ENVIRONMENTAL ASSESSMENT OF THE WHITES POINT QUARRY AND MARINE TERMINAL PROJECT

JOINT REVIEW PANEL REPORT

OCTOBER 2007

The Honourable John Baird
Minister of the Environment
East Block, Room 163
Ottawa ON K1A 0A6

The Honourable Mark Parent
Minister of Environment and Labour
5151 Terminal Road
Halifax NS B3J 2T8

Dear Ministers:

In accordance with the mandate issued on November 5, 2004, the Joint Review Panel has completed its environmental assessment of the Whites Point Quarry and Marine Terminal Project as proposed by Bilcon of Nova Scotia.

We are pleased to submit our report for your consideration.

Respectfully,

<original signed by>

Robert Fournier (Chairperson)

<original signed by>

Jill Grant

<original signed by>

Gunter Muecke

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Joint Review Panel Report on the Proposed Whites Point Quarry and Marine Terminal Project

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EXECUTIVE SUMMARY

THE PROJECT

Bilcon of Nova Scotia Corporation (the Proponent/Bilcon) proposes to construct, operate and decommission a large basalt quarry, processing facility, ship loading facility and marine terminal at Whites Point, Digby County, Nova Scotia, for the export of aggregate to New Jersey. Quarrying and processing of the rock would take place on a 152-hectare site located on Digby Neck approximately 30 km southwest of Digby, Nova Scotia and approximately 1 km west of the village of Little River.

The company intends to produce approximately 2 million tonnes of aggregate per year for 50 years. Land-based activities would include quarrying approximately 120 hectares, with other lands set aside for buffer zones. Basalt rock from the upper flow unit (top layer) of the North Mountain Basalt Formation would be extracted by drilling and blasting, followed by loading, transporting, crushing, screening, washing and stockpiling at the processing plant. Where possible, the Proponent would completely enclose each component of the process to minimize dust and noise. It would also line truck beds and crusher chutes with rubber mats to reduce noise. Five aggregate sizes (down to 0.05 mm diameter) would be produced and stored in open stockpiles, awaiting shipment.

Environmental control structures would include a series of sedimentation ponds, organic materials storage site, and sites to retain fine sediments that remain after the washing operations. The locations of the various project components would change during the 50-year duration of the Project to facilitate removal of the basalt over the entire 120 hectares. At the end of each five-year period of operation, the Proponent proposes to reclaim disturbed areas by covering them with a mixture of retained sediments, organic materials, and fines retained from aggregate washing, followed by planting with appropriate vegetation.

The Proponent would build a marine terminal to ship approximately 40,000 tonnes of aggregate weekly, 44 to 50 times per year, to New Jersey. Marine facilities would consist of two parts: berthing dolphins and mooring buoys to support and restrain a 230 m bulk carrier ship (70,000 tonnes), and a mechanical radial arm loader connected to the quarry via a covered conveyor (a ship loader). Ships would travel in the existing designated Bay of Fundy shipping lanes to a predetermined point and then proceed directly to the terminal along a fixed route. Ship loading would take approximately 12 hours and could on occasion take place outside of the normal working hours of 0600 – 2200 hours.

In year 50 of the Project, the quarry would be decommissioned. Processing equipment, conveyors and the ship loader would be removed from the site. The quarry compound area, electrical services and roads would remain in place, along with the conveyor support system, gallery trusses and floor, mooring dolphins and buoys. Plans for the future use of the site and the final disposition of the remaining marine terminal components have not been determined.

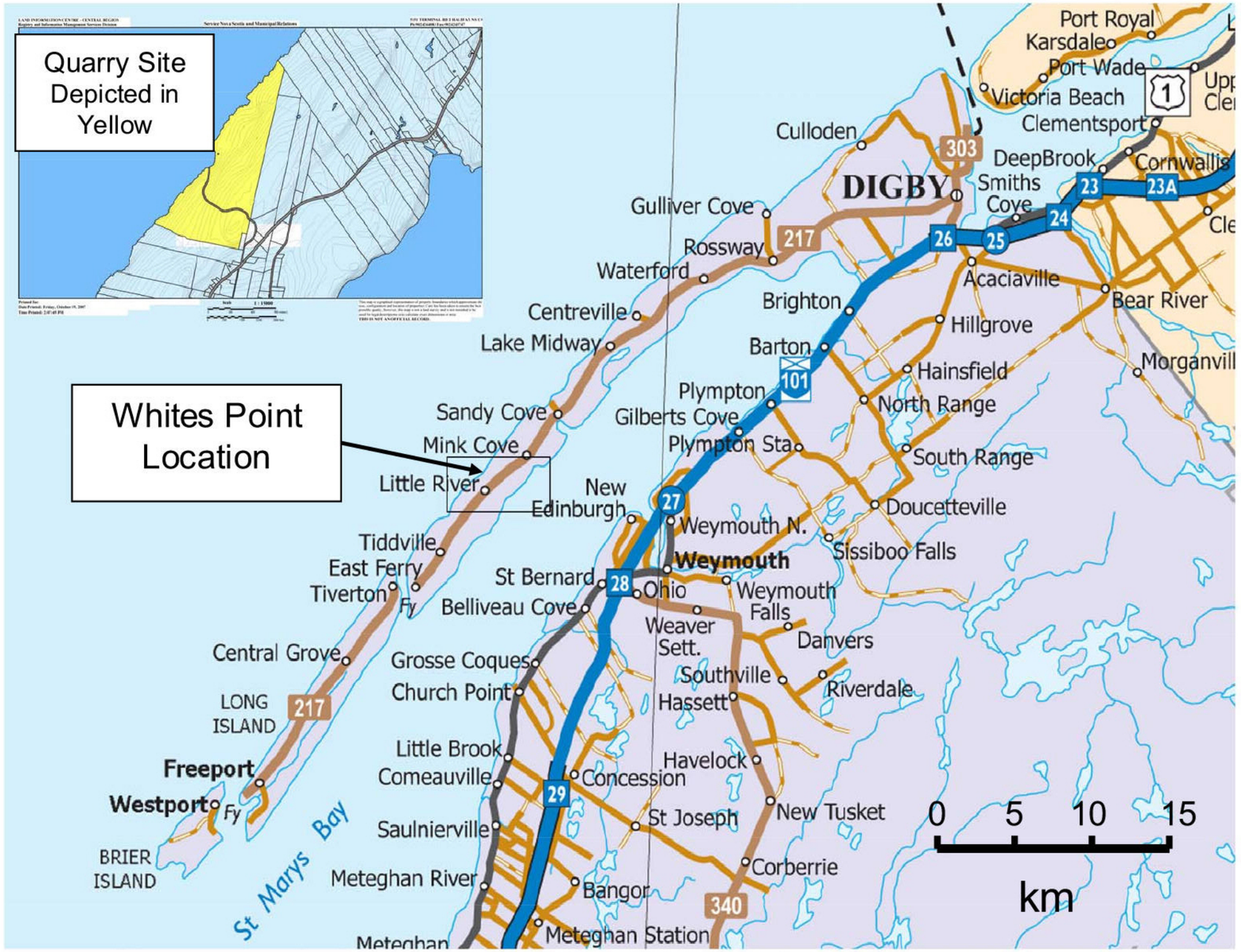
THE REVIEW PROCESS

An independent Joint Review Panel was appointed on November 5, 2004 to conduct an environmental assessment of the proposed Project. The members of the Panel are Dr. Robert O. Fournier (Chair), Dr. Jill Grant and Dr. Gunter Muecke.

Whites Point Quarry and Marine Terminal Project Locator Map

Digby County,NS

Compiled by: Lynda Russell
Sooriyakumaran, Map Librarian LIC- Halifax
Service Nova Scotia
October 2007



During its conduct of the Project review, the Panel was guided by the terms of a Joint Panel Agreement signed on November 5, 2004 by the Minister of Environment for Canada and the Nova Scotia Minister of Environment and Labour. The Panel held public "scoping sessions" on the EIS Guidelines, in January 2005, at Sandy Cove, Digby, Wolfville and Meteghan. Public hearings in Digby extended over 13 days in June 2007, and received 77 oral and 126 written submissions. When participants in the scoping sessions are included, the total number of individual registered participants exceeded 100. In addition, the Panel received upwards of 300 written comments on the Environmental Impact Statement submitted by the Proponent.

ASSESSMENT PRINCIPLES AND CRITERIA

In its directives to the Proponent, the Panel stressed the adherence to five guiding principles:

- **Public Involvement**: Environmental assessment requires the meaningful participation of community members.
- **Traditional Community Knowledge**: Digby Neck has a long history of occupation by Aboriginal peoples and by settlers. Some families in the region count many generations on the land and sea. Local people provide valuable knowledge to complement scientific studies provided by consultants and other experts.
- **Ecosystem Approach**: The ecosystem approach looks at organisms in their environmental context. A strong foundation of scientific knowledge is fundamental to the assessment of potential environmental effects that may affect ecosystem health and viability.
- **Sustainable Development**: Sustainable development suggests that communities make decisions about the use and commitment of resources while respecting the rights of future generations and other communities to social, economic and environmental health.
- **Precautionary Principle**: Where there are threats of serious or irreversible damage, the precautionary principle suggests that uncertainty does not reduce the need to try to prevent environmental degradation.

In its assessment, the Panel identified potential effects and then evaluated the adequacy of the Proponent's responses to those effects, within a contextual framework composed of the five guiding principles and an array of federal and provincial policies, guidelines, strategies, planning documents and legislation.

To be able to evaluate whether the Project's potential adverse and beneficial effects are well understood, and whether adverse effects could be satisfactorily mitigated, as well as to determine their significance, the Panel looked for the following:

- clarity and precision of the Project Description
- quality and completeness of baseline data
- appropriateness and reliability of data analysis
- scope and reliability of effects prediction
- appropriateness and effectiveness of proposed monitoring measures
- appropriateness and technical/economic feasibility of proposed mitigation measures

- effectiveness of compliance enforcement
- meaningfulness of continued community involvement.

The Panel believes that an adequacy analysis based on these criteria, followed by an evaluation of benefits and burdens, is the appropriate approach to the issues at hand and that it has attended to every requirement expected of it from the Canadian Environmental Assessment Agency and Nova Scotia Environment and Labour, as outlined in the Joint Panel Agreement and its accompanying Terms of Reference.

PANEL CONCLUSIONS AND RECOMMENDATIONS

The Panel's mandate was to determine whether the Project presented by Bilcon would result in significant adverse or beneficial physical, biological or socio-economic environmental effects and would be in the public interest. Based on its comprehensive synthesis and analysis of all the information provided, the Panel found that the Project would have a significant adverse effect on a Valued Environmental Component represented by the "core values" of the affected communities. The Panel's review of core values advocated by the communities along Digby Neck and Islands, as well as community and government policy expectations, led the Panel to the conviction that community has an exceptionally strong and well-defined vision of its future. The proposed injection of an industrial project into the region would undermine and jeopardize community visions and expectations, and lead to irrevocable and undesired changes of quality of life. In addition, the Project would make little or no net contribution to sustainability.

Based on an analysis of the benefits and burdens of the Project, the Panel has concluded that the burdens outweigh the benefits and that it would not be in the public interest to proceed with the Whites Point Quarry and Marine Terminal development. The Panel submits the following recommendations to the Minister of the Environment (Canada) and the Minister of Environment and Labour (Nova Scotia):

1. The Panel recommends that the Minister of Environment and Labour (Nova Scotia) reject the proposal made by Bilcon of Nova Scotia to create the Whites Point Quarry and Marine Terminal and recommends to the Government of Canada that the Project is likely to cause significant adverse environmental effects that, in the opinion of the Panel, cannot be justified in the circumstances.

2. The Panel recommends that the Province of Nova Scotia develop and implement a comprehensive coastal zone management policy or plan for the Province.

3. Because of the special issues associated with coastal quarries, the Panel recommends a moratorium on new approvals for development along the North Mountain until the Province of Nova Scotia has thoroughly reviewed this type of initiative within the context of a comprehensive provincial coastal zone management policy and established appropriate guidelines to facilitate decision-making.

4. The Panel recommends that the Province of Nova Scotia develop and implement more effective mechanisms than those currently in place for consultation with local governments, communities and proponents in

considering applications for quarry developments.

5. The Panel recommends that the Province of Nova Scotia modify its regulations to require an environmental assessment of quarry projects of any size.

6. The Panel recommends that the Canadian Environmental Assessment Agency develop a guidance document on the application of adaptive management in environmental assessments and in environmental management following approvals.

7. The Panel recommends that Transport Canada revise its ballast water regulations to ensure that ships transporting goods from waters with known risks take appropriate measures to significantly reduce the risk of transmission of unwanted species.

ENVIRONMENTAL EFFECTS ASSESSMENT

Key issues considered during the review process are described below.

BLASTING

Blasting with ANFO (ammonium nitrate – fuel oil mixture) would be a constant periodic activity during the construction and operational phases of the quarry. Concerns raised by individuals and community organizations centred on the generation of vibrations, noise and dust that would affect terrestrial wildlife, marine mammals and pinnipeds, residents and visitors. The magnitude of the impacts would be influenced by the amount of explosives used per blast, the configuration of the charges (blasting plan) and their frequency. In the EIS and during the public hearings, the Proponent provided widely varying values for the amount of explosive needed to yield one tonne of fragmented rock. This led to uncertainties about the quantities of ANFO that would be used in each blast, the number of blasts necessary to reach the annual production rate of 2 million tonnes of aggregate, and the total annual amount of ANFO that would be used at the site.

VIBRATIONS, NOISE AND DUST

NSEL Pit and Quarry Guidelines set specific limits on ground vibrations, air concussion, noise and dust for quarry operations.

The EIS presented data on vibrations and air concussion from other quarries, as well as modelling data, to support its assertion that the NSEL guidelines could be met. Given that explosive weights used for operational blasting appear to fall well above those cited in the examples or the modelling, the Panel remained unconvinced that compliance would be feasible. The Proponent did not consider the environmental effects or operational implications of smaller and more frequent blasts.

Continuous noise levels would be generated by mobile equipment and at the processing plant. During ship loading, noise levels would be elevated by the conveyor operation, the use of the radial ship loader, and the filling of the holds. When necessary, ship loading would continue through the night. The EIS asserted that enclosure of all stationary equipment and the use of thick rubber mats on equipment to reduce metal-rock contact would reduce acoustic disturbance to within allowable limits. Uncertainties about the Project's blasting requirements and protocols made it difficult for the Panel to determine the configuration and size of the area over which wildlife would be impacted by operational noise and blasting. Because of the lack of specificity in the Project

Description, many questions remain regarding specific impacts on nesting or migrating birds, mammals, lobster, herring, waterfowl etc.

Airborne particulates (dust) are the main air quality issue in quarrying. The EIS outlined a series of dust suppression measures to minimize the exposure of the workforce, the surrounding natural environment, and neighbouring humans and their environment. Enclosure of equipment, washing of the products, and water sprays constituted the primary mitigation measures. The presence of very fine size fractions in exposed aggregate stockpiles raised concerns about the consistent effectiveness of dust suppression. Frequent exposure of the site to high wind speeds led the Panel to question the successful protection of valued plant communities on the site and nearby human receptors from occasional deposits of dust.

WATER MANAGEMENT AND WATER QUALITY

Surface Water

The quarry site is confined to a single watershed and virtually all runoff from the property drains toward the Bay of Fundy. Only a few small streams, ephemeral or with low seasonal flow rates, occur on the site and none support a fish population.

The Proponent predicted that the water demand for quarry operations (aggregate washing, dust suppression etc.) could be met by surface runoff collected on the property, along with the capture of surface drainage from the uphill catchments of adjacent properties. All surface runoff and recycled process water would be channelled into a set of five interconnected sedimentation ponds. The purpose of the sedimentation ponds would be to retain fine suspended sediments from washing operations, to provide storage of water required for quarry operations, and to control runoff during storm events. The final outflow of the system would be into the Bay of Fundy through a constructed wetland, unless exceptionally high water levels necessitated a bypass of surface runoff directly into the Bay.

Concerns about water management focussed on the ability of the proposed pond system and its outflow structure to accommodate extreme storm events and climate change. As a result of critical comments on the EIS by the Panel, government agencies and the public, the Proponent offered several iterations involving significant changes to the design and management procedures of the sedimentation ponds, right to the end of the public hearings. None of these adequately addressed additional changes that may be necessary if climate change predictions for the region were taken into account. High-volume, high flow-rate discharges from the ponds may be necessary in anticipation of exceptional storm events.

When portions of ANFO end up in fragmented rock, through spillage or incomplete detonation, ammonium and nitrates can leach out into the surface water or seep into the groundwater. Small concentrations of ammonium in water are toxic to fish, while nitrates in the fresh water or the marine environment can stimulate algal growth, leading to eutrophication. Although the Proponent proposed a protocol that would minimize the loss of explosives into the surface waters and groundwater, it provided no empirical evidence on the effectiveness of such measures; the Panel continues to be concerned about their consistent long-term efficacy.

The Proponent presented the Panel with varying scenarios of surface water management for the Project. Each proposal

had its own set of associated problems and possible environmental effects. In the absence of a more reliable design and concrete management plan, the Panel was unable to conclude that the proposed structures would retain fine sediments and dissolved contaminants during extreme climatic events.

Groundwater

Groundwater collected from dug and drilled wells constitutes the sole source of domestic and commercial fresh water for Digby Neck, and residents expressed considerable concerns about the quarry's long-term impacts on groundwater quantity or quality. The Proponent's consultants and expert witnesses presented widely different interpretations and conceptual models of the groundwater regime at and near the quarry site. The Proponent's preferred model would envisage no intersection of the water table by the quarry face, and minimum impact on groundwater levels and quality for neighbouring properties. NRCan's and NSEL's hydrogeologists predicted that the quarry would almost certainly intersect the water table, and would act as a giant pump that could eventually displace the groundwater divide as well as the lower water levels and yields in the surrounding area. In the absence of extensive additional data from new and existing test wells, many of the uncertainties about groundwater remain very difficult to address, but the Panel believes that in the long term the quarry would negatively impact the yields of wells near the project site.

Wetlands

A coastal freshwater wetland, located on the project site, covers approximately 1.5 ha and was identified by an expert intervener as a coastal fen that depends on both surface flows and groundwater inputs. A botanical survey documented it as the habitat of 55 plant species, the second highest in biodiversity on the property. Two ephemeral watercourses and unconfined surface runoff that supply the fen would be cut off during the construction phase by a temporary stockpile of fragmented basalt up to 40 m high. The Proponent suggested that the blocked seasonal water flow into the wetland could be replaced by a pipe connected to a drainage channel that receives the overland flow from upslope of the property. The Panel's determination of the full extent of possible adverse impacts on the coastal fen was hampered by the lack of baseline data on its hydrologic requirements and of a viable strategy to assure its continued existence. Based on information available to it, the Panel believes that the coastal fen would likely suffer adverse environmental effects.

The Proponent proposed to construct an artificial wetland at the outlet of the sedimentation ponds that would "polish" the effluent of any remaining suspended sediment or dissolved nutrients. It would be populated by plant communities chosen from indigenous species that thrive in the coastal environment. The Panel believes that the likelihood of high-volume, high flow-rate emergency water releases during storm events sheds considerable doubt over the long-term sustainability of proposed plant and animal communities in the constructed wetland.

Terrestrial Ecology

Plants

Three Nova Scotia General Status of Wild Species listed species of vascular plants were found on headlands of the Whites Cove property; they include the glaucous rattlesnake root (*Prenanthes racemosa*), previously believed to be extirpated in Nova Scotia and not seen in the Province for 50 or more years, mountain sandwort (*Minuartia groenlandica*), yellow-listed, and

hemlock parsley (*Conioselinum chinense*), also yellow-listed. All occurrences on the property fall within a proposed coastal buffer zone, although their proximity to the border of this area was not established. Expert witnesses indicated that these species are poor competitors and could be adversely affected by habitat removal or habitat alterations such as microclimate changes, modifications to the local hydrology, exposure to dust, interference with pollinators, or a combination of these factors. An expansion of the coastal buffer may not guarantee the health or survival of these plants, even if a physical barrier was provided between the more vulnerable and ecologically important portions of the buffer zone and the operating quarry.

Birds

The use of Digby Neck, Long Island and Brier Island by migratory land birds is a very important biological feature in southwest Nova Scotia. Forty-five bird species were observed during field surveys of the property and 27 species of birds are believed to nest in forest habitats on the property. The Proponent recognized its obligation under the 1917 *Migratory Birds Convention Act* to mitigate impacts on nesting birds and their habitats. Clearing of forest cover and overburden removal for quarry expansion would have the greatest impact on nesting birds.

The Proponent plans to do nest surveys prior to clearing of forest cover and overburden removal, and to defer such activities to the late fall or winter. Environment Canada questioned the usefulness of nest surveys, since adult birds actively disguise nest locations.

MARINE ECOLOGY

Coastal Marine Environment

The Panel found that the general survey of the inshore and offshore biological environment presented in the EIS was adequate for the purpose of environmental characterization and to judge potential effects of the Project. However, the level of baseline information was often inadequate and insufficient to implement meaningful monitoring programs that would detect long-term changes and trigger mitigative action.

The EIS treated physical oceanographic conditions on the eastern side of the Bay of Fundy, adjacent to the proposed quarry and marine terminal, as well-known and predictable. During the hearings, the Panel heard from local fishers, Environment Canada and expert interveners that, depending on the combination of wind, fog, tidal currents and sea state, local conditions could be unpredictable and extreme. The resulting conditions could significantly influence a number of proposed Project operations, including vessel movements to and from the marine terminal, the planned avoidance of large animals by a ship, docking a large ship on a completely exposed coastline, and the capacity of observers to see and identify whales and seabirds for the purpose of informing ship captains or blasting engineers to mitigate effects. Interveners at the hearings pointed out that some of the planned mitigation activities would be exceedingly difficult, if not actually impossible, given conditions at the site.

Marine Species at Risk

Quarry activity and its associated shipping would potentially affect several marine species listed under the *Species at Risk Act* (SARA) and the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). These include Species of Concern (fin whales, harbour porpoises, harlequin ducks and the common loon) as well as Endangered Species (Northern right

whales, blue whales, leatherback turtles and the inner Bay of Fundy [iBoF] salmon).

Several whale species aggregate along the length of Digby Neck and Islands. The quarry site is near concentrations of humpbacks that attract whale watchers. The proposed shipping route transits the area frequented by the northern right whale but avoids the Right Whale Conservation Area. Ship movements and collisions, as well as sonic disturbance from blasting, would pose the most important threats to whales.

Inner Bay of Fundy salmon are thought to be represented by fewer than 250 individuals, and migrate into the Bay of Fundy along the Islands and Digby Neck. Any migratory disruption could reduce salmon success in locating specific rivers they might be seeking in order to reproduce. The Panel recognizes that limited data about salmon responses to acoustic disturbance, along with the inability to adequately predict blasting impacts, result in a high degree of uncertainty about possible behavioural effects on this endangered population.

Harbour porpoises range widely and unpredictably without a discernable aggregation site: observations from the site reported them as common in the vicinity. Leatherback turtles are infrequent visitors, with only rare sightings in the region. For both species, the intrusive anthropogenic sound pulses from blasting would probably result in avoidance of the area near the quarry site.

Harlequin ducks and common loons winter in the coastal waters off Digby Neck and Islands. Common loons were evident at the project site during surveys; harlequin ducks were not observed but two important wintering sites are located 12 km north and south of the quarry site.

