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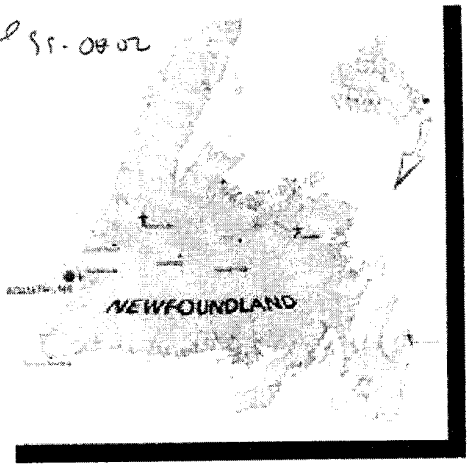
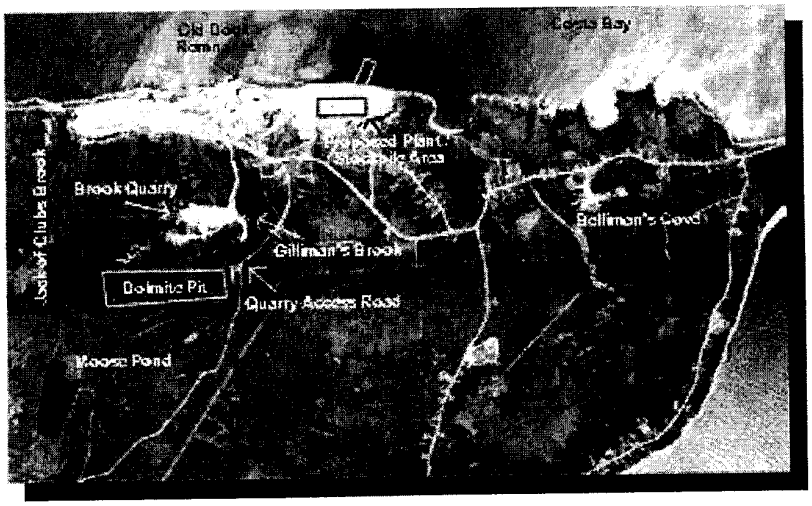
Mid Atlantic Minerals Inc.
Aguathuna Quarry Development
Environmental Impact
Comprehensive Study Report





Prepared on Behalf of

Atlantic Canada Opportunities Agency

AGUATHUNA QUARRIES

AGUATHUNA QUARRY DEVELOPMENT PROJECT
COMPREHENSIVE STUDY REPORT

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1.0 Introduction

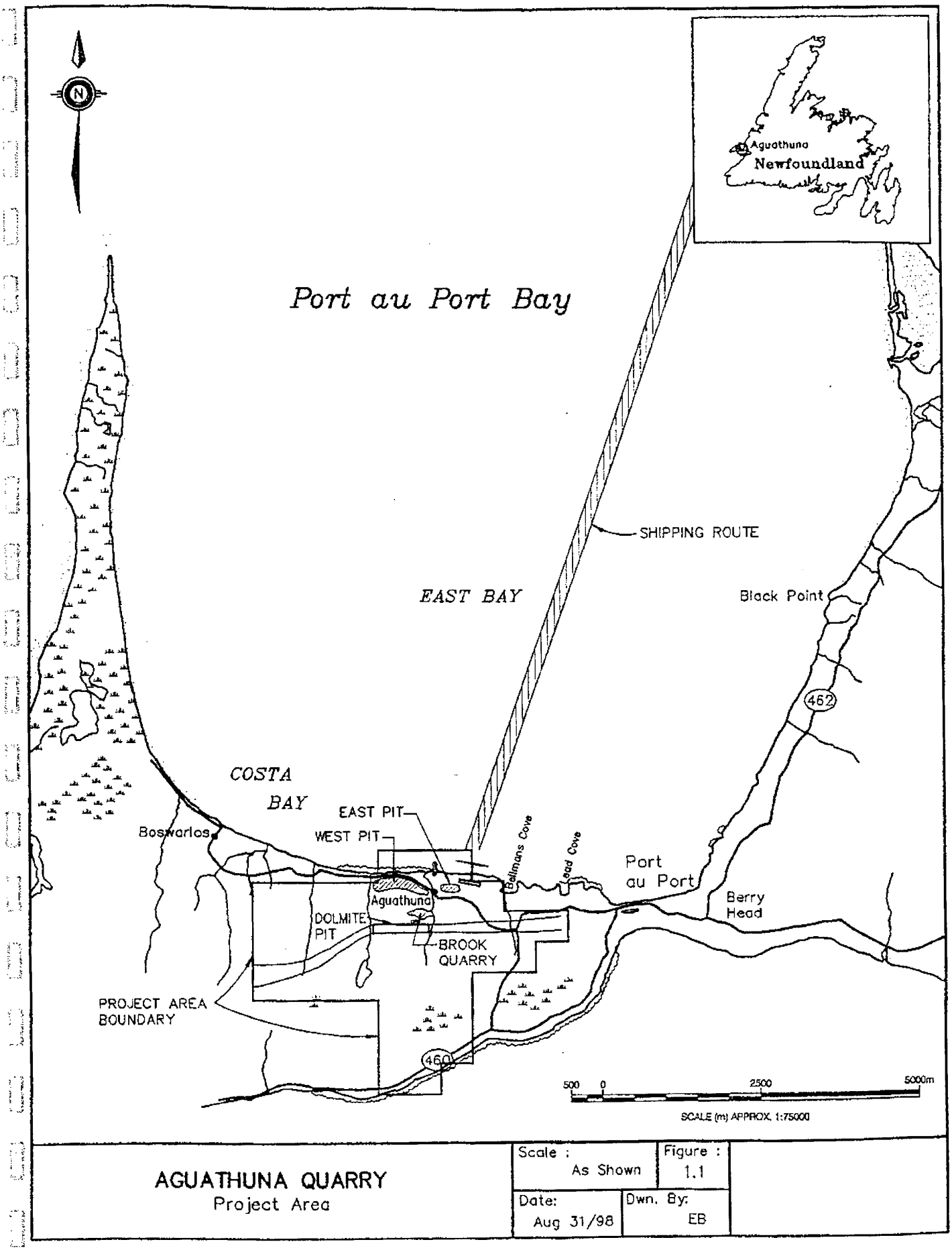
1.1 Project Overview

Aguathuna Quarries ("proponent"), a joint venture between Mosher Limestone Limited ("Mosher") from Nova Scotia and Mid-Atlantic Mineral Inc. ("Midatlantic") from Quebec, is proposing to develop a dolomite and/or limestone quarry in Aguathuna, Newfoundland (see Figures 1.1-1.4 for Project Area). The Aguathuna Quarry Development Project ("Project") will consist of re-opening the abandoned open-pit limestone quarry in Aguathuna and constructing a deep-water ship loading facility that can accommodate Panama-sized vessels (up to 54,446 DWT). The quarry is expected to generate 150,000 tonnes of multi-grade crushed stone in the first year of operation, eventually building up to a production capacity of 500,000 tonnes. Although final estimates have yet to be completed, the Project is anticipated to cost approximately $4.5 million.

Construction, including the installation of the crushing/screening plant and stockpile area, the new dolomite quarry and the marine terminal, is expected to commence in the late summer of 1999. Shipping is anticipated to start in the fall of 1999. The quarry will operate from April to December, with a life expectancy of approximately 20 years. The site will be fully decommissioned upon closure.

The proposed undertaking was submitted to the Government of Newfoundland and Labrador, Ministry of Environment and Labour on January 19, 1998 and was released from further assessment on March 23, 1998. ***However, the Project did trigger Section 28c of the Comprehensive Study List Regulations pursuant to the Canadian Environmental Assessment Act (CEAA).*** This section states that a comprehensive study is required for the proposed construction, decommissioning or abandonment of a marine terminal designed to handle vessels larger than 25,000 DWT." ***The Atlantic Canada Opportunities Agency (ACOA) is the Responsible Authority (RA) because of its role as the primary federal funding agency for this Project, pursuant to Section 5(1)(b) of CEAA.***

The following text comprises a combined environmental assessment (EA) and a Comprehensive Study Report (CSR) in relation to the Project. As such, the CSR provides information on EA methodology in addition to information normally provided by a CSR submitted subsequent to an EIS.



AGUATHUNA QUARRY
Project Area

Scale : As Shown	Figure : 1.1
Date: Aug 31/98	Dwn. By: EB

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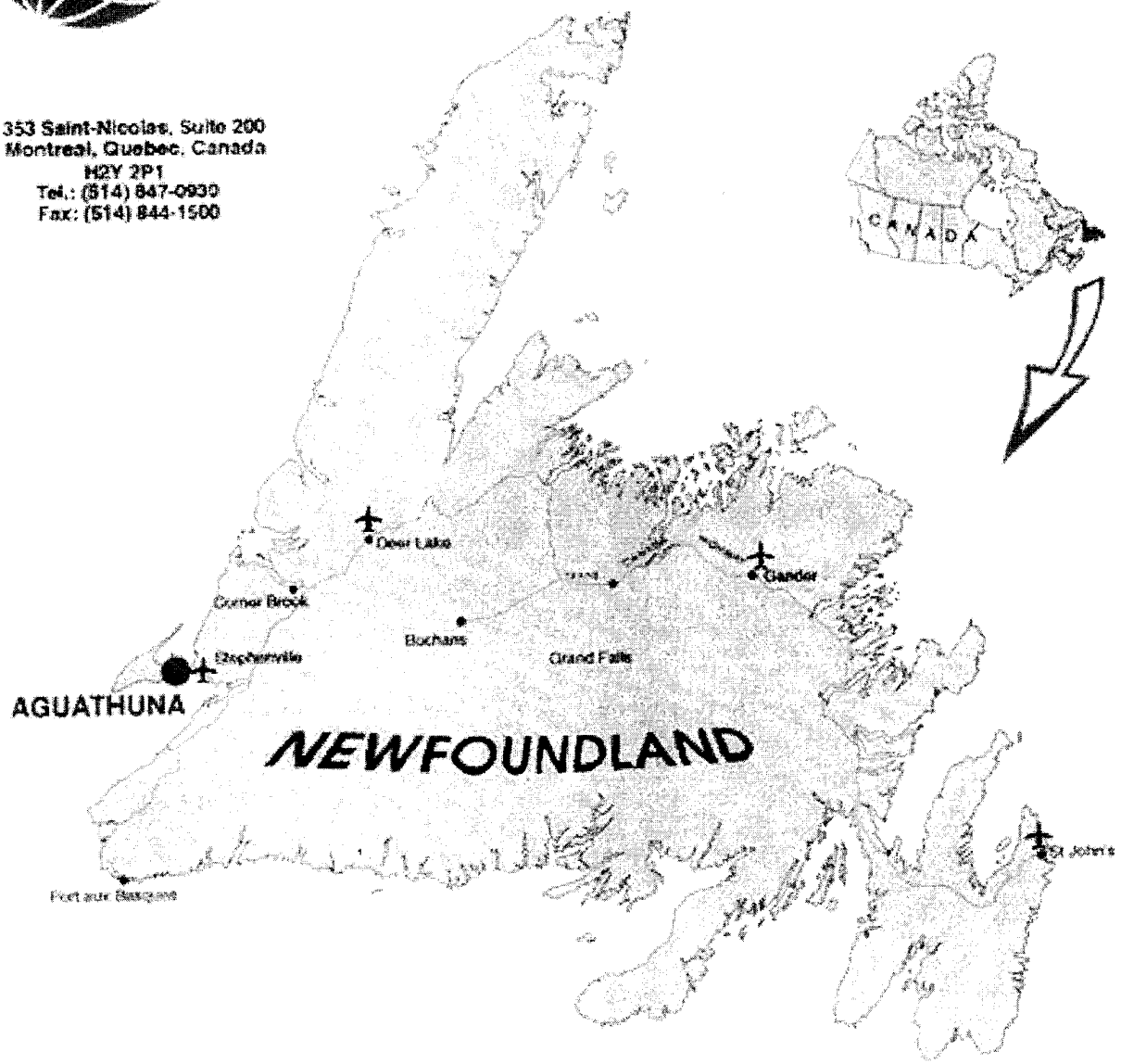


PROPERTY LOCATION

Fig. 1

By: J. Turach Geological Consultants, Inc

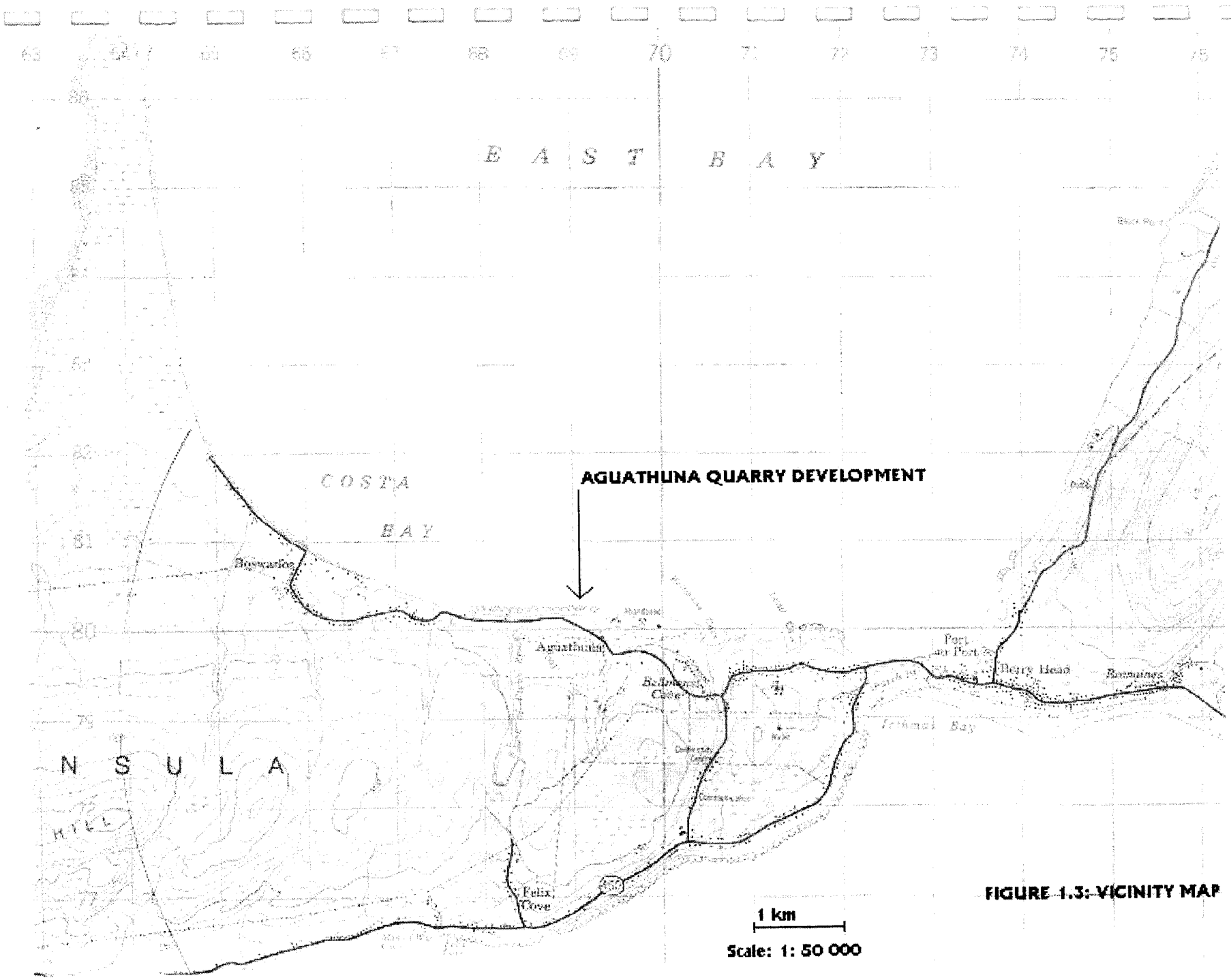
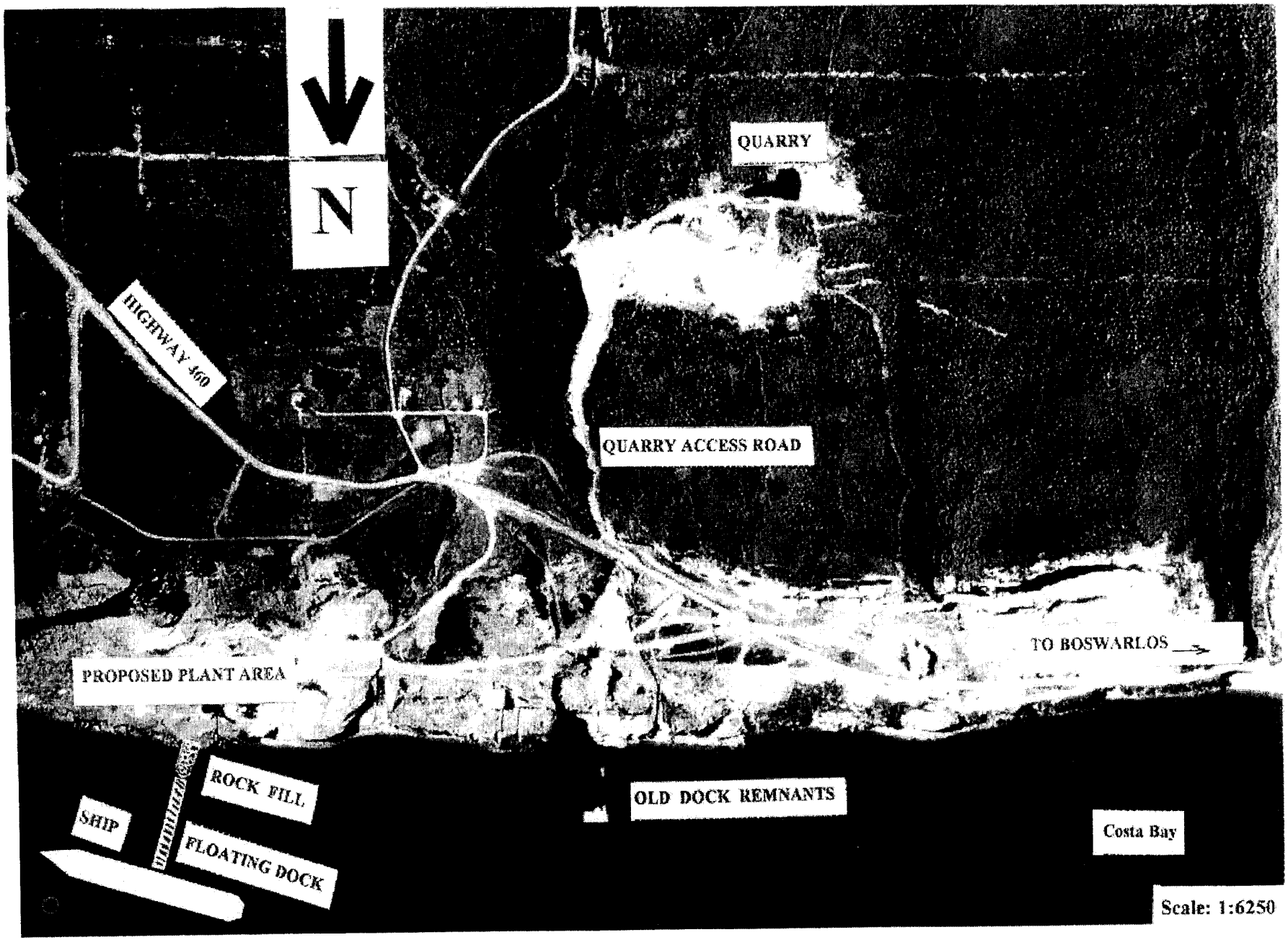


FIGURE 1.3: VICINITY MAP


N
QUARRY
HIGHWAY 460
QUARRY ACCESS ROAD
TO BOSWARLOS
PROPOSED PLANT AREA
ROCK FILL
SHIP
FLOATING DOCK
OLD DOCK REMNANTS
Costa Bay
Scale: 1:6250

1.2 Purpose of Project

The Aguathuna Quarry Development Project consists of the reactivation and further development of the Aguathuna quarry, located in the Port au Port Peninsula, Newfoundland. The Dominion Steel & Coal Corporation, Limestone Division began quarrying limestone in 1913 for use as a flux in their steel mill in Sydney, Nova Scotia. Operations ceased in 1964, with more than 12 million tonnes of material produced.

Mid-Atlantic owns a total of one hundred and thirty-six claims in the Project Area (42 in Aguathuna, 29 in Campbell's Creek, and 65 in White Hills), all of which will be transferred to the newly incorporated Aguathuna Quarries. In order to maintain the claims in good standing, engineering evaluation reports were submitted to the Department of Mines on January 7, 1998, for each of the three claim units outlining assessment work done between August 1, 1997 and December 5, 1997. This site work included geological and geochemical studies, a drilling program, bathymetric surveys and sub-bottom profiles, and, a wind and wave analysis.

The survey/evaluation work determined that the Aguathuna site offered several advantages. These include high grade calcium and dolomite limestone, close proximity of the quarry to tidal water, an ample and existing workforce in the area and financial support from both ACOA and the EDGE program funded by the provincial Department of Industry.

As indicated above, the construction of the crushing and screening plant and stockpile area, the new dolomite quarry, and the marine facility is scheduled for the late summer and fall 1999; and shipping is expected to begin in the fall of 1999. The company plans to ship 150,000 tonnes in the first year of operation, with annual capacity of 500,000 tonnes.

The purpose of this project is to facilitate the procurement of an expanded (global) market share, with a view to enhancing the long term viability of both the company proper, and the economy of the Port au Port region through the creation of sustainable employment.

1.3 Need for Project

Mosher and Mid-Atlantic are in a business partnership producing and selling limestone products to foreign markets from Mosher's Kelly Cove quarry in Nova Scotia with annual sales upwards of 250,000 tonnes. Due to limitations at the Kelly Cove quarry, the partnership decided to evaluate other mineral deposits in various locations that would allow the group to secure their position in an expanded marketplace and have a potential for growth. The development of the Aguathuna site will provide Mosher and Mid-Atlantic with a source of raw material supplies and an export facility to facilitate potential growth in global markets.

1.4 Regulatory, Policy and Planning Context

Three distinct, yet overlapping approval processes apply to the Aguathuna Quarry Development Project. These are the provincial environmental assessment process, the federal environmental assessment process, and the federal/provincial regulatory permits/authorizations that will be required prior to the start of construction. On January, 19, 1998, the Project was submitted to the Ministry of Environment and Labour for approval under the *Newfoundland Environmental Assessment Act*. As previously indicated, on March 23, 1998, Aguathuna was advised that no further assessment work was required under the provincial assessment process.

On April 16, 1998, Aguathuna Quarries met with Environment Canada and DFO to discuss issues and concerns. Based on subsequent discussions and reviews, it was determined that the Project would not require any authorizations pursuant to the *Fisheries Act*, the *Canadian Environmental Protection Act* (*CEPA*) or the *Navigable Water Protection Act* (*NWPA*). (Letters provided to the RA by these two regulatory authorities pursuant to the Federal Coordination Regulations confirming these determinations are on file and form part-and-parcel of the Public Registry). ***The project did however require an environmental assessment pursuant to the Canadian Environmental Assessment Act. Specifically, the Atlantic Canada Opportunities Agency (ACOA) has been asked to provide partial funding to the project. As such, ACOA is the sole RA for the project pursuant to Section 5(1)(b) of CEAA. The construction of the new marine terminal further triggered the Comprehensive Study List Regulations (Section 28(c)) under CEAA since the terminal will be designed to handle vessels larger than 25,000 DWT.***

In keeping with the provisions of the Federal Coordination Regulations, (FCR) the Department of Fisheries and Oceans (DFO) and Environment Canada (EC) were contacted concerning whether either department was likely to be an RA for the project. At the same time, both departments were asked to provide expert advice and/or pertinent knowledge over the course of the Comprehensive Study (CS).

DFO indicated that they would not be an RA for the project. Marginal fish habitat at the site, both marine and freshwater, negated the need for the issuance of a Fish Habitat Authorization. Additionally, the department concluded that the marine terminal would not require an authorization pursuant to the Navigable Waters Protection Act. DFO did, however, agree to provide expert advice and knowledge over the course of the CS concerning fish, fish habitat and fishing.

Similarly, Environment Canada was not triggered as an RA pursuant to CEAA, but also agreed to provide expert advice and review comments on matters pertaining mainly to pollution and migratory birds.

Natural Resources Canada (NRC) were not contacted via the FCR, since no explosives manufacturing or storage is to occur on-site. Telephone conversations with NRC confirmed that the department was not to be triggered under the Act.

Public Works and Government Services Canada (PWGSC) has assisted ACOA in the management and preparation of the CSR throughout the process. In this regard, ACOA has delegated the preparation of certain components of the CS within the context of Section 17(1) and 17(2) of CEAA.

In addition to a Comprehensive Study conducted pursuant to *CEAA*, the proponent will also be required to comply with all relevant ***regulatory and permitting requirements***. Table 2.1 lists the permits, authorizations and approvals that the proponent may be required to secure before proceeding with the Project. The proponent is committed to meeting and/or exceeding all federal and provincial legislation requirements and standards listed below.

Table 1.1 List of Permits/Authorizations that May be Required for Development of the Aguathuna Quarry	
PERMIT, AUTHORIZATION, APPROVAL	**AGENCY**
Federal	
Canadian Environmental Assessment Act Comprehensive Study	Atlantic Canada Opportunities Agency and the Canadian Environmental Assessment Agency
Provincial - Government of Newfoundland and Labrador	
Release from the environmental assessment process (Environmental Assessment Act, R.S.N. 1990, c. E-14).	Department of Environment and Labour, Environmental Assessment Division
Storage and handling of fuel oils	Department of Government Services and Lands, Government Services Centre
Permit to burn	Department of Government Services and Lands, Government Services Centre
Waste disposal issues reviewed for compliance	Department of Government Services and Lands, Government Services Centre
Building design plans reviewed for compliance	Department of Government Services and Lands, Government Services Centre
Permit for electrical work	Department of Government Services and Lands, Government Services Centre
Approval for heating and/or refrigeration systems	Department of Government Services and Lands, Government Services Centre
Certificate of approval for stream modifications or diversions	Department of Environment and Labour, Water Resources Division
Certificate of approval for the use of water (*e.g.*, withdraw of water for consumptive or processing purposes)	Department of Environment and Labour, Water Resources Division
Certificate of approval for all watercourse crossings	Department of Environment and Labour, Water Resources Division
Certificate of approval for fording a watercourse	Department of Environment and Labour, Water Resources Division
Certificate of approval for culvert installation	Department of Environment and Labour, Water Resources Division

Table 1.1 List of Permits/Authorizations that May be Required for Development of the Aguathuna Quarry	
PERMIT, AUTHORIZATION, APPROVAL	**AGENCY**
Certificate of approval for site drainage construction	Department of Environment and Labour, Water Resources Division
Mining lease	Department of Mines and Energy

1.5 Document Organization

This Comprehensive Study Report is organized based upon the CEAA Guide to the Preparation of a Comprehensive Study, Appendix C (CEAA, 1997).

