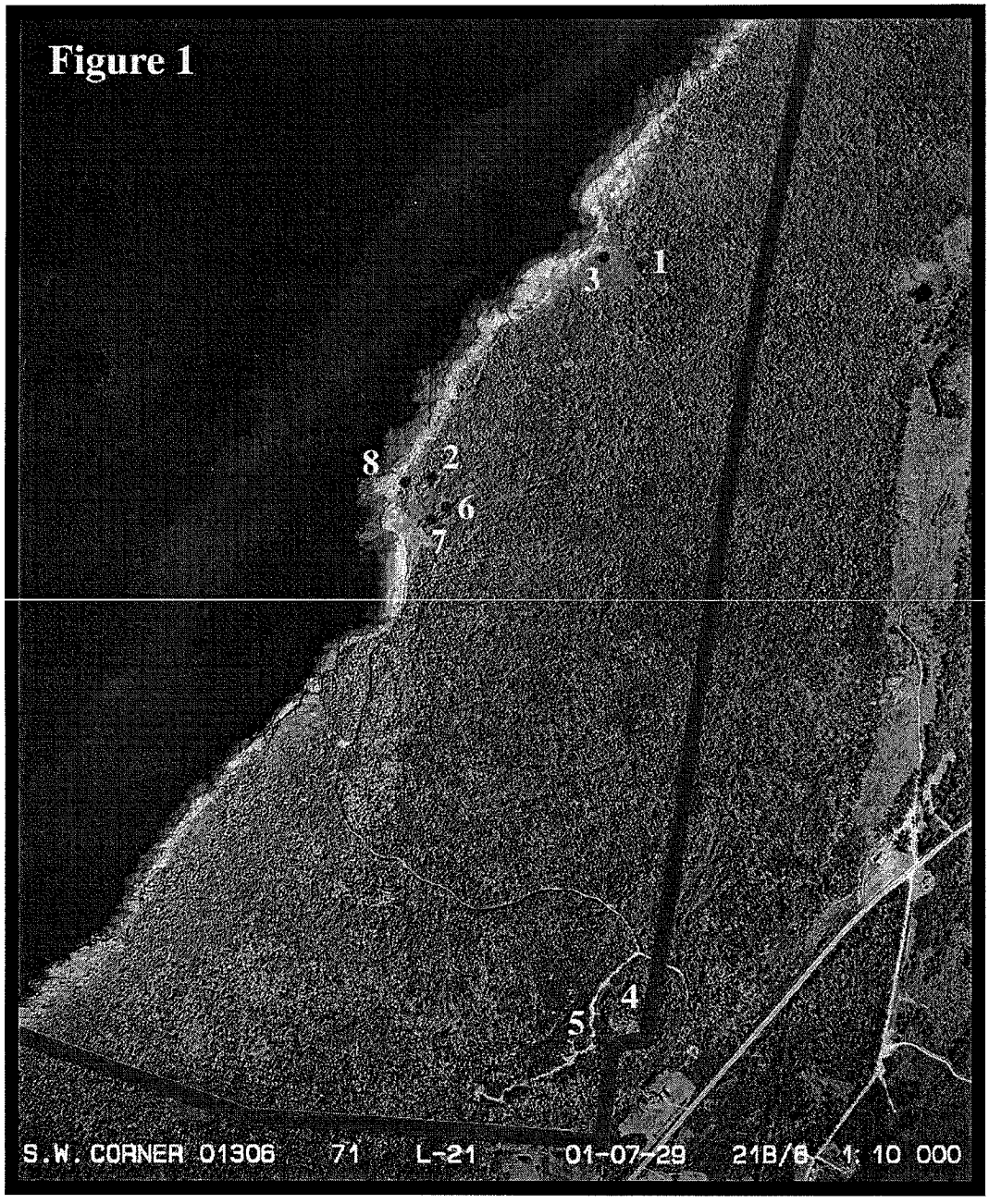
We visited all sites twice on August 6th, and once for a longer period each on August 7th. The weather was sunny and clear during the visits on both days, ideal weather for studying Odonata. Sites were located by GPS (±10 metres), and photographed.

I am reasonably sure that we have vouchered representatives of all species present as adults on the property on those two days, with the exception of *Celithemis elisa* and *Pantala flavescens* - which I can identify unambiguously on the wing.

Records and sites have been documented according to the ADIP (Atlantic Dragonfly Inventory Program) protocols.

Some species have not been encountered at water, and are recorded as from 'Whites Point Area'.

Figure 1: Freshwater aquatic sites on the Whites Point Property



Sites

See Figure 1, page 3, for locations of sites on the property.
There are three natural sites on the property which appear largely undisturbed.

'Whites Point Bog Stream' is a small, intermittent stream which flows down into 'Whites Point Bog'. During our visit it was dry, and it seems unlikely to be a viable habitat for Odonata. ADIP Site Code NS0855, 44.4691°N,-66.1372°W. Figure 1, number 1.

'Whites Point Stream' is also a small stream which flows down just east of Whites Point. It may harbour Damselfly species, although none were encountered. It has been mildly affected by the ATV trail along the shore. ADIP Site Code NS0854, 44.4668°N, -66.1423°W. Figure 1, number 2.

'Whites Point Bog' is a circumneutral bog/fen in an un-named cove midway between Whites Point and West Mink Cove. The area just behind the cobble beach is wet, with shallow pools, and may house some species of interest, although the wet area is very small in extent and largely lacking in *Sphagnum* moss. The oily surface of the small ponds may be a result of ATV activity in the area, or of minerals naturally occurring. The inland area of the bog is dry, and probably does not harbour larval Odonata. ADIP Site Code NS0853, 44.4691°N,- 66.1382°W. Figure 1, number 3.

There are five sites on the property which appear to be man-made, or heavily altered by human activity.

'Typha Marsh' is on the top of the mountain. It has little standing water and a dense growth of *Typha latifolia* (Cattail). It is a viable habitat for many Odonata species. The marsh has likely been formed or altered by road construction push-off. ADIP Site Code NS0847, 44.4559°N, -66.1386°W. Figure 1, number 4.

'Chara Pond' is also on the top of the mountain. It was likely formed by excavation of till and soil for road construction. The substrate is thin organic silt over bedrock. It is surprising that the dominant plant of the pond is *Chara algae* (Stinkwort), which is characteristic of water rich in calcium. This site was diverse in Odonata species. ADIP Site Code NS0848, 44.4554°N, -66.1391°W. Figure 1, number 5.

'Abandoned Pit Fen' is just inland of Whites Cove. It was apparently a gravel pit in the past, but the east side has become a small circumneutral fen, which may house species of that habitat type. The open pond area on the west side is included with the next site. ADIP Site Code NS0849, 44.4641°N, -66.1427°W. Figure 1, number 6.

'New Settle Pond' is also just inland of Whites Cove, constructed recently as a settle pond for run-off and cleaning water. It was shallow during our visit, but has the capacity for deeper water. It was rich in Odonata species, and has the potential for a very large list during the full

season. Included in this site are the pond on the west side of the old gravel pit, and the secondary settle pond on the west site of the main settle pond. ADIP Site Code NS0851, 44.4641°N, -66.1427°W. Figure 1, number 7.

'Whites Point Marsh' is formed by the overflow from the secondary settle pond, but may have had a natural origin. It drains to the shore immediately east of Whites Point. It has a small potential for Odonata, and has been somewhat affected by the ATV track along the shore. ADIP Site Code NS0852, 44.4647°N, 66.1441°W. Figure 1, number 8.

Species

We encountered the following species on August 6th and/or 7th, 2005. See Table 1 for conservation ranks. Six-digit numbers are ADIP Specimen Numbers.

Suborder Zygoptera – Damselflies
Family Lestidae – Spreadwings

Lestes disjunctus Sélys 1862-Northern Spreadwing
309006 - Specimen - Adult - 'New Settle Pond' August 7 2005 - Paul M. Brunelle
One female taken, the only individual of the species seen.

Lestes forcipatus Rambur 1842 - Sweetflag Spreadwing
308965 - Specimen - Adult - 'Chara Pond'
August 6 2005 - Paul M. Brunelle
Second visit this date. Towing pairs were laying in marginal plants, including Juncus Sp.
309011 - Photograph - Adult - 'Chara Pond'
August 7 2005 - Paul M. Brunelle.

Family Coenagrionidae - Pond Damsels

Enallagma aspersum (Hagen 1861) - Azure Bluet
308968 - Specimen - Adult - 'Chara Pond'
August 6 2005 - Paul M. Brunelle
Second visit this date. Males were perching on the Chara surface; towing and laying pairs similarly.
309013 - Photograph - Adult - 'Chara Pond'
August 7 2005 - Paul M. Brunelle.
309005 - Specimen - Adult - Whites Point Area
August 6 2005 - Paul M. Brunelle
One male foraging in grass beside the ATV track.

Enallagma civile (Hagen 1861) - Familiar Bluet
308982 - Specimen-Adult-'New Settle Pond'
August 6 2005 - Michael E. Brunelle.
309003 - Specimen-Adult-'New Settle Pond'
August 7 2005 - Paul M. Brunelle
308992-Specimen-Adult - Whites Point Area
August 6 2005 - Paul M. Brunelle
One male foraging in grass beside ATV track.

Ischnura posita (Hagen 1861) - Fragile Forktail
308971 - Specimen - Adult - 'Chara Pond'
August 6 2005 - Paul M. Brunelle
Second visit this date. Males perching on Chara. Towing pairs seen.
309015 - Observation - Adult - 'Chara Pond'
August 7 2005 - Paul M. Brunelle.

Ischnura verticalis (Say1839) - Eastern Forktail
308969 - Observation - Adult - 'Chara Pond'
August 6 2005 - Paul M. Brunelle
Second visit this date. Males perching on Chara surface, females laying similarly.
309014 - Observation - Adult - 'Chara Pond'
August 7 2005 - Paul M. Brunelle
308979 - Observation - Adult - 'New Settle Pond'
August 6 2005 - Paul M. Brunelle
308983 - Specimen - Adult - 'Whites Point Bog'
August 6 2005 - Paul M. Brunelle
308996 - Observation - Adult - 'Whites Point Bog'
August 7 2005 - Paul M. Brunelle.

Nehalennia irene (Hagen 1861) - Sedge Sprite
308963 - Specimen - Adult - 'Typha Marsh'
August 6 2005 - Paul M. Brunelle
Second visit this date. Laying in *Typha latifolia* near the water surface.
309009 - Observation - Adult - Typha Marsh
August 7 2005 - Paul M. Brunelle
308984-Specimen-Adult- 'Whites Point Bog'
August 6 2005 - Paul M. Brunelle
Only at small ponds in the bog.
308995-Observation-Adult-'WhitesPoint Bog'
August 7 2005 - Paul M. Brunelle.

Suborder Anisoptera – Dragonflies
Family *Aeshnidae* – Darners

Aeshna canadensis Walker1908-Canada Darner
308974 - Specimen - Adult - 'Abandoned Pit Fen'
August 6 2005 - Paul M. Brunelle
A female foraging over the fen - possibly resident.

Aeshna eremita Scudder 1866 - Lake Darner
308989-Specimen-Adult - Whites Point Area
August 6 2005 - Michael E. Brunelle
Flying along the ATV track near the treeline

Aeshna interrupta interrupta Walker 1908 – Variable Darner
308962 - Specimen - Adult - 'Typha Marsh'
August 6 2005 - Paul M. Brunelle
Second visit this date. Hovering in typical fashion over the few areas of surface water.
309007-Observation - Adult - 'Typha Marsh'
August 7 2005 - Paul M. Brunelle
308987-Specimen-Adult- 'Whites Point Bog'
August 6 2005 - Paul M. Brunelle
One female feeding low over the drier uphill sections of the bog.

Aeshna tuberculifera Walker1908-Black-tipped Darner
308967 - Specimen - Adult - 'Chara Pond'
August 6 2005 - Paul M. Brunelle
Second visit this date. Foraging over the pond about two metres above the water surface.

Aeshna umbrosa umbrosa Walker 1908- Shadow Darner
309010 - In Hand - Adult - 'Typha Marsh'
August 7 2005 - Paul M. Brunelle
Foraging on the road near 'Typha Marsh', possibly not resident in the marsh.
309016-Specimen-Adult - 'New Settle Pond'
August 7 2005 - Paul M. Brunelle
Female taken while ovipositing in the mud along the edge of the pond.

Anax junius (Drury 1770)-Common Green Darner
308975-Observation-Adult-'New Settle Pond'
August 6 2005 - Michael E. Brunelle.
308997-Specimen-Adult - 'New Settle Pond'
August 7 2005 - Michael E. Brunelle
A towing pair observed, indicating ovipositing.
308986-Observation-Adult - 'Whites Point Bog'
August 6 2005 - Paul M. Brunelle
Feeding over the bog and shore.