Commercial Marine Species

The waters adjacent to the proposed quarry are the site of current fisheries for lobster, herring, sea urchins and periwinkles. Fishers raised the issue of whether a small portion of the coastal zone could become sufficiently altered such that it could become less habitable for these species, thereby influencing long-shore migrations and affecting the interconnectivity of populations. Without the benefit of good baseline information on the species involved, extensive monitoring, and extensive ecosystem analysis, it becomes difficult to establish quantitative predictions.

The waters adjacent to the site provide an active and lucrative lobster fishery, which raised special concern about the potential effects of blasting on the behaviour and well-being of this species. Representatives of fishing interests and government scientists confirmed that relatively little is known about the impact of blasting on these crustaceans.

Invasive Species

Transport Canada noted that regulations require only a 95% exchange of ballast water, and a resulting salinity of at least 30 parts per thousand, to occur by the time the ship docks. The ship’s destination waters in New Jersey are known to carry parasitic lobster disease, which has contributed to the decimation of local lobster populations in that region. While this is identified as the most immediate threat, other species could be potentially damaging to the marine ecosystem and fisheries. Anything short of 100% removal of organisms provides opportunity for species invasion, and currently used mitigation measures cannot fully contain the risk.

The EIS proposed a regular monitoring program over the first five years of the Project, but no effective mitigation. The Panel believes that in the case of an

accident that might bring in unwanted organisms, the highly dynamic character of this coastline would result in rapid dispersal of undesirable organisms that may negate any feasible preventive action.

SHIPPING

The EIS described the process that ships would follow when entering or leaving the Bay of Fundy en route to the marine terminal, normally without the assistance of a pilot or supporting tugs. A ship would travel within the designated shipping lanes at the reduced speed of 12 knots to mitigate potential collisions with marine mammals. It would then turn at an oblique angle at a predetermined point out of the shipping lane, and proceed directly to the terminal. Major environmental concerns include the possibility of collisions and difficulties (accidents) that might arise during docking in bad weather.

The Atlantic Pilotage Authority and the Sierra Club suggested alternative routes from the shipping lanes to the quarry location which may offer advantages in relation to vessel safety and the probability of a vessel striking a large whale. The Panel accepts the arguments by fishers and professionals familiar with local coastal conditions that docking a large ship on this unprotected shore would be potentially dangerous and would present a serious risk for accidents that could have adverse effects on the local fishery.

HUMAN ENVIRONMENT

Digby Neck and Islands contain rural communities that depend on environmental resources for survival. Tight-knit networks help people cope with an economy of limited opportunities. Within the context of their historical development, the people of Digby Neck and Islands have developed core values that reflect their sense of place, their desire for self-reliance, and the need to respect and sustain their surrounding environment. In cooperation with political leaders and development associations, they have created and adopted policies, such as *Vision 2000*, that reflect their values, aspirations and visions for the future. Using population data, the EIS concluded that “the area appears to be a community in decline”. This is true for population numbers, but the community remains dynamic and vigorous in other ways.

Employment and Economic Benefits

During construction, the Project would employ approximately 65 to 80 workers on site, with an estimated overall construction impact for Nova Scotia estimated at 225 person-years. In operation, the quarry workforce was estimated at 34 persons ranging from skilled to unskilled (16 for 44 weeks per year, and 18 for the entire year). The quarry would operate from 0600 – 2200 hours daily, six days per week in two shifts. The EIS’s economic model suggested the Project would induce additional indirect jobs. The annual operating payroll would be in the order of $1.2 million. The Proponent committed to hiring and training local residents to work in the Project, and to providing enhanced opportunities for youth and female employment. The Project could represent a modest economic boost for the years the Project operates.

Construction of the site would cost about $40.6 million and would contribute $14.5 million to the GDP. Operating costs would be about $20 million annually, with a $6.3 million contribution to GDP. The major returns to government would come from income taxes paid by quarry employees, and taxes on inputs like fuel. Much of the annual budget for the Project would be spent in shipping; these expenditures would be unlikely to deliver economic benefits to

Canada since the company is not expected to be Canadian-owned.

Tourism

The local economy has become increasingly dependent on eco-tourism, particularly whale watching, and envisions an increasing future role for that activity. Industry representatives and government agencies expressed concerns focused on impacts upon whales, views of the coast from the Bay, migratory birds, and environmental activities in the planning stage (such as sea kayaking and bird watching). The potential effects of the Project on the tourism industry are difficult to predict with any certainty, given the many factors involved, but the Panel acknowledges that those involved in the tourism industry believe that the Project is not consistent with articulated provincial and local policy.

Fisheries and Harvesting

Fishing is the mainstay of the economy in southwest Nova Scotia and is at the heart of the region's plans for a sustainable economy. Lobster Fishing Area 34, which includes the Bay of Fundy adjacent to the proposed site and nearby St. Mary's Bay, is the highest-value fishing area in Atlantic Canada. In addition, periwinkle harvesting and collection of dulse seaweed along the Whites Cove shore are activities some local residents use to augment their incomes. The concerns of fishers and harvesters centred on loss of gear, loss of opportunity, and the introduction of harmful contaminants.

Although the EIS stated that the Proponent had reached an agreement with fishers regarding loss or damage to gear, this assertion was not supported by individuals or organizations in the industry. The Proponent did not address losses incurred by displacement from traditional grounds or the shoreline as a result of shipping or quarry activities. The Panel has concluded that the Project would likely have an adverse environmental effect on the socio-economic health and viability of some of the fishing communities of Digby Neck and Islands.

CUMULATIVE ENVIRONMENTAL EFFECTS

The Panel believes that in the EIS the Proponent's analysis of the cumulative effects of the Project, acting in concert with activities that should be considered as reasonably foreseeable, was not adequate. The Proponent considered the impacts of GHG emissions by the Project and the potential for whale collisions, in the context of other current or proposed Projects in the Bay of Fundy. In both instances the Proponent concluded that the Project's contributions would be small enough to be considered insignificant. Interveners and the Panel believe that although the Project's contributions to GHGs may be small, the serious nature of the effects would warrant additional mitigation on the Proponent's part.

The Proponent failed to address cumulative effects that could arise due to induced developments triggered by the Proponent's inability to overcome constraints in working the proposed site, the need to expand operations to meet demand, or economic imperatives. Ownership of adjacent properties provides the Proponent with the potential opportunity of expansion. The Panel believes that expansion of the present Project and the development of an additional quarry or quarries is reasonably foreseeable, and that scenarios such as that should have been evaluated in the cumulative effects assessment.

ENVIRONMENTAL MANAGEMENT

COMMUNITY LIAISON COMMITTEE

The Proponent's public participation program centered on a Community Liaison Committee (CLC) established early in the application process. Initially its membership reflected both sides of the issue, but over time it lost representation from those opposed to the quarry proposal. The CLC failed to engage key segments of the population, most significantly the local fishers, who could have provided valuable information on the local marine ecology and coastal conditions. The Panel concludes that the Proponent's public participation activities met the letter, but not the spirit, of the guidelines. The Panel believes that the lack of meaningful consultation is reflected in the failure of the EIS to include traditional community knowledge on key environmental and socio-economic issues.

BUFFER ZONES

The Proponent specified a "coastal environmental preservation" or buffer zone that would extend approximately 30 m inland from the highest normal tide level. In the vicinity of the coastal fen and near the headland habitats of plant species at risk, this zone extended somewhat further inland. Some of the undertakings submitted by the Proponent during the hearings referred to a 100 m preservation zone but few details were provided. NSDNR and Environment Canada questioned the effectiveness of a 30 m coastal buffer to preserve important local habitats of plant species at risk. The Panel concludes that a 100 m buffer would increase the probability that the buffer zones could fulfil the functions intended but would not guarantee the survival of the unique plant communities.

MARINE PROTECTION ZONES

The EIS outlined mitigation plans for marine mammals and water birds to protect them from ship strikes or blasting effects. Observers stationed either at the highest point on the marine terminal or in small boats would scan adjacent waters in an effort to identify mammals, sea turtles or water birds. If they spotted right whales, blue whales or turtles within 2500 m, other species within 500 m, or water birds within 170 m of the ship's path or the radius of a blast detonation point, mitigation measures would be implemented. Effective observation and identification would depend on the sea state, visibility, and observer awareness. Government reviewers, many interveners and the Panel have little confidence in the effectiveness of this mitigation process under other than near-perfect conditions.

ADAPTIVE MANAGEMENT

The Proponent proposed to use adaptive management to implement the precautionary principle; the Panel concludes that the EIS treats these two concepts as virtually synonymous. The EIS identifies the central role and preferred usage of adaptive management in the proposed Project by citing its anticipated implementation on no less than 140 occasions. The intention of adaptive management is to address scientific uncertainty in environmental decision-making and risk analysis. In its implementation, baseline information is critical as a starting point against which future changes would be assessed. Hypotheses should be constructed, tested and utilized in the further application of the scientific approach.

The Panel predicts that given the Proponent's flawed understanding, the eventual application of these tools could

negate any positive intention to offset potential environmental impacts.

ANALYSIS

PROJECT VIABILITY

The Panel was left with questions about the viability of the Project over the proposed 50-year lifespan. Firstly, the Proponent has not been able to acquire the provincially owned Whites Cove Road allotment which bisects the productive portion of the property. Secondly, some property owners are currently reluctant to grant permissions that would allow the Proponent to blast within 800 m of structures they own. Thirdly, an increase of the proposed 30 m coastal buffer zone to 100 m would further reduce the potentially available resource. These restrictions could shorten the life of the reviewed quarry to approximately 16 years or less, unless quarrying was extended into adjacent properties already owned by the Proponent. The proposal before the Panel did not address such a contingency, or the substantial alterations in the operational layout and the potential environmental effects it would entail.

COMMUNITY SUSTAINABILITY

Through a series of strategies and reports, the community of Digby Neck and Islands has established its commitment to sustainable community economic development based on fishing and tourism. The region has received international recognition for taking concerted actions to achieve its aspirations. The sustainability of the local economy depends on the health of the environment. The Panel believes that the strategies and policies adopted by governments at the local, provincial and federal levels reflect a commitment to supporting community sustainability through the fisheries and tourism. The Panel finds that the Project as proposed would not make a net contribution to sustainability in the context of local and regional aspirations.

BENEFITS AND BURDENS

The major benefits of the Project would accrue to the Proponent in the form of long-term access to a major aggregate resource. To a much lesser extent, the local economy would benefit from economic development and diversification from export production. The jobs created during construction and operation of the facility would aid local employment and could reduce migration of young workers to other regions. Modest amounts of tax revenue would accrue to the federal, provincial and municipal governments. Some of the direct and indirect expenditures would assist local and provincial businesses.

Potential burdens associated with the Project are diverse and numerous. Biophysical burdens include: threats to organisms at risk, such as marine mammals, fish, birds and rare plant species; wildlife displacements and loss of habitat; possible alteration or destruction of a coastal wetland (fen); and uncompensated greenhouse gas emissions at a time when governments seek reductions. Most of the social burdens would be borne by the surrounding communities, and could include changes in quality of life and enjoyment of property through reduced tranquility, increased vehicular and ship traffic, reduction of groundwater quantity, altered air quality, and lower property values. The economic burdens would fall upon the local fishers, harvesters and tourism operators. Local fishers could experience loss of commercial stocks due to introduction of invasive species, loss of gear, and displacement due to marine terminal activities and ship movements. Tourism operators could be impacted through the tarnishing of a

marketing image that promotes a pristine environmental setting, and the reduction of opportunities to promote present and potential eco-tourism activities.

The most striking burden repeatedly articulated in the scoping sessions, in documents provided to the Panel, and in the hearings concerned community core values. In the Panel's view, core values are shared beliefs by individuals within groups, and constitute defining features of communities. Individuals from Digby Neck and Islands identified these by stressing the importance of a strong sense of place, a living connection with traditional lifestyles, harmony with the environment, combined with a strong sense of stewardship as a way of life. Through participatory community development initiatives such as *Vision 2000*, the inhabitants of Digby Neck and Islands have forged a model of sustainable community development that embraces these core values. This model has received not only considerable support by higher levels of government, but also acclamation from national and international agencies. The Panel considers the community's core values to be an important Valued Environmental Component. The imposition of a major long-term industrial site would introduce a significant and irreversible change to Digby Neck and Islands, resulting in sufficiently important changes to that community's core values to warrant the Panel assessing them as a Significant Adverse Environmental Effect that cannot be mitigated.

1 INTRODUCTION

1.1 THE JOINT REVIEW PANEL

1.1.1 BACKGROUND

Bilcon of Nova Scotia Corporation (the Proponent/Bilcon) is proposing to construct, operate and decommission a large basalt quarry, processing facility, ship loading facility and marine terminal at Whites Point (known locally as Whites Cove), Digby County, Nova Scotia, for the export of aggregate to New Jersey.

In early 2002, Nova Scotia Environment and Labour granted a permit to Nova Stone Exporters Inc. to operate a 3.9 hectare quarry at Whites Point, Digby Neck. Nova Stone Exporters Inc. subsequently partnered with Bilcon of Nova Scotia Corporation to form Global Quarry Products, with the intention of expanding the quarry operations and adding a marine terminal for shipping the product. Their application for the construction of a marine terminal would necessitate authorizations under the federal *Navigable Waters Protection Act* from Transport Canada (TC) and under the *Fisheries Act* from Fisheries and Oceans Canada (DFO). The required authorizations triggered an assessment under the *Canadian Environmental Assessment Act*. The proposal to enlarge the quarry to greater than 4 hectares also triggered a provincial Environmental Assessment under Part IV of the Nova Scotia *Environment Act*, administered by Nova Scotia Environment and Labour (NSEL). In January 2003, DFO, the Responsible Authority for the Project, determined that a Comprehensive Study would be required. In June 2003, the Federal Minister of Fisheries and Oceans, the Honourable Robert Thibault, required that the Project be referred to a Panel Review under the *Canadian Environmental Assessment Act*. At that point Nova Stone Exporters Inc. withdrew, Global Quarry Products was dissolved, and Bilcon of Nova Scotia Corporation assumed the role of sole proponent.

On 5 November 2004, the Honourable Stéphane Dion, Federal Minister of the Environment, and the Honourable Kerry Morash, Nova Scotia Minister of Environment and Labour, announced the creation of a three-member Joint Review Panel to assess Bilcon's proposed basalt quarry and marine terminal at Whites Point, Digby County. The Joint Panel Agreement, signed by the respective Ministers, includes the Panel's Terms of Reference and can be found in Appendix 1.

1.1.2 THE PANEL MANDATE

The Joint Panel Agreement and Terms of Reference outline the factors the Panel must consider in preparing its report to the Minister of Environment, Canada, and the Minister of Environment and Labour, Nova Scotia. The review is intended to discharge requirements set out in the *Canadian Environmental Assessment Act* and Part IV of the Nova Scotia Environment Act.

The Panel was instructed to identify, evaluate and report on the potential environmental effects of the Project on the physical, biological and human environments. A fundamental theme of the environmental assessment process, under both federal and provincial legislation, is to maximize public participation and provide transparency during all its phases. The Panel's report should include recommendations about either the approval, including mitigation measures, or the rejection of the Project.

1.1.3 PANEL MEMBERSHIP

The Joint Review Panel (the Panel) for the Whites Point Quarry and Marine Terminal Proposal was appointed on 5 November 2004 to conduct an independent review. Panel members are: Dr. Robert O. Fournier (Chair), Dr. Jill Grant, and Dr. Gunter Muecke. Their biographies appear in Appendix 2.

1.1.4 PARTICIPANT FUNDING

The Canadian Environmental Assessment Agency made funding available to assist interested groups to participate in the review process. A funding committee, administered by the Agency but independent of the Panel, reviewed applications and awarded a total of $25,583 on 30 December 2004 to seven groups to assist their review of the draft Environmental Impact Statement (EIS) Guidelines. For the second phase of the review process, assessing the EIS itself, the committee awarded $81,300 to eight groups on 26 July 2005. Finally, on 30 May 2007 an additional $31,400 was made available to seven groups to assist with their preparation of oral and written submissions to the public hearings.

1.1.5 PUBLIC REGISTRY

In order to ensure complete public access to all information related to the environmental assessment, a public registry was created, as stipulated under the *Canadian Environmental Assessment Act*, in November 2004. The registry consists of all documents received or generated by the Panel during the review process. It includes all submissions by the Proponent as well as the official transcripts of public hearings. The registry was officially closed on 13 July 2007 when the Panel concluded the information-gathering process necessary to complete its report.

The registry is maintained by the Canadian Environmental Assessment Agency (CEAA) and will remain accessible for some time on the Agency's website (www.ceaa-acee.gc.ca). Following the release of the Panel's report, responsibility for maintaining the public registry will fall to Fisheries and Oceans Canada.

1.2 THE REVIEW PROCESS

1.2.1 PROGRESS OF THE ASSESSMENT

Together, CEAA and NSEL developed the draft guidelines for the preparation of the proposed Project's Environmental Impact Statement (EIS). On 10 November 2004, the draft guidelines were released along with an invitation to the public to offer comments by 21 January 2005. The Panel did not review the draft EIS guidelines before the start of the public comment period.

On 2 December 2004, the Panel announced its intention to hold public meetings to gather comments on the draft EIS guidelines. Public meetings were held from January 6 to 9, 2005 at Sandy Cove, Digby, Wolfville and Meteghan. Participants are included in the listing of Appendix 3. During these "scoping sessions", organizations, groups and individuals provided comments on the draft guidelines and enunciated the range of issues they thought should be addressed. In addition, many written submissions were received. Thereafter, the Panel extensively revised the guidelines and released the completed version of the EIS Guidelines on 31 March 2005.

1.2.2 ENVIRONMENTAL IMPACT STATEMENT

On 31 March 2006, the Proponent submitted the EIS and supporting documents to the Panel, where it became

the basis of the subsequent assessment of the Project's impact on the physical, biological and human environments. The EIS was made available to the public and regulatory agencies for their reviews as to the documents' completeness, accuracy and compliance with the EIS Guidelines. The public review period lasted from 27 April to 4 August 2006, with a one-week extension to 11 August at the request of the public (due to the length of EIS materials).

From June 2006 to February 2007, the Panel issued a series of Information Requests to the Proponent, asking for clarifications and additional information. In addition, all comments received during the review period from the public, environmental groups, Aboriginal groups, community organizations, federal and provincial government departments and agencies were submitted to the Proponent. In response, the Proponent produced a revised Project Description in November 2006, and documents responding to questions and comments in February and March 2007.

1.2.3 PUBLIC HEARINGS

On 1 May 2007, the Panel determined that the information provided in the EIS, comments on the EIS, and the Proponent's response documents were sufficient to proceed with public hearings. The Panel believed that issues still outstanding could be adequately addressed during the hearing process. Simultaneously, the Panel released a set of operational procedures for the conduct of public hearings that included: time allowances for presentations, details on the information exchange during the hearings, how questioning would be conducted, and a preliminary outline of the hearing schedule.

The hearings were conducted in Digby, NS, from June 16 to 30, 2007. During the hearings, the Panel heard oral presentations from 77 registered participants, several involving delegations of presenters, as well as 126 written submissions. The hearings allowed individuals, organizations and government representatives to provide their views regarding the implications of the proposed Project. The entire process was extremely useful as a means of augmenting, complementing and extending the Panel's understanding of relevant issues playing on the proposed Project. A complete list of registered participants can be found in Appendix 3.

1.2.4 PANEL REPORT

This report concludes the assessment process and provides the Panel's analysis, rationale, conclusions and recommendations to the governments.

A cursory review of previous Joint Panel reports carried out through the assessment process quickly reveals that the format the Panel has adopted for this report is somewhat unconventional. The CEAA process requires that each panel address certain obligatory issues, e.g., alternatives to the Project, alternative means of carrying out the Project, current Aboriginal use of resources, and the effects of accidents and malfunctions. In the past these have usually been dealt with as stand-alone identified sections in the document. The Panel has attended fully to these requirements while integrating them throughout the text. The traditional format addresses project effects through a stepped process of identification, discussion and recommendations that address possible mitigative steps. By contrast, the present report identifies potential effects and then analyzes the Proponent's response, along with other evidence on those effects within a contextual framework informed by five guiding principles and an array of federal

and provincial policies, guidelines, strategies, planning documents and legislation; the Panel refers to this as an "adequacy analysis" framework.

When evaluating significance, the Panel applied the Provincial definition, that "significant" means, with respect to an environmental effect, an adverse impact in the context of its magnitude, geographic extent, duration, frequency, degree of reversibility, possibility of occurrence, or any combination of the foregoing. While an effect that covers a large area may be significant, the Panel believes that a local effect may also be significant if it undermines the viability of ecosystems or community health and economy. When determining the significance of effects, the Panel examined each situation in its appropriate context.

The Panel believes that the format it has chosen is a clear, direct and unambiguous approach to the issues it was required to address. The Panel has attended to every requirement expected of it from CEAA and NSEL, as outlined in the Joint Panel Agreement and the accompanying Terms of Reference.

1.3 GUIDING PRINCIPLES

The EIS Guidelines stipulated that the assessment follow and respect five key principles.

Public Involvement: Environmental assessment requires the meaningful participation of community members.

Traditional Community Knowledge: Digby Neck has a long history of occupation by Aboriginal peoples and by settlers. Some families in the region count many generations on the land and sea. Local people provide valuable knowledge to complement scientific studies provided by consultants and other experts.

Ecosystem Approach: The ecosystem approach looks at organisms in their environmental context. A strong foundation of scientific knowledge is fundamental to the assessment of potential environmental effects that may affect ecosystem health and viability.

Sustainable Development: Sustainable development suggests that communities make decisions about the use and commitment of resources while respecting the rights of future generations and other communities to social, economic and environmental health.

Precautionary Principle: Where there are threats of serious or irreversible damage, the precautionary principle suggests that uncertainty does not reduce the need to try to prevent environmental degradation.

1.4 POLICY AND LEGISLATIVE CONTEXT

The Panel reviewed planning documents, policy frameworks, legislation and international agreements relevant to environments and communities potentially affected by the Project. This provided additional understanding regarding the context within which governments and communities identify the requisite values necessary to make decisions about development projects. Policies, acts and documents represent government expressions of community core values that set directions for development; accordingly, the Panel looked to them for guidance in the assessment process. By and large, the policies reinforced the guiding principles the Panel used in conducting the assessment. These policies, plans and legislative documents are reviewed in detail in Appendix 4; the key themes the Panel identified from the policy context are summarized below.

Although the Municipality of the District of Digby does not have a municipal planning strategy or land-use bylaw, many groups and government representatives making presentations to the Panel indicated that the community and government have developed a range of planning policies and visions about the desired direction for future development. In reviewing these materials, the Panel recognized that documents like *Vision 2000*, an action plan for the region prepared after widespread community consultation, articulated the desire of Annapolis and Digby Counties to pursue a sustainable development strategy. Although the Proponent argued that local governments no longer supported the Western Valley Development Agency that facilitated the vision, political representatives and community members who presented to the Panel spoke consistently in support of the message of *Vision 2000*. They indicated that community members believe economic development on Digby Neck should be based on local participation; should focus on small business; should recognize that healthy economies and ecologies are intrinsically interconnected; and should pursue an integrated approach that combines economic, social and environmental objectives. This region of Nova Scotia has received widespread recognition for its concerted attempts to promote an alternative model of economic development rooted in the sustainable use of local environmental resources. This local vision of sustainable development based on the quality of the local environment finds support in the Nova Scotia Community Development Policy, which specifically promotes the principles of sustainable community development, as does the provincial policy Towards a Sustainable Environment.