The ***Executive Summary*** briefly describes the project and discusses environmental effects. ***This section is provided under a separate cover.***

Section 1.0 provides an ***Introduction to the Project,*** and includes an overview, the purpose of and need for the project, timing considerations, regulatory framework for the proposed Project, policy and planning context and a table of concordance for key comprehensive study items.

Section 2.0 offers a ***detailed Project Description (scope of project)***, and covers the definition of the project, list of activities, and their location and schedule for all of the components of the proposed undertaking, subject to environmental assessment.

Section 3.0, provides a consideration of ***alternative means of carrying out the project*** and ***alternatives to the project.***

Section 4.0, describes those ***factors being considered in relation to the project (scope of assessment)***. A review of the issues and concerns raised through public, expert and regulatory consultation, and professional judgement is provided. A list of the Valued Environmental Components (VECs) identified in the issues scoping process is also provided.

Section 5.0 describes the ***Public Consultation Program*** and its results.

Section 6.0 provides a ***Description of the Existing Environment***, selected valued ecosystem components in the study area and a discussion of relationships between environmental components, a table of potential Project-VEC interactions, environmental sensitivity and potential environmental hazards.

Section 7.0 presents an ***introduction to the Predicted Environmental Effects of the Proposed Project***, including potential interactions, project effects on VEC's, cumulative environmental effects, effects on sustainable use of renewable resources, effects of the environment on the project, environmental effects of possible malfunctions or accidents and methods used to predict effects. It also identifies the technically and economically feasible measures that mitigate potential adverse environmental effects, defines significance criteria and Determination of Significance of the residual environmental effects..

Section 8.0 presents the ***Marine Habitat and Fish VEC*** in relation to the Predicted Environmental Effects, Mitigation and Significance Criteria of the Proposed Project.

Section 9.0 presents the ***Freshwater Resources VEC*** in relation to the Predicted Environmental Effects, Mitigation and Significance Criteria of the Proposed Project

Section 10.0 presents the ***Terrestrial Resources VEC*** in relation to the Predicted Environmental Effects, Mitigation and Significance Criteria of the Proposed Project

Section 11.0 presents the ***Air Quality VEC*** in relation to the Predicted Environmental Effects, Mitigation and Significance Criteria of the Proposed Project

Section 12.0 presents ***Additional Considerations*** in relation to socio-economic effects of the Project.

Section 13.0 provides a ***Cumulative Effects Assessment*** by identifying the potential environmental effects of the project, identifying other projects in the area which have the potential to contribute incrementally to these effects, and, to analyse the need for special mitigation measures in relation to related (additional) project / environment interactions.

Section 14.0 discusses the ***Implementation of Mitigation Measures and the Follow-Up Program*** to be used to verify the accuracy of the environmental assessment and determine the effectiveness of mitigation measures.

Section 15.0 summarizes ***Conclusions and Recommendations of the Responsible Authority.***

Section 16.0 provides a list of ***Reference Material cited.***

Section 17.0 provides a list of ***Personal Communications.***

Appendix A provides the *Port au Port Wave Climate Modelling.*

Appendix B is the *Proposed Environmental Management Plan Outline with Detailed Sections on the Environmental Protection Plan Health and Safety Plan And Environmental Effects Monitoring.*

Appendix C provides a list of the ***Rare, Endangered and Threatened Flora Species Within 20 Km of the Aguathuna Quarry Development***

Appendix D is the ***Aguathuna Divers Report***

Table 1.2 cross-references the sections of this CSR report with the key requirements for comprehensive studies as suggested in Appendix C of the Comprehensive Study Training Manual, "Suggested Content for a Comprehensive Study Report", (CEAA 1997). The items listed in this table meet all the key requirements.

Table 1.2 Table of Concordance with Key Points for the Suggested Content for a Comprehensive Study Report (CEAA 1997)

KEY POINTS FOR EACH SECTION OF THE SUGGESTED CONTENTS	RELEVANT SECTIONS OF THIS REPORT
Executive Summary (Under Separate Cover)	1.0
What is the project?	1.1, 1.5
What are the important potential environmental effects?	1.7, 1.8, 1.9
What are the mitigations?	1.10
What are the uncertainties and public concerns?	1.12
Introduction	1.0
What is the project?	1.1

Table 1.2 Table of Concordance with Key Points for the Suggested Content for a Comprehensive Study Report (CEAA 1997)

KEY POINTS FOR EACH SECTION OF THE SUGGESTED CONTENTS	RELEVANT SECTIONS OF THIS REPORT
Why will the project be carried out?	1.2
Why is the project important?	1.3
How important is the project's timing?	1.4
Why is the assessment required?	1.5
Project Description	2.0
What undertakings does the project include?	2.1
What are the activities and when and where will they be carried out?	2.2
Project Alternatives	3.0
What are alternative means of carrying out the project?	3.1
What are the alternatives to the project?	3.2
Scope of the Assessment	6.0
What is the scope of the project?	6.1
What are the factors to be considered in the assessment?	6.2
What is the scope of the factors?	6.3
Public Consultation Program	5.0
How was public input solicited?	5.0
Who was consulted?	5.0
What information came forward from the public consultations?	5.0
How was this information incorporated into the EA process?	5.0, 6.2
Description of the Existing Environment	4.0
What is the general environmental context?	4.1
What are the environmental components in the study area?	4.1.1 - 4.1.4

Table 1.2 Table of Concordance with Key Points for the Suggested Content for a Comprehensive Study Report (CEAA 1997)

KEY POINTS FOR EACH SECTION OF THE SUGGESTED CONTENTS	RELEVANT SECTIONS OF THIS REPORT
What are the relationships among environmental components?	4.5
What are the sensitivities to disturbance?	4.6
What are the potential environmental hazards to the project?	4.7
Predicted Environmental Effects of the Proposed Project	7.0, 8.0, 9.0, 10.0, 11.0
What are the effects of the project on environmental components?	7.1
What are the effects of environmental changes on human health, socioeconomic conditions, physical and cultural heritage and on current use of lands and resources for traditional purposes by aboriginal persons?	7.2, 12.0
What are the cumulative effects of the project?	7.2, 12.0
What are the effects on the sustainable use of renewable resources?	7.3
What are the effects of the environment on the project?	7.4
What are the effects of possible malfunctions or accidents?	7.5
What are the methods used to predict effects?	7.6
Mitigation Measures	7.8, 8.6, 9.6, 10.6, 11.5
What mitigation measures are planned?	7.8, 8.6, 9.6, 10.6, 11.5
How effective will these measures be in addressing identified environmental effects?	8.7, 9.7, 10.7, 11.6
Determination of Significance	8.1, 9.1, 10.1, 11.1
Are the residual environmental effects adverse?	8.7, 9.7, 10.7, 11.6
Are the residual environmental effects significant?	8.7, 9.7, 10.7, 11.6
Are the significant environmental effects likely?	8.7, 9.7, 10.7, 11.6
Cumulative Effects Assessment	13.0

Table 1.2 Table of Concordance with Key Points for the Suggested Content for a Comprehensive Study Report (CEAA 1997)

KEY POINTS FOR EACH SECTION OF THE SUGGESTED CONTENTS	RELEVANT SECTIONS OF THIS REPORT
Implementation of Mitigation Measures	14.0
Follow-up Program	14.0
What are the objectives of the follow-up program?	14.0
What are the elements of the follow-up program?	14.0
How will the follow-up program be implemented?	14.0
Who will implement the follow-up program?	14.0
Conclusion and Recommendations of the Responsible Authority	15.0
What is the recommendation about the project?	15.0
Outstanding issues and concerns	-
Conditions for approval	-

2.0 PROJECT DESCRIPTION

2.1 Definition of the Project

The project subject to environmental assessment consists of the activation of the Aguathuna Quarry for the extraction of mineral dolomite within the Project Area Boundary as shown in Figure 1.4. This includes the excavation of a dolomite pit, installation of equipment to move and process the material, construction of storage areas and infilling and floating dock emplacement to facilitate the loading of product on to ocean going vessels. The operational phase of the project includes the operation of all equipment required to excavate, process, store and load dolomite on to ships. Also included in the definition of the project are related shipping activities within Port au Port Bay. The decommissioning of the dolomite pit and associated infrastructure and reclamation of the area presently excavated are also part of the project subject to assessment.

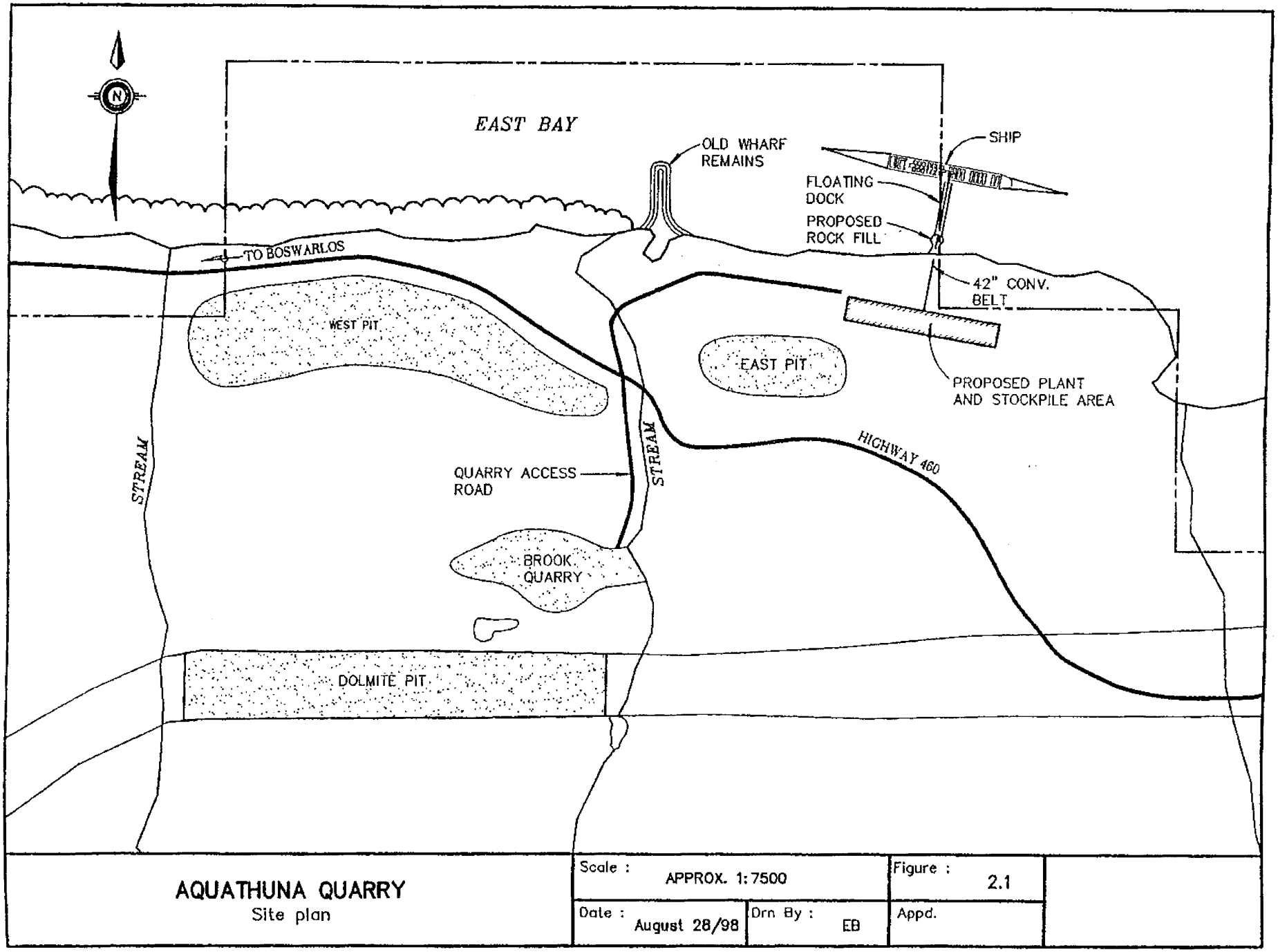
2.2 Description of Existing Site

The proposed Aguathuna quarry is located on a former limestone quarry site which dates back to 1913. The area is situated in western Newfoundland on Port Au Port Peninsula, on the shore of East Bay and Costa Bay (refer to Figures 1.1-1.4). The quarry lies between the communities of Boswarlos, to the west, and Bellman's Cove (also known as Butler's Beach), to the east. The township of Port au Port West, extends to include the communities of Bellman's Cove, Aguathuna, and Felix Cove. The Boswarlos town limits begin on the west side of Jack of Clubs Brook, which parallels the western edge of the quarry site. There are over 100 residences in this community, which borders Costa Bay. The closest residence to the quarry site is approximately 800 m. The town of Stephenville, a regional service center, lies 15 km to the east. Stephenville is connected to the Trans Canada Highway and has an airport with service to mainland Canada.

Access to the property is via Route 460 which crosses the property; a gravel road leads to the quarry site (Figure 2.1). Deposits are within 1000 meters of the shore and deep-water is within 150 meters of the shoreline. Electrical power is readily available. The communities surrounding the Project Site use drilled wells for their water supply, with the exception of Port au Port East which has a municipal water system. MidAtlantic Minerals Ltd., will have water trucked in for use by employees and any other associated other needs.

The site has been used for industrial purposes in the past and is generally developed with areas of sparse vegetative cover interspersed. The site is frequented occasionally by hunters in the fall and lobster fishers in the spring. There are no First Nation land claims on the project site or surrounding areas.

The quarry site lies on flat to gently sloping terrain at an elevation of about 80 m above sea level. The highest point slopes gradually toward small, steep-side brooks to the east and west ends and north to Port


EAST BAY
OLD WHARF REMAINS
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TO BOSWARLOS
42" CONV. BELT
WEST PIT
EAST PIT
PROPOSED PLANT AND STOCKPILE AREA
STREAM
STREAM
HIGHWAY 460
QUARRY ACCESS ROAD
BROOK QUARRY
DOLMITE PIT
AQUATHUNA QUARRY
Site plan
Scale : APPROX. 1:7500
Figure : 2.1
Date : August 28/98
Drn By : EB
Appd.

au Port Bay. The terrain over both deposits is mainly barren or scrub-covered, with sparse patches of stunted spruce. A few interspersed hardwoods are also found. Overburden depth is generally less than 1 m. The quarry has two brooks running on the east and west side of the site. Jack of Clubs Brook is located on the western limits of the quarry site, while Gilliman's Brook runs into the Brook Quarry and parallel to the quarry access road before entering East Bay. Jack of Clubs Brook is fed by Goose Pond, which is situated approximately 1.5 km inland from Costa Bay.

The quarry face of the abandoned East Quarry and the face of the West Quarry developed after 1956 are major physical features of the area. The rock fill of the old dock and its remnants are still in place under water. Other structures in the area include an old explosives storage shed, an existing power generating house (still operating) and concrete foundations from a water magnesia manufacturing plant decommissioned in 1969.

2.3 Activities, Location and Schedule

The project's timing and schedule is proposed to be a late summer and fall construction period in 1999 with first shipments of materials in the fall of 1999. The operation is projected to have a 20 year lifespan, at which time the facilities will be dismantled and site restoration conducted.

The facilities and processes associated with the Project consist of terrestrial and marine components as shown in Figure 2.1.

2.4 Descriptive Summary of Construction, Operation and Maintenance, and Decommissioning Activities

Construction activities will consist of developing the new dolomite quarry, facility installation and upgrades, the development of the new marine terminal and the refurbishing of existing infrastructure. The development of the new quarry will require the removal of overburden, clearing, grubbing, and stockpiling as well as the construction of a ramp into the pit and the installation of conveyors. The establishment of the crushing and screening plant will not require any permanent construction except for refurbishing existing access roads to the site, clearing and levelling. The immediate areas to be affected are the existing abandoned quarry just south of the Brook Quarry (located approximately 500 m south of the highway), and the East Quarry area north of the highway.

The construction of the marine terminal will include the addition of caissons as well as a shiploader and conveyors. The rockfill section will be constructed with approximately 12,000 C.M. of clean, limestone boulders from the existing east quarry face adjacent to the shore. It will be placed with dump trucks, front end loaders and dozers. The construction period is estimated to be four (4) days. The placing of anchors and buoys in the bay will be carried out using a floating barge and crane, and the construction period for this component is estimated to be three (3) days.

The marine terminal will have a 140 m long by 1.06 m wide conveyor system which transports the dolomite for shipment. This conveyor will connect to the new plant and stockpile area, located approximately 100 m from the shoreline. The new plant will measure 340 m by 50 m, having a total area of 17,000 square metres. The plant will be constructed on a previously cleared portion of the site, and will be used for dolomite processing and stockpiling.

The marine terminal will be used for the shipment of dolomite outside territorial Canada. There will be approximately 10-12 shipments per year which will be loaded between April and December. The shipments will weigh 30,000 - 33,000 metric tonnes and will take 10-12 hours to load. The marine facility will only accommodate one vessel at a time.

The service and tool sheds on the site will be constructed of pre-fabricated steel and mounted on wheels to facilitate transportation as needed.. The fuelling facility will consist of a fuel tank truck which will be serviced by the fuel supplier on an as- required basis. At the present time there are no permanent fuel tanks envisioned for the site other than the fuel truck.

The operational phase will consist of quarrying activities, which include drilling and blasting, primary, secondary and tertiary crushing, dry and wet screening, stockpiling, reclaiming of finished products and vessel loading. Blasting will take place approximately every ten days between the months of April and November. All blasting activities and plans will be completed by a licenced contractor. No manufacture or storage of explosives will occur on-site. Quarry de-watering will occur as required. The grounds and facilities will be maintained according to environmental health and safety standards and regulations.

The operation will be seasonal, running from mid April to December each year with a two-shift operation as required. The proponent will ensure that access to the site is blocked off when the site is not in operation. The quarry is expected to operate for approximately 20 years and at the end of operations, the pit is expected to be 18 hectares.

After 20 years the site will be decommissioned based on acceptable standards and protocols of the day for mine and quarry closures. ACOA will not set aside money to facilitate decommissioning, as the proponent is expected to have the resources to fund such a venture after 20 years of operation. In addition, the proponent will abide by all laws and regulations regarding the closure of quarry operations, deemed appropriate at the time of closure. The proponent is environmentally conscientious and is legally committed to decommission the site, therefore there is no reason for doubt that the proponent will not follow through on this responsibility. Decommissioning will be conducted on that portion of the quarry which has been developed during the operational phase of operation. The decommissioning plan will entail(such activity components as):

- A Phase I Environmental Site Assessment prior to finalization of attendant decommissioning plans. Mitigation measures will be further outlined at this point, as deemed necessary. The quarry pit is expected to be approximately 18 hectare in size at the end of operations.

- The proponent will progressively rehabilitate the quarry site, where possible, during the operational phase of the quarry development.

- No less than one year prior to the closure of the quarry, the proponent will consult with the public on the de-commissioning of the quarry to allow the community to propose alternative uses for the site, and to receive input from the local fishers as to the scope of decommissioning required for the wharf structure. The wharf will either be left in place for use by local fishers and/or to provide habitat for lobster similar to the existing wharf remnants on the site, or removed and disposed of in an appropriate manner.

- All land based facilities and infrastructure will be dismantled, removed and transported off the site. All ferrous metals, non-ferrous metals, metal building components, concrete, masonry, asphalt paving and/or any other suitable materials will be recycled in accordance with existing environmental regulations. Any remaining waste will be disposed of in an approved manner.

- Access roads may be closed, graded and/or revegetated to promote soil stabilization, enhance safety and promote aesthetic acceptability. Alternatively, local residents will be consulted concerning further use of the roads as appropriate.

- The site will be restored using (such measures as) re-establishment of drainage patterns, revegetation (using native species), soil stabilization, and habitat enhancement methodologies. Topsoil will be imported, as necessary, to ensure adequate coverage of disturbed areas. Over the course of related activities, aesthetics, health, safety, conservation and utility will be the companys' guiding principles.

- The public and regulatory agencies will be consulted concerning decommissioning plans for the 18 ha. quarry pit. The pit may be allowed to flood to create a lake and fish habitat, or not, depending on the results of these considerations.

2.5 Quarry, Processing and Storage Site Locations

The onshore facilities will include quarry works, a crushing/screening plant and stockpile area, a road network, conveyor belts and associated equipment. Quarry areas include three existing limestone open-pits and the proposed new dolomite quarry located south-east of the Brook Quarry. Existing quarries will not be used, and only the new dolomite quarry will be developed.

Jack of Clubs Brook located near the Brook Quarry will be used as make up water for the wet screening process. It is estimated that 15,000 gallons per month of make up water will be required to be withdrawn from Jack of Clubs Brook, during excessively dry periods of the operation. This water will feed into a closed-loop water recirculating system composed of two settling ponds. The settling ponds will be 60 m x 20 m x 3m and will be in the vicinity of the proposed plant area. Removal of sludge from the settling pond will take place at the end of each season. The sludge will be mixed with 1mm x 0 mm stone and stockpiled for shipment. The water in the existing settling pond on site is characterized by limestone sludge covered with surface water. The pH is expected to be neutral or higher, with no dissolved metals. Water quality assays will be conducted prior to dewatering the dolomite quarry and settling pond. Should results dictate, alternative means of disposal will be sought. A separate settling pond used for de-watering the dolomite quarry will also be located in-or-adjacent to the Brook Quarry. This pond will use a decant process to disperse excess water. The existing road network in the Project area will be used to transport materials from the quarry to the stockpile, plant and marine terminal.

The new crushing and screening plant and stockpile area will be located adjacent to the existing West Quarry. There are three stockpiles planned for the operation at the present time. Each pile will hold 30,000 metric tonnes of different sized stone (i.e 89mm x 38 mm, 63mm x 19mm and 6.3mm x 0 mm). The stockpiles will be approximately 17.7 m from the edge of the harbour. All of the conveyors used in the crushing, screening and loading processes will be hooded, to prevent fugitive dust and particulate emissions. Kidney-shaped stockpiles of various sizes will be located throughout the plant area. Run-off from the plant and stockpiles will be collected in a sedimentation pond.

Ancillary facilities on the site will include service sheds, vehicle fuelling facilities and tool sheds. No vessel re-fuelling will be associated with the marine terminal.

2.6 Marine Terminal

The marine facility will be composed of a rock fill section 40 metres in length and a floating ice-class barge will act as a year-round floating dock. The floating dock will measure 113 metres long by 16 metres wide and will extend to a depth of 5.5 metres. The dock will have a steel frame and a concrete deck. The stern end of the floating dock will be pinned and hinged to the rock fill while the bow will be free floating. Dock lines, lines to the shore and an anchoring system will secure it in place. The floating dock will support the shiploader and conveyor belt. Ships will rest against the floating dock, and lines to the shore and an anchoring system will secure them it in place. Previously designated shipping lanes will be used by vessels moving in and out of East Bay.

Of note, the design and location of the marine facility were changed by the proponent in recognition of the concerns expressed by fishers and DFO regarding the importance of the existing abandoned dock as habitat for crustaceans. The original plan was to use the old wharf site. The new marine terminal will now be located 600 m east of the old dock.

2.7 Blasting

All on-site blasting will be conducted by a licenced blasting contractor, approximately once every ten days between the months of April and November. A blasting plan will be developed by a specialized engineer and will ensure that all municipal, provincial, and federal regulations, permits and by-laws are strictly followed. No explosives or manufacturing will occur on the site. The contractor will be responsible for the transport, handling, storage and detonation of all blasting explosives. The blast plan and mitigation compliance will be further addressed in the EPP. The contractor must follow all municipal, provincial, and federal regulations regarding the storage, handling and detonation of explosives in the province of Newfoundland. Consultations with the public will be held as necessary to address concerns regarding the effects of blasting on foundations and noise levels. The contractor will ensure that all issues have been addressed, and that the required permits and insurance has been received prior to any blasting on site. Blasting will be further addressed in Section 10, Terrestrial Resources .

2.8 Schedule and Description of Activities

In the first year of operation, quarried material will be transported via trucks to the plant for crushing and screening. Ultimately, the site will be developed such that materials will be transported via conveyor belts directly from the dolomite quarry, over Highway 460, to the crushing and screening plant. This section describes the main elements involved in processing the quarried dolomite to finished product (refer to Figure 2.2).

The quarry operation will consist of the removal of a thin layer of overburden by bulldozer and drilling, blasting and feeding the blasted material to a mobile primary jaw crusher (main jaw set at 20.3 cm) with front end loaders. The mobile primary crusher will be positioned as close as possible to the face of the quarry to minimize the travel time of the front end loaders. A grizzly feeder with 20.3 cm openings, and a second deck with 3.8 cm openings will scalp the first bench of material. Once through the grizzly, the material will be fed to the main jaw set at 20.3 cm. From here, the material will be transported by 91.4 cm conveyor to a secondary jaw crusher and thence overland via a 91.4 cm conveyor running through a tunnel under highway 460 (northeasterly) to a 54,446 metric tonnes surge stockpile.