Family *Corduliidae* – Emeralds

Somatochlora elongata (Scudder 1866)-Ski-tailed Emerald
308980-Specimen-Adult - 'New Settle Pond'
August 6 2005 - Michael E. Brunelle
Males patrolling along the shore.
308998 - Observation - Adult - 'New Settle Pond'
August 7 2005 - Paul M. Brunelle
Males patrolling, and a female seen ovipositing at the pond margin.

Somatochlora walshii (Scudder 1866) - Brush-tipped Emerald
308972- Specimen-Adult-'Abandoned Pit Fen'
August 6 2005 - Paul M. Brunelle
A male territorial over the fen.
308994 - Observation - Adult - 'Abandoned Pit Fen'
August 7 2005 - Paul M. Brunelle
One male patrolling over the fen.

Family Libelullidae – Skimmers

Celithemis elisa (Hagen 1861) - Calico Pennant
308999 - Observation - Adult - 'New Settle Pond'
August 7 2005 - Paul M. Brunelle
One male perched on the grass at the pond edge.

Libellula pulchella Drury 1770-Twelve-spotted Skimmer
308978-Observation-Adult-'New Settle Pond'
August 6 2005 - Michael E. Brunelle.
309000-Specimen-Adult - 'New Settle Pond'
August 7 2005 - Michael E. Brunelle
Males present in small numbers; females were observed ovipositing several times, generally in shallows at edge of the pond.

Libellula quadrimaculata Linnaeus 1758 – Four-spotted Skimmer
308966 - Specimen - Adult - 'Chara Pond'
August 6 2005 - Paul M. Brunelle
Second visit this date. Males were abundant and fighting. Females were seen ovipositing several times; one was taken into wheel.
309012 - Observation - Adult - 'Chara Pond'
August 7 2005 - Paul M. Brunelle
309017 - Observation - Adult - 'New Settle Pond'
August 7 2005 - Paul M. Brunelle.

Pantala flavescens (Fabricius 1798) – Wandering Glider
308977 - Observation - Adult - 'New Settle Pond'
August 6 2005 - Paul M. Brunelle.
309002 - Observation - Adult - 'New Settle Pond'
August 7 2005 - Paul M. Brunelle.

Plathemis lydia(Drury1770)-Common Whitetail
308970 - Observation - Adult - 'Chara Pond'
August 6 2005 - Paul M. Brunelle
Second visit this date. A male passing through, possibly not resident.
308976-Observation-Adult-'NewSettle Pond'
August 6 2005 - Michael E. Brunelle
309001-Specimen-Adult - 'New Settle Pond'
August 7 2005 - Paul M. Brunelle
Females were observed ovipositing several times, they are much smaller than L. pulchella females.

Sympetrum internum Montgomery 1943 - Cherry-faced Meadowhawk
308964 - Specimen - Adult- 'Typha Marsh'
August 6 2005 - Paul M. Brunelle
Second visit this date. Males were territorial on and around the marsh.
309008-Observation - Adult - 'Typha Marsh'
August 7 2005 - Paul M. Brunelle
308973 - Observation - Adult - 'Abandoned Pit Fen'
August 6 2005 - Paul M. Brunelle
Males were territorial on the fen.
308981 - Specimen - Adult, Teneral - 'New Settle Pond'
August 6 2005 - Michael E. Brunelle
309004 - Specimen - Adult - 'New Settle Pond'
August 7 2005 - Paul M. Brunelle.

Table 1:
Odonata species known in Nova Scotia, and their potential for the Whites Point Property.

* Encountered on the Whites Point Property during the August 6 and 7th, 2005, Odonata Survey (21 species).
Throughout the table, ranks of conservation concern are given in bold type.

Note 1: Global Ranking.

Ranking by NatureServe. G1, G2, and G3 indicate global conservation concern. T or Q ranks indicate taxonomic complexities or uncertainty.

Note 2: General Status of Species in Canada (GSSC) National Ranking.

Website accessed August 17th, 2005: http://www.wildspecies.ca
Ranks 1, 2, and 3 indicate conservation concern. Ranks 5 and 6 indicate potential conservation concern.

Note 3: Nova Scotia Department of Natural Resources Provincial Colour Ranking.

Currently based on assessment of GSSC ranks. These ranks may differ from those given on the NSDNR website (M. Elderkin, NSDNR, pers. comm.) and are converted from the GSSC Nova Scotian ranks (Note 4 below) as follows;
GSSC 1 or 2 = Red.
GSSC 3 = Yellow.
GSSC 4 = Green.
GSSC 5 = Undetermined.
GSSC 6 = Unassessed.
Red, and Yellow indicate conservation concern; Undetermined (Undet.) indicates potential provincial conservation concern. Historical (Hist.) indicates the species has not been found in the province in >50 years. Unassessed indicates that the species has not been formally ranked.

Note 4: General Status of Species in Canada (GSSC) Nova Scotia Ranking.

Website accessed August 17th, 2005: http://www.wildspecies.ca
Ranks 1, 2, and 3 indicate provincial conservation concern. Ranks 5 and 6 indicates potential provincial conservation concern.

Note 5: Property Status.

This indicates the known or possible resident status of species on the Whites Point property.
- = unlikely to be present.
P = potentially present in some habitats as a resident population (larval development). If encountered during the 2005 survey, the species was found only away from aquatic habitats.

PE = 2005 survey was probably too early in the season to encounter adults of the species if present.

PL = 2005 survey was probably too late in the season to encounter adults of the species if present.

1 = known to be resident through emergence evidence (exuviae or teneral).

2.1 = likely to be resident as ovipositing has been observed.

2.2 = likely to be resident as mating behaviour has been observed.

3 = possibly resident, as adults were present at the appropriate habitat.

Note 6: General.

This indicates whether there is potential larval habitat for the species on the property.
NH = no aquatic habitat appropriate to the species is known on the Whites Point Property.
AH = aquatic habitat appropriate to the species is known on the Whites Point Property.

Note 7: Site Columns.

The remaining columns indicate the known and potential species status in each of the eight sites on the property.
P = indicates that the site could potentially harbour larvae of the species. These are assessments based on my experience with the species, and are not proof of presence.

In particular, note that the Coastal Bog is unlikely to harbour the number of species indicated as potentially present.

Table 1: Odonata species known in Nova Scotia, and their potential for the Whites Point Property.

Scientific Name	English Name	Global NatSrv 1	Canada GSSC 2	NSDNR Colour 3	NSDNR GSSC 4	Property Status 5	General 6	Typha Pond 7	Chara Pond	Settle Pond	Pit Fen	Overflow Marsh	Coastal Bog	Bog Stream	Point Strean
Suborder *Zygoptera*	Damselflies														
Family *Calopterygidae*	Broadwings														
Calopteryx aequabilis Say 1839	River Jewelwing	G5	4	Green	4	-	NH	-	-	-	-	-	-	-	-
Calopteryx amata Hagen 1890	Superb Jewelwing	G4	4	Green	4	-	NH	-	-	-	-	-	-	-	-
Calopteryx maculata (Bea. 1805)	Ebony Jewelwing	G5	4	Green	4	-	NH	-	-	-	-	-	-	-	-
Family *Lestidae*	Spreadwings														
Lestes congener Hagen 1861	Spotted Spreadwing	G5	4	Green	4	PE	AH	P	P	P	P	P	P	-	-
**Lestes disjunctus* Sélys 1862	Northern Spreadwing	G5T5	4	Green	4	3	AH	P	3	P	-	P	-	-	-
Lestes dryas Kirby 1890	Emerald Spreadwing	G5	4	Green	4	PL	AH	P	P	P	P	P	P	-	-
Lestes eurinus Say 1839	Amber-winged Spreadw.	G4	4	Undet.	5	-	NH	-	-	-	-	-	P	-	-
**Lestes forcipatus* Rambur 1842	Sweetflag Spreadwing	G5	4	Undet.	5	2.1	AH	P	2.1	P	-	P	-	-	-
Lestes rectangularis Say 1839	Slender Spreadwing	G5	4	Green	4	PL	AH	P	P	P	P	P	P	-	-
Lestes unguiculatus Hagen 1861	Lyre-tipped Spreadwing	G5	4	Green	4	PE	NH	P	P	P	P	P	P	-	-
Lestes vigilax Hagen 1862	Swamp Spreadwing	G5	3	Undet.	5	PL	AH	P	P	P	P	P	P	-	-
Family *Coenagrionidae*	Pond Damsels														
Amphiagrion saucium (Bu. 1839)	Eastern Red Damsel	G5	4	Green	4	PL	AH	-	-	-	P	P	P	-	-
Argia f. violacea (Hagen 1861)	Violet Dancer	G5T5	4	Green	4	-	NH	-	-	-	-	-	-	-	-
Argia moesta (Hagen 1861)	Powdered Dancer	G5	4	Green	4	-	NH	-	-	-	-	-	-	-	-
Chromagrion conditum (H. 1876)	Aurora Damsel	G5	4	Green	4	PL	AH	P	P	P	-	P	-	-	-
Coenagrion interrogatum (H. 1876)	Subarctic Bluet	G5	4	Undet.	5	PL	AH	-	-	-	P	-	P	-	-
Coenagrion resolutum (H. 1876)	Taiga Bluet	G5	4	Red	2	PL	AH	-	P	P	P	-	P	-	-
**Enallagma aspersum* (H. 1861)	Azure Bluet	G5	4	Green	4	2.1	AH	-	2.1	P	-	-	-	-	-
Enallagma boreale Sélys 1875	Boreal Bluet	G5	4	Green	4	PL	AH	P	P	P	-	P	-	-	-
Enallagma carunculatum M. 1895	Tule Bluet	G5	4	Undet.	5	-	NH	-	-	-	-	-	-	-	-
**Enallagma civile* (Hagen 1861)	Familiar Bluet	G5	4	Green	4	2.2	AH	-	-	2.2	-	-	-	-	-
Enallagma cyathigerum (Ch.. 1840)	Northern Bluet	G5	4	Undet.	5	PL	AH	P	P	P	-	-	-	-	-
Enallagma ebrium (Hagen 1861)	Marsh Bluet	G5	4	Green	4	PL	AH	P	P	P	P	P	P	-	-
Enallagma exsulans (Hagen 1861)	Stream Bluet	G5	4	Green	4	-	NH	-	-	-	-	-	-	-	-
Enallagma hageni (Walsh 1863)	Hagen's Bluet	G5	4	Green	4	PL	AH	P	P	P	P	P	P	-	-
Enallagma minusculum M. 1895	Little Bluet	G3G4	3	Yellow	3	-	NH	-	-	-	-	-	-	-	-
Enallagma signatum (Hagen 1861)	Orange Bluet	G5	4	Undet.	5	-	NH	-	-	-	-	-	-	-	-
Enallagma vernale Gloyd 1943	Vernal Bluet	G4Q	5	Undet.	5	-	NH	-	-	-	-	-	-	-	-
Enallagma vesperum Calvert 1919	Vesper Bluet	G5	4	Undet.	5	-	NH	-	-	-	-	-	-	-	-
**Ischnura posita* (Hagen 1861)	Fragile Forktail	G5	4	Green	4	2.2	AH	P	2.2	P	P	P	P	-	P
**Ischnura verticalis* (Say 1839)	Eastern Forktail	G5	4	Green	4	2.2	AH	P	2.2	P	P	P	3	-	P