Several policies and agreements focus on protecting ecosystem health, and advocate embracing an ecosystem approach. Nova Scotia has not yet developed a coastal plan or policy, but as a participant in the Gulf of Maine Council it has committed to the long-term goals of the Council's Action Plan; the plan indicates government's commitment to protect coastal and marine habitats in a healthy, productive and resilient condition. The province's Green Plan, Towards a Sustainable Environment, affirms that environmental protection is key to the integrity of ecosystems, and to human health and well-being. Provincial tourism policies link environmental quality with the branding of the province to tourists: they seek to position Nova Scotia as "Canada's seacoast".

Elements of many pieces of provincial and federal legislation and related guidelines apply to the Project. The *Canadian Environment Assessment Act* establishes the framework for assessment and directs the Panel to evaluate environmental effects and a project's contribution to sustainability. The Act promotes public participation and consultation, encourages an ecosystem approach, and advocates the precautionary principle. The Nova Scotia Environmental Assessment Regulations require the Panel to consider socio-economic effects of a project. The *Species at Risk Act*, the *Fisheries Act*, and the *Migratory Birds Convention Act* seek to protect wildlife and encourage the review to take a precautionary approach.

Like many provincial statements, Nova Scotia's Mineral Policy seeks to protect the environment. At the same time, though, it promotes the development of the mining industry, including the production and export of aggregate. It urges consultation and cooperation with stakeholders to help reduce land-use conflicts. Some economic

policies recognize the significance of exports to the provincial economy; for instance, Opportunities for Sustainable Prosperity links growth and competitiveness with natural capital and seeks to promote export opportunities. As a signatory to the North American Free Trade Agreement, Canada advocates free trade with its partners, although the legislation permits the parties to apply environmental standards to development decisions.

In sum, the Panel determined that the policy and legislative context for the assessment reinforced the following principles:

- sustainable development
- environmental protection and ecosystem approach
- public participation and community consultation
- precautionary principle
- development of free trade and export opportunities

1.5 ADEQUACY ASSESSMENT FRAMEWORK

The environmental assessment process seeks to predict possible environmental effects that could result from a project so that appropriate monitoring and mitigation measures could be taken to prevent or minimize adverse effects while maximizing beneficial effects. The Nova Scotia *Environment Act* defines an adverse effect as “an effect that impairs or damages the environment, including an adverse effect respecting the health of humans or the reasonable enjoyment of life or property”.

To be able to conclude that the Project’s potential adverse effects are well understood, capable of being mitigated and not significant, the Panel would require confidence in the following:

- clarity and precision of the Project Description
- quality and completeness of baseline data
- appropriateness and reliability of data analysis
- scope and reliability of effects prediction
- appropriateness and effectiveness of proposed monitoring measures
- appropriateness, technical and economic feasibility of proposed mitigation measures
- effectiveness of compliance enforcement
- meaningfulness of continued community involvement.

The precautionary approach puts the onus on the Proponent to demonstrate that the Project can avoid significant adverse environmental effects following mitigation. When determining the nature and significance of environmental effects, the Panel analyzed and evaluated the information provided, along with the monitoring and mitigation proposed, in order to draw conclusions about the adequacy of the proposed measures and predicted effects on valued environmental components. The sustainability approach in the legislation led the Panel to evaluate the extent to which the Project makes a net contribution to sustainability.

1.6 PROJECT DESCRIPTION

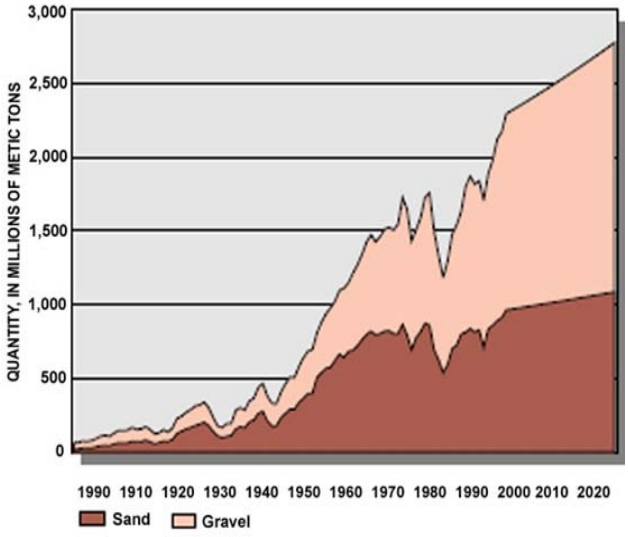
1.6.1 THE PROPONENT

Bilcon of Nova Scotia Corporation, the Proponent, is a wholly owned subsidiary of Bilcon of Delaware, which in turn is wholly owned by the principals of the Clayton group of companies of New Jersey, which includes Ralph Clayton and Sons and Clayton Concrete, Block and Sand. It has leased the site of the proposed Project for a period of 90 years, excepting the publicly

owned Whites Cove Road that bisects the site, and a small parcel of land held by others. The company has acquired adjacent properties as a “buffer”.

1.6.2 THE RESOURCE

The Proponent proposes to mine North Mountain basalts from Whites Point, Nova Scotia, to export aggregate (i.e., crushed stone and sand) to the Clayton group of companies of New Jersey. Aggregate would be used in the production of construction concrete, concrete block and masonry building materials in New Jersey and New York, where demand for high-quality aggregate is growing rapidly and the availability of local supplies has been sharply curtailed by land-use policies and environmental restrictions. The company is seeking an aggregate source from a coastal area with deep waters and reasonable proximity to its markets. The Proponent identified the basalt in the upper flow unit of the North Mountain Formation, running from Brier Island north to Blomidon, as an excellent source of high-quality aggregate. Basalt rock is not subject to royalties or extraction fees under Nova Scotia law.



National aggregates production in the United States with projections to 2020, based on growth rate of 1.0% for stone and 0.5% for sand and gravel.

Aggregate and Society

Natural aggregate (sand, gravel, crushed stone) is an absolutely essential commodity for the running of modern society. Few realize that, by weight, nearly half of the newly mined mineral-based material used on a per capita basis in North America is aggregate. During her lifetime, every North American child born in 2005 is expected to appropriate nearly one million kilograms of aggregate. The construction and maintenance of our roads, hospitals, schools, airports, public and apartment buildings, to list but a few, is vitally dependent on the ready access and pricing of aggregate. Transportation costs to the site of usage are generally the major determinant in setting the price. Truck transport costs can double the cost of aggregate to the end-user when hauling involves distances of 48 to 80 kilometres. When local sources are unavailable, become exhausted, are blocked by land-use restrictions and environmental regulations, or are stopped by popular resistance to the opening of quarries in populated areas, supplies must be shipped from more distant sources. Road and rail transport rapidly add to the cost, and more efficient bulk transport by barge or marine bulk carrier becomes profitable. The marine option greatly extends the range over which the resource can be sought, and the availability of giant bulk carriers encourages development of quarries making use of cost-savings inherent in economy of scale—hence the recent increase in the establishment of coastal mega-quarries and super-quarries along undeveloped coastlines. This trend is likely to be magnified by the need for infrastructure renewal in North America, which is well documented and will drive an increasing demand for aggregate. In the United States over the next 25 years, the aggregate industry expects to mine quantities equivalent to all aggregate mined over the past 100 years. Recycling of construction materials (concrete, asphalt) is increasingly used by the industry, but is not anticipated to have a significant impact on total demand. Coastal communities and jurisdictions with a non-industrial coastline, deep water access, and a ready source to sand, gravel or quality stone should therefore be prepared for an increasing frequency of development proposals advocating the establishment of mega- or super-quarries in their territory.

1.6.3 PROJECT COMPONENTS

Quarrying and processing of the rock will take place on a 152 hectare site approximately 1 km west of the village of Little River, on Digby Neck which separates the Bay of Fundy from St. Mary's Bay (Figure 1-1). The company intends to blast, crush and ship approximately 2 million tonnes of aggregate per year for 50 years. Land-based activities would include quarrying approximately 120 hectares, with other lands set aside for buffer zones. Basalt rock from the upper flow unit (top layer) would be extracted by drilling and blasting, followed by loading, transporting, crushing, screening, washing and stockpiling at the processing plant. Land-based structures would include rock crushers, screens, closed-circuit wash facilities, conveyors, load-out tunnel and support structures. Where possible, the Proponent would completely enclose each component of the process to minimize dust. It would line truck beds and crusher chutes with rubber mats to reduce noise. Five aggregate sizes (down to 0.05 mm diameter) would be produced and stored in open stockpiles, awaiting shipment.

Environmental control structures would include a series of sedimentation ponds, an organic materials storage site, and sites to retain fine sediments that remain after processing with flocculants. The locations of the various project components would change during the 50-year duration of the Project to facilitate removal of the basalt over the entire 120 hectares. At the end of each five-year period of operation, the Proponent proposes to reclaim disturbed areas by covering them with a mixture of retained sediments, organic material and fines retained from aggregate washing, followed by planting with appropriate vegetation.

The Proponent would build a marine terminal to ship approximately 40,000 tonnes of aggregate weekly, 44 to 50 times per year, to New Jersey. It would require a water lot lease or conveyance from the Province to construct the terminal. Marine facilities would consist of two parts: berthing dolphins and mooring buoys to support and restrain a 230 m bulk carrier ship (70,000 tonnes), and a mechanical radial arm loader connected to the quarry via a covered conveyor (a ship loader). Ships would travel in the existing designated Bay of Fundy shipping lanes to a predetermined point and then proceed directly to the terminal along a fixed route. Ship loading would take approximately 12 hours and could on occasion take place outside of the normal working hours of 0600 – 2200 hours.

During construction, the Project would employ approximately 65 to 80 workers on site with an estimated overall construction impact for Nova Scotia estimated at 225 person-years. In operation, the quarry workforce is estimated at 34 persons (16 for 44 weeks per year and 18 for the entire year). Wages would vary from $13.75 to $20 per hour. The quarry proposes to operate from 0600 – 2200 hours daily, six days per week, in two shifts.

In year 50 of the Project, the quarry would be decommissioned. Processing equipment, conveyors and the ship loader would be removed from the site. The quarry compound area, electrical services and roads would remain in place, along with the conveyor support system, gallery trusses and floor, mooring dolphins and buoys. Plans for the future use of the site and the final disposition of the remaining marine terminal components have not been determined.

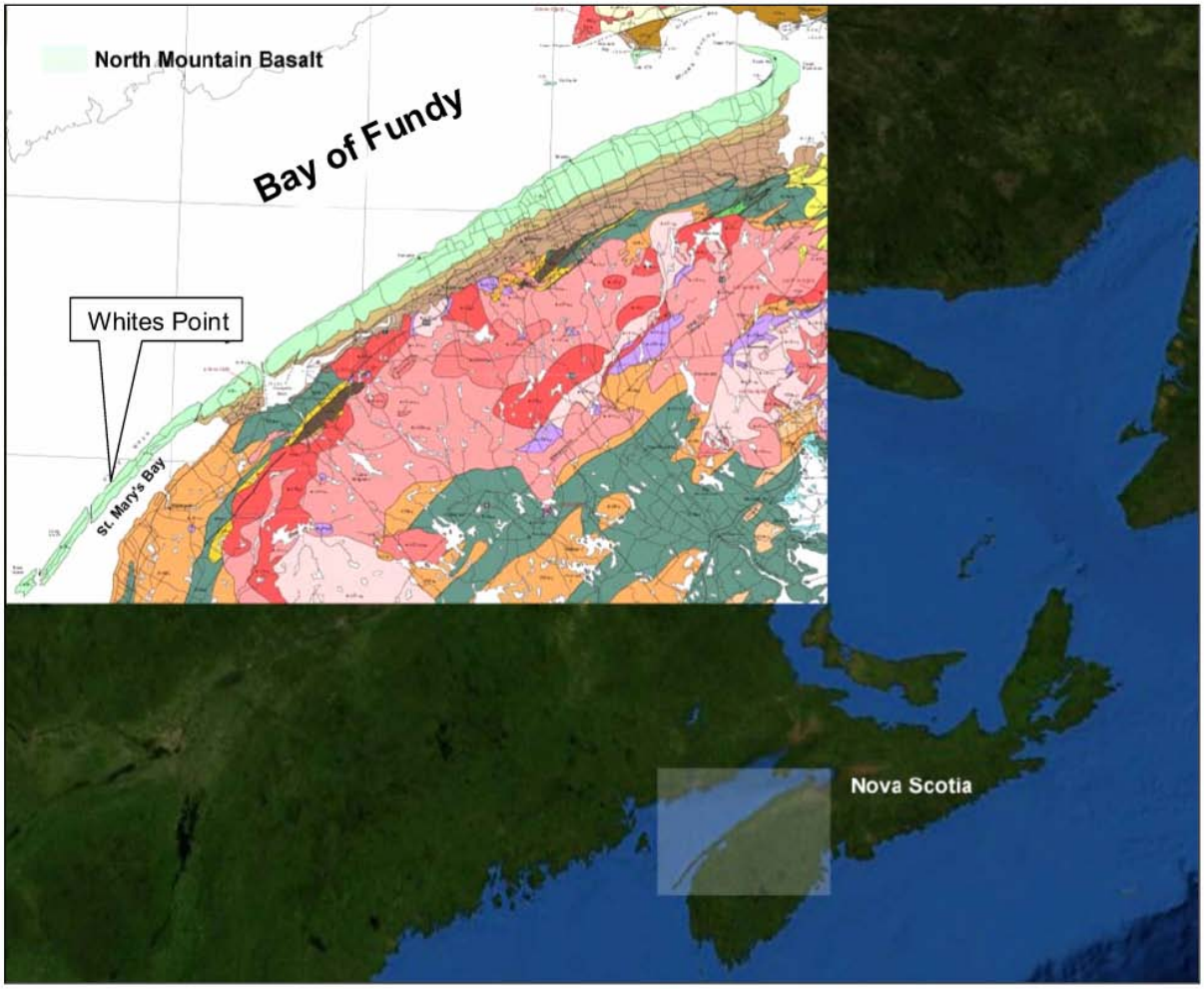


Fig. 1-1 *Proposed quarry location on Nova Scotia's Fundy coast, with inset showing the extent of North Mountain basalts.*

1.6.4 Alternatives to the Project

The Panel directed the Proponent to describe alternatives to the proposed Project that the Panel defined as functionally different ways to achieve the project need and purpose. This description was to include the "do nothing" scenario. The Proponent was then to discuss the reasons for selecting the proposed Project as the preferred alternative and the reasons for rejecting other alternatives. The EIS was to describe the criteria used for assessing each alternative, and the major beneficial and adverse effects of the alternatives considered.

The Proponent stated that Clayton Concrete Block and Sand recycles used concrete and other construction materials to supplement its demand for raw aggregate materials but the supply of recyclable materials does not meet its needs or provide a stable supply. Through the Project, Clayton Concrete Block and Sand is investigating alternatives to its current aggregate supply which will return an economic benefit to the company. Alternatives include purchasing aggregate on the open market and developing its own quarry to supply its needs.

The Proponent concluded that the “do nothing” alternative would not result in a stable and reliable source of aggregate for Clayton Concrete Block and Sand, and that in absence of the proposed Project, an economic diversification opportunity for Digby Neck and region would not be realized.

1.6.5 Alternative Means

The Panel directed the Proponent to identify technically and economically feasible ways the Project could be carried out for each phase and component. The Proponent indicated that it used the following criteria when evaluating alternatives: technical feasibility (which considers the means with respect to its suitability, reliability and safety) and economic feasibility (which includes an assessment of cost, commercial viability and commercial risk). It suggested that it selected alternatives with the most environmentally benign effects.

The Proponent investigated alternative sites for its proposed Project in the Atlantic Provinces and Nova Scotia, using preliminary literature research and on-site evaluation of the existing physical, biological and socio-economic conditions. It identified having used the following criteria in the alternatives evaluation:

- suitability of the geological resource
- availability and size of land base
- proximity to residential development
- adequacy of transportation systems
- engineering feasibility
- economic diversity and sustainability
- social/cultural health and quality of life
- unique heritage resources
- presence of species at risk and biodiversity
- quality of fish habitat and wetlands.

1.6.6 Economic Viability of the Resource

The Proponent evaluated the economic viability of the Project on the basis of exporting aggregate from the site over a span of 50 years. During the assessment process, however, interveners identified factors that could limit access to a portion of the resource. First, the Province of Nova Scotia refused the Proponent’s initial request to buy the Whites Cove Road. Depending on the size of the road right-of-way, avoiding the road allotment would reduce the yield of rock available for extraction. Second, government departments indicated that they may

require a 100 m buffer around the coast, to protect valued plant communities and the wetland. Third, the Proponent cannot blast without permission of the owners of structures within 800 m of a blast site, as per the Pit and Quarry Guidelines. Given the distribution of homes and cottages around the site and the current reluctance of some property owners to grant permission, the Proponent's output may be limited to about 29,000,000 tonnes. This amount would allow 16 years of production. With construction costs amortized over 50 years, the financial implications of a decline in the resource are not clear to the Panel. If the accessible resource on the site is less than the 91,000,000 tonnes anticipated in the Project Description, the Panel believes that the economic viability of the Project could be in question.

1.6.7 Adequacy Analysis of the Project Description

The Proponent provided reasonable consideration of most but not all components of alternative means. Given its instructions to the Proponent, however, the Panel expected a fuller evaluation of alternative sites and the "do nothing" scenario.

The Panel concludes that the Proponent did not fully discuss the potential availability of alternative sites along the New England coast closer to New Jersey, in response to the Panel's information request or when questioned by the Panel during hearings. The EIS did not consider in any detail options of buying aggregates from existing quarries. Interveners argued that the Proponent should have provided information to discuss the availability of materials for recycling or the costs and relative ease of access to raw versus recycled materials. If alternative designs for marine terminals were considered, the analysis was not presented in the EIS. The EIS did not evaluate alternative means of treating ballast waters for marine organisms.

In this case, the Proponent leased the site and initiated preparations for quarrying before it began the environmental assessment process. The Panel believes that had the Proponent considered alternatives in early project planning, it might have made other choices. The Proponent's arguments about the suitability of this particular site for the Project failed to address whether a site with rare plant species and a fully exposed shore would be the most appropriate choice for a quarry and marine terminal project.

The Panel did not find persuasive the Proponent's arguments that the company could not fulfil its need for product through alternative means (such as contracts with other suppliers).

Inconsistencies in the description of proposed Project components provided by the Proponent in the EIS and in the hearings complicated the Panel's task of identifying and assessing effects. Particular elements of the proposed Project (including blasting protocols and dimensions, location of operational elements, site drainage and water management mechanisms, and protocols for docking the ship) varied between and within documents. Inconsistencies in the Proponent's descriptions of Project features persisted through the hearing process and in written undertakings prepared by the Proponent.

While the Panel accepts that a conceptual level of detail in a project description may suffice for some elements of an EIS, it concludes that to conduct a full assessment of particular environmental effects it requires clarity regarding the nature of project activities and any alterations

proposed to the environment. The Panel found such clarity missing for key components of the Project Description, including the drainage system, protocols for managing ship docking, and blasting activities.

2 ENVIRONMENTAL EFFECTS ASSESSMENT

When assessing the environmental effects of the Project, the Panel drew on a broad array of information collected in the Public Registry since 2004, including the EIS documents and responses to them. Among the most important elements the Panel received were the many interventions made during two weeks of public hearings in June 2007. Those varied interventions provided a composite picture of Digby Neck and Islands that is useful as a context for the review process.

The marine environment off the west coast of Digby Neck and Islands has been important to human settlers from earliest times to the present. Its principal value has undoubtedly been as a reliable and abundant source of sea life, initially as an important source of sustenance and later as a commercial resource. The composition of animals gathered and hunted seems likely to have remained more or less similar through the years, including whales, seals, fish, lobsters and periwinkles. In a landscape with relatively poor prospects for farming, reliance on the sea for a livelihood became deeply engrained.

Throughout the history of human habitation, the residents of this part of Nova Scotia have had a complex relationship with the adjacent marine environment that has shaped and influenced the social, cultural and economic fabric of the region. Nowhere on the peninsula that comprises Digby Neck and Islands is anything farther than 1 km from salt water. The rugged landscape created by the spine of the North Mountain contains sparse settlements concentrated in small coastal villages. In a physical sense, everything on the Neck is subject to marine winds, salt spray, smells and sounds; in a cultural sense, human interaction with the ocean has exerted a formative influence throughout the years. While Nova Scotia as a whole has been strongly affected by social, commercial and industrial activities over the past 150 years, Digby Neck and Islands has remained relatively unspoiled, and associated with traditional ways that manifest an unbroken lineage with the past and its linkage to the sea.

During the last decade, many prominent national and international organizations have promoted and recognized efforts to protect the Bay of Fundy as a special place; its reputation as a unique marine ecosystem is well known and widely appreciated. The Nova Scotia Department of Tourism, Culture and Heritage has attempted to sell the image of a pristine natural environment in the Bay of Fundy to the rest of the world in order to appeal to individuals who are searching for unspoiled recreational venues. The communities of Digby Neck and Islands have mobilized to establish community economic development strategies within which they can evaluate proposals for the future of their region.

The question before the Panel is whether a major quarry and associated marine terminal can coexist with this unique environment in a manner that avoids significant adverse environmental effects, that avoids effects that impair or damage the health of humans or the reasonable enjoyment of life or property, and that makes a net contribution to the sustainability of the region consistent with the spirit and intentions of the concepts advanced at the Earth Conference in Rio in 1992.

2.1 TERRESTRIAL EFFECTS ASSESSMENT

2.1.1 BLASTING

The EIS describes blasting as a series of well-defined steps. However, the Proponent presented conflicting information during the hearings as to the size of each planned operational blast, the blast array, the amount of explosive to be used, the possible number of blasts required, the amount of residual ammonia that would be released and the exact details of the planned test blast.

Blasting with the explosive known as ANFO (ammonium nitrate – fuel oil mixture) would begin as the Proponent creates work areas and begins to dislodge rock for operations. Blasting has the potential to create dust, noise, vibration and residual ammonium nitrate. The amounts and the duration of these events would depend on the size, frequency and management of the blasts.

The frequency of blasts would average once per week during the construction phase and once every two weeks during the operational phase. While the size and configuration of blasts can vary depending on the circumstances, the Proponent provided information during the hearings as to what would constitute a “typical” blast during the ongoing operational phase. Each blast would involve 43 blast holes, 165 mm in diameter and 21 metres deep. Total explosives utilized per blast would be 17.7 tonnes, or 412 kg placed in each blast hole. The annual consumption of ANFO would amount to 460 tonnes. These values could vary by +/- 5% depending on specific field conditions.

The Proponent’s estimate of the quantity of ANFO needed to yield one tonne of fragmented rock varied by nearly 100% in its submissions between the EIS and the hearings. The first estimate provided in the EIS was 0.4 kg/tonne, while during the hearings the Proponent’s expert specified 1 lb/ton (0.45 kg/tonne), and later in an undertaking this became 0.23 kg/tonne. The Proponent’s explanation for the discrepancy was that the higher figures were generic and the lower value was more appropriate for basalt. During the hearings, a retired mining engineer questioned the Proponent’s blasting design and noted inconsistencies between the stated quantities of ANFO that would be used, the number of blasts per year and the annual production rate of aggregate.