Should operational monitoring indicate exceedances of 24 hour maximum allowable concentration of airborne particulates, a wet screening system will be installed. The system will be composed of two (2) re-circulating ponds interconnected with overflow pipes from one to the other. The ponds will have an impermeable liner on the bottom and sides; the size of the ponds will be approximately 20 m x 20 m. The effluent from the screens will enter via a 25.4 cm diameter pipe to the first pond for settling of solids, and from the second pond clear water will be pumped to the screen via a 7.6 cm diameter pipe. There will be no effluent discharged from these ponds since it is a closed re-circulating system. Maintenance will consist of removing settled solids with a clam shell once or twice during the season

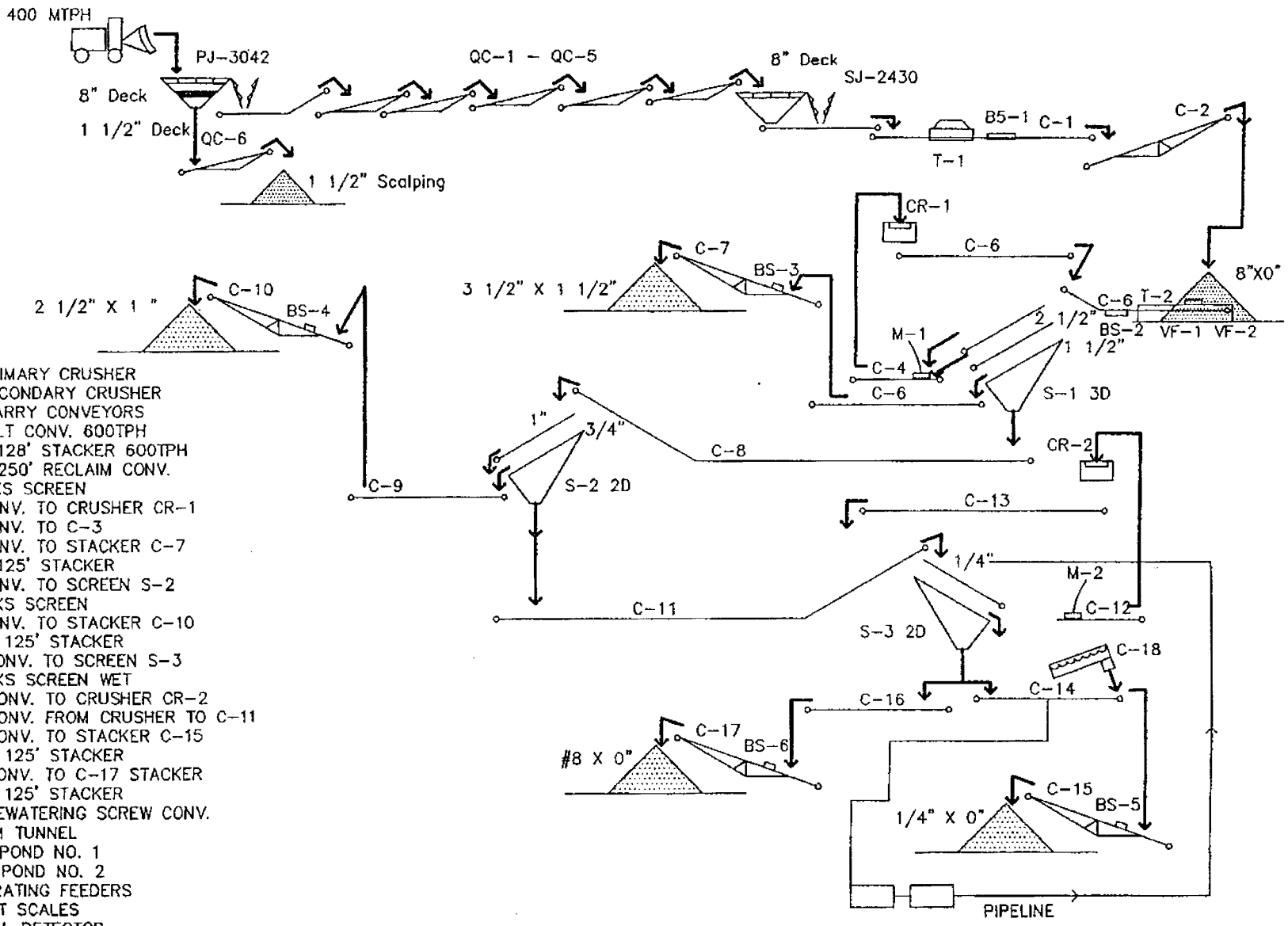
and placing it on dry land with a perimeter berm for storage and drying. The material will eventually be reclaimed back into the 6 mm x 0 mm product size.

The material from the surge stockpile will be reclaimed by gravity feeding through two vibrating feeders positioned in a tunnel underneath the surge stockpile. The feeders will drop the material onto a 91.4 cm conveyor belt that will deliver the material to Station No. 1, a triple deck screen (S-1) equipped with flow control gates. From the S-1, the oversize material will be conveyed by a 76.2 cm conveyor belt (C-4), equipped with a metal detector (M-1), to the tertiary crusher (CR-1). The material will remain in this closed circuit until sufficiently crushed. The material will then be transported to a stockpile (1.04 m x 3.8 cm) on a 76.2 cm conveyor belt.

Undersize material will move further through the plant on a 76.2 cm conveyor belt (C-8) to Station No. 2, a double deck screen (S-2). The material meeting a certain specification will go to the stock pile (6.3 cm x 2.5 cm) on a 76.2 cm conveyor belt (C-9). The undersize material will then move on a 76.2 cm conveyor belt (C-11) to Station No.3, a double deck screen (S-3) equipped with flow control gates and water spray nozzles for screening finer material. The oversize material will then be transported by a 76.2 cm conveyor belt (C-12) to the fines crusher (CR-2). The fine graded material meeting a certain specification will move via a 76.2 cm conveyor belt (C-14) and/or through the de-watering screw conveyor (C-18) and finally to the (6 mm x 0 mm) stockpile via a 76.2 cm conveyor belt (C-15). The undersize (minus #8) will move via a 76.2 cm conveyor belt (C-16) to the stockpile (# 8 x 0) or it will move onto the conveyor belt C-14 by positioning a flop gate.

The ship loading facility will consist of a rock fill section with a floating dock on which a 122 cm conveyor belt ship loader will be positioned. The ship-loader will be fed by a 1.06 m x 274 m conveyor belt which will be fed by trucks and/or front end loaders directly from the stockpile. Eventually, a reclaim tunnel will be built and will consist of a 1.06 m x 632 m conveyor belt. This belt will run underneath the stockpiles. The material will gravity feed onto this reclaim tunnel conveyor belt and it will in turn feed the 274 m belt. Ship loading will be carried out at 2,268 metric tonnes per hour. Shipments will be made via vessels up to Panamax-size in volumes ranging from 31,760 to 54,446 metric tonnes.

All conveyors are emptied of any stone into the hold of the vessel when completing loading. It is unlikely stone will enter the marine environment given the incorporation of conveyor skirts. Any stone entering the berthing area of the vessel would have an undesirable effect on the water depth and will not be permitted.



PJ-3042: PRIMARY CRUSHER
SJ-2430: SECONDARY CRUSHER
QC-1/6: QUARRY CONVEYORS
C-1: 36" BELT CONV. 600TPH
C-2: 36" X 128' STACKER 600TPH
C-3: 36" X 250' RECLAIM CONV.
S-1: 3-DECKS SCREEN
C-4: 30" CONV. TO CRUSHER CR-1
C-5: 30" CONV. TO C-3
C-6: 30" CONV. TO STACKER C-7
C-7: 30" X 125' STACKER
C-8: 30" CONV. TO SCREEN S-2
S-2: 2-DECKS SCREEN
C-9: 30" CONV. TO STACKER C-10
C-10: 30" X 125' STACKER
C-11: 30" CONV. TO SCREEN S-3
S-3: 2-DECKS SCREEN WET
C-12: 30" CONV. TO CRUSHER CR-2
C-13: 30" CONV. FROM CRUSHER TO C-11
C-14: 30" CONV. TO STACKER C-15
C-15: 30" X 125' STACKER
C-16: 30" CONV. TO C-17 STACKER
C-17: 30" X 125' STACKER
C-18: 30" DEWATERING SCREW CONV.
T-2: RECLAIM TUNNEL
P-1: WATER POND NO. 1
P-2: WATER POND NO. 2
VF-1/2: VIBRATING FEEDERS
BS-1/6: BELT SCALES
M-1/2: METAL DETECTOR
T-1: TUNNEL UNDER HIGHWAY

AGUATHUNA QUARRY
Proposed Plant Flow Diagram

Scale : N.T.S.		Figure : 2.2	
Date : August 28/98	Drn By : EB	Appd.	

3.0 PROJECT ALTERNATIVES

3.1 Alternative Means of Carrying out Project

The proponent has examined and evaluated technically and economically feasible alternative means of carrying out the Project, including different modes of transportation and alternative facility locations. In terms of transportation, consideration was given to the environmental and socio-economic implications of shipping the crushed dolomite/limestone versus moving it overland. It was determined that the use of ocean-going vessels along established and approved shipping lanes would be considerably less expensive, and that it would be considerably less intrusive to the surrounding community. Furthermore, it was determined that the use of ocean vessels will require less construction and maintenance of infrastructure such as roads and highways able to withstand heavy loads. Adopting the shipping mode of transportation was deemed to have the additional benefit of restricting the spatial extent of potential effects on the terrestrial environment in the project area and the Port au Port region.

As a result of consultations with stakeholders and regulatory authorities, it was discovered that the intended site for the marine terminal comprised the only viable lobster habitat in the project area. Accordingly, the site for the terminal was moved 600 metres to the east, a site not characterized by lobster habitat.

Over the course of assessing potential impacts of fugitive dust and particulate emissions from the conveyor facility, the design of the equipment was altered to include protective hooding.

3.2 Alternatives to the Project

The primary alternative to the project is maintaining the status-quo (i.e no new quarry project). This is not a preferred alternative because the proponents would not be able to access world markets with an additional 500 thousand metric tonnes of product per year. This production capacity is not available at the existing Kelly's Cove facility in Nova Scotia, nor does the partnership own other holdings which would supply sufficient quantities of high quality dolomite. ***As noted later in this document, no compelling environmental reasons for maintaining status quo were found.***

4.0 EXISTING ENVIRONMENT

The proposed Aguathuna quarry is located on a former limestone quarry site which dates back to 1913. The area is situated in western Newfoundland on the Port Au Port Peninsula, on the shore of the East Bay and Costa Bay (refer to Figures 1.1-1.4). It lies between the communities of Boswarlos, to the west, and Bellman's Cove, to the east. The town of Stephenville, a regional service center, is 15 km to the east. Stephenville is connected to the Trans Canada Highway and has an airport with service to mainland Canada.

Access to the property is via Route 460 which crosses the property; a gravel road leads to the quarry site (Figure 2.1). Deposits are within 1000 meters of the shore and deep-water is within 150 meters of the shoreline. Electrical power and water are readily available.

The quarry site lies on flat to gently sloping terrain at an elevation of about 80 m above sea level. The highest point slopes gradually toward small, steep-side brooks to the east and west ends and north to Port au Port Bay. The terrain over both deposits is mainly barren or scrub-covered, with sparse patches of stunted spruce. A few interspersed hardwoods are also found. Overburden depth is generally less than 1 m.

The quarry face of the abandoned East Quarry and the face of the West Quarry developed after 1956 are major physical features of the area. The rock fill of the old dock and its remnants are still in place under water. Other structures in the area include an old explosives storage shed, an existing power generating house (still operating) and concrete foundations from a water magnesia manufacturing plant decommissioned in 1969.

The existing environment has been partitioned into four main environmental components as follows:

4.1 Marine Habitat and Fish

The marine habitat and fish environmental component combines the physical and biological attributes of the marine communities that could be affected by the proposed development. As previously stated, benthic habitat and fish species associated with this habitat could be affected directly by the construction and operation of the loading dock. In addition, indirect adverse effects could occur from the site run-off and fugitive dust with the introduction of suspended sediments into the marine environment.

Existing Conditions and Knowledge

Costa Bay is located in the Port au Port Bay on the west coast of Newfoundland and is separated from the Gulf of St. Lawrence by the Port Au Port peninsula. The bay supports a moderate lobster fishery and has some potential for aquaculture. The physical environment in the area of the proposed loading

dock is characterized by limestone cliffs and outcrops from previous quarrying operations. The bathymetry from shore has a sloping drop off to a depth of approximately 15 m at a distance of around 150 m from shore.

Benthic habitat and species present were investigated along a diving transect at the proposed loading dock site on May 5, 1998. The diving transect included an area 25 m east and west of centre line, with buoys placed at a distance of 50 m from shore. Bottom composition in this area consists mainly of bedrock with boulders, and some sand-covered areas. Probes were only able to penetrate to a depth of 0.2 m. Observed marine life consisted of 14 flatfish, one rock cod and three rock crab. No lobster were observed on the sea floor or in traps located throughout the area. Just beyond the 50 m mark, the bottom tapers off from bedrock and boulders and becomes muddy sea floor. Within this area (50-150 m), there were fewer flatfish, five rock crab, and four scallops; no lobster or other species were observed. Average probe depth was 1-1.5 m, with an occasional depth of 2 m to the east of the center transect line.

Within the Port au Port Bay area, lobster constitute a commercially important fishery, although several other species are also commercially viable. Most significantly, herring spawning grounds exist within the bay area. During the spring there is a herring fishery and the young from these breeding grounds migrate along the entire western coast of Newfoundland. On a much smaller scale, the ground fishery (primarily cod and flounder), and the harvesting of scallop and snow crab also take place within the Port au Port Bay area.

Consultation with local fishers indicated that the area of the proposed infill and floating loading dock is not frequently fished for lobsters. As discussed, lobsters are fished in the rocky debris of the former quarry dock (located approximately 600 m to the west of the proposed dock).

The shipping route from the loading dock to the mouth of Port au Port Bay is not an area of concentrated fishing by scallop draggers, pelagic purse seines or groundfish otter trawlers. Historically, there has not been conflict between commercial shipping and fishing vessels along the shipping route (pers. comm. Andrew Harvey and Robert Lambert, 1998). Some gill netting occurs seasonally at the eastern end of the bay.

4.2 Freshwater Resources

The freshwater resources environmental component combines the physical and biological attributes of surface water and groundwater that could be affected by the proposed development. Stream and pond habitat could be affected directly by the construction and operation of the dolomite quarry, and an indirect adverse effect could occur from the site run-off and fugitive dust with the introduction of suspended sediments into freshwater environs.

Existing Conditions and Knowledge

There are two brooks and one pond within the quarry development area, and one additional brook located approximately 700 m east of the dolomite pit, off site. Jack of Clubs Brook is located along the western edge of the dolomite pit, and is fed by Moose Pond(a man-made pond) located approximately 1.5 km south of Costa Bay. Gilliman's Brook is located along the eastern edge of the dolomite pit, brook quarry and quarry access road. This brook becomes intermittent as it runs south toward Felix Cove. Bellman's Cove Brook, also known as Butler's Beach Brook, is located on the eastern outskirt of the project area. The three brooks and the pond do not provide any viable recreational fish habitat and no fish were observed over the course of a fish and habitat survey conducted by a biologist in 1998. The Jack of Club's Brook also contained several blockages that may impede upstream migration of fish.

Consultations with the Conne River Band and the Federation of Newfoundland Indians indicate that the area is not currently subject to land claims, nor is the site an integral part of traditional use patterns by aboriginals. In particular, the poor quality of fish habitat on the site makes it extremely unlikely that any such activities would have occurred for several generations, nor is it likely that the site will be sought for use in this regard in the future.

The proposed plant site contains two existing settling ponds which will have to be de-watered and pond embankment structures removed before the plant can be constructed. The preliminary dolomite pit excavation will have to be de-watered before further excavation can be conducted. Because of the nature of the bedrock material, the pH of the water is expected to be relatively high(eg.>7.0),with correspondingly low metal content. Sediments from either source will be removed using mitigation measures as described in sections 8.0 and 9.0.

The communities surrounding the Project Site, (with the exception of Port au Port East) have drilled wells for drinking water. The proponent will have water trucked in for general use by employees and any other associated needs.

4.3 Terrestrial Resources

The terrestrial resources environmental component combines the flora and fauna of the terrestrial environment that could be affected by the proposed development.

Existing Conditions and Knowledge

4.3.1 Fauna

Birds

The project is located along East Bay which opens to the Gulf of St. Lawrence. Generally, the Port au Port Peninsula comprises excellent habitat for a variety of migrant shorebirds, waterfowl, seabirds and raptors, as well as native songbird species.

Reports from local birdwatchers indicate that there is an active Common Tern colony at Gravels Pond, approximately 4 kilometres east of Aguathuna. This pond is also visited by American Wigeon, White-winged Scoter, American Black Ducks, Greater Scaup. In 1998 a few Northern Shovellers were also observed. Reports also indicated that there are Caspian Terns and a pair of Great Blue Herons inhabiting the Piccadilly estuary, west of Aguathuna. The Port au Port Peninsula also provides habitat for Ring-necked Duck and Pintail in the freshwater environs and the Red-breasted Merganser in the marine habitat. The Aguathuna site proper is not significantly utilized by any of the abovementioned species. Occasional usage by migrants in season is not uncommon. Caspian Terns are classified as a vulnerable species by Canadian Wildlife Service. No Caspian Tern nests are found on-or-adjacent to the site but occasional feeding migrants may pass the terminal area.

In total there are sixteen migrant shorebirds which frequent the entire western coast of Newfoundland. This list includes the Semi-palmated Sandpiper, White-rumped Sandpiper, Least Sandpiper, Spotted Sandpiper, Stilt Sandpiper, Semi-palmated Plover, Black-bellied Plover, Piping Plover, Short-billed Dowitcher, Sanderling, Greater Yellowlegs, Dunlin, Ruddy Turnstone, Red Knot, Whimbrel, and Common Snipe. Piccadilly Bay, which is located approximately 8 km from Aguathuna, is the closest shorebird habitat to the site. ***No Piping Plover, an endangered species, are found on-or-adjacent-to the site.***

Two candidate ecological reserves are located southeast of the project site; Browmoore Bog and Flat Island. Browmoore Bog covers approximately 50 km^2 and is located east of Stephenville Crossing within the boundaries of Route 461, Route 460, Route 1 and George's River. Harry's River runs through the bog, parallel to Route 460. The bog, which is over 25 km southeast of the Project site, does not provide habitat for any significant populations of songbirds or waterfowl. Flat Island (also known as Sandy Point) is located approximately 20 km southeast of Aguathuna on St. George's Bay and provides

excellent seabird habitat. This island has coniferous forest, grassy dunes, salt marshes, shallow ponds and extensive intertidal sand and pebble flats. Approximately 200 pair of Common Terns, 100 pair of Arctic Terns, Great Black-backed Gulls and Ring Billed Gulls and 3 pairs of Common Black-Headed Gulls use the island regularly for nesting habitat. The Common Black-headed Gull is considered a rare species in the province of Newfoundland. Both candidate ecological reserves are located over 20 km from the project site, and off of St. George's Bay, which is found on the south side of Port au Port Peninsula. Therefore, it is reasonable to conclude that the quarry development will have no effect on the populations of wildlife in these areas.

Western Newfoundland also provides suitable habitat for a variety of raptorial bird species including Bald Eagle, Osprey, Boreal Owl, Merlin, Goshawk, Sharp-shinned Hawk, and Great Horned Owl.

Songbirds characteristic of the deciduous and mixed forest habitat of the Port au Port Peninsula include the Yellow-bellied Flycatcher, Swainson's Thrush, American Redstart, Blackpoll warbler, Black-and-White Warbler, Black Throated Green Warbler, Tree Swallow, Ovenbird, Veery, Northern Waterthrush, Tennessee Warbler, Magnolia Warbler, and Pine Siskin. The Alder Flycatcher, Song Sparrow and Mourning Warbler are typical of shrubby or thicket habitat on the peninsula while Bobolinks are found in the open grasslands and fields of western Newfoundland.

The project area was visited by a biologist in June and September, 1998. During this period, there were no observations or reports of eagle, hawk or shorebird nests in the immediate project area. The coastal portion of the quarry operation has been previously developed and does not currently provide suitable breeding or feeding grounds for shorebird or waterfowl species. The quarry site itself was also previously cleared and therefore provides marginal habitat only for migrant species. The surrounding areas (Piccadilly, Long Range Mountains, Browmoore Bog and Flat Island) provide more suitable habitat with food and nesting grounds more accessible and less disturbed by humans.

Mammals

While western Newfoundland provides excellent habitat for an array of large mammals including caribou, moose, black bear, red fox, coyote, lynx and Pine Marten, moose and lynx are the only large mammals found within the project area. Smaller mammals found in the project area include Common Shrew, Little Brown Bat, Northern long-eared bat, Snowshoe Hare and Red Squirrel. The site does not comprise overwintering grounds for moose. ***Newfoundland Pine Martin, an endangered species, is not found on site.*** The nearest population is found in the deep woods of west central Newfoundland, approximately 100 km east of Aguathuna

4.3.2 Flora

The Port au Port region is characterized by wind-exposed limestone barrens, shallow soils and large areas of exposed bedrock. The flora is composed primarily of herbaceous species, with calcareous arctic-alpine species, Gulf endemics and Cordilleran disjuncts species also found on the Peninsula.

Within a 20 km radius of the project site, there are forty-seven rare, threatened and/or endangered plant species present; a complete listing of these plants can be found in Appendix C. During a walk over of the project site by a biologist, none of the plants listed on the rare, endangered or threatened species list were found. Since the site was previously developed for the purposes of quarry development, the area does not provide a suitable pristine environment which many of these sensitive species require. The proposed dolomite pit site has a thin layer of top soil over bedrock which is presently sparsely vegetated with a cover of mixed-age spruce trees.

As part-and-parcel of the EMP and follow-up monitoring, a rare and endangered survey of the Project Site will be conducted by a qualified botanist.

4.4 Air Quality

Air quality has an intrinsic importance to the health of humans, wildlife and vegetation. Air quality is a general term which provides a measure of the presence of air contaminants in the outdoor environment. The presence is determined by the measurement of concentrations of air contaminants at several locations around the province of Newfoundland. The air contaminants include sulfur dioxide, nitrogen oxides, particulate matter, particulate matter with particle diameters less than 10 microns, carbon monoxide, ozone, hydrogen sulfide and total reduced sulfur. The measured data are compared with the federal ambient air quality guidelines and the provincial ambient standards to determine whether the air quality meets the guidelines and standards.

Existing Conditions and Knowledge

The region within 5 kilometers of the proposed facility, and Newfoundland in general, experiences good air quality because there are relatively few large industrial sources of emissions located nearby. Climate conditions provide good dispersion of air contaminants and frequent rainfall scavenges contaminants from the air. The ambient air quality also benefits from the infusion of relatively clean, oceanic air masses from the North Atlantic.

The climate of the Project area is relatively wet, with a prolonged winter season resulting in the surface being saturated for much of the year. Stephenville and Port au Port Peninsula average 106 mm of precipitation per month, with rainfall accounting for approximately 940mm and snowfall contributing 411mm, for a total annual precipitation figure of 1272.1 mm. The wind averages 18 km/hr throughout

the year, and is prevalently blowing in the westerly direction. As a result of high precipitation and average wind speeds in the Project area, little wind induced particulate matter is likely to be found in the air.

4.5 Socio-Economics

Several small communities are located within 8 km of the Project site; Boswarlos to the west, Bellman's Cove (also known as Butler's Beach) and Port au Port West to the east, and Felix Cove to the south (see figure 1.3). The township of Port au Port West, extends to include the communities of Bellman's Cove, Aguathuna, and Felix Cove. There are an estimated 530 people within the township of Port au Port West, and 100 people more specifically within the community of Aguathuna, which also includes Bellman's Cove. The town of Boswarlos edges the western side of the quarry development and extends approximately 3.5 west along Coast Bay. There are approximately 100 residences in this community.

Services to the site include a fire department within 4 km, and a post office within 2 km of the site. The area is patrolled by RCMP, and has access to a full range of medical, social and financial services located in Stephenville (approximately 15 km east).

4.6 Relationship Between Valued Ecosystem Components(VECs)

Two pathways, water and air, link to some degree, all four environmental components. Water consisting of quarry site run-off has the potential to disturb terrestrial resources such as surface soils. The same run-off could enter the freshwater environment and make its way into the marine habitat. Once site run-off has affected the marine habitat, an effect on commercial species is possible, thereby reducing a fishermen's earnings and affecting the socio-economic parameters of the assessment area.

The second pathway amongst VECs is the most ubiquitous, air. Dust carried from the project in the air can settle on the terrestrial and freshwater resources, enter the marine environment and, in sufficient concentrations, cause human health concerns for individuals with respiratory ailments.

4.7 Sensitivity to Disturbance

The environmental components in the assessment areas, and specifically within the project area boundary, have been previously disturbed. Despite extensive disturbance of the site by former quarrying activities, there are indications that the site is in the process of recovering.

Lobsters have colonized the old dock area and the surrounding streams and ponds are all clear flowing. Surveys of aquatic and terrestrial resources on the site have not shown any unique habitat or rare species

present. The environment does not appear to have components that would make it particularly sensitive to disturbance.

4.8 Potential Environmental Hazards

The environmental hazards that could potentially affect the proposed project include ice scour, erosion and wind induced wave action. The infill and floating dock system will be designed to withstand the projected forces of ice scour erosion and wind action. To assist in the planning for these designs the proponent commissioned a wave climate study for the dock sites (Appendix A).

5.0 PUBLIC CONSULTATION

A stakeholder scoping meeting was held on April 14, 1998, in Stephenville, Newfoundland. At this time, the proponent met with Mr. Andrew Harvey, President of local Fishermen's Association, Mr. Al Pitcher, Area Habitat Coordinator (DFO), and Mr. Robert Lambert, Detachment Supervisor to discuss issues and concerns regarding the potential effects on fish habitat, marine fish and fisheries in East Bay. Their issues and concerns centred on the protection of the marine and freshwater environment and the preservation of the rubble associated with the old quarry wharf as lobster habitat. This information was used over the course of the initial consideration of the scope of the project discussed in Section 6.2 to shift the wharf site 600 meters east.

On September 21, 1998, stakeholders were contacted to verify if there were any local public concerns regarding the project. A series of questions were asked to Mr. Andrew Harvey, fisherman and local Fishermen's Committee Chair, Mr. Don McCann, Town Clerk of Port au Port West/Aguathuna and Mr. Robert Lambert, DFO Sub-district Supervisor. A summary of these interviews is available upon request. Those people interviewed were uniformly supportive of the project.

On November 3, 1998 a public meeting describing the project phases and predicted effects was held at the Port au Port Recreation Centre, Port au Port West, Newfoundland. A total of 45 people were in attendance, including Mr. John Appleby, Manager of Environmental Assessments, PWGSC, who chaired the meeting, along with Mr. Robert Angel from Atlantic Canada Opportunities Agency and Mr. Alvin Pitcher of Pitcher Consulting, Pasadena, Newfoundland.

A thirty minute summary presentation of the Draft Copy of the CEAA Comprehensive Study Report was provided and followed by a question and answer period with the audience. Graphic displays were also made available. Most issues raised during this period had been already incorporated into the Comprehensive Study Report, included concerns regarding: noise pollution , particularly during the night (Refer to Section 10.6); decommissioning plans for the project (refer to Section 2.5); health risks associated with limestone dust (refer to Section); the incorporation of settling ponds into the project design (refer to Section 2.5); effects of the project on vehicular traffic (refer to Sections 12.2.2 and 12.2.3) ; the potential for an oil spill similar to the incident 10-12 years ago at the old sea mining site (refer to Figure 8.2 and Section 8.4.1); and, the size of ships to be used for shipping and capacity of the Port to accommodate them.

Concerns related to the effects of blasting on local residences were raised, and it was agreed that related considerations would be incorporated into the Final Comprehensive Study. Specifically, concerns about the effects of blasting on the surrounding residences, and the possibility of structural / foundation damage as a result of such activities, was discussed (refer to Figure 9.2 and 10.2, and Sections 9.6 and 10.6). In addition, the public queried if there was a legal minimum distance for blasting operations from the nearest home to the quarry operation (refer to Section 10.2.2). The chair indicated that this would

also be discussed in the CSR. As such, the issue is addressed in Section 10, and in Follow-Up (Section 14)

Overall, there were no concerns on behalf of the fishers in the area related to the shipping routes or marine loading facility, and most people indicated they were looking forward to the employment opportunities that the project would offer in the area.

The public registry for the Aguathuna Quarry Development (as outlined by the Canadian Environmental Assessment Act) was established at the office of the town clerk of Port au Port West/Aguathuna, Don McCann.

