



Belleoram Crushed Rock Export Quarry

DRAFT - Comprehensive Study Report

Continental Stone Limited

CEAR Reference Number: 06-03-19881

Belleoram, NL

March 2007

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1.0 INTRODUCTION

1.1 Regulatory Framework

Transport Canada (TC), Fisheries and Oceans Canada (DFO), and the Atlantic Canada Opportunities Agency (ACOA) are conducting an environmental assessment, pursuant to the *Canadian Environmental Assessment Act* (the Act), for the proposed crushed granite stone quarry and marine terminal near Belleoram, Newfoundland and Labrador. TC, DFO, and ACOA have determined that their respective departments have a responsibility to conduct an environmental assessment of the proposed project pursuant to paragraphs 5(1)(b) & (d) of the Act. On January 8, 2007 a Track Report was forwarded to the Minister of the Environment detailing the project, as scoped by the responsible departments, and recommending that the proposal continued to be assessed by a comprehensive study process. On March 8, 2007, the Minister of the Environment reviewed the Track Report and concurred with the responsible departments and decided that this environmental assessment proceed as a comprehensive study process. Therefore, this Comprehensive Study Report (CSR) has been prepared to address issues identified within the Track Report. Further information on the federal environmental assessment process may be obtained from the CEAA website (www.ceaa.gc.ca).

1.2 Proponent Identification

The following corporate and contact information is provided for the proponent:

Name of Corporate Body: Continental Stone Limited

Address: P.O. Box 8274, Station A
St. John's, NL A1B 3N4

Chief Executive Officer: Edward Murphy

Contact Person: Robert Rose
(709) 782-3404
rose@pennecon.com

2.0 PROJECT DESCRIPTION

2.1 Project Overview

Continental Stone proposes the development of a crushed rock granite quarry to supply raw material to international markets. Using standard industry methods, granite will be quarried and conveyed to bulk carriers for shipment to various international markets. This project allows the proponent to gain a market share of the aggregate industry, with a

view of enhancing the long-term viability of their company and the economy of the Connaigre Peninsula through the creation of sustainable employment. The project is expected to bring 80-100 full time direct jobs with the potential for numerous indirect jobs for a project life of 50 years.

The project will be carried out in three stages:

Stage 1: Development - Excavation and removal of overburden material will be done to enable the construction of a road to the site for employees, visitors, and equipment suppliers. Core samples of the rock will be taken to ensure that the rock is suitable for market. This phase will also include the excavation of an area suitable for setup of the crusher and associated equipment (Figure 2.1) and the construction of a marine terminal for the project. All equipment will be setup during this stage (Figure 2.2).

Stage 2: Operation – Operation will consist of drilling and blasting of the rock source, with the fractured rock being crushed into various sizes. The crushed rock will then be conveyed to a marine terminal for loading onto a bulk aggregate carrier and shipped to international markets. It is estimated that 2,000,000 tonnes of aggregate will be shipped in the first year of operation, increasing to 6,000,000 tonnes for the remainder of the project. Also, depending on market demands, aggregate may also be stockpiled during the summer months for shipment later in the year.

Stage 3: Decommissioning – This will involve demobilizing all unsuitable structures at the site and the creation of an area friendly for the community and the environment. A rehabilitation and closure plan pursuant to the requirements of the Department of Natural Resources as outlined in *The Minerals Act* is being prepared.

2.2 Project Description

2.2.1 General Project Overview

The proposed site of the quarry (55°25'27" W - 47°32'37" N) is a 900-hectare parcel of land and intertidal zone in Fortune Bay approximately 4 km north of the Town of Belleoram, NL (sharing its limits with the Town's limits; population 450). Core samples of the rock have been analyzed and have been shown to contain high quality granite that is suitable for international markets. The site has been chosen due to its considerable granite deposit (yielding an estimate 6,000,000 tonnes per year) and its proximity to the shipping routes for easy distribution via ocean-going bulk carriers.

Due to the large volume of granite available close to the shoreline there will be a relatively slow progression of development (Phase 1 lasting 20-25 years); with the remainder of the 900 ha being quarried of suitable aggregate thereafter. This assessment will primarily address concerns identified with respect to the Phase 1 boundary. However, since the environment in the remainder of 900 ha proposed Project site is similar to that found in Phase 1 it is directly applicable to the areas to be quarried in

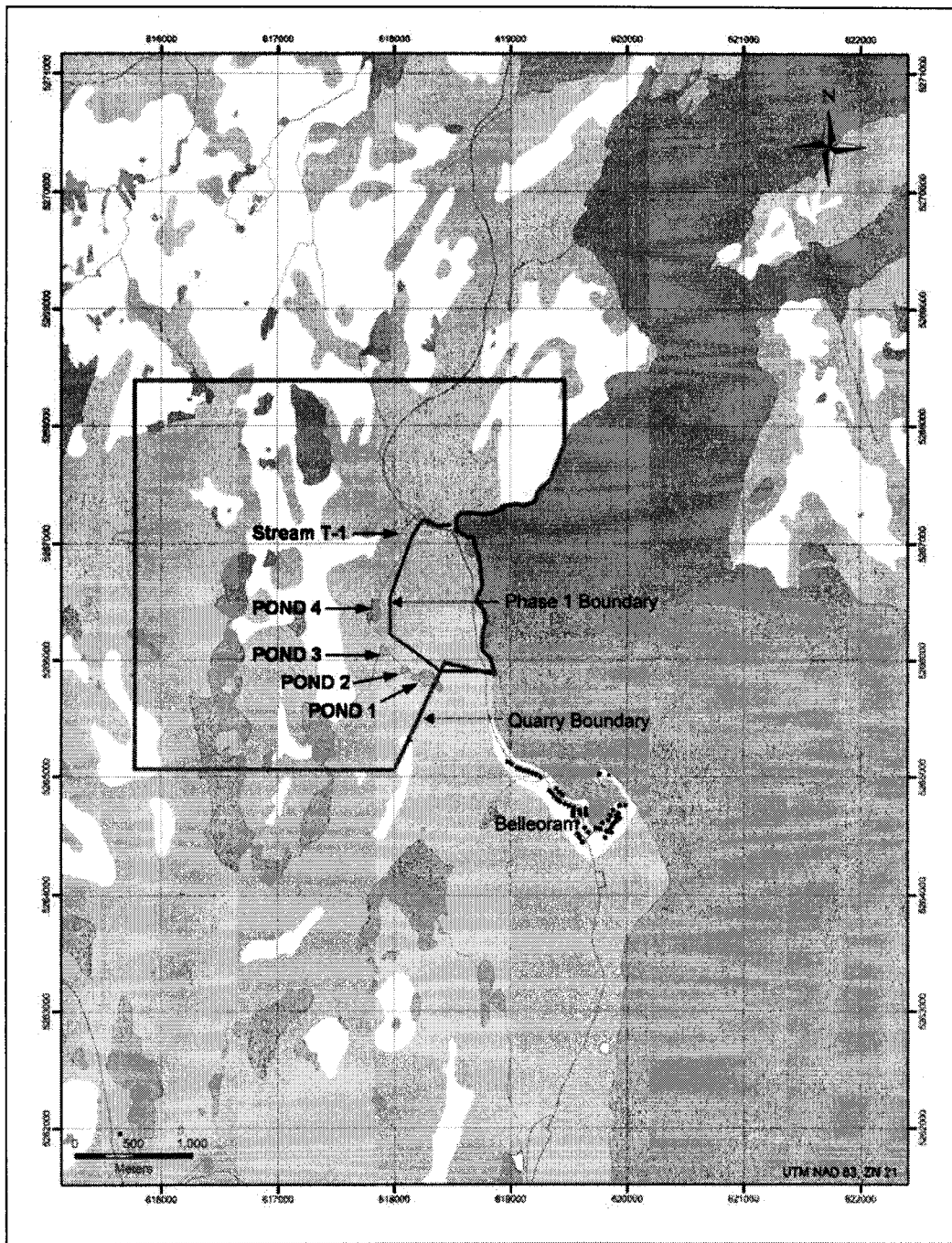


Figure 2.1: Location of the proposed granite quarry in Belleoram, NL. The boundary of Phase 1 and the entire quarry's boundaries are indicated.

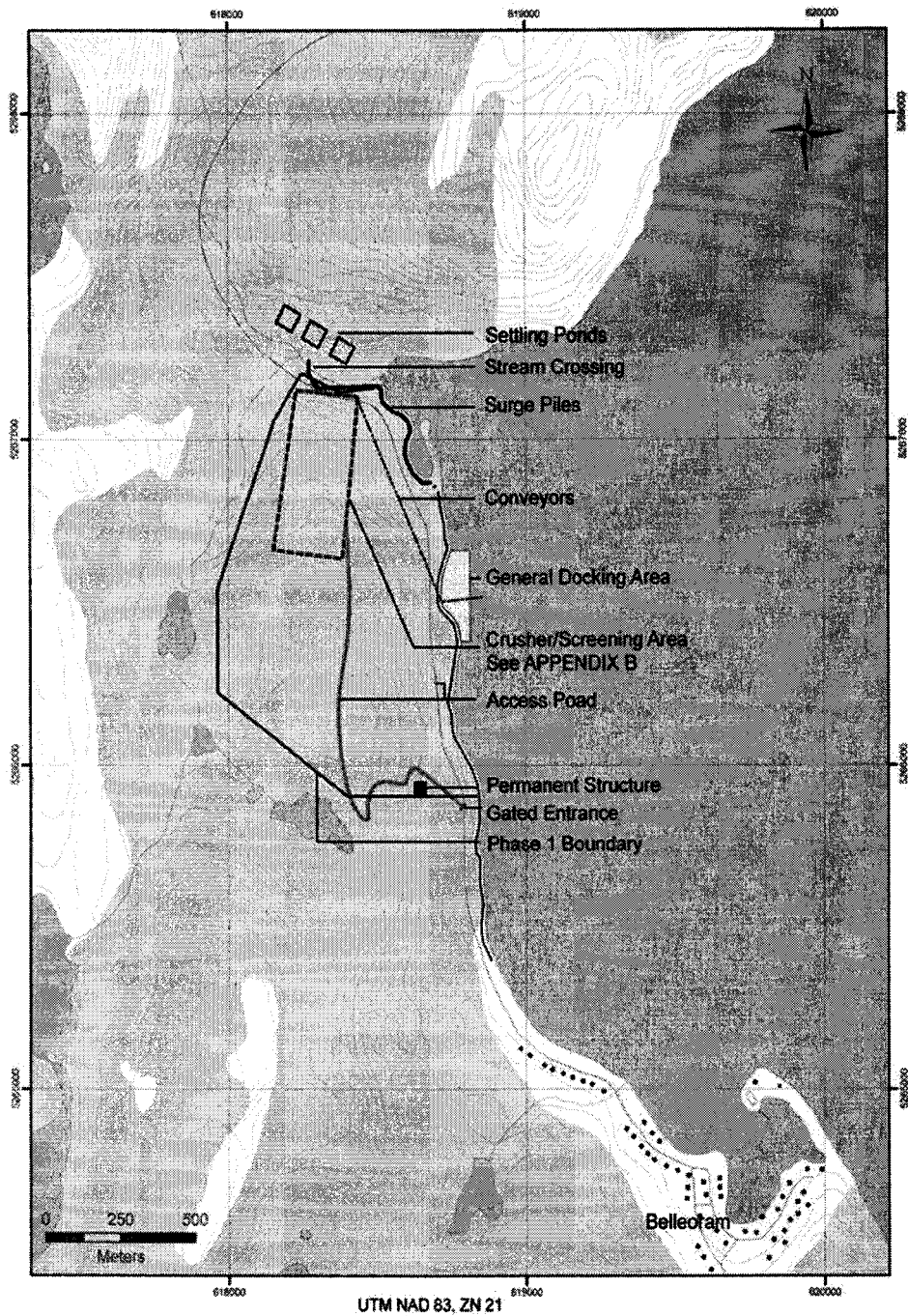


Figure 2.2: Approximate locations of the quarry's major features, equipment, and related structures. Exact size, location, and type of infrastructure will vary pending final project design and compliance with regulatory body's guidelines for construction and operation.

subsequent phases. The granite will be quarried and crushed on site using standard industry methodologies and loaded onto ships via a conveyor belt system and then shipped to market. The physical features will include the quarry itself, a new access road, crushing and grading equipment, settling ponds, water extraction pumphouse/intake, conveyors, utility installations, office and laboratory building, and marine terminal.

2.2.2 Construction Activities

Development of the quarry is anticipated to start on April 1, 2007, with construction activities taking one year to complete. The construction phase will consist of:

- Access development;
- Timber salvage;
- Stripping of overburden;
- Building and wharf construction; and
- Settling pond construction.

Construction activities will adhere to high industry standards; following the *Aggregate Operators Best Management Practices (BMP) Handbook for British Columbia 2002 Volume 2*. The BMP Handbook addresses such issues as: storm water management, erosion control, noise and dust, risk management and pollution.

Access Development

An access road will be constructed from the community to the quarry by expanding an established trail along the shoreline. Construction of the access road is expected to take approximately 4 weeks. The access road will be used to transport employees and service vehicles to the site but will not be used on a regular basis for heavy equipment. A network of site roads will be constructed as needed within the quarry for safe and efficient movement of people and equipment.

Timber Salvage

Merchantable timber (greater than 10 cm diameter-at-breast-height) will be salvaged by local contractors when site clearing and overburden removal operations commence. Timber salvage will progress across the Phase 1 site as the aggregate is quarried.

Stripping of Overburden

Overburden will be removed to uncover bedrock during the development phase. Overburden thickness varies (being very shallow; approximately 1 m), with the starting pit targeting an area of minimal cover to minimize the volume to be removed and stored. The volume of overburden that will be removed will be confirmed once the in-fill drilling program and final detailed designs are completed. Prior to stripping, sediment control

structures (i.e. silt curtains, dykes, sediment fences) will be constructed to limit the amount of sediment-laden runoff leaving active work areas. These structures will be regularly monitored and remain in place over the course of activities. Overburden will be stored in an area north of the settling ponds to be used for future land reclamation projects.

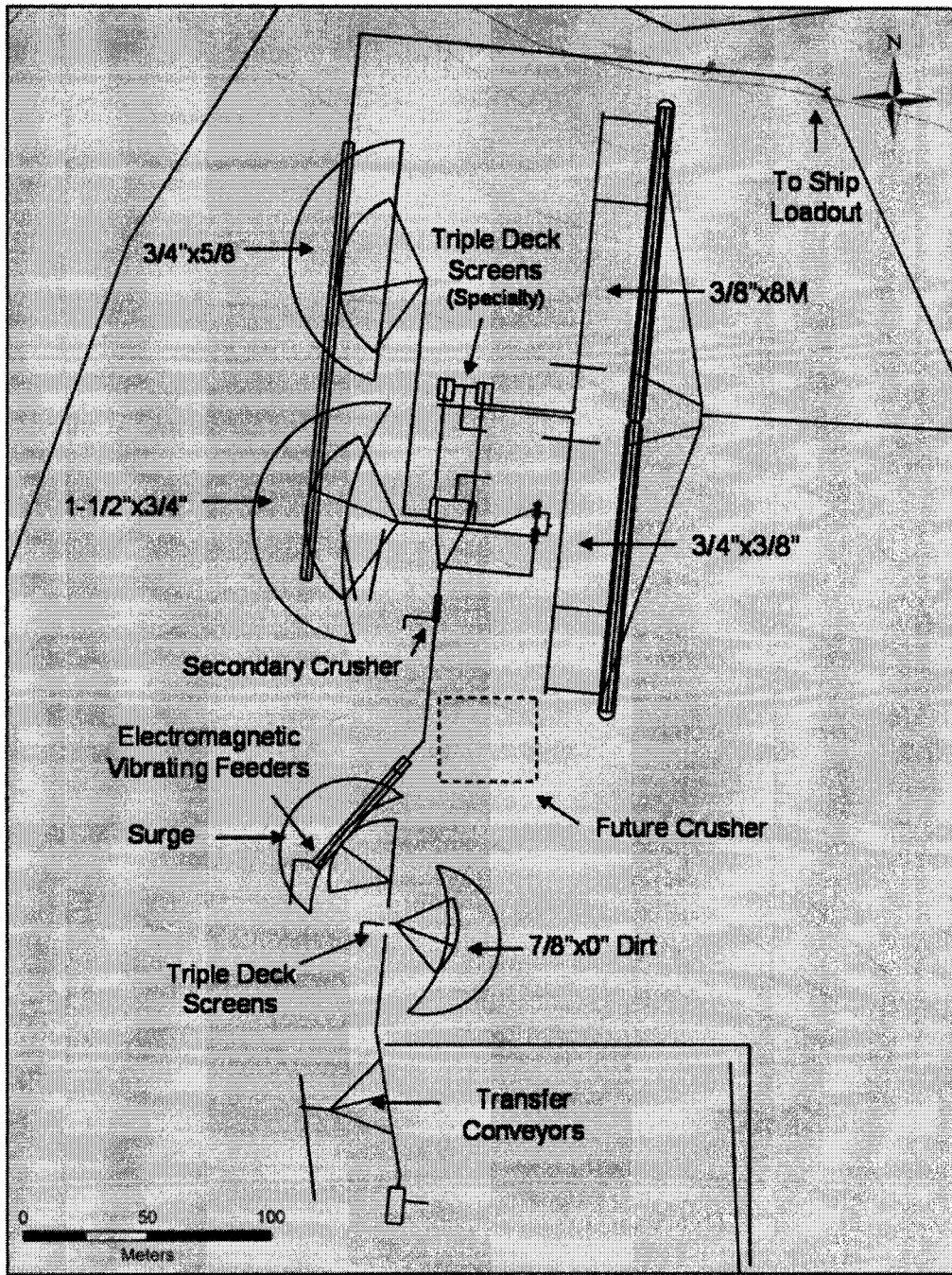
Building and Wharf Construction

The establishment of the quarry operations will require the construction of some permanent structures. These include several crushers and screeners (types and sizes vary; pending final project design approval) which will be connected via conveyor belt systems (Figure 2.3). A building will also be built at the main gate entrance to house offices, a laboratory, and a future welding facility. A transmission line will be needed for electrical power and telephone services, however, installation of the new transmission line is the responsibility of Newfoundland and Labrador Hydro and will only be assessed as a cumulative effect with respect to this CSR. There are currently no municipal water supply lines or wells in the area of the quarry's proposed footprint. However, the quarry will tap into the Town of Belleoram's water supply lines to obtain water for the offices and laboratory building. Waste water and sewage from the building's sinks and toilets will be treated with industry-approved Blivet™-style waste management tanks installed during Phase 1 of the construction process.

Rock will be conveyed to the marine wharf, whose construction is expected to begin on April 1, 2007, and will take a year to complete. The wharf will include the construction and placement of caissons as well as a ship loader with a hopper and conveyors, the installation of a girder supported wharf section, and anchorage emplacement. The rock fill section will be constructed with clean armour stone from within the quarry site along the east facing shore line. These stones will be placed using dump trucks, loaders, and excavators. The docking facility will consist of an on-shore dock or, if the bathymetry requires, a pier structure projecting offshore. Formal approval for the wharf construction will be obtained under Section (1) of the *Navigable Waters Protection Act*.

Settling Ponds

Three settling ponds will be constructed to process aggregate washwater and site runoff prior to its release. Due to space limitations, the ponds will be constructed north of the quarry (Figure 2.4). In order to transport water to the ponds, a small pumping system and bridge will cross the stream from the quarry. The exact location is yet to be determined but is anticipated to be in the general location as shown in Figure 2.4. The proposed bridge will be clear span and standard construction mitigations and DFO *National Operational Statements* will be employed to minimize its effect on fish and fish habitat.



UTM NAD 83, ZN 21

Figure 2.3: Approximate design layout of the crusher/screening area. Equipment size, type, and location may vary pending final project design approval. Various stone sizes will be obtained (i.e. 0" dirt to 1-1/2" stone) depending on the stage or type of crusher being employed.

General Construction Sequence

The quarry project will follow the 3-Phase design outlined in Section 2.1, with Phase 1 consisting of all construction activities. Road construction will be completed first, allowing construction equipment access to the site. Trees and overburden are to be removed to prepare the site for quarrying operations. The marine terminal will be started next, and consist of an initial marine geological survey carried out in January, 2007, to determine its exact placement and specifications. Installation of all remaining equipment and buildings will then be completed before blasting starts in late 2007.

Construction Mitigations

All construction activities will comply with federal, provincial, and municipal building codes and regulations. Project activities are to comply with the provincial *Occupation Health and Safety Act and Regulations* and be conducted within the confines of the CEEA, *The Fisheries Act*, and *Navigable Waters Protection Act*. By adhering to these guidelines, the proponent ensures that all activities will be conducted in a safe, environmentally friendly manner and will cause no undue harm to the biophysical, ecological, or sociological aspects of the surrounding area. Detailed mitigations will be outlined further in this CSR.

2.2.3 Operational Activities

The operational phase will include the following aspects: 1) drilling and blasting; 2) primary, secondary, and tertiary crushing; 3) dry and wet screening; 4) stockpiling; 5) reclaiming of finished products; and 6) ship loading. Quarry and settling pond dewatering will occur as required. Water leaving the site will be tested as required.

Aggregate washwater will be obtained from the freshwater steam system via an installed water intake system. A pumphouse (with intake) will be installed in the stream adjacent to the settling ponds (Figure 2.1). Water will be extracted and held in a storage tank located in the crushing/screening area of the quarry. It has been anticipated, based on conversations with Metso Minerals Canada Inc., that water requirements will be 5US gallons (19 L) per tonne of granite. With a rinsing screen and recycling of water, it is anticipated that a loss of 10% can be expected (i.e. evaporation, waste water discharge). The first year of operation will expect production of 450 tonnes per hour. With recycling, ongoing water extraction will therefore be required at a rate of approximately $0.00024\text{m}^3/\text{s}$ (0.237L/s). In subsequent years, the quarry capacity will most likely be doubled (900 tonnes per hour) which will require a total water extraction of $0.00048\text{m}^3/\text{s}$ (less than 0.500L/s). Quarrying operations are expected to run for approximately 20 hours per day (i.e. two ten-hour shifts) for 40 weeks from March to December each year. It is unclear at this time what storage capacity the water tank may have in order to accommodate any identified low-flow periods.

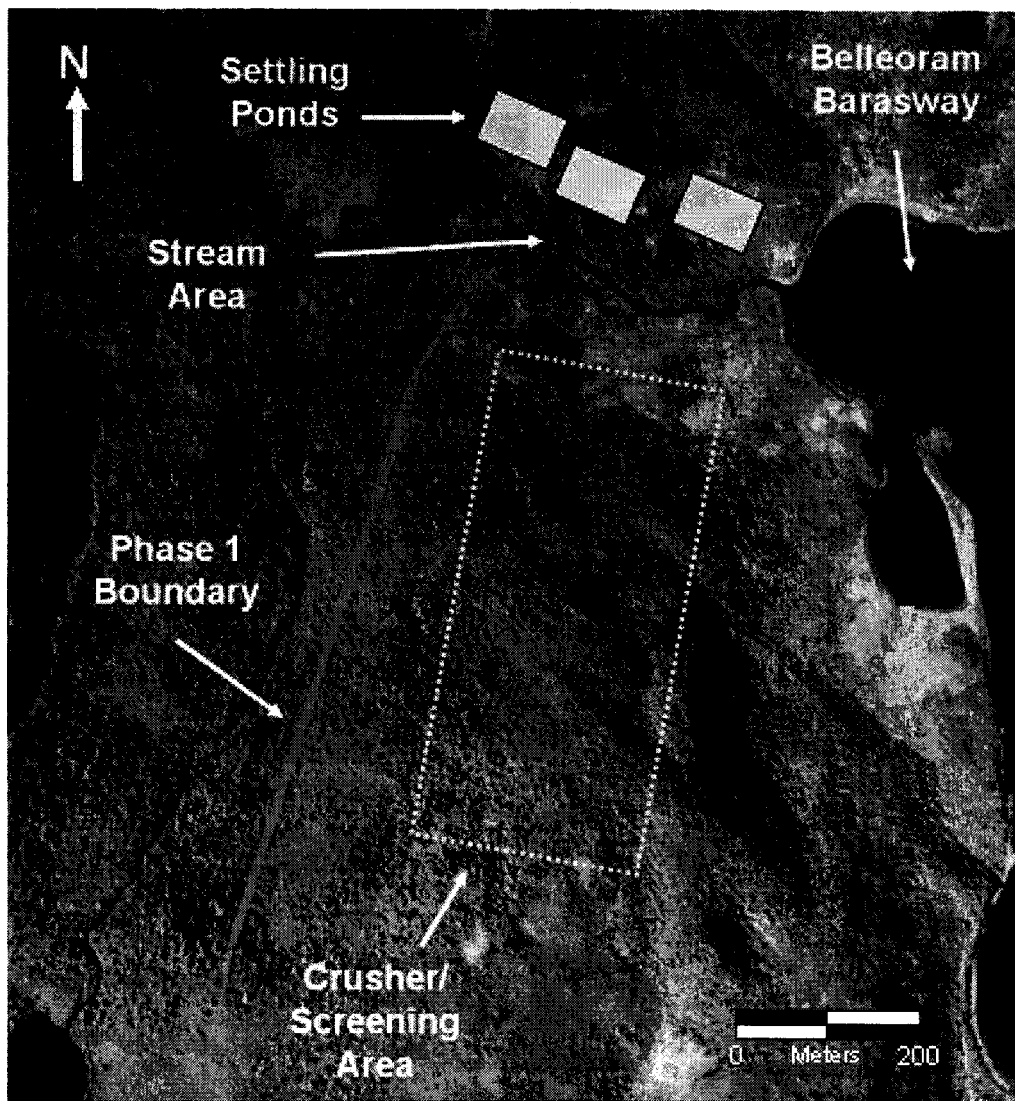


Figure 2.4: Air photo overlay of the approximate locations of the quarry's crushing and screening equipment and related structures in relation to the local stream system. The lower section of the stream will be spanned by a Bailey bridge and a wash water pipeline, with the exact size, location, and type of infrastructure being determined upon final project design approval.

Blasting

Blasting operations will be conducted at the Belleoram Granite Quarry in accordance with:

- *The Fisheries Act*, DFO Canada.
- *The Newfoundland and Labrador Environment Act and Occupational Health and Safety Act*.
- *The Explosives Act*, Natural Resources Canada.
- *Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters*, DFO Canada, Wright and Hopky (1998).
- *Dyno Nobel Canadian Blast Site Safety Procedures* (2002).

Blasting during quarry start-up will be once per week and twice per week during full production, corresponding to a weekly production of 40,000 tonnes at startup and increasing to 80,000 tonnes during the life of the quarry (year-round operation). All blasts will be conducted between the hours of 0700 hours and 1900 hours. At the entrance to the quarry a 'Blast Notice Board' shall be erected detailing the time and date of any proposed blast as well as a description of the blast signaling system.

Continental Stone will be employing the following blast parameters during production operations:

Bench Height	12.0 m
Hole Diameter	165 mm
Burden	4.87 m
Spacing	4.87 m
Subdrill	1.52 m
Collar	3.04 m

Each bore hole will be loaded with 290 kilograms of Dyno Gold 70-30 Bulk Emulsion Blend explosive pumped in to the bore hole using bulk explosives delivery systems. The bore holes will be double primed using 350 gram cast boosters used in conjunction with Nonel EZ detonators having a 25 millisecond surface delay and a 500 millisecond in-hole delay interval. The Nonel EZ detonators are to be used with Nonel EZ Trunkline Delays in such a fashion that each bore hole in the blast is fired independently and with a minimum of 8 milliseconds of delay interval. The collar of each blast hole will be filled with 20 mm diameter clean crushed stone to contain the gasses within the bore hole and reduce unwanted air overpressure. Drilling will be conducted using Down The Hole (DTH) drills equipped with either a vacuum dust collection system or a water injection dust suppression mechanism.

A Blasters Safety Certificates (from the DOEC) and a Temporary Magazine License (from the NL Department of Mines and Energy) will be obtained prior to drilling and blasting to ensure that the proper procedures are known and followed.

In light of the hazardous nature of ammonia, the following measures will be put into place, and will be incorporated into the quarry's EMP and Contingency Plan, including:

- Using a bulk emulsion explosive that is proven to have a reduced ammonia release rate, which will allow any wastage to assimilate into the environment at a more sustainable rate;
- Using suppression and/or collection equipment during drilling, using DTH drills equipped with either a vacuum dust collection system or a water injection dust suppression mechanism;
- Capping each 12 m bore hole with 3 m of 20 mm, clean, crushed stone to trap gases and dust during blasts;
- Discharging water from blasting areas to vegetated areas to encourage bio/chemical-degradation of any ammonia present;
- Constantly monitoring water quality to ensure site runoff complies with appropriate regulations (e.g. NL *Water and Sewer Regulations*), with non-compliant water being treated by alternate means;
- Ensuring that the handling, transportation, storage and use of explosives will be conducted in compliance with all applicable laws, regulations, and orders of the Department of Energy and Conservation (DOEC) and the Department of Natural Resources-Mines.
- Only allowing persons properly trained and qualified to handle explosives in accordance with the manufacturer's instructions and governmental laws and regulations;
- Maintaining the integrity of all storage containers, tanks, and loading equipment to prevent spills of explosives, and following the manufacturer's spill clean up recommendations;
- Using explosives in a manner that will minimize scatter of blasted material beyond the limits of the activity;
- Designing blasting patterns and procedures which minimize shock or instantaneous peak noise levels and ensures that the magnitude of explosions is limited to only what is necessary; such as optimizing drill patterns and those outlined above;
- Making a blasting plan available to the local committee;
- Disposing of all blasting associated debris (e.g. explosive boxes and used blasting wire) in government approved facilities designed to handle such wastes;
- Surveying the immediate area prior to blasting, with blasting operations being delayed if big game (such as moose) are observed within 100 m and allowing animals to leave of their own accord; and
- Not blasting underwater or within a waterbody.