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Table 1: continued

Scientific Name	English Name	Global NatSrv 1	Canada GSSC 2	NSDNR Colour 3	NSDNR GSSC 4	Property Status 5	General 6	Typha Pond 7	Chara Pond	Settle Pond	Pit Fen	Overflow Marsh	Coastal Bog	Bog Stream	Point Stream
Nehalennia gracilis Morse 1895	Sphagnum Sprite	G5	4	Undet.	5	PL	AH	-	-	-	P	-	P	-	-
**Nehalennia irene* (Hagen 1861)	Sedge Sprite	G5	4	Green	4	2.1	AH	2.1	P	P	P	P	2.2	-	-
Suborder *Anisoptera*	Dragonflies														
Family *Aeshnidae*	Darners														
**Aeshna canadensis* Walker 1908	Canada Darner	G5	4	Green	4	3	AH	P	-	P	3	P	P	-	-
Aeshna clepsydra Say 1839	Mottled Darner	G4	4	Green	4	-	NH	-	-	-	-	-	-	-	-
Aeshna constricta Say 1839	Lance-tipped Darner	G5	4	Undet.	5	PL	AH	P	-	P	-	-	-	-	-
**Aeshna eremita* Scudder 1866	Lake Darner	G5	4	Green	4	P	AH	-	-	-	-	-	-	-	-
**Aeshna i. interrupta* Walker 1908	Variable Darner	G5T5	4	Green	4	3	AH	3	-	-	-	-	-	-	-
Aeshna septentrionalis Burm. 1839	Azure Darner	G5	4	Hist.	5	PE	AH	-	-	-	P	-	P	-	-
Aeshna sitchensis Hagen 1861	Zigzag Darner	G5	4	Green	4	PL	AH	-	-	-	P	-	P	-	-
Aeshna subarctica Walker 1908	Subarctic Darner	G5	4	Green	4	PE	AH	-	-	-	P	-	P	-	-
**Aeshna tuberculifera* Walker 1908	Black-tipped Darner	G4	4	Green	4	P	AH	-	P	P	-	-	P	-	-
**Aeshna u. umbrosa* Walker 1908	Shadow Darner	G5T5	4	Green	4	2.1	AH	P	P	2.1	P	P	P	-	-
Aeshna verticalis Hagen 1861	Green-striped Darner	G5	4	Green	4	PE	AH	-	-	-	P	-	P	-	-
**Anax junius* (Drury 1770)	Common Green Darner	G5	4	Green	4	2.1	AH	P	-	2.1	-	-	P	-	-
Basiaeschna janata (Say 1839)	Springtime Darner	G5	4	Green	4	-	NH	-	-	-	-	-	-	-	-
Boyeria grafiana Williamson 1907	Ocellated Darner	G5	4	Undet.	5	-	NH	-	-	-	-	-	-	-	-
Boyeria vinosa (Say 1839)	Fawn Darner	G5	4	Green	4	-	NH	-	-	-	-	-	-	-	-
Gomphaeschna furcillata (S. 1839)	Harlequin Darner	G5	2	Red	2	PL	AH	-	-	-	P	-	P	-	-
Rhionaeschna mutata (H. 1861)	Spatterdock Darner	G3G4	2	Undet.	6	-	NH	-	-	-	-	-	-	-	-
Family *Gomphidae*	Clubtails														
Dromogomphus spinosus S. 1854	Black-shouldered Spinyl.	G5	4	Green	4	-	NH	-	-	-	-	-	-	-	-
Gomphus abbreviatus Hagen 1878	Spine-crowned Clubtail	G3G4	2	Undet.	6	-	NH	-	-	-	-	-	-	-	-
Gomphus adelphus Sélys 1858	Moustached Clubtail	G4	4	Green	4	-	NH	-	-	-	-	-	-	-	-
Gomphus borealis (Needham 1901)	Beaverpond Clubtail	G4	4	Green	4	PL	PH	-	-	P	-	-	-	-	-
Gomphus descriptus (Banks 1896)	Harpoon Clubtail	G4	4	Yellow	3	-	NH	-	-	-	-	-	-	-	-
Gomphus exilis Sélys 1854	Lancet Clubtail	G5	4	Green	4	PL	PH	-	-	P	-	-	-	-	-
Gomphus spicatus Hagen 1854	Dusky Clubtail	G5	4	Green	4	PL	PH	-	-	P	-	-	-	-	-
Gomphus ventricosus (Walsh 1863)	Skillet Clubtail	G3	2	Red	2	-	NH	-	-	-	-	-	-	-	-
Hagenius brevistylus Sélys 1854	Dragonhunter	G5	4	Green	4	-	NH	-	-	-	-	-	-	-	-
Lanthus parvulus (Sélys 1854)	Northern Pygmy Clubt.	G4	4	Yellow	3	PL	PH	-	-	-	-	-	-	P	P
Ophiogomphus aspersus M. 1895	Brook Snaketail	G3G4	4	Red	2	-	NH	-	-	-	-	-	-	-	-
Ophiogomphus carolus Need. 1897	Riffle Snaketail	G5	4	Green	4	-	NH	-	-	-	-	-	-	-	-
Ophiogomphus mainensis P. 1863	Maine Snaketail	G4	4	Red	2	-	NH	-	-	-	-	-	-	-	-

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Table 1: continued

Scientific Name	English Name	Global NatSrv	Canada GSSC	NSDNR Colour	NSDNR GSSC	Property Status	General	Typha Pond	Chara Pond	Settle Pond	Pit Fen	Overflow Marsh	Coastal Bog	Bog Stream	Point Stream
		1	2	3	4	5	6	7							
Ophiogom. rupinsulensis (W. 1862)	Rusty Snaketail	G5	4	Red	2	-	NH	-	-	-	-	-	-	-	-
Stylogomphus albistylus (H. 1878)	Eastern Least Clubtail	G5	4	Green	4	-	NH	-	-	-	-	-	-	-	-
Stylurus scudderi (Sélys 1873)	Zebra Clubtail	G4	4	Undet.	5	-	NH	-	-	-	-	-	-	-	-
Family *Cordulegastridae*	Spiketails														
Cordulegaster diastatops (S. 1854)	Delta-spotted Spiketail	G5	4	Green	4	-	NH	-	-	-	-	-	-	-	-
Cordulegaster maculata Sélys 1854	Twin-spotted Spiketail	G5	4	Green	4	-	NH	-	-	-	-	-	-	-	-
Family *Macromiidae*	Cruisers														
Didymops transversa (Say 1839)	Stream Cruiser	G5	4	Green	4	-	NH	-	-	-	-	-	-	-	-
Macromia i. illinoiensis W. 1862	Illinois River Cruiser	G5	4	Green	4	-	NH	-	-	-	-	-	-	-	-
Family *Corduliidae*	Emeralds														
Cordulia shurtleffii Scudder 1866	American Emerald	G5	4	Green	4	PL	AH	P	P	P	P	P	P	-	-
Dorocordulia lepida (Hagen 1871)	Petite Emerald	G5	4	Green	4	PL	AH	-	-	P	-	-	P	-	-
Dorocordulia libera (Sélys 1871)	Racket-tailed Emerald	G5	4	Green	4	-	NH	-	-	-	-	-	-	-	-
Epitheca canis (McLachlan 1886)	Beaverpond Baskettail	G5	4	Green	4	PL	AH	P	P	P	-	P	-	-	-
Epitheca cynosura (Say 1839)	Common Baskettail	G5	4	Undet.	5	PL	AH	P	P	P	-	P	-	-	-
Epitheca princeps (Hagen 1861)	Prince Baskettail	G5	4	Yellow	3	-	NH	-	-	-	-	-	-	-	-
Epitheca semiaquea (Burm. 1839)	Mantled Baskettail	G4	5	Undet.	5	PL	AH	P	P	P	-	P	-	-	-
Epitheca spinigera (Sélys 1871)	Spiny Baskettail	G5	4	Green	4	PL	AH	P	P	P	-	P	-	-	-
Helocordulia uhleri (Sélys 1871)	Uhler's Sundragon	G5	4	Green	4	-	NH	-	-	-	-	-	-	-	-
Somatochlora albicincta (B. 1839)	Ringed Emerald	G5	4	Red	2	-	NH	-	-	-	-	-	-	-	-
Somatochlora brevicincta Rob. 1954		Québec Emerald			G3	3	Yellow	5	PL	AH	-	-	-	P	-
Somatochlora cingulata Sélys 1871	Lake Emerald	G5	4	Green	4	-	NH	-	-	-	-	-	-	-	-
**Somatochlora elongata* (S. 1866)	Ski-tailed Emerald	G5	4	Green	4	2.1	AH	-	P	2.1	-	-	-	-	-
Somatochlora forcipata (S. 1861)	Forcipate Emerald	G5	4	Undet.	5	PL	AH	-	-	-	P	-	P	-	-
Somatochlora franklini (S. 1861)	Delicate Emerald	G5	4	Undet.	5	PL	AH	-	-	-	P	-	P	-	-
Somatochlora incurvata W. 1918	Incurvate Emerald	G4	4	Green	4	PE	AH	-	-	-	P	-	P	-	-
Somatochlora kennedyi W. 1918	Kennedy's Emerald	G5	4	Undet.	5	PL	AH	-	-	-	P	-	P	-	-
Somatochlora minor Calvert 1898	Ocellated Emerald	G5	4	Green	4	-	NH	-	-	-	-	-	-	-	-
Somato. septentrionalis (H. 1861)	Muskeg Emerald	G5	4	Yellow	3	-	NH	-	-	-	-	-	-	-	-
Somatochlora tenebrosa (Say 1839)	Clamp-tipped Emerald	G5	3	Yellow	3	-	NH	-	-	-	-	-	-	-	-
**Somatochlora walshii* (S. 1866)	Brush-tipped Emerald	G5	4	Green	4	3	AH	-	-	-	3	-	P	-	-
Somatochlora williamsoni W. 1907	Williamson's Emerald	G5	4	Red	2	-	NH	-	-	-	-	-	-	-	-
Williamsonia fletcheri Will. 1923	Ebony Boghaunter	G3G4	3	Red	2	PL	AH	-	-	-	P	-	P	-	-
Family *Libellulidae*	Skimmers														

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Table 1: continued															
Scientific Name	**English Name**	**Global NatSrv**	**Canada GSSC**	**NSDNR Colour**	**NSDNR GSSC**	**Property Status**	**General**	**Typha Pond**	**Chara Pond**	**Settle Pond**	**Pit Fen**	**Overflow Marsh**	**Coastal Bog**	**Bog Stream**	**Point Strean**
		1	2	3	4	5	6	7							
Celithemis martha Will. 1922	Martha's Pennant	G4	5	Green	5	-	NH	-	-	-	-	-	-	-	-
Erythrodiplax berenice (D. 1770)	Seaside Dragonlet	G5	2	Red	2	-	NH	-	-	-	-	-	-	-	-
Ladona exusta (Say 1839)	White Corporal	G4	4	Green	4	-	NH	-	-	-	-	-	-	-	-
Ladona julia (Uhler 1857)	Chalk-fronted Corporal	G5	4	Green	4	PL	AH	-	P	P	-	P	-	-	-
Leucorrhinia frigida Hagen 1890	Frosted Whiteface	G5	4	Green	4	PL	AH	P	P	P	P	P	P	-	-
Leucorrhinia glacialis Hagen 1890	Crimson-ringed Whitef.	G5	4	Green	4	PL	AH	P	P	P	P	P	P	-	-
Leucorrhinia hudsonica (S. 1850)	Hudsonian Whiteface	G5	4	Green	4	PL	AH	P	P	P	P	P	P	-	-
Leucorrhinia intacta (Hagen 1861)	Dot-tailed Whiteface	G5	4	Green	4	PL	AH	P	P	P	-	-	-	-	-
Leucorrhinia patricia Walker 1940	Canada Whiteface	G4	4	Undet.	5	-	NH	-	-	-	-	-	-	-	-
Leucorrhinia proxima Calvert 1890	Belted Whiteface	G5	4	Green	4	PL	AH	P	P	P	-	-	-	-	-
Libellula incesta Hagen 1861	Slaty Skimmer	G5	4	Green	4	PL	AH	-	-	P	-	P	-	-	-
Libellula luctuosa Burmeister 1839	Widow Skimmer	G5	4	Hist.	5	-	NH	-	-	-	-	-	-	-	-
**Libellula pulchella* Drury 1770	Twelve-spotted Skimmer	G5	4	Green	4	2.1	AH	-	-	2.1	-	-	-	-	-
**Libellula quadrimaculata* L. 1758	Four-spotted Skimmer	G5	4	Green	4	2.1	AH	P	2.1	3	P	P	P	-	-
Nannothemis bella (Uhler 1857)	Elfin Skimmer	G4	4	Green	4	-	NH	-	-	-	-	-	-	-	-
**Pantala flavescens* (Fab. 1798)	Wandering Glider	G5	4	Green	4	P	AH	-	P	P	-	-	P	-	-
Pantala hymenaea (Say 1839)	Spot-winged Glider	G5	4	Green	4	P	AH	-	P	P	-	-	P	-	-
**Plathemis lydia* (Drury 1770)	Common Whitetail	G5	4	Green	4	-	-	-	-	-	-	-	-	-	-
Sympetrum corruptum (H. 1861)	Variegated Meadowhawk		G5	4	Undet.	5	-	NH	-	-	-	-	-	-	-
Sympetrum costiferum (H. 1861)	Saffron-winged Mead.	G5	4	Green	4	PE	AH	P	P	P	P	P	P	-	-
Sympetrum danae (Sulzer 1776)	Black Meadowhawk	G5	4	Green	4	PE	AH	P	P	P	P	P	P	-	-
**Sympetrum internum* Mont. 1943	Cherry-faced Meadow.	G5	4	Green	4	I	AH	P	P	I	P	P	P	-	-
Sympetrum janeae Carle 1993	Jane's Meadowhawk	G5	5	Undet.	5	PE	AH	P	P	P	P	P	P	-	-
Sympetrum obtrusum (Hagen 1867)	White-faced Meadow.	G5	4	Green	4	PE	AH	P	P	P	P	P	P	-	-
Sympetrum rubicundulum (S. 1839)	Ruby Meadowhawk	G5	4	Undet.	5	PE	AH	P	P	P	P	P	P	-	-
Sympetrum semicinctum (Say 1839)	Band-winged Meadow.	G5	4	Green	4	PE	AH	P	P	P	P	P	P	-	-
Sympetrum vicinum (Hagen 1861)	Autumn Meadowhawk	G5	4	Green	4	PE	AH	P	P	P	P	P	P	-	-
Tramea carolina (Linnaeus 1763)	Carolina Saddlebags	G5	5	Undet.	5	-	NH	-	-	-	-	-	-	-	-

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Adult Butterfly Habitat and Larval Host Plant Survey of Whites Point, Digby Co., Nova Scotia

22 August 2005

by

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Adult Butterfly Habitat and Larval Host Plant Survey of Whites Point, Digby Co., N.S.