No indication of serious or pronounced public concern regarding the potential adverse impacts of the project on the environment or human health and safety has been noted. Public concern did not warrant a referral of the Project to the Minister of the Environment for a Mediation or Public review by Panel.

6.0 SCOPE OF ASSESSMENT

6.1 Scope of Project Subject to Environmental Assessment

The scope of the project refers to those components of the undertaking which are considered part of the project for the purposes of the environmental assessment (CEAA, 1994). As previously noted, the scope of this Project includes all phases of construction, operation, maintenance and decommissioning, including accidental events and malfunctions, as previously defined and described in Sections 1.1 through 1.6.

6.2 Factors Considered

An issues scoping process was used to identify potential project / environment interactions for the Project. This process involved: public consultation with local fishers and residents; consultation with expert departments (DFO, EC, CEAA, Newfoundland and Labrador Department of Environment and Labour), site visits, a review of the existing literature on the study area; an inshore marine habitat survey; a synthesis of the issues identified in the consultation process; and the use of the study teams' professional judgement.

Table 6.1 lists the regulatory agencies consulted in this regard.

Table 6.1 Government Agency Representatives Contacted

Department/Agency	Division/Branch	Contact
Provincial		
Environment and Labour	Environmental Assessment	Mr. Phil Graham
Federal		
Canadian Environmental Assessment Agency	Atlantic Region	W. Coulter
Fisheries and Oceans Canada	Marine Environment and Habitat Management Division	A. Hoddinott, A. Pitcher
Environment Canada	Environmental Protection	K. Coady, K. Power, B.Jeffrey

As previously indicated, the ***purpose of the project, alternative means and alternatives to the project*** were factored into the scope of the assessment. Additionally, the scope of the assessment considers the ***need for any follow-up program***.

6.3 Project/environment interactions identified:

- ***Generation of noise/vibrations attributed to the quarry operations from drilling, blasting, crushing, screening, material conveying, and rolling equipment.***
- ***Generation of dust due to drilling, crushing, screening, conveying, stockpiling fines and road traffic and subsequent introductions to air and water.***
- ***Increase in traffic volume above present levels.***
- ***Contamination (onshore/offshore) due to localized oil and/or material spills.***
- ***Visual effects of the quarry and the marine facility.***
- ***Reclamation and associated effects.***
- ***Physical impacts on the marine environment (dolomite/limestone) during ship and barge loading.***
- ***Release of sediments to water from settling ponds.***
- ***De-watering requirements for quarry and related effects on surface waters.***
- ***Loss of fish habitat (crustaceans) in the coastal zone.***
- ***Interference with traditional use patterns (forestry, fishing) in Port au Port Bay***

6.4 Scope of Factors - Valued Ecosystem Components (VECs).

Valued Ecosystem Components (VECs) are defined here to mean those environmental components potentially negatively affected by the project. These VECs have been determined to be Marine Habitat and Fish, Freshwater Resources, Terrestrial Resources and Air Quality. In doing so, the RA has adopted an appropriately conservative approach to impact assessment in the sense that, while no clear indication was found during the scoping process regarding the ability of the project to significantly impact any of the VECs chosen, an in depth consideration of related cause and effect relationships has nonetheless be carried out. The principle of conservation is further advanced over the course of boundary establishment, establishment of significance criteria and effects prediction.

Table 6.2 Rationale for Selecting the Valued Environmental Components

VECs	Rationale		
	Public	Regulators	Professional Judgement
Marine Habitat and Fish	√	√	√
Freshwater Resources			√
Terrestrial Resources		√	√
Air Quality	√	√	√

A fifth potential VEC considered was historic resources, but a site visit and consultations with local residents revealed the site had been substantively disturbed over the last 40 years and any historic resource was beyond recovering.

6.5 Valued Environmental Components and Associated Assessment Boundaries

The establishment of study boundaries focuses the scope of the assessment in order to allow for more meaningful results. Study boundary considerations are in two main categories. The first is centred on the temporal and spatial characteristics of both the project and the various VECs, and includes ecological, socio-economic and project boundaries. The second type of boundary addresses the limitations on the scope of the assessment due to technical and/or administrative constraints.

For the purposes of this assessment, the study area is generally bound by the limits of the quarry site, the marine terminal and the shipping passage to the entrance of the Bay. However, unique assessment areas will be defined for each VEC; these may or may not be the same as the study area.

6.5.1 Ecological Boundaries -Marine Habitat and Fish

Marine Habitat and Fish was selected due to the potential for contamination resulting from localized oil and/or material spills, erosion run-off and dust depositions. Concern was also expressed regarding the potential loss of habitat and fisheries resources, (eg. lobster) due to marine terminal construction.

Costa Bay is part of the marine environment of the larger embayment of Port au Port on the west coast of Newfoundland. Marine biota within Costa Bay have widespread distributions along the west coast of Newfoundland. A very small portion of the Gulf of St. Lawrence population of each indigenous species is present in the bay for at least part of their life cycle. Although Port au Port Bay, containing Costa Bay, is not known to support distinct or unique habitat conditions or sub-populations of species, physical (spatial) characteristics bounding the Port au Port Bay may form a partial barrier to movement of component species. ***Spatial ecological boundaries*** for the purpose of this assessment are thus set as the entire Port au Port Bay and represent the minimum confined spatial limit (the spatial boundary) for any one species.

Spatial and Temporal Project Boundaries

The ***principal temporal boundary*** is the project construction and operation period, and most individual activity components are subdivided on a hourly, daily, or weekly basis. Similarly, accidents may occur at any time during construction or operation, and are as a result examined over all phases.

The ***spatial Project boundaries*** for this assessment include the Project area (Figure 1.1) and the shipping route from the loading dock through Port au Port Bay to the bay fairway buoy XU (Canadian Hydrographic Chart 4659).

Within this context, the ***spatial boundaries for the marine habitat and fish*** include those areas that will be directly affected by the construction of the loading dock and those areas adjacent to the site where fugitive dust and suspended sediment from site run-off may settle on substrate. Consideration of the shipping route was also included for determining the potential effect of an accidental event on marine habitat and marine organisms.

6.5.2 Ecological Boundaries - Freshwater Resources

Ecological boundaries for freshwater resources are defined by the spatial and temporal extent of:

- physical and chemical characteristics of the habitat; and
- the potential freshwater species using that habitat for either part or all of their life cycle.

The freshwater environment of the Port au Port Peninsula is part of the freshwater environment of the west coast of Newfoundland. Freshwater species found on Port au Port have widespread distributions along the coast and include salmonids, American eel, smelt, speckled trout and forage species. A small portion of the west coast population of each species may be present in the Costa Bay area for at least part of their life cycle. The Project area does not support viable freshwater habitat conditions or sub-populations of species. ***Spatial ecological boundaries*** for the purpose of this assessment are the freshwater resources of Port au Port Peninsula and represent the most confined spatial limit (the spatial boundary) for any one species.

The principle ***spatial project boundary*** is the project footprint plus 100 meters.

The principal ***temporal boundary*** is the site construction and operation period, although many events or components occur on a hourly, daily, or weekly basis.

6.5.3 Ecological Boundaries - Terrestrial Resources

Ecological boundaries for terrestrial resources are defined by the spatial and temporal extent of:

- physical characteristics of the habitat; and,
- the potential terrestrial species using that habitat for either part of the year or their life cycle.

A very small portion of Newfoundland's west coast populations of moose, grouse and songbirds are present in the project area for at least part of their life cycle. Although that portion of the Port au Port

Peninsula containing the Project area does not support distinct or critical habitat conditions or distinct sub-populations of species, physical (spatial) characteristics bounding the Port au Port Peninsula may form a partial barrier to movement of component species. In a fashion similar to freshwater resources boundary considerations, ***spatial ecological boundaries*** are thus set conservatively as the terrestrial environment of Port au Port Peninsula, and represent the most confined spatial limit (the spatial boundary) for any one species.

The principal ***temporal boundary*** is the site construction, operation and decommissioning period, although many influencing events also occur on a hourly, daily, or weekly basis. Accidents may occur at any time during construction or operation. The ***spatial Project boundaries*** for this assessment include the Project area as defined by Figure 1.1.

6.5.4 Ecological Boundaries - Air Quality

Spatial Boundaries

Effects on air quality due to the proposed activities are not expected to extend beyond 1000 m of the quarry, plant and ship loading operation, except during very high wind events, which typically occur more frequently in the winter, with winds from the north, funnelled into Port au Port Bay across the narrow isthmus that connects the Port au Port Peninsula to the rest of Newfoundland.

Temporal Boundaries

Because of the nature of the proposed activity, releases of air emissions causing effects on air quality will occur during the operation which is expected to occur over a nine month period from April to December, 6 days per week. During the project, the effects on air quality may extend from hours, during high wind events or ship loading, to days under normal operating conditions.

Administrative Boundaries

Effects on ambient air quality may be caused by air contaminants including particulate matter, which is regulated by government agencies at the federal (Environment Canada) and provincial (Newfoundland Department of Environment and Labour) levels.

Technical Boundaries

Technical boundaries apply to the ability to predict the downwind concentrations based on worst case emissions and meteorology.

7.0 INTRODUCTION TO PREDICTED ENVIRONMENTAL EFFECTS, MITIGATION MEASURES AND SIGNIFICANCE CRITERIA OF PROPOSED PROJECT

7.1 Project-VEC Interactions

Tables 7.1 to 7.4 summarize the Project elements that could interact with the VECs during Project phases, including accidental events. The nature and extent of these interactions are discussed in Sections 8.0 to 11.0.

Table 7.1 Potential Interactions Between Project Activities and VECs During Construction

VECs	Construction Project Activities				
	Clearing/Leveling /Grubbing/Blasting	Overburden Removal	Vehicular Traffic	Facility Installation/ Upgrade/Refurbishing	Waste Disposal
Marine Habitat and Fish		√		√	√
Freshwater Resources	√	√	√	√	√
Terrestrial Resources	√	√	√	√	√
Air Quality	√	√	√		

Table 7.2 Potential Interactions between Project Activities and VECs during Operation and Maintenance

VECs	Operation and Maintenance Project Activities				
	Blasting	Water Management	Vessel Loading	Vehicular Traffic	Facility / Infrastructure Maintenance
Marine Habitat and Fish	√	√	√		√
Freshwater Resources	√	√		√	√
Terrestrial Resources	√			√	√
Air Quality	√		√	√	

Table 7.3 Potential Interactions between Project Activities and VECs during Decommissioning

VECs	Decommissioning Project Activities	
	Facility/Infrastructure Removal	Site Clean-up and Restoration
Marine Habitat and Fish	√	√
Freshwater Resources	√	√
Terrestrial Resources	√	√
Air Quality		

Table 7.4 Potential Interactions between Project Activities and VECs during Accidental Events

VECs	Accidental Events			
	Marine Spill (Materials & Oil)	On-land spill (Materials & Oil)	Water Management Failures	Fires
Marine Habitat and Fish	√		√	
Freshwater Resources		√	√	√
Terrestrial Resources		√	√	√
Air Quality	√	√	√	√

Potential interactions, issues and concerns are based on the information gathered during the scoping process and knowledge of the proposed Project activities. This information is key to conducting an analysis of environmental effects.

7.2 Cumulative Environmental Effects

The consideration of cumulative environmental effects was integrated into the overall assessment for each VEC, however, a separate rating nonetheless is provided for each VEC (See Tables 8-11). The assessment boundaries for the consideration of cumulative effects in this assessment are considered to be the marine area of Port au Port Bay and the Port au Port Peninsula and greater Stephenville area. These boundaries were determined to be a composite of the individual VEC boundaries. This approach gives a large assessment area to ensure that all potential cumulative effects are considered. Activities that could potentially interact with the Project are discussed in detail in Section 13.

7.3 Capacity of Renewable Resources to Meet Present and Future Needs

The potential renewable resources considered in this study include the shell fish and fish species in the marine environment adjacent to the site, forest resources on the site, water quality, air quality, wildlife habitat and fish habitat. ***No likely significant effects on renewable resources are predicted. Because of this, the capacity of Renewable Resources to meet present and future needs will not be compromised.***

7.4 Effects of the Environment on the Project

Extreme weather conditions such as wind driven ice or wave action could pose a threat to the infill and floating dock. The design and construction of the facility will be such that there is a sufficient margin of safety so that the facility is safe and durable. The operation will also be seasonal, with no marine terminal activities occurring during winter months.

Any potential effects on the marine terminal will be of a physical nature only. Because of the absence of any human activity, and minimal biological activity, at the terminal site during severe weather conditions, predicted impacts will be repairable with minimal associated environmental or health effects occurring.

7.5 Effects of Malfunctions and Accidental Events

An accidental release of petroleum products could occur on land from storage facilities, during re-fuelling, or as fuel is delivered to the site. If a fuel spill reaches the marine environment through site run-off, it could have adverse effects on water quality, bottom substrate and benthic communities.

The failure of site drainage control mechanisms could result in an accidental release of water containing elevated quantities of suspended sediments and/or blasting residue into the marine environment. This has the potential to degrade water quality and increase the accumulation of sediment on the substrate.

A complete ***loss of a ship*** transporting dolomite in the shipping route defined in this study would result in the loss of cargo of dolomite onto the substrate and the ships fuel into the water column. This would result in smothering of habitat and effects on water quality, benthic sediment and benthic communities along the shipping route in Port au Port Bay. For the purpose of this CSR, such an event is considered to be unlikely to occur. However, some related treatment is provided.

Other accidental events or malfunctions, including health and safety and forest fires, are discussed in ensuing sections.

7.6 Methods Used to Predict Effects

The methods used to predict effects in this study consist of quantitative modelling, qualitative estimates and professional judgement. As previously noted, wave modelling was conducted to determine the effect of the environment on the project (Appendix A). Dust dispersion modelling was also conducted for the air quality component of each VEC and is described in Section 11.3.

7.7 Summary of Potential and Predicted Effects

Tables 8.2, 9.2, 10.2 and 11.4 provide the results of the frequency, extent, duration and confidence of the assessment results for each project phase and accidental events.

7.8 Mitigation Measures

The proponent recognizes that the potential effects described in the ensuing sections must be mitigated. All of the mitigation measures described in this CSR consist of proven technology that is readily obtainable and has been proven to substantially reduce environmental effects when properly implemented.

7.9 Environmental Protection Planning

The proponent is committed to the sustainability of the Aguathuna quarry and will develop an Environmental Protection Plan. An Environmental Protection Plan (EPP) will be developed for all phases of the Project for both the quarry and marine facility. It will be designed to ensure that environmentally sound construction and operational practices are being used. The design will also be based on recognized standards and guidelines for mining and quarrying. It is designed to be a site-specific, field-usable document that will contain the following information:

- ***responsibilities of the owner and all site personnel;***
- ***purpose, organization and maintenance of the EPP;***
- ***specific mitigative measures to be implemented during routine and non-routine construction and operation activities (e.g., erosion and drainage control, transportation, storage and handling of hazardous wastes, clearing and leveling, blasting, stockpiling and shipping)***
- ***contingency plans to be followed in the case of an accidental event;***
- ***measures to be taken in the event of decommissioning and subsequent rehabilitation of the site; and***
- ***a list of permits, approvals, authorizations, and key personnel to be contacted in the case of an emergency.***

The EPP will be a living document, which will be modified and updated, as required. An outline of EPP requirements is provided in Appendix B.

7.10 Determination of Significance: Definition and Evaluation

Sections 8-11 of this CSR provide criteria for evaluating the significance of potential adverse environmental effects. In this regard, definitions of significant and nonsignificant effects have been developed on a VEC-by-VEC basis.

The effects analysis for this Project follow the three steps as outlined in the Responsible Authority's Guide or "Guidelines" (CEAA 1994) for applying *CEAA*:

- determining whether the environmental effects are adverse;
- determining whether the environmental effects are significant; and
- determining whether significant adverse effects are likely to occur.

For adverse effects, the effect is rated as significant or nonsignificant based on the criteria established for each VEC. Significance is not evaluated for positive effects. As per the Guidelines (CEAA 1994), significance is established based on the extent, duration, magnitude, frequency and irreversibility of the potential effect, as well as the ecological context. Effects significance has been evaluated based on a review of the relevant literature, consultation with experts, the public and professional judgement. Effect ratings may be quantitative and/or qualitative, depending on the nature of the data available.

A comprehensive study must also consider the likely effects of the Project on the capacity of renewable resources to meet present and future needs (16(2)(d)). An evaluation of capacity need only be conducted if it is determined that there will be a potentially significant adverse effect.

Residual environmental effects are those adverse environmental effects which remain, ***following the application of mitigation measures***, and are evaluated against established significance criteria for each VEC.

CEAA also requires that a comprehensive study consider the need for any follow-up program. According to the Guidelines (Agency, 1994), a follow-up program "verifies the accuracy of the EA and determines the effectiveness of any mitigation measures implemented". Accordingly, the report includes a summary description of follow-up requirements in Section 13.

8.0 MARINE HABITAT AND FISH

8.1 Significance Criteria

For Marine Habitat and Fish, the following definitions have been selected:

Significant effect: affects a marine population, or a portion thereof, including their critical habitat, such that it causes a decline or change in abundance or distribution of the population over one or more generations in excess of that expected due to natural variation. Natural recruitment is unlikely to reestablish the population to its original level.

Non-significant effect: affects a marine population, or a specific group of individuals in a localized area or specific habitat, for a short period of time in a manner equal-to-or-less-than natural variation and has no measurable effect on the sustainability of the population as a whole.

8.2 Potential Interactions and Predicted Effects

8.2.1 Construction

Predicted Interactions

The ***construction of the infill area of the loading dock*** will interact with the marine habitat by covering a portion of the substrate, and also has the potential to introduce fines into the water column from the infill material. In addition, the anchors that will be set to secure the barge will disturb a small area of the substrate. Construction of the loading dock will result in a physical presence in the marine environment and interact with the substrate under the footprint of the infill and anchor locations.

During the clearing of the plant site, and the clearing and grubbing of the dolomite pit, site drainage may contain suspended sediment that could be introduced to the marine water column, increasing the suspended sediment load and potentially accumulating on the substrate. Interactions with the marine habitat and benthic communities may occur by ingestion of suspended sediments by filter feeders, or by smothering from subsequent settling of these particles.

The installation of the loading dock infill will result in the covering of a 40 m section of substrate with rock, and includes anchor placement on the substrate. The installation of the infill may introduce sediments into the water column through re-suspension and as fines are washed from the infill material.

The infill will be armoured with rock that has the potential to provide crustacean habitat. As previously discussed, the location of the infill was selected to avoid the disturbance of existing lobster habitat at

the old dock site. The proposed infill area does not contain any unique or highly concentrated marine species.

The marine habitat covered by the infill is assumed to be similar to habitat found in Costa Bay in general; therefore, the spatial effect within this context is limited. The reversibility of any potential effects is high for the anchoring component, since the mooring anchors can be removed and substrate will revert to ambient conditions through natural processes.

Predicted Effects

The adverse residual environmental effect is predicted to be non-significant as the location, construction methods and limited spatial extent of the loading dock mitigates the potential effect on marine habitat and fish. In addition to this, there is a potential positive residual effect since the infill area will provide habitat for lobsters similar to the old dock material 600 m to the west.

The dolomite pit site clearing and water removal will displace or expose fine-grained sediments that could contribute to the total suspended sediment loadings to the marine environment. Prior to clearing and grubbing, measures will be put in place to control erosion and discharge of sediment laden run-off into the marine environment. Detailed mitigation measures will be provided in an Environmental Protection Plan, and will include berms, settling ponds, check dams, take-off ditches, the use of vegetative cover (e.g. hydroseeding), the use of geofabric and/or other stabilization techniques.

Infill material will be selected so as to contain not more than 5% fines (i.e. sand, silt, and clay particle size fractions combined). Infill material may be evaluated for contaminants prior to introduction to the marine coastal zone, however, quarried limestone is a relatively beneign material, not characterized by heavy metals or acid generating potential. No related impacts from associated contaminants are predicted.

The potential adverse residual environmental effects on the marine environment from suspended solids introductions are predicted to be nonsignificant.

8.2.2 Operation

Predicted Interactions

The loading dock (floating barge and infill area) will be a long term feature of the coastal zone marine environment. During dolomite quarrying, processing, transportation to stockpiles, and loading onto ships, dust will be generated by activities such as blasting, crushing, loading and unloading material. This particulate material may settle onto the water surface, enter the water column, and accumulate on

the substrate. Particulate material may also enter the marine environment during vessel loading due to material spills.

During operation, the plant and quarry drainage may contain blasting residue (nutrients) that could cause a localized increase in primary production, should it reach the marine environment.

The loading dock (infill and floating dock) will result in a physical presence on the water and a limited physical blockage by the infill. The floating dock will not block water circulation or be in contact with the substrate. The floating dock system provides the structure for ship loading but does not directly affect the marine habitat other than a slight shadowing effect.

The loading of material onto vessels will result in fugitive dust generation over the water and potential material loss from the conveyer during loading. The conveyer loading system will be equipped with hoods to reduce the amount of fugitive dust and mitigate the occurrence of accidental material release. The modelling of the fugitive dust characteristics shows that the spatial extent of dust in the marine environment is limited.

The operation of the dolomite pit and the plant area will produce seasonal run-off that may also contribute to the total suspended sediment loadings in the marine environment. Prior to operation, measures will be put in place to control erosion and discharge of sediment laden run-off into the marine environment. Any decant water pumped from the working areas containing blasting residue (nutrients) will be sufficiently diluted to reduce eutrophication in the marine environment. Specific mitigation measures will be described in an EPP, and will include berms, ponds, take off ditching, geofabric use, etc.

The use of runoff controls, dust emission controls, best practices for ship loading and cover/wet technology for stockpiles renders it extremely unlikely that fugitive dust emissions will be in sufficient quantities to significantly impact the marine environment. Environmental effects on the marine habitat and fish VEC are accordingly, predicted to be nonsignificant during the operational phase.

8.2.3 Decommissioning

Potential Interaction

The decommissioning of the site will involve the removal of all equipment and reclamation of the dolomite pit. Site drainage during this phase may contain suspended sediment that could be introduced to the water column, increasing the suspended sediment load and potentially accumulating material on the substrate.

Predicted Effects

Prior to commencing reclamation, measures will be put in place to control erosion and discharge of sediment laden run-off into the marine environment. ***Specific mitigation measures will be described in a decommissioning plan, subject to approval by regulatory agencies and the RA. Related residual impacts from decommissioning are predicted to be nonsignificant.***

8.3 Cumulative Environmental Effects

(See Section 13.0)

8.4 Effects of Malfunctions and Accidental Events

8.4.1 Fuel Spills

The likelihood of a fuel spill occurrence that would affect the marine environment is low. Ships that will be loading and transporting dolomite will not be refuelling at the marine terminal. While at the terminal no vessel discharges will occur.

Any fuels that could potentially be spilled would be land- based diesel and gasoline. These fuels are light and would be small volume only. Should a small volume spill occur, it is expected that at most a limited (small) intertidal area will be impacted. The immediate area is not considered to be particularly sensitive to spills of this type. Any spills into the marine environment will be immediately reported to DFO's (Coast Guard) 24 hour emergency reporting number. Spill clean-up methodologies will need to be provided in the EPP. ***Related impacts are predicted to be nonsignificant.***

8.4.2 Mitigation Failure

Failure of the site run-off control mechanisms would result in a pulse of water with elevated levels of suspended solids entering the marine environment. It is projected that the majority of suspended sediments would quickly settle onto the substrate over a limited spatial area and/or be quickly diluted. The effect would be of a limited geographic extent over Costa Bay. The water quality would recover quickly with the dilution and flushing of the tide, but sessile members of benthic communities may experience smothering over a limited spatial extent adjacent to the source. Over a relatively short period of time, the benthic community would recover and/or re-colonize. ***The potential environmental effects resulting from mitigation failure are predicted to be nonsignificant.***

8.4.3 Shipping

A complete loss of a ship transporting dolomite in the shipping route described in this study would result in the loss of the cargo of dolomite onto the substrate and the ships fuel into the water column. This would result in smothering of habitat and effects on water quality, benthic sediment and benthic communities along the shipping route in Port au Port Bay.

To realistically evaluate the significance of the loss of a ship, along with its cargo and fuel, it is important to consider such an occurrence within the context of probability. In this regard, there are a large number of factors which come into play which collectively greatly reduce the likelihood that such an event would in fact take place. These include up-to-date on board navigational aids equipment, expert captains, ship safety requirements, ballast stability controls, established aids-to-navigation in Port au Port Bay, seasonal operations (e.g. non operation during prevailing northerlies) suitable shipping channels and appropriate docking operational protocols. Because of these factors it has been qualitatively concluded that the likelihood of an accident sufficient to result in the loss of a ship is extremely low.