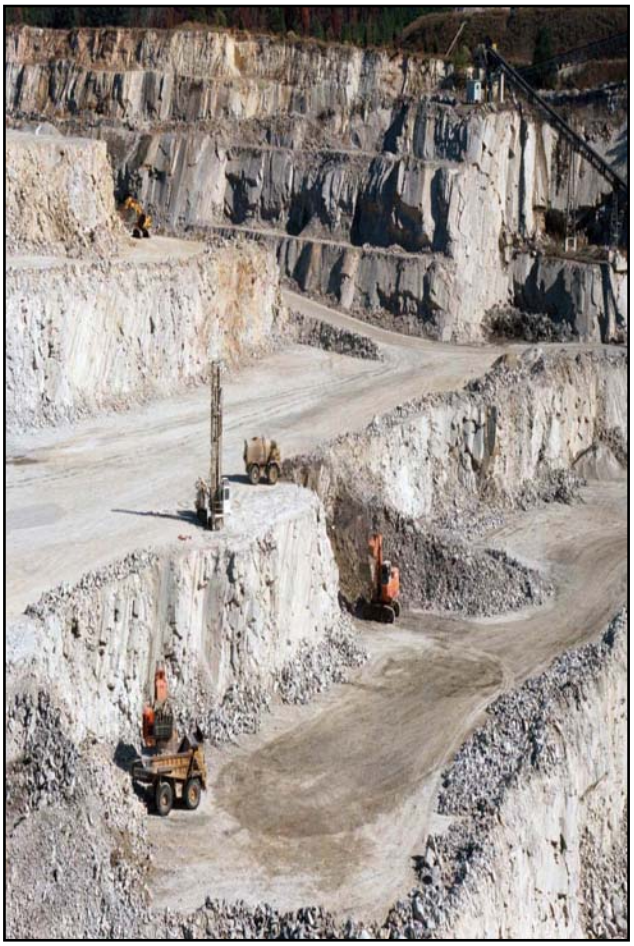


Fig. 2-1*Benches created during operations and equipment typical of large quarries.*

The Proponent suggested that both air concussions and ground vibrations of a blast could be reduced by introducing short delays between ignition of individual blast holes. Using multiple charges in a single blast hole, known as decking, would allow further reduction in the amount of explosives detonated in any single interval. By sequencing the explosions, the individual charges become more important than the total amount of explosives used. However, the benefits of decking become less significant at distances more than 300 meters from the blast location. While coherent summing of shot energy from different holes would not occur when shooting an array with appropriate delays, partial overlap of the signals from two or three holes can occur. The resulting reinforcement due to signal overlap would tend to extend the duration of the pulses rather than increase the peak pressures. The Proponent expressed confidence that a blasting plan could be devised that would meet the requirements of both Fisheries and Oceans Canada (DFO) and the NSEL Pit and Quarry Guidelines.

Most of the blasting energy would be dissipated by fragmentation of the surrounding rocks, but some fraction would travel in the form of shock waves through the ground. The resulting tremor can be expressed as a particle velocity and may be felt by humans or animals for some distance from the source.

If peak particle velocity exceeds certain thresholds, rigid structures such as buildings or water wells could be damaged.

The Proponent specified a set of atmospheric conditions and the possible presence of wildlife in the protection zones (Figure 2-2) when it would not permit blasting to occur. The atmospheric conditions included fog, low cloud cover, precipitation, and atmospheric inversions. If blast holes were filled with explosives prior to the onset of unfavourable conditions, the Proponent suggested that charges could be left safely in place until conditions improved.

ANFO is normally is a mixture of about 94% ammonium nitrate and 6% #2 diesel fuel oil. Ammonium nitrate is highly soluble in water and releases both ammonia and nitrates. When portions of this explosive end up in fragmented rock, through spillage or incomplete detonation, ammonia and nitrates can leach out into the surface water or seep into the groundwater. Even relatively small concentrations of ammonia in water are toxic to fish. The release of nitrates into fresh water or the marine environment can stimulate algal growth that can lead to eutrophication.

The Proponent, in consultation with DFO, concluded that ammonia and nitrate residues could be almost completely eliminated by rigorously following the "Revey Protocol"[1] of best practices. The "protocol" is a set of generalized guidelines that should help to limit losses.

Adequacy Analysis:
The Panel does not find the value of 0.23 kg of ANFO per tonne of basalt blasted credible. Basalts are denser and more cohesive than virtually any other rock type commonly quarried. The amount of explosives needed to fragment massive basalts would be expected to lie above the generic value rather than below it. In view of the uncertainties about volumes of explosives, the Panel considers it advisable to use precaution and estimates that the amount of explosives used to fragment one tonne of rock could be 0.45 kg. Each blast would then involve 35 tonnes of ANFO with

[1]Revey,G.R.1996 Practical methods to control explosives losses and reduce ammonia and nitrate levels in mine water.*Mining Engineering* 48(7):61-64.

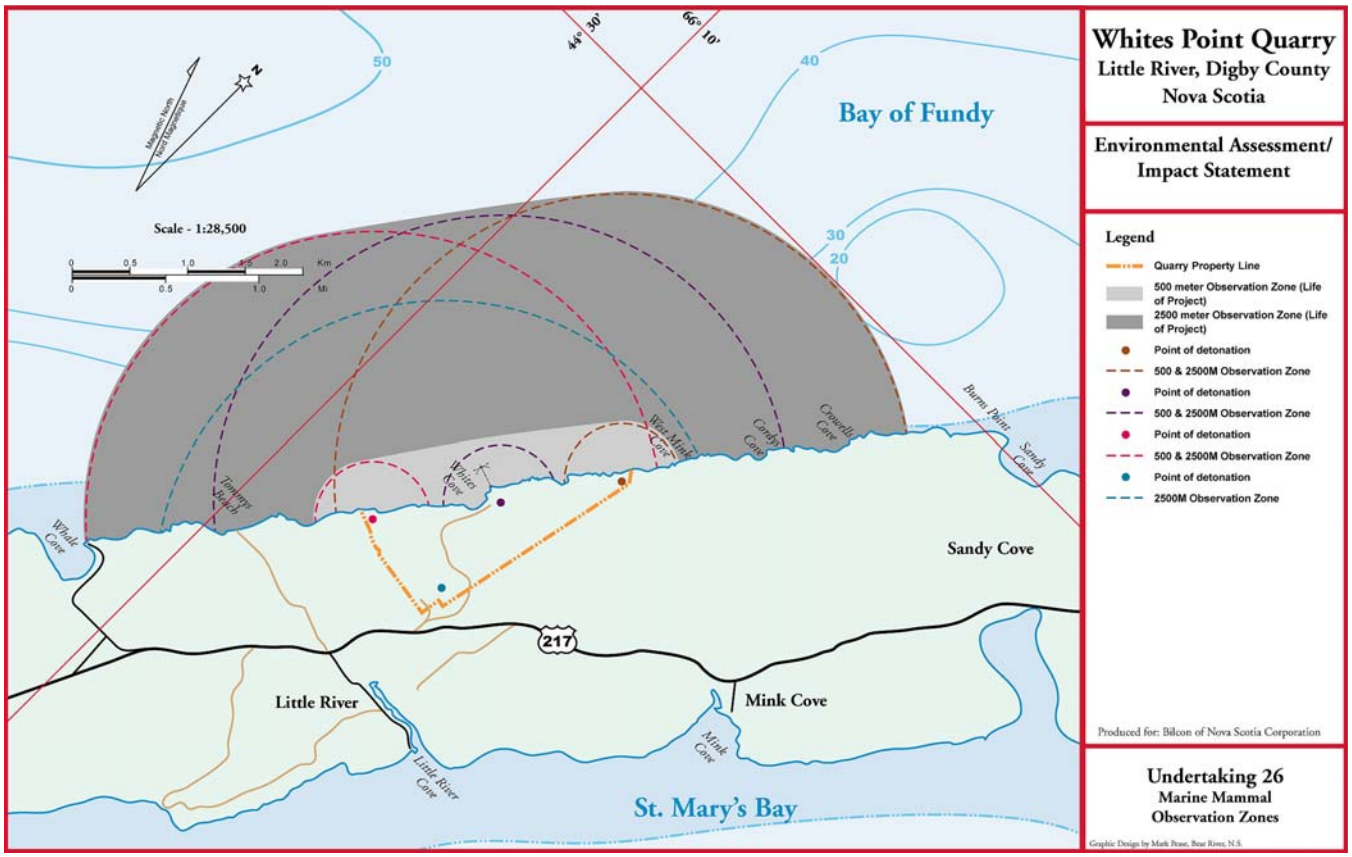


Fig. 2-2 *The Proponent proposed to establish blasting protection zones: if wildlife is observed in the zone, the blast would be delayed.*

805 kg in each blast hole, yielding an annual total expenditure of about 900 tonnes of explosives.

The Proponent was unable to provide empirical evidence to support its assertion that ANFO residues could be eliminated or that their level would fall within permissible limits if it followed the “Revey Protocol”. The Proponent assumed that the amounts of ammonia and nitrate from ANFO entering the surface water and groundwater would be minimal and that this therefore precluded a comprehensive evaluation of potential effects. The Panel continues to have concerns because of persistent uncertainty about the residue’s pathways, residence times, degradation, discharges, and environmental effects.

Using the high-end estimates of explosive demand and acknowledging the risk of residual ammonium nitrate, the Panel predicts that adverse effects could result from blasting. The frequency of blasting increases the possibility of occurrence. The Panel expects that sediment ponds and wetlands on the site would face the risk of significant degradation of water quality from these residues. (Other effects of blasting are discussed in association with particular valued environmental components.)

2.1.2 Surface Water

The proposed quarry operations are confined to a single watershed that is delineated to the east of the proposed Project site by the topographic divide forming the crest of the North Mountain, and to the west by the Bay of Fundy coast. All runoff from the property drains toward the Bay of Fundy, except for a small portion of the southeast corner, which is part of the local Little River watershed that falls within the property’s buffer zone. A few small streams, ephemeral or with low seasonal flow rates, occur on the site. Surveys by the Proponent showed that none of these contain fish habitats. The main potential impacts on surface water include siltation of watercourses and marine waters, introduction of contaminants, reduced flows in watercourses that could impact any aquatic life and the riparian zone, and altered flow to valued wetlands.

Sedimentation Pond Management

The Proponent predicted that the water demand for quarry operations can be met by surface runoff collected on the property, along with the capture of surface drainage from the uphill catchments of the adjacent properties to the east. All surface runoff and recycled process water would be channelled into a set of five interconnected sedimentation ponds, with a sixth to be added after 15 years of operation (Figure 2-3). Maximum depth of water storage for the sedimentation ponds would be 3.9 metres. The purpose of the sedimentation ponds would be to retain fine suspended sediments, to provide storage of water required for quarry operations, and to control runoff during storm events. A sediment retention forebay in the head pond would be installed to capture most of the suspended sediments in order to retain the maximum storage capacity of the ponds. The final outflow of the system would be into the Bay of Fundy via a constructed wetland.

As a result of critical comments on the EIS by the Panel, government agencies and the public, the Proponent offered several iterations involving significant changes to the design and management procedures of the sedimentation ponds. It presented the latest version to the Panel during the hearings, in the form of an undertaking.

The Panel’s and expert reviewer concerns about water management centered on the ability of the proposed pond system and its outflow to handle extreme storm events

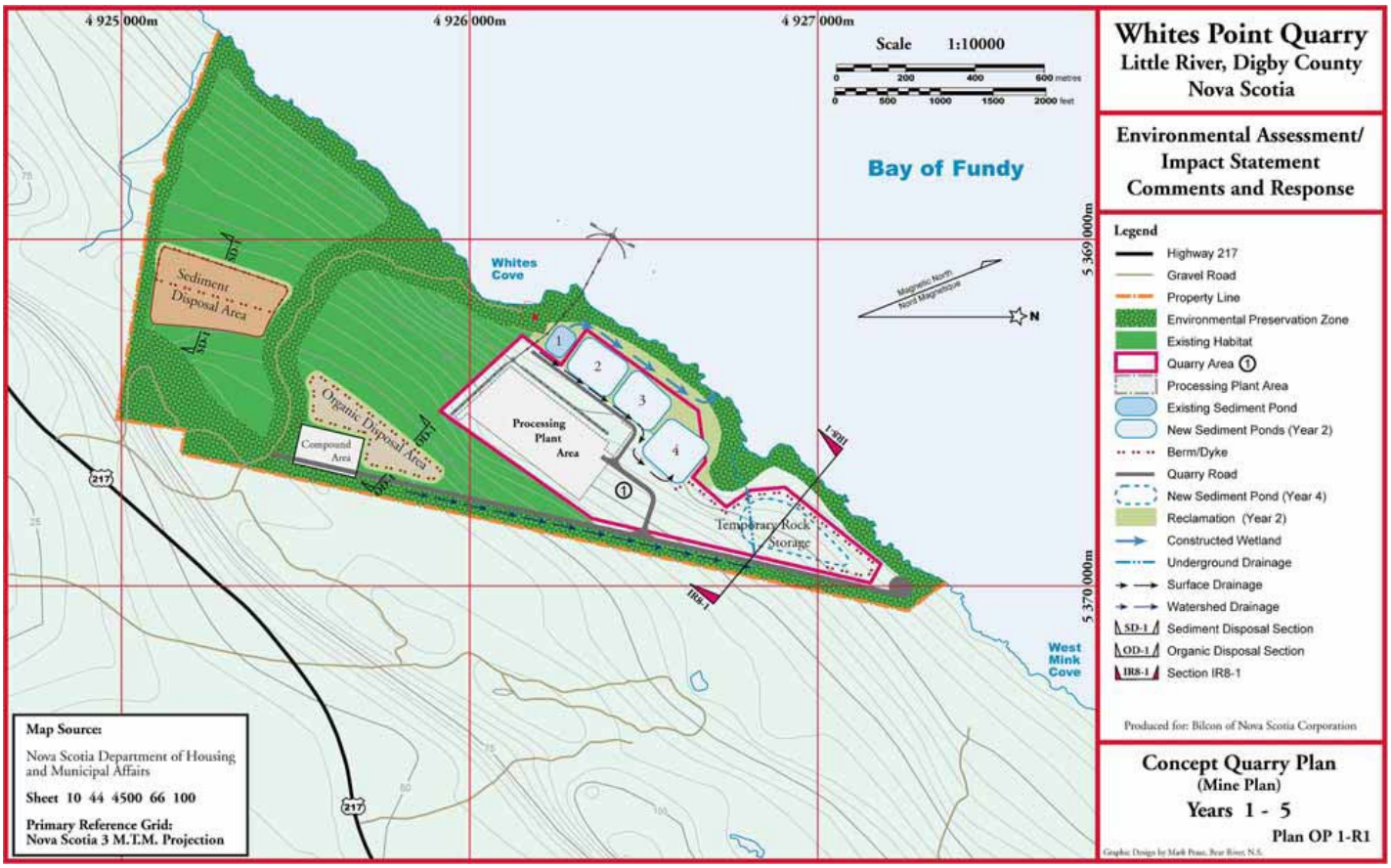


Fig. 2-3 *This plan from the EIS indicates the first 5 years of proposed project activity*.

such as the 100-yr/24-hr maximum rainfall or the 100-yr/5-day maximum rainfall. Maximum supply/storage in the ponds would require a water depth of 2.4 metres to sustain operations during the worst drought conditions observed in a 35-year data set (1963-1997). Assuming all runoff from the 143 ha drainage area to the north of the Whites Cove Road was directed to the ponds, flood storage would add 2.2 metres for the 100-yr/24-hr storm, and 2.9 metres for the 100-yr/5-day storm. In the worst case scenario (simultaneously containing full drought storage capacity, experiencing a 100-yr/5-day storm, maintaining 0.3 metres freeboard with anticipated sediment accumulation), an emergency release of 1.6 metres (149,000 m^3) would be required to avoid overtopping the pond berms. Climate change considerations could add another 0.4 metres (or 37,250 m3) to this estimate.

Environment Canada issues severe weather warnings 12 to 24 hours in advance of a predicted event. Depending on the exact time of the warning, the required emergency release would require an outflow rate of between 207 m^3/min (207,000 l/min) and 103.5 m^3/min (103,500 l/min), possibly as high as 259 m^3/min (259,000 l/min) with the climate change additional volume.

An alternative presented by the Proponent during the hearings suggested that in anticipation of an approaching storm the runoff from the undisturbed watershed (64 ha) above the property boundary could be diverted away from the ponds. A diversion structure at the inlet of the head pond would be designed to channel exceptionally high storm flows around the head pond and directly into the Bay of Fundy.

Adequacy Analysis:
In normal conditions, the proposed sedimentation ponds would have the capacity to manage surface water. However, a comprehensive rainfall dataset (1880-2006) provided by Environment Canada predicts maximum drought conditions that exceed those suggested by the Proponent in the EIS. In anticipation of such a drought, pond storage would have to be significantly higher than recommended by the Proponent, along with release volumes and flow rates commensurate with these higher requirements. Intersection of the water table during quarrying, considered highly probable by the hydrogeologists from NRCan and NSEL, would require yet more additional storage. Both experts agreed that the available hydrogeologic information did not allow an estimate of volumes of water released due to dewatering at the quarry face.

The Proponent failed to evaluate the effects of such rapid releases on the discharge of suspended sediments into coastal waters, re-suspension of sediments, flushing of dissolved contaminants, and the integrity of the constructed wetland at the outflow. Because the Proponent did not define the location of the storm-water diversion structure, the impact of this structure on the coastal environment, the coastal fen and the buffer zone cannot be known with certainty. The Proponent provided no quantitative evaluation of the efficiency of the forebay structure in the head pond at removing suspended sediments. This led to further uncertainties about the storage capacity of the sedimentation ponds during extreme storm events.

The Proponent presented the Panel with a continuously varying scenario of surface water management for the Project. Each proposal had its own set of associated problems and possible environmental effects. In the absence of a reliable design and management plan from the Proponent, the Panel continues to have concerns about

the ability of the proposed structures to retain fine sediments and dissolved contaminants during extreme climatic events that may lead to accidents or malfunctions.

Given the evidence heard, the Panel believes that a failure of the sedimentation ponds or an emergency diversion of storm water during the lifetime of the Project is likely and would result in the release of sediments and flocculants into the Bay of Fundy. Ocean currents would distribute the materials to unknown locations.

The Panel believes that seasonal variations in water flow would limit the viability of the proposed constructed wetland as a filter and as wildlife habitat, thus undermining its usefulness as a mitigation measure.

Surface Water Contamination

The Proponent identified potential sources of surface water contamination from dissolved components, resulting from accidental spills or through the release of chemical agents during quarry operations. Much of the operational equipment planned for use would be driven by electrical power, but refuelling would be necessary for mobile equipment. The Proponent outlined precautionary measures, in the design of the quarry compound area, for fuel storage and equipment maintenance that would contain any diesel fuel spills. Refuelling of mobile equipment would be by an approved fuel truck equipped with dry-break quick disconnect coupling at specific sites, each equipped with an Emergency Spill Kit.

Recycling of the washing water to remove suspended rock would involve the use of a flocculant, a polyacrymide copolymer commonly used in waste water treatment plants. Some of this material would adhere to the discarded fines and the stockpiled aggregate, or could be released into the sedimentation ponds, where it would break down in the presence of sunlight and air.

To evaluate the environmental impacts of ANFO residues, it would be necessary to quantify the amount of ANFO being used and the fraction left unexploded or leached prior to ignition. If any fraction of the 900 tonnes of ANFO used annually was spilled and/or remained unexploded in the fragmented rock, it could lead to serious environmental consequences. If only 0.1% of the annual ANFO usage was released into the environment, that would amount to nearly 900 kg.

The Panel anticipates a moderately high probability that some blast holes would be filled with explosives when a decision to delay blasting would be reached due to climatic or other conditions. Under such circumstances, charged shot holes would be left to “sleep” until more favourable conditions prevailed.

Adequacy Analysis:

While the Proponent should have presented an emergency plan to address responses to major accidental fuel spills or vehicle upsets, the Panel concludes that the precautions proposed for preventing and containing on-site fuel spillages are adequate. (This information would be required as part of NSEL’s Part V approval stage.)

Allowing charged blast holes to “sleep” increases the period over which groundwater can either infiltrate the boreholes and dissolve some of the ammonium nitrate or wick into it and desensitize it. In either case, the ANFO charge may partially or completely fail to detonate. The Proponent failed to provide mitigation measures to address this contingency.

Interveners suggested that unanswered questions remain about the impact of ANFO residues on the nutrient status of the sedimentation ponds, as well as about how much would be released during normal outflow into the Bay of Fundy, how much during emergency storm water releases, and how much leaching of residual nitrates and ammonia from the stockpiles may affect the groundwater, the coastal fen or the buffer zone.

The Panel believes that sedimentation ponds are likely to accumulate residues that would require appropriate management. The Panel also believes that an emergency release of waters containing contaminants is likely at some time during the life of the Project.

Wetlands

A coastal freshwater wetland, located on the project site, covers approximately 1.5 ha. It was classified as a coastal bog by the Proponent and identified as a significant natural feature deserving of protection. A 30 m strip around the wetland would be designated as a protection buffer zone.

During the hearings, a wetland expert argued that the bog is likely to be a coastal fen that originated inland during ancient lower sea levels and that it may have special palaeoecological significance. He pointed out that fens depend on both surface flows and groundwater inputs. The Proponent showed surface water flow into this wetland via a stream that originates from an off-site pond northeast of the property. Subsequent on-site investigations identified two ephemeral watercourses and unconfined surface runoff in the coastal wetland watershed. A botanical survey documented 55 species in the wetland, making it the second highest on the property in terms of biodiversity.

During the construction phase a temporary stockpile of fragmented basalt, up to 40 metres high, would be deposited a short distance upslope from the wetland. After removal of the stockpile, this site would be converted into the head sedimentation pond. The blocked seasonal water flow into the wetland would be replaced by a pipe connected to the drainage channel that receives the overland flow from upslope of the property. The Proponent proposed to conduct a general wetland survey every five years to document any changes in species composition and diversity from baseline conditions.

Adequacy Analysis:

As noted by a local resident, colour aerial photography confirms that the coastal wetland is not connected to the pond to the northeast of the property, but that it receives outflow from a sub-watershed that falls within the quarry area and which would be disturbed and mined during the construction phase in the first 10 years of operation. Evaluation of possible impacts on the coastal wetland is hampered by the lack of baseline data in the EIS on the hydrologic requirements of the wetland.

The Panel recognizes the vulnerability of floral and faunal communities to alterations in hydrologic regime. The Panel requested sampling data and an intervener requested palaeoecological data to clarify the scientific and ecological value of the wetland. Some interveners pointed out that monitoring every five years would be too infrequent to prevent irreversible changes to the habitat and that initially more frequent surveys would be required. The Panel believes that more research on the wetland is required to clarify its importance and functional dynamics.

The Panel concludes that the Proponent has not demonstrated that its mitigation measures can protect the ecological

integrity and continuing viability of the wetland. The Panel believes that the wetland would experience adverse environmental effects from the disruption of its watershed.

Alternative mitigation measures (such as different strategies for developing the site) that might protect the wetland would reduce the amount of the resource that could be extracted and increase project costs, which may not be economically feasible.