Date of Observations: 22 August, 2005.

Entomologist: Dr. Kenneth A. Neil, BSc., PhD, PDF
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Introduction: This report presents adult butterfly habitat and larval host plant observations made on a property belonging to Bilcon of Nova Scotia Ltd. situated in the vicinity of Whites Point, Digby Co., Nova Scotia. The property is located on Digby Neck on the northwest-facing slope of North Mountain (Boundary marker at sw corner, at shoreline, N44° 27.326' W66° 9.164; Approximate nw property boundary at shoreline, N44° 28.563' W66° 7.887'; see Figure 1). The site covers approximately 350 acres composed mainly of boreal forest, and includes a 3 km section of Bay of Fundy shoreline.

An adult butterfly habitat and larval host plant survey was conducted on 22 August, 2005 (Figure 1). The adult butterfly specimens seen were collected using a standard aerial insect net, identified, and released. A list of species observed is included. The site was examined, and potential adult butterfly habitats and larval host plants observed (host plant identification was confirmed using the Plant Survey of White's Cove, as prepared by Ruth E. Newell, Wolfville, Nova Scotia).

In the following report, butterfly species at risk have been identified from two priority lists:
1) species listed as Endangered, Threatened or of Special Concern, by COSEWIC (Committee on the Status of Endangered Wildlife in Canada)
2) species assigned a status Red (At Risk or Maybe at Risk) or Yellow (Sensitive) under the General Status Ranks of Wild Species in Nova Scotia. (A third priority list, the Nova Scotia Endangered Species Act, at this time contains no butterfly species).

Of the nine species listed in the Nova Scotia General Status which are ranked Red or Yellow, only three, the Monarch Butterfly (*Danaus plexippus* L., also ranked by COSEWIC as being of Special Concern), the Satyr Comma (*Polygonia satyrus* W. H. Edws.), and the Hoary Comma (*Polygonia gracilis* G. & R.) have habitats found in the Western region of Nova Scotia. The Mustard White (*Pieris oleracea* Harr.), although listed as Undetermined by the Nova Scotia General Status, has been included in this priority list due to its very limited known geographic distribution in Nova Scotia and the presence of suitable habitat at the Whites Point site.

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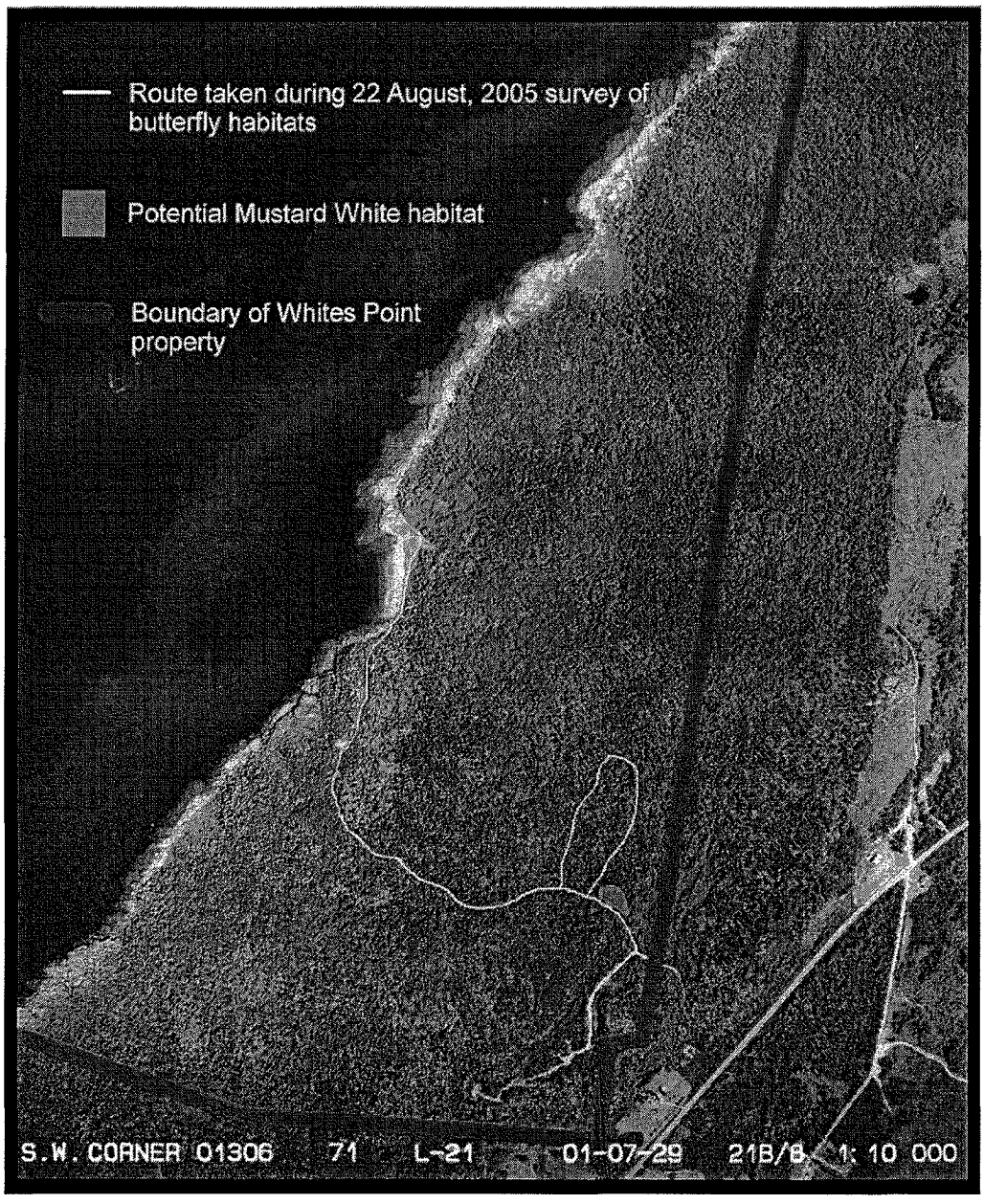

Figure 1. The Whites Point property showing the survey route and potential butterfly habitat identified on 22 August, 2005.

These lists, as well as the comments and conclusions, are based on my nearly 45 years field experience collecting and studying the Lepidoptera in Nova Scotia, literature surveys and a personal database of records taken from private collections throughout the Maritime Provinces, databases from the provincial museums of the Maritimes, the Nova Scotia Department of Natural Resources, Shubenacadie, N.S., the Canadian National Collection, Ottawa, the Peabody Museum, Harvard University, Mass., the Cornell University Collection, New York, the American Museum of Natural History, New York, and the National Museum Collection, Smithsonian Institute, Washington, D.C., as well as information from the Province's Significant Species and Habitats Database and a commissioned search of the ACCDC (Atlantic Canada Conservation Data Centre) database. A recommendation has also been provided.

Systematics used in this report follow those proposed by Layberry, Hall, and Lafontaine (1998). Other literature which has been consulted or cited has been listed in the references.

Butterfly species observed at the Whites Point Property, 22 August, 2005. Although very late in the summer, the following butterfly species were observed:

1) *Pieris rapae* (L.) - Cabbage White
2) *Colias philodice* Godt. - Clouded Sulphur
3) *Lycaena phlaeas americana* (L.) - American Copper
4) *Boloria selene atrocostalis* (Huard) - Silver-bordered Fritillary
5) *Phyciodes tharos* (Drury) - Pearl Crescent
6) *Nymphalis antiope* (L.) - Mourning Cloak
7) *Vanessa cardui* (L.) - Painted Lady
8) *Vanessa atalanta* (L.) - Red Admiral

All of the above are common species; 1-3, 7, and 8 are typical of open areas, although the latter two do not overwinter in Nova Scotia (or anywhere in Canada), but migrate here in the spring and vary greatly in seasonal abundance. Species 4 and 5 are common in habitats such as wet meadows and roadside ditches, throughout the province. Species 6 is a common woodland species.

Species at Risk: Although none of the species presented below have been collected or observed at the Whites Point site, their occurrence there is possible because either or both the larval host plant and proper habitat for adults were observed at the site.

***Dauaus plexippus* (L.) (Monarch Butterfly).** This species is ranked as of Special Concern by COSEWIC, and as Yellow by the Nova Scotia General Status.

The large, orange and black Monarch Butterfly is North America's most recognized butterfly species. It is best known for its yearly migrations to and from the overwintering sites in the highlands of North-Central Mexico, and the fact that this butterfly is "protected" from predators by the poisonous plant juices absorbed by the larvae from the host plant, milkweed *(Asclepias syriaca* L.)

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There has been a sharp decline in adult *D. plexippus* in recent years, which has prompted the concern of both the federal and provincial agencies. There are two main reasons for this decline:
1) destruction of the overwintering sites in Mexico as a result of logging and development; and 2) reduction of milkweed, the larval host plant, through the use of herbicides throughout North America, but especially in the American Midwest (Layberry *et al.* 1998).

Monarch numbers vary from year to year in Nova Scotia. Approximately every 5-10 years the Monarch will become abundant throughout the province from May to October. The last time this occurred was 1999-2001. What causes populations to "spike" like this every few years is not quite clear. However, certain weather conditions may be determining factors (Neil, in prep.).

Although adult Monarchs may visit the Whites Point property during the spring and autumn migration periods, the property does not support the milkweeds required by the larvae so breeding would not occur on the property. The nearest areas to Whites Point where breeding Monarchs have been documented are at Bear River and Belliveau Lake, Digby County (Neil *in prep.*).

Relatively little is known of the migration patterns of Monarchs in Nova Scotia. Monarchs are known to migrate long distances over water and spring migrants may arrive in Western Nova Scotia during late May or early June via migration paths through the Gulf of Maine and Bay of Fundy. Along the Bay of Fundy, cleared areas along the top of the North Mountain, including the cutover area at the Whites Point site, provide potential "staging" habitat for arriving spring migrants. These areas harbour the flowering plants that the nectar-feeding adult Monarchs require to replenish the energy reserves used in their long over-water flight before continuing their northward migration. These areas also provide potential habitat for Monarchs that have made landfall farther south and are continuing their northward migration.

Autumn migration of Monarchs in Nova Scotia occurs between late August and October. In 1949, Ferguson (1954) documented movements of Monarchs along the South Shore (Lunenburg County) and Schappart (1996) reports that fall migrants can be quite common along the Bay of Fundy. It would seem likely that many of these autumn migrants might follow a path along the Digby Neck, Long and Brier Islands, similar to migrating birds, although this has not been established. During the autumn migration, goldenrod (*Solidago* sp.) and asters (*Aster* sp.) are important foods for Monarchs and any areas supporting these "old field" species (including Whites Point) could be used by Monarchs.

***Polygonia satyrus* (W. H. Edws.) (Satyr Comma) and *Polygonia gracilis* (G. & R.) (Hoary Comma).** These two species are ranked as Yellow by the Nova Scotia General Status.

These species overwinter as adults, and are on the wing from early April to late October (single generation) (Ferguson 1954; Neil, in prep.). Abundance varies but they were considered more common in the past, a fact first noted by Ferguson (ibid.).This decrease is probably due to deforestation (Neil, in prep.).

As they are a resident forest species, adults should be sought along paths through wooded areas and on the edges of woodland clearings, where they can usually be seen sunning themselves on patches of bare ground. Adults are rarely attracted to flowers, and feed on running sap, carrion, and animal dung. They are easily collected using sugar bait, a mixture of overripe fruit, brown sugar, and alcohol, which is painted on the trunks of trees and allowed to ferment in the sun for a day or two.

P. gracilis could possibly breed at this site, as the larval host plant for this species, gooseberry

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(*Ribes hirtellum)*,occur s here. The larval host plant of *P. satyrus* is nettles (*Urtica dioica*), which has not been found on the Whites Point property. However, adult *Polygonia* are strong, active flyers, and can travel far in search of food sources.

***Pieris oleracea* Harr. (Mustard White).** This species is listed as Undetermined (Insufficient information to determine status) by the Nova Scotia General Status. However, in my professional opinion, the Mustard White could be considered Yellow (sensitive to human activities or natural events), due to its limited known geographic distribution in this province.