In the unlikely event that a complete loss of cargo and fuel did occur, the shoreline and inter tidal habitat would also be affected by the fuel spill. Sandy beaches, areas of marine plant concentrations, salt marshes and ichthyplankton, are the most vulnerable. All would suffer temporary reductions in habitat quality and/or population densities. Whether these latter alterations would be in excess of population variations occasionally caused by natural means is uncertain. ***The potential environmental impacts associated with a loss of a ship are considered to be nonsignificant because of the low level of resources at risk, the temporary nature of related impacts and the very low level of probability associated with such an accident occurring.***

8.5 Summary of Potential Interactions, Predicted Effects

Table 8.1 Summary Table for Marine Habitat and Fish - Potential Interactions, Predicted Effects

Predicted Effects	Construction	Operation	Decommissioning	Accidental Events
Geographical Extent	1	1	1	2
Duration of Interaction	2	5	2	2
Frequency of Occurrence	2	2	2	1
Level of Confidence	3	3	3	3
Cumulative Effects Significance	N	N	N	N
Residual Effects Significance	N	N	N	N

KEY

Geographical Extent:
1 = <1 km^2
2 = 1-10 km^2
3 = 11-100 km^2
4 = 101-1000 km^2
5 = 1001-10,000 km^2
6 = >10,000 km^2

Duration of Interaction:
1 = <1 month
2 = 1-12 months
3 = 13-36 months
4 = 37-72 months
5 = >72 months

Frequency of Occurrence:
1 = <10 events/year
2 = 11-50 events/year
3 = 51-100 events/year
4 = 101-200 events/year
5 = >200 events/year
6 = continuous

Level of Confidence:
1 = low
2 = moderate
3 = high

Residual and Cumulative Effects Significance:
S = Significant
N = Not significant
NA = Not applicable

8.6 Mitigation Measures

- rock with <5% fines will be used to construct infill to limit introduction of fines to the water column;
- dock infill will be located 600 m from the existing lobster habitat;
- dock infill to be placed to maximize boulder contact with existing marine bottom substrate around the perimeter of the footprint;
- conveyer loading system will have hoods to eliminate spillage and fugitive dust introduction to the marine environment;
- site run-off will be controlled to reduce elevated sediment loading into the marine environment to be detailed in the EPP;
- zero discharge policy for vessels loading at dock;
- blasting residue to be monitored in site run-off before discharge to marine environment;
- plant and storage site run-off to be collected in a sedimentation pond;
- stockpiles must be sloped and compacted to prevent ingress of moisture;
- stockpiles should be protected from erosion with mulch, plastic, or geotextile and surrounded by straw, earthen berms or silt fences, as appropriate;
- the proponent will consider using non-toxic or less hazardous material alternatives where possible (i.e. juniper wood, water soluble paint, non-toxic preservatives);
- waste oil will be stored and subsequently disposed of at a facility that recycles oil otherwise disposed of a manner approved by NFDOEL;
- construction activities will be coordinated with seasonal constraints (e.g. clearing, grubbing, and excavation activities to avoid periods of heavy precipitation; avoidance of sensitive periods for fish and wildlife; the work site run-off will be controlled to reduce elevated sediment loading into the marine environment in accordance with pre-established criteria detailed in the EPP and as outlined in Table 8.2);
- measures will be implemented, in advance of grubbing and excavation activities, that will allow surface drainage to be diverted around the work area. Related detailed requirements will be provided in the EPP;
- existing drainage patterns and vegetated buffer zones will be maintained as appropriate to protect resources at risk;
- all necessary perimeter control structures (e.g. silt fencing, sediment traps, settling ponds) will be installed prior to any land disturbance;

- exposed soil, including stockpiled topsoil, will be stabilized as soon as possible (e.g. mulch, erosion control blankets or fast-growing, non-invasive, native vegetation);
- sediment control structures will be maintained (by repairing structural problems during and after storm events, removing accumulated sediment at regular intervals or at designated capacities(i.e. less than 60% of maximum), and by disposing of it at an approved site, given its unsuitability as structural fill material);
- on-site water will be directed to vegetated fields and forest floors where possible
- existing drainage patterns and vegetated buffer zones will be maintained as appropriate;
- water retained by sediment control structures will be periodically sampled and analyzed to determine if further treatment is required prior to discharge. Suspended solids concentrations within effluent released from sedimentation control structures (e.g. settling ponds) should not exceed 25 mg/L (monthly average) or 50 mg/L (grab sample). (These concentrations reflect permissible limits of suspended solids in effluents subject to industry-specific regulations under Section 36 of the *Fisheries Act)*;
- suspended solids levels in marine receiving waters will be monitored to ensure they are consistent with the CCME *Interim Marine and Estuarine Water Quality Guidelines for General Variables* (1996), which state that human activities should not cause suspended solids levels to increase by more than 10% above ambient. It is acknowledged, however, that the relatively pristine waters of Port au Port area may result in temporary exceedance of this guideline during infill emplacement and/or during periods of heavy precipitation during the construction stage. Accordingly,'upset' limits will also be applied as 25 mg/L(monthly average) and a maximum of 50 mg/L in a grab sample are to be used. Beyond these limits, required mitigation will have to be reviewed to determine additional measures to be undertaken. Related monitoring requirements will be provided in the EPP.
- receiving waters will be monitored to attempt compliance with the CCME *Canadian Water Quality Guidelines* (1987) for the protection of aquatic life (and other uses as appropriate) when considered in conjunction with existing ambient water quality and site-specific factors. The *Canadian Water Quality Guidelines* (1987) for the protection of aquatic life recommends that the concentration of suspended solids within the receiving water should: a) not increase by more than 10 mg/l if the background suspended solids concentration is equal to or less than 100 mg/l, or b) not increase more than 10% above the background concentration if the background concentration exceeds 100 mg/l).Again, during construction activities, exceedance of these limits will result in application of the 25 and 50 mg/L(respectively) as described above.

- all personnel working at the site will be educated on proper methods of erosion and sedimentation prevention and control. This will be carried out by RA or the RA's representative.
- further mitigative actions may be taken as necessary based on monitoring results. Contingencies in this regard will be detailed in the EPP.

8.7 Residual Environmental Effects Prediction

The residual environmental effects assessment summary matrix for the Marine Habitat and Fish VEC is presented in Table 8.2. Potential adverse environmental effects will be of limited spatial intrusion and of low levels. The potential physical disturbance and accumulation of material in the water column and on the substrate, after mitigation, is not anticipated to adversely impact biologically significant proportions of species populations or habitat required for life cycle completion. ***A non-significant residual environmental effect on marine habitat and fish is predicted for this Project. There is also a potential positive environmental effect with armour stone of the loading dock serving as potential crustacean habitat.***

The potential adverse residual environmental effect of discharged site drainage and/or accumulated standing water during construction will be mitigated by control measures to be detailed by an EPP.

The potential adverse residual environmental effect from fugitive dust emissions is predicted to be non- significant as the installation of hoods on the conveyer system mitigates the potential effect of excess dust and material entering the marine habitat.

The potential adverse residual environmental effect of discharged site drainage and/or blasting residue during operation will be mitigated by control measures to be detailed by an EPP and is predicted to be non-significant.

Potential accidental events such as a fuel spill or failure of run-off containment structures are predicted to have nonsignificant residual environmental effects on marine habitat and fish, including cumulative effects, due to the limited geographic extent and rapid recovery of non critical habitat through natural regeneration processes. Contingency and emergency response procedures will be outlined in the EPP.

The total loss of a ship with its cargo and fuel is considered to have an extremely low probability of occurrence. The potential adverse residual environmental effect for a total loss of fuel and cargo is reversible in time and is rated non-significant.

Table 8.2 Summary of Bio-physical and Socioeconomic Effects Related to the Construction, Operation and Decommissioning

Valued Ecosystem Component (VEC)	Project Activity Causing Effect	Specific VEC Component	Description of Effect	Mitigation Measure and/or EPP Operation Procedures	Residual Environmental Effect
Marine Habitat and Fish	Construction of the infill area	Lobster Habitat	Habitat will be altered by infill.	The dock infill area will be located at least 600 m from existing lobster habitat.	⊙
			The infill area will provide habitat for lobsters.		⊕
		Water Column	Potential for infill material to introduce fines.	Rock with less than 5% fines will be used to construct infill area, resulting in only low levels of fines entering the water column.	⊙
	Securing the barge in the water	Marine Substrate	Anchors will alter substrate in a site specific manner.	The effects of anchoring into marine substrate is localized and highly reversible when the mooring anchors are removed.	⊙
	Clearing of the plant site and clearing and grubbing of the pit	Water Column	Erosional runoff leaving site.	Stockpiles should be sloped and compacted to prevent ingress of moisture. Stockpiles should be protected from erosion with mulch, plastic, or geotextile and surrounded by straw, earthen berms or silt fences. Additional site run-off control mechanisms are listed in Section 8.6 above and will be implemented as part of the EPP.	⊙

Legend: ⊖ Negative Significant Effects ⊕ Positive Significant Effects ⊙ Non-significant Effects

Table 8.2 Summary of Bio-physical and Socioeconomic Effects Related to the Construction, Operation and Decommissioning

Valued Ecosystem Component (VEC)	Project Activity Causing Effect	Specific VEC Component	Description of Effect	Mitigation Measure and/or EPP Operation Procedures	Residual Environmental Effect
Marine Habitat and Fish	Generation of dust by operation of dolomite quarry, processing (blasting, crushing, loading and unloading) and transportation to stockpiles.	Water column	Dust	The conveyor loading system will have hoods to avoid spillage and fugitive dust in the marine environment	⊙
		Marine Substrate	Accumulation of particulate matter on substrate, potentially causing destruction of habitat.	Suspended Solids will be monitored on site run-off before discharge to the marine environment. Use of settling ponds, berms and any other required means mandatory.	⊙
	Spills associated with loading dolomite onto ships.	Marine Environment	Destruction of habitat	A loading program for vessels at the dock will be implemented.	⊙

Legend: ⊖ Negative Significant Effects ⊕ Positive Significant Effects ⊙ Non-significant Effects

Table 8.2 Summary of Bio-physical and Socioeconomic Effects Related to the Construction, Operation and Decommissioning

Valued Ecosystem Component (VEC)	Project Activity Causing Effect	Specific VEC Component	Description of Effect	Mitigation Measure and/or EPP Operation Procedures	Residual Environmental Effect
Marine Habitat and Fish	Blasting residue	Marine Environment	Localized increase in marine primary production if blasting residue reaches marine environment	Blasting residue levels to be monitored on an event-specific basis. Associated bi-products to be controlled and treated as detailed by the EPP.	⊙
	Decommissioning of the site (equipment removal and reclamation of dolomite pit)	Marine Environment	Site drainage during this phase may increase the suspended sediment load and potentially the accumulation of material on substrate.	Site run-off control mechanisms will be implemented as part of EPP, and will include any and all means deemed necessary by the RA, by expert departments and by the Province.	⊙
	Accidental hydrocarbon spills	Marine Environment	Potential adverse effects on water quality, benthic sediment and benthic communities from a ship source accident.	Low likelihood of an accidental event as the shipping route is charted around hazards in Port au Port Bay. Coast Guard oil spill response plan in place to limit spatial extent of any potential spill. No ships' fuelling facilities will exist on site. All waste oil should be returned to a facility that recycles oil or, if this is not possible, disposed of in an approved manner.	⊙

Legend: ⊖ Negative Significant Effects ⊕ Positive Significant Effects ⊙ Non-significant Effects

9.0 FRESHWATER RESOURCES

9.1 Significance Criteria

For the Freshwater Resources VEC, significance criteria are defined as follows:

A significant effect on surface waters is one which alters the quality or quantity of freshwater species and/or their habitat such that a freshwater and/or anadromous fish population or stock is affected in such a way as to cause a change or decline in abundance or distribution of the population or stock over one or more generations. Such changes would exceed those normally expected due to natural variation, and occur to the extent that natural recruitment may not re-establish the population or stock to its original level.

A non-significant effect on surface waters is one which at most temporarily alters the quality or quantity of freshwater, or alters habitat features, such that a freshwater and/or anadromous fish population or stock and/or their habitat is affected in a localized area over a short period of time in a manner similar to natural variation and which has no measurable effect on the long term sustainability of the population or its' habitat as a whole.

A ***significant effect*** on groundwater is defined as hydrocarbon contamination exceeding those limits described for Commercial Non-Potable ground water in the Atlantic Partnership in RBCA (Risk-Based Corrective Action)Implementation Report(March,1999). In mg/L, these limits are defined as: Benzene(4.7); Toluene(20); Ethyl Benzene(20); Xylenes(20); Gas(20); Diesel # 2(20); and, #6 Oil(20).

A ***non-significant effect*** is defined as hydrocarbon contamination not in excess of those limits described above.

9.2 Potential Interactions, Predicted Effects

9.2.1 Construction

Potential Interactions

The construction phase, consisting of clearing of the plant site, clearing and grubbing of the dolomite pit, and site drainage may generate suspended sediment that could be introduced to existing streams and ponds. This will result in an increase in the suspended sediment load in freshwater with potential accumulation on stream beds and pond bottoms. Interactions with freshwater fish and fish habitat may occur by ingestion of the suspended sediments in the water, clogging of interstitial gill spaces or by accumulated material on the substrate. While no colonized fish habitat exists on-site, a suitable

conservative approach was adopted. In this regard, marginal habitat was viewed as being potentially colonized in the future. Accordingly, mitigation of impacts is nonetheless discussed.

Predicted Effects

The dolomite pit site-clearing and water removal will displace or expose fine-grained sediments that may contribute to the total suspended sediment loadings to freshwater environments. Prior to clearing and grubbing, measures will be put in place to control erosion and discharge of sediment laden run-off. Any water pumped from the existing dolomite pit area and the existing sedimentation ponds at the plant area will be retained in a clearing pond to control and treat the water to reduce suspended material. Specific mitigation measures will be described in an EPP, and will include (such measures as) the use of geofabric, settling ponds, take-off ditches, berms, check dams, dust controls or any other measures deemed necessary to ensure that suspended solids in natural watercourses do not exceed 25 mg/L.

The site is not adjacent to residential wells. The project will not utilize groundwater during the operations phase. Because of this, ***groundwater draw down will not occur***. Similarly, accidental contamination by small, localized vehicle fuel spills will not adversely affect residential wells. As previously noted there is no colonized freshwater fish habitat on site.

Residual effects on freshwater resources during construction are predicted to be nonsignificant.

9.2.2 Operation

Potential Interactions

The physical degradation of water resources due to suspended solids, and contamination by hydrocarbons from fuel or lubrication spills are potential sources of impacts on surface water. To reduce the potential for contamination, fuel and oil will be stored and handled in accordance with present government regulations and environmental standards, and equipment will be properly maintained and/or repaired accordingly to prevent unnecessary leaks of hydrocarbons. A water re-circulating system consisting of two settling ponds will handle the plant effluent that may be used during wet screening. However, make up water will be drawn from Goose Pond.

During dolomite quarrying, processing, transportation to stockpiles, and loading onto ships, dust will be generated by activities such as blasting, crushing, loading and unloading material. This particulate material may settle onto water surfaces, enter the water column, and accumulate on the substrate. As previously described, a model was used to quantify the spatial extent and levels of fugitive dust that would be generated during the operation of the proposed quarry, the plant and storage area, and ship loading. (See Section 11).

During operation, the plant and quarry drainage may contain blasting residue (nutrients) which could cause a localized increase in primary production, should it reach freshwater environments.

During excessively dry periods, approximately 15,000 gallons of make-up water will be drawn from Jack of Clubs Brook. Jack of Clubs Brook is fed by Moose Pond, approximately 700 m south of the from area where the make-up water will be withdrawn. Moose Pond holds over 2 million litres of water, which will quickly replace the estimated 2000 litres per day of water required from the brook during excessively dry periods. Therefore, it is reasonable to conclude that the withdrawal of make-up water from Jack of Clubs Brook will have no effect on the invertebrate inhabitants of Jack of Clubs Brook or the small freshwater fish species which may be present in Moose Pond.

Personnel on site during operation will generate domestic sewage waste. Sewage will be routed through a septic system(s), and will not impact freshwater quality. Garbage will be disposed of in approved landfills. Personnel will use trucked in water, and therefore will not draw upon the ground water supply of the surrounding communities.

The operation of the quarry, including the transportation of material to the plant and material processing at the plant, will result in fugitive dust generation over the Project area, with some deposition to freshwater. The conveyer loading system will be equipped with hoods to reduce the amount of fugitive dust and mitigate the occurrence of accidental material release.

The operation of the dolomite pit and the plant area will produce seasonal run-off that could also contribute to the total suspended sediment loadings to the freshwater environment. Prior to operation, measures will be put in place to control erosion (buffer zones) and discharge of sediment laden run-off into the freshwater environment. Specific mitigation measures will be described in an EPP.

Residual impacts on freshwater resources during operation of the facility are predicted to be nonsignificant

9.2.3 Decommissioning

Potential Interactions

The decommissioning of the site will involve the removal of all equipment and reclamation of the dolomite pit. Site drainage during this phase may contain suspended sediment that could be introduced to surface water, increasing the suspended sediment load and potentially accumulating material on the substrate.

The decommissioning plan must detail all remediation measures to be utilized, and will include revegetation, re-establishment of grade, habitat restoration/enhancement (as appropriate) and any other aesthetic or stabilization deemed appropriate by governments.

Predicted Effects

Residual effects during decommissioning are predicted to be nonsignificant.

9.3 Cumulative Environmental Effects

(See Section 13)

9.4 Effects of Malfunctions and Accidental Events

9.4.1 Fuel Spill

An accidental release of petroleum products may occur on land from storage facilities, during vehicle re-fuelling, or as fuel is delivered to the site. The environmental effects of fuel in soil, surface water and groundwater are well known, and include short to medium term contamination, mortality or morbidity of affected organisms and elimination of potability (groundwater). The EPP will detail fuel handling procedures and required buffer zones from water. Fuel must be handled pursuant to the requirements of the Newfoundland Environment Act, Gas and Associated Products Regulations. In addition, no refuelling will occur within 50 meters of a waterbody. ***The predicted residual impacts from land based fuel spills are predicted to be nonsignificant.***

9.4.2 Mitigation Failure

The failure of site drainage control mechanisms may result in an accidental release of water containing elevated quantities of suspended sediments and/or blasting residue into the freshwater environment. This could degrade water quality and increase the accumulation of sediment on stream beds.

Methods for ***controlling the introduction of process dust into surface waters*** include water spraying at the emission points, enclosures around discharge and transfer points and processing equipment, and, dampening of roadways and stockpiles. The high levels of precipitation in the area will contribute positively to reduce dust. ***Accidental dust generation will not cause significant impacts on freshwater resources during construction or operation.***

Failure or overflow of the settling ponds will result in a pulse of water with elevated levels of suspended solids entering the freshwater environment. It is anticipated that the majority of suspended

sediments would quickly settle onto the substrate over a limited spatial area. Water quality would recover quickly with dilution and flushing, but sessile members of freshwater benthic communities may experience smothering. ***No significant impacts are predicted from such events.***

9.5 Summary of Potential Interactions, Predicted Effects

Table 9.1
Summary Table for Freshwater Resources - Potential Interactions, Predicted Effects

Predicted Effects	Construction	Operation	Decommissioning	Accidental Events
Geographical Extent	2	2	2	2
Duration of Interaction	2	5	2	2
Frequency of Occurrence	2	2	2	1
Level of Confidence	3	3	3	2
Cumulative Effects Significance	N	N	N	N
Residual Effects Significance	N	N	N	N

KEY

Geographical Extent:
1 = <1 km^2
2 = 1-10 km^2
3 = 11-100 km^2
4 = 101-1000 km^2
5 = 1001-10,000 km^2
6 = >10,000 km^2

Duration of Interaction:
1 = <1 month
2 = 1-12 months
3 = 13-36 months
4 = 37-72 months
5 = >72 months

Frequency of Occurrence:
1 = <10 events/year
2 = 11-50 events/year
3 = 51-100 events/year
4 = 101-200 events/year
5 = >200 events/year
6 = continuous

Level of Confidence:
1 = low
2 = moderate
3 = high

Residual and Cumulative Effects Significance:
S = Significant
N = Not significant
NA = Not applicable

9.6 Mitigation Measures

- water pumped from the existing dolomite pit and plant area will be collected in a retention pond to control and treat the water;
- decant water pumped from the working areas containing blasting residue (nutrients) will be sufficiently diluted to reduce eutrophication in aquatic environments(further outlined in EPP);
- prior to commencing reclamation, measures will be put in place to control erosion (buffer zones) and discharge of sediment laden run-off into the aquatic environment;
- site run-off control mechanisms to be implemented as part of EPP;
- all water required for wet screening will be re-circulated with limited make up volumes required;
- all conveyers will have hoods and dust suppression measures will be implemented as part of EPP to eliminate fugitive dust entering freshwater bodies;
- the blasting plan should be designed to subdivide larger charges into a series of smaller charges. The blasting contractor must ensure that the minimum required distances from a watercourse for blasting, (confined charges)as outlined in the Guidelines for Protection of Freshwater Fish Habitat in Newfoundland and Labrador by Fisheries and Oceans Canada are strictly followed;
- a minimum distance of fifty meters will be maintained between the boundaries of the quarry pit and the top bank or high water mark of any surface watercourses comprising productive fish habitat. Approval from the Newfoundland Department of Environment and/or the Department of Fisheries and Oceans must be obtained if monitoring shows that the buffer zone is going to be encroached upon;
- timing of clearing, grubbing, and excavation activities will avoid periods of heavy precipitation and/or biologically sensitive periods for fish and wildlife wherever possible. However, because no fish currently reside on-site, avoidance of freshwater fish sensitivities is not an issue. Additionally, clearing and grubbing is not expected to begin before and songbird nestlings have fledged. The following year, it is expected that any areas adjacent to the active site will be avoided by song birds. Stabilization of the work site in accordance with pre-established criteria in advance of the winter season will also be carried out. Specific requirements will be detailed in the EPP;
- measures will be implemented, in advance of grubbing and excavation activities, that will allow surface drainage to be controlled in the work area. Details will be provided for expert department approval in the EPP.
- existing watercourses and vegetated buffer zones (i.e. 10 m) will be maintained as appropriate to protect resources at risk;
- all perimeter control structures (e.g. silt fencing, sediment traps, settling ponds) will be installed prior to any clearing and/grubbing;
- exposed mobile soil, including stockpiled topsoil, will be stabilized as soon as possible (e.g. mulch, erosion control blankets, fast-growing, non-invasive, native vegetation);

- sediment control ponds will be maintained (by repairing structural problems and removing accumulated sediment at regular intervals or at a designated capacity not exceeding 60% of maximum, and by subsequent disposal at an approved site, given unsuitability as structural fill material);
- surface water discharges from ditching or check dams, as appropriate, will be directed to vegetated fields and forest floors where possible. Otherwise, sediment laden runoff will be directed into settling ponds.;
- water quality assays will be conducted prior to dewatering the dolomite quarry and settling pond. Should results dictate, alternative means of disposal will be sought.
- water retained by sediment control structures will be sampled and analyzed to determine if further treatment is required prior to discharge. Suspended solids concentrations within effluent released from sedimentation control structures (e.g. settling ponds) should not exceed 25 mg/L (monthly average) or 50 mg/L (grab sample). (These concentrations reflect permissible limits of suspended solids in effluents subject to industry-specific regulations under Section 36 of the *Fisheries Act)*;
- suspended solids levels in marine receiving waters will be monitored to ensure they are consistent with the CCME *Interim Marine and Estuarine Water Quality Guidelines for General Variables* (1996), which state that human activities should not cause suspended solids levels to increase by more than 10% of the ambient conditions.
- receiving waters will be monitored to ensure maintenance of the CCME *Canadian Water Quality Guidelines* (1987) for the protection of aquatic life (and other uses as appropriate) when considered in conjunction with existing ambient water quality and site-specific factors. The *Canadian Water Quality Guidelines* (1987) for the protection of aquatic life recommend that the concentration of suspended solids within the receiving water should: a) not increase by more than 10 mg/l if the background suspended solids concentration is equal to or less than 100 mg/l, or b) not increase more than 10% above the background concentration if the background concentration exceeds 100 mg/l);
- No machine maintenance to occur within 50 meters of a watercourse. All regulations with respect to the storage and handling of hydrocarbons to be complied with the EPP.
- the proponent will consider using non-toxic or less hazardous material alternatives where possible (i.e. juniper wood, water soluble paint, non-toxic preservatives);
- waste oil will be returned to a facility that recycles oil or disposed of a manner approved by NFDOEL;
- all personnel working at the site will be educated on the proper methods of erosion and sedimentation prevention and control; and
- further mitigative actions will be taken as necessary based on monitoring results.

9.7 Residual Environmental Effects Prediction

The residual environmental effects assessment summary matrix for the Freshwater Resources VEC is presented in Table 9.2. Potential adverse environmental effects will be of limited extent on an area with minimal freshwater resources at risk. ***The construction and operation of this Project is anticipated to have an nonsignificant affect on the sustainable use of renewable freshwater resources including groundwater, surface water or freshwater fish habitat.***

Modelling of fugitive dust characteristics (See Section 12) shows that the spatial extent of dust deposition in the Project area is primarily limited to the area of constant work. No viable freshwater fish habitat exists in this area. No potable surface water exists in the area. No critical habitat is located downstream of receiving surface water. ***Because of this, potential adverse residual environmental effects on freshwater from dust emissions are predicted to be non-significant.***

The potential adverse residual environmental effect of discharged site drainage and/or blasting residue during operation will be mitigated by control measures as detailed in the EPP. Monitoring will be used to verify the efficacy of these measures. Site drainage will not influence productive or critical fish habitat. Nutrification from blast residues are expected to be minimal, and in all probability will be insufficient to effect nutrient budgets in receiving waters. Noise from blasting will have insignificant effects on fish, as long as all mitigation measures outlined above, are followed. Related impacts are predicted to be non-significant.

The potential adverse residual environmental effect of discharged site drainage during reclamation will be mitigated by technically and economically feasible control measures and is predicted to be non-significant. Specific measures will be detailed by a reclamation plan.

No significant cumulative effects associated with future or past development in relation to suspended solids and erosion in the Project area are anticipated for freshwater resources (See Section 12).

Accidental events such as fuel spills or failure of run-off containment structures are predicted to have no significant residual environmental effects on freshwater resources, including cumulative effects, due to the limited resources at risk and potential recovery of habitat from minor occurrences through natural regeneration processes. Contingency and emergency response procedures will nonetheless be developed and provided in the EPP. Due to the limited volume of fuel that could be spilled, subsequent rapid evaporation, and contingency and emergency response planning to be outlined in an EPP, the potential residual adverse effects on groundwater resources are considered non-significant.