Constructed Wetland
The final outlet of the sedimentation ponds would be via a wide channel running parallel to the coastline prior to discharging into the Bay of Fundy. The Proponent would construct an artificial wetland along the length of the outlet to "polish" the effluent of remaining suspended sediment or dissolved nutrients. The plant communities would be chosen from indigenous species that thrive in the coastal environment. The Proponent suggests that the influx of native flora and fauna into the constructed wetland would enhance biodiversity on a local scale.

Adequacy Analysis:
Natural or artificial wetlands require seasonal water-flow regimes to maintain the species that inhabit them. The Proponent did not provide data on seasonal discharges or species composition to demonstrate the ecological value of such a wetland or its contribution to biodiversity.

The Panel believes that the possibility of high-volume, high flow-rate emergency water releases during storm events casts considerable doubt over the long-term sustainability of proposed plant and animal communities in the constructed wetland. The Panel believes that the constructed wetland would not function effectively as a mitigation measure to protect the quality of effluent released from the ponds.

2.1.3 GROUNDWATER

Groundwater collected from dug and drilled wells constitutes the source of domestic and commercial fresh water for Digby Neck. In addition, base flow of groundwater into stream beds maintains flow in streams, such as the Little River, during the dry season. Any activity that would compromise the long-term quality and quantity of the groundwater is of considerable concern to the residents and to government. As pointed out by Natural Resource Canada's (NRCan) hydrogeologist, an evaluation of the potential effects of the Project on the groundwater supply requires knowledge of the depth and nature of the water table(s), a delineation of groundwater flow directions, and the location of the groundwater divide.

Groundwater Models
In the EIS, the Proponent presented a conceptual groundwater model for the quarry site and adjacent areas. It presented a substantially modified version of this model at the hearings (Figure 2-4). The database consisted of four boreholes drilled to delimit the basalt resource, plus six groundwater monitoring wells. Only a few of the monitoring wells remained functional over an extended period. Limited observations of variable quality made over a relatively short interval greatly reduced the reliability of the model and opened the possibility for multiple interpretations.

The Proponent's model located the water table in the upper portion of the Middle Flow Unit (MFU), where the water table remains until it approaches the coastline. At that point it rises into the Upper Flow Unit (UFU) at low elevations above sea level. Recharge of the aquifer occurs along the outcroppings of the MFU to the east of the topographic divide, in an area that falls outside the quarry footprint. Since groundwater is confined by the major basalt units, the aquifer slopes toward the Bay of

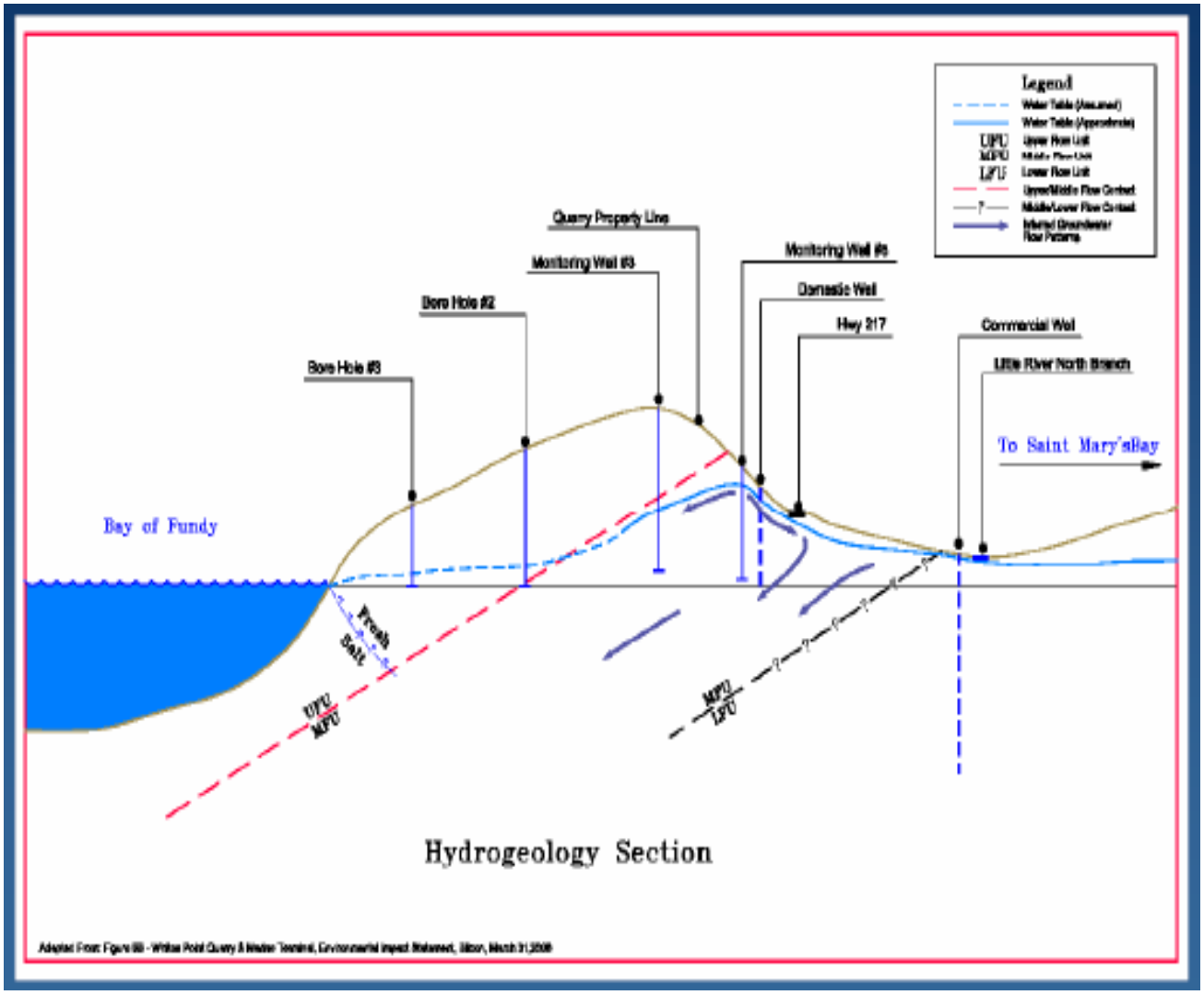


Fig. 2-4 *The Proponent offered this model of the groundwater regime during the public hearings.*

Fundy and groundwater flows to the northwest. Contaminants introduced during quarrying would travel with the groundwater and eventually discharge into the Bay of Fundy. This model might be appropriate if the groundwater in the basalts was stored and transported predominantly through interconnected pores. Using the proposed scenario, removing UFU basalt would not intersect the water table and quarrying would be carried out in “dry” conditions. The Proponent indicated that a one-metre cap of UFU rock would be preserved over the aquifer and that cap would prevent any impacts on groundwater quantity or quality.

During the hearings, NRCan presented an alternate model (Figure 2-5), based on the same data, which the Panel considers more appropriate in the circumstances. In the newer model, groundwater is stored in basalt fractures and predominantly moves from fracture to fracture. This model explains features not accounted for by the Proponent’s model and conforms to general conclusions from hydrogeological studies in basaltic rocks conducted elsewhere. NRCan’s hydrogeologist emphasized that in a fractured medium, horizontal to sub-horizontal fractures define multiple localized water levels, rather than one all-encompassing water table. Recharge of the aquifer would not be confined to the outcroppings of a single geologic horizon, but would occur through vertical fractures over the entire area. Contaminants resulting from quarry operations, such as ANFO residues or fuel spills, could reach the water table. The dominant flow direction would still be to the northwest into the Bay of Fundy and would follow the sloping surface of the basalt units. NSEL’s hydrogeologist agreed that quarrying would inevitably intersect some of the localized water tables and lead to dewatering at the quarry face. The quarry would effectively act as a “giant pump” draining water from the rocks.

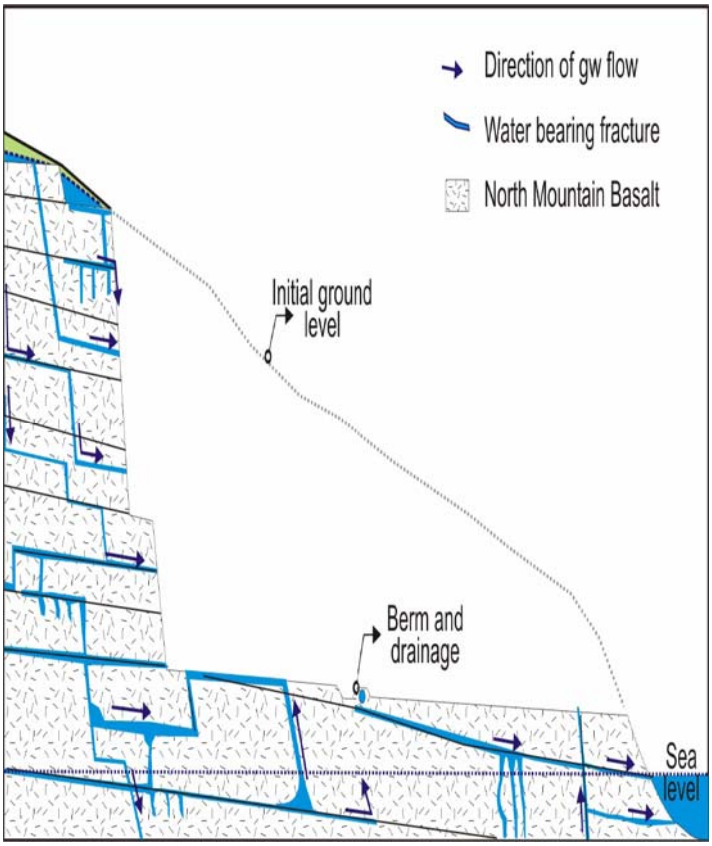


Fig. 2-5 *NRCan hydrogeologists presented this model of how water flows in the North Mountain basalts.*

Adequacy Analysis:
During the hearings many nearby residents voiced considerable apprehension about the potential impacts of quarry operations on the quality and quantity of their groundwater. The Proponent revealed plans to repair defunct monitoring wells and to monitor relevant hydrogeological parameters. A well-water survey on neighbouring properties was partially completed. If the quality or quantity of water in wells adjacent to the proposed Project site were to be impacted, the Proponent proposed to mitigate those changes by deepening or replacing the well at no expense to the owner.

The Proponent used limited hydrogeological data to derive a conceptual groundwater model that predicted quarrying would have little or no impact on the regional groundwater supply. As NRCan’s

expert argued, however, the data lends itself to alternate interpretations that are potentially less benign. The Proponent's model fails to recognize that in massive bodies of rock, such as the North Mountain basalts, groundwater flow and storage is largely governed by fractures. NRCan's and NSEL's experts stressed that the Proponent's monitoring wells were not appropriate for characterizing this type of aquifer and could not test for the presence of multiple water levels. The existing monitoring wells are not suitable to measure parameters such as transmissivity or hydraulic conductivity that are required to estimate the amount of groundwater flow. Acquisition of such data would necessitate the construction of multi-level wells and appropriate packer testing to define transmissivity profiles and locate the major water-bearing fractures.

Based on the NRCan model, the Panel believes that groundwater withdrawal at the quarry face could lower the water level in any well located in an interconnected geologic unit if its water table was higher than the quarry floor. Over the 50-year life of the Project, flow in the Little River could be reduced due to a lowering of the base flow as a result of quarry operations; if this effect occured, then fish habitat might be affected in Little River. In the absence of more specific and targeted information, the magnitude and lateral extent of the effects of quarry dewatering remain difficult to quantify.

Uncertainties exist regarding possible impacts of quarry activities on the local groundwater. In the view of some government departments, additional hydrogeological testing, data collection, analysis and modelling would be required to obtain properly definitive conclusions regarding the nature and extent of impacts on groundwater quantity and quality.

The Proponent failed to outline any mitigative measures that could be implemented to prevent or alleviate domestic water supply problems prior to compensation. The Panel considers modification or replacement of impacted domestic wells, or the provision of alternative water supplies, as measures of last resort.

The Panel believes that quarry activities would adversely affect the groundwater regime. Given the fractured nature of the basalts on the site, it is highly probable that quarrying would intersect the water table. Dewatering at the quarry face would continue until a stable equilibrium (lowered water table) was reached or some yet to be specified mitigative action stopped the process.

Groundwater Quality

Groundwater chemical tests conducted by the Proponent from the project site and adjacent properties show the recovered water to be of good quality for human consumption. Currently, the water quality is generally good. The EIS suggests that project activities would not affect water quality.

Adequacy Analysis:

Some residents expressed concerns about potential changes in water quality as a result of quarry activities, referring to studies that indicate that blasting can mobilize sediments into groundwater. The groundwater divide is thought to lie east of the topographic divide, with groundwater flow toward the Bay of Fundy, making the movement of contaminants toward domestic wells highly unlikely. However, NRCan's groundwater expert indicated that long-term quarry dewatering could alter that picture by bringing about a shift in the groundwater divide to the east. The Proponent's analysis did not address such a contingency.

The Panel believes that the Project presents little risk to groundwater quality.

2.1.4 DUST

Activities associated with quarrying aggregate inevitably generate airborne particulates (dust). Drilling rocks, blasting, handling and transport to the processing facilities, crushing, screening, stockpiling and loading can all contribute to dust generation. Airborne particulates are the main air-quality issue in quarrying. Dust suppression measures are therefore of paramount importance in minimizing the exposure of the workforce, the surrounding natural environment, and neighbouring humans and their environment.

The Proponent stated at the hearings that the stockpiled aggregate would be as fine as 0.05 mm (-200 mesh) and that 3% of all stockpiles would consist of residual material even smaller. The fine material separated during the washing process would be discarded and stored in a bermed sediment disposal area. Under dry conditions, the fines in both stockpiles and sediment

disposal sites can become windborne within and beyond the project site. In addition, air

quality would be affected by emissions from heavy-duty diesel-powered vehicles operating onsite and emissions from the bulk carrier docked at the marine terminal on a weekly basis.

NSEL Pit and Quarry Guidelines specify a maximum limit for suspended particulate levels of 70 µg/m^3 for the annual geometric mean at or beyond the property boundary and 120 µg/m^3 for concentrations over a 24-hr period. These values conform to Health Canada's National Ambient Air Quality Objectives and Guidelines. NSEL stated at the hearings that the Proponent would be required to predict air emissions and their impact, to submit a monitoring plan, and then to develop a management plan. The Proponent outlined a series of measures to suppress the release of airborne particulates that included:

- all crushing and screening equipment would be enclosed;
- conveyors would be hooded to reduce fugitive dust;
- quarry products would be washed before being stockpiled;
- load-out tunnels would be used to reduce product handling and associated dust generation;
- water sprays would be used to control dust on quarry roads and work areas;
- a paved access road from Highway 217 to the quarry site would be constructed and would eliminate dust generated by employee and delivery vehicles;
- the sediment disposal area and product stockpiles would be water sprayed during dry periods.

Emissions from equipment would be controlled by assuring that heavy operational diesel engines conform to EPA Tier 3 emission specifications.

Adequacy Analysis:
Notwithstanding the dust suppression measures outlined, the Panel has outstanding concerns. The Proponent failed to properly delineate the dispersion patterns of project-related emissions and their potential impact on ambient air quality. The Proponent has not defined an appropriate air shed that takes local seasonal wind conditions into account. Blasting can result in a concentrated plume of particulate matter, of limited volume and short duration. The fate of such plumes at the site remains unclear, particularly with respect to their impact on vegetation and soil conditions in the buffer zones.

Environment Canada indicated that in winter the project site frequently

experiences wind speeds exceeding 20 knots, and sometimes higher than 35 knots. Additional information provided during the hearings indicated that extremely fine materials would remain exposed to the winds in storage and loading. The Proponent failed to demonstrate the effectiveness of water spray in preventing windborne transport of the fine aggregate, the even finer residual fraction within the stockpiles, and the fines in the sediment disposal area. While some of such wind-blown fines may be too coarse to be transported beyond the property boundary, their impacts on sensitive plant communities in the buffer zone need to be considered.

The Panel believes that windborne fines would have an adverse environmental effect. Plant communities on the site and nearby human receptors would be likely to experience occasional deposits of dust over the length of the project life. The additive effect of such releases may affect ecosystem viability.

2.1.5 NOISE

The paucity of industrial activity along the Fundy coast of Digby Neck and Islands provides an environment where the sounds of nature dominate. Wave action on the shoreline, wind and bird calls provide a background that is rarely disturbed by anthropogenic acoustic disturbances. Anthropogenic components become important near Highway 217 and near settlements, due to harbour and truck traffic. Sound levels ranging from 30 to 70 decibels (dBA) were measured by the Proponent near the highway and at settlements, while at the Whites Cove shore, levels ranged from 33 to 52 dBA.

Episodic noise levels at the quarry would peak every two weeks due to blasting during the production phase, and once per week during the construction phase. During operational hours of 0600 – 2200 hours, continuous noise levels would be generated by mobile equipment (rock drills, hauling trucks, front-end loaders etc.) and the crushers, screens and conveyors at the processing plant. Much of the noise generated during quarry operations results from metal-rock contact. During ship loading, noise levels would be elevated by the conveyor operation, the use of the radial ship loader and the filling of the holds. When necessary, ship loading would continue through the night.

Under NSEL Pit and Quarry Guidelines, air concussion due to blasting may not exceed 128 dBA within 7 metres of the nearest structure not located on the site. In addition, no blasting may occur within 800 metres of residential structures not located on the quarry property, without written consent of the owner.

The Proponent presented data on air concussion from other quarries to support its assertion that it could meet NSEL guidelines. However, the amount of explosives per delay in the examples appeared to be considerably less than the amount proposed for the Whites Point quarry. The topographic divide separating the quarry site from residences would deflect the direct path of air concussions of blasts upward to decrease their intensity at ground level. NSEL guidelines specify that noise levels at the property boundary must not exceed the thresholds of Leq 65 dBA in daytime, Leq 60 dBA in the evening and 55 dBA at night time. The Proponent proposes to achieve this goal by enclosing all crushers, screening equipment and conveyors. Hauling truck cargo bays, front loaders and chutes to crushers are to be lined by thick rubber mats to reduce rock-metal contact.

The Proponent acknowledged that noise from quarrying operations would affect wildlife on the property and in areas adjacent to the property. While operational noise may rapidly dissipate within the adjacent forest, noise from blasting would carry considerable distances into surrounding habitats. The Proponent argued that noise from operations and blasting would not constitute a significant stressor for most wildlife in the area.

Adequacy Analysis:
Given the projected size of the explosive charges, the Panel questions whether the Project can meet NSEL air concussion guidelines for blasts. If tests show it cannot, then smaller and more frequent blasts would be needed to achieve the proposed production targets. The possibility and implications of more frequent blasts were not considered by the Proponent. The Panel expects that more frequent blasts would be problematic for nearby residents.

Atmospheric conditions such as cloud cover, fog and thermal inversions can result in the reflection of sound waves to enhance their impacts on neighbours. The Proponent proposed “no blasting” within specific limits of such atmospheric conditions; but, it remains unclear to the Panel how these conditions would be determined locally since the nearest Environment Canada meteorological station is in Yarmouth. Both local traditional knowledge and Environment Canada experts suggested that conditions in the Yarmouth region often differ substantially from those at the project site. The Panel believes that the proposed mitigation may not be technically feasible.

Uncertainties about the Project’s blasting requirements and protocols made it difficult for the Panel to determine the configuration and size of the area over which wildlife would be impacted by operational noise and blasting, and to fully characterize specific impacts on nesting or migrating birds, mammals etc.

2.1.6 VIBRATION

NSEL Pit and Quarry Guidelines specify that blasts must not occur closer than 800 metres from any off-site structure without prior written consent of the owner. Ground vibration must not exceed 12.5 mm/sec peak particle velocity below grade or less than 1 metre above grade in any part of the nearest structure not located on the site.

The EIS provided model predictions based on an explosive weight of 45 kg per delay to demonstrate that ground vibrations would be well within the criteria specified by NSEL. The modelling appears to have been conducted for a single delay or explosive charge.

Adequacy Analysis:
Given that the explosive weights expected to be used during operational blasting (possibly up to 805 kg per blast hole) appear to fall well above those used for the modelling, and that an array of 43 holes would be detonated per blast, the Panel questions the vibration extrapolation provided by the Proponent. A blasting expert from Fisheries and Oceans Canada (DFO) indicated during the hearings that the department would wish to reconsider its evaluation following the Proponent’s presentation of new information on the size of the blasts. The Proponent did not provide information on how an extension of the pulse duration by delays could affect nearby structures.

From the information the Proponent provided, the Panel is not convinced that a single production blast every two weeks would be sufficient to meet production targets without violating NSEL guidelines on peak particle velocities at the nearest structures not on the site.

2.1.7 LIGHT

Current light levels at the proposed Project site are determined by natural light. The proposed daily operating schedule from 0600 – 2200 hours requires artificial lighting during parts of the year in several areas of the quarry site, including the working face, the processing plant, the compound area, and the ship loader and mooring facilities. If a bulk carrier were docked, loading would continue throughout the night and lights would be required at all active locations.

The Proponent proposed to limit outdoor lighting to levels necessary for basic safety requirements. Outdoor lighting would be primarily directed downward as well as shielded to the maximum extent possible to keep light from the night sky. The topographic ridge and the vertical quarry faces would block horizontal light flow toward adjacent areas to the east.

Adequacy Analysis:
The main impacts of site-lighting on the terrestrial environment would be felt by migrating and nesting birds and are discussed below.

2.1.8 GREENHOUSE GASES

In recognition of the overwhelming scientific evidence for climate change, the governments of both Canada `and Nova Scotia have committed to reduce greenhouse gas (GHG) emissions. Industries, institutions and individuals will be asked to adopt measures that reduce potential increases and hopefully will lead to decreases in carbon dioxide, methane and other GHG emissions. Regulations are still at the drafting stage and no limits or regulations have yet been released for the mining and extractive industries. In such a regime, the Panel believes that it is nevertheless incumbent upon proponents to demonstrate that their projects seek to minimize GHG releases and that they contribute to provincial and national goals and commitments.

The Proponent estimates annual on-site carbon dioxide production of 81.8 kilo tonnes (kt) during the production phase, while ship transport of the aggregate to New Jersey would add another 22.2 kt, for an annual total of 104 kt. The Proponent suggested that activities such as incremental site reclamation, re-use of wood fibres from land clearing, and improved silviculture practices on adjacent properties would partially offset GHG emissions.

Adequacy Analysis:
The Nova Scotia Department of Natural Resources (NSDNR) pointed out that the Proponent did not pay sufficient attention to soil carbon, as opposed to carbon above ground. Soil carbon is generally the largest portion of terrestrial carbon and proper handling of topsoil would therefore be critical. The magnitude of the proposed carbon offsets was not quantified but officials concluded that it is unlikely that they would be sufficient to make the Project carbon-neutral.

Some interveners suggested that the Project would qualify as a “large emitter” in the Nova Scotia context. The NS *Environmental Goals and Prosperity Act* calls for a 10% reduction of GHGs by 2020, using 1990 as the baseline. The Green Party of Nova Scotia argued that the onus would fall on the people of Nova Scotia to reduce GHG increases generated from the Project.

The Panel was disappointed that the Proponent did not consider voluntary measures leading to a more aggressive GHG reduction. The Panel believes that the long-term effectiveness of the proposed offsets would be limited and that the Project would add a small but significant GHG

burden at a time when Nova Scotia and Canada have committed to reduction.