Shipping

The most economical and environmentally friendly method to transport the crushed granite aggregate from the proposed quarry site to market is via marine bulk carriers. With an anticipated aggregate production level between 40,000 and 80,000 tonnes

weekly, carriers will be required to enter Fortune Bay and dock at the proposed marine terminal on an estimated weekly basis and will have an anticipated 60,000 tonne capacity. Due to their large size and the need for these vessels to turn one-hundred-eighty degrees once they reach the dock for loading, speeds within Fortune Bay are anticipated to be less than two knots.

Shipping activities will be contracted out to a third party, who will be responsible for the vessels and shipping as well as its operation and maintenance. All ships shall also adhere and be responsible for all environmental compliance, permits and certificates and meet all regulatory standards pursuant to the *Canadian Shipping Act*. It should be noted that no "tanker" traffic will occur as part of the Project and that there will be no bulk oil/fuel transport, no oil/fuel refueling of ships and no bilge water discharge at the Project site. While shipping by bulk carrier was determined to be the most economical, potential interaction between this option and the marine environment exist. Figure 2.2 presents the proposed bulk carrier shipping route. Standard mitigations with respect to vessel traffic have been outlined in this CSR and will also be included in Continental Stone's EMP and Contingency Plan.

2.2.4 Production Capacity and Demand

The demand for granite has increased greatly in recent years primarily due to it being favoured as a component in high quality asphalt used in road construction. International markets, such as southern Florida, are currently overhauling their road infrastructure which has intensified the need for new sources of granite. It is estimated that 2,000,000 tonnes of aggregate will be shipped in the first year of operation, increasing to 6,000,000 tonnes for the remainder of the project's 50 year lifespan.

2.2.5 Alternatives to the Project

The primary alternative to the project is maintaining the status-quo (i.e. not undertaking the quarry project). This is not a preferable alternative as the quarry is required by the proponent to access a vast reserve of granite, estimated 6,000,000 tonnes per year, to be shipped to international markets. Not establishing a quarry will also deprive the Town of Belleoram and the rest of the Conaigre Peninsula of 80-100 full time direct jobs with the potential for numerous indirect jobs over the 50 year life of the project.

Continental Stone 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 aggregate versus moving it overland. Continental Stone has determined that the use of ocean going vessels along established and approved shipping lanes would be less intrusive to the

surrounding communities and also less expensive. Furthermore it was also determined that the use of ocean going vessels would require less construction and maintenance of

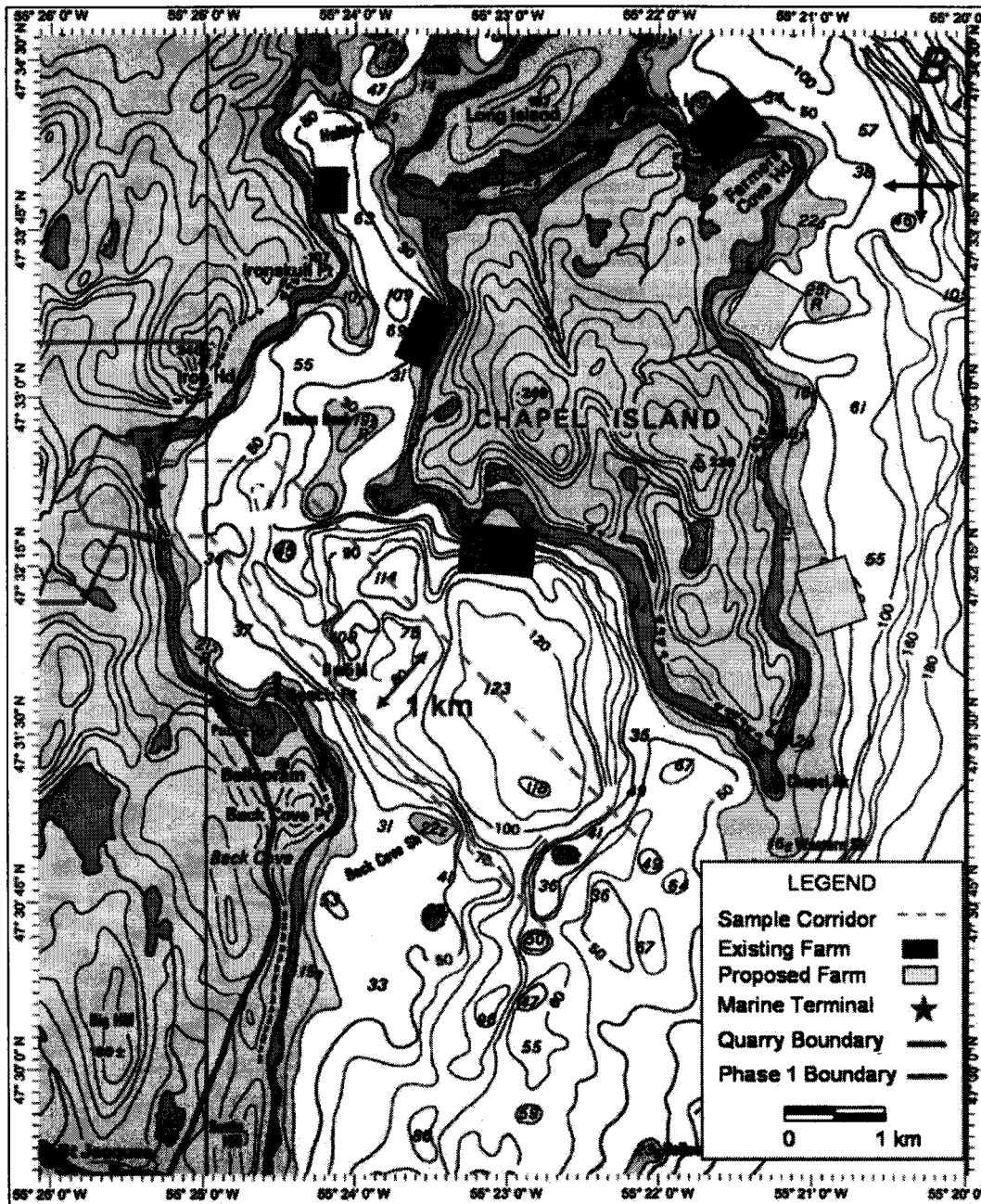


Figure 2.5: Proposed bulk carrier shipping route into the Fortune Bay area in relation to the local fish farms. The central green line indicates the path that is a maximum possible distance for the nearest aquaculture farm (Cold Ocean Salmon Inc., approximately 750 m

at the nearest point). Aquaculture site mapping was obtained from the Newfoundland and Labrador AquaGIS database.

infrastructure such as roads and highways able to withstand the repeated heavy loads of trucks.

Adopting the shipping mode of transportation is deemed to have the additional benefit of restricting the spatial extents of potential effects on the terrestrial environment in the project area. The Belleoram site was chosen due to its large deposit of granite within a relatively small footprint, deep ice free port, proximity to shipping lanes, minimal tidal action, and supply of suitable labour. The quarry will be located proximal to the dock and near existing roadways. It was determined that the overburden will be stored in an area north of the settling ponds instead of creating a berm around the perimeter of the property. The berm was initially proposed to reduce the visual impact of the quarry as well act as a barrier to unauthorized off-road vehicles. However, it was not deemed necessary as the rock face that can be seen from the Town of Belleoram will be left intact in the initial stages of the project to maintain the aesthetic appeal of the area.

2.2.6 Decommissioning/Rehabilitation

The quarry will be progressively rehabilitated as operations progress across the entire project area. The details of the decommissioning will be provided in the EMP and Closure Plan. However, based on existing decommissioning standards and protocols for mines and quarries, it is anticipated that the following activities will occur:

- Prior to decommissioning, the public and local stakeholders will be consulted to determine possible further commercial or recreational uses for the site.
- All facilities and infrastructure, with the possible exception of the marine wharf, will be dismantled. These structures and all other waste materials will be disposed of and /or recycled in an appropriate manner, and in accordance with all federal and provincial regulations. Access roads will also be closed.
- The site will be restored by re-establishing drainage patterns, re-vegetation, soil stabilization and habitat enhancement methodologies, as appropriate.
- A Phase 1 Environmental Site Assessment will be conducted prior to finalization of any decommissioning plans.

2.2.7 Local Special Interest Committee

In keeping with Continental Stone's commitment to ensuring a minimum impact on the local environment and its residents, it will invite all interested parties to participate in a committee which will allow them to voice their concerns and offer any comments they have on a regular basis. This committee could include residents of Belleoram, property owners in the area, local business owners, owners/operators of aquaculture sites within

Fortune Bay, aboriginals, and recreational users of the area. It is also recommended that a scientific advisor also be on a member, such as a veterinarian specializing in fish aquaculture or an aquatic scientist. Continental Stone will openly accept and consider all comments and concerns expressed by these interested parties and strive to provide any information requested by them. The ultimate goal of this committee will be to provide an avenue for efficient communication between stakeholders and to prevent conflicts from escalating to situations that may negatively affect any of the parties involved, whether the issues are social, environmental or quality of life. This preventative, hands on, approach should ensure the prosperity, stability and long term viability of the region through the elimination of potential conflicts and the minimization of the quarry's negative effects.

3.0 PROJECT EXISTING ENVIRONMENT

3.1 Geophysical Environment

3.1.1 Physiological and Topographical

The site is located in the South Coast Barrens Sub-region of the Maritime Barrens Ecoregion of Newfoundland. The ecoregion ranges from sea level to about 250 m asl (with a maximum of approximately 220 m asl reached within the project site). The terrain can be described as rugged with steep to gently rolling topography. The boundary of Phase 1 contains the lower part of a stream system with four shallow ponds occupying the area approximately 100-200 m to the west of the Phase 1 site boundary. The land in the area is undeveloped, however, contains an old trail which has recently been expanded to allow for preliminary site evaluation and activities. Representative photographs of the site are presented in Appendix A.

3.1.2 Soils and Geology

The land is composed predominantly of a mixture of late Precambrian and Palaeozoic sedimentary rocks and granites. Where stream erosion has cut deeply, the uplands are rugged and rocky, but elsewhere they present a rolling terrain of low relief. The surface of the uplands is dominated by rolling to hummocky, sandy morainal deposits and is associated predominantly with Humo-Ferric Podzolic soils. Significant inclusions are acidic rock outcroppings, Ferro-Humic Podzols, peaty Gleysols, and Fibrisols. Lands within the project site contain a shallow overburden (approximately 1 m) with areas of exposed granite bedrock. Preliminary test drills on-site have shown that no acid-rock generators are present. The soil in this area has no capacity for arable culture or permanent pasture. Wind, lack of protective snow cover and soil frost disturbance are important factors limiting plantation establishment.

3.1.3 Hydrogeology and Groundwater

The area's rocky barren landscape, with a shallow overburden and patches of sparse tree cover, results in a low infiltration capacity of the land. Of the 1829 mm of annual precipitation, 1250 mm form overland runoff to rivers and the ocean. Nearly 90% of the region's surface material is rock cover (and exposed bedrock), leading to a low capacity to store groundwater. Environment Canada estimates the area does not have any aquifers with flow rates of 0.4 L/min or greater.

3.1.4 Natural Hazards

The region has had no significant occurrence of major natural disasters (i.e. slides, ice jams, earthquakes), nor does it have any imminent potential for such hazards. There has been no record of seismic activity or landslides in the area, and, with its lack of geological activity and shallow overburden, the potential is minimal for any future events. The site is located on the shores of the protected Fortune Bay area, with the area being virtually ice-free with no great density of ice bergs.

3.2 Atmospheric Environment

The average daily temperature in the area ranges from a high of 18.5°C in August to -8.1°C in February. Annual precipitation is 1829 mm with January and November being the months of highest precipitation. Table 3.1 displays climatological information from Environment Canada's Canadian Climate Averages and Normals for the region (with the information obtained at the Harbour Breton weather station; 32 km West of Belleoram, averaged between 1970-2000). Wind direction and speeds are displayed in Figures 3.1 and 3.2, showing a predominantly west/south-westerly direction. Mean windspeed recorded for the period 1994-2006 was 31 km/h, gusting to a maximum speed of 133 km/h (Environment Canada - Meteorological Service of Canada-Atlantic Operations). The windiest months occur during the winter season (December to March), having an averaged mean windspeed of 47.9 km/h, peaking in December at an average speed of 52 km/h.

The region within 10 km of the proposed site, and rural Newfoundland in general, experiences good air quality due to the lack of industrial emission sources. Climate conditions support good dispersion of airborne particles and the frequent rainfall help dilute those particles in the air. The air quality is also enhanced by the infusion of relatively clean, oceanic air masses from the North Atlantic Ocean. The climate is relatively wet with a winter season that typically lasts for 4 months. This snow cover results in the saturation of the surface and thus it is expected there is little background particulate matter.

3.3. Terrestrial Vegetation and Wildlife

3.3.1 Vegetation

The South Coast Barrens sub-region is characterized by extensive heathland interspersed with bogs, fens, and forests. The land in this area can be divided into approximately two individual equal groups. The first group contains land which has severe limitations to the growth of commercial forests. The second group contains lands that have severe limitations which preclude the growth of commercial forests. Good forest growth is localized on long slopes of a few protected valleys. Forests dominated by balsam fir and to a lesser extent black spruce occur primarily in sheltered valleys and on leeward hillsides. Typical heathland shrub species include rhododendron, common juniper, Labrador tea, sheep laurel, blueberry, crowberry, partridge berry, bunch berry and bakeapple (Protected Areas Association 2000). Herbaceous plants are less common but include aster, sedges and minor amounts of grasses. The moss and lichen layer is usually dominated by reindeer lichen with minor amounts of moss that typically includes red-stemmed feathermoss.

The Project area's vegetation is typical of the South Coast Barrens sub-region described above. Treed areas are dominated by balsam firs; however, they tend to be sparse, with dense forested areas confined to the steeper slopes. The predominant vegetation includes alders, with grassy fields and boggy areas, amongst exposed rock

3.3.2 Terrestrial Wildlife

Wildlife in the South Coast Barrens Sub-region include many of the same species found throughout the rest of the island. Mammals such as caribou, moose, black bear, red fox, snowshoe hare, and mink are common throughout, while red squirrel, meadow voles and masked shrews are less abundant. Beaver and muskrat may be found around freshwater bodies. The project area falls within Moose and Black Bear Management Areas 25 and Caribou Management Area 64.

3.3.3 Birds

Terrestrial Birds

The Connaigre Peninsula in general is subject to migratory shorebirds, waterfowl, and seabirds. Birds in the area are also typical of the boreal ecosystem and likely include migratory species such as osprey and bald eagle, and migrant passerines including thrushes, warblers, and fly catchers. Common year-round resident birds likely include

common raven, boreal chickadee, willow ptarmigan, spruce grouse, dark-eyed junco and pine grosbeak.

PARAMETERS	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
TEMPERATURES (°C)													
Mean Daily Average	-4.2	-4.5	-2	2.6	6.4	10.1	14.1	15.8	12.9	8	3.5	-1.1	5.1
Mean Daily Maximum	-0.5	-0.9	1.4	5.6	9.9	13.5	16.9	18.5	15.7	10.8	6.4	2.1	8.3
Mean Daily Minimum	-7.9	-8.1	-5.3	-0.5	2.9	6.8	11.2	13	10	5.1	0.6	-4.3	2
Precipitation (mm)													
Total Precipitation	112	124	99	134	120	148	122	94	141	138	141	119	1492
Total Rainfall	71	93	72	126	118	148	122	94	141	138	134	87	1345
Snowfall (cm)	41	31	27	8	2	0	0	0	0	0	6	33	147
Extreme Daily Rainfall	62	101	75	81	53	115	50	61	97	74	72	44	
Extreme Daily Snowfall (cm)	21	30	35	17	12	0	0	0	0	2	13	22	
Extreme Daily Precipitation	62	101	76	81	53	115	50	61	97	74	72	44	

Table 3.1: Monthly average climatological information from Environment Canada's Canadian Climate Averages and Normals for the region (1970-2000). Data obtained at the Harbour Breton weather station; 32 km West of Belleoram.

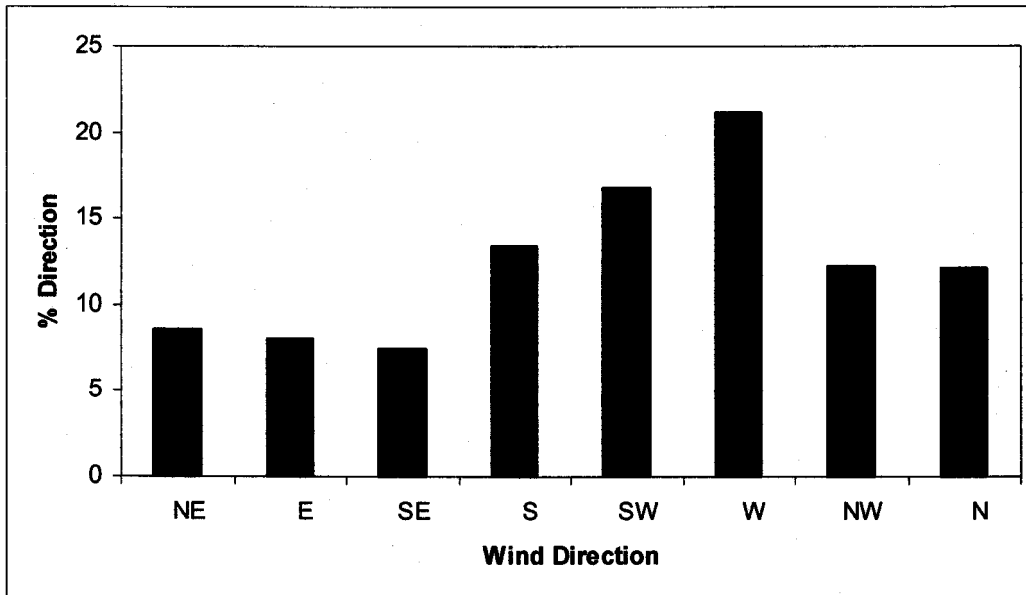


Figure 3.1: Percent direction (a measure of the directional frequency the wind the blows) and wind direction for the Sagona Island weather station (Climate ID 8403255). Historical data compiled from 1994 – 2006. Environment Canada - Meteorological Service of Canada (Atlantic Operations).

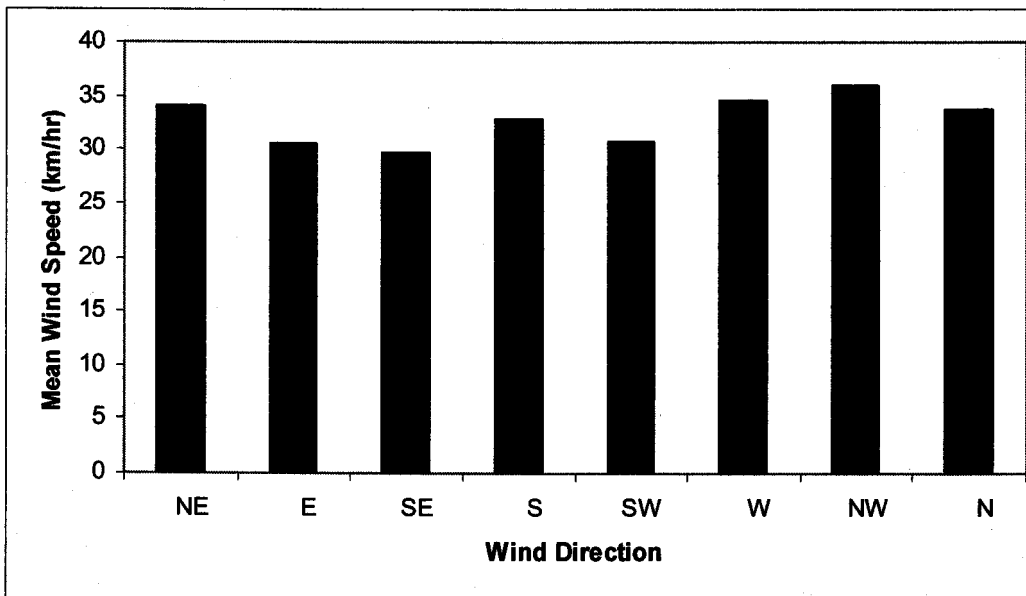


Figure 3.2: Mean wind speed (km/h) and wind direction for the Sagona Island weather station (Climate ID 8403255). Historical data compiled from 1994 – 2006. Environment Canada - Meteorological Service of Canada (Atlantic Operations).

Canada's Important Bird Areas program is a science-based initiative that identifies, conserves, and monitors a network of sites that provide essential habitat for Canada's bird populations. The program has not identified any 'Important Bird Areas' on the site. A field survey should be performed before tree cutting and overburden removal operations begin to determine which species do in fact nest within the proposed project's boundaries, with mitigative measures being employed to reduce habitat disturbances pursuant to the *Migratory Birds Convention Act and Regulations*.

Wetland/Waterfowl

Waterfowl common to the area may include the Canada goose, black ducks, and green-winged teal. Wetland/marsh habitat occurs in localized areas around Pond 2 to the west of the active Project area (see Figure 2.1). Preliminary surveys of this area suggest that this wetland/marsh is not preferred habitat for waterfowl (with no birds observed during the field season); being shallow and supporting no nesting sites. The wetland appears to be ephemeral and dependent on localized seasonal flooding. Plants species include blueberry (*Vaccinium sp.*), Leatherleaf (*Chamaedaphe calyculata*), and Labrador tea (*Ledum groenlandicum*).

Marine Birds

The eastern boundary of the Project site is the marine waters of Fortune Bay. This area is known to contain colonies of terns and gulls, and also be home to Great and Double-crested Cormorants and the Common Eider. Marine bird colonies have been identified further afield in areas around Belleoram, with colonies at Harbour Island, Boxey Harbour Head, Little Sagona Island, and in the area of Brunette Island. These areas, at distances of 14 km (Boxey Harbour Head) to 44 km (Brunettes Island area) away from the proposed quarry, are not in proximity to construction or operational activities. However, a shorebird survey, pursuant to the *Migratory Birds Convention Act and Regulations*, should be conducted before operations commence in order to identify any key habitat (i.e. over wintering areas, feeding and breeding grounds, and nesting areas) in the Project area.

3.3.4 Species at Risk

The Species at Risk Act (SARA), Atlantic Canada Conservation Data Centres (ACDCs), and the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) have identified species whose populations are at risk due to anthropogenic and environmental changes. Species of concern that are potential inhabitants of the project's area are outlined below, explaining their biology, status, and reason for their populations' decline.

North Atlantic Right Whale

The North Atlantic Right Whale (*Eubalaena glacialis*) is designated as endangered under the SARA and COSEWIC. As of 2003, records indicated 402 individuals were seen in Canadian waters. This population seems to be declining as a result of several factors, including collisions with ships and entanglement with fishing gear. The International Whaling Commission recognizes two stocks of the North Atlantic Right Whale; one in the eastern and one in western North Atlantic. The Right Whale is a migratory species that will spend summers feeding in the cool temperate waters, north of its distribution range, and will winter in the subtropical waters of the southern United States (US).

Blue Whale

The Blue Whale (*Balaenoptera musculus*) is the largest animal to have ever existed on the planet. The biggest blue whale recorded was 29.5 m long. The blue whale is designated as endangered under the SARA and COSEWIC. Threats to the species include past commercial harvesting, collisions with ships, entanglement with fishing gear and oil spills. The blue whale is found world wide, with the Atlantic population frequenting waters off eastern Canada. During spring, summer and fall they will occur along the north shore of the Gulf of St. Lawrence and off Nova Scotia. They will normally migrate south for the winter.

Red Crossbill

The Newfoundland subspecies of the Red Crossbill (*Loxia curvirostra perna*) is listed on Schedule 1 of the SARA and placed in the endangered category by COSEWIC. The Red Crossbill is a medium sized finch that uses its crossed mandibles to pry open conifer cones to feed on their seeds. It is a dull red colour with no white wing bars, and the bill is thicker than other North American Red Crossbills. The breeding range of this subspecies is unknown, but observations have occurred throughout much of the island, with most occurring in the older mature forests of western Newfoundland. The population is thought to have declined dramatically over the last 50 years. The limiting factors and threats to the Red Crossbill are poorly understood. Habitat loss can reduce cone crops that make up the Red Crossbill's food source, and Red Squirrels (an introduced species) may be out-competing the bird for food resources.

Monarch Butterfly

The SARA (Schedule 1) and COSEWIC have designated the Monarch Butterfly (*Danaus plexippus*) as Special Concern. The adult Monarch is a bright orange butterfly with heavy black veins and a wide black border containing two rows of white spots and has a wingspan of 10 cm. This butterfly exists primarily wherever milkweed and wildflowers grow and can include abandoned farmland, along roadsides and other open spaces. The distribution of the Monarch has gradually shifted eastward over the past century, due to a combination of clearing of deciduous forests in eastern US and southeastern Canada. Increasing use of herbicides is another significant threat.

Harlequin Duck

The Harlequin Duck (*Histrionicus histrionicus*) is a small subarctic sea duck. The Harlequin Duck will spend most of the year in coastal marine environments, but will move inland each spring to breed along fast flowing turbulent rivers. In Newfoundland, the ducks do not migrate very far. Many winter on the east and south coasts of Newfoundland and along the north shore of the Gulf of St. Lawrence. Threats to the Harlequin include the destruction, alteration and contamination of their habitat due to human activities such as hydro projects. Oil spills and chronic oil pollution are major threats to the ducks wintering habitat. The Harlequin Duck is has been listed as Special concern by both the COSEWIC and the SARA (Schedule 1).

Boreal Felt Lichen

The Boreal Felt Lichen (*Erioderma pedicellatum*) has been designated by COSEWIC as Special Concern. It is also pending public consultation for addition to Schedule 1 of the SARA. This Lichen grows on the branches or trunks of Balsam fir, Black Spruce, White Spruce and occasionally Red Maple. It is normally 2-5 cm in diameter, with the edges of the body slightly curled. Colour of the lichen is normally appears bluish grey or dark grey to grayish brown. In Canada, there are two populations of the Lichen: Newfoundland and Nova Scotia/New Brunswick. The greatest threat to the Boreal Felt Lichen is logging, followed by air pollution, pesticides and possibly climate change.

Greenland Sandwort

The ACCDCs have listed the Greenland Sandwort (*Minuartia groenlandica*) as an 'S3' (Uncommon throughout its range in the province or found only in a restricted range with 21 to 100 occurrences). While not listed under the SARA, it is ranked as "Sensitive" by the General Status Initiative, with possible SARA listing in the future. The genus is widely distributed, being native in Asia, Europe, and North America, however, its range is restricted to the south coast in Newfoundland. It lives only in very rocky and barren areas, with an extremely sparse plant cover (i.e. rocky ledges and stony soil). It is a small flowering plant and very little is known about their biology. They are adapted to habitats that might be blown clear of snow in the winter, with the plants being able to withstand extremes of wind, freeze and thaw, and desiccation. Plants adapted to such extreme habitats are often slow growing, with low reproductive potential. While some species of extreme environments are known to tolerate and even require disturbances, such as frost boils, this species of concern is not known to be among them.

Golden Heather

The ACCDCs have listed the Golden Heather (*Hudsonia ericoides*) as an 'S2' (Rare throughout its range in the province, with 6 to 20 occurrences). The genus is widely distributed throughout North America, however, its range is restricted to the south coast in Newfoundland. While not listed under the SARA, it is ranked as "Sensitive" by the General Status Initiative, with possible SARA listing in the future. It lives only in very

rocky and barren areas, with an extremely sparse plant cover (i.e. rocky ledges and stony soil). It is a small (8-15 cm tall) evergreen heath-like plant with yellow flowers and very little is known about their biology. They are adapted to habitats that might be blown clear of snow in the winter, with the plants being able to withstand extremes of wind, freeze and thaw, and desiccation. Plants adapted to such extreme habitats are often slow growing, with low reproductive potential. While some species of extreme environments are known to tolerate and even require disturbances, such as frost boils, this species of concern is not known to be among them. The Golden Heather may be vulnerable to extirpation due to its rarity.

3.4 Aquatic Environment

3.4.1 Freshwater Environment

The freshwater habitat in the immediate project area includes a small stream system containing 4 shallow ponds, and a fast-running, narrow stream (named T1) emptying into the Belleoram Barasway. An estimate of the monthly flows and flow duration for stream T1 were calculated by prorating nearby gauged streams. The mean annual runoff (MAR) mapping for Newfoundland was also reviewed for an estimate of the runoff for the T1 area. The following assumptions were made for determining the mean flow monthly flows and duration curve:

- The MAR is 1000 mm for the T1 drainage basin; and
- The flow pattern is similar to Little Barasway Brook on Burin Peninsula.