Table 9.2 Summary of Bio-physical and Socioeconomic Effects Related to the Construction, Operation and Decommissioning

Valued Ecosystem Component (VEC)	Project Activity Causing Effect	Specific VEC Component	Description of Effect	Mitigation Measure and/or EPP Operation Procedures	Residual Environmental Effect
Freshwater Resources	Construction phase (clearing of plant site, and clearing and grubbing of dolomite pit)	Stream bed, pond bottoms, fish habitat.	Potential for the accumulation of suspended sediment on substrate.	Erosion control measures including geofabric, settling ponds, take-off ditches, berms, check dams, dust controls or any other measures deemed necessary to ensure suspended solids in natural watercourses do not exceed 25mg/L will be implemented and outlined in the EPP and subsequently implemented. No critical fish habitat is found on site.	⊙
		Fish	Increased suspended sediment load may clog interstitial gill spaces.	See above.	⊙
	Construction and processing machinery	Stream beds and pond bottoms	Potential for hydrocarbon contamination from fuel or lubricant spills	No refuelling to take place within 50 m of surface water. Land spills and leaks to be cleaned immediately and reported as appropriate. Waste oil should be returned to a facility that recycles oil or if this is not possible, disposed of in an approved manner.	⊙

Legend: ⊖ Negative Significant Effects ⊕ Positive Significant Effects ⊙ Non-significant Effects

Table 9.2 Summary of Bio-physical and Socioeconomic Effects Related to the Construction, Operation and Decommissioning

Valued Ecosystem Component (VEC)	Project Activity Causing Effect	Specific VEC Component	Description of Effect	Mitigation Measure and/or EPP Operation Procedures	Residual Environmental Effect
Freshwater Resources	Generation of dust by operation of dolomite quarry, processing (blasting, crushing, loading and unloading) and transportation to stockpiles.	Water column	Dust will cause an increase in the suspended sediment loading of the water column.	Dust suppressant (i.e. water or calcium chloride) must be used when airborne particulate matter is greater than 80 ug/m^3. The conveyor loading system will be equipped with hoods to reduce the amount of fugitive dust and mitigate the occurrence of accidental material release. The high levels of precipitation in the Project area will positively reduce dust on the site.	⊙
		Stream beds and pond bottoms.	Accumulation of particulate matter on substrate, potentially causing destruction of habitat.	Erosion control measures including geofabric, settling ponds, take-off ditches, berms, check dams, dust controls or any other measures deemed necessary to ensure suspended solids in natural watercourses do not exceed 25mg/L/day average will be implemented and outlined in the EPP. Water quality assays will be conducted prior to dewatering the dolomite quarry and settling pond. Should results dictate, alternative means of disposal will be sought. A minimum distance of fifty meters will be maintained between the boundaries of the quarry pit and the top bank or high water mark of any surface watercourses. Approval from the Newfoundland Department of Environment must be obtained if this buffer zone is going to be smaller.	⊙

Legend: ⊖ Negative Significant Effects ⊕ Positive Significant Effects ⊙ Non-significant Effects

Table 9.2 Summary of Bio-physical and Socioeconomic Effects Related to the Construction, Operation and Decommissioning

Valued Ecosystem Component (VEC)	Project Activity Causing Effect	Specific VEC Component	Description of Effect	Mitigation Measure and/or EPP Operation Procedures	Residual Environmental Effect
Freshwater Resources	Blasting residue	Surface Water Quality	Potential for a localized increase in nutrients available in freshwater resources surrounding the Project area. Potential for an increase in primary production if blasting residue reaches freshwater environment	Runoff to freshwater environs will be monitored on an event specific basis. Runoff control efficacy to be subject to follow-up investigations.	⊙
	Blasting vibrations	Fish	Blasting near water produces shock waves that can damage fish swim bladders and internal organs. Blasting can also kill or damage fish eggs or larvae.	The blasting plan should be designed to subdivide larger charges into a series of smaller charges. The blasting contractor must ensure that the minimum required distances from a watercourse for blasting, (confined charges)as outlined in the Guidelines for Protection of Freshwater Fish Habitat in Newfoundland and Labrador by Fisheries and Oceans Canada are strictly followed. No impacts are, however, expected given the absence of fish at the site.	⊙

Legend: ⊖ Negative Significant Effects ⊕ Positive Significant Effects ⊙ Non-significant Effects

Table 9.2 Summary of Bio-physical and Socioeconomic Effects Related to the Construction, Operation and Decommissioning

Valued Ecosystem Component (VEC)	Project Activity Causing Effect	Specific VEC Component	Description of Effect	Mitigation Measure and/or EPP Operation Procedures	Residual Environmental Effect
Freshwater Resources	Blasting and Pit Dewatering	Ground water Quality and Quantity.	Potential for a reduction in water supply due to project draw-up or sedimentation from blasting activities.	Water will only be drawn from Jack of Clubs Brook during excessive dry periods. The existing small pit on site has good water quality and therefore can be de-watered without harm to the ground water supply. Blasting activities will be intermittent and therefore any sedimentation of the ground water will be temporary. The blasting plan will be designed to eliminate/reduce the effect of these activities on the ground water supply.	⊙
	Decommissioning of the site (equipment removal and reclamation of dolomite pit)		Site drainage during this phase may increase suspended sediment load, with potential accumulation of material on stream beds and/or pond bottoms.	Erosion control measures including geofabric, settling ponds, take-off ditches, berms, check dams, dust controls or any other measures deemed necessary to ensure that suspended solids in natural watercourses do not exceed a monthly average of 25mg/L, or 50 mg/L in a grab sample, will be implemented and outlined in the EPP.	⊙

Legend: ⊖ Negative Significant Effects ⊕ Positive Significant Effects ⊙ Non-significant Effects

Table 9.2 Summary of Bio-physical and Socioeconomic Effects Related to the Construction, Operation and Decommissioning

Valued Ecosystem Component (VEC)	Project Activity Causing Effect	Specific VEC Component	Description of Effect	Mitigation Measure and/or EPP Operation Procedures	Residual Environmental Effect
Freshwater Resources	Accidental hydrocarbon spills	Surface Water Quality, Freshwater Fish / Fish Habitat	Potential for hydrocarbon contamination as the result of accidental fuel spills, machine maintenance or inadequate storage methods, may lead to adverse effects on water quality.	The likelihood of a hydrocarbon spill sufficient to affect the freshwater environment is very small. Contingency and emergency response plans will be outlined in the EPP and aimed at immediate containment and clean-up of localized spills. No machine maintenance to occur within 50 meters of a watercourse. All regulations with respect to the storage and handling of hydrocarbons to be complied with the EPP. The proponent should consider using non-toxic or less hazardous material alternatives where possible (i.e. juniper wood, water soluble paint, non-toxic preservatives etc.)	⊙
	Accidental hydrocarbon spills	Ground water Quality	Potential for ground water contamination if a fuel spill occurs and is not contained or remediated.	The only accidental spills which could potentially occur on the site are small localized vehicle fuel spills, which will have no significant impact on the Ground water quality on the site or any residential wells in the area provided clean up is effected upon discovery.	⊙

Legend: ⊖ Negative Significant Effects ⊕ Positive Significant Effects ⊙ Non-significant Effects

Table 9.2 Summary of Bio-physical and Socioeconomic Effects Related to the Construction, Operation and Decommissioning

Valued Ecosystem Component (VEC)	Project Activity Causing Effect	Specific VEC Component	Description of Effect	Mitigation Measure and/or EPP Operation Procedures	Residual Environmental Effect
Freshwater Resources	Failure of drainage control mechanisms	Freshwater Resources	Failure of drainage control mechanisms may result in temporary degradation of water quality and increased sediment loading to freshwater surrounding the Project area.	If the site run-off control mechanisms were to fail, the suspended sediments would quickly settle over a limited spatial extent. Flushing in the area will dilute residual suspended sediment in the water column. Sessile benthic invertebrates may be smothered by the sediment overload in the short term. The follow-up program will outline inspection measures. No fish will be impacted.	⊙

Legend: ⊖ Negative Significant Effects ⊕ Positive Significant Effects ⊙ Non-significant Effects

10.0 TERRESTRIAL RESOURCES

10.1 Significance Criteria

A significant effect is one that alters the population of terrestrial flora and/or fauna and their ***critical habitat***, or a portion thereof, such that it causes a decline or change in abundance or distribution of a population in excess of that expected due to natural variation over one or more generations and such that natural recruitment may not re-establish the population to its original level.

A non-significant effect is one that alters the population of terrestrial flora and fauna or a specific group of individuals in a localized area or specific habitat for a short period of time in a manner similar to natural variation and has no measurable effect on the sustainability of the population as a whole.

10.2 Potential Interactions and Predicted Effects

10.2.1 Construction

Potential Interactions

The construction phase, consisting of clearing of the plant site and clearing and grubbing of the dolomite pit overburden, will result in an alteration of the existing vegetation and the frequency of use by animals. There will also be waste disposal requirements for solids generated during the facility construction.

Predicted Effects

The dolomite pit site clearing will remove vegetation incrementally as the quarry is developed. Prior to clearing and grubbing, measures will be put in place to control erosion and only the immediate area for use will be grubbed. Mitigation measures will be detailed by an EPP and will include (such measures as) settling ponds, soil removal and stockpiling/disposal, berms, geofabrics, etc. The proponent understands and will comply with the Migratory Birds Convention Act and Regulations. Provisions prohibiting the disturbance, destruction or removal of a migratory nest, egg, nest box or duck box will be strictly followed. However, it is expected that migratory birds will in fact avoid the site.

No overwintering habitat for large mammals exists on-site. No rare or endangered animal or plant species are found on-site. The area does not constitute critical habitat for any species.

The potential adverse residual environmental effects of removal of vegetation and displacement of species that use this habitat are predicted to be nonsignificant.

10.2.2 Operation

Potential Interactions

The operation of the facility, including dolomite quarrying, processing, transportation to stockpiles, and loading onto ships, will generate dust. This particulate material will settle onto adjacent vegetation. As previously indicated, a model was used to quantify the spatial extent and levels of fugitive dust that would be generated during the operation of the proposed quarry, the plant and storage area and ship loading *(Section 11)*.

The operation of the dolomite quarry represents a progressive expansion of the spatial extent of the facility and will result in the displacement of some of the species that inhabit the sparsely treed area to be excavated. Dust coating may reduce the rate of photosynthesis in plants adjacent to operations. Some related plant mortality will occur, although effects will be localized.

Surrounding communities may be effected by the noise levels and vibrations associated with blasting activities and in general the proximity of the mine to residences. However, blasts will occur approximately once every 10 days only. Timed charges and blasting mats will be used to reduce noise and shock. Blasting will occur during daylight hours only. Pre-blast conditions will be determined for control residences, and monitored periodically thereafter to determine effects.

Other noise generating activities, i.e processing equipment are expected to have no impact on the surrounding community, due to the distance between the residences and the Project Site. The proponent will comply with all municipal, provincial and federal air quality regulations to further ensure the operation does not impact on the surrounding communities.

Predicted Effects

The conveyor loading system will be equipped with hoods to reduce the amount of fugitive dust and mitigate the occurrence of accidental material release. Further to this, the modelling of the fugitive dust characteristics shows that the spatial extent of dust in the Project area is mainly limited to the area of constant work. (See Section 11)

The operation of the dolomite pit and the plant area will result in the removal of vegetation from the area to be quarried. Topsoil will be stockpiled for rehabilitation of the site during decommissioning. Prior to operation, measures will be put in place to control erosion and discharge of sediment laden run-off into the adjacent terrestrial environment. Specific mitigation measures will be described in an

EPP, subject to approval by expert departments and the RA, and will include standard erosion control measures.

Blasting activities will be conducted in accordance with all municipal, provincial and federal standards and regulations to minimize the impact on surrounding communities and structures. All blasting activities will be conducted by a private contractor and a blast plan will be designed prior to initiation of activities. Noise and vibration concerns related to blasting have been expressed by the surrounding communities and blast plans will be designed to ensure negligible impacts.

The Newfoundland Department of Mines and Energy regulations state that the minimum separation distance for residences to a quarry is 300m. Any residences closer than 300 m to the quarry must give written permission for the project to proceed. The present proposal has a few houses within 1000 m of the site, but none within 300m of the site. Therefore this is not a concern for the present project.

Residual effects on terrestrial resources during the operational phase are predicted to be nonsignificant.

10.2.3Decommissioning

Potential Interactions

Decommissioning of the site will involve the removal of all equipment and reclamation of the dolomite pit. No potential negative interactions with terrestrial resources are predicted for this phase of the project. The site will be revegetated with plant species compatible with existing Newfoundland Species during site remediation efforts. Approval will be required from appropriate regulatory authorities. Native species (only) are preferred.

The dolomite pit site reclamation process will displace or expose fine-grained sediments that could contribute to the total suspended sediment loadings to the terrestrial environment. Prior to commencing, reclamation measures will be put in place to control erosion and subsequent discharge of sediment laden run-off into the terrestrial environment. Specific mitigation measures will be described in an EPP.

Predicted Effects

Residual effects on terrestrial resources during decommissioning will not be significant.

10.3 Cumulative Environmental Effects

Cumulative effects on terrestrial resources will ensue from an additional and/or destruction of forested area at the dolomite quarry site. This will add to forest cover removal which has already occurred from past quarry activities.

No critical or over wintering habitat was found in the upland sections of the project area. In addition to this, deforestation will be restricted to the footprint of the quarry site, and reclamation efforts will include revegetation of certain areas.

The cumulative effects on terrestrial resources are predicted to be nonsignificant. For further discussion of cumulative effects, please see section 13.

10.4 Effects of Malfunctions and Accidental Events

An ***accidental release of petroleum products*** could occur on land from storage facilities, during re-fuelling, or as fuel is delivered to the site.

The ***failure of site drainage control mechanisms*** could result in an accidental release of water containing elevated quantities of suspended sediments and/or blasting residue that will cover areas of vegetation on the project area.

An ***accidental forest fire*** in the project area would remove the vegetation and alter the species composition using this habitat.

Because of the remoteness of the quarry from the major communities, ***the noise generated from this operation*** will not cause any adverse effects. Proper blasting techniques will be used at all times to minimize any negative effect (construction and operation)
Methods for controlling ***accidental dust emissions*** include water spraying at the emission points, enclosures around discharge and transfer points and processing equipment, dampening of roadways and stockpiles. The high levels of precipitation in the area will contribute positively to dust reduction.

Failure of the site run-off control mechanisms would result in a pulse of water with elevated levels of suspended solids entering the terrestrial environment.

10.5 Summary of Potential Interactions, Predicted Effects

Table 10.1 Summary Table for Terrestrial Resources - Potential Interactions, Predicted Effects

Predicted Effects	Construction	Operation	Decommissioning	Accidental Events
Geographical Extent	2	2	2	3
Duration of Interaction	2	5	2	3
Frequency of Occurrence	2	6	2	1
Level of Confidence	3	3	3	3
Cumulative Effects Significance	N	N	N	N
Residual Effects Significance	N	N	N	N

KEY

Geographical Extent:
1 = <1 km^2
2 = 1-10 km^2
3 = 11-100 km^2
4 = 101-1000 km^2
5 = 1001-10,000 km^2
6 = >10,000 km^2

Duration of Interaction:
1 = <1 month
2 = 1-12 months
3 = 13-36 months
4 = 37-72 months
5 = >72 months

Frequency of Occurrence:
1 = <10 events/year
2 = 11-50 events/year
3 = 51-100 events/year
4 = 101-200 events/year
5 = >200 events/year
6 = continuous

Level of Confidence:
1 = low
2 = moderate
3 = high

Residual and Cumulative Effects Significance:
S = Significant
N = Not significant
NA = Not applicable

10.6 Mitigation Measures

- an inventory of migratory bird and nesting migratory birds will be conducted prior to the construction phase. Provisions prohibiting the disturbance, destruction or removal of a migratory nest, egg, nest box or duck box must be strictly followed. Clearing of vegetation should not take place until chicks have fledged from their nests, as outlines by the Migratory Bird Convention Act and Regulations;
- oil spill and fire prevention and response programs will be established;
- reclamation programs during decommissioning for new sections of quarry to be developed;
- minimize footprint to limit area disturbed;
- wildlife must not be fed. All litter must be placed in appropriate containers. Staff should pick up litter for proper disposal whenever it is encountered. Wildlife must not be harassed or pursued unless human safety is compromised;
- construction waste and other refuse must be recycled and/or disposed of at an approved landfill site;
- a vegetative buffer zone will be maintained between the development and established surface waters;
- controlled blasting techniques, through the use of an engineered approach to blasting, which utilizes the use of portable seismographs, air pressure readings and the services of a licenced blaster and a blasting engineer;
- the blasting contractor and proponent will ensure that sound level limits of 55 dBA at night and on weekends, (23:00 - 07:00), 60 dBA in the evening(19:00- 23:00), and 65 dBA during the day (07:00 - 19:00) are observed at the property boundaries of the site. This will be observed through sound emission monitoring.
- ground vibrations resulting from blasting measured below grade or less than 1 m above grade in any part of a building not located on the property where blasting occur must have a peak particle velocity less than 0.5 in/sec or 12.5 mm/sec. This must also be confirmed by monitoring, and detailed in the EPP;
- the concussion from an air blast must not exceed 128 dBA within 7 m of a building not located on the property where the blasting operations occur.
- dust and erosion control measures for the site have been discussed in previous section of the CSR.
- as part-and-parcel of the EPP and follow-up program, a qualified botanists will conduct a rare and endangered flora survey of the Project Site.

10.7 Residual Environmental Effects Prediction

The residual environmental effects assessment summary matrix for the Terrestrial Resources VEC is presented in Table 10.2. Potential adverse environmental effects will be of limited spatial extent on an area with low level of resources at risk. ***The construction and operation of this Project is anticipated to have a non-significant affect on the sustainable use of renewable terrestrial resources such as forestry and associated wildlife. A non-significant residual environmental effect on terrestrial resources is predicted for this Project.***

Cumulative effects on terrestrial resources are predicted to be nonsignificant.

Accidental events such as a fuel spill or failure of run-off containment structures and fires are predicted to have non-significant residual environmental effects on terrestrial resources, including cumulative effects, due to the limited resources at risk and potential recovery of habitat through natural regeneration processes, reclamation protocols, and by following the contingency and emergency response procedures in the EPP. ***Related adverse effects are predicted to be nonsignificant.***

Legend: ⊖ Negative Significant Effects ⊕ Positive Significant Effects ⊙ Non-significant Effects

Table 10.2 Summary of Bio-physical and Socioeconomic Effects Related to the Construction, Operation and Decommissioning

Valued Ecosystem Component (VEC)	Project Activity Causing Effect	Specific VEC Component	Description of Effect	Mitigation Measure and/or EPP Operation Procedures	Residual Environmental Effect
Terrestrial Resources	Construction phase (clearing of plant site, and clearing and grubbing of dolomite pit)	Wildlife	Wildlife will be displaced as the result of the removal of vegetation and forest cover. Wildlife may stray into the project site.	The proponent will ensure an inventory of migratory bird and nesting migratory birds is conducted prior to the construction phase. Provisions prohibiting the disturbance, destruction or removal of a migratory nest, egg, nest box or duck box must be strictly followed. Clearing of vegetation should not take place until chicks have fledged from their nests, as outlines by the Migratory Bird Convention Act and Regulations. Wildlife must not be fed. All litter must be placed in appropriate containers. Staff should pick up litter for proper disposal whenever it is encountered. Wildlife must not be harassed or pursued unless human safety is compromised. The project will not displace any endangered, threatened and/or rare fauna or flora. The EPP will include monitoring for wildlife on the site, and detail protection responses as appropriate.	⊙
	Construction phase (clearing of plant site, and clearing and grubbing of dolomite pit)	Vegetation	Vegetation will be removed.	Vegetation should be reestablished by replanting, seeding or sodding, to ensure soil stabilization very necessary. The disturbed area will be minimized to the project footprint. Buffer zones will be left or planted where necessary to avoid further vegetation destruction over time.	⊙

Legend: ⊖ Negative Significant Effects ⊕ Positive Significant Effects ⊙ Non-significant Effects

Table 10.2 Summary of Bio-physical and Socioeconomic Effects Related to the Construction, Operation and Decommissioning

Valued Ecosystem Component (VEC)	Project Activity Causing Effect	Specific VEC Component	Description of Effect	Mitigation Measure and/or EPP Operation Procedures	Residual Environmental Effect
Terrestrial Resources	Generation of dust by operation of dolomite quarry, processing (blasting, crushing, loading and unloading) and transportation to stockpiles.	Vegetation	Localized reduction in photosynthesis, minor mortality.	Dust suppressant (i.e. water or calcium chloride) must be used when airborne particulate matter is greater than 80 ug/m^3. Dust from operations will be confined to the plant, storage and quarry areas and will not significantly impact the surrounding vegetated buffer zones.	⊙

Legend: ⊖ Negative Significant Effects ⊕ Positive Significant Effects ⊙ Non-significant Effects

Table 10.2 Summary of Bio-physical and Socioeconomic Effects Related to the Construction, Operation and Decommissioning					
Valued Ecosystem Component (VEC)	**Project Activity Causing Effect**	**Specific VEC Component**	**Description of Effect**	**Mitigation Measure and/or EPP Operation Procedures**	**Residual Environmental Effect**
	Generation of noise operation of dolomite quarry and processing (blasting, crushing, loading and unloading).	Wildlife, and Surrounding communities	The blasting, crushing and loading of dolomite can generate noise, causing avoidance behaviour by local wildlife and nuisance effects on nearby communities.	The remoteness of the quarry from surrounding communities reduces the effects of blasting, crushing and related noise. Monitoring must be conducted to ensure that noise levels are below the municipal, provincial and federal sound level limits. The blasting contractor and proponent will ensure that sound level limits of 55 dBA at night and on weekends, (23:00 - 07:00), 60 dBA in the evening(19:00- 23:00), and 65 dBA during the day (07:00 - 19:00) are observed at the property boundaries of the site. The concussion from an air blast must not exceed 128 dBA within 7 m of a building not located on the property where the blasting operations occur. Proper blasting techniques will be used at all times to minimize the effects of noise on surrounding wildlife. Avoidance of the quarry area by wildlife will minimize project / wildlife interactions.	⊙

Legend: ⊖ Negative Significant Effects ⊕ Positive Significant Effects ⊙ Non-significant Effects

Table 10.2 Summary of Bio-physical and Socioeconomic Effects Related to the Construction, Operation and Decommissioning

Valued Ecosystem Component (VEC)	Project Activity Causing Effect	Specific VEC Component	Description of Effect	Mitigation Measure and/or EPP Operation Procedures	Residual Environmental Effect
Terrestrial Resources	Accidental release of petroleum products	Soil	Potential for soil contamination as the result of a hydrocarbon spill.	The only accidental spills which could potentially occur on the site are small localized vehicle fuel spills. Soil can be contained and removed immediately to avoid further contamination. Appropriate spill response equipment (e.g sorbent pads, barrels, heavy equipment) should be maintained in a readily accessible location. Personnel working on the project should be knowledgable about response procedures. All spills and releases should be promptly contained, cleaned-up and reported to the 24-hour emergency response line in St. John's (1-800-563-2444) or (709) 772-2083.	⊙
	Vibrations from blasting	Non-VEC. Concrete foundations and community structures.	Air and/or physical vibrations from blasting may influence the integrity of concrete foundations.	A pre-blast survey of foundations and structures likely to be affected will be undertaken. Ground vibrations resulting from blasting measured below grade or less than 1 m above grade in any part of a building not located on the property where blasting occurs must have a peak particle velocity less than 0.5 in/sec or 12.5 mm/sec. Qualified personnel to design and undertake a non-intrusive blasting program. Requirements for post-blasting surveys must be included in the EPP and follow-up plan.	⊙

Legend: ⊖ Negative Significant Effects ⊕ Positive Significant Effects ⊙ Non-significant Effects

Table 10.2 Summary of Bio-physical and Socioeconomic Effects Related to the Construction, Operation and Decommissioning

Valued Ecosystem Component (VEC)	Project Activity Causing Effect	Specific VEC Component	Description of Effect	Mitigation Measure and/or EPP Operation Procedures	Residual Environmental Effect
Terrestrial Resources	Accidental forest fire.	Forest cover and wildlife habitat	Potential for the destruction of pristine vegetation and wildlife habitat.	The likelihood of a forest fire is very remote as a result of any operations at the plant site. Any fires will be reported immediately to the proper authorities. Company personnel to include contact lists and first-response procedures in EPP.	⊙
	Long term effects of dolomite quarry	Forest and wildlife	Disruption and destruction of habitat and forest area surrounding the dolomite site.	The project area was previously utilized as a quarry and thus the surrounding habitat has already been disturbed. The overall effects of the project are nonsignificant with mitigation.	⊙

Legend: ⊖ Negative Significant Effects ⊕ Positive Significant Effects ⊙ Non-significant Effects

11.0 AIR QUALITY

11.1 Significance Criteria

The definitions for the rating of effect significance on air quality have been developed from the federal ambient air quality objectives (CEPA) and the provincial air quality regulations of Newfoundland. The air quality guidelines of tolerable, acceptable and desirable, as defined under CEPA, will be used. The maximum tolerable level denotes a concentration beyond which appropriate action is required to protect the health of the general population. The maximum acceptable level is intended to provide protection against effects on soil, water, vegetation, visibility and well-being. The maximum desirable level is the long-term goal for air quality.

A *significant* adverse effect for non-protected areas (i.e. no-mask areas) reduces the air quality from an acceptable level to a tolerable level or worse. A significant effect, then, would be an exceedance of the provincial one hour acceptable emissions level of 80$\mu g/m^3$ or a 24 hour federal tolerable exposure limit of 400 $\mu g/m^3$.

A *non-significant effect* includes any mitigable Project-related effects on the air quality of the local area, such that it only temporarily alters the air quality of the surrounding area and/or is between the desirable and acceptable levels (as per the federal ambient air quality objectives) in non-protected areas.

11.2 Potential Interactions and Predicted Effects

Potential Interactions

There is a potential for dust generation during the operation of the facility due to equipment operation, wind induced fugitive dust from aggregate storage piles, and truck movement between the quarry and the plant area. ***Air Quality Modelling*** of particulate matter was used to quantify the spatial extent and levels of fugitive dust that would be generated during the operation of the proposed quarry, the plant and storage area, and ship loading. The US EPA ISC3 model was used to predict the ambient concentrations of particulate matter arising from four different sources: the quarry, the plant and storage area, the haulout road and ship load out.

The sources at the quarry will include wet drilling, primary crushing, secondary crushing, screening, conveyor transfers, and truck loading. The quarry was modelled as an area source of 200 m by 150 m. The sources at the plant and storage area include process equipment (tertiary crusher, fines crusher, conveyor transfers, fines screening, screening, truck loading and unloading) and aggregate storage of all aggregate including surge storage pile. The plant and storage area was modelled as an area source of 334 m by 58 m. Sources for the ship load-out included truck unload, conveyor transfers, and controlled loading. This source was modelled as a volume source with a height of 4 m.

In all cases, the emission factors were obtained from the US EPA *Compilation of Air Pollutant Emission Factors, Chapter 11 and 13.* A standard meteorological data set, representing worst case meteorology, was used to predict downwind ambient concentrations of particulate matter.

The predicted worse case 24-hour maximum particulate concentrations are presented in Figure 11.1. Predicted concentrations in the area immediately adjacent the facility and at a distance greater than 1,000 m, meet the 24-hour criteria of 120 $\mu g/m^3$, 100% of the time.