2.1.9 TERRESTRIAL ECOLOGY

Species at Risk

Species at risk (see Appendix 5) are classified at the federal level through the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and the *Species at Risk Act* (SARA). At the provincial level, species of concern are protected by the Nova Scotia *Endangered Species Act*, and in the absence of listing under law they are assessed using the Nova Scotia General Status of Wild Species. COSEWIC defines species at risk as endangered, threatened or vulnerable. Species defined by COSEWIC receive legal protection when the species is accepted for listing on Schedule 1 of SARA. Nova Scotia fauna and flora that are considered at risk are classified as either “red-listed” when known or believed to be at risk, “yellow-listed” when sensitive to human activities or natural events, “green-listed” when secure, or “extirpated” (blue) when no longer reported in Nova Scotia.

In the EIS the Proponent provided a list of species at risk, that is, species at risk for which the regional occurrence was determined to be possible, likely or common based on the general distribution of these species. Also included are species at risk identified during field surveys. Two columns of this table are included in Appendix 5 for reference.

Fig. 2-6 *A colony of glaucous rattlesnake root plants, believed extirpated in Nova Scotia, was identified on the site*

At the public hearings, Fisheries and Oceans Canada provided the Panel with updated information on the marine species that may be found in the project area at some time during the life of the Project and that are protected by the *Species at Risk Act*. Identified were five endangered species (inner Bay of Fundy population of Atlantic salmon, Atlantic whitefish, North Atlantic right whale, blue whale and leatherback turtle) and two species of Special Concern (Atlantic wolffish and fin whale). The Atlantic whitefish (red-listed provincially) and the blue whale were not included in the Proponent’s long list.

NSDNR noted that the surveys and listing of plant species provided by the Proponent were among the most exhaustive they have seen in an EIS. Taxonomic screenings and on-site field inventories of the project site identified no terrestrial species listed under the federal SARA or the Nova Scotia *Endangered Species Act*. Three Nova Scotia General Status of Wild Species listed species of vascular plants were found on the Whites Cove property and include the glaucous rattlesnake root (*Prenanthes racemosa*), previously believed to be extirpated in Nova Scotia and not seen in the Province for 50 or more years, mountain sandwort (*Minuartia groenlandica*), yellow-listed, and hemlock parsley (*Conioselinum chinense*), also yellow-listed. NSDNR stated that the latter is actually far more common than suspected when its status was determined and may not warrant special attention. All three plants occur in the coastal strip between the high-tide mark and the forest

cover, and appear to be at the geographic edge of their normal occurrence. Their spatial distribution on the property falls within the proposed 30 m coastal buffer zone, although their proximity to the border of the buffer zone was not evaluated. Near the headland hosting the colony of some 250 plants of glaucous rattlesnake root, the Proponent defined a buffer that extends somewhat beyond the 30 m limit.

A NSDNR wildlife expert and a professional botanist indicated that species of concern could be adversely affected through habitat removal or habitat alterations such as microclimate changes, modifications to the local hydrology, exposure to dust, interference with pollinators, or a combination of these factors. NSDNR experts explained that these species are very poor competitors with other species, and any disturbance to the soils or hydrology would have negative consequences on their long-term viability and the consequent biodiversity of the plant communities. The Proponent indicated that monitoring of plant populations that are considered at risk would be conducted at appropriate times.

Adequacy Analysis:
The EIS evaluation of the vascular plant species of concern was limited to identifying species and their general locations. The Proponent did not provide a habitat or ecosystem analysis. A professional botanist noted that the absence of data on the spatial distribution of plant communities restricted the ability to assess the dimensions of the buffer zone necessary to ensure their long-term survival or to protect habitat they could potentially colonize. NSDNR and Environment Canada concluded that the proposed 30-metre coastal environmental preservation zone would not be sufficient and proposed that the zone be extended to 100 metres over the entire coastline of the property. The Proponent indicated its readiness to work with researchers and government officials to identify appropriate buffer sizes. According to the NSDNR expert, even expanding the coastal buffer may not guarantee the health or survival of these plants, given the stresses they would endure.

The Panel believes that the drastic topographic changes produced by the quarry would undoubtedly alter the hydrology of the coastal strip, vegetation clearing would affect its microclimate, and accidental dust releases would alter the soil characteristics. The zone would also be exposed to accidental or careless encroachment by personnel or machinery, unless a physical barrier was provided between the more vulnerable and ecologically important portions of the buffer zone and the operating quarry. Protecting the ecosystems that support these rare plant colonies would require frequent monitoring and management through the life of the Project. The Panel concludes that uncertainty remains about their likelihood of survival, even with mitigation measures.

In assessing whether the potential loss of rare plants that are not currently listed as warranting protection may qualify as “significant”, the Panel considered the principles that frame its review. From the perspective of the ecosystem approach, protecting biodiversity is a critical component. These plants are at the limits of their range and therefore represent unique characteristics in the region. The colony of glaucous rattlesnake root, previously believed extirpated from Nova Scotia, is substantial in size. The sustainable development principle would suggest preserving indigenous biological diversity because it represents options for future generations. The precautionary principle

argues that we not use uncertainty as a justification for doing nothing to protect valued environmental components. In this context, the Panel believes that the proposed Project's impact on these native species should be considered as an adverse environmental effect.

Buffer Zone

The Proponent specified a "coastal environmental preservation" or buffer zone that would extend 30 metres inland from the highest normal tide level. In the vicinity of the coastal fen and near the headland habitats of plant species at risk, this zone extended somewhat further inland. Some of the undertakings submitted by the Proponent during the hearings referred to a 100-metre preservation zone but few details were provided.

Nova Scotia does not have specific regulations regarding the separation of the shoreline from industrial development, such as quarries. A 20-metre special management zone applies equally to inland water bodies and salt water, but NSEL's Pit and Quarry Guidelines specify a separation distance of 30 m from the bank of any watercourse or the ordinary high-water mark. (Some jurisdictions demand more extensive protection zones along their coastlines; for example, Maine requires a 75 m buffer and Spanish quarries cannot be located within 200 m of the coast.)

Adequacy Analysis:

Representatives of both NSDNR and Environment Canada questioned the effectiveness of a 30-metre coastal buffer to preserve important local habitats or to provide a visual buffer from the ocean. Coastal barrens and low vegetation constitute large portions of the 30 m coastal strip on the site, leaving only isolated patches of forest that could be prone to blow-down under harsh coastal conditions. Access by foot or vehicle into this zone would have to be strictly controlled to prevent habitat destruction.

The Panel believes that a 30 m buffer zone would be insufficient for environmental protection. A 100 m buffer would increase the probability that the buffer zone could fulfil its intended function. It notes, however, that vulnerable habitats in the coastal zone under the conveyor belt would not be protected by the buffer designation and would remain at risk of adverse environmental effects. By removing substantial portions of the property from the development envelope, the larger buffer would potentially reduce the economic feasibility of the Project.

Nova Scotia should review its environmental regulations regarding the width of coastal buffers for industrial developments, such as quarries, in the light of the importance of the coastal zone as a unique faunal and floral habitat.

Nesting Birds

Forty-five bird species were observed during field surveys of the property and twenty-seven species of birds are believed to nest in forest habitats on the property. The Proponent recognized its obligation under the 1917 *Migratory Birds Convention Act* to mitigate impacts on nesting birds and their habitats. Clearing of forest cover and overburden removal for quarry expansion would have the greatest impact on nesting birds. The Proponent proposed to defer such activities to the late fall or winter to avoid spring and summer nesting periods of resident species. Nest surveys would be carried out if clearing was required during the nesting season.

Adequacy Analysis:

Environment Canada questioned the usefulness of nest surveys, since adult birds actively disguise nest locations. The breeding season for most birds within the

project area occurs between the beginning of May and the end of August, but some species protected under the Act nest outside this timeframe. The Proponent did not provide an analysis to determine the time period over which nesting of observed species would occur on the property. According to Environment Canada, the only completely effective measure to avoid the disturbance of nests and their chicks would be to avoid all vegetation clearing until nesting is complete and chicks have naturally migrated from the area. The Proponent provided scant information on how site lighting, noise and dust may affect the willingness or ability of birds to nest on the site or the adjacent properties. The Panel believes that the Project would reduce the availability of habitat for nesting birds when land is cleared; with reclamation, habitat may be re-established.

Migratory Birds

The use of Digby Neck, Long Island and Brier Island by migratory land birds is a very important biological feature of southwest Nova Scotia. A total of 226 species of birds, including 154 species of land birds, of which 23 are considered at risk, have been recorded as migrants using Brier Island. The orientation of Digby Neck, Long Island and Brier Island with respect to the flyway strongly suggests that migration data from Brier Island should be applicable to the project site. Spring migration is typically in April and May, while fall migration is from August to the end of October. The quarry would be fully operational during these periods and the amount of daylight does not cover the entire working day. The Project has the potential to affect migratory birds and would have to comply with the *Migratory Birds Convention Act*.

Environment Canada noted that potential interactions with migratory birds that have to be considered include blasting activities, project lighting, habitat loss, and accidents or spills.

Bird collisions at lighted and floodlighted structures have been documented for a range of projects and are thus of considerable concern. Nocturnal migrants and night-flying sea birds are most at risk. Given the proposed daily operating schedule, night lighting would be required for most of the year during early morning hours and in the evening. On occasion, lighting would extend through the night when the bulk carrier was being loaded. Lighting on the ship loader would extend approximately 25 metres above sea level, but lighting would be directed downward and shielded to reduce light spill into the night sky. The effectiveness of proposed mitigation measures would be monitored for a period of one year by conducting monthly monitoring of bird fatalities in the vicinity of project structures during bird migration periods.

Quarry operations or marine traffic associated with the Project could result in accidental uncontrolled releases of hazardous materials, interacting with water and land areas frequented by migratory birds. Environment Canada wildlife experts stated that in the case of hydrocarbons, even a small spill could be significant if it reached avian species at risk, sensitive habitats or large numbers of birds.

Adequacy Analysis:

In its submission, Environment Canada identified a number of best management practices that address bird collisions with lighted structures and referred the Proponent to a guidance document. Environment Canada considers a monthly monitoring program of bird collisions to be of limited value and proposed the development of a detailed avian collision monitoring program designed in consultation with the agency. Such a

program would involve a more intense monitoring effort during peak spring and fall migration (e.g., daily, for a shorter period), including monitoring on mornings following inclement weather. No mitigative measures other than reduced and downward-directed lighting were offered by the Proponent as a strategy to reduce avian collisions.

The Panel and Environment Canada noted the lack of a spill response plan in the EIS to address accidental releases that could result in the oiling of birds and/or sensitive habitats.

The Panel believes that the Project has the potential to adversely affect migratory birds because of the site's location on an important flyway, the proposed project's requirements for night lighting, and the small risk of accidents.

Reclamation and Re-vegetation

The Proponent stated that reclamation would proceed incrementally over the lifespan of the quarry (Figure 2-7). Once abandoned, the site would be left with steep cliffs, which may need to be managed for seepage as well as for safety. Areas from which the basalt rock had been removed, that would no longer be needed for other purposes, would periodically be graded and contoured for surface drainage before being covered by a one to three metre thick soil layer. The soil would be obtained by mixing stockpiled original soil, composted vegetation derived from site clearing, and fine waste material from washing operations (dredged from the sedimentation ponds). Soil productivity would be enhanced with lime and fertilizer. An erosion control mix of native grasses would be seeded prior to reforestation with softwoods and native hardwoods, to establish a mixed forest and shrub community over most of the site. In the EIS, the current forest on the site is characterized as "in decline" and in poor shape. Consequently, the Proponent claimed that proposed re-vegetation would enhance forest productivity and biodiversity.

Adequacy Analysis:

The Panel agrees that incremental reclamation would provide some erosion control, watershed stabilization, wildlife habitat restoration and improved aesthetics during the operational phase of the quarry. NSDNR's forestry expert noted that reclamation of the site should aim at re-establishing indigenous forest and plant species. He also noted that the addition of nutrients, liming and soil depths exceeding one metre would provide little benefit for tree establishment and growth. An experienced consulting botanist expressed concern that liming, fertilization and washout of fines from the manufactured soils could negatively affect valued plant communities in the buffer zone and would modify the coastal fen.

The Panel believes that the Proponent paid insufficient attention to the potential impacts of reclamation measures on the valued plant communities in the buffer zones, and it questions the appropriateness of the proposed "improvements" in species selection, given the harsh climatic environment of the site. The Panel believes that the reclamation of the site as a productive indigenous forest system would be difficult to accomplish without substantial cost. Finally, the EIS did not sufficiently address on-going management of the site after decommissioning.

2.1.10 Effect of the Environment on the Project

When applying meteorological information to the design of infrastructure, such as the sediment retention ponds, the Proponent relied on historical information. Environment Canada presented recent research that

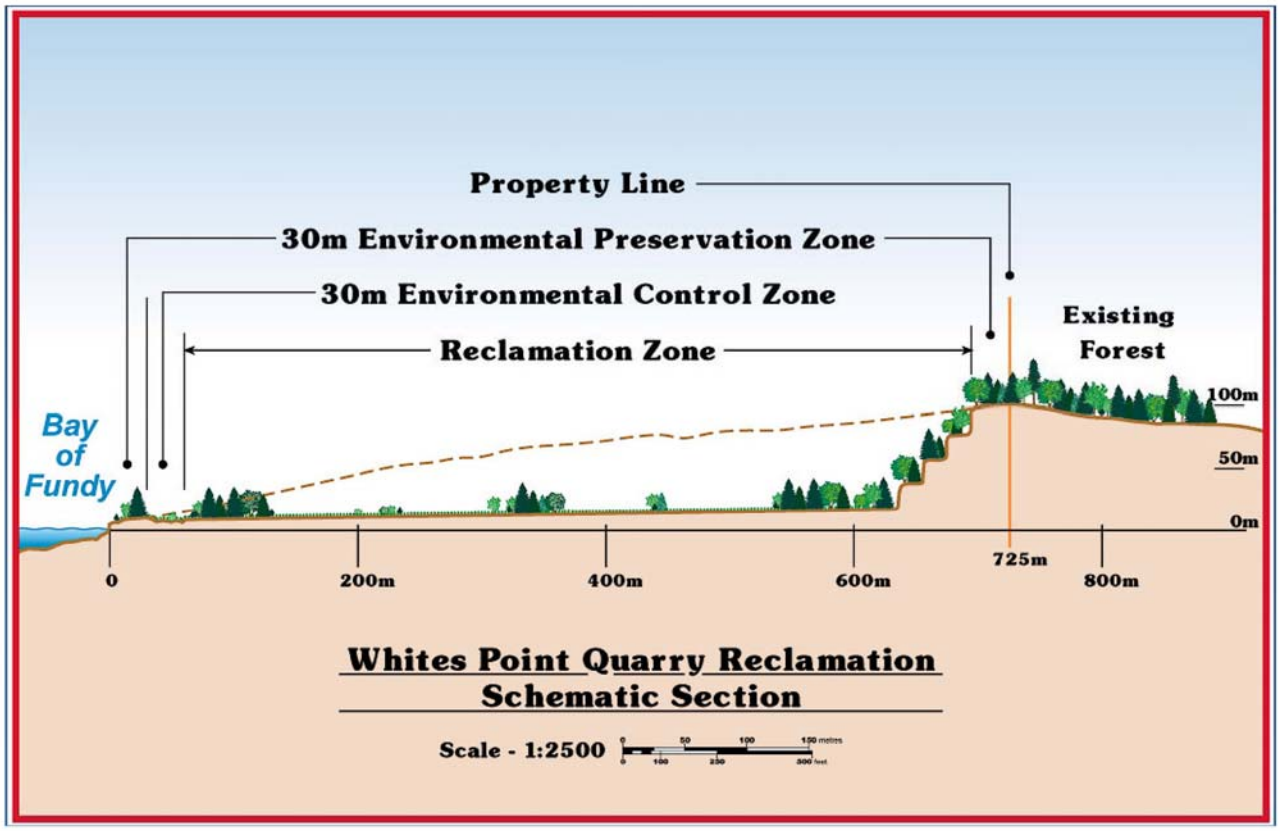


Fig. 2-7 *This figure demonstrates the Proponent's concept of the site elevations after the reclamation.*

indicates "…when accounting for the effects of climate change on extreme events, such as particularly heavy precipitation, the return period of these events could reduce by at least a factor of two." As a result, by the end of the century, the 100-year storm events would become 50-year events.

Environment Canada's most recent projection for Sea-Level Rise, combined with subsidence of the land mass, predicts an average relative Sea-Level Rise of approximately 30 cm by the year 2050 for Atlantic Canada. These figures were supported by NRCan.

Adequacy Analysis:
The planned life of the proposed Project is 50 years, but the Proponent did not incorporate current predictions on climate change into the design, monitoring or mitigation for the Project. For example, such considerations should have been included in the hydrologic management of the site, protection of groundwater, and reclamation plans. The EIS lacked clarity on how sea-level change was incorporated into the design of the loading facility and coastal structures, such as the constructed wetland or the environmental preservation zone.

The Panel believes that the risk of accidents and malfunctions, resulting from the effect of the environment on the Project, is higher than that the Proponent projected.

2.2 MARINE EFFECTS ASSESSMENT

2.2.1 COASTAL MARINE ENVIRONMENT

Biological Setting
Marine organisms potentially affected by the proposed quarry and marine terminal occur in the immediate shallow-water coastal environment on the bottom and in the overlying waters, as well as further out in the Bay proper. The Proponent assessed organisms and habitats in this coastal setting using direct sampling and video observation along several transects perpendicular to the coast. Those observations showed vertical intertidal zonation (along the 4% vertical gradient extending from inshore to offshore) that included a transition in macroflora, along with attached and mobile animals that included rockweed, Irish moss, periwinkles, mussels, green crabs, whelks and lobster. Transient species in the area included leatherback turtles, herring, common loons, harlequin ducks and inner Bay of Fundy (iBoF) salmon. Both the periwinkle and the European green crab are documented examples of invasive species. Infauna is completely lacking due to the absence of a sedimentary substrate, prevented from accumulating due to strong tidal currents. Video evidence provided during the hearings showed a lush, diverse and productive environment, a fact strongly reinforced by the extensive fishery activity in this area.

Fig. 2-8*A view of Whites Point and Cove*

Offshore, in deeper water farther from the coast, organisms of special interest include resident and transient species such as: blue, fin, humpback, minke and Northern

right whales; harbour seals; and the harbour porpoise. The harbour porpoise was reported by many observers to be common in many coastal environments, such as the proposed Project site. All of these animals are highly mobile and range widely and, although more common in deeper water, can be found wherever sufficient water depth permits. Anecdotal evidence offered during the hearings reported sightings of right whales rubbing their bodies on rocks along the shoreline of Digby Neck.

Of special interest in both inshore and offshore settings is the conservation status of many of these animals (see Appendix 5). Within the frameworks available to categorize species at risk, the North Atlantic right whale, blue whale, leatherback turtle and inner Bay of Fundy (iBoF) salmon all fall into the category of Endangered (SARA and COSEWIC), as does the harlequin duck, according to NS *Endangered Species Act* and NS General Species Ranks (NSGSR). Species categorized as “Of Special Concern” include fin whales and harbour porpoise (COSEWIC) and the harlequin duck (SARA and COSEWIC), while the common loon is ranked as sensitive (yellow) by NSGSR, although “not at risk” by COSEWIC.

In the absence of Canadian federal or provincial legislation bearing directly and unequivocally on the health of marine and coastal habitats, the Panel is guided by the Gulf of Maine Council on the Marine Environment Action Plan 2007-2012. That document identifies three goals for the broader Gulf of Maine: maintaining coastal and marine habitats in a healthy, productive and resilient condition; fostering environmental and human health, with a focus on preventing and reducing water pollution; and encouraging Gulf of Maine communities to be vibrant with marine-dependent industries that are globally competitive.

Adequacy Analysis:
Although several interveners questioned various particulars during the hearings, the Panel found the brief general survey presented in the EIS of the inshore and offshore marine environments adequate for the purpose of environmental characterization and to assist the process of EIS evaluation.

The EIS makes many references to the need for continuous monitoring and implementation of adaptive management as a tool to rectify unexpected environmental changes. (For instance, the EIS offers the routine collection of periwinkles as a vehicle to assess environmental copper.) Monitoring efforts require solid information regarding the state of the environment prior to the onset of project-related change. Baseline information, as the name implies, is the starting point for all future comparative studies. Without it, subsequent observations are meaningless. While the surveys carried out for the preparation of the EIS met the needs of the EIS process, the Panel found they often appeared inadequate for evaluating the long-term processes described throughout the EIS.

Physical Setting
The sea floor adjacent to the proposed quarry, 800 m in width parallel to the shore and seaward 500 m, was imaged using a multibeam echo sounder. The area investigated is dominated by basaltic bedrock, an underwater extension of the North Mountain. The sea bottom was largely barren of sediment due to scouring by strong tidal currents. Occasionally, some turbidity occurs, usually on the ebb flow, apparently reflecting the transport of sediment seaward from the upper reaches of the bay. Water chemistry adjacent to the proposed site showed nothing untoward

other than high copper levels, reflecting the chemistry of the surrounding basaltic rocks.

A generalized picture of local oceanographic conditions in the area of the proposed quarry was further developed in the hearings from a variety of sources, including traditional knowledge from local fishers who have fished those waters, in some cases, for over 40 years. Off Whites Cove tidal currents, driven by the exceptionally high tides in the Bay, can attain speeds between 2-4 knots four times in each lunar day. Residual currents can be an order of magnitude greater than those measured off Saint John. In addition, the local area is subject to unpredictable swells of variable length, driven by storms in the Atlantic, that penetrate the Bay of Fundy, sometimes colliding with ebbing tidal currents and resulting in a chop, eddies and a changeable sea state referred to as a “confused sea”. Conditions off the proposed quarry site were described as second only in roughness to Petite Passage, the opening between Digby Neck and Long Island. One intervention offered that local fishers use up to 40 different words to describe various sea states in this highly changeable environment. Superimposed over these events is the local weather environment where the collision of warm and cold air masses often occur, creating a microenvironment quite different from the surrounding land and subject to a high level of unpredictability, operating over very short time scales. These conditions can often bring about the onset of thick fog in a matter of minutes. Finally, the prevailing westerly winds that blow across the Bay of Fundy push water against the lee shore, the site of the proposed quarry and marine terminal, further complicating an already complex circulatory environment.

Adequacy Analysis:
The EIS treated oceanographic conditions on the eastern side of the Bay of Fundy, adjacent to the proposed quarry and marine terminal, as well known and sufficiently predictable such that planning for the proposed Project holds few surprises. The Proponent advanced this confident view on an exceedingly modest base of supporting documentation. However, a substantial literature reports on the physical oceanography of the Bay of Fundy; and, a substantial body of traditional knowledge draws from more than 250 years of close interaction with surrounding waters by the residents of Digby Neck and Islands. Unfortunately, the Panel saw little evidence that the Proponent tapped either of these two data sources. The EIS incorrectly bench-marked its tidal current estimates at Saint John, New Brunswick. Many project planning decisions appear to have been based on an unrealistic picture of the environment, especially without sufficient regard for the number and degree of possible extreme weather events.

Depending on the combination of wind, fog, tidal currents and sea state, the resulting conditions could influence a number of proposed Project operations ranging from ship movements to and from the marine terminal, the planned avoidance of large animals by a ship, docking a large ship on a completely exposed coastline, and the capacity of observers to see and identify whales and seabirds for the purpose of informing ship captains or blasting engineers to mitigate effects. Hearing interveners pointed out that some of the planned activities would be exceedingly difficult, if not actually impossible, given conditions at the site.