Belt (1864) and Perrin and Russell (1909) both listed the Mustard White as "common", however, this has changed through the years. Ferguson (1954) listed *P. oleracea* as "seemingly diminishing in numbers and occupying only a part of its former range". Today, this species is known to occur in Nova Scotia at only three small colonies, one located in western Kings County, one in Pictou County, and one in Cumberland County. The colony in Kings County is under extreme pressure from land development. Single captures have been recorded near Truro (2005), Mount Uniacke (2004), North Alton (2005), the Wentworth Valley (2005), and River Denys, Cape Breton (2004). There is not enough evidence to indicate the presence of colonies at these sites.

There are two main reasons for the decline of the Mustard White in Nova Scotia. The primary one is loss of its woodland habitat due to deforestation, and secondly, the introduction of the invasive, highly competitive Cabbage White (*Pieris rapae* (L.) from Europe into Quebec in the 1860's. This species spread rapidly across this country within the next few decades (Layberry *et al.* 1998).

The Mustard White should be sought during its adult flight period, from June to mid-July (Ferguson ibid.; Neil, in prep.), and again (second generation) in late July into September (Ferguson, ibid.). Although I have never caught a second generation specimen, a single specimen was collected in the Wentworth Valley in 2005. Adults are found in rich wooded areas or in the open areas near any slow-moving streams where any plants of the Mustard family *(Brassicaceae)*, the larval host plant,g row. An ideal habitat for *P. oleracea* was observed along the main access road to the Whites Point property where a shallow, slow-moving stream runs approximately parallel to the path (Figure 1). The habitat is nearly identical to those of the three known colonies of the Mustard White which still survive in this province.

Recommendation

It is recommended that field work be conducted in 2006, at the appropriate times, to verify the presence/absence of these species at risk prior to project development.

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Websites

Atlantic Canada Conservation Data Centre (ACCDC) www.accdc.com

Committee on the Status of Endangered Wildlife in Canada (COSEWIC) www.cosewic.gc.ca/index.htm

Nova Scotia Endangered Species Act (NSESA 1999) www.gov.ns.ca/natr/wildlife/endngrd/specieslist.htm

Nova Scotia General Status of Wild Species www.gov.ns.ca/natr/wildlife/genstatus

Significant Species and Habitat (SigHab) database (Nova Scotia) www.gov.ns.ca/natr/wildlife/thp/disclaim.htm

Species at Risk Act (SARA 2003) www.sararegistry.gc.ca/default_e.cfm

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Plant Survey of White's Cove Property, Digby Neck, Digby County, Nova Scotia

Client: Paul G. Buxton,
P.O. Box 98,
Annapolis Royal,
Nova Scotia
B0S 1A0

Dates of survey: July 2, 3 & 7, 2002

Botanist: Ruth E. Newell, B.Sc. (Hons.), M.Sc.
General Delivery,
Wolfville,
Nova Scotia
B0P 1X0

Introduction:
This report represents the results of a botanical survey carried out on a 380-acre site situated on Digby Neck, Digby County, Nova Scotia in the vicinity of White's Cove. The property is located primarily on the northwest-facing slope of the North Mountain. It also encompasses an approximately 3 km section of the Bay of Fundy shoreline. Vehicle access is off of Highway 217 between the communities of Little River and Mink Cove.

This plant survey was carried out over three days (July 2nd, 3rd and 7th, 2002) by botanist, Ruth Newell and an assistant. Time spent in a given habitat depended on potential for rare plant species based on the Atlas of Rare Vascular Plants of Nova Scotia (Pronych and Wilson, 1993). Two days were spent surveying coastal habitats (headlands, coastal wetlands, rocky shoreline and mountain streams) and one day was devoted to the forested areas.

The entire coastline was surveyed and the vegetation recorded for both the headlands and the rocky shoreline. Two small streams flowing off of the North Mountain to the Bay of Fundy were also examined along their lengths to the extent that they occurred within the property boundaries. A coastal bog/marsh located approximately .6 km northeast of White's Cove was checked. The woodlands were surveyed by walking one broad northeast/southwest transect for most of the property length with two perpendicular transects off of the main transect, to the coast. Transect width varied from 20 - 40 m. A significant proportion of the woods along the top of the mountain has been recently clearcut, as has a section of the woods in the vicinity of White's Cove. These clearcut areas are not evident on the air photo. These areas were briefly examined during this study.

Locations of most of the populations of rare plant species observed on the property were documented digitally with a GPS unit (Garmin 12). Due to technical difficulties however,

A REPORT ON A BOTANICAL SURVEY, BILCON PROPERTY, WHITES COVE, LITTLE RIVER, DIGBY COUNTY, NOVA SCOTIA

Prepared for

Bilcon of Nova Scotia
P.O. Box 2113
Digby, Nova Scotia
BOV 1AO

By

Gini Proulx
R.R. #1
Deep Brook, Nova Scotia
BOS 1JO

09 November 2005

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The purpose of this botanical survey was to determine if Rock Spikemoss, Selaginella Rupestris, or any other rare or endangered plants, occur on rock outcrops on Bilcon property at Whites Cove, the site of a proposed basalt quarry.

Rarity Status of Selaginella Rupestris

Historically in Nova Scotia, Selaginella Rupestris was known only from two North Mountain sites on Digby Neck in the 1950's: the summit of Shoebel's Mountain in Sandy Cove and on rock outcrops east of Centreville. (Roland / Zinck 1998, Roland's Flora of Nova Scotia). It had not been seen recently and was considered probably extirpated by 2001.

In October 2002, I rediscovered the Centreville population at the crest of the mountain. This discovery led to the possibility that S. Rupestris may also occur in similar habitat throughout Digby Neck.

Preferred Habitat of S. Rupestris

Based on habitat encountered at the Centreville site, the actual summit of the North Mountain, consisting of an exposed, southern facing rock face provided the largest populations. Smaller populations were encountered on other basalt outcrops on the Bay of Fundy slope from the summit.

Scope of Search

Assisted by Brent Newell, a careful search was made of the rock face defining the summit of the North Mountain within the Bilcon property. This section begins in the west within the clear cut and continues roughly northeasterly through standing timber back to the Whites Cove Road. The rock face exits the Bilcon property just east of this road. Random searches were undertaken of rock outcrops in the clear cut area sough of the Whites Cove Road and the "grubbed off" section directly above Whites Cove. See attached map #6 (Terrestrial Ecology, Vegetative Cover & Plant Surveys) showing areas searched in red. Total time on site was approximately 5.5 hours.

Results of Search

No Selaginella Rupestris or other rare or endangered plants were encountered in this search.

the locations of the various populations of *Primula laurentiana* (Bird's-eye Primrose) found on site were not marked with a GPS unit. There were instead, pinpointed on an aerial photo at the time of observation. All rare species observed were photographed with a 35 mm camera with the exception of *Conioselinum chinense* /Hemlock Parsley, and flagged. The approximate population size for each rare species was also recorded. Locations of all the rare plant species found during this survey are indicated on the air photo located on the last page of this report.

Habitat descriptions and a list of plant species for each, is provided in APPENDIX 1.

Results:

Rare Species found on the White's Cove Property during this survey:

1) *Prenanthes racemosa* (Glaucous Rattlesnake-root). *Photo 1.*

ACCDC ranking: S1; listed as rare for Nova Scotia by Maher *et al.* (1978) and Pronych & Wilson (1993). (See APPENDIX 2 for an explanation of the ACCDC Ranking System)

Map coordinates for the location of this species on the White's Cove property: NAD 83, 19T 0726914E, 4926924N.

This plant has been reported in the past, in low numbers, from nearby Sandy Cove and Whale Cove (Roland, 1998), but has not been seen in either area, for approximately fifty years. One clump, consisting of approximately15 closely associated plants, many small and probably not reproducing, was found on a very sheltered, narrow rock ledge on a layer of peaty soil, along the upper portion of the rock shoreline.

It should be noted here that these plants were not in flower when discovered, so identification is based on vegetative material and comparison with herbarium specimens. It would be advisable to make a return visit to the site in August or September when these plants are normally in flower or fruit to confirm identification. A return visit is also advisable in terms of looking for other plants of this species. Glaucous Rattlesnake-root was reported from an exposed Juniper-crowberry headland at Whale Cove on Digby Neck (Roland, 1998). Although the headlands in the White's Cove area were examined closely, this species would be difficult to spot amongst the dense carpets of Juniper and Crowberry unless in flower or fruit. In other words, it would be more conspicuous in the field at this time and therefore more likely to be found if present.

Photo 1. *Prenanthes racemosa* (Glaucous Rattlesnake-root) growing on a rock ledge on the White's Cove property.

2) *Arenaria groenlandica* (Mountain Sandwort). *Photo 2.*

ACCDC ranking: S2; listed as rare for Nova Scotia by Maher et al. (1978) and Pronych & Wilson (1993).

Map coordinates for the location of this species on the White's Cove property: NAD 83; 19T 0727702E, 4928232N – this represents the northeast limit of the population.

Approximately 15 small clumps of Mountain Sandwort were observed on the coast, about .6 - .7 km northeast of White's Cove. Most of the plants occur in shallow soil on the edges of flat outcroppings of basalt well up on the shoreline. One clump only, was found along an ATV trail on bare, peaty substrate. This species seems to be restricted to two locations on the White's Cove property. These are points on the coast where the shoreline broadens into three, terraces of flat basalt outcropping and headland vegetation, inland of the outer rock shoreline. The Mountain Sandwort seems to be restricted to the middle bedrock terrace in all cases. This particular habitat structure only occurs immediately northeast and immediately southwest of the cove marking the location of the coastal bog/marsh that was also surveyed for this study (see aerial photo). Most of the plants found occurred to the northeast of the bog. Two clumps were found southwest of the bog. This species inhabits areas with seemingly harsh environmental conditions where there is little competition from other plants species.

Photo 2. *Arenaria groenlandica* (Mountain Sandwort) in shallow soil on the edge of a coastal basalt outcrop, northeast of White's Cove.

3) *Conioselinum chinense* (Hemlock Parsley) (no photo available)

ACCDC ranking: S2S3

This member of the carrot family is sparsely distributed along the coastline southwest of White's Cove. It was not observed northeast of White's Cove. It occurs in small numbers both on the headlands and with *Primula laurentiana* on the upper portion of the rocky shore. Most plants were vegetative and very small. Several more robust plants were along the stream near the southwest corner of the property. These latter plants had young flowering stems.

4) *Primula laurentiana* (Bird's-eye Primrose). *Photos 3 & 4.*

ACCDC ranking: S3; listed as rare for Nova Scotia by Maher *et al.* (1978) and Pronych & Wilson (1993).

Bird's-eye Primrose was observed intermittently along the coast in approximately 10 locations from White's Cove, southwestwards to the property line. It was not located along the shoreline northeast of White's Cove. It is found as scattered small populations on disturbed, often relatively bare soil where the headland and rock shoreline habitats meet. It also grows in shallow soil in the lee of rock faces or large boulders on the upper section of the rocky shoreline. These are damp, shady micro-habitats sheltered from the elements. Approximately 300 plants in total were observed, ranging from fruiting specimens to non-flowering/fruiting rosettes to seedlings.

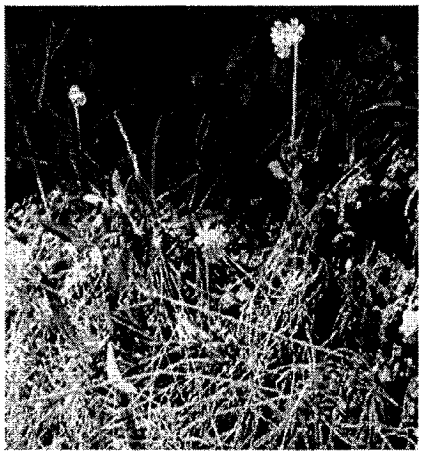

Photo 3.

Photo 4.

Photos 3 & 4. Photographs taken on site of *Primula laurentiana* (Bird's-eye Primrose) in flower (top) and in fruit (bottom) (top photo courtesy of G. Alliston).

5) *Symplocarpus foetidus* (Skunk Cabbage) P*hoto 5.*

ACCDC ranking: S3; listed as rare for Nova Scotia by Maher et al. (1978) and Pronych & Wilson (1993).

Map coordinates for the location of this species on the White's Cove property: NAD83, 19T 0727407E, 4927074N.

Only one plant of Skunk Cabbage was found during this survey. It was found in the woods, in a low area between two boulders under White Birch with Cinnamon Fern growing nearby. Because the entire forested area of the property was not surveyed, it is possible that other plants of this species may occur here.

Photo 5. *Symplocarpus foetidus* (Skunk Cabbage) in woods northeast of White's Cove Road.