Table 11.1 Ambient Air Quality Criteria - Newfoundland and Environment Canada

Contaminant	Averaging Period	Newfoundland and Labrador Criteria for Acceptable Air Quality[1] ($\mu g/m^3$)	Environment Canada[2] - Maximum ($\mu g/m^3$) Desirable[3] / Acceptable[4] / Tolerable[5]
Total Suspended Particulate (TSP)	1 hour	80	n/a / n/a / n/a
	24 hour	120	n/a / 120 / 400
	Annual	60	60 / 70 / n/a

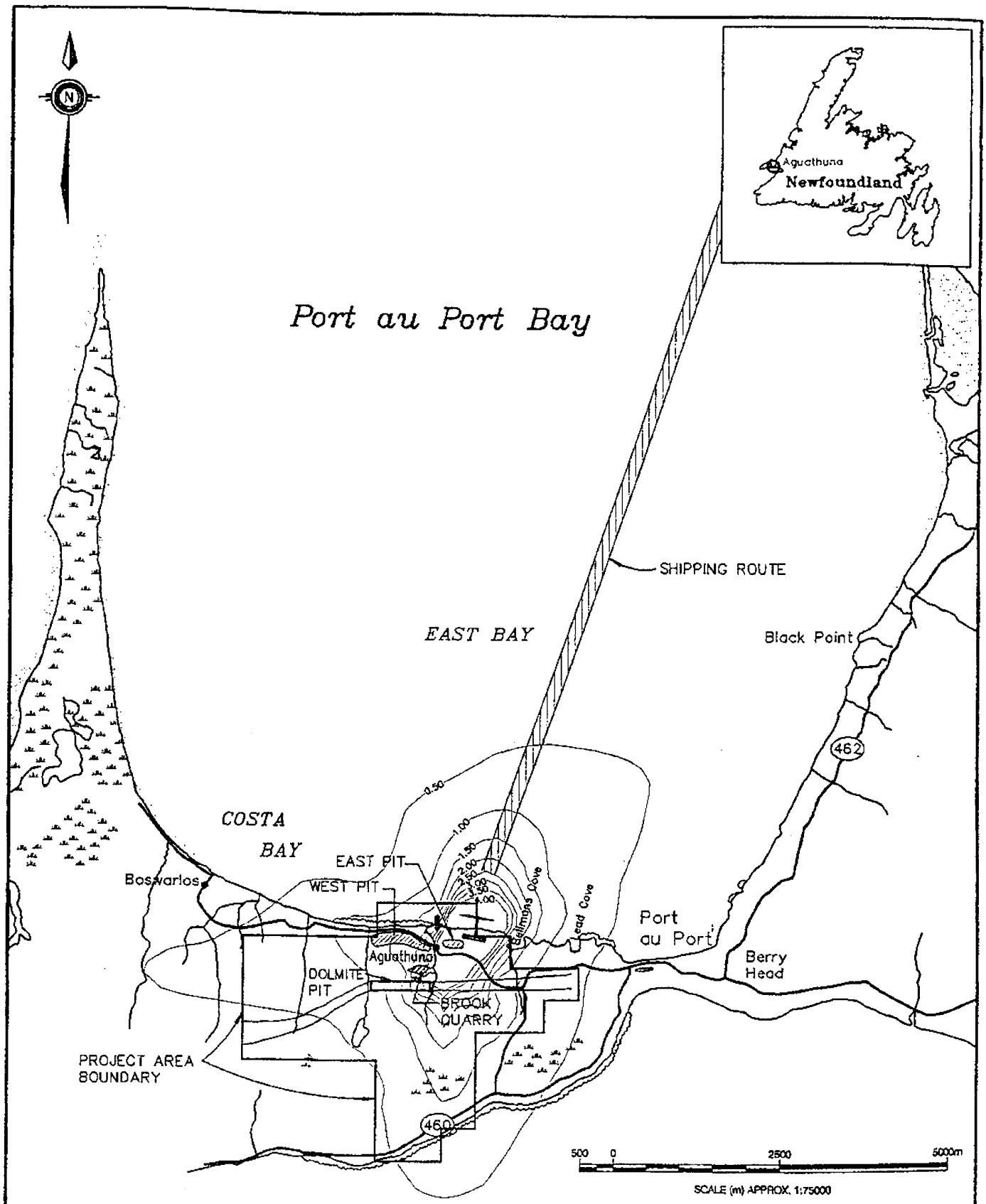
1 - NF Reg 957/96, Air pollution Control Regulations, Schedule A, Criteria for Acceptable Air Quality.
2 - *Canadian Environmental Protection Act*, Subsection 8(1), National Air Quality Objectives, 1991
3 - The "maximum desirable level " has been suggested as the level at which a given area remains pristine for a given pollutant and is the long term goal for air quality.
4 - The "maximum acceptable level" is the level at which human health and the environment are considered to be adequately protected for a given pollutant.
5 - The "maximum tolerable level" denotes a level that requires abatement without delay to avoid further deterioration to air quality, and to protect the health of the general population.

Dust suppressants will be used whenever hourly dust emissions exceed 80 $\mu g/m^3$. This will include watering trucks and calcium chloride, as necessary.

11.3 Methods Used to Predict Effects

11.3.1 The Dispersion Model

The following Dust Dispersion Model will be referred throughout the impacts and mitigation sections of this report. The Industrial Source Complex (ISC) dispersion models were developed by the US EPA to predict the potential effect of emissions on ambient air quality due to a given source or set of sources. The most recent edition, ISC version 3 (or ISC3), is an update of the previous ISC2. The updated version has new algorithms for area sources and dry deposition of particulate matter. The ISC3 model is a steady-state Gaussian plume model which can be used to assess pollutant concentrations from several different types of sources associated with an industrial source complex, hence its name. ISC3 can be run in both short and long-term modes. The US EPA recommends the



AGUATHUNA QUARRY
AIR QUALITY MODELLING

Scale :	Figure :
As Shown	11.1
Date: Aug 31/98	Dwn. By: EB

NOTE:
CONTOURS REPRESENT PREDICTED "WORST CASE" 24 HOUR MAXIMUM PARTICULATE CONCENTRATION ($\mu g/m3$).

use of ISC3 for industrial source complexes with rural or urban areas, flat or rolling terrain, a transport distance less than 50 km, 1 hour to annual averaging times, and sources with continuous pollutant emissions. The NF DOE has supported the use of ISC3 for this type of modelling work in the past.

11.3.2 Characterization of the Source

The data required to run the ISC model for each emission source includes the following parameters: physical location of the emission point, emission rate, physical stack or vent height, exhaust gas exit velocity, stack or vent inside diameter, and exhaust gas temperature at the exit. Optional inputs include source elevation, building heights and widths, particle sizes with settling data, and surface reflection coefficients. The sources, described in more detail below, were modelled in accordance with the US EPA Guidance document on dispersion modelling for industrial sources.

The US EPA ISC3 model was used to predict the ambient concentrations of particulate matter arising from four different sources:

1. the Quarry;
2. the Plant and Storage area;
3. the Haul Road between the Quarry and the Plant; and
4. the Ship Load Out.

The sources at the Quarry included wet drilling, primary crushing, secondary crushing, screening, conveyor transfers, and truck loading. The Quarry was modelled as an area source with an initial area of 200 m by 150 m. This area reflects the maximum area of the quarry face which will be exposed, at any point in time, during the operation of the facility. This is a very conservative estimate and thus represents the worst case scenario for a 24 hour period.

The sources at the Plant and Storage Area included process (equipment including tertiary crusher, fines crusher, conveyor transfers, fines screening, screening, truck loading and unloading) and aggregate storage of all aggregate including surge storage pile. The Plant and Storage area was modelled as an area source with area of 334 m by 58 m. Although the actual area of the plant and storage area is 240 m by 37 m, a larger area was used for modelling to ensure a conservative estimate of dust emissions was achieved.

Emissions generated by truck traffic on the Haul Road were calculated by modelling the source as a rectangular area source, 1,000 m long by 10 m wide. The traffic data were for 10-wheel transport trucks at 40 trips/hour, 10 hours/day, 1,000 m per trip between the Quarry and the Plant Storage area.

Sources for the Ship Load Out included truck unload, conveyor transfers, and conveyor - controlled. This source was modelled as a volume source with a height of 4 m. The source emission assumptions are summarized in Table 11.2.

Table 11.2 Summary of Source Emissions			
Source	**Model**	**Dimensions (m)**	**Emissions (g/s)**
Quarry	Area source	150 x 200	0.23
Plant and Storage Area	Area source	334 x 58	2.86
Haul Road	Area source	1,000 x 10	55.65
Ship Load Out	Volume source	274 x 1 x 2	0.05

In all cases, the emission factors obtained from the US EPA *Compilation of Air Pollutant Emission Factors, Chapters 11 and 13*, were applied for 10-hour days, 7 days per week, 52 weeks of the year.

11.3.3 The Area Surrounding the Source

The Aguathuna Quarry Development is located on the southwestern coast of Newfoundland, just west of Port Au Port. Ambient pollutant concentrations are predicted at several locations downwind of the sources at the Quarry. For the purposes of modelling, a receptor grid was set up at 11 radial locations for every 22.5 degree increment around the compass i.e. 16 wind directions. The downwind distances were (in metres)100, 200, 400, 600, 800, 1000, 2000, 3000, 4000, 5000. Therefore exactly 176 receptors were used in all modelling runs. The ground elevations were assumed to be 0, from the reference datum, i.e. flat terrain was assumed. Straight-line plume transport is assumed to occur between the source and all downwind receptors.

11.3.4 Meteorology of the Area

The short term model in the ISC model set, referred to as ISCST3, was used to predict downwind pollutant concentrations for the point, volume and area sources. The ISCST3 model requires surface weather data from a pre-processor code which provides data on an hourly basis with each record containing the year, month, day, hour, wind direction, wind speed, ambient temperature, stability class, and mixing height. These data were provided by Atmospheric Environment Service and pre-processed by JWEL to produce a meteorological input data file to be used for the modelling work.

The ISC-ready meteorological data set from Argentia, NF, consisting of data for two full years (1993 and 1994), was used to predict the downwind ambient concentrations of particulate matter. Related analyses were carried out by Jacques Whitford Environment Ltd. on behalf of the RA. Follow-up evaluations by that company resulted in assurances by their meteorological experts that a two year data set was appropriate for the assessment of a relatively small non-toxic source of heavy particles at a site of this type. Model verification will be carried out during the operation phase.

While there are some differences, especially with maximum wind speeds, the measured weather data from Argentia were assumed to be reasonably representative of the conditions at the Aguathuna site. Comparisons of the climatology of the Argentia and Stephenville areas, specifically the mixing heights, wind speeds, and ventilation coefficients, show reasonable agreement. In addition, dust emissions will be generated by low level dispersal, making the climatology data from the Argentia area, when compared with conditions at Aguathuna, compatible.

Stephenville and Port au Port Peninsula average 106 mm of precipitation per month, with rainfall accounting for approximately 940mm and snowfall contributing 411mm, for a total annual precipitation figure of 1272.1 mm. The wind averages 18 km/hr throughout the year, and is prevalently blowing in the westerly direction. As a result of high precipitation and average wind speeds in the Project area, little wind induced particulate matter is likely to be found in the air. This will be verified by off-site monitoring during the operation phase.

For modelling purposes, a constant uniform horizontal wind is assumed for each hour and vertical wind speeds are assumed to be zero. The atmospheric stability classes were computed from the weather data and categorized into the six standard classes according to wind speed and solar insolation.

11.3.5 Data Generation and Handling

After running the program ISCST3 with the appropriate input files, an output file was generated according to specific instructions on the required format. The first highest or maximum concentrations were calculated at each receptor for the complete time period spanned by the meteorological input file (two full years). This output data file containing the predicted concentrations was then used with a plotting routine to develop the contours of equal concentrations of the maximums on the receptor grid. These are presented as maximums of the 24 -hour daily averages.

11.3.6Dispersion Modelling Predictions

The dispersion modelling results for emissions from the four sources operating simultaneously are presented in Figure 11.1 for the maximums of the daily averages. The figure provides a spatial reference to the sources at the Quarry and the predicted concentration contours over an area within a 5 km radius of the Development. The regulated limits or guidelines, where applicable, are also provided for comparison.

In this type of modelling study, the background pollutant concentrations, generally considered to be the annual average of data collected over the most recent 5 years, are usually added to the maximum concentration for comparison with the regulated standard. Since the facility is located in a largely rural area, and since the available monitoring data are very limited, and since the objective is

specifically to address emissions from the Quarry, the background concentrations were not added to modelled values in this work.

The contours shown in Figure 11.1 illustrate the influence of the Haul Road on the results. In all cases, the predicted concentrations were well below the regulatory limit of 120 $\mu g/m^3$ for the 24-hour average. This is mainly due to the incorporation of the changing emission factors at different times of the day, i.e. essentially zero emissions between 6 pm and 8 am.

Model predictions were also made for 1 hour maximum worst case concentrations. Worst case outputs were based upon no mitigation whatsoever being employed for any of the four sources of emissions (Quarry, plant and storage area, truck traffic and ship load out). Outputs ranged from 1200 $\mu g/m^3$ near the haul road to approximately 100 $\mu g/m^3$ 2 km off site. Unmitigated emissions near the haul road and elsewhere close-to-source exceed those significance criteria previously offered.

Expert opinion (Jacques Whitford Environmental Limited) indicated that it is reasonable to expect reductions of air born particulates of over 90 % using standard and industry-wide accepted mitigation measures as follows:

- Conveyor belt hoods;
- storage pile wind breaks;
- use of dust suppressants on roads (e.g water, calcium chloride and/or citrus-based mixtures);
- truck and equipment speed limits;
- truck covers for fine grained product;
- stabilization of high traffic areas;
- regular haul-road maintenance; and
- wet spraying at point source emissions.

It should be noted that the haul road source comprised over 70% of total emission output. Haul roads are not only the easiest to mitigate effectively, but will only be heavily used during the early operational stages, pending hooded conveyor belt construction. Thereafter, haul road emissions are expected to be substantively decreased.

It is reasonable to assume mitigation efficacy of over 90% (Mike Murphy, pers. Comm., Jacques Whitford Environment Ltd.) Accordingly, air particulate concentrations are not predicted to exceed the 1 hour provincial maximum acceptable limit of 80 $\mu g/m^3$. Accordingly, related residual effects are predicted to be non-significant.

Not withstanding the above, the EPP will include an air monitoring protocol designed to delineate areas which exceed the provincial maximum acceptable 1 hour criteria of $\mu g/m^3$ (Table 11.1). Areas identified as a result will require mask protection for workers and/or the employment of appropriate mitigation measures (above) suitable to reduce emissions to acceptable levels.

11.4 Summary of Potential Interactions, Predicted Effects

Table 11.3 Summary Table for Air Quality Aspects - Potential Interactions, Predicted Effects

Predicted Effects	Construction	Operation	Decommissioning	Accidental Events
Geographical Extent	1	1	1	1
Duration of Interaction	2	2	2	1
Frequency of Occurrence	2	4	1	1
Level of Confidence	3	3	3	3
Cumulative Effects Significance	N	N	N	S
Residual Effects Significance	N	N	N	N

KEY

Geographical Extent:
1 = <1 km^2
2 = 1-10 km^2
3 = 11-100 km^2
4 = 101-1000 km^2
5 = 1001-10,000 km^2
6 = >10,000 km^2

Duration of Interaction:
1 = <1 month
2 = 1-12 months
3 = 13-36 months
4 = 37-72 months
5 = >72 months

Frequency of Occurrence:
1 = <10 events/year
2 = 11-50 events/year
3 = 51-100 events/year
4 = 101-200 events/year
5 = >200 events/year
6 = continuous

Level of Confidence:
1 = low
2 = moderate
3 = high

Residual and Cumulative Effects Significance:
S = Significant
N = Not significant
NA = Not applicable

11.5 Mitigation Measures

- air quality monitoring program will be established;
- dust control, watering or other approved dust suppressants, will be implemented, and detailed in the EPP; and
- in consultation with the Province and Environment Canada, Health and Safety requirements (e.g. filter mask requirements) will be identified and included in the EPP.
- dust control, when needed, can be achieved by application of water spray or other approved dust suppressants on the areas in which construction equipment is operating.
- masks must be worn in areas exceeding 1-hr. maximum limits of 80 $\mu g/m^3$. Dust suppressants will be used on haul roads; truck speed limits will be imposed; regular haul out road maintenance will be carried out; wet spraying at point source emissions will be used as a contingency, based upon monitoring results. Conveyors and trucks hauling product must be covered to prevent fugutive dust from being released.

11.6 Residual Environmental Effects Prediction

In summary, there are no significant residual ambient air quality effects related to construction and/or operation.

The residual environmental effects assessment summary matrix for the Air Quality Resources VEC is presented in Table 11.4.

Table 11.4 Summary of Bio-physical and Socioeconomic Effects Related to the Construction, Operation and Decommissioning

Valued Ecosystem Component (VEC)	Project Activity Causing Effect	Specific VEC Component	Description of Effect	Mitigation Measure and/or EPP Operation Procedures	Residual Environmental Effect
Air Quality	Construction phase (clearing of plant site, and clearing and grubbing of dolomite pit)	n/a	Minor 'annoyance' levels of dust.	Dust control, when needed, can be achieved by application of water spray or other approved dust suppressants on the areas in which construction equipment is operating.	⊙
	Generation of dust by operation of dolomite quarry, processing (blasting, crushing, loading and unloading), and transportation to stockpiles and ship load out.	n/a	Generation of dust causing the potential for breathing and health problems associated with the ingestion of poor quality air.	See above. Dust from operations will be mainly confined to the plant, storage and quarry areas, and are not predicted to significantly impact the surrounding vegetated buffer zones. Masks must be worn in areas exceeding 1-hr. maximum limits of 80 $\mu g/m^3$. Dust suppressants will be used on haul roads; truck speed limits will be imposed; regular haul out road maintenance will be carried out; wet spraying at point source emissions will be used as a contingency, based upon monitoring results. Conveyors and trucks hauling product must be covered to prevent fugutive dust from being released.	⊙

Legend: ⊖ Negative Significant Effects ⊕ Positive Significant Effects ⊙ Non-significant Effects

12.0 ADDITIONAL CONSIDERATIONS

12.1 Rational

The CSR does not identify any significant negative socioeconomic effects from the project directly attributable to environmental effects. Not withstanding this, it is important for the document to include a very brief description of related socioeconomic considerations in the interests of providing the reader with an appropriate context within which to consider the documents' contents.

12.2 Existing Conditions and Knowledge

Several small communities are located within 8 km of the Project site; Boswarlos to the west, Bellman's Cove (also known as Butler's Beach) and Port au Port West to the east, and Felix Cove to the south (see figure 1.3). The township of Port au Port West, extends to include the communities of Bellman's Cove, Aguathuna, and Felix Cove. There are an estimated 530 people within the township of Port au Port West, and 100 people more specifically within the community of Aguathuna, which also includes Bellman's Cove. The town of Boswarlos edges the western side of the quarry development and extends approximately 3.5 west along Coast Bay. There are approximately 100 residences in this community.

Services to the site include a fire department within 4 km, and a post office within 2 km of the site. The area is patrolled by RCMP, and has access to a full range of medical, social and financial services located in Stephenville (approximately 15 km east).

Local fishing activities in Costa Bay include(primarily) lobster, scallop and herring ,with good indications for potential aquaculture in the future. Forestry, and pulp and paper industries also contribute to the local economy. The area further benefits from quarry and mining experience gained over the course of previous operations at the Aguathuna quarry. Area residents also commute to Stephenville to take advantage of employment opportunities there.

12.3 Cumulative Socio-Economic Effects

Cumulative effects involving Project activities and past, present, and planned future projects were considered in this assessment. ***No cumulative effects having the potential to significantly negatively affect socioeconomics in the area were identified.*** The establishment of two additional, unrelated projects have been announced for this area, involving a Barite pit, and an on-shore oil well drilling exploration. Potential(insignificant) negative cumulative effects on the socio-economics of the region include increases in traffic and related safety concerns. Potential positive effects relate to increased employment and associated spinoffs.

Local traffic, especially that of heavy machinery, will be increased within the immediate vicinity of the site, further contributing to traffic safety concerns related to the Project. These additional projects also increase the probability of health and safety concerns related to accidents, fuel spills, and dust and noise production. However, standard construction and operation practices for all of these projects will likely minimize the potential for any significant adverse cumulative effects. Issues related to traffic and health and safety are further discussed below.

Positive cumulative effects are anticipated with respect to increased local employment opportunities. In addition to the development of new jobs, economic benefits will be generated for the local area through the direct, indirect and induced expenditures on goods and services.

12.4 Effects of Construction and Operation

During the construction and operational phases, the project is expected to provide 25 full time jobs in the local area, 24 of which will be held by local residents, for a period of not-less-than-20 years. Port au Port residents recognize this benefit as a significance contribution to their community, which exists in an area traditionally characterized by high unemployment rates. While no figures are available from the proponent, per capita wages for workers were estimated to be $30 K per annum. Using a multiplier of 2.5, the Project may be expected to generate in the order of $1.8 million dollars per year to the local economy. Due to the local labour supply, the Project is not expected to generate additional stress on housing and services, which otherwise would be expected with an immigrant labour force.

Potential social concerns related to health include dust ,noise and accidents. Generally, dust is an irritant which may aggravate certain respiratory conditions in susceptible individuals. Noise, at certain levels, can be both a nuisance and health hazard. ***Due to the remoteness of the quarry, off-site noise is not expected to generate adverse effects on surrounding communities.*** However, the generation of dust and noise could potentially pose a nuisance factor in relation to recreational use of the surrounding lands immediately adjacent to the site. As previously discussed, standard practices including proper blasting techniques, water spraying at dust emission points, enclosures around discharge points, transfer points and processing equipment, and dampening of roadways and stockpiles will help minimize any potential adverse effect in this regard. Furthermore, the high precipitation levels in the area will contribute positively to minimize dust production.

On-site, dust masks will be required where dust levels routinely exceed 120 $\mu g/m^3$ cubic meter, 24 hour average. Similarly, hearing protection will be required where noise levels exceed 65 db on average, or, during blasting. The proponent is committed to meeting or exceeding all applicable health and safety guidelines, policies, regulations and legislative requirements in this regards.

As previously mentioned, a further potential effect of the Project relating to safety concerns is that of increased traffic of large machinery in the surrounding areas. ***All vehicle operators will be required to possess the appropriate licences with respect to operating oversized vehicles and will follow driving***

rules and regulations. Appropriate signs will also be posted on main roads, access roads and at road crossings. As such, predicted effects are not expected to be significant.

Predicted effects with respect to existing land use are not expected to be significant. Recreational and commercial land use of the immediate Project area is minimal to non-existent . Since the Project entails the re-opening of a pre-existing open-pit quarry, significant changes to land use patterns at the Project site are not anticipated.

The aesthetics of the quarry were examined as a potential concern to local residents. The quarry will not be visible from the highway or the residential communities of the area, and the plant located on the floor of the East Quarry area will be buffered by the faces of the old quarry. The marine and loading facility will, however, be visible to the local residents. Based upon consultations with local residents and professional judgement, the aesthetics of the site are not predicted to suffer potentially significant adverse effects.

No heritage or cultural sites have been identified within the Project area. There are no aboriginal land claims or traditional hunting, gathering or burial grounds on site associated with the site(Conne River Band Council, Pers. Comm).

12.5 Effects of Decommissioning

The greatest socioeconomic impact related to the decommissioning of the Project will be the loss of employment. Decommissioning will result in lay-off of all 25 employees. Appropriate re-training programs may be provided to employees. Additionally, workers may be able to employ acquired skills on other (similar) ***projects. Similarly, residents will be able to participate in the development of decommissioning plans, including plans associated with the marine terminal, recreational and/or educational use of the site, fish habitat creation and enhancement opportunities, etc.,all of which have the potential for job creation.***

Re-training programs and/or lateral movement of affected employees will serve to partially mitigate the adverse economic effects of decommissioning. Notwithstanding this, the proponent and the RA view 20 years employment for 25 individuals as having a significant potential for the generation of spin-off trades in addition to quarry-related skills acquisition. While no formal cost-benefit analysis has been carried out in this regard(nor is one required pursuant to the CEAA), it seems obvious that the social and economic benefits from the project will far outweigh any negative effects in this regard.

13.0 CUMULATIVE EFFECTS

Cumulative effects assessment considerations differ from those associated with standard environmental assessment in that spatial and temporal boundaries are expanded well beyond the footprint of a given project. ***For the Aguathuna Quarries Development project, it was determined that spatial boundaries would include the entire Port au Port Peninsula and the entire marine area covered by East Bay, West Bay and Port au Port Bay.***

Temporal boundaries were likewise expanded to include past developments in this area and reasonably foreseeable future developments.

The overall approach was then to identify the potential environmental effects of the project, identify other projects in the area which have the potential to contribute incrementally to these effects, and, to analyse the need for special mitigation measures in relation to additional project / environment interactions.

13.1 Effects of the Project

Sections 8.0 through 11.0 summarize the predicted residual environmental effects of the project on the environment. Impact categories include: sedimentation of freshwater and marine environments from mitigation malfunctions, surface water runoff, fugitive and wind blown dust emissions and accidental spills of fines during ship loading; residual habitat effects in the coastal zone from marine terminal construction; minor fuel spills and leaks (freshwater, terrestrial, marine); potential nutrification of surface waters by blasting residues; impacts on air quality from fugitive dust emissions; site-specific impacts on terrestrial wildlife habitat and vegetative cover; potential structural damage to adjacent structures during blasting; noise pollution; vehicular traffic; health and safety, ships' traffic and forest fires.

13.2 Potentially Interacting Past, Present and Future Activities

13.2.1 Past Activities

As previously noted, the development site was operated as a quarry from 1913 to 1964. As such, the project area was extensively impacted over this time period, and evidence of this remains at the present time. In particular, freshwater environs remain extensively altered and comprise non-viable to (potentially) moderately productive fish habitat. No potable surface water currently exists. Damage to forest cover and other vegetation, while recovering, remains clearly evident as well.

Coastal zone impacts are not clearly evident in part owing to a lack of reasonable pre-impact baseline data to serve as a basis for comparison. Notwithstanding this, it is the opinion of the study team that the intertidal and sub-tidal coastal zone at the site has recovered to approximate baseline conditions.

All of these impact conditions are currently restricted to the footprint of the previous project area. No evidence was found to suggest that project-related impacts encompassed an appreciably greater zone-of-influence at any time.

No evidence exists in the Port au Port Peninsula or Port au Port Bay area to suggest that other activities occurred which contributed incrementally to any impact categories previously listed, either on-or-off site. Similarly, no evidence suggests that project-related activities contributed in any significant way to alterations in marine or terrestrial resources within the established cumulative effects study boundaries either in-and-of-themselves, or in concert with other influences.

13.2.2 Present Day Activities

No current activities were identified within the Cumulative Effects study boundaries which will potentially contribute to residual environmental impact significance, excepting that of vehicular traffic and road construction associated with Pan-Canadian land-based exploratory drilling for hydrocarbons at the tip of Shoal Point, a slender land mass bisecting East Bay and West Bay. The proposal was assessed by the province of Newfoundland and Labrador - Department of Environment and Labour, and subsequently released after an initial screening of the registration document.

Road Construction

The exploratory drilling project includes the construction of eight kilometres of new access road from Boswarlos to the drill site. It is reasonable to expect some sediment runoff as a result. However, the road has already been constructed and will be stabilized prior to the onset of quarry-related activities. It is unlikely combined sediment releases from the respective activities will interact in any significant way.

In particular, the drilling project was subject to an EA review by provincial authorities. As a result, adherence to mitigation requirements in combination with permitting conditions should maintain associated residual impacts at a very low (i.e. nonsignificant) level.

Similarity, stringent mitigation and permitting requirements associated with the Aguathuna Quarry Development renders the likelihood that any cumulative effects from the sediment releases vis a vis interaction with the drilling project to be almost zero.

No cumulative effects from the respective projects related to sedimentation of water courses and/or marine waters are predicted.

Vehicular Traffic

The drilling project will make some contribution to local traffic related to equipment and crew transport. However, the bulk of equipment transfer is completed and crew transport will only contribute in a minor fashion. No significant cumulative effects on highway safety are predicted over the course of the operational phase of the drilling program.

Equipment transport during the decommissioning phase of the drilling program may increase the likelihood that vehicular safety in the Port au Port area may be compromised. This assumes that the construction phase of the quarry operation will have begun by that time.

The proponent will be required to liaise with the drilling contractor to ascertain what the most likely peak period of equipment transport and crew transport will be. Consultations must then be held with the Provincial Department of Government Services (Highways Division) to determine suitable signage and speed limit restrictions.