Fig. 2-9 *This satellite image shows Digby Neck and the Bay of Fundy.*

In the absence of a risk assessment, the Panel can only conclude that the physical setting of the marine terminal, situated on this exposed coast, carries a very high potential risk of an accident over the lifetime of the proposed Project.

2.2.2 Potential Project Effects

The construction phase for the proposed quarry is expected to take approximately 18 months. During that period considerable blasting, earth and rock movement, truck traffic and heavy machinery activity would take place. Many of the planned protective controls would only become available as the site approached completion.

Proposed construction and operation of sedimentation ponds on the site would alter water flows from the site to the Bay of Fundy. The ponds would store process water and surface runoff, and collect sediments. In high precipitation events when pond capacity could be exceeded, sediment-laden water could be transported to the marine environment. Contamination of runoff by dissolved components could occur from spills or through the release of chemical agents during normal quarry operations. Flocculants used in processing sediments would adhere to the discarded fines or stockpiled aggregates, or could be released into the sedimentation ponds, where they would break down in sunlight and air. Water-borne sediments and accompanying chemicals from sedimentation ponds can follow several possible routes upon entering the marine environment. Nitrogenous effluent would be caught up in the coastal residual circulation.

While the Proponent proposes to enclose the crushers and loading equipment, given the fine particle sizes anticipated, dust would likely require further mitigation. The project site frequently experiences wind speeds of 30-40 knots. The smallest particles (smaller than 0.05 mm), stored in large exposed piles awaiting future disposition, have the potential to be carried considerable distances in the windy conditions common on the site. High winds could pick up this material, keep it airborne and transport it off the quarry site with eventual deposition in the nearby marine coastal environment, where it could settle to the sea floor to interact with fauna and flora.

Rock-moving machines that cannot be enclosed would contain sound absorbing material in order to reduce as much sound as possible associated with earth moving, crushing and sieving. Despite the proposed precautions, a prominent fear on the part of fishers is that excessive noise might alter the behaviour of commercially important species such as herring, known to be sensitive to sudden sharp noises.

The Proponent proposed to limit outdoor lighting to levels necessary for basic safety requirements. Outdoor lighting would be primarily directed towards the ground and would be shielded to the maximum extent possible to reduce light illuminating the night sky. Reduced daylight hours in winter would require artificial lighting in several locations. When a bulk carrier was docked at the marine terminal, loading could continue through the night, requiring lights at active locations along the coast. Fishers indicated that the area has an important herring fishery, with a weir not far from Whites Cove. They expressed concerns that light from the quarry could frighten herring away from the coast, with food-chain repercussions for other species in the ecosystem.

Noise and vibrations resulting from blasting could yield impacts that range from annoyance and discomfort to incapacitation and death of marine animals. Proposed mitigation measures included putting observers on land or in workboats to watch

for marine mammals or birds within designated zones, and advising the blaster of the need for delays. Potential impacts on specific organisms that could result from blasting are dealt with below (Marine Organisms Under Threat).

Adequacy Analysis:
The EIS provided insufficient knowledge regarding the circulation of the waters in the Bay and the implications of that circulation for materials that leave the proposed quarry site, carried initially by either wind or water. The Panel obtained additional information during the hearings. Although the Proponent indicated that it had consulted local fishers for traditional knowledge relevant to this issue, fishers and their fishing organization representatives reported that consultation had not occurred. A Sierra Club submission, drawing on widely accepted models created by DFO scientists, showed that particle trajectory in the Bay of Fundy was highly variable and very sensitive to timing, depth and the point at which the particle entered the system. One alternative showed sediment being carried from the site, presumably along with associated residual chemicals, to the nearby whale feeding habitat, where uptake by plants and eventual accumulation into the local food chain, including whales, could be possible.

Concerns regarding possible runoff from the quarry site would be addressed through the legislative vehicle of the federal government's *Fisheries Act*. The Act prohibits the deposit of a substance deleterious to fish-bearing waters; this may influence the manner in which settling pond discharges would need to be managed.

Based on tidal current information, the Panel predicts that it is unlikely that dust or sediment produced on the site will accumulate on the sea floor adjacent to the proposed quarry and affect nearby flora, fauna or habitats. Tidal velocities are too high to permit a depositional environment to exist at that site. Any materials released from the site would be distributed through the Bay of Fundy system.

The EIS provided assurances that during full quarry operation, every possible measure would be taken to reduce project-related noise to extremely low levels through muffling, containment and suppression. The Panel notes, however, that few of these procedures are 100% efficient, or cover all possible sound sources or means of transmission. The Panel predicts that the Project would change noise patterns and levels in the waters near the site.

The EIS proposed that the Proponent would not blast if pinnipeds or marine birds were within 170 m, if marine mammals were within 500 m, or any endangered marine mammals were within 2500 m of the point of blast detonation. Due to conflicting information presented in the EIS and hearings about blasting protocols, many of the proposed operational parameters remain unclear. Perhaps most importantly for the marine environment, the exact details of the planned test blast, upon which a predictive model would be based, are uncertain. Proposed and alternative mitigative measures cannot be quantified in the absence of the requisite quantitative rigor identifying the magnitude of effects.

Ship Approaches
The EIS describes the process that ships would follow entering or leaving the Bay of Fundy en route to the marine terminal (Figure 2-10). A ship would travel within the designated shipping lanes at the reduced speed of 12 knots to mitigate potential collisions with marine mammals. It would then turn at an oblique angle at a predetermined point out of the shipping lane, and proceed directly to the terminal.

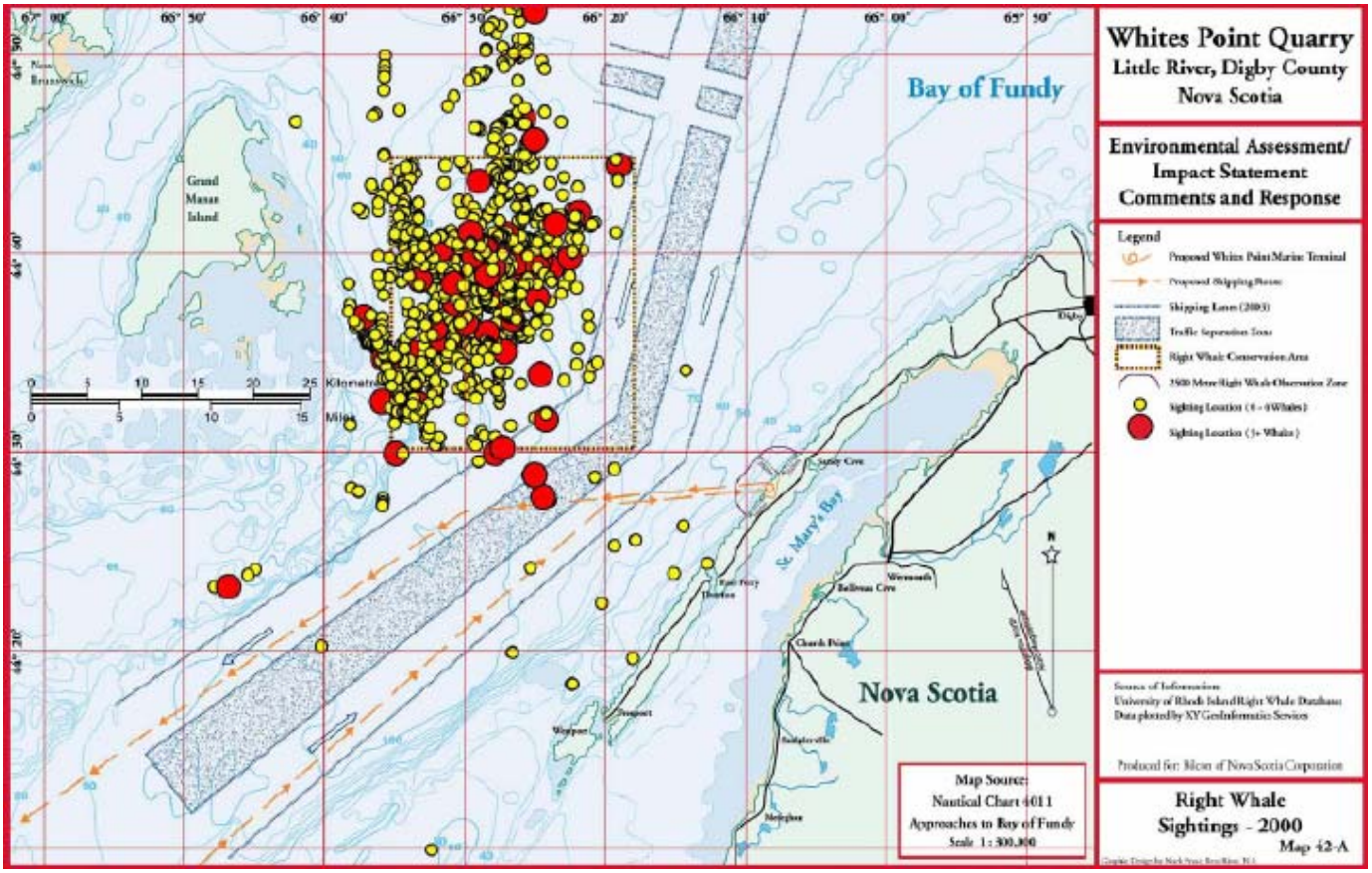


Fig. 2-10*The EIS illustrated the shipping lanes, the Northern right whale conservation zone, and the ship route to the terminal.*

During this process major environmental concerns include the possibility of collisions, difficulties (accidents) that might arise as a result of bad weather, and the fear of potential introduction of invasive species. The EIS suggested that normally the passage to the terminal would be carried out unaided—that is, without the assistance of a pilot or supporting tugs.

Adequacy Analysis:
An expert analysis presented in the hearings suggested that a ship striking a whale at a speed of 12 knots had a 50% probability of producing lethal injury for the whale; a ship travelling at 8 knots reduced the probability of mortality to 20%. The Proponent offered limited justification for the choice of its speed limit. Given the critically endangered status of the North Atlantic right whale, the Panel believes that further mitigation measures should have been considered. Although a decline in ship manoeuvrability with reduced speed could be a consideration, the Atlantic Pilotage Authority indicated that those concerns could be offset with the regular use of pilots and tugs. Also, during the hearings several interveners, among them the Atlantic Pilotage Authority and the Sierra Club, suggested alternative routes from the shipping lanes to the quarry location. The alternative routes may offer advantages in relation to vessel safety and the probability of a large whale strike by a vessel.

As noted by DFO, “the increased ship traffic due to the proposed activity, and the proposed route for these vessels, will result in an increase in the probability of vessel-whale interaction along the proposed route”. The North Atlantic right whale population is declining and the species is on the brink of extinction. Any losses due to shipping threaten the viability of the species. The Panel acknowledges that while the probability of a whale/project vessel interaction may be low in comparison with existing or future non-project vessel traffic, an unknown level of risk would be added by the Project. This should certainly be considered as a potentially adverse environmental effect.

Fig. 2-11*Large bulk carrier similar to the vessel proposed for the Project*

The EIS suggested that under typical conditions, the arrival and departure of the planned 230 m, 70,000 tonne bulk carriers on an unprotected lee shore could be carried out without a pilot or the aid of tugs. This major issue was repeatedly addressed in documents and interventions throughout the hearings. Many fishers with traditional knowledge of the marine environment feared that a large ship, riding high in the water without a cargo, would present a large surface area for wind to strike and thereby influence the ship’s passage.

The Atlantic Pilotage Authority pointed out that it bases any decision regarding the use of pilots on: degree of difficulty with docking; hazards of the approach; ship

size; wharf design; manoeuvrability; amount of vessel movement; and the degree of environmental concern. Although they suggested that a risk assessment should be carried out, they also expressed strong conviction that a decision to attempt passage and docking without the benefit of a pilot and one or two tugs might be unwise, especially when one factors strong unpredictable weather, ocean dynamics and ship masters unfamiliar with local conditions into the equation. An independent pilot, formerly a fisherman in the Digby Neck area and now working in Halifax Harbour, echoed the concern. The Panel accepts the arguments that coastal conditions would make docking a large ship on this unprotected shore potentially dangerous and would present a significant risk for accidents.

With high winds, when docking would not be possible, the ship would be forced to hold a position, steam a prescribed route or move back into the less confining Gulf of Maine to wait for improvement in the weather. The EIS did not detail procedures pertaining to these choices, particularly as they apply to the potential threat they could pose to whales, known to be reasonably abundant in the region where these activities could occur.

Some of the fishers working off Whites Cove follow several generations of ancestors in harvesting these particular waters. At least 30 to 35 boats (with 90 to 100 fishers) traditionally work the area between the site and the shipping lanes. Aggregate-carrying ships passing through and manoeuvring into the marine terminal berth could entangle or damage fishing gear and could displace or delay fishing activity by making it dangerous for smaller boats to work in the vicinity. Fear of losing gear could make the designated shipping access lanes and turning areas less attractive to fishers. The Pilotage Authority recommended that routine alerts or bulletins directed to the fishing community would lessen the risk of collision or gear disruption. Fishers who lose lobster traps could face delays in replacing gear and could lose income over an extended period. The Panel believes that the Project would disrupt fishing activities around the marine terminal and inconvenience fishers who by tradition work these waters.

Invasive Species

An issue of some considerable concern to local fishers is the possibility of inadvertent transport of unwanted species in the ballast water of large ships, between the coastal waters off New Jersey and the waters off Digby Neck and the Islands. Carver and Mallet[2] have studied the capacity of various ship-types to harbour different organisms, and have found that the largest number of species and highest cell densities were seen in bulk carriers and tankers from the east coast of the United States. Invasive species are foreign species that proliferate unchecked when introduced into new environments, often displacing or harming indigenous organisms.

Of special concern to the fishers of Digby Neck and Islands is a parasitic lobster disease that occurs in the waters off New Jersey and New York, where it has contributed to the decimation of local lobster populations. This organism has not yet been seen as far north as the state of Maine but the risk from it, as well as other potentially ecosystem-disrupting organisms, is much too great for stakeholders to be anything but careful and vigilant. Ships carrying ballast water from New Jersey to

[2] Carver, C.E. and A.L. Mallett. 2004. Investigating potential ballast management strategies for ships travelling from Chesapeake Bay to ports in Nova Scotia. Prepared for Department of Transport, Marine Safety Division.

the Bay of Fundy present a serious risk for transmission.

Adequacy Analysis:
The question of how to reduce invasive species in ballast water is undergoing intense scrutiny in the scientific world. For the moment, the mechanism of choice is for ships to exchange their ballast water between ports; this is widely acknowledged to be less than completely effective. The EIS suggested that responsibility for ballast water quality lies with Transport Canada, which draws its authority from the Canadian Ballast Water Control and Management Water Regulations. Ships' captains are expected to adhere to those regulations.

As a mitigation strategy, ballast water exchange is problematic on several counts. Transport Canada noted that regulations require only a 95% exchange of ballast water, and a resulting salinity in the ballast tank water of at least 30 parts per thousand, to occur by the time the ship docks. Anything short of 100% removal of organisms provides opportunity for species invasion. Consequently, ineffective ballast water exchange could potentially exert an adverse environmental impact on organisms in the Bay of Fundy marine environment. As the Panel heard, despite regularization of ballast water practices in the Great Lakes since 1999, there has been no demonstrable reduction in the introduction of new species.

Invasive organisms are not restricted only to ballast water; they can also be transported through hull fouling and residual sediment in ballast tanks, further complicating the issue.

In order to offset deficiencies with regulations, the EIS proposed a regular monitoring program over the first five years of the Project. This could result in the identification of newly introduced organisms but, given the vigorous physical environment off Whites Cove, the Panel believes that it is more than likely that once introduced, any invasive species would almost immediately be dispersed. In the highly mobile Bay of Fundy waters, monitoring would be a process of record-keeping rather than prevention against the risk.

The Panel believes that the Project carries a reasonable risk of introducing unwanted diseases or invasive organisms to the Bay of Fundy from ballast water. The ships' destination waters in New Jersey are known to carry organisms that may affect a commercially important species and the mainstay of the regional economy. Mitigation measures beyond those codified by Transport Canada are not technically or economically feasible to completely contain the risk at this time. Hence, this must be considered as a potential adverse environmental effect.

Marine Terminal
A cornerstone of coastal marine quarries is their ability to keep transportation costs low through the use of easily accessible, large-capacity, bulk-carrying ships. Shipping product by truck over even modest distances can have a major financial impact on the cost of aggregates. Consequently, the availability of high quality rock at the Whites Point site immediately adjacent to deep water means that the Marine Terminal is an integral part of the proposed Project.

The proposed marine terminal would consist of two parts: three berthing dolphins and two mooring buoys to support and restrain a 230 m, 70,000 tonne ship; and a mechanical ship loader that would be connected to the quarry via conveyor (Figure 2-12) and would extend out into the Bay of Fundy 200 m from the coastline, possibly representing a navigational hazard for small craft. Ship-loading would consist

of approximately 40,000 tonnes of aggregate weekly, 44 to 50 times per year for shipment to New Jersey (or New York). Ship traffic from the Project would increase large ship traffic in the Bay of Fundy by 6% per year.

Potential impacts resulting from the marine terminal can be divided into three categories: those tied directly to the physical presence of the facility in the coastal zone; those that are ship-related; and those that impinge on specific organisms. DFO expects that the marine terminal would transmit sound into the water through piles and bedrock, and would occupy 40 m^2 of the sea floor, thereby removing it from traditional fishing practice. Each pile is expected to be approximately one metre in diameter. Questions remain regarding the influence the piles could have on along-shore circulation and the free movement of marine organisms: some interveners drew comparisons with the Cape Breton Causeway and the PEI Confederation Bridge, both of which affected the marine environment following their completion. The mooring buoys would be secured to weights on the sea floor using chains and ropes that would undoubtedly be dragged over the bottom as a result of tides, tidal currents and storm conditions, essentially scouring it with each passage. Further complications, according to the Atlantic Pilotage Authority, include the planned use of both buoys (generally judged to be inappropriate in this climate because they routinely ice up in winter, making it difficult to shed mooring lines) and dolphins (considered to be problematic for personnel attempting to tie up a ship, especially in rough weather conditions).

An additional issue raised by fishers was the amount of turbulence that could be generated by the ship's propeller and bow thrusters; any supporting tugs would compound the risk of affecting sediment banks in the vicinity. The introduction of large amounts of turbulent energy into a shallow, biologically rich epibenthic environment is certain to exert a sizable impact on the flora, fauna and associated habitats within reach of that turbulence.

Finally, regarding the eventual decommissioning of the marine terminal, Transport Canada informed the Panel that a 30-year renewable license would be required for the construction and use of a terminal, with conditions regarding its eventual disposition. The Proponent provided contradictory indications of its plans for the potential future use of the marine terminal.

Adequacy Analysis:
Given the importance of the local fishery and its dependence on a sustainable high-quality environment, the Panel concluded that the absence of rigorous modelling and detailed risk assessment did not provide a high degree of confidence in the assurances presented in the EIS. Given the risk of accidents in this exposed location, the Proponent's limited knowledge of local oceanographic parameters and its minimal consideration of appropriate mitigation measures especially troubled the Panel.

Berthing and loading a ship could involve potential impacts on fishing activities in the area between the site and the shipping lanes: ships have the potential to interfere with gear and influence traditional fishing, harvesting or whale watching activities. The ship would pass through a range of marine mammal and waterfowl habitats (some of which involve species at risk). It could potentially generate environmental effects through ship strikes or noise levels. In adverse climatic conditions, the ship could be vulnerable during the docking process. Protocols for berthing the ships remain uncertain. Although the EIS suggested that

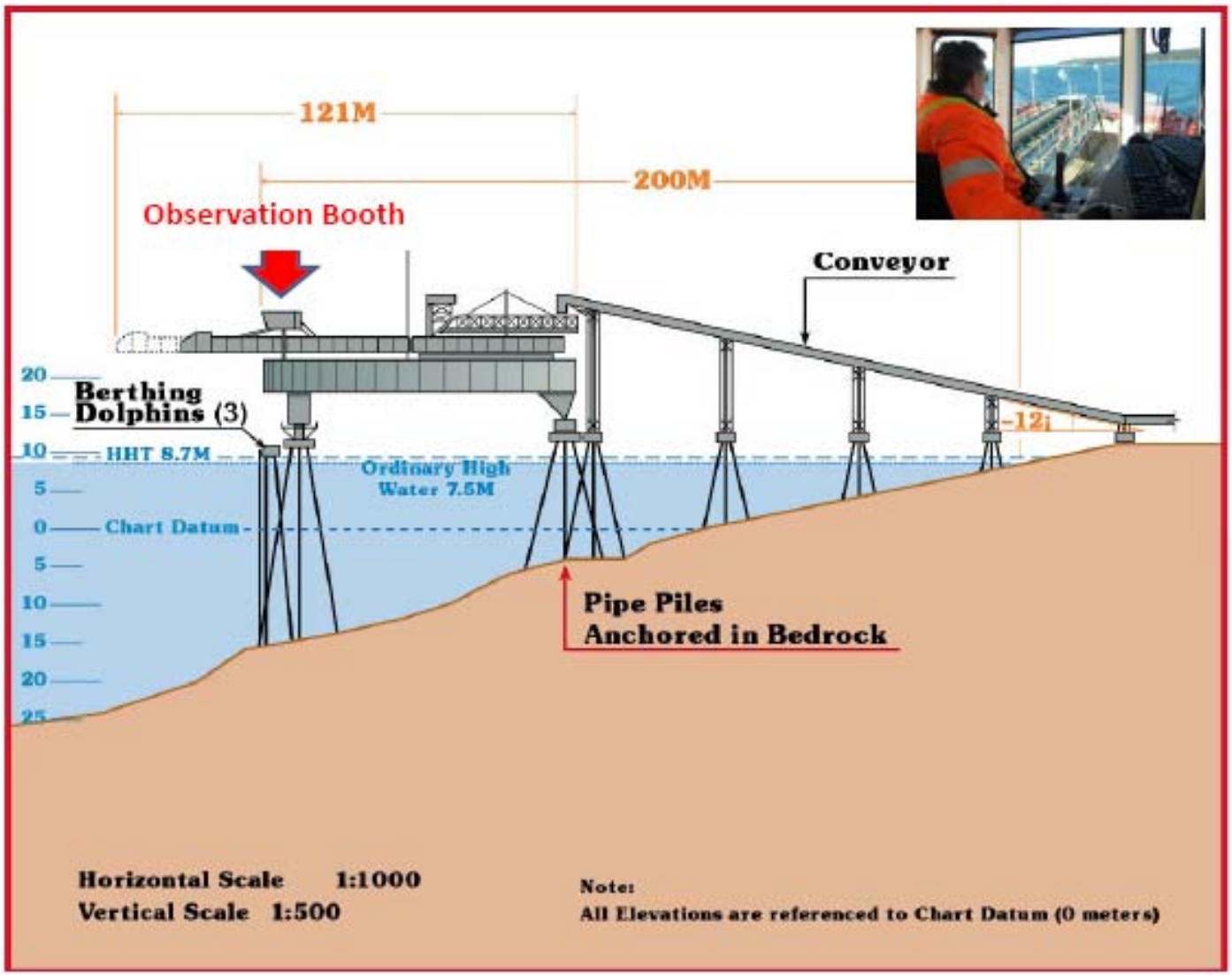


Fig. 2-12 *The EIS presented a drawing of the proposed ship terminal and loader.*

the ship would come in under its own power, pilotage experts and those familiar with ocean and wind conditions in the region argued that a ship would often need one or more tugs to safely berth at the site. The nearest tugs are docked at Saint John, NB, some 4 to 5 hours away. Having tugs available on an on-going basis would significantly increase the costs of the undertaking. The Panel believes that even with the mitigative measures that have been proposed, the potential for accidents over the lifetime of the Project creates a risk for potentially adverse environmental effects.