Table 3.2 presents the estimated monthly flows and Figure 3.3 presents the flow duration curve. As shown, the monthly flows are relatively low as the drainage area of the stream is only 10.84 km². The results also show that the stream has relatively low flows in July and August (i.e. summer low flow).

Fish and fish habitat surveys of the T1 stream and the 4 associated ponds were conducted between September 12 and October 19, 2006, including electrofishing surveys (September 12-14), stream habitat quantification (October 14-15), and pond habitat quantification (October 13-19). The stream habitat was classified in both the Beak as well as the new proposed classification system (Table 3.3). A series of electrofishing stations within the stream, as well as fyke net and minnow traps within the ponds were completed over the sample period. In total, only resident brook trout were captured. Electrofishing stations yielded stream population estimates of 19.16 (95% CI of 18.20-23.29) and 27.32 (5% CI of 23.41-36.61) brook trout per 100m² of habitat. In general, the habitat is high gradient with large substrate and primarily consists of rearing and migratory habitat (i.e. Type II/III).

The local freshwater system contains four 4 shallow ponds (Figure 2.1), ranging in depth from 0.6 m to 1.6 m. Their surface areas are 2.9 ha, 0.16 ha, 0.55 ha, and 1.8 ha for

Table 3.2: Belleoram Brook estimated monthly flows (prorated by MAR from Little Barasway).

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
1987	0.16	0.15	0.40	0.59	0.18	0.10	0.03	0.01	0.10	0.56	0.55	0.29	0.26
1988	0.19	1.25	0.72	0.44	0.18	0.52	0.27	0.05	0.15	0.32	0.49	0.28	0.40
1989	0.63	0.36	0.23	0.72	0.12	0.11	0.07	0.07	0.33	0.33	0.60	0.43	0.33
1990	0.50	0.45	0.42	0.63	0.32	0.46	0.05	0.05	0.10	0.49	0.33	0.58	0.36
1991	0.10	0.43	0.45	0.24	0.13	0.09	0.02	0.02	0.15	0.39	0.50	0.44	0.24
1992	0.28	0.16	0.77	0.26	0.41	0.10	0.20	0.06	0.16	0.29	0.21	0.43	0.28
1993	0.13	0.54	0.52	0.73	0.50	0.26	0.24	0.17	0.28	1.08	0.54	0.53	0.46
1994	0.47	0.12	1.12	0.73	0.46	0.21	0.03	0.04	0.38	0.30	0.71	0.46	0.42
1995	0.56	0.16	0.89	0.36	0.06	0.07	0.08	0.03	0.48	0.14	0.66	0.32	0.32
1996	0.27	0.29	0.24	0.13*	*	*	*	*	*	*	*	*	*
average	0.33	0.39	0.57	0.48	0.26	0.21	0.11	0.06	0.24	0.43	0.51	0.42	0.34
min	0.10	0.12	0.23	0.13	0.06	0.07	0.02	0.01	0.10	0.14	0.21	0.28	0.24
max	0.63	1.25	1.12	0.73	0.50	0.52	0.27	0.17	0.48	1.08	0.71	0.58	0.46

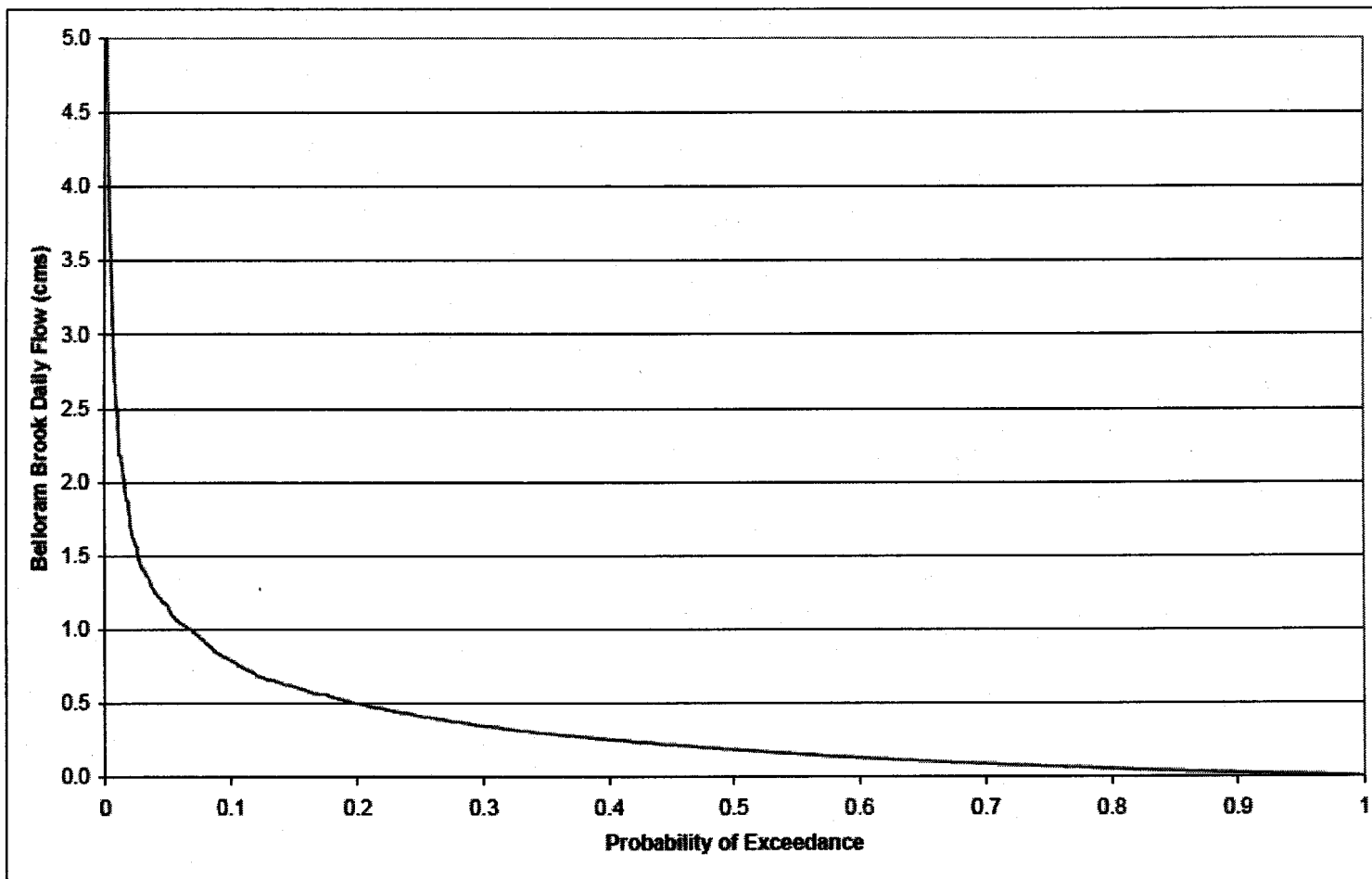


Figure 3.3: Belleoram Brook flow-duration curve prorated by MAR from Little Barasway (02ZG005).

Table 3.3: Summary of Beak and Proposed New Classification system, Belleoram Stream (T1).

Classification	Units (1Unit =100 m²)	Total Length(m)
New Classification		
Riffle	31.56	488.3
Run	45.74	529.0
Cascade	44.42	539.7
Pool	0.65	27.0
Rapid	0.00	0.00
Beak		
I	0.00	0.00
II	50.50	648.3
III	71.22	908.7
IV	0.65	27.0

Ponds 1-4, respectively. The shorelines of the ponds are comprised mainly of cobble, rubble, and boulders, with their bottoms being covered with muck and detritus. Emergent vegetation is evident in the shallow areas of Ponds 3 and 4.

3.4.2 Marine Environment

Belleoram is located on the south coast in Fortune Bay. The Fortune Bay area supports moderate lobster, scallop, and ground fish. The region also supports a number of aquaculture sites with the closest to the project being a distance of approximately 2 km. The physical shoreline environment in the area of the proposed wharf consists of grass, small trees and a marshy area with no previous construction. The bathymetry from the shore has a slope of approximately 45 degrees and drops to a depth of 15 m at a distance of approximately 15 m from the shore. The presence of benthic habitat and species has been surveyed and a detailed habitat report is pending. Consultation with locals indicates the area for the proposed wharfing facility is not fished for lobsters. The shipping route from the loading dock to the mouth of Fortune Bay sees no concentrated commercial fishing effort, although there are some seasonal fishing activities in the area (Personal Communication: Stuart May and Barry Fiander, 2006; Cooke Aquaculture, 2007). Historically there has not been any conflict between commercial shipping and fishing vessels.

3.5 Land Use

The proposed project area is comprised mainly boreal forest approximately 4 km north of the Town of Belleoram. There has been historically very little land use in the area due to its difficult terrain and lack of access. One small footpath exists along the shoreline that allows access to the, with a narrow foot bridge crossing the stream T1 at the northern boundary of Phase 1. Fishing in the ponds and stream on-site are non-existent. No commercial silviculture occurs in the area; with residents historically removing some trees for firewood near the ponds and the southern boundary of the site. It has been noted that local residents occasionally use the area for hiking (by means of the small foot path), with infrequent small game hunting as well. However, the rugged terrain limits the site's appeal for hunters, and those who do come to the area represent a small portion of the local population.

No cultural or heritage sites have been identified within the project area and no ecological reserves or areas of concern are in its immediate vicinity. There are also no aboriginal land claims or traditional hunting, gathering, or burial grounds associated with the site.

3.6 Socio-economic Environment

3.6.1 Cultural Characteristics

Belleoram is much like many other rural Newfoundland town, with roots as a close-knit fishing port which has been negatively affected by the Cod Moratorium of the early 1990's. The Town's community centre is a hub for dances, bingo, and recreation activities. The annual Ironskull Folk Festival held within the Town of Belleoram was started in 1992 and is a venue for many Newfoundland artists to display their talents to fund the Town's new community centre. The Belleoram Legion was started in 1965 and served 76 members in the area from Rencontre East to Wreck Cove. However, the Legion eventually closed its doors in 1988 and the premises was sold and is now an arcade. Since the closure of the Legion, town council and the Loyal Orange Lodge (an active group that provides services to members who are sick), now carry out Remembrance Day services. The service is held mainly at the war memorial monument site at the old cemetery situated within Belleoram. The Town also looks after the grounds in which the monument is located.

The only remaining church in Belleoram is the Anglican Church, built in 1891, and also serves as the parish for the surrounding towns of St. Jacques, English Harbour West, Rencontre East and Mose Ambrose. It is home to the Anglican Church Womens Organization whose 26 members raise funds for the church and also care for senior citizens, shut-ins and the sick.

Other features of the town include a 22 member volunteer fire department, which also provides services to communities from St. Jacques to Wreck Cove. All kindergarten to grade 12 students attend FitzGerald Academy, as St. Lawrence Elementary School was closed in 1999 due to diminished enrollment. There is a library that was started in 1994, which serves twelve communities along the coast and schools in Belleoram, Pools Cove, and English Harbour West. The Fortune Bay North Family Resource Center officially opened in June 1994 and is dedicated to the development, administration and the delivery of services that promote the health and well-being of young children in the Fortune Bay North Region. Finally, The Cluett House, which was built in 1844 by John Cluett, Sr. and John Cluett, Jr., is now a town-operated historic home used to educate people on what life was like when the town was first settled.

3.6.2 Economic and Social Characteristics and Conditions

The 480 inhabitants of Belleoram (Census, 2001), and the immediate surrounding area, occupy 50 individual homes and have historically been employed in the fishing industry or related businesses (Note: all census information reported illustrates the most recent data provided by Statistics Canada). The town has seen a 15% decrease in population since 1996, due to out-migration caused mainly by the collapse of the region's fishery. In 2001, 33% of the population was under 20 years of age, and 8% was 65 years old or

older. Mean income for every man, woman, and child (personal income per capita) in 2004 was \$9,800 (Provincial mean being \$20,600), with 150 people collecting Employment Insurance at some point in the year. Census 2001 reported 74% of people over 20 years of age do not have a high school diploma (province-wide it is 40%). Many young people move away after finishing high school to obtain a post-secondary diploma or to seek work. Some retired workers have returned to make Belleoram their retirement home.

Many people work in the number of small businesses in the area, including: real estate, grocery and convenience stores, a recording studio and arcade. The fishery is still its main employer, with the old fish plant having been converted to a scallop hatchery in 1995 (employing 5-7 people). Belleoram Harbour is home to a small lobster business that collects lobsters from surrounding waters, and also services numerous cod fishing vessels who also dock within the harbour. The outlook for the Town has recently improved with new aquaculture sites being established in Fortune Bay (four existing farms and two proposed, (Figure 3.4), with farm boats using Belleoram Harbour for the daily transport of feed, supplies and fish. Residents of the town are also excited about the prospect of the quarry opening and it is thought the town and surrounding communities will have enough workers to satisfy its staffing demands (Personal Communication: Steward May; Mayor of Belleoram, 2006).

3.7 Human Health and Safety

The proposed project area is a low density rural setting with a local population of 480 (2001 Census). The majority of the land outside of the Town of Belleoram is undeveloped wilderness. There is very little human-generated noise in the area, with no industrial or heavy equipment operations currently underway. The air quality in the region is good, owing to a lack of industrial emission sources, the climate supporting good particle dispersion, and through infusions of relatively clean oceanic air masses from the North Atlantic Ocean. This good air leads to a low incidence of respiratory illness in the region.

The rate of smoking (current daily smokers) in the region in 2001 was 24%, being in-line with the provincial rate of 25%. The percentage of people who were overweight (body mass index greater than 27, the Canadian Standard) in 2001 was 45% (provincial rate was 39%). The highest percentage (19%) of hospital admittances during the period 1994 to 1999 for Belleoram was due to diseases of the digestive system. With many residents involved in the fishing industry, the potential for accidents is high among the population. The port is active, servicing the commercial fishing, aquaculture, and transport industries. The nearest medical clinic is The Bay D'Espoir Medical Clinic located in St. Alban's, with the nearest hospital being in Harbour Breton. The town of Belleoram has its own 22 member volunteer firefighting unit.

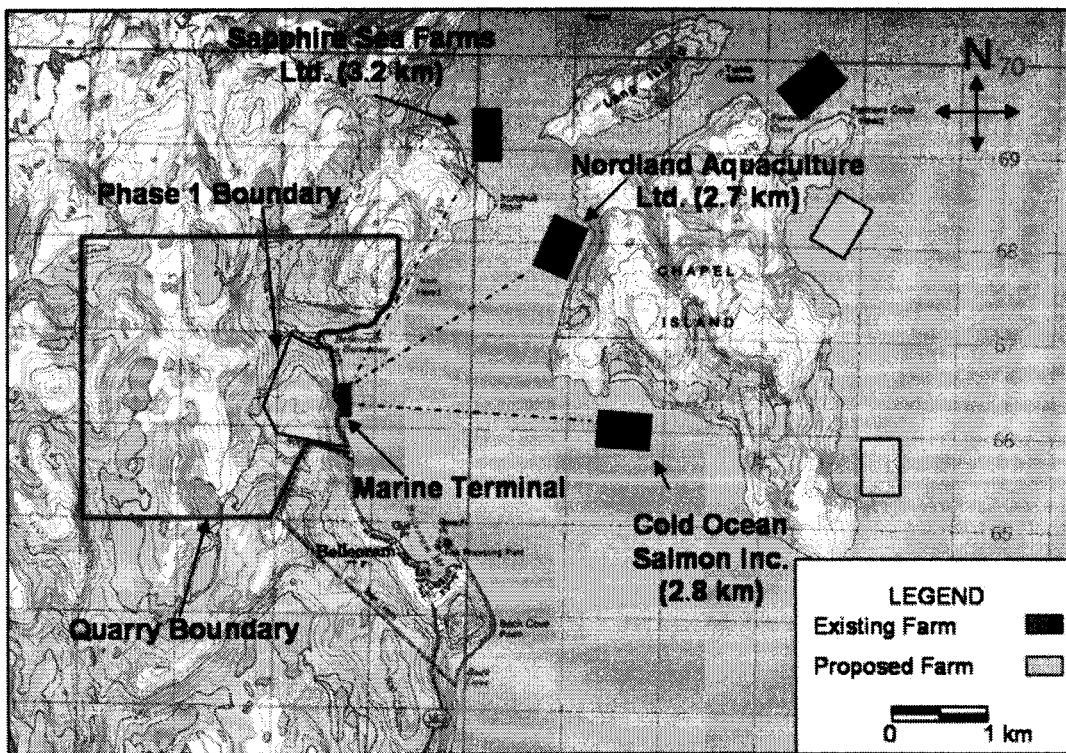


Figure 3.4: Locations of local fish farms in relation to Phase 1 activities. Locations and distances are approximations based on the best available mapping and data. Distances indicated are estimations of the nearest distance any aquaculture site is to the quarrying operations of Phase 1. Aquaculture site mapping obtained from the Newfoundland and Labrador Aquaculture GIS database.

3.8 Aboriginal Land Issues

There are no aboriginal land claims, traditional hunting or gathering areas, or burial grounds within the project area. However, Continental Stone invites any local aboriginal community members to take part in the Local Special Interest Committee (Section 2.2.7) to voice their comments of concerns with regards to the proposed project.

4.0 POTENTIAL INTERACTIONS

While the ultimate quarry output will be granite aggregate for international markets, several residual products and effluents may be produced as a result of the production activities. These potential outputs are listed here along with their potential interactions with the environment and standard mitigations. Any specific issues with respect to these output sources and the identified Valuable Ecosystem Components (VECs) are outlined in following sections.

- 1) **ANFO (Ammonium Nitrate/Fuel Oil)** - The use of ANFO explosives has the potential to produce ammonia blast residue in the pit water and waste rock drainage. Although elevated levels of ammonia are toxic to some aquatic life, all drainage will be directed to the settling ponds for bio/chemical-degradation of residual ammonia. Water quality monitoring will be employed to ensure discharge from the settling ponds complies with all regulatory limits.
- 2) **Dust** - Dust emissions from the quarry will result from blasting, aggregate transport, and vehicle movement throughout the site. Bore hole collars will be filled with 20 mm clean crushed stone to help suppress dust and gases during blasting. Should dust become a problem, water trucks will be used to moisten surfaces and keep dust down.
- 3) **Site Runoff** - Effluent Site runoff will be directed to vegetated areas within the project boundaries, which will filter any potential suspended solids. Washwater from aggregate washing will be directed to industry approved settling ponds constructed to allow silt and other suspended solids to precipitate out. Cleared water from these ponds will be recycled back into the aggregate cleaning process. All water releases will meet the regulatory requirements of the *Environmental Control (Water and Sewage) Regulations* and provincial permits.
- 4) **Accidental Fuel Spills and Hydrocarbon Fuel Storage** - Machinery must be checked for leakage of lubricants or fuel and must be in good working order. Refueling must be done at least 30 m from any water body over non-permeable materials. Basic petroleum spill clean-up equipment should be on-site, with adsorbents being used to recover any hydrocarbon sheen in the pit water. All spills or leaks should be promptly contained, cleaned up, and reported to the 24-hour environmental emergencies report system (1-800-563-9089). There will be no on-site bulk storage of fuel or oil, and all fuel handling is to comply with the *Storage and Handling of Gasoline and Associated Products Regulations*.

Any waste oil generated will be handled, stored, and disposed of by a licensed disposal agent in accordance with the *Used Oil Control Regulations*.

5) **Sewage** - Sewage from bathroom facilities within the office/laboratory building will be collected and stored in an industry approved above-ground Blivet™-style system. Portable outdoor toilet facilities will also be onsite, each with self contained storage tanks. All holding tanks will be emptied by pump truck on a regular basis by a licenced contractor and disposed of in a government-approved waste management facility. All waters disposed of on the proposed site will comply with the *Environmental Control (Water and Sewer) Regulations*.

6) **Waste and Litter** - During operation, domestic garbage will be collected and hauled to the incinerator operated by Belleoram in accordance with the *Waste Material Disposal Act*. Any food or organic garbage onsite will be held in animal-proof containers to prevent attracting bear, fox, birds, or other wildlife.

7) **Air Emissions**- All construction equipment must be fitted with standard and well-maintained emission control and noise suppression devices. Dust control measures will be applied as appropriate and as described in the BMP Handbook. All activities will be carried out in accordance with the *Air Pollution Control Regulations*.

8) **Noise** - Noise from vehicles, blasting, crushing/screening equipment, small machines, and shipping has the potential to affect humans as well as local wildlife. All equipment is to be fitted with standard noise suppression devices and be in good working order. Procedures and protocols related to blasting and shipping will include mitigations to decrease the sounds generated from these activities. Local residents should not be significantly affected by quarry-related noise, due to the remoteness of the quarry (4 km from Belleoram). All operations will adhere to the *Occupational Health and Safety Regulations* under the *Occupational Health and Safety Act*, with all employees using proper personal protective equipment (e.g. ear protection, blast shields)

4.1 Valued Ecosystem Components (VECs)

In order to predict the potential effects of the project on the environment, it is important to focus the assessment. To do this, the "Environmental Components" (i.e. the various aspects of the biological, physical, and social environment) are determined for the area of interest. These Environmental Components can refer to a physical feature (i.e. vegetation), a process (i.e. biodegradation), or a condition (i.e. biodiversity). "Valued Ecosystem Components" (VECs) are the Environmental Components that exist in the area and therefore could be effected by the project. This document will address all VECs pertaining to Continental Stone's proposed quarry Project with respect to their legal, scientific, ecological, cultural, economic value.

The following is a list of identified VECs that will be considered in this environmental assessment.

- Soil/Sediment Quality and Transport
- Atmospheric Conditions
- Vegetation and Wetlands
- Terrestrial Wildlife and Habitat
- Land Birds and Waterfowl
- Marine Birds
- Species at Risk
- Human Health and Safety
- Navigation/Marine Safety
- Land Use
- Acoustic Disturbances
- Fish and Fish Habitat
- Aquaculture and Commercial Fisheries

The environmental assessment methodology to be used by the proponent will include the following:

- 1) Describe the potential interactions between the Project and each VEC.
- 2) An overview or study, as appropriate, for each of the VECs, in order to describe the actual conditions in the study area (i.e., baseline conditions).
- 3) Prediction of environmental effects.
- 4) Identification of mitigation that can be used to avoid or minimize adverse effects on the environment.
- 5) Identification and assessment of cumulative residual (i.e. still remaining) and cumulative effects (to be discussed in Sections 4.2 and 4.5, respectively).
- 6) A description and implementation procedure for a follow-up program (see Section 4.7).

Residual Impact Significance Criteria

The terminology used to describe a residual impact should be clear, objective, and easily understood. This section provides criteria for evaluating the significance of residual environmental impacts (negative or positive). Precise definitions for the ranking of residual environmental impacts, where applicable, are used in this CSR, as follows:

A **Major (significant)** residual environmental impact is one affecting a whole stock or population of a VEC in an area in such a way as to cause a change in abundance and/or change in distribution beyond which natural recruitment (reproduction and immigration from unaffected areas) would not return that population, or any populations or species dependant upon it, to its former level within several generations.

A **Moderate (significant)** residual environmental impact is one affecting a portion of a population in an area that results in a change in abundance and/or distribution over one or more generations of that portion of the population, or any populations or species dependant upon it, but does not change the integrity of any population as a whole; it may be localized. A change in habitat (including food sources) that produces the same result in populations would be moderate

A **Minor (not significant)** residual environmental impact is one affecting the population or a specific group of individuals in a localized area and/or over a short period (one generation or less), but not affecting other trophic levels or the integrity of the population itself.

A **Negligible (not significant)** residual environmental impact is one affecting the population or a specific group of individuals in a localized area and/or over a short period in such a way as to be similar in effect to small random changes in the population due to natural irregularities, but having no measurable environmental effect on the population as a whole.

4.1.1 Soil/Sediment Quality and Transport

Potential Interactions

Construction and operational activities of the quarry have the potential to affect the surrounding terrestrial, freshwater, and marine environments by altering the soil and sediment characteristics of the area. Phase 1 of the quarry project is located adjacent to the ocean shore and also contains the lower end of a small stream/pond system which flows into the Belleoram Barasway, with the land being mostly boreal forest. The remainder of the 900 ha outside Phase 1 contains similar terrestrial habitat with several fresh waterbodies totaling an area of approximately 75 acres. Potential effects on soils and sediments include:

- Erosion related to altered/damaged terrain;
- Metal leaching and acid rock drainage from disturbed rock;
- Chemical contamination from fuel/oils spills or explosive residues; and
- Alteration of marine sediment dynamics.

Mitigative measures for the above interactions have been designed to minimize their effects, but more importantly, to reduce/prevent any releases into the environment. An overview of mitigative measures is outlined below, and will also be provided in the EPP (see EPP 'Table of Contents' in Appendix B)

Mitigative Measures

Erosion and Runoff

Clearing of trees and overburden within the quarry's boundary has the potential to increase overland flow to the surrounding areas due to a decreased infiltration capacity of the ground material (soil vs. rock). This is of particular concern in this area, with the presence of steep slopes and the wet conditions in the region. During the construction phase, siltation control structures (i.e. silt curtains, cofferdams, and sediment fences) will be constructed prior to beginning any activities involving disturbance of the soil, work along the shoreline, or near areas of high runoff potential. Construction activities will be coordinated to avoid periods of heavy precipitation and not coincide with sensitive periods for fish and wildlife (when possible). Mitigative measures will be implemented prior to any grubbing or excavation to direct any natural drainage around work areas, avoiding sediments above ambient suspended particle concentration in runoff waters.

Soil disturbance will be minimized by limiting the area exposed at any one time, stabilizing exposed soil with anti-erosion devices (i.e. rip rap, filter fabrics, gravel or wood chips) and revegetating disturbed areas where possible. Grubbing of the organic vegetation mat and/or the upper soil horizons will be restricted to the minimum area required. The organic vegetation mat and upper soil horizon material that has been grubbed will be spread in a manner so as to cover inactive exposed areas. No soils are to be exposed for more than 30 days. Further, a 50 m buffer zone of undisturbed natural vegetation between construction areas and all waterbodies will be maintained to prevent sediments from entering local waterways.

Runoff will be directed to vegetated areas (natural or constructed) within the project boundaries to slow flow, and allow particles to precipitate out. A decreased flow rate also reduces the erosion potential of the runoff water, effectively mitigating the chance of further washouts. Aggregate stockpiles will be sloped and compacted in such a way as to prevent water accumulation. Washwater from aggregate washing will be collected and sent through an enclosed steel pipeline to industry approved settling ponds. This will significantly reduce fugitive water effluents from the site into the surrounding environment, with the washwater recycled from the settling ponds back into the operations to decrease the drawdown from local ponds (with a predicted recovery of 90%).

Sediment releases to the marine environment are expected to be low due to the implementation of the above mitigative measures. Suspended solids concentrations within any effluent from siltation control structures entering marine waters will not exceed 25 mg/L (monthly average) or 50 mg/L (grab sample) as per Section 36 of *The Fisheries Act*.

Marine Waters

Any infilling or dredging activities within marine waters will be conducted in strict compliance with all authorizations and/or permits as required all federal and provincial agencies. Blasted rock from the quarry site will be used for infilling, with armour stone be placed progressively to minimize erosion and prevent the loss of infill material. Silt curtains will be put in place around marine activities to prevent sediment from entering the water column outside work areas. The silt barrier will be attached to a flotation boom and extend from the sea surface to 1-2 m from the sea bottom. Seabed sediment removed during dredging activities will be placed on barges while inside the silt curtain, and removed for disposal on land. Heavy equipment will only be used from dry, stable, areas or barges specifically designed for that purpose; with heavy equipment not operating from barges completing work below the high water mark during low tide. Further, timber used for construction in or near marine waters will consist of wood treated with preservatives safe for use in the marine environment or is to be left untreated.

Leachate, Chemical and Spills

Quarrying operations may lead to chemical losses to the surrounding terrestrial and aquatic environments. Preliminary testing has shown that the area does not contain any natural acid-rock potential, eliminating the possibility of increased acidity of soils and local waters as a result of quarrying activities (a geological survey has been conducted at the site, with the report still pending). However, runoff has the potential to contain hydrocarbons from fuels/oils/greases, detergents from cleaners and ammonia from explosive residues, which can all affect wildlife. Due to the toxic nature of these substances, the best mitigation is to be proactive and prevent potential losses; with adherence to proper handling, use, and storage guidelines for all dangerous or toxic substances.

Hydrocarbon releases from machinery and vehicles can be minimized through regular maintenance to ensure they are in good working order and thoroughly checked for leakage. However, only minor repairs and maintenance of 'non-mobile' equipment (such as drilling and crushing equipment) will be performed on-site. All other major repairs will take place offsite at an approved facility. Fuel, and other hazardous substances, will only be handled, stored, or disposed by persons who are trained and qualified to do so in accordance with the manufacturer's instructions (such as Material Safety Data Sheets) and governmental laws and regulations (e.g. *Storage and Handling of Gasoline and Associated Products Regulations; Used Oil Control Regulations*). Procedures will include:

- Having operators present for the duration of refueling;
- Refueling equipment and vehicles at least 30 m from any water body, and over a non-permeable surface;
- Having basic petroleum spill clean-up equipment on-site, with adsorbents being used to recover any hydrocarbon sheen in pit water;

- Promptly containing, and cleaning up, all spills or leaks on land or in water and Reporting them to the 24-hour environmental emergencies report system (1-800-563-9089) as required by Environment Canada;
- Allowing no on-site bulk storage of fuel or oil;
- Not disposing of wastes in-or-near waterbodies, with no burning of waste without a permit
- Routine water testing as per criteria listed in Schedule A of the *Environmental Control Water and Sewage Regulations (2003)*, under the *Water Resources Act*, before discharging from the settling ponds.