Recommendations:

1. It is recommended that the coastal communities remain undisturbed due to the presence of four rare plant species including an ACCDC S1- ranked plant, Glaucous Rattlesnake-root (*Prenanthes racemosa*).

2. It is recommended that a field visit be made later in the season (in August or September) when Glaucous Rattlesnake-root is in flower or fruit, to search for more plants in the headland areas.

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Web Sites

Atlantic Canada Conservation Data Center: ***http://www.accdc.com***

APPENDIX 1. Habitat Descriptions and Species Lists

Habitat 1
Headland at White's Cove
This is a low, grassy area located behind the beach at White's Cove. A number of introduced species are present which suggest some past human disturbance. Common graminoid species include: Red Fescue, Hair Fescue, Sweet Vernal Grass, and Kentucky Blue Grass. Common forbs include: Yellow Rattle, Rough Goldenrod, Sheep Sorrel, Yarrow, Knapweed, etc. Scattered shrub and tree species include Common and Creeping Juniper, Bayberry, White Spruce, Meadowsweet, etc.

Plant List

Latin Name	Common Name	Abundance
Achillea millefolium	Yarrow	common
Anthoxanthum odoratum	Sweet Vernal Grass	common
Aster sp.	an aster	common
Campanula rotundifolia	Harebell	scattered
Carex viridula	Little Green Sedge	common
Centaurea nigra	Knapweed	scattered
Cerastium vulgatum	Mouse-eared Chickweed	scattered
Chrysanthemum leucanthemum	Ox-eye Daisy	scattered
Dactylis glomerata	Orchard Grass	occasional
Daucus carota	Wild Carrot	scattered
Empetrum nigrum	Black Crowberry	common
Festuca filiformis	Hair Fescue	common

Festuca rubra	Red Fescue	common
Fragaria virginiana	Wild Strawberry	scattered
Hieracium floribundum	King Devil	occasional
Holcus lanatus	Yorkshire Fog	occasional
Hypericum perforatum	Common St. John's-wort	occasional
Hypochoeris radicata	Cat's-ear	occasional
Iris versicolor	Blue Flag	occasional
Juncus arcticus	Arctic Rush	occasional
Juncus bufonius	Toadrush	occasional in patches
Juniperus communis	Common Juniper	common
Juniperus horizontalis	Creeping Juniper	common
Luzula multiflora	Common Woodrush	scattered
Myrica pensylvanica	Bayberry	common
Panicum boreale	Northern Witchgrass	common
Picea glauca	White Spruce	occasional
Plantago lanceolata	English Plantain	scattered
Poa pratensis	Kentucky Bluegrass	common
Ranunculus acris	Tall Buttercup	scattered
Rhinanthus crista-galli	Yellow Rattle	common
Ribes sp.	a gooseberry	scattered
Rosa virginiana	Common Wild Rose	occasional
Rubus sp.	a blackberry	common
Rubus strigosus	Wild Raspberry	occasional
Rumex acetosella	Sheep Sorrel	common
Sisyrinchium montanum	Blue-eyed Grass	occasional
Solidago rugosa	Rough Goldenrod	common
Spiraea alba	Meadowsweet	scattered
Taraxacum officinale	Dandelion	occasional
Tragopogon pratensis	Goat's-beard	scattered
Vaccinium angustifolium	Lowbush Blueberry	scattered
Vaccinium macrocarpon	Large Cranberry	occasional
Veronica officinalis	Common Speedwell	occasional

Habitat 2
Headlands northeast of White's Cove
The headlands northeast of White's Cove are noticeably less rugged than those to the southwest. The gentler terrain has permitted the establishment of a well-traveled ATV trail from north of the property, as far south as White's Cove. Common plant species on these headlands include Three-toothed Cinquefoil, Beach Blue Flag, White Goldenrod, Common and Creeping Juniper, Black Crowberry, several large patches of Rugose Rose, the succulent, Roseroot, the sedge, *Carex panicea* (conspicuous due to it's bluegreen leaves), Little Green Sedge and numerous grasses including Poverty Grass, Blue Joint and Red Fescue.

At two locations along this stretch of coast, the upper shoreline/headland area broadens into three terraces. Each of these three levels has large, relatively level patches of

exposed basalt bedrock. **It is in these areas (primarily on the middle terrace) that the rare species, Mountain Sandwort (*Arenaria groenlandica*) was discovered.**

Plant List

Latin Name	Common Name	Abundance
Angelica lucida	Seaside-angelica	occasional
Aralia nudicaulis	Wild Sarsaparilla	common
Arenaria groenlandica	**Mountain Sandwort**	**uncommon**
Arenaria lateriflora	Sandwort	occasional patches
Calamagrostis canadensis	Bluejoint	scattered
Carex folliculata	Long Sedge	uncommon
Carex panicea	a sedge	locally common
Carex viridula	Little Green Sedge	common
Cornus canadensis	Bunchberry	occasional
Danthonia spicata	Poverty Grass	common to abundant
Deschampsia flexuosa	Hairgrass	common
Drosera intermedia	Narrow-leaved Sundew	occasional
Empetrum nigrum	Black Crowberry	common
Ilex verticillata	Canada Holly	occasional
Iris setosa	Beach Blue Flag	occasional
Juniperus communis	Common Juniper	common
Juniperus horizontalis	Creeping Juniper	common
Osmunda cinnamomea	Cinnamon Fern	common
Poa compressa	Canada Bluegrass	uncommon
Poa palustris	Fowl Meadow Grass	occasional
Potentilla simplex	Cinquefoil	scattered
Potentilla tridentata	Three-toothed Cinquefoil	common
Pteridium aquilinum	Bracken	scattered
Radiola linoides	Tiny All-seed	locally abundant
Raphanus raphanistrum	Wild Radish	uncommon
Ribes hirtellum	Gooseberry	scattered
Rosa rugosa	Rugose Rose	locally common
Rubus sp.	blackberry	scattered
Salix humilis	Small Pussy-willow	uncommon
Scirpus cespitosus	Deergrass	uncommon to common
Sedum rosea	Roseroot	common
Solidago bicolor	White Goldenrod	common

Habitat 3

Headlands southwest of Whites Cove

The coastline southwest of White's Cove is much more rugged than the coastline northeast of White's Cove. There are occasional cliffs separating the headland habitat from the lower rocky shore. In a number of spots, giant boulders are strewn over the bedrock of the outer shoreline area. Walking this shoreline is much more challenging than the shoreline to the northeast. There are two large headland areas dominated by

Juniper and Crowberry species. There is also little evidence of human disturbance along this part of the coastline. **A number of rare plant species were found here. These include Bird's-eye Primrose (*Primula laurentiana*), Hemlock Parsley (*Conioselinum chinense*) and Glaucous Rattlesnake-root (*Prenanthes racemosa*).**

Plant List

Latin Name	Common Name	Abundance
Achillea millfolium	Yarrow	scattered
Anagallis arvensis	Poor-man's Weather-glass	uncommon
Aralia nudicaulis	Wild Sarsaparilla	scattered
Aster sp.	an aster	common
Calamagrostis canadensis	Bluejoint	occasional to scattered
Campanula rotundifolia	Harebell	common
Carex conoidea	Field Sedge	uncommon
Carex panicea	a sedge	locally common
Carex viridula	Little Green Sedge	scattered
Conioselinum chinense	**Hemlock Parsley**	**uncommon**
Danthonia spicata	Poverty Grass	scattered
Deschampsa flexuosa	Hairgrass	scattered to common
Empetrum nigrum	Black Crowberry	common
Euphrasia randii	Small Eyebright	uncommon
Festuca rubra	Red Fescue	common
Iris setosa	Beach Blue Flag	occasional scattered
Iris versicolor	Blue Flag	occasional
Juniperus communis	Common Juniper	abundant
Juniperus horizontalis	Creeping Juniper	abundant
Ligusticum scothicum	Scotch Lovage	occasional
Lysimachia terrestris	Swamp Candle	occasional
Myrica pensylvanica	Bayberry	common
Oenothera perennis	Sundrops	uncommon
Oryzopsis asperifolia	Rice-grass	uncommon
Osmunda cinnamomea	Cinnamon Fern	common
Panicum boreale	Northern Witchgrass	common
Picea glauca	White Spruce	common
Potentilla simplex	Cinquefoil	scattered
Potentilla tridentata	Three-leaved Cinquefoil	scattered
Prenanthes racemosa	**Glaucous Rattlesnake Root**	**rare**
Primula laurentiana	**Bird's-eye Primrose**	**uncommon; occurring at interface of coastal rocky shoreline and headland**
Rhinanthus crista-galli	Yellow-rattle	occasional
Scirpus caespitosus	Deergrass	scattered to common
Sedum rosea	Roseroot	scattered
Sisyrinchium montanum	Blue-eyed Grass	occasional
Solidago bicolor	White Goldenrod	common

Spiraea alba	Meadowsweet	common
Toxicodenron sp.	Poison Ivy	locally common
Vaccinium angustifolium	Lowbush Blueberry	scattered to common
Vaccinium macrocarpon	Large Cranberry	occasional

Habitat 4

Coastal marshes/open seepage slopes

A number of small, open, marshes and seepage areas occur periodically along the shoreline on the White's Cove property. No rare plant species were observed in any of these.

Plant List

Latin Name	**Common Name**	**Abundance**
Aster umbellatus	Tall White Aster	scattered
Calystegia sepium	Hedge-bindweed	common
Carex crinita	Fringed Sedge	occasional
Carex echinata	Little Prickly Sedge	common
Eleocharis sp.	a spike-rush	common
Impatiens capensis	Jewelweed	common
Lycopus americanus	Water Horehound	uncommon
Lycopus uniflorus	Bugle-weed	occasional
Lysimachia terrestris	Swamp Candle	common
Mentha sp.	a mint	occasional
Onoclea sensibilis	Sensitive Fern	common
Platanthera sp	an orchid	uncommon
Polygonum sagittatum	Tear-thumb	occasional
Potentilla anserina	Silverweed	occasional
Rosa virginica	Common Wild Rose	common
Scutellaria galericulata	Marsh Skullcap	uncommon

Habitat 5

Rock crevices along lower shoreline (outermost vegetated zone; situated between high tide line and headlands)

This hostile environment is highly subject to salt spray and wind. Vegetation only occurs in crevices that offer a little bit of soil and some protection from the elements. The most prevalent and widespread species in this habitat is Seaside Plantain. Other fairly widespread species include Roseroot, Red Fescue, Beach Blue Flag and Scotch Lovage. **Bird's-eye Primrose (*Primula laurentiana*) and Parsley Hemlock (*Conioselinum chinense*) are rare species found in the upper reaches of this habitat.** These species bridge two habitats by occurring in the upper reaches of the lower rocky shoreline and the lower reaches of the grassy headland habitat.

Plant List

Latin Name	**Common Name**	**Abundance**
Atriplex sp.	an orach	uncommon
Carex scoparia	Pointed Broom Sedge	scattered

Circaea alpina	Small Enchanter's Nightshade	uncommon
Conioselinum chinense	**Hemlock Parsley**	**uncommon**
Epilobium sp.	a willow-herb	uncommon
Festuca rubra	Red Fescue	occasional
Glaux maritima	Sea-milkwort	uncommon
Iris setosa	Beach Blue Flag	scattered
Juncus gerardii	Black Grass Rush	occasional
Lathyrus japonicus	Beach-pea	uncommon
Ligusticum scothicum	Scotch Lovage	scattered
Plantago maritima	Seaside Plantain	common
Primula laurentiana	**Bird's-eye Primrose**	**uncommon**
Puccinellia maritima	Seaside Alkali Grass	uncommon
Ranunculus cymbalaria	Seashore Buttercup	uncommon
Rumex pallidus	Sea-beach Dock	occasional patches in low channels (fractures) through the basalt bedrock
Sagina procumbens	Pearlwort	occasional
Scirpus caespitosus	Deergrass	uncommon
Sedum rosea	Roseroot	common
Solidago sempervirens	Seaside Goldenrod	occasional
Triglochin maritima	Arrow-grass	occasional

Habitat 6

Inland boulders and outcrops

This property is peppered with large boulders (erratics?) and small outcroppings of bedrock. Vegetation occurring in shallow soil on top of or in crevices of these must be able to tolerate drought conditions as the shallow soil would dry out fairly rapidly in sunny weather. Lichens are abundant and often dominate particularly when the boulder or exposed bedrock receives little shade. No rare plant species were observed in this particular habitat.