No significant cumulative effects related to vehicular traffic in relation to the two projects are predicted.

13.2.3 Future Projects

The only foreseeable project which could occur and may interact with the quarry proposal would be that related to a significant oil or gas find at the Shoal Point site. Should this be the case, any future project at the (Shoal Point) site could include pipelines, a marine terminal, production wells, etc.

The only way to view such a development at this point in time, and within the context of cumulative effects assessment, would be qualitatively and generically.

The two projects could potentially interact with regard to shipping (should tankers be involved), vehicular traffic, impacts on freshwater resources and impacts on terrestrial resources. At this time,

however, it is not possible to conduct an assessment of potential cumulative effects in the absence of a reasonable likelihood of such a project occurring in any sort of meaningful way.

It is, however, reasonable to assume that a project involving a production facility, along with attendant infrastructure, can be implemented with sufficient mitigation to greatly reduce the likelihood that significant interactions between the project and the quarry development will occur. More importantly, it is also reasonable to conclude that the two projects could co-exist within the cumulative effects assessment boundaries without significantly impacting biological resources and/or habitat in any significant way.

No significant cumulative effects are predicted for the quarry development and any other foreseeable future development, in concert with or independent of respective activities.

14.0 IMPLEMENTATION OF MITIGATION MEASURES AND FOLLOW UP

14.1 Implementation of Mitigation Measures

Pursuant to Section 20(2) of the CEAA, ACOA, as the RA, will ensure that all necessary mitigation measures will be implemented. In this regard, the RA commits to requiring, as a condition of funding, the development of Environmental Protection Plans for the construction, operation and decommissioning of the project. In these plans, mitigation generally discussed in the CSR will be detailed for all potentially impacting project components and activities. An EPP for the construction phase must be submitted for approval to ACOA, expert departments (i.e. Department of Fisheries and Oceans; Environment Canada) and the Province prior to construction start-up. Appendix B provides outlines of a Management Plan, EPP and Health and Safety Plan.

Similarly, an operational phase EPP will be submitted for approval prior to operational start-up.

A decommissioning plan and attendant EPP must be submitted for approval one year prior to decommissioning,

Mitigation measures outlined by the CSR are all technologically and economically feasible. Mitigation measures required to prevent impacts on the environment for operations of this nature are well understood and relatively non-complex. No lack of required expertise, equipment or materials is anticipated.

14.2 FOLLOW UP

Aguathuna Quarries Ltd. has committed to meeting or exceeding all legislative and regulatory requirements for the project. Included as part-and-parcel of these requirements are the Follow Up provisions of CEAA, as described by section 38 of CEAA. ***In particular, the CEAA requires that Environmental Assessment predictions be verified and that required mitigation is in fact put in place. As such, ACOA, as the RA, is committed to ensuring that a detailed follow-up program is prepared and acted upon. In this regard, ACOA will consult with expert departments concerning the development and implementation of the program. Part and Parcel of that program will be a clear outline of accountability within the proponent company related to corrective measures, should they be required.***

For the Aguathuna Quarry Development, effects have been predicted to be insignificant with mitigation. It is acknowledged, however, that in order for the project to be successfully carried out with minimal harm to the existing environment, mitigation will be required. In this regard, the follow up program will include (but not be limited to) those components presented below:

- Monitoring suspended solids in freshwater and coastal zone environs during the construction phase; ensure compliance with Section 36 of the Fisheries Act, CCME Water Quality Guidelines (1987) and CCME Interim Marine and Estuarine Water Quality Guidelines for General Variables (1996). Sampling will occur for all potentially affected watercourses prior to project start-up to determine baseline levels. Thereafter, sampling will occur twice weekly at baseline collection points. During the periods of visible suspended solids, samples will be collected and tested daily. Discharge from the settling pond to be sampled daily.
- Monitoring suspended solids in freshwater and coastal zone environs during the operational phase (bi-weekly except during heavy precipitation events -daily);
- Pre-established criteria for water quality monitoring, including the frequency and location of sampling and contingency plans in case criteria are exceeded, will be outlined in the EPP.
- Monitoring zone-of-influence air quality during the operational phase, and implementation of dust controls as necessary, (i.e. in excess of 80 ug/m^3);
- A dive survey of existing habitat has been carried out, and is provided in Appendix D. Following infill emplacement, a second underwater survey will be conducted either by SCUBA or ROV, to determine habitat characteristics within 50 meters of the footprint of the dock. Periodic surveys will be carried out to monitor effects of shiploading on bottom marine habitat (e.g. every three years.);
- Periodic site inspections by ACOA and/or its' representatives to verify mitigation efficacy;
- Conducting pre-blast baseline surveys on all potentially affected poured concrete structures, and post blast surveys on same;

- Follow-up inspections to ensure mitigation predictions;
- Air quality monitoring surveys will occur throughout the construction and operational phases of the Quarry Development. Dust and noise sampling will take place in the immediate working vicinity and at intervals up to 1 km away from the dust and noise generating activities. Monitoring will occur on a regular basis (i.e. biweekly during the first year, and as dictated by weather and intensity of activities after that period).
- Predictions regarding rare and endangered species on and surrounding the project site, will be confirmed as part-and-parcel of the EPP. Prior to the initiation of construction and quarrying phases, a qualified botanist will survey the site to confirm there are no rare or endangered plant species present. Further, an inventory of migratory and nesting birds on the site, and an supplemental survey of Goose Pond for freshwater fish species will be conducted prior to the construction phase.
- A Health and Safety Plan must be developed to ensure worker safety. It will include standard operating practices for the handling of site machinery, safety requirements and instructions for medical emergencies. Employees will also be required to take appropriate safety training courses;
- CEAA requires that follow up monitoring be conducted for potential negative effects on the environment. By extension, this includes any negative socio-economic effects associated with them. No adverse socio-economic effects have been identified for the project.
- Weekly environmental reporting will be conducted in order to confirm EPP provisions, report accidents and/or malfunctions and verify mitigation efficacy. Reports will be retained by the proponent, and copied to ACOA, DFO, Environment Canada and provincial DOE.
- Other follow-up provisions may be applied as the development progresses through its' phases.

15.0 CONCLUSIONS AND RECOMMENDATIONS

The assessment considered the potential residual environmental effects, including cumulative effects, of the site development and possible accidental events. The assessment focussed on four Valued Environmental Components, which were selected on the basis of an issues scoping exercise, consultation with local area residents and fishers, regulators, and the professional judgement of the study team. These VECs include:

- ***Marine Habitat and Fish;***
- ***Freshwater Resources;***
- ***Terrestrial Resources; and,***
- ***Air Quality***

The assessment considered measures that are technically and economically feasible that would mitigate potentially significant effects of the Project. The potential adverse residual environmental effects are evaluated against criteria and the significance determined according to rating definitions established for each VEC. Cumulative effects considered include temporal and spatial overlap of effects, and synergistic or additive effects between Project activities and with other past, present and planned future Projects.

Based on the proposed mitigation, the scope of the work proposed, the conditions at the site, and existing knowledge of environmental conditions of Project-environment interactions, the assessment concludes that, overall, the Aguathuna Quarry development would not result in any significant adverse residual environmental effects, including cumulative effects.

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17.0 PERSONAL COMMUNICATIONS

Alvin Pitcher, Pitcher Consulting and (past) DFO Area Habitat Coordinator, Pasadena, Newfoundland.

Andrew Harvey, Fisherman and President of local Fishermen's Association, Port au Port Peninsula, Newfoundland.

Annette Hodinotte, DFO, St. John's, Newfoundland.

Atlantic Canada Opportunities Agency, St. John's, Newfoundland.

Barry Jeffrey, Environment Canada, Halifax, Nova Scotia

Conne River Band Council, Newfoundland

Catherine Badke, CEA Agency, Hull, Quebec.

Dan McCann, Town Manager, Port au Port West, Newfoundland

Don Ball, Fisheries and Oceans Canada, Corner Brook, Newfoundland

Jose Boves, Aguathuna Quarries, Port au Port Peninsula, Newfoundland.

Kevin Power, Environment Canada, St. John's, Newfoundland.

Mike Murray, Jacques Whitford Environment Ltd, Fredericton, New Brunswick.

Paul Amarandos, Senior Geotechnical Engineer, Public Works and Government Services Canada, Halifax, Nova Scotia.

Robert Lambert, Sub-district Supervisor, Department of Fisheries and Oceans, Stephenville, Newfoundland.

Stephen Gerriets, Data Manager, Atlantic Canada Conservation Data Centre, Sackville, New Brunswick.

APPENDIX A

PORT AU PORT WAVE CLIMATE MODELLING

W. F. Baird & Associates
Coastal Engineers Ltd.
1145 Hunt Club Road, Suite
Ottawa, Ontario, K1V 0Y3
Telephone 613 731-8900
Fax 613 731-9778

July 10, 1998

Bill Donald
CDA Engineering Ltd.
103 Colonial Court
Burlington, Ontario L7L 5K8

Baird

Dear Bill:

Re: Port au Port Wave Climate Modeling

We have now completed our numerical modeling of wave generation and propagation within Port au Port Bay. In general, the results of this modeling exercise indicate that the wave climate at the site is dominated by waves generated locally within Port au Port Bay. Waves generated in the Gulf of St. Lawrence are significantly attenuated by refraction, diffraction and breaking as they propagate into the Bay. Considering the combination of these two processes, we recommend that a design wave height in the order of Hs = 3.25 to 3.75 m be considered for your project (return period in the order of 20 to 100 years). The wave period associated with this condition would be in the order of Tp = 7 to 9 s. However, note that the maximum wave height could be up to double the significant wave height, and that wave energy could be present at much longer wave periods (13 s or greater) due to the contribution of longer waves generated on the Gulf. The following paragraphs provide a more detailed discussion of the numerical modeling and its results.

The model simulations were undertaken using the Nearshore Spectral Wave (NSW) module of MIKE21 (a state of the art hydrodynamic and wave model developed by DHI in Denmark). Simulations were undertaken for NNW, North and NNE wave directions, with offshore wave heights and peak wave periods (at the entrance to Port au Port Bay) ranging from Hso/Tp =2 m/6s to 7 m/13 s and wind speeds ranging from U = 0 to 110 kph. A water level of +2 m CD was assumed in all of the simulations. In general, the most severe wave conditions at the site of the proposed facility were associated with the North wind/wave direction.

With respect to wave generation within the Bay, the MIKE21 NSW model gives lower wave conditions than our parametric hindcast model. We have contacted DHI to discuss

this discrepancy, but do not have their response at this time. Our hindcast model, which was described in my April 3, 1998 letter, has been calibrated and verified at many locations throughout the Gulf and Great Lakes regions. As such, at this time, we recommend that our hindcast model results be used to estimate the extreme wave conditions generated locally within the Bay. These results (refer to my letter of April 3, 1998) give extreme wave heights at the site in the order of Hs = 3.1 to 3.6 m (20 and 100 year events respectively), with wave periods in the order of Tp = 7 to 9 s.

With respect to wave propagation from the Gulf into the Bay, the MIKE21 NSW results indicate that significant attenuation occurs as the waves interact with the islands and shoals at the entrance to the Bay (due to refraction, diffraction and breaking), and subsequently as they spread (diffract) into the Bay. The enclosed figure provides a sample output from the MIKE21 NSW program (wave height contours and wave amplitude/direction vectors) for a 4 m/8 s wave (Hs/Tp) propagating into the Bay from the North (note that local wind generation is not included in this example). For the range in wave conditions considered at the entrance to the Bay (up to Hs/Tp = 7 m/13 s), the maximum wave height obtained at the site was Hs = 1.0 m. We previously assumed a value of Hs = 3.5 m for this component of the wave climate at the site.

The design wave height associated with the combined occurrence of locally generated waves and waves propagating into the Bay from the Gulf has been estimated based on the concept of the "energy equivalent wave height" (square root of the sum of the squares of the two components). Assuming locally generated wave heights of Hs = 3.1 and 3.6 m (20 and 100 year return periods respectively) and attenuated Gulf waves with Hs = 1.0 m, this gives a combined design wave height of Hs = 3.25 to 3.75 m. The peak wave period associated with this wave height would be in the order of Tp = 7 to 9 s. However, it is important to note that both higher and longer waves would be present in the wave train (Hmax is up to double Hs, and attenuated Gulf waves may have Tp up to 13 s).

Baird

Note that we have forwarded you an invoice for $6,000 for this work under separate cover.

Thank you for providing us with the opportunity to undertake this work for you. We look forward to assisting you further as this project proceeds.

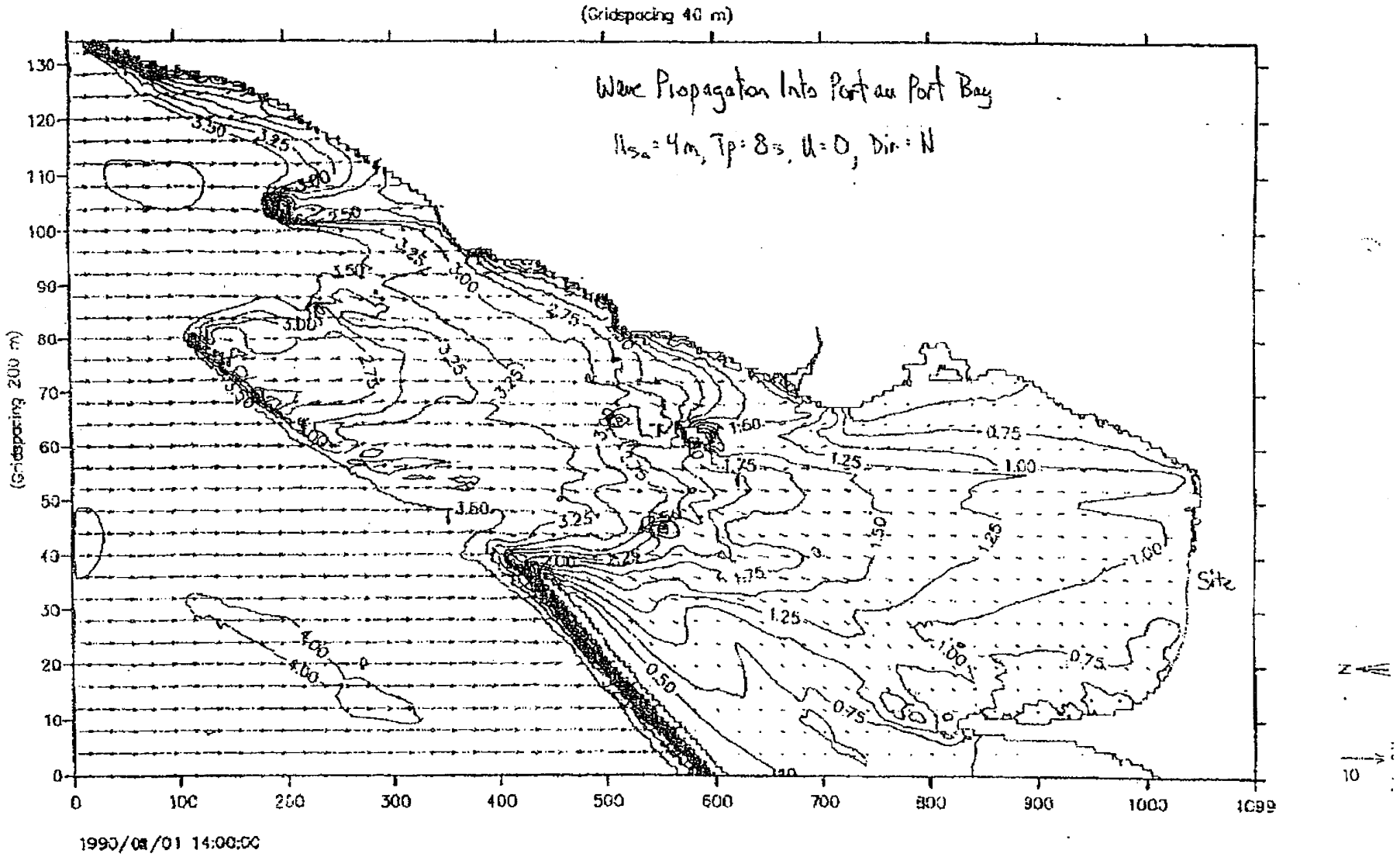
Yours truly,

W.F. Baird & Associates Coastal Engineers Ltd.

Dave Anglin, P.Eng.
Associate

enc: as stated

File No. 9175


(Gridspacing 40 m)
Wave Propagation Into Port au Port Bay
Hs = 4m, Tp = 8s, θ = 0, Dir. = N
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Site
1990/08/01 14:00:00

APPENDIX B

PROPOSED ENVIRONMENTAL MANAGEMENT PLAN OUTLINE WITH DETAILED SECTIONS ON THE ENVIRONMENTAL PROTECTION PLAN HEALTH AND SAFETY PLAN AND ENVIRONMENTAL EFFECTS MONITORING

- Quarrying and Aggregate Removal
- Blasting on Land
- Site Run-off, Containment and Treatment
- Buffer Zones
- Erosion Prevention
- Working in the Marine Environment
- Stream Crossings and Working Adjacent to Water Bodies
- Dust Control
- Dewatering - Work Areas
- Noise Control
- Storage, Handling and Transfer of Fuel and Other Hazardous Materials
- Sewage Disposal
- Solid Waste Disposal

1.4.3 Marine Facility Development Area

The marine facility will be composed of a rock fill section 40 m into the bay and a floating ice-class barge to act as a floating dock. The floating dock will support the shiploader and conveyer belt to load vessels. ***Specific environmental concerns and protection procedures associated with the development and operation of the facility will be discussed in this section.***

1.4.4 Contingency Plans

The objectives of the contingency plans are to minimize danger to persons, pollution to watercourses, area affected by the spill or fire, degree of disturbance to the area and watercourse during clean-up, and degree of disturbance to wildlife. Response plans will be developed for the following accidental and unplanned situations.

- Fuel and Hazardous Material Spills
- Run-off Containment Failure
- Wildlife Encounters
- Discovery of Historic Resources
- Forest Fires

1.4.5 Contact List

A contact list including the following organizations will be described.

- Mosher Limestone Limited/Mid-Atlantic Mineral Inc.
- Environment Canada
- Fisheries and Oceans Canada
- Canadian Coast Guard
- Transport Canada
- Newfoundland Department of Tourism, Culture and Recreation
- Newfoundland Department of Government Services and Lands
- Royal Canadian Mounted Police

1.5 Emergency Response and Contingency Plan

A description of the emergency response and contingency plans, as required, will be discussed including the purpose, content and implementation.

1.6 Health and Safety Plan

A description of the health and safety plan will be given, including a description of how the plan will be implemented and managed, and will include the following components:

- Introduction
- Safety Management
- Co-Ordination Processes

Scoping exercises during the environmental assessment have shown that an item of concern in the field of health and safety is the issue of respirable dust on the work site. While the Industrial Hygienist at the Newfoundland and Labrador Department of Environment stated that the limit for respirable dust is $3mg/m^3$ there are no clear guidelines for mandatory dust mask donning. Industry practices are to designate specific areas of chronic dust (such as a rock crushing area) as mask mandatary areas. The rule of thumb is that if you can constantly see dust in the air, then a mask should be worn. It is projected that pending the operation set up and run-up dusty areas will be designated mask mandatory areas as required to protect worker health.

Document Contents

1.6.1 Introduction

A general overview of the health and safety plan will be provided. Topics will include the following.

- Purpose
- Scope
- Policy
- Definitions
- References
- Project Health and Safety Organization
- Responsibilities for Health and Safety
- Implementation Process
- Distribution Amendment and Revision Process
- Regulatory Deliverables
- Safety Plans

1.6.2 Safety Management

A summary of Safety Management procedures will be provided. Topics will include the following.

- Safety Drivers
- Accidental Events
- Safety Assessment Program
- ALARP (keeping risks as low as reasonably possible)
- Safety Plan
- Working Environment Assessment
- Concept Working Environment Survey
- The Workplace Hazardous Materials Information System (WHMIS)
- Occupational Health and Safety
- Job Safety Analysis
- Occupational Health and Safety
- Emergency Procedures

1.6.3 Coordination Processes

Adequate processes and procedures covering all health and safety aspects of the project from design through to commissioning and operations will be developed. These procedures will specify the required levels of health and safety performance for all materials, products, services and activities and will include:

- Communications
- Incident Investigation
- Emergency Preparedness

1.6.4 References and Glossary

This section is to contain the list of references and standards required for setting the standards to be met.

1.7 Follow-Up Plan - Environmental Effects Monitoring

This project requires the construction of a processing and storage area on a previously disturbed area, construction of a marine loading facility, de-watering of a quarry pit, expansion of the quarry pit, construction of material transfer conveyer systems on site, operation of the quarry and marine loading facility and decommissioning of the site. The primary environmental concerns are for material entering water bodies, dust generation and for land based potential effects during blasting.

The EEM program will monitor specific project activities associated with specific phases of the project. Such programs normally involve the collection of repetitive measurements of environmental variables to detect, what, if any, changes are caused by external influences directly or indirectly attributable to the development. An EEM program is undertaken for the following primary objectives:

- To verify earlier effect predictions and evaluate the effectiveness of mitigation to lower uncertainty or risk;
- To provide an early warning of undesirable change in the environment.

At this time candidate monitoring programs are outlined in the following sections. Final EEM design will be carried out by the proponent in concert with the RA.

1.7.1 Construction

The EEM program during construction will focus on the quality of decant water, marine infilling, earthmoving and initial blasting . Candidate monitoring components may include the following.

- Monitoring water quality of decant water on old sedimentation ponds on proposed plant site and in the water pumped from the dolomite quarry pit;
- Measuring water quality in the marine environment during the infill program;
- Monitoring blast effects during initial pit opening.
- Suspended sediment sampling

1.7.2 Operation

The EEM program during operation will focus on the ongoing water quality of site run-off, containment structure decant, dust and blasting effects. Candidate monitoring components may include the following.

- Monitoring water quality of decant water from the process plant and storage area run-off containment structure and in the settling ponds for the water pumped from the dolomite quarry pit;
- Verify the modelling of the spatial and temporal extent of dust concentrations generated by processing and transportation of the quarried material ;
- If required, monitoring blast effects during pit operation.

1.7.3 Decommissioning

The EEM program during decommissioning will focus on the water quality of site run-off and the effectiveness of the site reclamation program. Candidate monitoring components may include the following.

- Monitoring water quality of site run-off water;
- Reclamation effectiveness determination over time.

1.8 Reclamation Plan

The Reclamation Plan will include the following components:

- Purpose
- Content
- Implementation

This plan will be compiled using the most up to date Abandonment and Rehabilitation guidelines as described in the *Environmental Guidelines for Construction and Mineral Exploration Companies* prepared the Environmental Impact Management Section, Environmental Assessment Division, Department of Environment and Labour and Department of Mines and Energy, April 1996.

1.9 Auditing and Continuous Improvement Plan

Aguathuna Quarries is committed to auditing these plans to ensure compliance and continuous Improvement of the EMP. The Auditing and Continuous Improvement Plan will include the following:

- Purpose
- Content
- Implementation

1.10 References

Appendix 1 - Legislation, Permit, Approvals, and Authorizations
Appendix 2 - Project Safety Hazards
Appendix 3 - Permit Protocol Hazards

Rare, Endangered and Threathen Flora Species Within a 20 km Radius of the Aguathuna Quarry Development

Amelanchier fernaldii
Anemone multifida
Antennaria albicans
Antennaria alpina ssp canescens
Antennaria howellii ssp gaspensis
Antennaria pulvinata
Antennaria straminea
Apocynum cannabinum var hypericifolium
Arceuthobium pusillum
Arnica angustifolia ssp tomentosa
Aster ciliolatus
Braya humilis var humilis
Carex glacialis
Carex hormathodes
Carex hostiana
Carex lacustris
Carex pedunculata
Carex petricosa var misandroides
Cystopteris bulbifera
Cystopteris laurentiana
Festuca brachyphylla
Festuca prolifera
Festuca saximontana
Galium kamtschaticum
Gymnocarpium robertianum
Juncus nodosus
Lesquerella arctica
Limonium carolinianum
Minuartia dawsonensis
Myriophyllum sibiricum
Osmorhiza depauperata
Oxyria digyna
Polygonum raii
Potamogeton friesii
Ranunculus recurvatus
Salix arctophila
Salix ballii
Scirpus maritimus
Senecio cymbalaria
Solidago sempervirens
Spartina alterniflora
Sphenopholis intermedia
Trisetum melicoides
Valeriana dioica ssp sylvatica
Veronica serpyllifolia ssp humifusa
Viola septentrionalis
Woodsia glabella

APPENDIX D

AGUATHUNA DIVERS REPORT

147-2 Main Street
Stephenville, NF
A2N 1J5

Dean Bailey - Owner
Phone/Fax: (709) 643-9260
Email: prosport@nf.sympatico.ca

MID ATLANTIC MINERALS INC.
68-2199 Burnhamthorpe Road W.
Mississauga, Ont.
L5L 5M7

06-May-98

PH : 905-828-9694
FX : 905-828-2027

Attn : Mr. Jose A. Boves

Re : Diving Inspection - Aguathuna

Dear Mr. Boves,
As per your request, Pro Sport Diving assembled a dive crew to carry out an under water inspection at Aguathuna. The area inspected was located from your drawings and notes supplied to me.

- Date of inspection : 05-May-1998
- Weather : Fog - 12c
- Winds : light
- under water visibility: 10m
- Dive crew : Dean Bailey diver / supervisor
- Anselm Benoit diver
- Scott Bailey diver tender / boat operator

The inspection began at the shoreline where a measurement 25m to the West and East of the center line were marked. Bouys were then placed a distance of 50m from shore to establish our main inspection area.

Divers were towed behind the boat with the aid of tow boards to enable the divers to maintain depth. The boat ran parallel with the shoreline in runs approximately 5m apart, from the shoreline out to the 50m mark.

- Findings in this area :
- Bottom composition - mainly bedrock with boulders, some sand covered areas, probes here only penetrated .2m.
- Marine life encountered : during our inspection, divers encountered 14 flatfish, 1 rock cod, 3 rock crab. No lobster were seen either on the sea floor nor in any of the traps located throughout the area.
- Beyond the 50m mark to 150m :

Divers carried on with the survey out to the 150m mark. Findings in this area were consistant with our findings within the previously noted area with regard to marine life, fewer flatfish, 5 rock crab, 4 scallops, no lobster, no other species encountered.

- Bottom composition :

Just beyond the 50m mark from shore, the bottom tapers off from bedrock and boulders and

PRO SPORT DIVING

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becomes a muddy silty sea floor. Divers used a 2.5m steel rod as a probing tool, probes were carried out at intervals approximately 10m apart. The average probe depth acheived was 1m - 1.5m with an occasional depth up to 2m. It was noted that the 2m probes were located to the East of our area center line. Maximum water depth 15m.

If you have any questions regarding this report or need clarification on any points listed, please do not hesitate to contact me at the above number or cell # 709-649-7331.

Regards

Dean Bailey