All water releases will meet the regulatory requirements of the *Environmental Control (Water and Sewage) Regulations* and provincial permits. No untreated sewage is to be released, with it being collected and stored in a Blivet™-style containment system and disposed of by a licenced contractor.

Explosive Chemicals

The quarry will use a Dyno Gold bulk emulsion explosive, containing ANFO (Ammonium Nitrate/Fuel Oil). This type of explosive, like all explosives, contains ammonia (ammonium) that has the potential to be released into the water from contaminated shot rock, through spillage, incomplete detonation, and through pit drainage/runoff. The toxicity of ammonia varies with pH and temperature, with lower temperature and pH causing an increase in the toxicity of free ammonia (Wiber *et al.* 1991). In aqueous solutions, ammonia exists in two forms: free ammonia which carries no ionic charge (NH₃), and ammonium which carries a positive charge (NH₄). The free ammonia is the more toxic of the two, and converts hemoglobin to methaemoglobin which impairs oxygen transport in animals (Wiber *et al.* 1991).

Runoff potentially containing explosive residues (ammonia levels greater than 2.0 mg/L, as per Schedule A of the *Environmental Control Water and Sewage Regulations*) will be directed to the settling ponds, or, if this is not feasible, it will be sent to designated vegetated areas. This will allow for natural decomposition/dilution of nitrogenous compounds (ammonia). The decomposition is achieved during anaerobic (low oxygen) conditions by denitrifying bacteria (Postgate 1998). This results in bound nitrogen being converted to nitrogen gas and returned to the atmosphere. These bacteria are often associated with plant roots (Rhizobium bacteria), such as those of ferns, and also can form symbiotic relationships with fungi and lichens (Postgate 1998). Therefore, directing runoff to areas with these plant species, whether naturally occurring or planted, will remove any excess ammonia from the runoff water and soils. Further, fish loss is prevented as harmful ammonia will be converted to nitrates, which are not toxic to fish in ambient concentrations, prior to entering any waterbody.

In light of the hazards involved with ammonia release, measures will be put into place to prevent its release (see Section 2.2.3) and they will be incorporated into the quarry's EMP. Blasting will be done in accordance with the *Aggregate Operators Best*

Management Practices Handbook for British Columbia, Volume 2 (2002) which will ensure a sound environmental framework is adhered to. Further, Wright Hopky's *Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters* have also been incorporated into the blasting operations as well. By following these guidelines, and the regulatory framework of *The Explosives Act*, nitrogen releases from the quarry are expected to be minimal.

Land Reclamation

As quarrying is completed on portions of the property, the area will be "reclaimed" in order to revert the land back to its previous state as much as possible. Reclamation is accomplished by filling the land in with overburden cleared from active project areas and regrading and revegetating as soon as quarrying activities cease. This will eliminate the chance of further degradation of the site, which could result in repeated sediment and chemical losses from former quarried areas. Reclamation measures will also include soil testing in areas previously used for repeated refueling or for temporary fuel/explosives storage, with all contaminated soils excavated and disposed of in a government approved hazardous waste disposal facility.

Residual Impact

By implementing the outlined mitigations, effects of the quarry's construction, operation, and decommissioning on the soils and sediment (and related resources) are predicted to be **Non-Significant**. Accidental events such as a fuel/chemical spills, failure of runoff containment structures, and/or fires are predicted to have non-significant residual environmental effects on the soil, including cumulative effects. All outlined mitigations and reclamation protocols will be documented in the Project's Contingency and Emergency Plans and EPP.

4.1.2 Atmospheric Conditions

Potential Interactions

There is a potential for the generation of airborne particles as a result of blasting events, fugitive dusting from aggregate storage piles, the operation of vehicles, or during quarrying operations (crushing, screening, conveying and transporting aggregate). The operation of construction equipment, vehicles, and diesel-powered crushers/screeners will also lead to exhaust emissions being released from the site. The potential effects related to alterations of the atmospheric environment include:

- Human health concerns;
- Environmental effects, including increased siltation in freshwater and marine ecosystems;

- Increased exhaust emissions; and
- Effects on air quality from potential accidents or malfunctions.

Mitigative Measures

Meteorological Conditions

Climate in the area supports good dispersion of airborne particles and the frequent rainfall helps dilute those particles in the air. This wet climate has a winter season that typically lasts for 4 months, with snow cover resulting in surface saturation, thus little background particulate matter is expected. Air quality is also enhanced by the infusion of relatively clean, oceanic air masses from the North Atlantic Ocean. Winds on the south coast of Newfoundland blow predominantly from the west/south-west (Figure 3.1) however, local conditions at Belleoram have a great effect on their direction. This is evident in the channeling effect between Belleoram and Chapel Island, which forces winds to the north/north-west. Therefore, the majority of airborne dust would be directed away from the Town of Belleoram and local aquaculture sites. The topography of the area also acts to shelter the quarry site, by slowing winds (Bowyer and Gray 1995). This will generally reduce the distance dust released from the quarry will travel; localizing any airborne particles.

Dust Emissions

Dust emission during the construction phase will be localized to the areas where overburden is being cleared to allow for construction of all permanent structures. Any areas with a high dust potential will be sprayed with water to decrease the chance of particles becoming airborne while overburden is being cleared and stockpiled. The use of calcium chloride on access roads for dust suppression is to be done in accordance with all guidelines from the NL Department of Works, Services and Transportation and be stored away from water bodies. Waste oil shall not be used for dust control. Further, the phasing in of all project activities allows only active areas to be exposed, leaving much of the area with natural cover preventing soil and other particles from becoming airborne. Once active areas are cleared of all overburden (to be stockpiled), the potential for dusting will be minimal, as the land will consist only of exposed granite bedrock.

Vehicle-related dusting from the access roads will be largely confined to the construction stage while large trucks transporting equipment. Once construction is completed, the dusting potential will be low, as the majority of on-site vehicles will be company cars and small trucks following designated roadways. Further, wet conditions common to the area greatly decrease the amount of dust that will be released as a result of vehicle movement, making it an insignificant source of dust emissions. The decision to use a marine terminal and bulk carriers, instead of dump trucks, to transport the aggregate also greatly decreases the potential for dust emissions. The bulk carrier will be loaded once a week via a ship loader fed by covered conveyor belts at the marine terminal. This allows for a single point source of dust due to aggregate transporting, instead of the huge number of

trucks that would be required to transport the same amount of product; each being a dust point source during loading and transportation.

The majority of dusting during operations will be localized to the vicinity of the crushing, screening, and loading equipment. Therefore, dust suppression procedures will be implemented in these areas to comply with the NL *Criteria for Acceptable Air Quality* (which allows a total suspended particulate concentration of 80 µg/m³ and 120 µg/m³ for 1 hour and 24 hour exposure, respectively). The primary dust measures will include spraying all equipment and the areas around them with water to minimize airborne dust. Also, aggregate washing will greatly reduce fugitive dust emissions from the crushed rock product itself. Once crushed, the aggregate will be washed and screened (essentially cleaning the rock) removing any soil, silt, or fine particles that have adhered to the stone. The sediment-laden washwater will be directed to settling ponds to allow accumulated particulate matter to precipitate out in a controlled environment. This effectively contains any fine particles, rather than having them dispersed while conveying/loading the product. Settling ponds will be regularly dredged to remove accumulated silt, with the material being stored properly and used as fill for ongoing restoration projects at the quarry site.

Exhaust Emissions

Exhaust from construction and operation of the quarry will be a small source of atmospheric pollution related to vehicle exhaust and diesel powered crushing/screening equipment. All construction and operation equipment will be well maintained and fitted with standard exhaust suppression devices to keep emissions at a minimum. The use of heavy equipment will peak during construction, with large trucks transporting building materials and equipment for the construction of the permanent structures on-site. These vehicles will be mainly diesel powered, and will comply with the NL Regulation 39/04 *Air Pollution Control Regulations* 'Visible Emissions Standards'. These standards require diesel vehicles to meet SAE J1667 (Snap Acceleration Smoke Test Procedure for Heavy-Duty Diesel Vehicles; a measure of combustion efficiency) targets of visible emissions of 40% for 1991 model vehicles and newer, and 55% for 1990 model vehicles and older.

Once construction is complete, and the quarry is operational, the use of heavy trucks will be limited. During operation, exhaust emissions will result mainly from crushing equipment, company cars and small trucks, and gas-powered tools used on site. Employee personal vehicles will not be onsite, with all personnel transported via well maintained company-owned trucks. As with the heavy vehicles, diesel powered crushing equipment (which may be a combination of diesel and electric power) will comply with the *Air Pollution Control Regulations* and be maintained for efficient operation. Chain saws and other small equipment will be regularly maintained and in good repair to ensure exhaust emissions are minimal.

Blasting Protocol

Since the ground material in the area is predominately granite, with overburden being cleared prior to blasting, the amount of dust escaping after a blast will be small and localized. Due to granite's high density, particles ejected by a blast will be restricted to the vicinity of the quarry site, with very little blow-over to the neighboring land or water. Continental Stone's blasting protocol was designed to be effective and efficient, which will help minimize dust emissions resulting from a blast.

Blasting will be done in accordance with the *Aggregate Operators Best Management Practices Handbook for British Columbia, Volume 2 (2002)* which will ensure a sound environmental framework is adhered to. Further, Wright Hopky's *Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters (1998)* have been incorporated into the blasting operations (as well as the EPP). These guidelines outline best-practice measures in terms of all environmental effects, including dust suppression. Continental Stone's drilling/blasting protocol (see Section 2.2.3) has incorporated dust suppression mitigations, including:

- Requiring dust suppression and/or collection equipment during drilling, such as using drills equipped with either a vacuum dust collection system or a water injection dust suppression mechanism;
- Plugging all bore holes with 3 m collars of 20 mm, clean, crushed stone to trap gases and dust during blasting; and
- Adjusting blast timing such that every blast is as effective as possible allowing for efficient use of explosives.

Human Health

The proposed quarry site's 4 km distance from the nearest Town of Belleoram, and its down-wind trajectory, make the probability of human health effects related to air quality within the town very low. Exhaust emission are expected to be minimized by maintaining the good working condition of all equipment and adhering to all provincial and federal emissions standards. Quarry-related dusting will be controlled from both an environmental and occupational health and safety perspective. As previously stated, the low dust potential of the site (related to aggregate type, low overburden, and dust suppression measure), and low dispersion potential should localize any concentrations of dust to the vicinity of the crushing, screening, and loading equipment. Therefore, dust suppression procedures will be implemented in these areas to comply with the NL *Criteria for Acceptable Air Quality* (which allows a total suspended particulate concentration of 80 $\mu\text{g}/\text{m}^3$ and 120 $\mu\text{g}/\text{m}^3$ for 1 hour and 24 hour exposure, respectively). All workers will be required to wear proper dust suppressants (i.e. masks respirators) whenever hourly dust emissions exceed 80 $\mu\text{g}/\text{m}^3$ in their work areas (as per the *Canadian Environmental Protection Agency's ambient air quality guidelines*).

Accidents

While impossible to predict, the potential for accidental release of dust or other air emissions will be incorporated into a Contingency Plan as part of the EPP. This will ensure that Continental Stone adheres to the regulations pursuant to the NL *Air Pollution Control Regulations*, which state:

Where a facility has the potential for air pollution due to an unanticipated failure to operate in the normal manner due to an accident, emergency or urgent situation, a change in operating conditions, or a shut-down of a pollution control device, the owner or operator of the facility shall:

- (a) Take immediate remedial action to reduce any emissions and provide the department with the particulars of that failure, change or shutdown; and*
- (b) Provide the department in writing with the particulars of the remedial action taken under paragraph (a) and the reasons for that action as soon as it is practicable.*

However, the nature of the quarry, with its benign product, doesn't lend itself to a high risk of release of substantial atmospheric pollutant/particles. Fires resulting from equipment failures and accidents involving fuels or explosives are of the greatest concern with respect to accident-related emissions. These can be effectively mitigated by following all safety standards with respect to their storage, handling, and use. There will be no on-site bulk storage of fuel or explosives; with their handling complying with the *Storage and Handling of Gasoline and Associated Products Regulations* and the *Explosives Act*, respectively. Stored waste oil will be handled and stored by a licensed disposal agent in accordance with the *Used Oil Control Regulations*, and be regularly disposed of to prevent accumulation. Any areas with temporary storage of flammable products will adhere to the fire prevention/suppression measures outlined in the NL *Occupational Health and Safety Act* to mitigate the chance that fires can spread.

All equipment and buildings are to adhere to the NL *Fire Prevention Smoke and Fire Alarm Regulations under the Fire Prevention Act*, with proper fire suppression and alarm equipment being installed in all buildings and permanent equipment. Regular testing and maintenance will be done to ensure these systems are functioning properly. Employees are to be trained in fire prevention and suppression techniques, with drills being conducted on a regular basis. The Town of Belleoram's fire department can provide assistance if on-site fire suppression equipment is not sufficient. However, a large fire is unlikely, with no tall/large buildings, no bulk fuel storage, and mainly steel equipment. Measures to prevent forest fires shall be followed in accordance with *The Forest Fires Act*.

Residual Impact

Due to the rocktype, low overburden levels, and low blasting frequency, there is not expected to be sizable amounts of dust released from the site. Also, through the adherence to the above mitigations with respect to dust, exhaust, and fires, it is determined that dust, and all other atmospheric disturbances, will pose a transient, **Non-Significant**, impact.

4.1.3 Vegetation and Wetlands

Potential Interactions

The most obvious effect of the quarry with respect to vegetation is the clearing of the quarry site to allow for construction and operations. It is a necessity to remove all overburden and flora to allow access to the granite below. Further, the quarry's construction and operations could cause:

- The direct loss of habitat, including wetlands;
- The indirect loss or alteration of plant communities and wetlands; or
- Cumulative effects on vegetation and plant communities and wetlands.

Mitigative Measures

Clearing Procedures

To minimize the effect of vegetation clearing, it will be performed incrementally over the extent of the quarry's footprint; keeping as much habitat intact as possible. This includes leaving a 50 m buffer zone of undisturbed natural vegetation between construction areas and all waterbodies (fish habitat protection guidelines recommend a buffer width of 12 m + 1.5 x % slope; Scruton *et al.* 1997). Maintenance of access roads' right-of-way will be done on an ongoing basis, but will be restricted to their primary footprint (approximately 10 m wide). Buffer zones will be maintained along the roads (wherever possible) to ensure that vehicle activities do not interfere with the surrounding forest habitat.

Clearing activities will comply with the requirements of all applicable permits, including the Permit to Burn. Disposal of cleared unmerchantable timber, slashings and cuttings by burning shall be in compliance with the Forest Fire Regulations, Environmental Code of Practice for Open Burning, and the Permit to Burn. At no time will fires be left unattended. Merchantable or usable timber will be removed by a local contractor. Slash and any other construction material or debris will not be permitted to enter any watercourse, and will be piled above spring flood levels for later disposal.

Access Roads and Vehicles

The road will only be used by company vehicles to carry employees to and from the site, and not used by heavy equipment. All vehicle operators will be required to possess the appropriate licences with respect to operating their respective vehicles and will follow driving laws and regulations. Appropriate signs will also be posted on the main road, access roads, and road crossings to ensure proper use and decrease the chances of accidents which may affect surrounding habitats. Access roads will be for company employees and vehicles only, and will be cordoned off by means of a gate at the quarry's entrance. This will limit access and eliminate the potential for destructive unlawful usage of the land (i.e. wood harvesting, off-road recreational vehicles, and/or fires).

Erosion/Siltation Losses

Destabilization of the ground in areas prone to excess soil movement or slides (i.e. steep slopes or areas of high runoff) can lead to continued loss of vegetation. Erosion control measures have been outlined in Section 4.1.1 and have also been incorporated into the EPP. This will prevent indirect alteration of freshwater and terrestrial habitat from excess sediment loads, mechanical destruction and flooding in the area beyond the active quarry site. Sediment releases to the marine environment are expected to be low, as there will be no direct release of untreated runoff from active areas into Fortune Bay. Minimal particulate inputs from non-point sources (i.e. sporadic overland flow) entering the marine environment will be rapidly diluted, diminishing their effect to negligible levels. All releases from point sources (i.e. settling ponds) will comply with the *Environmental Control Water and Sewage Regulations*, under the *Water Resources Act*, the *CEAA* before it is discharged.

Aquatic Vegetation and Wetlands

Where necessary, runoff will be directed to vegetated areas (natural or man made) within the project boundaries, to slow flows and allow for particles to settle out. The slower flows will also have a decreased erosion potential, effectively reducing any further washouts. Vegetated areas receiving quarry runoff will first be assessed to ensure they do not contain any valuable habitat or species of concern. No runoff will be allowed to freely flow into any water body, which will ensure aquatic vegetation is not affected by sediment accumulation. Aggregate washwater will be collected and sent through an enclosed steel pipeline to industry approved settling ponds where excess sediments will precipitated out. This will significantly reduce sediment-laden water emissions from the site. Also, the cleared washwater will be recycled from the settling ponds back into the operations, decreasing the drawdown from local ponds and maintaining the local freshwater habitat.

Water extraction requirements for aggregate washing, with recycling measures in place, is expected to draw $0.00048\text{m}^3/\text{s}$ of water from the local freshwater system. An estimate of the monthly flow rates for this system was conducted (See Section 3.4.1). The anticipated water withdrawal of a fully operational quarry (up to 900 tonnes per hour),

will amount to only 0.8% of the August mean monthly flow and only 4.8% of the estimated minimum August flow (i.e. 1987). Thus, the effect of water withdrawal on the aquatic habitat in this stream/pond system is not significant and should allow for sustainability of existing vegetation.

Chemical Losses

Measure will be taken to prevent vegetation from being lost as a result of accidental toxic chemical spills or through runoff. Runoff has the potential to contain hydrocarbons from fuels, oils/greases, and detergents from cleaners, which can kill local vegetation if their concentrations are high enough. Due to the toxic nature of these substances, the best mitigation is to prevent losses. This can be accomplished by adhering to the proper handling, use, and storage recommendations for all dangerous chemicals (see Section 4.1.1). These measures will also be incorporated into the EPP. Nitrogenous compounds from blast residues will be mitigated by directing runoff from blast sites to setting ponds and controlled vegetated areas which will encourage their bio/chemical-degradation. Water quality monitoring will be employed to ensure runoff sources to the aquatic environment comply with *Environmental Control Water and Sewage Regulations*, under the *Water Resources Act*.

Land Reclamation

As quarrying is completed on portions of the property, the area will be reclaimed in order to revert the land back to its previous state to the extent possible. Reclamation is accomplished by filling quarried areas in with overburden cleared from active project areas and regrading and revegetating as soon as quarrying activities cease. This will stabilize the area and will eliminate the chance of further degradation of the site. Revegetation efforts will strive to revegetate cleared areas with local plant species.

Residual Effects

Effects of the quarry's construction, operation and decommissioning on the vegetation include losses from: the initial clearing of vegetation, potential losses from accidental fuel/chemical spills, failure of runoff containment structures, and/or fires. Of the total 900 ha Project site, the Phase 1 boundary encompasses an area of 88 ha that is sparsely forested; with much of the land being covered with alders and grasses amongst exposed rock. The remainder of the site contains similar terrestrial habitat and approximately 75 acres of fresh waterbodies. It holds no apparent critical habitat for any species; with the vegetation being typical of the surrounding region. Therefore, the phasing in of the quarrying operations, and incremental spread of activities across, with subsequent land reclamation protocols outline in a forthcoming EMP, adverse effects are predicted to have a **Non-Significant** residual impact on vegetation and wetland ecosystems.

4.1.4 Terrestrial Wildlife and Habitat

Potential Interactions

The construction stage, consisting of tree removal, overburden stripping, and equipment set-up, will result in an alteration of the existing local habitat and the frequency of its use by animals. The effect of the quarry on terrestrial wildlife and their habitat include:

- Direct loss of habitat;
- Direct mortality;
- Disturbance of feeding, denning and/or breeding habitats;
- Introduction of physical barriers and the blockage of movements;
- Reduction in productivity; and
- Impacts resulting from accidents and malfunctions.

Mitigative Measures

Preventing Direct Mortality and Habitat Loss

The clearing of the quarry will occur incrementally as it is developed over its lifespan. Noise generating activities (such as crushing and screening equipment, vehicles, and blasting) are expected to cause wildlife to avoid the site; but pose no direct mortality. The area is not historically ideal habitat for large mammals, and no critical overwintering habitat for large mammals exists on-site. However, it does fall within Moose and Black Bear Management Area 25 and Caribou Management Area 64. Some loss of small mammal feeding and breeding sites may occur. This effect is not expected to pose a threat to any species' population, as it is unlikely that the area holds any critical habitat, or contains any rare or endangered species. The incremental spread of operations over the quarry's lifespan, and the abundance of suitable habitat outside of the quarry's boundaries, should allow wildlife adequate room to migrate to unaffected areas, preserving their reproductive populations and potential.

Habitat fragmentation should not be an issue as the quarrying operations will start proximal to the shoreline of Fortune Bay and work westward without a fragmented Project area (i.e. the Project is within the smallest contiguous area possible). This will allow corridors of undisturbed habitat, enabling wildlife to traverse the majority of the quarry site even once operations are underway. It is anticipated that construction and operational activities will result in local wildlife dispersing into surrounding areas, with no negative effects on productivity or direct mortality.

Sediment and Chemical Losses

Habitat degradation outside of active operational areas will be achieved by mitigating the outputs from these sites. Sediment and chemical losses will be mitigated through the measures outlined in Section 4.1.1, and will also be detailed in the EPP. This includes

sediment control measures (such as the use of settling ponds, berms, and geofabrics), and chemical control measures pursuant to all provincial and federal laws and regulations. All waste water will be directed to the settling ponds. Effluent discharge will comply with standards set forth in the *Environmental Control Water and Sewage Regulations*, under the *Water Resources Act*.

Blasting-Related Effects

Blast related effects, such as vibration, noise, dust, and nitrogenous residues will be controlled by applying the best practices pursuant to the use of quarrying explosives. As per Section 2.2.3, a blast plan has been created to optimize efficiency and reduce its effects. Also, mitigative measures outlined in Section 4.1.1 will also be included in an EMP and serve to further reduce any effects blasting will have on wildlife habitat. Monitoring for blasting-related effects such as noise and vibration levels will be conducted once blasting is initiated. This will allow for assessment of the efficacy of the outlined protocols and mitigative measures and determine if they need to be altered. Best practices outlined in the *Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters* (Wright and Hopky 1998) and the *Dyno Nobel Canadian Blast Site Safety Procedures* will be followed to ensure a minimal effect of blasting on wildlife in the area.

Residual Effect

Effects of the quarry's construction, operation and decommissioning on wildlife and their habitat include losses from: the initial clearing of vegetation, potential losses from accidental fuel/chemical spills, failure of runoff containment structures, and/or fires. The Project's boundary encompasses an area of 900 ha that is sparsely forested, with much of the land being covered with alders and grasses amongst exposed rock. It holds no apparent critical habitat for any species; with the vegetation and habitat type being typical of the surrounding region. Therefore, the phasing in of the quarrying operations, and incremental spread of activities, with subsequent land reclamation protocols outlined in the EPP, adverse effects are predicted to have a **Non-Significant** residual impact on terrestrial wildlife and their habitat.

4.1.5 Land Birds and Waterfowl

Potential Interactions

The construction stage, consisting of tree removal and overburden stripping, and equipment set-up, will result in an alteration of the existing vegetation and local habitat and the frequency of use by bird species. Once operational, the quarry will generate noise/vibrations, dust, and has the potential to result in increased sediment/chemical-laden runoff that could negatively affect bird habitat, including wetlands. Further, effects of the quarry construction and operation include:

- The physical alteration of the land which may act as a loss of habitat or a barrier to natural migratory routes or nesting sites
- On-site accidents could also result in a degradation of habitat through the accidental release of harmful substances (i.e. hydrocarbons from fuels spills and toxins from fires).

Mitigative Measures

Habitat

Vegetation removal at the quarry site may result in the loss of feeding and breeding/nesting grounds. Also, noise generating activities (such as crushing and screening equipment, vehicle, and blasting) are expected to result in birds avoiding the site; but pose no direct mortality. These effects are not expected to pose a threat to any species' populations. The 900 ha footprint is sparsely treed (with balsam fir), with the predominant cover being alders and grasses. The forest types identified within the footprint of the Project are consistent with those in the region with no unique or limiting habitat types identified. Therefore, it is unlikely that the area holds any critical habitat, or contains any rare or endangered bird species. In addition, the IBA has not identified any Important Bird Areas on the Conaigre Peninsula, which are sites that provide essential habitat for one or more species of breeding or non-breeding birds.

Further, the incremental spread of operations over the quarry's lifespan, and the abundance of suitable habitat adjacent to the quarry's boundaries, should allow birds adequate time and room to migrate to unaffected areas, preserving their reproductive potential. Continental Stone understands, and will comply with, the *Migratory Birds Convention Act and Regulations* which provides for the protection of migratory birds, their nests, eggs, and young. The proponent will comply with this Act during all project stages. Under Section 5.1 of the Act:

No person shall deposit or permit to be deposited oil, oily wastes or any other substance harmful to migratory birds in any waters or any area frequented by migratory birds. In addition, no person shall disturb, destroy, or take a nest, egg, nest shelter, eider duck shelter or duck box of a migratory bird.

Bird habitat is to be maintained as much as possible during both construction and operational stages. A pre-construction survey should be completed to identify nesting sites, particularly in wetlands, to determine if there are any areas that warrant protection during construction and operation. Areas that have been identified as an important habitat (i.e. over wintering areas, feeding and breeding grounds, and nesting areas) are to be left undisturbed. Adequate buffers will be maintained between activities and possible habitat (i.e. 50 m from a waterbody or wetlands). Nests or eggs will not be moved or obstructed, and it is recommended that vegetation clearing not take place during the breeding season until fledglings have left parental territories. If a nest is found:

- the nest site and neighbouring vegetation should be left undisturbed until nesting is completed; and
- construction activities be minimized in the immediate area until nesting is completed.

Wetland/marsh habitat occurs in localized areas around Pond 2 (see Figure 2.1) to the west of the project boundaries. Due to their shallow nature, they may be feeding areas for local birds. However, preliminary surveys of the ponds suggest that they are not preferred habitat for waterfowl (with none observed during the September- October, 2006, field season); being shallow and supporting no apparent nesting sites. Structures required for water extraction operations will not be placed near any pond. The pumphouse's construction will take place at least 50 m from the high water mark, with natural vegetation being maintained in the 50 m buffer (where possible). All ponds will maintain a naturally vegetated 50 m buffer.

The potential for habitat degradation, resulting from sediment losses, will be greatly diminished by adherence to measures outlined in an EPP (see Section 4.1.1) and will include such measures as settling ponds, soil removal and stockpiling/disposal, berms, and geofabrics. Chemical losses, as with sediment losses, will be mitigated through measures detailed in an EPP, and Section 4.1.1 of this document. Measures include ensuring all fuels and chemicals are handled, used, and stored in compliance with all provincial and federal laws and regulations, with access restricted only to trained employees. All discharges from the quarry site will comply with standards set forth in the *Environmental Control Water and Sewage Regulations*, under the *Water Resources Act*.

Blasting-Related Effects

Blast related effects, such as vibration, noise, dust, and nitrogenous residues will be controlled by applying best practices pursuant to the use of quarrying explosives. As per Section 2.2.3, a blast plan has been created to optimize efficiency and reduce its effects. Also, mitigative measures outlined in Section 4.1.1 will be implemented and included in the EPP and serve to further reduce any effects blasting. Monitoring for blasting-related effects such as noise and vibration levels will be conducted once blasting is initiated. This will allow for assessment of the efficacy of the outlined protocols and mitigative measures and determine if they need to be altered. Best practices outlined in the *Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters* (Wright and Hopky 1998) and the *Dyno Nobel Canadian Blast Site Safety Procedures* will be followed to ensure a minimal effect of blasting on birds in the area.

Residual Effect

Effects of the quarry's construction, operation and decommissioning on the on terrestrial birds and wetlands include: loss of habitat from the initial clearing of vegetation, potential losses from accidental fuel/chemical spills, failure of runoff containment

structures, and/or fires. The Phase 1 boundary encompasses an area of 88 ha that is sparsely forested, with much of the land being covered with alders and grasses amongst exposed rock. It holds no apparent critical habitat for any species; with the vegetation being typical of the surrounding region. Wetland habitat is minimal, with no apparent waterfowl nesting activities and being confined to a single pond. Therefore, the phasing in of the quarrying operations, and incremental spread of activities across, with subsequent land reclamation protocols outline in the Contingency and Emergency Plans of the EPP, adverse effects are predicted to have a **Non-Significant** residual impact on terrestrial birds and bird habitat (including wetlands).