Plant List

Latin Name	**Common Name**	**Abundance**
Achillea millefolium	Yarrow	occasional
Agrostis capillaris	Brown Top	uncommon
Aralia nudicaulis	Wild Sarsaparilla	common
Aster umbellatus	Tall White Aster	occasional
Cornus canadensis	Bunchberry	common
Deschampsia flexuosa	Hairgrass	common
Festuca rubra	Red Fescue	common
Fragaria virginiana	Wild Strawberry	occasional
Hieracium pilosella	Mouse-eared Hawkweed	occasional
Juniperus communis	Common Juniper	common
Linnaea borealis	Twinflower	common
Maianthemum canadense	Wild Lily-of-the-valley	occasional

Melampyrum lineare	Cow-wheat	occasional
Polypodium virginianum s.l..	Rock Polypody	common
Rubus strigosus	Wild Raspberry	occasional
Senecio vulgaris	Groundsel	uncommon
Vaccinium angustifolium	Lowbush Blueberry	common
Veronica officinalis	Common Speedwell	occasional

Habitat 7
Coastal "boggy" marsh northeast of White's Cove
This is a Cinnamon Fern/shrub/Red Maple-dominated wetland with a mix of both bog and marsh plant species. A few open wet areas exist with clumps of Deergrass and a variety of other herbaceous plants. No rare species were observed in this particular habitat.

Plant List

Latin Name	Common Name	Abundance	Comments
Acer rubrum	Red Maple	scattered	
Alnus uncana	Speckled Alder	occasional to scattered	
Alnus viridis	Downy Alder	common	
Amelancher sp.	a shadbush	occasional	
Arethusa bulbosa	Dragon's-mouth	uncommon	
Aronia sp. a chokeberry	occasional		
Aster nemoralis	Bog Aster	scattered	
Aster umbellatus	Tall White Aster	occasional	
Brachyelytrum erectum	Long-awned Wood Grass	uncommon	
Carex buxbaumii	Buxbaum's Sedge	uncommon	
Carex cf. rostrata	Beaked Sedge	uncommon	large coarse sedge vegetative
Carex echinata	Little Prickly Sedge	scattered	
Carex exilis	Coast Sedge	abundant	
Carex folliculata	Long Sedge		
Diervilla lonicera	Bush Honeysuckle	uncommon	
Drosera intermedia	Narrow-leaved Sundew	occasional	
Drosera rotundifolia	Round-leaved Sundew	occasional	
Eleocharis sp.	a spikerush	occasional	immature
Empetrum nigrum	Black Crowberry	occasional	
Eriophorum polystachion	Narrow-leaved Cotton-grass	occasional	
Eriophorum virginicum	Tawny Cotton-grass	occasional	
Ilex verticillata	Canada Holly	common	
Iris versicolor	Blue Flag	occasional	
Juncus arcticus	Arctic Rush	occasional to scattered	
Juniperus communis	Common Juniper	occasional	

Kalmia angustifolia	Sheep Laurel	occasional	
Ledum groenlandicum	Labrador Tea	scattered	
Lonicera caerulea	Mountain Fly-honeysuckle	occasional	
Myrica gale	Sweet Gale	common	
Myrica pensylvanica	Bayberry	occasional to scattered	
Osmunda cinnamomea	Cinnamon Fern	common	
Osmunda claytoniana	Interrupted Fern	uncommon	
Osmunda regalis	Royal Fern	occasional	
Panicum boreale	Northern Witchgrass	occasional	
Platanthera dilatata	Tall White Northern-bog Orchid	uncommon	
Potentilla fruticosa	Shrubby Cinquefoil	scattered	
Pteridium aquilinum	Bracken	scattered	
Pyrola rotundifolia(?)	American Wintergreen	uncommon	
Rhododendron canadense	Rhodora	occasional	
Rosa nitida	Swamp-rose	scattered	
Rubus pubescens	Dewberry	occasional	
Rubus sp.	a blackberry	scattered	
Scirpus caespitosus	Deergrass	common to abundant	
Scirpus hudsonianus	Alpine Cotton-grass	occasional	= Eriophorum alpinum
Solidago uliginosa	Bog Goldenrod	occasional	
Sphagnum spp.	sphagnum mosses	abundant	
Spiraea alba	Meadowsweet	common	
Thalictrum pubescens	Meadow-rue	occasional	
Thelypteris palustris	Marsh Fern	occasional	
Toxicodendron sp.	Poison Ivy	locally common	
Vaccinium angustifolium	Lowbush Blueberry	occasional to scattered	
Vaccinium macrocarpon	Large Cranberry	common	
Vaccinium oxycoccos	Small Cranberry	occasional	
Vaccinium vitis-idaea	Foxberry	occasional	
Viburnum nudum	Witherod	occasional	

Habitat 8
Streams

Stream #1. A small stream, located near the northeastern extremity of the property and flowing westwards off of the North Mountain to the sea, was surveyed. It is a narrow, shallow, rocky stream running through a small gorge. Near it's mouth on the coast, it flows through a shrub thicket of Canada Holly, Meadowsweet, Downy Alder, Common

Wild Rose, Mountain Fly-honeysuckle and Witherod. No rare species were found in the vicinity of this stream.

Plant List

Latin Name	Common Name	Abundance
Abies balsamea	Balsam Fir	occasional
Acer rubrum	Red Maple	occasional
Alnus viridis	Downy Alder	occasional
Aralia nudicaulis	Wild Sarsaparilla	scattered
Aster acuminatus	Wood Aster	occasional
Aster macrophyllus	Large-leaved Aster	common
Aster umbellatus	Tall White Aster	scattered
Betila papyrifra	White Birch	scattered
Brachyelytrum erectum	Long-awned Wood Grass	uncommon
Carex echinata	Little Prickly Sedge	uncommon
Carex gracillima	Graceful Sedge	uncommon
Carex leptonervia	Finely-nerved Sedge	uncommon
Clintonia borealis	Clintonia	uncommon
Coptis trifolia	Goldthread	occasional
Cornus canadensis	Bunchberry	scattered
Deschampsia flexuosa	Hairgrass	scattered
Empetrum nigrum	Black Crowberry	occasional
Fraxinus americanus	White Ash	uncommon
Gaultheria hispidula	Creeping Snowberry	occasional
Ilex verticillata	Canada Holly	occasional
Juniperus communis	Common Juniper	occasional
Linnaea borealis	Twinflower	common
Lonicera caerulea	Mountain Fly-honeysuckle	uncommon
Maianthemum canadense	Wild Lily-of-the-valley	scattered
Myrica pensylvanica	Bayberry	occasional
Osmunda cinnamomea	Cinnamon Fern	occasional to scattered
Phegopteris connectilis	Beech Fern	occasional
Picea rubens	Red Spruce	common
Potentilla fruticosa	Shrubby Cinquefoil	uncommon
Potentilla tridentata	Three-toothed Cinquefoil	uncommon
Prenanthes sp.	a lion's-paw	uncommon
Pteridium aquilinum	Bracken	occasional
Rosa virginiana	Common Wild Rose	uncommon
Rubus pubescens	Dewberry	occasional
Smilacina racemosa	False Solomon's-seal	uncommon
Spiraea alba	Meadowsweet	common at stream mouth
Streptopus roseus	Rosy Twisted-stalk	uncommon
Taxus canadensis	Yew	occasional
Thalictrum pubescens	Meadow-rue	occasional to scattered
Trientalis borealis	Starflower	occasional
Vaccinium angustifolium	Lowbush Blueberry	occasional

Vaccinium vitis-idaea	Foxberry	occasional
Viburnum nudum	Witherod	occasional

Stream #2. Only a part of a stream at the southwestern corner of the property occurs within the property boundary. This is the section that runs through the open, headland area before coming to the outer rocky shoreline. The stream is narrow and shallow and runs through a small, narrow rock gorge. Clumps of Deergrass and Little Prickly Sedge are dominant along the stream where it makes its way across the headland. Other components of the streamside vegetation include Tall White Northern-bog Orchid, Blue Flag, Meadow-rue and Tall White Aster. **A small number of Hemlock Parsley (*Conioselinum chinense*) plants were located along this stream.** These were the most robust plants of this species seen on the property and were the only ones to have immature flowering shoots. All previous plants of this species observed were vegetative.

Plant List

Latin Name	**Common Name**	**Abundance**
Achillea millefolium	Yarrow	occasional
Alnus viridis	Downy Alder	uncommon
Aster umbellatus	Tall White Aster	occasional
Campanula rotundifolia	Harebell	occasional
Carex crinita	Fringed Sedge	uncommon
Carex echinata	Little Prickly Sedge	common
Carex panicea	a sedge	common
Carex viridula	Little Green Sedge	occasional
Conioselinum chinense	**Hemlock Parsley**	**uncommon**
Eleocharis sp.	a spikerush	ocasional
Empetrum nigrum	Black Crowberry	common
Festuca rubra	Red Fescue	scattered
Iris versicolor	Blue Flag	occasional
Juncus arcticus	Arctic Rush	thinly scattered
Juniperus communis	Common Juniper	common
Juniperus horizontalis	Creeping Juniper	common
Lonicera caerula	Mountain Fly-honeysuckle	occasional
Myrica pensylvanica	Bayberry	occasional
Osmunda cinnamomea	Cinnamon Fern	scattered
Panicum boreale	Northern Witchgrass	scattered
Phegopteris connectilis	Beech Fern	occasional
Picea glauca	White Spruce	occasional to common
Platanthera dilatata	Tall White Northern-bog Orchid	uncommon
Prunus virginina	Chokecherry	occasional
Rubus pubescens	Dewberry	occasional
Scirpus caespitosus	Deergrass	common
Thalictrum pubescens	Meadow-rue	occasional

Habitat 9
Wooded areas

#1. Wooded area southwest of White's Cove Road
The woods vary from mostly coniferous to mixed coniferous-deciduous. Dominant trees include Red Spruce and Balsam Fir. Scattered throughout are Red Maple and White Birch. The terrain along the transect consisted of a series of alternating dry knolls and damp, sphagnous hollows. There was a scattering of large boulders, usually with some vegetation on top and in crevices on the sides. A large section near the southwestern property line has numerous deadfalls. No rare species were observed along this transect.

Plant List

Latin Name	Common Name	Abundance
Abies balsamea	Balsam Fir	common
Acer rubrum	Red Maple	scattered
Alnus viridis	Downy Alder	occasional
Anthoxanthum odoratum	Sweet Vernal Grass	uncommon
Aralia nudicaulis	Wild Sarsaparilla	common
Aster acuminatus	Wood Aster	occasional
Aster macrophyllus	Large-leaved Aster	
Aster umbellatus	Tall White Aster	occasional to scattered
Athyrium filix-femina	Lady Fern	uncommon
Betula papyifera	White Birch	occasional to scattered
Calamagrostis canadensis	Blue Joint	occasional
Carex debilis var. rudgei	White-edged Sedge	uncommon
Carex echinita	Little Prickly Sedge	occasional
Carex intumescens	Bladder Sedge	uncommon
Carex leptalea	Bristly-stalked Sedge	occasional in damp areas
Carex novae-angliae	New England Sedge	uncommon
Carex trisperma	Three-seeded Sedge	common in low damp areas
Circaea alpina	Small Enchanter's-nightshade	forming carpets in damp wooded areas
Coptis trifolia	Goldthread	common
Cornus canadensis	Bunchberry	occasional
Danthonia spicata	Poverty Grass	uncommon
Deschampsia flexuosa	Hairgrass	scattered
Diervilla lonicera	Bush Honeysuckle	uncommon
Dryopteris intermedia	Evergreen Wood Fern	occasional
Galium triflorum	Sweet-scented Bedstraw	uncommon
Glyceria striata	Fowl Manna-grass	occasional in damp areas
Gymnocarpium dryopteris	Oak Fern	uncommon
Ilex verticillata	Canada Holly	occasional to common

Linnaea borealis	Twinflower	abundant
Lonicera canadensis	Fly-honeysuckle	occasional
Lycopodium annotinum	Bristly Club-moss	occasional in clearcut
Lysimachia terrestris	Swamp Candle	occasional in damp areas
Maianthemum canadense	Wild Lily-of-the-valley	common
Nemopanthus mucronata	False Holly	occasional
Osmunda cinnamomea	Cinnamon Fern	common in low damp areas
Osmunda regalis	Royal Fern	uncommon
Panicum boreale	Northern Witchgrass	uncommon
Phegopteris connectilis	Beech Fern	locally common
Picea glauca	White Spruce	scattered to common
Picea rubens	Red Spruce	common
Poa saltuensis	Drooping Bluegrass	uncommon
Prunus virgninana	Chokecherry	occasional
Pteridium aquilinum	Bracken	common
Ranunculus repens	Creeping Buttercup	occasional
Rubus pubescens	Dewberry	occasional
Rubus sp.	a blackberry	occasional
Rubus strigosus	Wild Raspberry	occasional
Sambucus racemosa	Red-berried Elder	uncommon
Solidago rugosa	Rough Goldenrod	occasional to common
Thalictrum pubescens	Meadow-rue	occasional
Thelypteris noveboracensis	New York Fern	common in damp areas
Trientalis borealis	Starflower	occasional
Veronica officinalis	Common Speedwell	occasional
Viburnum nudum	Witherod	thinly scattered