4.1.6 Marine Birds

Potential Interactions

Marine bird conservation is increasingly important as they are very vulnerable to habitat loss (Shorebird.org 2007). This is due to the fact that many of them live in colonies with very specific habitat niches. The destruction of a nesting colony can have a great effect on a seabird's population. The construction and operation of the quarry may lead to potential negative effects on marine birds through:

- Direct loss of habitat, especially near the marine terminal and surge piles along the shore
- Direct or indirect mortality;
- Disturbance of feeding, nesting, and/or breeding habitats; and
- Impacts resulting from accidents and malfunctions.

Mitigative Measures

Habitat Maintenance

The construction of the marine terminal and the placement of the surge piles along the shoreline and creation of a permanent structural presence may potentially interfere with marine bird habitat. Where possible, any areas that have been identified as important habitat (i.e. over wintering areas, feeding and breeding grounds, and nesting areas) are to be left undisturbed. Adequate buffers will be maintained between activities and possible habitat. Where possible, nests or eggs will not be moved or obstructed and it is recommended that vegetation clearing not take place during the breeding season until fledglings have left parental territories. If a nest is found:

- The nest site and neighbouring vegetation should be left undisturbed until nesting is completed; and
- Construction activities be minimized in the immediate area until nesting is completed.

Specific measures to protect key habitat for these marine birds will be outlined in an EPP and may include:

- Adherence to the *Migratory Bird Convention Act*,
- Maintenance of buffers between construction/operation activities and key habitats (where possible);
- Guarding against disposal of hazardous chemicals into surrounding terrestrial and marine habitats (see Section 4.1.1);
- Erecting siltation control measures (e.g. silt curtains, cofferdams, sediment fences) prior to beginning any activities involving disturbance of the site and work along the shoreline (see Section 4.1.1); and
- Ensuring that staff and/or contractors do not approach concentrations of seabirds, waterfowl, or shorebirds when approaching the construction site, accessing the marine terminal, or ferrying supplies, and have well muffled vessels.

Shipping

Marine bird colonies have been identified further afield in areas around Belleoram, with colonies of terns and gulls at Harbour Island, Boxey Harbour Head, Little Sagona Island, and in the area of Brunette Island. These areas, ranging from 14 km (Boxey Harbour Head) to 44 km (Brunettes Island area) away from the proposed quarry, are not in proximity to the shipping route of bulk carriers entering or exiting the quarry site. Therefore the colonies should not experience any effects from their present in the area. The marine waters of southern Newfoundland are a hub for fishing vessels, aquaculture-related boats, recreational craft, and other shipping operations. Further, the slow speed the ships will travel at (2 knots) will create minimal wakes and noise. All shipping operations will be performed by a licenced contractor who fully complies with *The Shipping Act*, with specific mitigative measures being outlined in Section 2.2.3 and the EPP.

Noise and Blasting

Avoidance due to noise from construction and operations (i.e. aggregate crushing/conveying, vehicles, blasting) will be localized to the immediate area occupied by the proposed quarry. As the area has not been identified as containing any key habitat for marine birds, any avoidance of the site would not likely pose any significant stress to marine bird populations or affect their ability to maintain natural population levels. Noise related the quarry will be outlined in the EPP and be mitigated through the use of best practices pertaining to:

- The maintenance of equipment in good working order, with properly fitted noise suppression devices;
- Having those only those trained to operate and service equipment allowed to work on, or be in control of, any quarry equipment (i.e. vehicles, crushers, screeners, conveyors);

- Designing blasting patterns and procedures to minimize shock or instantaneous peak noise levels and ensures that the magnitude of explosions is limited to only what is necessary (See Section 2.2.3); and
- Not blasting underwater or within a waterbody.

Residual Effect

Effects of the quarry's construction, operation and decommissioning marine birds and their habitat include: loss of habitat from the initial clearing of 88 ha of vegetation, potential losses from accidental fuel/chemical spills, failure of runoff containment structures, and/or fires. The marine frontage of the Phase 1 boundary is 1900 m of shoreline along Fortune Bay. This area will no longer be available to marine birds once the marine terminal is constructed. However, the extent to which the disturbance has the potential to affect seabirds will be localized to the immediate area, and should pose no threat to birds further afield. Additionally, the site holds no apparent critical habitat for any species and is typical of the surrounding region. Further, the estimated once-weekly passage of the bulk carrier servicing the quarry should pose no adverse effect on marine bird populations due to its relative infrequency compared to existing marine traffic. Therefore, with the lack of critical habitat, the localized interference of the quarrying operations, and the mitigative measures outlined above and in the EPP, adverse effects are predicted to have a **Non-Significant** residual impact on marine bird populations.

4.1.7 Species at Risk

Potential Interactions

Continental Stone is committed to ensuring that the proposed quarry does not add to the difficulties facing Canada's threatened wildlife. Newfoundland is home to many species that have been listed by the SARA, COSEWIC, or have been identified as species of concern with respect to their declining populations or loss of habitat. Protected species that may be affected by the quarry's construction and operation have been identified as the: Blue Whale (Atlantic population), North Atlantic Right Whale, Harlequin Duck (eastern population), Red Crossbill (*perca* subspecies), Monarch Butterfly, Rusty Blackbird, Boreal Felt Lichen (Boreal population), Greenland Sandwort, and the Golden Heather. Descriptions of these species, and the reason for their population's decline, are given in Section 3.3.4.

The establishment and operation of the quarry may create potential negative effects on protected species if they are found within the project area. Habitat may be lost as a result of surface clearing during construction. Once operational, the quarry will generate noise/vibrations, dust, and has the potential to result in increased sediment/chemical-laden runoff that may negatively effect habitat. On-site accidents could also result in a degradation of habitat through the uncontrolled release of harmful substances (i.e. hydrocarbons from fuels spills, toxins from fires).

Mitigative Measures

The proponent and all contractors working on-site will adhere to all stipulations set out in the SARA, and are reminded that it is illegal to kill, harass, capture or harm any species listed under it. An action plan, as per the SARA guidelines, is to be included in the EPP outlining specific measure to follow should any protected species be found. Under Section 73 of the SARA, a competent Minister may enter into an agreement or issue a permit authorizing a person to engage in an activity affecting a listed wildlife species, with no operations commencing until a proper permit is obtained. The proponent must successfully demonstrate that all reasonable alternatives to the activity have been considered, all feasible measures will be taken to minimize the effect of the activity on the species, and the activity will not jeopardize its survival or recovery.

Specific mitigations with respect to minimizing habitat loss resulting from overburden clearing and fugitive dust/sediment/chemical (Section 4.1.1), vegetation removal (Section 4.1.3), blast vibrations (Section 2.2.3), or on-site accidents (Section 4.3) are outlined in the appropriate sections and will also be included in the EPP.

Residual Effect

Effects of the quarry's construction, operation, and decommissioning on species at risk are expected to be **Non-Significant** due to the lack of critical habitat found within the project's boundaries. However, specific mitigations should any be found will be included in the EMP pursuant to the SARA.

4.1.8 Human Health and Safety

Potential Interactions and Effects

The quarry project will see the development of a currently undeveloped site into an industrial site, which may lead to health and safety concerns within the worksite, and for the surrounding residents. Potential effects include:

- Contamination of the surrounding soil and water, leading to changes in country foods;
- Human Health impacts related to industrial accidents or malfunctions; and/or
- Increased traffic levels on local roads may increase the incidence of accidents.

Mitigative Measures

Local Food Contamination

The Project footprint is not widely used by local residents for hunting, freshwater fishing, or gathering, due to its rugged terrain and minimal access. It is also not a traditional

aboriginal hunting or gathering ground. However, prudent preventative and mitigative measures will be administered to minimize chemical contamination of the environment around the project site. Details for preventing chemical contamination of the quarry site, and surrounding area, will be outlined in an EPP, with specific details having been outlined in Section 4.1.1. These measures will keep the potential release of contaminants (fuels, oils, explosive chemicals, sewage) to a minimum, and include: spill prevention and clean up measures, proper monitoring of the discharges, and regular maintenance of all machinery and chemical storage containers.

All discharges from the quarry site will comply with standards set forth in the *Environmental Control Water and Sewage Regulations* under the *Water Resources Act* before they are allowed to leave the site. As quarrying is completed on portions of the property, the area will be reclaimed in order to revert the land back to its previous state to the extent possible. Reclamation is accomplished by filling quarried areas in with overburden cleared from active project areas and regrading and revegetating as soon as quarrying activities cease. This will stabilize the area and will eliminate the chance of further degradation of the site. Revegetation efforts will strive to revegetate cleared areas with local plant species. Reclamation measures will also include soil testing in areas previously used for repeated refueling or for temporary fuel/explosives storage, with all contaminated soils excavated and disposed of in a government approved hazardous waste disposal facility. These measures will preserve local foodchains and allow for residents, and future generations, to have the ability to harvest sustenance from the land in nearby areas.

On-site Accidents

All project activities are to comply with the provincial *Occupational Health and Safety Act* regulatory requirements, with all employees receiving thorough, and regular, safety training specific to their jobs. To ensure the safety of all workers and visitors, access will be limited to only those properly trained in, and aware of, the dangers of the area. Signs are to be posted noting hazards during construction and operational activities, with emergency contacts and procedures clearly stated. Protective gear will be worn as required (i.e. gloves, hard hats, masks, safety goggles), and be made mandatory according to each specific task. Any and all stipulations of federal, provincial, or municipal authorities or their officers will be strictly followed.

Accidents have the potential to result in the release of contaminants (mainly hydrocarbons or explosive chemicals) that will directly, or chronically, affect the health of employees on-site, or residents in the surrounding communities. This concern will be effectively mitigated through safety measures outlined in the EPP, with a key feature being the prohibition of bulk fuel/explosives storage on-site. This safety feature ensures that any spills, leaks, or fires will be kept on a small, localized scale, with a low potential for adverse affects to human health outside the immediate area. Hydrocarbon, chemical, and explosives-related contaminants will be mitigated through the use of best practice techniques as outline by their manufacturer and any federal or provincial laws. Transport of these materials on-site will be performed by contracted professionals, with all

operators possessing the appropriate licences with respect to transporting dangerous goods and will follow driving rules and regulations. Workers will be required to be knowledgeable of accident procedures, especially in relation to explosive-related accidents, and proper spill containment and clean-up equipment/material will remain in proximity to any harmful substances at all times.

Traffic Concerns

The main road serving the Belleoram area is the two-lane asphalt road (Highway 362). Construction activities are expected to require some heavy equipment and materials to be transported to the site via this road. Possible concerns related to these vehicles include advanced road deterioration (due to their heavy weights), the potential for collisions, fuel spills, and dust and noise production. However, once the construction stage has been completed, the quarry will not require a significant amount of heavy vehicles due to the use of the marine terminal for shipment of materials and the final aggregate product. Therefore, only maintenance, personnel, and other service vehicles will travel to the quarry, alleviating any concerns related to traffic within the town. Employees will be required to park their personal vehicles at a parking lot inside the front gate of the quarry, adjacent to the proposed office building, and be shuttled to work sites via company trucks. All vehicle operators will be required to possess the appropriate licences with respect to operating oversized vehicles and the transport of dangerous goods (i.e. explosives), and will follow rules and regulations with respect to driving their vehicle. Appropriate signs will also be posted on main road, access roads, and road crossings.

Residual Impact

Effects of the quarry's construction, operation and decommissioning on human health and safety include: potential contamination of country foods, traffic concerns, and issues regarding on-site accidents. The low utilization of the land, in concert with mitigation measures for protection of all environmental components, will limit the potential risk to human health from contamination of the natural food supply. Further, through the implementation of the above mitigations, and those outlined Contingency Plan and Emergency Plan of the EPP, the residual effects from the project on all aspects of human health are expected to be **Non-Significant**.

4.1.9 Navigation/Marine Safety

Potential Interactions

The most economical method to transport the crushed granite product from the proposed quarry site is via marine bulk carriers. With an anticipated aggregate production level between 40,000 and 80,000 tonnes weekly, carriers will be required to enter Fortune Bay and dock at the proposed marine terminal on an estimated once-weekly basis and will have an anticipated 60,000 tonne capacity. Due to their large size, and the need for these

vessels to turn one-hundred-eighty degrees once they reach the dock for loading, there is an inherent potential for interactions between the bulk carriers and other marine traffic in the Bay. Interactions between the bulk carriers and other vessels may lead to a decrease in navigability of Fortune Bay, with a potential for safety concerns for smaller craft.

The marine vessel activity in the waters immediately adjacent to the quarry and Chapel Island are mainly aquaculture-related, include supply and harvest boats that make daily trips between the Town of Belleoram and the fish farms. There are currently four fish farms in the area, with two proposed sites near Chapel Island. The route taken by these boats passes through the proposed corridor bulk carriers will use, leading to potential interactions when the bulk carrier enters the area. Further, Belleoram harbour is an active fishing port, servicing the daily operations of many vessels fishing on the south coast of Newfoundland. Other large ships do frequent the region around Fortune Bay, with most servicing refinery and transshipment terminal operations at Come By Chance in Placentia Bay (to the East).

Mitigative measures

Shipping will occur approximately once per week, with the bulk carrier remaining inside a designated shipping corridor while approaching and leaving the marine terminal (Figure 2.5). The corridor will be at least 750 m away from the nearest aquaculture site and allow for unobstructed operation of the farms. The bulk carriers should not interfere with the normal day-to-day passage of farm boats through the proposed corridor, with its passage being short in duration, and the more maneuverable farm boats easily avoiding them. The slow speed of the bulk carrier (approximately 2 knots) means that it will not cause any significant wake, thus alleviating any safety concerns related to potential swamping of farm, or other small, boats. Engines will be turned off (except for any generators required for power) when ships are docked at the marine terminal to minimize mechanical noise. All bulk carriers will be double hulled, with oil spill and clean up equipment (e.g. absorbants, inflatable dykes) onboard; with crew trained in their use. There will be no dumping of bilge or foreign ballast within the waters of Fortune Bay, with no refueling at the marine terminal.

The majority of commercial fishing vessels disembarking from Belleoram Harbour do not fish in the waters between the proposed quarry and Chapel Island. They mainly head south to the fishing grounds at the mouth of Fortune Bay, or to the east/north east towards the Burin Peninsula or into Belle Bay. Therefore there will be little interaction between these vessel and the bulk carriers, except when the ship passes the mouth of the harbour. Belleoram Harbour does not support any large shipping vessels, and any navigation concerns related to any other large vessel passage in the area are effectively mitigated through adherence to all procedures and protocols contained in the *Canadian Shipping Act*. The Local Special Interest Committee will be consulted with respect to ship arrival and departure times to further mitigate potential interactions.

Shipping activities will be contracted out to a third party, who will be responsible for the adherence to all federal and provincial permits, licences, and certificates, and meet all

regulatory standards pursuant to the *Canadian Shipping Act*. Specific mitigative measures are outlined in Section 2.2.3, and will be incorporated into Continental Stone's EMP and contingency planning.

Residual Effect

Through the implementation of the above mitigative measures and those outline in the EPP, regular communication of arrival and departure times with the Local Special Interest Committee, and adherence to all regulations and laws pursuant to *The Shipping Act*, safety or navigation concerns between the bulk carriers and other marine traffic are not expected. Effects of the quarry's construction and operation on marine safety and navigation are predicted to produce **Non-Significant** residual effects.

4.1.10 Land Use

Potential Interactions and Effects

The quarry project will see the development of an undeveloped area into an industrial site, which will alter its land use characteristics and potentially restrict historical practices such as hunting/gathering/trapping, forestry, fishing, and recreational activities. The visual aesthetics will change, and, noise and activities from construction and quarrying/blasting operations will diminish the overall 'wilderness' appeal of the land. The restriction of access to the quarry will pose a physical barrier to non-employees, with locals no longer able to use the footpath that currently traverses the project's boundaries.

Mitigative Measures

Visual Aesthetics/Tourism

The aesthetics of the site will be changed from a relatively untouched wilderness to an industrial area, which is generally considered a negative effect. The phasing of the Project will allow for the maintenance of much of the area's visual appeal, with the rock face visible from the Town of Belleoram being kept intact throughout the entire Project. Further, as quarrying is completed on portions of the property, the area will be reclaimed, by reverting the land back to a natural state, and returning its visual aesthetic appeal.

The tourism industry of the Conaigre Peninsula/Fortune Bay is based mainly on nature hikes, whale watching, and historical tours. Whale watching and sightseeing boats do not currently frequent the Belleoram Barasway between the proposed quarry and Chapel Island, thus it will not pose a threat to local tour operators' businesses. Further, fish farms are established in the area, having already reduced the area's appeal for tour operators. Due to the existing limited access to the proposed quarry site, it has never been a draw for non-resident land use (i.e. hiking, fishing, nature walks). All major

attractions in the area are located in Belleoram itself, with the quarry's distance from the town being approximately 4 km).

Traditional Land Use

The area is not widely used by local residents for hunting/trapping, freshwater fishing, gathering, or forestry and is not a traditional aboriginal hunting or gathering ground. Recreational use of the area does exist, with some local residents using the existing footpath for hiking. The area is not suitable for the use of ATV's due to its rugged terrain and minimal access. Forestry is not wide spread within the project's boundaries, although there is evidence of harvesting near Pond 1 (Figure 2.1) on the border of the proposed quarry and the Town of Belleoram. The loss of access to this resource will be compensated for by offering residents of the area to access to the timber felled during overburden stripping. Thus, the cordoning off of the project area, and subsequent clearing of the land and vegetation, should not pose a significant concern to locals with respect to their traditional uses of the land.

Although it is unlikely that historic resources or archeological sites will be discovered within the Project boundaries, a contingency plan has been developed to address such circumstances. This plan includes:

- Stopping all work in the immediate area of the discovery until authorized personnel (e.g. the Project Environmental Manager) has consulted the Provincial Archaeologist; at which point work will be permitted to resume;
- Marking the site's visible boundaries, with no artifacts or associated materials being moved or removed unless the integrity of the material is threatened; and
- Having Continental Stone reporting the find to the Provincial Archaeology Office - Culture and Heritage Division, Department of Tourism, Culture, and Recreation (St. John's) providing the following information:
 - nature of the find;
 - precise descriptive and map location and the time of the find;
 - nature of the activity resulting in the find;
 - identity of the person(s) making the find;
 - present location of the material, if moved, and any protective
 - measures initiated for the material and the site; and,
 - extenuating circumstances.

Further, as the quarry will provide a very positive affect to the local economy, generating 80-100 full time direct jobs and the potential for numerous indirect jobs, the stimulation of the Conaigre Peninsula's economy will far outweigh any minor disturbances to local land use. The residents of Belleoram, and the surrounding communities, have supported the quarry's development and Continental Stone will ensure that any land use issues will be resolved through the Local Special Interest Committee. It is anticipated that the residents will be accepting of the changes to the area in light of the numerous benefits to their region; finding other suitable locations to meet their land use needs.

Residual Effect

Effects of the quarry's construction, operation and decommissioning on the land use in the area include: the potential alteration of traditional land usage, a change in the visual aesthetics of the site, and a loss of its wilderness appeal. There are four operators in the area; however, they do not operate in proximity to the Project area. Therefore, the quarry's affect on these activities is expected to be negligible. The footprint of the quarry is 4 km from the Town of Belleoram hence construction or operational activities should not affect the tourism industry of Belleoram or the surrounding communities. Through remedial measures such as the phasing of operations, the maintenance of natural buffers, and the reclamations measures outlined in this document and the EPP, the residual effects of the quarry on land use are predicted to be **Non-Significant**.

4.1.11 Acoustic Disturbances

Predicted Effects/Interactions

The construction and operation of the quarry will result in acoustic disturbances to the surrounding environment. Noise from vehicles, blasting, crushing/screening equipment, small machines, and shipping has the potential to affect humans as well as local wildlife. Human-related effects are generally nuisance and quality of life issues, with occupational health and safety concerns localized on-site pertaining to blasting and the use of heavy equipment. Wildlife will generally avoid anthropogenic noise, with many studies having been conducted on a variety of species (Birds: Driscoll, 1997, Attenborough 1998; Terrestrial Mammals: CLB 2007, Hompland *et al.* 1985, Calef *et al.* 1976; and Marine Mammals: CLB 2007, Richardson *et al.* 2005). This avoidance behaviour can be very strong and lead to fragmentation of natural migration routes and feeding and nesting areas. Fish, both wild and aquacultural species, also display avoidance behaviour to noise (Chapman and Hawkins 1969; Schwartz and Greer 1984; and Pearson *et al.* 1992), and can be negatively affected by intense sounds (such as those from blasting) or from prolonged exposure to certain types of acoustic disturbances (McCauley *et al.* 2003). Crustaceans, such as lobsters, are thought to be unaffected by sound (Parry and Gason 2005).

Mitigative Measures

Vehicles and Equipment

Mechanical equipment to be used onsite will produce noise that has the potential to disturb the surrounding environment. Noise from combustion engines (vehicles, crushing/screening equipment, generators, power tools) can be effectively mitigated through the use of approved noise suppression devices and ensuring all equipment is in a state of good repair. They are only to be operated by trained/licenced personnel according to manufacturer's specifications and all federal and provincial laws and

regulations and local bylaws. The remoteness of the quarry from the nearest town, Belleoram (approximately 4 km), will help to ensure that the public is not exposed to operational noises. The maintenance of the rock face proximal to the town will further diminish the resonance of sound from the site.

Wildlife in the area will most likely avoid any source of noise, leading to a very low probability they will be directly harmed by mechanical noise. However, this avoidance may lead to the abandonment of traditional breeding grounds or migration routes. Preconstruction habitat surveys should be conducted to determine if there are any critical breeding or migratory areas within, or in proximity to, the project's footprint. If such a site is found, proper mitigations/compensation measures will be put in place to protect or provide an alternate habitat for these animals outside the affected area.

On-Site Health And Safety

All operations where workers are exposed to continued or excessively loud noises will comply with the NL *Occupational Health and Safety Regulations* under the *Occupational Health and Safety Act*. These regulations state that:

- (1) When workers are required to work in areas in which noise levels exceed the criteria for permissible noise exposure*
 - (a) the employer shall first take appropriate measures to reduce the noise intensity to approved levels; or*
 - (b) if it is not practicable to reduce the noise to approved noise levels, or isolate the workers from the noise, the workers shall wear personal protective equipment which will effectively protect their hearing.*
- (2) Criteria for permissible noise shall be as established by the American Conference Governmental Industrial Hygienists.*

Thus, adherence to these regulations will ensure that exposure to sounds that have the potential for detrimental effects will be minimized. Employees should be proactive and trained to recognize and effectively mitigate harmful situations before they have the potential to result in injury. This includes the use of proper personal protective equipment, such as ear protection and blast shields.

Blasting Protocols

Detonation of explosives during the quarrying operations will produce vibrational and acoustic noise in the surrounding environment. Continental Stone recognizes the potential sensitivity that wildlife (particularly fish and marine mammals) and humans may have to these blasting effects and has incorporated measures to minimize negative effects into their blasting design. Blasting protocols have been designed to be as efficient and effective as possible, with many safety measures incorporated into them (see Section

2.2.3). Drawing from publications such as: Wright and Hopky's (1998) *Technical Report for the Use of Explosives Near Canadian Fisheries Water*, Dyno Nobel North America's *Canadian Blast Site Safety Manual*, and DFO's *Mitigation of Seismic Noise in the Marine Environment - Statement of Canadian Practice*, Continental Stone will ensure safe, environmentally conscious, blasting procedures.

Blasting during quarry start-up will be once per week and twice per week during full production. All blasts will be conducted between the hours of 0700 hours and 1900 hours to avoid any after-hours disturbance of residents in the surrounding area. At the entrance to the quarry a 'Blast Notice Board' shall be erected detailing the time and date of any proposed blast as well as a description of the blast signaling system. This will help to inform locals of the blasting procedures, allowing them notice to avoid the area once blasting begins. This blasting plan will also be made available to the Local Special Interest Committee. As per the *Consolidated Newfoundland Regulations* under the *Occupation health and Safety Act*, before any blasting event the blaster shall:

Give or cause to be given sufficient warning in every direction, and shall ensure that all persons have reached a place of safety before the blast.

and

The blaster shall ensure that a signalling device of a type distinct from other signalling devices in the area is provided and is used to give warning in accordance with the following procedure and immediately preceding the blast, no less than 12 short-whistle signals shall be sent at one second intervals.

Two minutes shall elapse after the last warning signal before the explosive is detonated.

Following the blast and after the area has been found safe, one continuous whistle signal of 15 seconds duration shall be sounded to signify that permission is granted to return to the blasting area.

By following the above measures, all employees or general public in the area of the blast will be sufficiently warned and informed of the blasts and allow time to prepare; either through avoidance of the area or wearing of proper protective equipment. These mitigative measures will also be incorporated into the facilities EPP.

Acoustic Noise and Aquatic Environments

While the above steps will be taken to reduce noise/vibrations resulting from blasting, it will be impossible to eliminate all unwanted seismic noise from the operation. In that regard, this subsection provides estimates of the likelihood that cage-reared Atlantic salmon in Fortune Bay, wild freshwater/marine fish, and marine mammals will be affected by the vibrational or acoustic effects as a result of the proposed blast design.

Two main variables should be examined when determining how sound and vibrations can affect aquatic wildlife. These are: 1) shock pressure, represented and measured in Peak Particle Velocity (PPV), and; 2) compressional seismic waves, measured as a pressure force (kPa). These phenomena can lead to disturbance or damage to fish by affecting their internal organs (Hawkins and Johnstone 1978; Whalberg and Westererberg 2005). Marine mammals are also sensitive to these effects, with whales being particularly sensitive to damage (CWR 2007). Explanations of these phenomena, and the ability for sound to propagate from the air into water, are discussed below, outlining possible effects on marine and freshwater fish. Marine mammals will be discussed separately.

Peak Particle Velocity

DFO guidelines state that: “no explosive is to be detonated that produces, or is likely to produce a PPV greater than 13mm/second in a spawning bed during the period of egg incubation” (Wright and Hopky 1998). An estimate of PPV can be calculated using the following equation (Oriard 2002):

$$PPV = 150(SD/W^{0.5})^{-1.6}$$

Where: PPV is in inches per second, SD is the distance from the blast in feet, and W is the weight in pounds per delay. By altering the blast configuration and estimated weight of each charge for the proposed Belleoram Quarry (294kg), the PPV experienced by any nearby aquaculture facilities can be estimated. The current blast design produces the following predicted PPV at various distances:

50 m	187mm/sec.
200 m	20 mm/sec.
300m	13.0 mm/sec.
500 m	4.87 mm/sec.
1500 m	0.75 mm/sec.
2000 m	0.37 mm/sec.

By observing this DFO guideline, blasting would need to be approximately 300 m from any area of fish egg incubation. As shown, the particle velocity values for distances between the proposed quarry and the aquaculture facilities (estimated conservatively at 1500 m; Figure 3.4) are not likely detectable using currently available blast monitoring seismographs (Personal Communication, Keith Phelan: Hard Rock Newfoundland, 2006). Further, since spawning is a fish’s most sensitive life stage, these values would be considered very conservative for adult fish. In addition, the PPV value at 1500 m, the distance to the nearest fish farm, is over seventeen times less than that required for egg incubation. Potential spawning beds of freshwater fish will be more than 600 m from the initial blasting sites, and, again, should not be affected by the blasting. As operations approach potential freshwater spawning locations (i.e. within 300 m), appropriate alterations to blasting charges will be conducted to stay below guidelines.

Compressional Seismic Waves

DFO guidelines further state that: “no explosive is to be detonated in or near fish habitat that produces, or is likely to produce, an instantaneous pressure change greater than 100kPa (14.5 psi) in the swimbladder of the fish” (Wright and Hopky 1998). To calculate the minimum distance that an onshore blast could occur from fish habitat, the following equation can be used:

$$SD = 5.03(W)^{0.5}$$

Where: SD is the distance from the blast in meters, and W is the charge weight per delay (Personal Communication, Keith Phelan: Hard Rock Newfoundland, 2006). Using this formula and based on the predetermined charge weight of 294 kg, the distance that the blast must be from fish habitat is estimated at 86 meters. From these calculations, there will be little effect from compressional seismic waves on either marine or freshwater habitat. Thus, the blasting protocol itself (by maximizing the explosives' efficiency) has sufficiently mitigated any effects of compressional seismic waves. As operations approach potential freshwater spawning locations (i.e. within 300 m), appropriate alterations to blasting charges will be conducted to stay below guidelines.

Propagation of Sound from Air to Water

Although sound may propagate in air over several kilometers as a result of blast detonations, its effect relative to submerged marine fishes is considered to be minimal. This statement is supported by Rayles Equation which describes the reflective abilities as sound passes from one medium to another. Salt water is a far more dense substance than air (1,027 kg/m³ and 1.2 kg/m³, respectively). Using when Rayles Equation, the following results are obtained.

$$\text{Rayles Equation: } R = \frac{(z_2 - z_1)}{(z_2 + z_1)}$$

Where: z_1 = acoustic impedance of air = density (1.2 kg/m³) x the speed of sound in air (343 m/s) = 411.6

z_2 = acoustic impedance of salt water = density (1027 kg/m³) x the speed of sound in salt water (1500 m/s) = 1540500

Solving for R, we get a value of 0.99. An R-value of <1 indicates a rigid boundary where most of the sound energy will be reflected off the surface with little transmission. Therefore, sound pressure released from a blast would not likely be enough to penetrate into a waterbody.

Marine Mammals

There is a potential for marine mammals to be present in the Fortune Bay area during the blasting events. At least 15 different species of whales, dolphins, and porpoises can be found in the Bay, many being seen from shore. DFO's *Mitigation of Seismic Noise in the Marine Environment* regulations were designed to establish guidelines for the protection of aquatic life from seismic activity in marine waters. Pursuant to Section 8 of these guidelines, the proponent shall:

- a) *establish a safety zone of 500 metres from the centre of the seismic source; and*
- b) *when the safety zone is visible, conduct regular on-going visual monitoring of the safety zone by a qualified Marine Mammal Observer, including continuous visual monitoring during a period of at least 30 minutes prior to start-up of the seismic (activity)*

Since no real-world data has been obtained to support the above calculations, additional monitoring is being considered within Fortune Bay. During initial stages of blasting, sound/vibration measuring equipment (i.e. hydrophones) will be deployed to measure the effects at various points within Fortune Bay to validate the above calculations and predictions. Procedures may be altered if marine mammals are observed near the quarry site during scheduled blasting events.

Shipping

Continental Stone has recognized that, while the use of bulk carriers for product transport was determined to be the most economical, there is a potential interaction between this option and the marine environment. Again this may include avoidance of the area by marine mammals and wild fish, however, these effects will be transitory and reversible. There is concern with respect to the local aquaculture operations, with noise from ship's engines potentially disturbing farmed fish. Underwater noise has been shown to affect feeding and behaviour patterns, and subsequently decreasing growth rates (Engås *et al.* 1995). Mitigations to reduce the affect of noise originating from ships will be indicated in the EPP and will include:

- Having all bulk carriers travel within a predetermined pathway that will allow for both adequate passage into the bay as well as maximizing the distance the ship will be from the farms at any one time;
- Restricting the bulk carrier to speeds that will not create an excessive wake or vibrations; and
- Requiring all bulk carriers to turn off their engines (except for any generators required for power) when ships are docked at the marine terminal for loading to minimize exposure to mechanical noise.

Shipping will occur approximately once per week using a 60,000 tonne bulk carrier inside a designated shipping corridor. This corridor is located at least 750 m away from the nearest aquaculture site. Due to the slow movement of the vessels (2 knots), and low frequency of visits relative to other local vessel traffic, there is a low probability that fish will be affected by quarry-related shipping.

Residual Impact

By implementing the above mitigative measures, along with those outlined in the EPP, the effects of the quarry's construction and operation on the acoustic environment of the region are predicted to be minimal, with any effects being transitory and reversible. The effect of noise from the quarry on local residents will be minimal; with the nearest town (Belleoram) at a distance of 4 km and the most proximal aquaculture farm being at least 1500 m away. Further, environmental effects are effectively mitigated through the implementation of measure pertaining to the operation and maintenance of equipment and vehicles/bulk carriers, effective blasting protocols, and the adherence to all occupational health and safety best-practices. Therefore, acoustic disturbances resulting from the quarry's construction and operational activities are expected to have a **Non-Significant** effect on humans and wildlife.

4.1.12 Fish and Fish Habitat

Potential Interactions

The construction and operation of the quarry has the potential to effect fish and fish habitat by changing the productive capacity of aquatic systems or through the loss of habitat as defined in sub-section 32(3) of *The Fisheries Act* as the 'Harmful Alteration, Disruption, or Destruction' (HADD) of fish habitat.

Mitigative Measures

Habitat Protection

During the construction stage, siltation control structures (i.e. silt curtains, cofferdams, and sediment fences) will be constructed prior to beginning any activities involving disturbance of the soil, work along the shoreline, or near areas of high runoff potential. Siltation control measures will remain in place, and be regularly maintained, throughout the operation of the quarry. Soil disturbance and runoff will be minimized through the measure outlined in Section 4.1.1 and will also be detailed in the EPP. Dusting from the quarry will be control as per Section 4.1.2, with the local winds and aggregate washing effectively containing the majority of fugitive dust emissions. Chemical losses to aquatic environments will be mitigated as per Section 4.1.1. These measures will ensure that the quarry's effect on water quality and fish habitat are minimal, maintaining the productivity of the surrounding area. All operations will be in accordance with *The Fisheries Act*,

Environmental Control Water and Sewage Regulations under the *Water Resources Act* to ensure that direct discharge, and indirect runoff, from the quarry doesn't negatively affect water quality.

Marine Terminal Construction

Construction of the marine terminal will interact with marine habitat by filling in a portion of the shoreline. It also has the potential to introduce sediment fines into the water from infill material. Infill for the marine terminal construction will contain no more than 5 % fines (i.e. sand, silt, and clay) and may be evaluated for contaminants prior to introduction to marine waters. Direct mortality of fish during the marine terminal's construction is highly unlikely, with fish generally avoiding the area once the activities start. Substrate surveys in the area of the marine terminal have revealed that it is mainly large boulders and exposed bedrock up to 70 m from shore, with a gravel bottom and kelp beds thereafter (to 100 m). The area constitutes good lobster habitat, although consultation with locals indicates the area is not fished for lobsters. However, measures to compensate for any habitat loss caused by the marine terminal's construction will be implemented (e.g. using armour stone to provide artificial habitat for fish and lobsters). Details of the mitigative measures to preserve fish habitat during construction and operation of the marine terminal have been included in Section 4.1.1 of this document and also outlined in the EPP.

Work Near Freshwater

Special consideration is needed when working in or near freshwater fish habitat. Quarrying activities that will encroach on freshwater habitat include: water extraction for aggregate washing, wastewater pipeline spanning the stream T1, blasting, and the effects of potential runoff from active work sites. DFO provides several publications which must be followed to preserve local fish and fish habitat through the use of best practices. These include:

- The National Policy for the Management of Fish Habitat
- The Fisheries Act - Habitat Protection and Pollution Prevention Provisions – Compliance and Enforcement Policy
- Guidelines for the Use of Explosives In or Near Canadian Waters
- National Fact Sheets – Brook Trout (Specifically)
- Newfoundland Factsheets for:
 - Effects of Silt on Fish and Fish Habitat
 - Blasting - Fish and Fish Habitat Protection
 - Temporary Forging Sites
 - Forwarder Trails
 - Temporary Bridges
 - Resource Road Construction
 - Instream Work in the Dry Cofferdams

- Streambank Stabilization
 - Instream Work in the Dry – Temporary Diversion and Elevated Pipes
-
- Temporary Settling (Detention) Basins
 - Freshwater Salmonid Habitat Requirements
 - Freshwater Intake End-of-Pipe Fish Screen

Specific mitigative measures can be drawn from these documents to help minimize the quarry's affect. For instance: a buffer of undisturbed natural vegetation is to be maintained 50 m from construction areas and all waterbodies (fish habitat protection guidelines recommend a buffer width of 12 m + 1.5 x % slope; Scruton *et al.* 1997). Water extraction activities have also been designed to minimize their effect, with the pumphouse located as far downstream as possible to avoid dewatering fish habitat. Also, the amount of water required represents only 4.8% of the estimated lowest annual flow. As outlined in Section 4.1.11, blasting related vibrations and noise are not expected to negatively affect freshwater fish spawning or nursing grounds. Further, the construction of the washwater pipeline and Bailey bridge to span the stream will be performed in the dry, with no work being done within the stream itself. Detailed mitigations will also be included in the EPP.

Shipping

Shipping activities, and maritime accidents (i.e. fuel spills, contaminated bilge discharge), could also affect fish (both wild and aquacultural) through water quality degradation and habitat loss. Shipping activities will be contracted out to a third party, who will be responsible for the vessels and shipping as well as its operation and maintenance. Continental Stone is committed to safe and environmentally safe shipping practices, and will require the contractor to: not refuel at the marine terminal, not dump of bilge or foreign ballast water outside the allowable restrictions of the *Canadian Shipping Act* (i.e. not within the Fortune Bay area), and requiring bulk carriers to carry oil spill clean up equipment (i.e. absorbants, inflatable dykes) with trained crew members in spill prevention and clean up techniques. Details of standard mitigations with respect to shipping activities are outlined in Section 2.2.3 and will be included in Continental Stone's EPP.

Residual Effects

Effects of the quarry's construction, operation and decommissioning on fish and fish habitat potentially include: loss of habitat due to sediment and chemical losses, interactions with the marine terminal and bulk carriers, and effects of blasting-related noise/vibrations. Water extraction is not expected to cause a negative change to freshwater habitat due to the low volumes required. However, an authorization for any fish habitat altered, disrupted, or destroyed will be required from the Federal Minister of Fisheries and Oceans. As part of this authorization, an acceptable compensation plan is

to be completed. Through the implementation of mitigations outlined in this CSR, following the Contingency and Emergency Plans and EPP, and by adhering to all relevant federal and provincial laws and regulations, the residual effects of the quarry on fish and fish habitat are predicted to be **Non-Significant**; being localized to the immediate site, transitory, and reversible.

4.1.13 Aquaculture and Commercial Fisheries

Potential Interactions

Seasonal commercial fishing exists within the waters of Fortune Bay, with some activity in proximity to the proposed quarry site. However, this activity is sparse, with most local vessels fishing in the southern offshore fishing grounds, or in Fortune Bay to the east of Chapel Island (towards the Burin Peninsula). A small lobster fishery also exists in the area, with lobster habitat potentially being affected as a result of the quarry's construction and operation (specifically in the marine terminal area). Aquaculture farms also occupy the area of Fortune Bay between the quarry and Chapel Island (Figure 3.4). Further, the proposed shipping route bulk carriers will take from the loading dock to the mouth of Fortune Bay will cross the path used by aquaculture vessels when accessing their sites from Belleoram harbour.

Concerns with regard to the quarry's interaction with the aquacultural and commercial fisheries include:

- Changes in the productive capacity of aquatic systems;
- Direct mortality of wild or caged fish;
- Effects of blasting on caged fish; and
- Interference between bulk carriers and commercial fishing or aquaculture vessels.

Mitigative Measures

Protection of Habitat

The mitigative measures outlined in Section 4.1.12, regarding the preservation of fish and fish habitat, apply directly to the sustainability of the commercial fishery and aquaculture industries in the area. All measures to mitigate sediment and chemical losses to the marine environment, as well as the standards and regulations regarding shipping activities, have been designed to maintain the productivity of the area. Detailed mitigative measures to preserve fish habitat during construction, operation, and decommissioning of the quarry will be outlined in the EPP. As well, any HADD will require authorization from the Federal Minister of Fisheries and Oceans and a suitable compensation plan.

Direct Mortality or Decreased Productivity of Wild or Caged Fish

Direct mortality of fish in the area, both wild and caged, is not expected to result from the quarry's construction or operation. As stated in section 4.1.11, lethal blasting effects (noted conservatively for the egg/larval stages) will not be seen outside 300 m (for peak particle velocity) or 86 m (for compressional seismic waves) from a blast. Caged fish will be at least 1500 m from any blast, well outside the distances where blasting effects may occur. However, marine fish, particularly those found in the Barasway's shallow inlet, may be within a range where blasting effects can occur. As previously noted, this area does support eelgrass beds and may act as nursing grounds for some fish and lobsters. The initial blasts at the site will be monitored with hydrophones to gauge the sound/vibrational effects near the quarry, and it is recommended that one be placed in this inlet for any blasts within 300 m. Monitoring will allow for the assessment of the blasting effects (if any) on potential rearing grounds for commercial fish species, enabling conservation measures to be designed to sustain their populations.

Navigation/Marine Safety

Shipping activities, and maritime accidents (i.e. fuel spills, contaminated bilge discharge), could affect fish stocks (both wild and aquacultural) through water quality degradation and habitat loss. Shipping activities will be contracted out to a third party, who will be responsible for the vessels and shipping as well as its operation and maintenance. Continental Stone is committed to safe and environmentally safe shipping practices (see section 2.2.3), and will require the contractor to: not refuel at the marine terminal, not dump of bilge or foreign ballast water outside the allowable restrictions of the *Canadian Shipping Act* (i.e. not within the Fortune Bay area), and requiring bulk carriers to carry oil spill clean up equipment (i.e. absorbants, inflatable dykes) with trained crew members in spill prevention and clean up techniques.

Interference/navigation issues between the bulk carriers and commercial fishing or fish farm boats are expected to be negligible, with all quarry-related vessels following the mitigations outlined in Section 2.2.3 and adhering to all procedures and protocols contained in the *Canadian Shipping Act*. The occurrence of interactions will be minimized by several factors, including: the infrequent passage of the bulk carrier (once per week), its travel within a designated shipping corridor, the distance to the nearest fish farm (at least 750 m), its slow speed (approximately 2 knots), communicating arrival and departure information with the Local Special Interest Committee, and the low concentration of commercial fishing vessels in the area.

Residual Effects

Effects of the quarry's construction, operation, and decommissioning on the local commercial fishing and aquaculture industries potentially include: loss of habitat (and subsequent loss of productivity) resulting from the quarry's operation, navigational interference between the bulk carriers and other vessels, and the effect of blasting on the health of caged and wild fish. However, these effects will be effectively mitigated

through adherence to the above mitigative measures and those outlined in the EPP, EMP, and all relevant laws and regulations; such as those outlined in *The Fisheries Act*, *The Shipping Act*, and *The Explosives Act*. Therefore, the residual effects of the quarry commercial fishing and aquaculture industries are predicted to be **Non-Significant**; being localized to the immediate site, transitory, and reversible.

4.2 Cumulative Effects

CEAA specifically requires an environmental assessment to consider the cumulative environmental effects of a project. These are effects that are likely to result from the project in combination with other projects or activities that have been or will be carried out (CEAA Sub-Section:16-1a). Cumulative effects related to the quarry include an increase in road use by quarry-related vehicles in the area, and an increase in marine traffic as a result of the bulk carriers servicing the marine terminal

Road Traffic

The town of Belleoram is serviced by the two-lane asphalt road (Highway 362). Construction activities are expected to require some heavy equipment and materials to be transported to the site via this road. Possible concerns related to these vehicles include advanced road deterioration (due to their heavy weights), the potential for collisions, fuel spills, and dust and noise production. These issues may be exacerbated by the recent increase in traffic servicing the local fish farms. However, once the construction stage is complete, the quarry will not require a significant amount of heavy vehicles due to the use of the marine terminal for aggregate (and equipment) shipment. Therefore, only maintenance, personnel, and other vehicles will travel to the quarry; alleviating any concerns related to traffic. All vehicle operators will be required to possess the appropriate licences with respect to operating oversized vehicles and the transport of dangerous goods (i.e. explosives), and will follow rules and regulations with respect to driving their vehicle. Appropriate signs will also be posted on main road, access roads, and road crossings.

Marine Traffic

Another potential cumulative effect is the increase in marine traffic resulting from the bulk carrier entering Fortune Bay to transport the crushed granite product from the quarry. Marine traffic in the waters adjacent to the quarry is mainly aquaculture-related, with some seasonal commercial fishing occurring in the area. There are no large shipping vessels currently operating near Belleoram, however, there are many large shipping vessels servicing southern Newfoundland; servicing refinery and transshipment terminal operations at Come By Chance in Placentia Bay (to the east of Fortune Bay). The passage of the bulk carrier to and from the quarry will add to this marine traffic. Potential navigational issues between the bulk carriers and commercial fishing/fish farm or other large vessel is expected to be negligible, with all quarry-related vessels following

the mitigations outlined in Section 2.2.3 and adhering to all procedures and protocols contained in the *Canadian Shipping Act*.

4.3 Accidents and Malfunctions

The proponent is committed to the sustainable development of the Connaigre Peninsula and will develop an EPP for the construction, operation, and decommission of the quarry. It will be a site specific, field usable, document that will be designed to ensure environmentally sound construction practices are adhered to, and proper operational procedures pursuant to all recognized standards and guidelines are in place.

Potential accidents and malfunctions at the quarry are listed below, with their specific mitigative measures being provided in the EMP upon its completion. These include:

- Vehicle accidents
- Chemical and hydrocarbon spills from temporary storage containers
- Explosives-related fires, unplanned detonations, leaks
- Bulk carrier fuel/oil spills
- Marine navigation
- Structure fires
- Forest fire
- Sediment control malfunctions
- Occupational health and safety
- Human health in the surrounding area

4.4 Effects of the Environment on the Project

Engineering planning and design of the quarry will involve consideration of effects of the environment on the project during its construction and operation. Design and engineering of all structures and project areas will take into account the regions climatological, geological, and topographic characteristics to ensure work at the site is safe and efficient. Potential environmental effects are listed below; however, their impact on the project is predicted to be **Non-Significant**.

4.4.1 Slides, Avalanches, Floods

Due to the stripping of overburden, there will be minimal chance of landslide or avalanche occurrence at the quarry site. Once operations have been started, the work areas will consist of only exposed rock, which poses no threat of shifting (outside of blasting events). Adherence to the proper safety regulations and best practices with

respect to blasting will mitigate any potential concerns related to rock slides (i.e. blasting protocols, measurements of ground stability, proper material storage). Seismic activity in the region is virtually non-existent and poses no threat to ground, or stored material stability. Heavy rain, or large snowmelt, events can produce flooding in low lying areas; an effect that is potentially exacerbated by land clearing causing increased runoff flow peaks. However, with much of the site at elevation, limited overburden for water storage, and all operational equipment placed in moderate-lying areas, the potential for flood damage is low. Runoff from the site will be controlled by the appropriate sediment and flow control measure outlined in Section 4.1.1 and will also be included in the EPP.

4.4.2 Climate and Climate Change

Designs that do not account for potential changes in the climate may over or underestimate the effects of climatic variables. Consideration of past climate change is necessary to understand trends that may be occurring in the area in order to predict future situations. Examination of Environment Canada's 'Canadian Climate Normals and Averages between 1985-2006' have shown no significant change in several temperature and precipitation variables for the surrounding the proposed quarry (obtained from the Harbour Breton climatological station). Figures 4.2-4.3 illustrate that the area has experienced no strong statistical change in climatological parameters. Precipitation levels have remained relatively constant, showing no real trend-change for the past 20 years. However, it has exhibited a general trend to warmer temperatures, having a slightly increased mean, with the greatest difference being an increase in the minimum values as opposed to an increase in the maximum temperatures attained.

Environment Canada's climate change projections suggest that Canada could see warming by an average of 1° to 3.5° C. However, it suggests that Atlantic Canada will not experience the significant warming trend anticipated for the rest of the country, and has, in fact, experienced a general cooling trend over the past 20-25 years. In spite of this decrease, Atlantic Canada is particularly vulnerable to rising sea levels; whose impacts could include greater risk of floods, coastal erosion, coastal sedimentation, and reductions in sea and river ice (Natural Resources Canada). Natural Resources Canada anticipates a sea level rise of approximately 20 cm/100 years, which, when combined with a large storm surge event, may pose an additional risk to the operation of the quarry. The nature of the site may make it to prone to washouts related to spring flooding and changes in late winter-early spring precipitation patterns. Care shall be taken to ensure that all project components are engineered to account for these potential changes, such as ensuring sediment-control structures are regularly examined and maintained to ensure their effectiveness during peak flood times.

The primary effect of weather on the project is the temporary delay of construction activities during periods of inclement weather. Inclement weather may present a safety hazard for workers, or may make it difficult to perform specific construction and operational tasks. All infrastructure will be designed to *National Building Code of Canada* standards that include consideration of temperature, precipitation, and wind, as

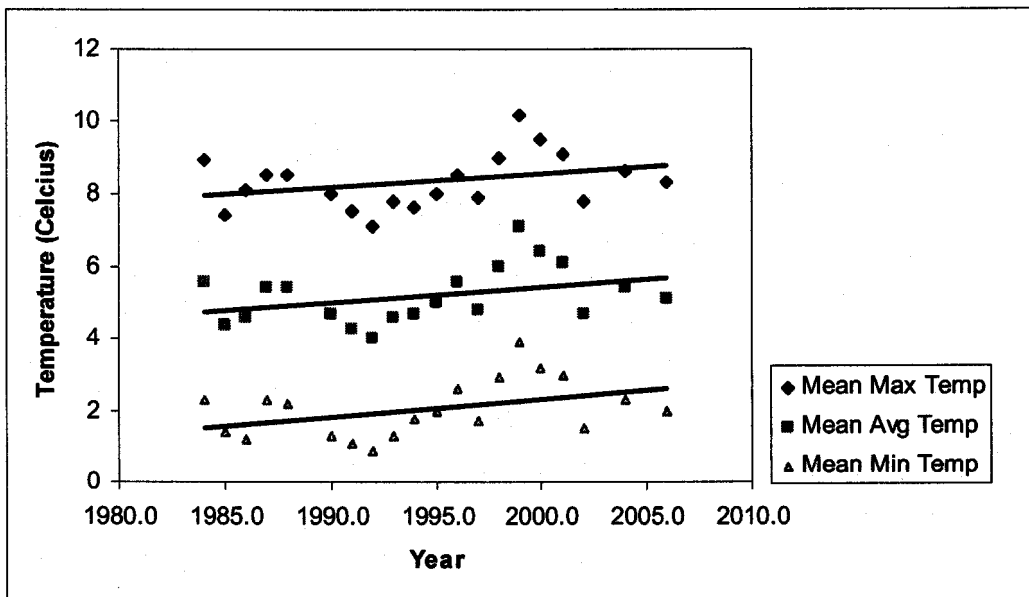


Figure 4.1 Mean annual maximum, minimum and average temperature for the region around Belleoram, NL. Data obtained from Environment Canada's 'Canadian Climate Normals and Averages between 1985-2006' for Harbour Breton.

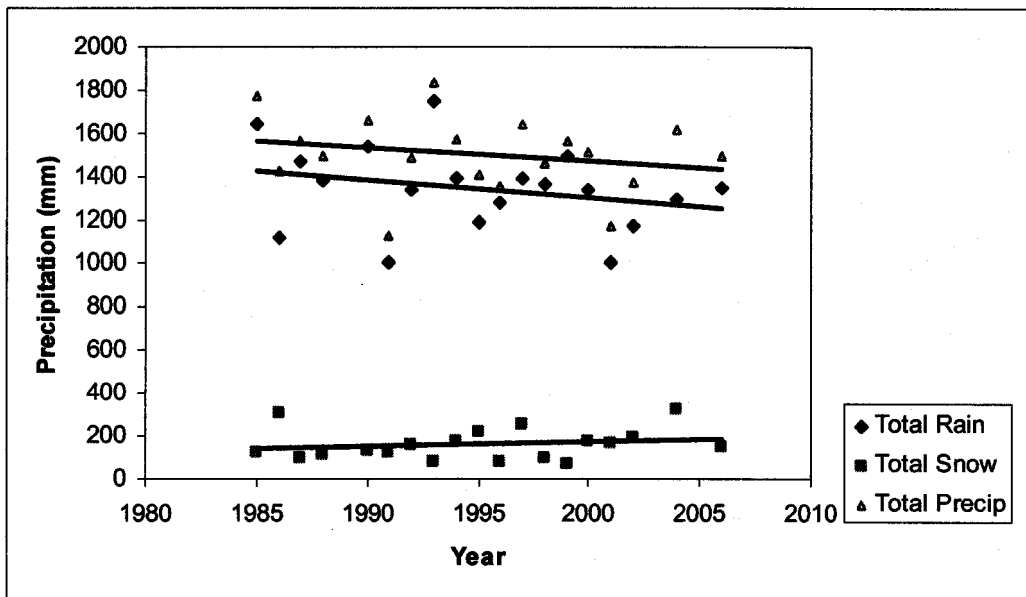


Figure 4.2 Total annual rain, snow and total precipitation for the region around Belleoram, NL. Data obtained from Environment Canada's 'Canadian Climate Normals and Averages between 1985-2006' for Harbour Breton.

appropriate. Extremely cold temperatures have the potential to freeze equipment, especially with high winds driving precipitation across the site. The average extreme low for the area is minus 18.7° C, which could interfere with the operation of equipment and vehicles (such as the metal structured crushing and grinding equipment). Thus, all equipment and vehicles on-site should be rated for work at low temperatures, with measures in place to de-ice and warm them as needed.

4.5 Residual Effects

The residual effects from Project activities include a change in the area's landscape, having the overburden and vegetation removed to quarry the underlying granite bedrock. These effects will be spatially confined to the 900 ha footprint of the Project boundary, and are not expected to produce any effects in surrounding areas. Revegetation will use local plants, where possible, to revert the land to its previous state. Avoidance of the site by wildlife will be temporary and is expected to return to baseline levels once regrading and revegetation procedures are complete. No habitat will be fragmented, with the progression of project activities across the site occupying the smallest contiguous area possible. All effects will be effectively mitigated through adherence to the land reclamation measures outlined in this CSR, which will be further detailed in the Contingency Plan and EPP. Therefore, the residual effects on the terrestrial environment are expected to be **Non-Significant**.

The marine environment will also experience residual effects pertaining to the marine terminal's construction in Fortune Bay. Its physical presence may result in a loss of fish and lobster habitat, with its footprint precluding occupying areas identified as potential feeding grounds. An authorization for any fish habitat altered, disrupted, or destroyed will be required from the Federal Minister of Fisheries and Oceans. As part of this authorization, an acceptable compensation plan is to be completed. Compensation for this loss will include the use of armour stone to create artificial habitat, with detailed mitigative measures to be outlined in the Contingency Plan and EPP. Therefore, the residual effects on the marine environment are expected to be **Non-Significant**.

4.6 Capacity of Renewable Resources

The development of the quarry will inevitably cause alterations to the landscape that could impact the site and surrounding areas. Renewable resources in the area, such as trees, small game, and fresh/saltwater fish, may be impacted by the quarry's activities. However, historical usage of these resources by local residents is minimal. While the quarrying operations will require the clearing of the land (being confined to the 900 ha Project footprint), reclamation procedures will ensure that the site is reverted back to its previous state as much as possible; restoring its resource potential. Outlines for land reclamation will be outlined in the Contingency Plan and EPP. Productivity of marine fish and lobster resources may also be affected by the Project activities due to the

potential loss of habitat resulting from the construction of the marine terminal. Again, an authorization for any fish habitat altered, disrupted, or destroyed will be required from the Federal Minister of Fisheries and Oceans, with an acceptable compensation plan completed as well. Mitigative and compensation measures will be outlined in the Contingency Plan and EPP and include.

4.7 Follow-Up

Continental Stone will be responsible for both environmental compliance and effects monitoring at appropriate stages of the quarry's operation. The environmental compliance monitoring will include activities that require monitoring to ensure compliance with regulatory and self-imposed environmental requirements. These will be conducted as per permit requirements and regulatory frameworks. For example, runoff will be periodically tested, as needed, to ensure it conforms to all regulatory requirements. All permit requirements will be identified in the EMP and Contingency Plan to ensure adherence to schedule.

Prior to construction, Continental Stone commits to preparing an EMP and a field-usable Contingency Plan that will:

- Bring forward the mitigative measures outlined in this document;
- Include additional measures that may be included as permit conditions; and
- Outline contingency procedures for possible unforeseen events.

Environmental effects monitoring is conducted to validate impact predictions and to evaluate the effectiveness of and identify the need for altering or improving mitigative measures.

5.0 SUMMARY OF MITIGATION MEASURES

This section includes a summary of mitigative measures for each VEC outlined in Section 4.0.