#2. Wooded area northeast of Whites Cove Road

These woods range from primarily coniferous to mixed coniferous-deciduous. The main species occurring here are Red Spruce, White Spruce, Balsam Fir, Red Maple and White Birch. Occasional tree species include Mountain Maple, Moose Maple, White Ash and American Mountain-ash. A section in the vicinity of the White's Cove Road near the coast was observed to have numerous deadfalls. There are scattered dry streambeds, swamps and seepage areas throughout as well as boulders, rock faces and rock outcrops. This area has a more noticeable slope to it than the previous section. **The only rare species observed was a single plant of Skunk Cabbage (*Symplocarpus foetidus*). This was observed in a low area between two boulders. It is possible that more plants of this species may occur on the property.**

Plant List

Latin Name	**Common Name**	**Abundance**
Abies balsamea	Balsam Fir	common
Acer pensylvanicum	Moose Maple	uncommon
Acer rubrum	Red Maple	common

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Acer spicatum	Mountain Maple	uncommon
Alnus viridis	Downy Alder	occasional
Aquilegia vulgaris	Columbine	uncommon
Aralia nudicaulis	Wild Sarsaparilla	scattered to common
Aster acuminatus	Wood Aster	scattered
Aster lateriforus	Calico Aster	occasional
Aster macrophyllus	Large-leaved Aster	occasional large patches
Aster umbellatus	Tall White Aster	occasional
Betula papyrifera	White Birch	occasional to scattered
Carex echinata	Little Prickly Sedge	common in swampy area
Carex trisperma	Three-seeded Sedge	common in swampy area
Circaea alpina	Small Enchanter's Nightshade	common in low areas (forming mats)
Clintonia boreale	Clintonia	uncommon
Coptis trifolia	Goldthread	occasional
Cornus canadensis	Bunchberry	occasional
Cypripedium acaule	Pink Lady's-slipper	uncommon
Dalibarda repens	Dalibarda	uncommon
Dennstaedtia punctilobula	Hay-scented Fern	scattered patches
Deschampsia flexuosa	Hairgrass	scattered
Dryopteris campyloptera	Eastern Spreading Wood Fern	occasional
Dryopteris carthusiana	Spinulose Wood Fern	occasional
Dryopteris intermedia	Evergreen Wood Fern	scattered
Fraxinus americana	White Ash	uncommon
Glyceria striata	Fowl Manna-grass	occasional in damp areas
Goodyera sp.	a rattlesnake plantain	uncommon
Gymnocarpium robertianum	Oak Fern	uncommon
Ilex verticillata	Canada Holly	occasional to common
Impatiens capensis	Jewelweed	common in wet area
Iris versicolor	Blue Flag	occasional in damp areas
Kalmia angustifolia	Sheep Laurel	uncommon
Ledum groenlandicum	Labrador Tea	occasional in marshy areas
Linnaea borealis	Twin Flower	common to abundant
Luzula multiflora	Common Woodrush	occasional
Lycopus uniflorus	Bugle-weed	occasional in damp seeps
Maianthemum canadense	Wild Lily-of-the-valley	scattered
Melampyrum lineare	Cow Wheat	occasional in dry areas
Nemopanthus mucronata	False Holly	occasional
Onoclea sensibilis	Sensitive Fern	common in damp low areas
Osmunda cinnamomea	Cinnamon Fern	common
Osmunda claytoniana	Interrupted Fern	occasional
Oxalis acetosella	Wood Sorrel	occasional to common
Phegopteris connectilis	Beech Fern	forming carpets in some areas

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Picea glauca	White Spruce	scattered
Picea rubens	Red Spruce	common
Platanthera obtusata	Blunt-leaved Orchid	uncommon
Prenanthes sp.	a lion's-paw	uncommon
Prunus virginiana	Chokecherry	occasional
Pteridium aquilinum	Bracken	occasional to scattered
Ranunculus repens	Creeping Buttercup	occasional
Ribes sp.	a gooseberry	occasional to scattered
Rubus pubescens	Dewberry	occasional
Rubus strigosus	Wild Raspberry	uncommon to occasional
Sambucus racemosa	Red-berried Elder	occasional
Solidago rugosa	Rough Goldenrod	occasional
Sorbus decora	American Mountain-ash	thinly scattered throughout
Streptopus rosea	Rosy Twisted-stalk	uncommon
Symplocarpus foetidus	**Skunk Cabbage**	**uncommon**
Thalictrum pubescens	Meadow-rue	damp areas
Thelypteris noveboracensis	New York Fern	occasional
Trientalis borealis	Starflower	occasional
Viburnum nudum	Witherod	occasional

APPENDIX 2. Explanation of the Plant Ranking System Used by the ACCDC (Atlantic Canada Conservation Data Centre); this information is also available on the ACCDC Web Site.

Sub-national Rank Definitions: S-ranks

S1
Extremely rare throughout its range in the province (typically 5 or fewer occurrences or very few remaining individuals). May be especially vulnerable to extirpation.

S2
Rare throughout its range in the province (6 to 20 occurrences or few remaining individuals). May be vulnerable to extirpation due to rarity or other factors.

S3
Uncommon throughout its range in the province, or found only in a restricted range, even if abundant in at some locations. (21 to 100 occurrences).

S4
Usually widespread, fairly common throughout its range in the province, and apparently secure with many occurrences, but the Element is of long-term concern (e.g. watch list). (100+ occurrences).

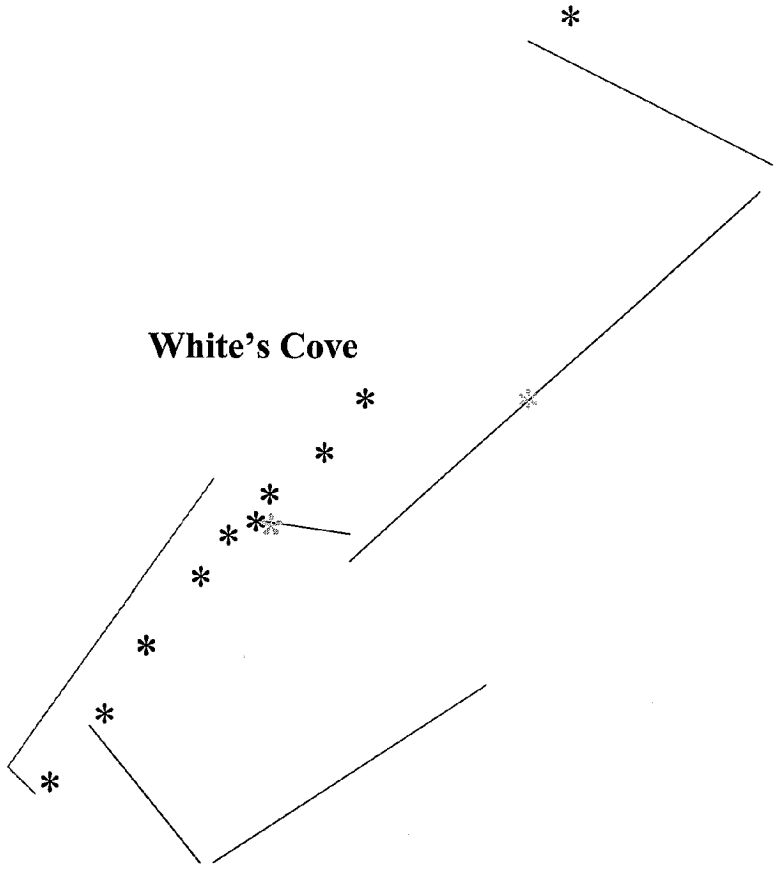
S5
Demonstrably widespread, abundant, and secure throughout its range in the province, and essentially ineradicable under present conditions.

S#S#
Numeric range rank: A range between two consecutive numeric ranks. Denotes uncertainty about the exact rarity of the Element (e.g., S1S2).

Air Photo of White's Cove Property (see following page).

Legend:

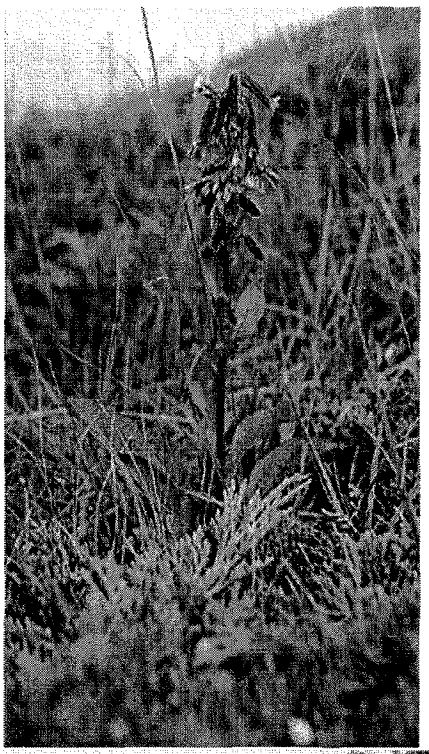
Outer black line: property boundary
Inner black lines: survey transects
Red line: section of coastline where Hemlock Parsley occurs
Red asterisks: Locations of Mountain Sandwort
Black asterisks: Locations of Bird's-eye Primrose
Yellow asterisk: Location of Skunk Cabbage
Pink asterisk: Location of Glaucous Rattlesnake-root


White's Cove

Addendum to report entitled: "Plant Survey of White's Cove Property, Digby Neck, Digby County, Nova Scotia" by Ruth E. Newell

On August 18th, 2002, the White's Cove Property on Digby Neck was re-visited by botanist, Ruth E. Newell, to confirm the presence of Glaucous Rattlesnake-root (*Prenanthes racemosa*) and to search for more plants of this species. Since earlier visits to the site in July had located vegetative plants, it was recommended that another visit be made during this species' flowering period in August, to confirm the identification of these plants. On this return trip, flowering plants of Glaucous Rattlesnake-root were observed on the White's Cove property thus confirming the presence of this rare plant species (photo 1). In addition to the original clump of 15 plants observed in July on a rock ledge south of White's Cove, approximately 100-200 more plants were discovered (only a small proportion were flowering). These were thinly scattered throughout extensive, low, uniform beds of Creeping Juniper (*Juniperus horizontalis*) on the lower portion of the large headland just south of White's Cove. The new site is near the original small population of plants discovered in July, 2002. Photos 2 and 3 show the headland habitat where these additional plants were located.

Photo 1. Flowering plants of Glaucous Rattlesnake-root (*Prenanthes racemosa*) near White's Cove, Digby Neck, Digby County, Nova Scotia, August 18th, 2002 (on rock ledge).



Photos 2 & 3. Headland habitat just south of White's Cove, where 100 to 200 plants of Glaucous Rattlesnake-root (*Prenanthes racemosa*) were discovered on August 18th, 2002, growing in mats of Creeping Juniper (*Juniperus horizontalis*).

Ruth E. Newell, B.Sc.(Hons.), M.Sc.

September 6, 2002

A REPORT ON A BOTANICAL SURVEY, BILCON PROPERTY, WHITES COVE, LITTLE RIVER, DIGBY COUNTY, NOVA SCOTIA

Prepared for

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09 November 2005

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The purpose of this botanical survey was to determine if Rock Spikemoss, Selaginella Rupestris, or any other rare or endangered plants, occur on rock outcrops on Bilcon property at Whites Cove, the site of a proposed basalt quarry.

Rarity Status of Selaginella Rupestris

Historically in Nova Scotia, Selaginella Rupestris was known only from two North Mountain sites on Digby Neck in the 1950's: the summit of Shoebel's Mountain in Sandy Cove and on rock outcrops east of Centreville. (Roland / Zinck 1998, Roland's Flora of Nova Scotia). It had not been seen recently and was considered probably extirpated by 2001.

In October 2002, I rediscovered the Centreville population at the crest of the mountain. This discovery led to the possibility that S. Rupestris may also occur in similar habitat throughout Digby Neck.

Preferred Habitat of S. Rupestris

Based on habitat encountered at the Centreville site, the actual summit of the North Mountain, consisting of an exposed, southern facing rock face provided the largest populations. Smaller populations were encountered on other basalt outcrops on the Bay of Fundy slope from the summit.

Scope of Search

Assisted by Brent Newell, a careful search was made of the rock face defining the summit of the North Mountain within the Bilcon property. This section begins in the west within the clear cut and continues roughly northeasterly through standing timber back to the Whites Cove Road. The rock face exits the Bilcon property just east of this road. Random searches were undertaken of rock outcrops in the clear cut area sough of the Whites Cove Road and the "grubbed off" section directly above Whites Cove. See attached map #6 (Terrestrial Ecology, Vegetative Cover & Plant Surveys) showing areas searched in red. Total time on site was approximately 5.5 hours.

Results of Search

No Selaginella Rupestris or other rare or endangered plants were encountered in this search.