Valued Ecosystem Component (VEC)	Project Component/ Activity	Specific VEC Component	Description of Effect	Proposed Mitigation Measure	Residual Environmental Effect
Soil/Sediment Quality and Transport	Overburden Stripping	Sediment Quality and Transport	Potential for an increase in aquatic suspended solids and degradation of terrain.	<ul style="list-style-type: none"> <input type="checkbox"/> During the construction phase, siltation control structures (i.e. silt curtains, cofferdams, and sediment fences) will be constructed prior to beginning any activities involving disturbance of the soil, work along the shoreline, or near areas of high runoff potential. <input type="checkbox"/> Construction activities will be coordinated to avoid periods of heavy precipitation and not coincide with sensitive periods for fish and wildlife (when possible). <input type="checkbox"/> Mitigative measure will be implemented prior to any grubbing or excavation to direct any natural drainage around work areas, avoiding sediments above ambient suspended particle concentration in runoff waters. <input type="checkbox"/> Soil disturbance will be minimized by limiting the area exposed at any one time, stabilizing exposed soil with anti-erosion devices (i.e. rip rap, filter fabrics, gravel or wood chips) and revegetating disturbed areas where possible. <input type="checkbox"/> Grubbing of the organic vegetation mat and/or the upper soil horizons will be restricted to the minimum area required. <input type="checkbox"/> The organic vegetation mat and upper soil horizon material that has been grubbed will be spread in a manner so as to cover inactive exposed areas. No soils are to be exposed for more than 30 days. <input type="checkbox"/> A 50 m buffer zone of undisturbed natural vegetation between construction areas and all waterbodies will be 	Non-Significant

	Leaching, Chemicals, and Spills	Soil Quality	Potential contamination of soils.	<p>maintained to prevent sediments from entering local waterways.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Runoff will be directed to vegetated areas (natural or constructed) within the project boundaries to slow flows, and allow particles to precipitate out. A decreased flow rate also reduces the erosion potential of the runoff water, effectively mitigating the chance of further washouts. <input type="checkbox"/> Aggregate stockpiles will be sloped and compacted in such a way as to prevent water accumulation. <input type="checkbox"/> Washwater from aggregate washing will be collected and sent through an enclosed steel pipeline to industry approved settling ponds. <input type="checkbox"/> Washwater recycled from the settling ponds back into the operations to decrease the drawdown from local ponds (with a predicted recovery of 90%). <input type="checkbox"/> Suspended solids concentrations within any effluent from siltation control structures entering marine waters will not exceed 25 mg/L (monthly average) or 50 mg/L (grab sample) as per Section 36 of <i>The Fisheries Act</i>. <input type="checkbox"/> Hydrocarbon releases from machinery and vehicles can be minimized through regular maintenance to ensure they are in good working order and thoroughly checked for leakage. <input type="checkbox"/> Only minor repairs and maintenance of 'non-mobile' equipment (such as drilling and crushing equipment) will be performed on-site. All other major repairs will take place offsite at an approved facility. <input type="checkbox"/> Fuel, and other hazardous substances, will only be handled, stored, or disposed of by persons who are trained and qualified to do so in accordance with the manufacturer's instructions and governmental laws and regulations (e.g. Storage and Handling of Gasoline and Associated Products Regulations; Used Oil Control Regulations). Procedures will include: 	Non-Significant
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	Potential Release of Explosive Chemicals	Soil Quality	Potential contamination of soils.	<ul style="list-style-type: none"> • Having operators present for the duration of refueling; • Refueling equipment and vehicles at least 30 m from any water body, and over a non-permeable surface; • Having basic petroleum spill clean-up equipment on-site, with adsorbents being used to recover any hydrocarbon sheen in pit water; • Promptly containing, and cleaning up, all spills or leaks on land or in water and Reporting them to the 24-hour environmental emergencies report system (1-800-563-9089) as required by The Fisheries Act; • Allowing no on-site bulk storage of fuel or oil. • Not disposing of wastes in-or-near waterbodies, with no burning of waste without a permit. • Water testing as per criteria listed in Schedule A of the Environmental Control Water and Sewage Regulations (2003), under the Water Resources Act, before it is discharged into a water body. <p><input type="checkbox"/> All water releases will meet the regulatory requirements of the Environmental Control (Water and Sewage) Regulations and provincial permits.</p> <p><input type="checkbox"/> No untreated sewage is to be released, with it being collected and stored in a Blivet™-type containment system and disposed of by a licenced contractor.</p> <p><input type="checkbox"/> Runoff from temporary explosives storage and blasting sites will be directed to vegetated areas to allow for natural decomposition.</p> <p><input type="checkbox"/> Using a bulk emulsion explosive that is proven to reduce ammonia's release rate, which will allow any wastage to assimilate into the environment at a more sustainable rate.</p> <p><input type="checkbox"/> Using suppression and/or collection equipment during drilling, using DTH drills equipped with either a vacuum dust collection system or a water injection dust suppression mechanism.</p> <p><input type="checkbox"/> Plugging the 12 m bore holes with 3 m of 20 mm, clean,</p>	Non-Significant
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				<p>crushed stone to trap gases and dust during blasts.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Discharging pit water to vegetated areas to encourage bio/chemical-degradation of ammonia. <input type="checkbox"/> Constantly monitoring water quality to ensure runoff to the marine environment complies with CEAA, with non-compliant water being treated by alternate means. <input type="checkbox"/> Ensuring that the handling, transportation, storage and use of explosives will be conducted in compliance with all applicable laws, regulations, and orders of the Department of Energy and Conservation (DOEC) and the Department of Natural Resources-Mines. <input type="checkbox"/> Only allowing persons properly trained and qualified to handle explosives in accordance with the manufacturer's instructions and governmental laws and regulations. <input type="checkbox"/> Maintaining the integrity of all storage containers, tanks, and loading equipment to prevent explosives spills, and following the manufacturer's spill clean up recommendations. <input type="checkbox"/> Using explosives in a manner that will minimize scatter of blasted material beyond the limits of the activity; <input type="checkbox"/> Designing blasting patterns and procedures which minimize shock or instantaneous peak noise levels and ensures that the magnitude of explosions is limited to only what is necessary; such as: <ul style="list-style-type: none"> • plugging the 12 m bore holes with a 3 m collar of 20 mm, clean, crushed stone to trap gases and dust during blasting • optimizing drill hole patterns • using explosives in a manner that will minimize scatter of blasted material beyond the limits of the activity • employing the proper working on time-delayed blasting cycles (500 ms in-hole delay and a 25 ms surface delay) • using a Nonel EZ Dets or similar blast initiation system which allows accurate firing of the explosives); 	
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	Contamination of Marine Sediments	Marine Waters	Work within or near marine waters could result in reduce water quality.	<ul style="list-style-type: none"> • making a blasting plan available to the local committee; and not blasting underwater or within a waterbody. <input type="checkbox"/> The use of explosives will be in compliance with all applicable laws, regulations, and orders of the DOEC and the DNR-Mines. <input type="checkbox"/> Only those persons properly trained and qualified in the handling and detonation of explosives will be allowed to use them, and all use will be in accordance with the manufacturer's instructions and governmental laws and regulations. <input type="checkbox"/> A Blasters Safety Certificates (from the DOEC) and a Temporary Magazine License (from Energy, Mines, and Resources Canada) will be obtained prior to drilling and blasting to ensure that the proper procedures are known and followed. <input type="checkbox"/> Any infilling or dredging activities within marine waters will be conducted in strict compliance with all authorizations and/or permits as required all federal and provincial agencies. <input type="checkbox"/> Blasted rock from the quarry site will be used for infilling, with armour stone be placed progressively to minimize erosion and prevent the loss of infill material. <input type="checkbox"/> Silt curtains will be put in place around marine activities to prevent sediment from entering the water column outside work areas. The silt barrier will be attached to a flotation boom and extend from the sea surface to 1-2 m from the sea bottom. <input type="checkbox"/> Seabed sediment removed during dredging activities will be placed on barges while inside the silt curtain, and removed for disposal on land. <input type="checkbox"/> Heavy equipment will only be used from dry, stable, areas or barges specifically designed for that purpose; with heavy equipment not operating from barges completing work below the high water mark during low tide. 	Non-Significant
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				<input type="checkbox"/> Timber used for construction in or near marine waters will consist of wood treated with preservatives safe for use in the marine environment or is to be left untreated.	
Atmospheric Conditions	Construction and Operational Activities	Atmospheric Conditions	Increased dust emissions.	<input type="checkbox"/> Any areas with a high dust potential will be sprayed with water to decrease the chance of particles becoming airborne while overburden is being cleared and stockpiled. <input type="checkbox"/> The use of calcium chloride on access roads for dust suppression is to be done in accordance with all guidelines from the NL Department of Works, Services and Transportation and be stored away from water bodies. <input type="checkbox"/> Waste oil shall not be used for dust control. <input type="checkbox"/> The phasing in of all project activities allows only active areas to be exposed, leaving much of the area with natural cover preventing soil and other particles from becoming airborne. <input type="checkbox"/> Once active areas are cleared of all overburden (to be stockpiled), the potential for dusting is minimal, as the land will consist only of exposed granite bedrock. <input type="checkbox"/> Vehicle-related dusting from the access roads will be largely confined to the construction phase while large trucks bring in equipment. Once construction is completed, the dusting potential will be low, as the majority of on-site vehicles will be company cars and small trucks following designated roadways. <input type="checkbox"/> Wet conditions common to the area greatly decrease the amount of dust that will be released as a result of vehicle movement. <input type="checkbox"/> The use of a marine terminal and bulk carriers, instead of dump trucks, to transport the aggregate greatly decreases the potential for dust emissions; with less point-sources for dust to escape from. <input type="checkbox"/> Dust suppression procedures will be implemented in the crusher/screener areas to comply with the NL Criteria for Acceptable Air Quality (which allows a total suspended particulate concentration of 80 $\mu\text{g}/\text{m}^3$ and 120 $\mu\text{g}/\text{m}^3$ for 1	Non-Significant

	Construction and Operational Activities	Atmospheric Conditions	Increased exhaust emissions.	<p>hour and 24 hour exposure, respectively).</p> <ul style="list-style-type: none"> <input type="checkbox"/> Crushers/screeners, and the areas around them, will be sprayed with water <input type="checkbox"/> Aggregate washing will greatly reduce fugitive dust emissions from the crushed rock product itself. <input type="checkbox"/> Aggregate washwater will be directed to settling ponds to allow accumulated particulate matter to precipitate out in a controlled environment <input type="checkbox"/> Settling ponds will be regularly dredged to remove accumulated silt, with the material being stored and used as fill for restoration projects at the quarry site. <ul style="list-style-type: none"> <input type="checkbox"/> All construction and operation equipment will be well maintained and fitted with standard exhaust suppression devices to keep emissions at a minimum. <input type="checkbox"/> Diesel vehicles and crushing/screening equipment will comply with the NL Regulation 39/04 Air Pollution Control Regulations 'Visible Emissions Standards'. These standards require diesel vehicles to meet SAE J1667 (Snap Acceleration Smoke Test Procedure for Heavy-Duty Diesel Vehicles; a measure of combustion efficiency) targets of visible emissions of 40% for 1991 model vehicles and newer, and 55% for 1990 model vehicles and older. <input type="checkbox"/> Employee's personal vehicle will not be onsite (parked at the front gate), with all personnel transport via well maintained company-owned trucks. <input type="checkbox"/> Chain saws and other small equipment will be regularly maintained and in good repair to ensure exhaust emissions are minimal. 	Non-Significant
	Blasting Activities	Atmospheric Conditions	Increased dust emissions.	<ul style="list-style-type: none"> <input type="checkbox"/> Continental Stone's blasting protocol was designed to be effective and efficient, which will help minimize dust emissions resulting from a blast (see the 'Soil/Sediment Quality and Transport' portion of this table). <input type="checkbox"/> Blasting will be done in accordance with the Aggregate 	Non-Significant

	Construction and Operational Activities	Atmospheric Conditions	Atmospheric pollutants affecting human health.	<p>Operators Best Management Practices Handbook for British Columbia, Volume 2 (2002), and will incorporate Wright Hopky's Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters (1998) into the blasting operations (as well as the EPP).</p> <ul style="list-style-type: none"> <input type="checkbox"/> Requiring dust suppression and/or collection equipment during drilling, such as using drills equipped with either a vacuum dust collection system or a water injection dust suppression mechanism; <input type="checkbox"/> Plugging all bore holes with 3 m collars of 20 mm, clean, crushed stone to trap gases and dust during blasting; and <input type="checkbox"/> Adjusting blast timing such that every blast is as effective as possible allowing for efficient use of explosives. <p><input type="checkbox"/> Exhaust emission are expected to be minimized by maintaining the good working condition of all equipment and adhering to all provincial and federal emissions standards.</p> <p><input type="checkbox"/> Dust suppression procedures will be implemented in these areas to comply with the NL Criteria for Acceptable Air Quality (which allows a total suspended particulate concentration of 80 µg/m³ and 120 µg/m³ for 1 hour and 24 hour exposure, respectively).</p> <p><input type="checkbox"/> All workers will be required to wear proper dust suppressants (i.e. masks respirators) whenever hourly dust emissions exceed 80 µg/m³ in their work areas (as per the Canadian Environmental Protection Agency's ambient air quality guidelines).</p>	Non-Significant
	Accidents during Construction and Operation.	Atmospheric Conditions	Accidental release of dust or toxic fumes.	<p><input type="checkbox"/> While impossible to predict, the potential for accidental release of dust or other air emissions will be incorporated into the EPP. This will ensure that Continental Stone adheres to the regulations pursuant to the NL Air Pollution Control Regulations.</p> <p><input type="checkbox"/> Fires involving fuels or explosives will be mitigated by following all safety standards with respect to their</p>	Non-Significant

				<p>storage, handling, and use.</p> <ul style="list-style-type: none"> <input type="checkbox"/> There will be no on-site bulk storage of fuel or explosives; with their handling complying with the Storage and Handling of Gasoline and Associated Products Regulations and the Explosives Act, respectively. <input type="checkbox"/> Stored waste oil will be handled and stored by a licensed disposal agent in accordance with the Used Oil Control Regulations, and be regularly disposed of to prevent accumulation. <input type="checkbox"/> Any areas with temporary storage of flammable products will adhere to the fire prevention/suppression measures outlined in the NL Occupational Health and Safety Act to mitigate the chance that fires can spread. <input type="checkbox"/> All equipment and buildings are to adhere to the NL Fire Prevention Smoke and Fire Alarm Regulations under the Fire Prevention Act, with proper fire suppression and alarm equipment being installed in all buildings and permanent equipment. <input type="checkbox"/> Regular testing and maintenance will be done to ensure these systems are functioning properly. <input type="checkbox"/> Employees are to be trained in fire prevention and suppression techniques, with drills being conducted on a regular basis. <input type="checkbox"/> Measures to prevent forest fires pursuant to The Forest Fires Act will be adhered to. 	
Vegetation and Wetlands	Clearing Procedures	Vegetation Loss	Loss of vegetation and wildlife habitat.	<ul style="list-style-type: none"> <input type="checkbox"/> Clearing will be performed incrementally over the extent of the quarry's footprint; keeping as much habitat intact as possible. <input type="checkbox"/> A 50 m buffer zone of undisturbed natural vegetation will be left between construction areas and all waterbodies (fish habitat protection guidelines recommend a buffer width of $12\text{ m} + 1.5 \times \% \text{ slope}$; Scruton <i>et al.</i> 1997). <input type="checkbox"/> Maintenance of access roads' right-of-way will be done on an ongoing basis, but will be restricted to their primary footprint (approximately 10 m wide). Buffer zones will 	Non-Significant

	Access Roads and Vehicles	Loss of Vegetation and Wetlands.	Loss of vegetation and wildlife habitat.	<p>be maintained along the roads (wherever possible) to ensure that vehicle activities do not interfere with the surrounding forest habitat.</p> <ul style="list-style-type: none"> <input type="checkbox"/> As quarrying is completed on portions of the property, the area will be reclaimed in order to revert the land back to its previous state to the extent possible. Revegetation efforts will strive to revegetate cleared areas with local plant species. <input type="checkbox"/> Clearing activities will comply with the requirements of all applicable permits, including the Permit to Burn. <input type="checkbox"/> Disposal of cleared unmerchantable timber, slashings and cuttings by burning shall be in compliance with the Forest Fire Regulations, Environmental Code of Practice for Open Burning, and the Permit to Burn. At no time will fires be left unattended. <input type="checkbox"/> Merchantable or usable timber will be removed by a local contractor. <input type="checkbox"/> Slash and any other construction material or debris will not be permitted to enter any watercourse, and will be piled above spring flood levels for later disposal. <input type="checkbox"/> All vehicle operators will be required to possess the appropriate licences with respect to operating their respective vehicles and will follow driving laws and regulations. <input type="checkbox"/> Appropriate signs will also be posted on the main road, access roads, and road crossings to ensure proper use and decrease the chances of accidents which may affect surrounding habitats. <input type="checkbox"/> Access roads will be for company employees and vehicles only, and will be cordoned off by means of a gate at the quarry's entrance; limiting access and eliminate the potential for destructive unlawful usage of the land (i.e. wood harvesting, off-road recreational vehicles, and/or fires). 	Non-Significant
	Erosion	Degradation of	Loss of		

	Control	Vegetation and Wetlands	vegetation and wildlife habitat.	<ul style="list-style-type: none"> <input type="checkbox"/> During the construction phase, siltation control structures (i.e. silt curtains, cofferdams, and sediment fences) will be constructed prior to beginning any activities involving disturbance of the soil, work along the shoreline, or near areas of high runoff potential. <input type="checkbox"/> Construction activities will be coordinated to avoid periods of heavy precipitation and not coincide with sensitive periods for fish and wildlife (when possible). <input type="checkbox"/> Mitigative measure will be implemented prior to any grubbing or excavation to direct any natural drainage around work areas, avoiding sediments above ambient suspended particle concentration in runoff waters. <input type="checkbox"/> Soil disturbance will be minimized by limiting the area exposed at any one time, stabilizing exposed soil with anti-erosion devices (i.e. rip rap, filter fabrics, gravel or wood chips) and revegetating disturbed areas where possible. <input type="checkbox"/> Grubbing of the organic vegetation mat and/or the upper soil horizons will be restricted to the minimum area required. <input type="checkbox"/> The organic vegetation mat and upper soil horizon material that has been grubbed will be spread in a manner so as to cover inactive exposed areas. No soils are to be exposed for more than 30 days. <input type="checkbox"/> A 50 m buffer zone of undisturbed natural vegetation between construction areas and all waterbodies will be maintained to prevent sediments from entering local waterways. <input type="checkbox"/> Runoff will be directed to vegetated areas (natural or constructed) within the project boundaries to slow flows, and allow particles to precipitate out. A decreased flow rate also reduces the erosion potential of the runoff water, effectively mitigating the chance of further washouts. <input type="checkbox"/> Aggregate stockpiles will be sloped and compacted in such a way as to prevent water accumulation. 	Non-Significant
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	Activities Near Aquatic Vegetation and Wetlands	Vegetation and Wetlands	Loss/ degradation of aquatic vegetation and wetlands.	<input type="checkbox"/> Washwater from aggregate washing will be collected and sent through an enclosed steel pipeline to industry approved settling ponds. <input type="checkbox"/> Washwater recycled from the settling ponds back into the operations to decrease the drawdown from local ponds (with a predicted recovery of 90%). <input type="checkbox"/> Suspended solids concentrations within any effluent from siltation control structures entering marine waters will not exceed 25 mg/L (monthly average) or 50 mg/L (grab sample) as per Section 36 of <i>The Fisheries Act</i> . <input type="checkbox"/> Where necessary, runoff will be directed to vegetated areas (natural or man made) within the project boundaries, to slow flows and allow for particles to settle out. <input type="checkbox"/> Vegetated areas receiving quarry runoff will first be assessed to ensure they do not contain any valuable habitat or species of concern. <input type="checkbox"/> No runoff will be allowed to freely flow into any water body, which will ensure aquatic vegetation is not affected by sediment accumulation. <input type="checkbox"/> Aggregate washwater will be collected and sent through an enclosed steel pipeline to industry approved settling ponds where excess sediments will precipitated out. <input type="checkbox"/> Cleared washwater will be recycled from the settling ponds back into the operations, decreasing the drawdown from local ponds and maintaining the local freshwater habitat. <input type="checkbox"/> The anticipated water withdrawal of a fully operational quarry (up to 900 tonnes per hour), will amount to only 0.8% of the August mean monthly flow and only 4.8% of the estimated minimum August flow (i.e. 1987). Thus, the effect of water withdrawal on the aquatic habitat in this stream/pond system is not significant and should allow for sustainability of existing vegetation.	Non-Significant
	Chemical Losses	Vegetation and Wetlands	Loss/ degradation of		Non-Significant

			<p>aquatic vegetation and wetlands.</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Runoff has the potential to contain hydrocarbons from fuels, oils/greases, and detergents from cleaners, which can kill local vegetation if their concentrations are high enough. All chemicals will be handled, used, and stored according to all recommendations for dangerous chemicals (see Section 4.1.1 and the 'Soil/Sediment Quality and Transport' portion of this table). <input type="checkbox"/> Nitrogenous compounds from blast residues will be mitigated by directing runoff from blast sites to setting ponds and controlled vegetated areas which will encourage their bio/chemical-degradation. <input type="checkbox"/> Water quality monitoring will be employed to ensure runoff sources to the aquatic environment comply with Environmental Control Water and Sewage Regulations, under the Water Resources Act. 	
<p>Terrestrial Wildlife and Habitat</p>	<p>Clearing Procedures</p>	<p>Terrestrial Wildlife and Habitat</p>	<p>Loss of wildlife and their habitat.</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Noise generating activities (such as crushing and screening equipment, vehicles, and blasting) will be mitigated by maintaining all machinery in proper working order and fitting them with industry approved sound suppression devise. <input type="checkbox"/> The incremental spread of operations over the quarry's lifespan, and the abundance of suitable habitat outside of the quarry's boundaries, should allow wildlife adequate room to migrate to unaffected areas, preserving their reproductive populations and potential. <input type="checkbox"/> Habitat fragmentation will be mitigated by having all Project activities occupying the smallest contiguous footprint; allowing corridors of undisturbed habitat to enable wildlife to traverse the majority of the quarry site even once operations are underway. <input type="checkbox"/> As quarrying is completed on portions of the property, the area will be reclaimed in order to revert the land back to its previous state to the extent possible. Revegetation efforts will strive to revegetate cleared areas with local plant species. 	<p>Non-Significant</p>
	<p>Sediment and</p>	<p>Terrestrial</p>	<p>Loss of</p>		

	<p>Chemical Losses from Construction and Operations</p>	<p>Wildlife and Habitat</p>	<p>wildlife and their habitat.</p>	<p><input type="checkbox"/> Habitat degradation outside of active operational areas will be achieved by mitigating the outputs from these sites. Sediment and chemical losses will be mitigation through the measures outlined in Section 4.1.1 and the 'Soil/Sediment Quality and Transport' portion of this table. This includes: the use of siltation control structures (i.e. silt curtains, cofferdams, and sediment fences), coordinating construction activities to avoid periods of heavy precipitation and not coincide with sensitive periods for fish and wildlife (when possible), limiting the area exposed at any one time, stabilizing exposed soil with anti-erosion devices (i.e. rip rap, filter fabrics, gravel or wood chips) and revegetating disturbed areas where possible. And maintaining appropriate vegetative buffers between work areas and waterbodies or sensitive habitat.</p> <p><input type="checkbox"/> All chemical control measure will comply with all provincial and federal laws and regulations.</p> <p><input type="checkbox"/> All waste water will be directed to the settling ponds. Effluent discharge will comply with standards set forth in the Environmental Control Water and Sewage Regulations, under the Water Resources Act.</p>	<p>Non-Significant</p>
	<p>Blasting-Related Effects</p>	<p>Terrestrial Wildlife and Habitat</p>	<p>Effects of blasting on wildlife and their habitat.</p>	<p><input type="checkbox"/> Blast related effects, such as vibration, noise, dust, and nitrogenous residues will be controlled by applying the best practices pursuant to the use of quarrying explosives.</p> <p><input type="checkbox"/> The blast plan has been created optimize efficiency and reduce its effects., with mitigative measures being detailed in Section 4.1.1 and the 'Soil/Sediment Quality and Transport' portion of this table.</p> <p><input type="checkbox"/> Surveying the immediate area prior to blasting, with blasting operations being delayed if big game (such as moose) are observed within 100 m and allowing animals to leave of their own accord.</p> <p><input type="checkbox"/> Monitoring for blasting-related effects such as noise and vibration levels will be conducted once blasting is initiated. This will allow for assessment of the efficacy of</p>	<p>Non-Significant</p>

				<p>the outlined protocols and mitigative measures and determine if they need to be altered.</p> <p><input type="checkbox"/> Best practices outlined in the Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters (Wright and Hopky 1998) and the Dyno Nobel Canadian Blast Site Safety Procedures will be followed to ensure a minimal effect of blasting on wildlife in the area.</p>	
Land Birds and Waterfowl	Clearing Operations	Land Birds and Waterfowl	Loss of habitat.	<p><input type="checkbox"/> The incremental spread of operations over the quarry's lifespan, and the abundance of suitable habitat adjacent to the quarry's boundaries, should allow birds adequate time and room to migrate to unaffected areas, preserving their reproductive potential.</p> <p><input type="checkbox"/> Noise generating activities (such as crushing and screening equipment, vehicles, and blasting) will be mitigated by maintaining all machinery in proper working order and fitting them with industry approved sound suppression devise.</p> <p><input type="checkbox"/> Habitat fragmentation will be mitigated by having all Project activities occupying the smallest contiguous footprint; allowing corridors of undisturbed habitat to enable wildlife to traverse the majority of the quarry site even once operations are underway.</p> <p><input type="checkbox"/> Continental Stone understands, and will comply with, the Migratory Birds Convention Act and Regulations which provides for the protection of migratory birds, their nests, eggs, and young. The proponent will comply with this Act during all project stages.</p> <p><input type="checkbox"/> Adequate buffers will be maintained between activities and possible habitat (i.e. 50 m from a waterbody or wetlands). Nests or eggs will not be moved or obstructed, and it is recommended that vegetation clearing not take place during the breeding season until fledglings have left parental territories. If a nest is found:</p> <ul style="list-style-type: none"> • the nest site and neighbouring vegetation should be left undisturbed until nesting is completed; and • construction activities be minimized in the 	Non-Significant

	<p>Sediment/ Chemical Losses Resulting from Construction and Operational Activities</p>	<p>Land Birds and Waterfowl</p>	<p>Loss or degradation of habitat.</p>	<p>immediate area until nesting is completed.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Structures required for water extraction operations will not be placed near any pond. The pumphouse's construction will take place at least 50 m from the high water mark, with natural vegetation being maintained in the 50 m buffer (where possible). All ponds will maintain a naturally vegetated 50 m buffer. <input type="checkbox"/> As quarrying is completed on portions of the property, the area will be reclaimed in order to revert the land back to its previous state to the extent possible. Revegetation efforts will strive to revegetate cleared areas with local plant species. <input type="checkbox"/> The potential for habitat degradation, resulting from sediment losses, will be greatly diminished by adherence to measures outlined Section 4.1.1 and the 'Soil/Sediment Quality and Transport' portion of this table, and will include such measures as settling ponds, soil removal and stockpiling/disposal, berms, and geofabrics. <input type="checkbox"/> Chemical losses, as with sediment losses, will be mitigation through measures detailed in Section 4.1.1 of this document and the 'Soil/Sediment Quality and Transport' portion of this table. <input type="checkbox"/> All water releases will meet the regulatory requirements of the Environmental Control (Water and Sewage) Regulations and provincial permits. <input type="checkbox"/> No untreated sewage is to be released, with it being collected and stored in a Blivet™-type containment system and disposed of by a licenced contractor. <input type="checkbox"/> All fuels and chemicals are handled, used, and stored in compliance will all provincial and federal laws and regulations, with access restricted only to trained employees. Employees will be trained in emergency response procedures in the event of such a spill, with proper spoil prevention and clean-up materials on-site. <input type="checkbox"/> All discharges from the quarry site will comply with 	<p>Non-Significant</p>
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	Blasting-Related Effects	Land Birds and Waterfowl	Disturbances/ direct mortality of terrestrial birds.	<p>standards set forth in the Environmental Control Water and Sewage Regulations, under the Water Resources Act.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Blast related effects, such as vibration, noise, dust, and nitrogenous residues will be controlled by applying best practices pursuant to the use of quarrying explosives. <input type="checkbox"/> A blast plan has been created to optimize efficiency and reduce its effects, with mitigative measures outlined in Section 4.1.1 of this document and the 'Soil/Sediment Quality and Transport' portion of this table to serve to further reduce any effects blasting. <input type="checkbox"/> Monitoring for blasting-related effects such as noise and vibration levels will be conducted once blasting is initiated. This will allow for assessment of the efficacy of the outlined protocols and mitigative measures and determine if they need to be altered. <input type="checkbox"/> Best practices outlined in the Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters (Wright and Hopky 1998) and the Dyno Nobel Canadian Blast Site Safety Procedures will be followed to ensure a minimal effect of blasting on birds in the area. 	Non-Significant
Marine Birds	Construction of the Marine Terminal	Marine Birds	Loss of marine bird habitat.	<ul style="list-style-type: none"> <input type="checkbox"/> Where possible, any areas that have been identified as important habitat (i.e. over wintering areas, feeding and breeding grounds, and nesting areas) are to be left undisturbed. <input type="checkbox"/> Adequate buffers will be maintained between activities and possible habitat. <input type="checkbox"/> Where possible, nests or eggs will not be moved or obstructed and it is recommended that vegetation clearing not take place during the breeding season until fledglings have left parental territories. . If a nest is found: <ul style="list-style-type: none"> • the nest site and neighbouring vegetation should be left undisturbed until nesting is completed; and • construction activities be minimized in the immediate area until nesting is completed. 	Non-Significant

	Shipping Activities	Marine Birds	Disruption of marine birds and their habitat.	<input type="checkbox"/> Specific measures to protect key habitat for these marine birds will be outlined in an EPP and may include: <ul style="list-style-type: none"> • Adherence to the Migratory Bird Convention Act; • Maintenance of buffers between construction/operation activities and key habitats (where possible); • Guarding against disposal of hazardous chemicals into surrounding terrestrial and marine habitats (see Section 4.1.1 and the 'Soil/Sediment Quality and Transport' portion of this table); • Erecting siltation control measures (e.g. silt curtains, cofferdams, sediment fences) prior to beginning any activities involving disturbance of the site and work along the shoreline (see Section 4.1.1 and the 'Soil/Sediment Quality and Transport' portion of this table); and • Ensuring that staff and/or contractors do not approach concentrations of seabirds, waterfowl, or shorebirds when approaching the construction site, accessing the marine terminal, or ferrying supplies, and have well muffled vessels. <input type="checkbox"/> As quarrying is completed on portions of the property, the area will be reclaimed in order to revert the land back to its previous state to the extent possible. Revegetation efforts will strive to revegetate cleared areas with local plant species. <ul style="list-style-type: none"> <input type="checkbox"/> The bulk carrier will not be in proximity to known bird colonies. <input type="checkbox"/> The slow speed the ships will travel at (2 knots) will create minimal wakes and noise. <input type="checkbox"/> All shipping operations will be performed by a licenced contractor who fully complies with The Shipping Act, with specific mitigative measures being outlined in 	Non-Significant
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	Blasting activities	Marine Birds	Disruption of marine birds and their habitat.	<p>Section 2.2.3 and the 'Navigation and Marine Safety' portion of this table.</p> <p><input type="checkbox"/> Avoidance due to noise from construction and operations (i.e. aggregate crushing/conveying, vehicles, blasting) will be localized to the immediate area occupied by the proposed quarry.</p> <p><input type="checkbox"/> Noise will be mitigated through the use of best practices pertaining to:</p> <ul style="list-style-type: none"> • The maintenance of equipment in good working order, with properly fitted noise suppression devices; • Having those only those trained to operate and service equipment allowed to work on, or be in control of, any quarry equipment (i.e. vehicles, crushers, screeners, conveyors); • Designing blasting patterns and procedures to minimize shock or instantaneous peak noise levels and ensures that the magnitude of explosions is limited to only what is necessary (See Section 2.2.3 and the 'Navigation and Marine Safety' portion of this table); and • Not blasting underwater or within a waterbody. 	Non-Significant
Species at Risk	Construction and Operational Activities.	Species at Risk	Disruption of protected species and their habitat.	<p><input type="checkbox"/> The proponent and all contractors working on-site will adhere to all stipulations set out in the SARA, and are reminded that it is illegal to kill, harass, capture or harm any species listed under it.</p> <p><input type="checkbox"/> An action plan, as per the SARA guidelines, is to be included in the EPP outlining specific measure to follow should any protected species be found. Under Section 73 of the SARA, a competent Minister may enter into an agreement or issue a permit authorizing a person to engage in an activity affecting a listed wildlife species, with no operations commencing until a proper permit is obtained.</p> <p><input type="checkbox"/> The proponent must successfully demonstrate that all</p>	Non-Significant

				<p>reasonable alternatives to the activity have been considered, all feasible measures will be taken to minimize the effect of the activity on the species, and the activity will not jeopardize its survival or recovery.</p> <p><input type="checkbox"/> Specific mitigations with respect to minimizing habitat loss resulting from overburden clearing and fugitive dust/sediment/chemical (Section 4.1.1), vegetation removal (Section 4.1.3), blast vibrations (Section 2.2.3), or on-site accidents (Section 4.3) are detailed in the appropriate sections of this document and summarized within the 'Soil/Sediment Quality and Transport' and the 'Human Health and Safety' portions of this table.</p>	
Human Health and Safety	Construction and Operational Activities	Human Health and Safety	Local Food Contamination	<p><input type="checkbox"/> Details for preventing chemical contamination of the quarry site, and surrounding area, have been outlined in Section 4.1.1 and the 'Soil/Sediment Quality and Transport' portion of this table.</p> <p><input type="checkbox"/> These measures will keep the potential release of contaminants (fuels, oils, explosive chemicals, sewage) to a minimum, and include: spill prevention and clean up measures, proper monitoring of the discharges, and regular maintenance of all machinery and chemical storage containers.</p> <p><input type="checkbox"/> All discharges from the quarry site will comply with standards set forth in the Environmental Control Water and Sewage Regulations under the Water Resources Act before they are allowed to leave the site.</p> <p><input type="checkbox"/> As quarrying is completed on portions of the property, the area will be reclaimed in order to revert the land back to its previous state to the extent possible.</p> <p><input type="checkbox"/> Revegetation efforts will strive to revegetate cleared areas with local plant species.</p> <p><input type="checkbox"/> Reclamation measures will also include soil testing in areas previously used for repeated refueling or for temporary fuel/explosives storage, with all contaminated soils excavated and disposed of in a government approved hazardous waste disposal facility.</p>	Non-Significant

	Construction and Operational Activities	Human Health and Safety	On-site Accidents.	<input type="checkbox"/> All project activities are to comply with the provincial Occupational Health and Safety Act regulatory requirements, with all employees receiving thorough, and regular, safety training specific to their jobs. <input type="checkbox"/> To ensure the safety of all workers and visitors, access will be limited to only those properly trained in, and aware of, the dangers of the area. <input type="checkbox"/> Signs are to be posted noting hazards during construction and operational activities, with emergency contacts and procedures clearly stated. Protective gear will be worn as required (i.e. gloves, hard hats, masks, safety goggles), and be made mandatory according to each specific task. <input type="checkbox"/> Any and all stipulations of federal, provincial, or municipal authorities or their officers will be strictly followed. <input type="checkbox"/> No bulk fuel/explosives storage will be allowed on-site. This safety feature ensures that any spills, leaks, or fires are will be kept on a small, localized scale, with a low potential for adverse affects to human health outside the immediate area. <input type="checkbox"/> Hydrocarbon, chemical, and explosives-related contaminants will be mitigated through the use of best practice techniques as outline by their manufacturer and any federal or provincial laws. <input type="checkbox"/> Transport of hazardous materials on-site will be performed by contracted professionals, with all operators possessing the appropriate licences with respect to transporting dangerous goods and will follow driving rules and regulations. <input type="checkbox"/> Workers will be required to be knowledgeable of accident procedures, especially in relation to explosive-related accidents, and proper spill containment and clean-up equipment/material will remain in proximity to any harmful substances at all times.	Non-Significant
	Construction and	Human Health and Safety	Traffic Concerns	<input type="checkbox"/> Once the construction stage has been completed, the	Non-Significant

	Operational Activities			<p>quarry will not require a significant amount of heavy vehicles due to the use of the marine terminal for shipment of materials and the final aggregate product.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Only maintenance, personnel, and other service vehicles will travel to the quarry, alleviating any concerns related to traffic. <input type="checkbox"/> Employees will be required to park their personal vehicles at a parking lot inside the front gate of the quarry, adjacent to the proposed office building, and be shuttled to work sites via company trucks. <input type="checkbox"/> All vehicle operators will be required to possess the appropriate licences with respect to operating oversized vehicles and the transport of dangerous goods (i.e. explosives), and will follow rules and regulations with respect to driving their vehicle. <input type="checkbox"/> Appropriate signs will also be posted on main road, access roads, and road crossings. 	
Navigation and Marine Safety	Shipping Activities	Navigation and Marine Safety	Disruption of aquaculture activities.	<ul style="list-style-type: none"> <input type="checkbox"/> Shipping will occur approximately once per week, with the bulk carrier remaining inside a designated shipping corridor while approaching and leaving the marine terminal (Figure 2.5). The corridor will be at least 750 m away from the nearest aquaculture site and allow for unobstructed operation of the farms. The bulk carriers should not interfere with the normal day-to-day passage of farm boats through the proposed corridor, with its passage being short in duration, and the more maneuverable farm boats easily avoiding them. <input type="checkbox"/> The slow speed of the bulk carrier (approximately 2 knots) means that it will not cause any significant wake, thus alleviating any safety concerns related to potential swamping of farm, or other small, boats. <input type="checkbox"/> Engines will be turned off (except for any generators required for power) when ships are docked at the marine terminal to minimize mechanical noise. <input type="checkbox"/> All bulk carriers will be double hulled, with oil spill and clean up equipment (e.g. absorbants, inflatable dykes) 	Non-Significant

	Shipping Activities	Navigation and Marine Safety	Disruption of commercial fishing activities.	<p>onboard; with crew trained in their use.</p> <p><input type="checkbox"/> There will be no dumping of bilge or foreign ballast within the waters of Fortune Bay, with no refueling at the marine terminal.</p> <p><input type="checkbox"/> Shipping activities will be contracted out to a third party, who will be responsible for the adherence to all federal and provincial permits, licences, and certificates, and meet all regulatory standards pursuant to the Canadian Shipping Act.</p> <p><input type="checkbox"/> Interaction of the bulk carriers with local commercial fishing vessels will be minimized due to the minimal fishing effort in the waters near the proposed Project site.</p> <p><input type="checkbox"/> Belleoram Harbour does not support any large shipping vessels, and any navigation concerns related to any other large vessel passage in the area are effectively mitigated through adherence to all procedures and protocols contained in the Canadian Shipping Act.</p> <p><input type="checkbox"/> The Local Special Interest Committee will be consulted with respect to ship arrival and departure times to further mitigate potential interactions.</p> <p><input type="checkbox"/> Shipping activities will be contracted out to a third party, who will be responsible for the adherence to all federal and provincial permits, licences, and certificates, and meet all regulatory standards pursuant to the Canadian Shipping Act.</p>	Non-Significant
Land Use	Construction and Operational Activities	Land Use	Affects on the visual aesthetics/ tourism of the area.	<p><input type="checkbox"/> The phasing of the project will allow for the maintenance of much of the area's visual appeal by keeping the rock face visible from the Town of Belleoram intact throughout the Project's lifespan.</p> <p><input type="checkbox"/> As quarrying is completed on portions of the property, the area will be reclaimed, by reverting the land back to a natural state, and returning its aesthetic appeal.</p>	Non-Significant
	Construction and	Land Use	Alteration of traditional land	<p><input type="checkbox"/> As quarrying is completed on portions of the property, the</p>	Non-Significant

	Operational Activities		use.	<p>area will be reclaimed, by reverting the land back to a natural state, and returning its previous resource potential.</p> <p><input type="checkbox"/> Although it is unlikely that historic resources or archeological sites will be discovered within the Project boundaries, a Contingency Plan has been developed to address such circumstances. This plan includes:</p> <ul style="list-style-type: none"> • Stopping all work in the immediate area of the discovery until authorized personnel (e.g. the Project Environmental Manager) has consulted the Provincial Archaeologist; at which point work will be permitted to resume; • Marking the site's visible boundaries, with no artifacts or associated materials being moved or removed unless the integrity of the material is threatened; and • Having Continental Stone reporting the find to the Provincial Archaeology Office - Culture and Heritage Division, Department of Tourism, Culture, and Recreation (St. John's) providing the following information: <ul style="list-style-type: none"> o nature of the find; o precise descriptive and map location and the time of the find; o nature of the activity resulting in the find; o identity of the person(s) making the find; o present location of the material, if moved, and any protective o measures initiated for the material and the site; and, o extenuating circumstances. 	
Acoustic Disturbances	Operation of Vehicles and Equipment	Acoustic Disturbances	Quarry-related noise affecting wildlife habitat and local quality of life.	<p><input type="checkbox"/> Noise from combustion engines (vehicles, crushing/screening equipment, generators, power tools) will be mitigated through the use of approved noise suppression devices and ensuring all equipment is in a state of good repair.</p> <p><input type="checkbox"/> All machinery will be operated by trained/licenced personnel according to manufacturer's specifications and</p>	Non-Significant

	<p>Operation of Vehicles and Equipment</p>	<p>Acoustic Disturbances</p>	<p>On-site health and safety issues.</p>	<p>all federal and provincial laws and regulations and local bylaws.</p> <ul style="list-style-type: none"> <input type="checkbox"/> The remoteness of the quarry from the nearest town, Belleoram (approximately 4 km), will help to ensure that the public is not exposed to operational noises. The maintenance of the rock face proximal to the town will further diminish the resonance of sound from the site. <input type="checkbox"/> Preconstruction habitat surveys should be conducted to determine if there are any critical breeding or migratory areas within, or in proximity to, the project's footprint. If such a site is found, proper mitigations/compensation measures will be put in place to protect or provide an alternate habitat for these animals outside the affected area. <input type="checkbox"/> All operations where workers are exposed to continued or excessively loud noises will comply with the NL Occupational Health and Safety Regulations under the Occupational Health and Safety Act. These regulations state that: <ul style="list-style-type: none"> (1) When workers are required to work in areas in which noise levels exceed the criteria for permissible noise exposure: <ul style="list-style-type: none"> (a) the employer shall first take appropriate measures to reduce the noise intensity to approved levels; or (b) if it is not practicable to reduce the noise to approved noise levels, or isolate the workers from the noise, the workers shall wear personal protective equipment which will effectively protect their hearing. (2) Criteria for permissible noise shall be as established by the American Conference Governmental Industrial Hygienists. <input type="checkbox"/> Employees should be proactive and trained to recognize and effectively mitigate harmful situations before they have the potential to result in injury. This includes the 	<p>Non-Significant</p>
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	Blasting Operations	Acoustic/ Vibrational Disturbances	Blasting effects on human health and safety.	<p>use of proper personal protective equipment, such as ear protection and blast shields.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Blasting protocols have been designed to be as efficient and effective as possible, with many safety measures incorporated into them (see Section 2.2.3 and the "Soil/Sediment Quality and Transport" section of this table). <input type="checkbox"/> Blasting during quarry start-up will be once per week and twice per week during full production. All blasts will be conducted between the hours of 0700 hours and 1900 hours to avoid any after-hours disturbance of residents in the surrounding area. <input type="checkbox"/> A 'Blast Notice Board' shall be erected detailing the time and date of any proposed blast as well as a description of the blast signaling system. <input type="checkbox"/> The blasting plan will be made available to the Local Special Interest Committee. <input type="checkbox"/> Blasting operations will adhere to the Consolidated Newfoundland Regulations under the Occupation health and Safety Act. <input type="checkbox"/> All employees or general public will be given sufficient warning to allow time to prepare; either through avoidance of the area or wearing of proper protective equipment. <input type="checkbox"/> These mitigative measures will also be incorporated into the quarry's EPP. 	Non-Significant
	Blasting Operations	Acoustic/ Vibrational Disturbances	Acoustic disturbances on aquatic environments.	<ul style="list-style-type: none"> <input type="checkbox"/> Blasting related effects on the aquatic environment will be mitigated through pertinent measures recommended by the: <ul style="list-style-type: none"> • The Fisheries Act, DFO Canada. • The Newfoundland and Labrador Environment Act and Occupational Health and Safety Act. • The Explosives Act, Natural Resources Canada. • "Guidelines for the Use of Explosives in or Near 	

				<p>Canadian Fisheries Waters", DFO Canada, Wright and Hopky (1998).</p> <ul style="list-style-type: none"> • Dyno Nobel Canadian Blast Site Safety Procedures. <input type="checkbox"/> As operations approach potential freshwater spawning locations (i.e. within 300 m), appropriate alterations to blasting charges will be conducted to stay below guidelines. <input type="checkbox"/> Adherence to DFO's Mitigation of Seismic Noise in the Marine Environment regulations will be adhered to. Pursuant to Section 8 of these guidelines, the proponent shall: <ul style="list-style-type: none"> a) establish a safety zone of 500 metres from the centre of the seismic source; and b) when the safety zone is visible, conduct regular on-going visual monitoring of the safety zone by a qualified Marine Mammal Observer, including continuous visual monitoring during a period of at least 30 minutes prior to start-up of the seismic (activity) <input type="checkbox"/> During initial stages of blasting, sound/vibration measuring equipment (i.e. hydrophones) will be deployed to measure the effects at various points within Fortune Bay to validate predicted effects. Procedures may be altered if marine mammals are observed near the quarry site during scheduled blasting events. <input type="checkbox"/> Mitigations to reduce the affect of noise originating from ships will be indicated in the EPP and will include: <ul style="list-style-type: none"> • Having all bulk carriers travel within a predetermined pathway that will allow for both adequate passage into the bay as well as maximizing the distance the ship will be from the farms at any one time; • Restricting the bulk carrier to speeds that will not create an excessive wake or vibrations; and • Requiring all bulk carriers to turn off their 	<p>Non-Significant</p>
	Shipping Activities	Acoustic Disturbances	Acoustic disturbances on aquatic environments.	<ul style="list-style-type: none"> • Having all bulk carriers travel within a predetermined pathway that will allow for both adequate passage into the bay as well as maximizing the distance the ship will be from the farms at any one time; • Restricting the bulk carrier to speeds that will not create an excessive wake or vibrations; and • Requiring all bulk carriers to turn off their 	<p>Non-Significant</p>

				<p>engines (except for any generators required for power) when ships are docked at the marine terminal for loading to minimize exposure to mechanical noise.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Shipping will occur approximately once per week using a 60,000 tonne bulk carrier inside a designated shipping corridor. This corridor is located at least 750 m away from the nearest aquaculture site. <input type="checkbox"/> The bulk carriers will travel at a slow speed (2 knots) that will not create excessive noise or wake. <input type="checkbox"/> Shipping activities will be contracted out to a third party, who will be responsible for the adherence to all federal and provincial permits, licences, and certificates, and meet all regulatory standards pursuant to the Canadian Shipping Act. <input type="checkbox"/> Specific mitigative measures are outlined in Section 2.2.3, and the 'Navigation and Marine Safety' section of this table. 	
Fish and Fish Habitat	Construction and Operational Activities	Fish and Fish Habitat	Potential mortality of fish or the destruction or alteration of fish habitat.	<ul style="list-style-type: none"> <input type="checkbox"/> During the construction stage, siltation control structures (i.e. silt curtains, cofferdams, and sediment fences) will be constructed prior to beginning any activities involving disturbance of the soil, work along the shoreline, or near areas of high runoff potential. Siltation control measures will remain in place, and be regularly maintained, throughout the operation of the quarry. <input type="checkbox"/> Soil disturbance and runoff will be minimized through the measure outlined in Section 4.1.1 and the 'Soil/Sediment Quality and Transport' portion of this table. <input type="checkbox"/> Dusting from the quarry will be control as per Section 4.1.2 and the 'Atmospheric Conditions' portion of this table, with the local winds and aggregate washing effectively containing the majority of fugitive dust emissions. <input type="checkbox"/> Chemical losses to aquatic environments will be mitigated as per Section 4.1.1 and the 'Soil/Sediment Quality and Transport' portion of this table, including: only allowing 	Non-Significant

	<p>Marine Terminal Construction</p>	<p>Marine Fish and Their Habitat</p>	<p>Potential mortality of marine fish or the destruction or alteration of their habitat.</p>	<p>properly trained employees to handle, use, or store toxic substances, having spill prevention and clean-up equipment on-site at all times, and through adherence to all best-practices and regulations/ recommendations pursuant to all provincial and federal guidelines.</p> <ul style="list-style-type: none"> <input type="checkbox"/> All operations will be in accordance with The Fisheries Act, Environmental Control Water and Sewage Regulations under the Water Resources Act to ensure that direct discharge, and indirect runoff, from the quarry doesn't negatively affect water quality. <input type="checkbox"/> Infill for the marine terminal construction will contain no more than 5 % fines (i.e. sand, silt, and clay) and may be evaluated for contaminants prior to introduction to marine waters. <input type="checkbox"/> Any infilling or dredging activities within marine waters will be conducted in strict compliance with all authorizations and/or permits as required all federal and provincial agencies. <input type="checkbox"/> Blasted rock from the quarry site will be used for infilling, with armour stone be placed progressively to minimize erosion and prevent the loss of infill material. <input type="checkbox"/> Silt curtains will be put in place around marine activities to prevent sediment from entering the water column outside work areas. The silt barrier will be attached to a flotation boom and extend from the sea surface to 1-2 m from the sea bottom. <input type="checkbox"/> Seabed sediment removed during dredging activities will be placed on barges while inside the silt curtain, and removed for disposal on land. <input type="checkbox"/> Heavy equipment will only be used from dry, stable, areas or barges specifically designed for that purpose; with heavy equipment not operating from barges completing work below the high water mark during low tide. <input type="checkbox"/> Timber used for construction in or near marine waters will consist of wood treated with preservatives safe for 	<p>Non-Significant</p>
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	<p>Work Near Freshwater</p>	<p>Freshwater Fish and Their Habitat</p>	<p>Potential mortality of freshwater fish or the destruction or alteration of their habitat.</p>	<p>use in the marine environment or is to be left untreated.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Compensation for any habitat loss will be implemented (e.g. using armour stone to provide artificial habitat for fish and lobsters). <input type="checkbox"/> An authorization for any fish habitat altered, disrupted, or destroyed will be required from the Federal Minister of Fisheries and Oceans. As part of this authorization, an acceptable compensation plan is to be completed. <input type="checkbox"/> All Project activities that encroach on freshwater habitat will follow the guidelines/recommendations outlined in several of DFO's publications, including: <ul style="list-style-type: none"> • The National Policy for the Management of Fish Habitat • The Fisheries Act - Habitat Protection and Pollution Prevention Provisions – Compliance and Enforcement Policy • Guidelines for the Use of Explosives In or Near Canadian Waters • National Fact Sheets – Brook Trout (Specifically) • Newfoundland Factsheets for: <ul style="list-style-type: none"> o Effects of Silt on Fish and Fish Habitat o Blasting - Fish and Fish Habitat Protection o Temporary Fording Sites o Forwarder Trails o Temporary Bridges o Resource Road Construction o Instream Work in the Dry Cofferdams o Streambank Stabilization o Instream Work in the Dry – Temporary Diversion and Elevated Pipes • Temporary Settling (Detention) Basins • Freshwater Salmonid Habitat Requirements • Freshwater Intake End-of-Pipe Fish Screen <input type="checkbox"/> Specific mitigative measures can be drawn from these documents to help minimize the quarry's affect. For instance: a buffer of undisturbed natural vegetation is to 	<p>Non-Significant</p>
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	Shipping Activities	Marine Fish and Their Habitat	Potential mortality of marine fish or the destruction or alteration of their habitat.	<p>be maintained 50 m from construction areas and all waterbodies (fish habitat protection guidelines recommend a buffer width of 12 m + 1.5 x % slope; Scruton <i>et al.</i> 1997).</p> <ul style="list-style-type: none"> <input type="checkbox"/> Water extraction activities have also been designed to minimize their effect, with the pumphouse located as far downstream as possible to avoid dewatering fish habitat. <input type="checkbox"/> The construction of the washwater pipeline and Bailey bridge to span the stream will be performed in the dry, with no work being done within the stream itself. <input type="checkbox"/> Detailed mitigations will also be included in the EPP. <input type="checkbox"/> Shipping activities, and maritime accidents (i.e. fuel spills, contaminated bilge discharge), could also affect fish (both wild and aquacultural) through water quality degradation and habitat loss. <input type="checkbox"/> Shipping activities will be contracted out to a third party, who will be responsible for the vessels and shipping as well as its operation and maintenance. <input type="checkbox"/> Continental Stone is committed to safe and environmentally safe shipping practices, and will require the contractor to: not refuel at the marine terminal, not dump of bilge or foreign ballast water outside the allowable restrictions of the Canadian Shipping Act (i.e. not within the Fortune Bay area), and requiring bulk carriers to carry oil spill clean up equipment (i.e. absorbants, inflatable dykes) with trained crew members in spill prevention and clean up techniques. <input type="checkbox"/> Details of standard mitigations with respect to shipping activities are outlined in Section 2.2.3 and the 'Navigation and Marine Safety' portion of this table. 	Non-Significant
Aquaculture and Commercial Fisheries	Construction and Operational Activities	Aquaculture and Commercial Fisheries	Potential loss of commercial fish species or their habitat.	<ul style="list-style-type: none"> <input type="checkbox"/> The mitigative measures outlined in Section 4.1.12, regarding the preservation of fish and fish habitat, apply directly to the sustainability of the commercial fishery and aquaculture industries in the area. <input type="checkbox"/> All measures to mitigate sediment and chemical losses to 	Non-Significant

	Construction and Operational Activities	Aquaculture and Commercial Fisheries	Direct mortality or decreased productivity of wild or caged fish.	<p>the marine environment (see the 'Soil/Sediment Quality and Transport' portion of this table), as well as the standards and regulations regarding shipping activities, have been designed to maintain the productivity of the area.</p> <ul style="list-style-type: none"> <input type="checkbox"/> Detailed mitigative measures to preserve fish habitat during construction, operation, and decommissioning of the quarry will be outlined in the EPP. As well, any HADD will require authorization from the Federal Minister of Fisheries and Oceans and a suitable compensation plan. <input type="checkbox"/> Blasting protocols have been designed to produce minimal environmental effects through adherence to all pertinent provincial and federal laws and regulations, as well as industry-accepted best-practices. <input type="checkbox"/> Caged fish, and potential freshwater spawning grounds, will be at a sufficient distance from the initial blast site to mitigate any noise/vibrational effects. <input type="checkbox"/> The initial blasts at the site will be monitored with hydrophones to gauge the sound/vibrational effects near the quarry, and it is recommended that one be placed in this inlet for any blasts within 300 m. Monitoring will allow for the assessment of the blasting effects (if any) on potential rearing grounds for commercial fish species, enabling conservation measures to be designed to sustain their populations. 	Non-Significant
	Shipping Activities	Aquaculture and Commercial Fisheries	Direct mortality or decreased productivity of wild or caged fish.	<ul style="list-style-type: none"> <input type="checkbox"/> Shipping activities will be contracted out to a third party, who will be responsible for the vessels and shipping as well as its operation and maintenance. <input type="checkbox"/> Continental Stone is committed to safe and environmentally safe shipping practices (see section 2.2.3 and the 'Navigation and Marine Transport' portion of this table), and will require the contractor to: not refuel at the marine terminal, not dump of bilge or foreign ballast water outside the allowable restrictions of the Canadian 	Non-Significant

				<p>Shipping Act (i.e. not within the Fortune Bay area), and requiring bulk carriers to carry oil spill clean up equipment (i.e. absorbants, inflatable dykes) with trained crew members in spill prevention and clean up techniques.</p> <p><input type="checkbox"/> Interference/navigation issues between the bulk carriers and commercial fishing or fish farm boats are expected to be negligible, with all quarry-related vessels following the mitigations outlined in Section 2.2.3, the 'Navigation and Marine Transport' portion of this table and adhering to all procedures and contained in the Canadian Shipping Act.</p> <p><input type="checkbox"/> The occurrence of interactions will be minimized by several factors, including: the infrequent passage of the bulk carrier (once per week), its travel within a designated shipping corridor, the distance to the nearest fish farm (at least 750 m), its slow speed (approximately 2 knots), communicating arrival and departure information with the Local Special Interest Committee, and the low concentration of commercial fishing vessels in the area.</p>	
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6.0 CONCLUSION

The residual effects from Project activities include a change in the area's landscape, having the overburden and vegetation removed to quarry the underlying granite bedrock. These effects will be spatially confined to the 900 ha footprint of the Project boundary, and are not expected to produce any effects in surrounding areas. Revegetation will use local plants, where possible, to revert the land to its previous state. Avoidance of the site by wildlife will be temporary and is expected to return to baseline levels once regrading and revegetation procedures are complete. No habitat will be fragmented, with the progression of project activities across the site occupying the smallest contiguous area possible. All effects will be effectively mitigated through adherence to the land reclamation measures outlined in this document, which will also be included in the EPP. Therefore, the residual effects on the terrestrial environment are expected to be **Non-Significant**.

The marine environment will also experience residual effects pertaining to the marine terminal's construction in Fortune Bay. Its physical presence may result in a loss of fish and lobster habitat, with its footprint precluding occupying areas identified as potential feeding grounds. An authorization for any fish habitat altered, disrupted, or destroyed will be required from the Federal Minister of Fisheries and Oceans. As part of this authorization, an acceptable compensation plan is to be completed. Compensation for this loss will include the use of armour stone to create artificial habitat, with mitigative measures also outlined in the Contingency Plan and EPP. Therefore, the residual effects on the marine environment are expected to be **Non-Significant**.

This CSR considered the potential environmental effects, including residual and cumulative effects, and accidents and malfunctions, of the development of the proposed crushed rock granite quarry at Belleoram, NL. The assessment focused on several VECs that may be affected by the quarry's operations and are of value to the stakeholders in the area. These include:

- Soil/Sediment Quality and Transport
- Atmospheric Conditions
- Vegetation and Wetlands
- Terrestrial Wildlife and Habitat
- Land Birds and Waterfowl
- Marine Birds
- Species at Risk
- Human Health and Safety
- Navigation/Marine Safety
- Land Use
- Acoustic Disturbances
- Fish and Fish Habitat
- Aquaculture and Commercial Fisheries

Mitigative measures to eliminate or minimize potentially significant environmental effects were outlined for each VEC. The potential for adverse residual environmental and cumulative effects were evaluated, and their significance rated, based on criteria including their temporal, spatial, synergistic and/or additive effects between Project activities and the current environmental and socio-economic condition in the area. Based on the scope of work proposed, and the current environmental conditions at the site and in the surrounding area, the Project is not likely to cause significant adverse environmental effects taking into account the implementation of appropriate impact mitigation measures provided in this document, and to also be included in the EPP and Emergency and Contingency Plans.

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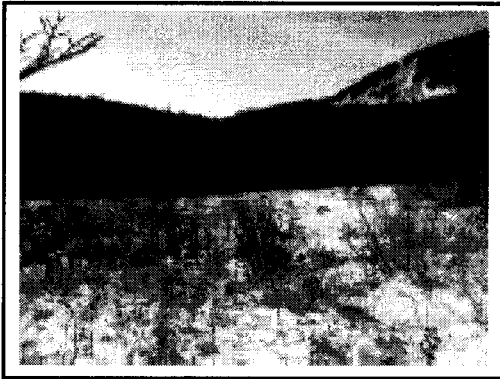
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**APPENDIX A: Representative Photographs of the Existing Area at the Proposed
Crushed Rock Quarry Site, Belleoram, NL.**





**APPENDIX B: EPP Table of Contents for the Proposed Crushed Rock Quarry Site,
Belleoram, NL.**

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