Marine Organisms Under Threat

The presence of an industrial site in close proximity to a natural marine ecosystem would almost certainly exert a measurable influence on some organisms close to that site. The issues at hand include the extent of that influence, the expected sensitivity experienced by various organisms and whether the measured effects are mitigable. For the purpose of this discussion, two categories of marine organisms are considered relevant to the proposed quarry and terminal. According to SARA and COSEWIC they are: Species of Concern (fin whales, harbour porpoises, harlequin ducks and the common loon) and Endangered Species (Northern right whales, blue whales, leatherback turtles and the iBoF salmon). These are grouped below according to their environmental similarities. In addition, lobsters have been evaluated because of their considerable commercial importance.

Harlequin Duck and Common Loon

Harlequin ducks and common loons winter in the coastal waters off Digby Neck and Islands. Two important wintering sites are located 12 km north and south of the quarry site. Although harlequin ducks were not seen near the proposed quarry site, one sighting at nearby Whale Cove was reported during the hearings. In general, concerns were raised about possible negative impacts on individual birds traversing the Whites Cove site while moving among traditional wintering areas.

During winter fieldwork conducted by the Proponent, common loons were observed adjacent to the project site. A February 2005 survey found the highest density of common loons along the Digby Neck shoreline in the coastal waters of the proposed quarry. The EIS suggests that these wintering loons did not belong to the threatened mainland population. The EIS proposed extending a guideline, normally used to protect seals from blasting effects, to the protection of waterbirds. Should observers see waterbirds within 170 metres of the blast site, the blast coordinator would be notified and detonation would not take place until the birds had moved out of the 170 m radius. Environment Canada suggested that a boat could be used to “nudge” waterfowl out of the 170 m zone, but that scare tactics would not be permissible.

Adequacy Analysis:

Although perhaps infrequent, the transit of harlequin ducks through the property cannot be precluded. Experts at the hearings disputed the EIS conclusions that the wintering common loons were not part of a Nova Scotia breeding population. The Panel questions the feasibility of the proposed mitigation to protect waterbirds from blasting effects. As with identical measures proposed for marine mammals, effective observation of the presence of waterbirds would depend on the sea state, visibility and observer awareness. The effectiveness of the proposed 170 m zone would need to be demonstrated by a monitoring program that allows quick detection and mitigation of adverse effects.

The Panel believes that quarry activities could displace common loons from a small portion of their wintering quarters, and possibly interfere with the transit of harlequin ducks.

The *Migratory Birds Convention Act* prohibits the deposit of harmful substances into the waters used by migratory birds, and prohibits the disturbance or destruction of nests or eggs of those animals. This prohibition would influence the timing of activities proposed for the quarry site.

iBoF Salmon
Inner Bay of Fundy salmon are thought to be represented by fewer than 250 individuals. Under the SARA Allowable Harm Assessment, no anthropogenic mortality is allowable. Organisms of any species in a precarious position such as this one should be permitted to follow normal behavioural instincts as much as possible. At the hearing, DFO scientists raised concerns principally about the possibility that noise generated at the proposed Project site could disrupt normal migratory behaviour and thereby raise an additional impediment for an already fragile population.

Adequacy Analysis:
Concern about salmon focused on its migration into and out of the Bay of Fundy—outward along the New Brunswick coast and inward along the Islands and Digby Neck. Disruption of that return path for any reason might force a detour away from the coast, thereby producing a negative influence on factors related to the success of the species. Any migratory disruption could reduce salmon success in locating specific rivers they might be seeking in order to reproduce. The Panel recognizes that limited data about salmon responses, along with the inability to adequately predict blasting impacts, results in a high degree of uncertainty about possible behavioural effects on this endangered population.

Whales, Porpoises and Leatherback Turtles
Composite all-species whale distribution maps presented during the hearings showed marked aggregations of these mammals along the length of Digby Neck and Islands. The site is near concentrations of humpbacks that attract whale watchers. The harbour porpoise is a fast and mobile animal that ranges widely and unpredictably without a discernable aggregation site: observations from the site reported them as common in the vicinity. Leatherback turtles are infrequent visitors, with only a handful of sightings in the region.

Whales, in general, are frequently involved in group socialization. That plus their relatively slow movements make all species an ongoing concern relative to ship movements and blasting. The right whale's propensity to rest indifferently on the surface (logging) makes it significantly more vulnerable to ship strikes than the others.

Fig. 2-13*A Northern right whale surfaces for air.*

Ship movements are acknowledged to be an important threat to whales. The EIS outlines a plan to use observers stationed either at the highest point on the marine terminal or in small boats. The observers would scan in an effort to identify mammals or turtles: if they spotted right whales, blue whales or turtles within 2500 m or other

species within 500 m of the ship's path (or the radius of a blast detonation point), mitigation measures would be implemented. Information thus obtained would be relayed to the captains of vessels in transit so that they could take remedial action to avoid strikes.

Adequacy Analysis:
Government reviewers and many other interveners in the hearings questioned the proposed use of observers as a mitigation measure to determine the presence of endangered animals. According to DFO, success in this process depends on four factors: weather, the observer's angle of incidence, observer fatigue and the species under observation. DFO observers noted that they do not attempt to count whales above a sea state of 4 on the Beaufort Scale: that is a moderate breeze of 11-15 knots (20-29 kph) with average wave height of approximately one metre. When DFO representatives were asked about possible success in sighting these animals in 30-knot winds, the response was "close to zero".

The Panel predicts that the ability of observers to see endangered animals over the prescribed distances in anything other than perfect conditions is doubtful; identifying species at those distances is close to impossible for all but highly trained individuals. Questions directed to DFO personnel and professional fishermen regarding the proposed observer function resulted in agreement that there was little confidence this mitigation process would achieve anything even remotely close to what the EIS promised.

Porpoises, like whales, are sonar-ranging mammals sensitive to intrusive anthropogenic sound pulses introduced into their habitat. However, they are exceptionally mobile with wide-ranging habits and are less likely to be impacted by ship movements or sound pulses. The Panel believes that the dual activities of quarrying and shipping could displace porpoises from favoured feeding areas off Whites Cove, but given their high mobility and penchant to seek out ships and human activity, it is unlikely that the proposed Project impact would be considered as adverse.

The effects of blasting on marine mammals are poorly understood. The potential impact is difficult to characterize with a reasonable degree of certainty without the benefit of a test blast and greater clarity as to the exact nature of planned operational blasting. Very little is known about the deleterious effects of exposure to noise in marine mammals. Several outcomes are possible: animals sighted within either the 500 m or 2500 m safety zone (depending on the species) could bring about a delay of blasting until the animals moved outside that zone; animals unobserved on the margin of the zone might be encouraged by a blast to move to less noisy surroundings where they would be less available to the local whale watching industry, or they could be mildly annoyed, experience behavioural effects such as alterations in feeding, socializing, logging (resting at the surface) and avoidance behaviour; undetected animals in closer to the blasting could become confused, disoriented and undergo serious alteration in their normal behaviour; some could receive a sharp overpressure that could affect their internal organs and result in slow or immediate death. The Panel believes that direct physical harm and behavioural effects that could undermine survival rates of critically endangered species must be avoided. Hence, the requirement for mitigative measures well beyond those proposed by the Proponent would qualify this as an adverse environmental effect.

Evidence showing a wide range of responses by whales to underwater noise can be found in two scientific papers (both in the public record) that address the effects of blasting on humpback whales in Trinity Bay, Newfoundland. The authors[3] observed that "the whales showed little behavioural reaction to the underwater detonations in terms of decreased residency, overall movements or general behaviour. However, it appeared that increased entrapment rates in fixed fishing gear may have been influenced by the long-term effects of exposure to deleterious levels of sound". The authors suggest that this could be "an acoustic problem where the whales fail to detect the net acoustically in time to avoid it because of cryptic, masked or weak acoustic cues produced by the net." They also reported that "the dissection of the peripheral auditory systems of two whales found dead in nets in Chance Cove conducted, as part of the monitoring of explosions on humpbacks in Trinity Bay, demonstrated that both whales had damaged ear structures, likely as a result of shock waves."

Additional observations[4] from the study revealed "that humpback whales responded to industrial activity in Trinity Bay (dredging, ship activity and blasting) with short-term and long-term responses." The authors concluded that "humpback whales appeared tolerant of transient blasting and frequent vessel traffic, but were more affected by continuous activity from dredging, coupled with vessel traffic. A significant decreased return rate to feeding grounds indicated a possible long-term effect of exposure to blasting". This evidence leads the Panel to conclude that further research is required to clarify the potential physical and behavioural effects that blasting may have on endangered marine mammal species that may be in the vicinity of blasting in the coastal zone.

Marine Species Integral to the Local Economy

Lobster is the principal commercial marine resource in the region. Considerable concern was expressed about the impact aspects of the proposed Project could have on organisms and the fishery. Those concerns extend to herring and, to a lesser extent, the smaller and nascent resources of periwinkles and sea urchins. All of these species reside or routinely transit the waters adjacent to the proposed quarry. Possible impacts include: air-borne fines deposition; pond-released sediment and residual chemicals; eutrophication; diminished prey; reduction of bottom habitat; sediment re-suspension and increased levels of turbulence; and the effects of blasting.

Adequacy Analysis:

Fishers raised the issue of whether a small portion of the coastal zone could become sufficiently altered such that it would be less habitable for some species, thereby influencing long-shore migrations and affecting the interconnectivity of these populations. Without the benefit of good baseline information on the species involved, extensive monitoring and extensive ecosystem analysis, it becomes difficult to establish quantitative predictions.

The Panel believes that the potential effects of blasting, especially on the behaviour and well-being of lobster, are of special concern. Representatives of fishing interests and government scientists confirmed that relatively little is known

[3] Todd, S. et al. 1996. Behavioural effects of exposure to underwater explosions in humpback whales (*Megaptera navaeangliae*). *Canadian Journal of Zoology* 74: 1661-1672.

[4] Borggaard, D. et al. 1999. Assessing the effects of industrial activity on large cetaceans in Trinity Bay, Newfoundland (1992-1995). *Aquatic Mammals* 25(3): 149-161.

about the impact of blasting on these crustaceans. DFO identifies 185 decibels of overpressure as the uppermost level of tolerance but that recommendation was not based on research on lobsters. DFO's research on seismic noise effects on snow crab showed no deleterious physiological or behavioural impacts; however, fertilized eggs exposed to certain sound levels were affected, and adult snow crabs that had received some sound levels were more easily caught. Scientists concluded that seismic energy above certain levels could temporarily affect lobster activity patterns, thereby resulting in less lobster movement and lower catches. Snow crabs are not lobster but the species are closely related and effects observed in one certainly raise important questions about the other. More details on the planned operational blasting would be required to facilitate the development of accurate models to permit quantitative predictions.

In light of the evidence before it, the Panel believes that blasting is likely to have an adverse environmental effect on lobster on a local scale. It also believes that dust emissions from project phases that occur near the coast may have an adverse environmental effect on periwinkles and dulse on a local scale.

2.3 HUMAN ENVIRONMENT EFFECTS ASSESSMENT

Digby Neck and Islands contains rural communities that depend on environmental resources for survival. Tight-knit networks help people cope with an economy of limited opportunities. Within the context of their historical development, the people of Digby Neck and Islands have developed core values that reflect their sense of place, their desire for self-reliance, and the need to respect and sustain their surrounding environment. In cooperation with political leaders and development associations, they have created and adopted policies, such as *Vision 2000*, that reflect their values, aspirations and visions for the future.

2.3.1 COMMUNITY PROFILE

Like much of rural Canada, the region of Digby Neck and Islands is losing population to urban centres and the West. Digby Neck and Islands had a population of 1,325 in the 2001 census, down 525 from 1981. The EIS indicates that the region is primarily white and English-speaking; 79% were from families that have lived in the Digby region for three generations or more. The population is older than the Nova Scotia average, with relatively few children and young people. Data provided to the Panel indicated three clusters of residents: households with members of working age, households with one or two retired people, and households of summer residents. Most people live in small coastal villages strongly connected to the sea by occupation or recreation.

Incomes for Digby Neck and Islands males are relatively high, but are quite low for females. This probably reflects limited job opportunities for women, although it could also reflect lifestyle choices. The EIS points out a large gap between those with high incomes versus those with low. Unemployment and under-employment rates in this area are higher than average for Nova Scotia. A study of school leavers presented to the Panel showed that even when young people move away from the Neck for work or education, many relocate within 50 km.

In recent years, local authorities have adopted policies to attract retirees to immigrate to the region. As one political representative put it, they are "marketing lifestyle" with a strong emphasis on the region's natural beauty and tranquility.

Some of those who have retired to Digby Neck and Islands have family or personal connections in the area, while others with few prior connections come from distant parts to make their homes there. The region also attracts a large number of summer residents, some of whom appeared before the Panel, who have visited for decades because of family ties or lifestyle choices.

Many submissions to the Panel presented the region as containing a dynamic and engaged population, albeit one struggling with how to develop viable employment strategies. Generating jobs is an important component in creating a workable development strategy.

Adequacy Analysis:
Using population data the EIS concluded that "the area appears to be a community in decline". This is certainly true when considering only population numbers, but less so when all available information is reviewed.

The proposed Project would create jobs that appeal to younger workers. The Proponent indicated that sufficient labour supply is available locally, and that locals would be given first opportunity; however, the Panel believes it unlikely that the Project would have a major effect on the demographics of the area, due to the small number of jobs involved.

Aboriginal Resource Use
Aboriginal communities have hunted and fished along Digby Neck for thousands of years. A slate ulu found some years ago on an offshore ridge 2 km from the site revealed ancient occupation of the general region. The Confederacy of Mainland Mi'kmaq (CMM) 2005 report on "Mi'kmaq Use of Oositookum (Digby Neck)" stated that the Mi'kmaq people continue to use the Neck and surrounding waters for traditional purposes. The report identified land and resource-use sites on or near the Whites Cove property, including the "historic Indian Hill Camp" in the north east where the Mi'kmaq hunted moose and porpoise. Burial remains could be present on the site.

Adequacy Analysis:
The EIS notes that the Bay of Fundy contains an Aboriginal food fishery, some of which may take place off the proposed Project site. The Proponent's partial archaeological survey, however, found no specific evidence of Aboriginal occupation and did not mention the "Indian Hill Camp" identified in the CMM report.

Aboriginal spokespersons indicated that Digby Neck was, in addition to a hunting site, a place where berries and other materials were harvested for traditional purposes. The Aboriginal community possesses a considerable store of traditional community knowledge about the area. The Proponent's efforts to consult with Aboriginal communities were not successful, leaving traditional knowledge out of the EIS.

The Panel heard that Bear River First Nation believes that consultation between governments and the 13 Chiefs of Nova Scotia is required, that there is an established process, and that the federal government has initiated this process for the Project but the provincial government has not. The Bear River First Nation requested that the Government of Canada and the Government of Nova Scotia engage in consultation prior to any decisions being made. The Panel also heard the Aboriginal peoples must have a vital role in sustainable development decisions.

The Panel believes that government should work with Aboriginal communities to assist them in dealing with interested parties to

document potential environmental effects of future projects.

Community History and Heritage Resources

Digby Neck and Islands has been sparsely settled throughout its history. Fishing has always been the mainstay of the economy, supplemented by farming and forestry. Small fishing villages occupy protected coves; few appear on the exposed or lee shore of the Bay of Fundy coast.

During the 19th century, Whites Cove contained a small settlement of several families who engaged in fishing. Residents from nearby communities used the property for recreational purposes over many decades in the 20th century. Fishing boats occasionally hauled up on the shore, and several fishing shacks occupied the site into the 1950s. Periwinkle collectors ("winklers") worked along the shore and community residents traditionally picked raspberries on the site. For many years, rocks at Whites Cove were white-washed to honour ancestors associated with the site.

The Proponent's archaeological assessment of the Whites Cove property was conducted in 2002 following a public complaint to the Nova Scotia Museum: clearing activities were underway in preparation for the proposed 3.9 ha quarry. Community residents suggested that by the time the archaeological study was undertaken several building foundations had already been destroyed, much of the site had been clear-cut and levelled, and a sedimentation pond had been constructed.

Early in the 1990s, a proposal for a quarry at Eastern Head on St. Mary's Bay resulted in a prolonged fight by community residents, eventually resulting in rejection of that project. Some of the key players from that earlier dispute also became involved in the Whites Point Quarry assessment process. Some interveners remarked that the proposed Project seemed to continue the earlier fight; they expressed their weariness at living under a "black cloud", dealing with externally driven initiatives that were indifferent to the core values of the local communities as enunciated repeatedly in various development documents over the past decade.

As mitigation, the Proponent proposed to contact the Nova Scotia Museum if activities uncovered artefacts or burials on the site. The Museum responded that further investigation and possible conservation of archaeological features around the site may be necessary to characterize the remains. They suggested a 250 m zone around the "Hersey House" remains would warrant special attention and employees would need training.

Adequacy Analysis:

The EIS provided a detailed history of landownership on the site. It did not find significant historical or archaeological features on the site. Individuals preparing the documents could almost certainly have benefited from the application of detailed traditional community knowledge to help establish the background of the site, and to identify the probable location of archaeological remains. Community historians presented evidence to the Panel suggesting that the Proponent's historical and archaeological studies were incomplete in their documentation of the numbers, locations and tenures of families known to have lived and died at the Cove.

The Panel notes that the archaeological investigation, conducted by an archaeologist whose primary experience was in Plains archaeology, occurred only after the site had been extensively disturbed by quarry activities that may have obliterated evidence of prior site

occupation. A more comprehensive study may have come to different conclusions.

Following the Proponent's 2003 presentation of the archaeological study, a community debate erupted over the possibility of family burials on the site. The issue received significant media coverage, and the Proponent filed a defamation suit against the local newspaper and a community member. The Proponent felt that it had no choice but to defend itself legally since it was being accused of an illegal act. One intervener told the Panel, "So for my own protection, I just did not feel comfortable being alone in a room with three other people that were prone to thinking about lawsuits." Reluctance of community members to participate in the assessment process may have restricted the Proponent's access to traditional community knowledge. The Panel concludes that this suit cast a pall over community participation regarding the history of the site.

Project activities would remove most archaeological remains on the site but the Proponent would be required to work with the Nova Scotia Museum to document them first. While the small settlement at Whites Cove does not hold historic significance on a regional scale, for community members with family history on the site its loss represents a personal tragedy.

Community Character

Through a series of community-based initiatives in the 1990s and early 2000s, local authorities and development agencies made community character and sustainability the focus of a future regional vision. Digby Neck and Islands received international recognition from agencies like UNESCO and UN Habitat for its approach to encouraging a sustainable economy based on fisheries and tourism. The pristine quality of the local environment, facilitating both whale and bird watching, is central to that vision and approach.

Throughout the review process (scoping meetings, written submissions and hearings), emotions ran high as people described what they understood their community to be and what they feared they would lose if the Project proceeded. Community residents and political leaders spoke about Digby Neck and Islands as a special place of environmental quality and spiritual inspiration. The region's unique geography, as a narrow peninsula of a basalt mountain between two highly productive bays, has no parallel in the province. Residents view their communities and landscapes as sanctuaries away from the troubles of the world and the problems of city life. They see themselves as interdependent, self-reliant and connected to the sea.

Comments to the Panel

"*Removing the rock we stand on and shipping it away is a violation of our landscape and heritage."*

"Our society is so full of violence, it is important for there to be non-industrialized places that people can visit to renew their spirits."

"[T]he reason that you live in … a small rural community where everybody knows everybody and people are inter-connected is because you live it, it is your breath, it is your life, it is your heritage and it is the heritage of your forefathers."

"You want to take our little strip of land, a unique piece of land between two beautiful bays, one and one-half miles wide, and blow it up. What have we, the people in this village, done wrong to get this brought on us twice?"

The proposed Project site is located in a rural landscape of forests, fields and rock outcrops interspersed with fishing villages. Although the Municipality of the District of Digby does not have a land-use planning strategy, a range of economic development

strategies, resolutions and policies (described earlier) reflect the local intention to focus regional economics on sustainable development through fisheries and eco-tourism. Elected representatives of all three levels of government appeared before the Panel to confirm their agreement with the strategies' intent to keep the rural landscape free of industrial activities (including large quarries). The quality of the coastal environment is vital to local land-use visions of a sustainable future.

Adequacy Analysis:
The EIS acknowledged the rural character of the area. As many interveners pointed out, the EIS failed to identify the range of community organizations and local government agents that have committed themselves to sustainable development strategies that build on community character and resource usage as a means of creating viable futures. Digby Neck and Islands possesses many organizations that reflect a grass-roots commitment to community. Digby Neck Consolidated School plays an important role in the area, despite declining student enrolments. Opposition to the quarry provided a focus for community action, resulting in the formation of the Partnership for the Sustainable Development of Digby Neck and Islands Society (the Partnership), with a membership of several hundred. Because opposition to the proposed quarry mobilized many organizations it contributed to building social capital.

The Panel noted with concern the significant split that occurred in the community between supporters and opponents of this initiative, with each side accusing the other of intimidation tactics. Those advocating the Project focused on the need for jobs and suggested that only year-round residents should influence the outcome. Those opposing the Project reflected a cross-section of the community, including fishing families who have lived continuously on the Neck for many generations, descendants of Neck families, retirees who have recently arrived in the area, and summer residents. Both sides presented petitions to political leaders or to the Panel to make their case.

Rather than attempting to mitigate the rift in social cohesion through the use of an effective public participation program, the Proponent may have exacerbated this "them and us" situation through comments presented in a newsletter circulated to local homes.

The Panel concluded that the Project, if approved, would almost certainly change, in a significant manner, local perceptions of community character and identity, while also producing severe and lasting repercussions that might directly affect social networks and community cohesion, and that would be impossible to mitigate. The proposal is not consistent with core values and community visions of the future as expressed in documents, by community leaders and by the majority of community members appearing before the Panel.

Community Attitudes
The Proponent used various means to engage the community in discussions about the proposed Project. Open houses, newsletters and meetings provided venues for people to meet, discuss and share their views. The Panel noted considerable scepticism among some community members and organizations regarding the consultation process. Some community members indicated that they refused to meet with the Proponent's agents.

Under the requirements of the 3.9 ha quarry permit issued by NSEL in 2002, the Proponent created a Community Liaison Committee (CLC) to facilitate

communication with the community. In one of the first CLC meetings, the Proponent expressed its desire to expand the scale of the quarry. The Panel was told that by the time the CLC ceased meeting, only people in favour of the quarry remained as members of the CLC. Some community residents informed the Panel that the CLC worked well and provided answers to their project-related questions, while others reported their view that the CLC was the Proponent's vehicle to help promote the quarry. It is clear to the Panel that as a vehicle to encourage open exchanges on the issues in an unthreatening environment, the CLC had mixed success.

The Proponent commissioned an attitude survey, a quality of life survey and studies of traditional knowledge as part of the EIS. The surveys reported the views of those contacted and revealed strong differences about the proposed project. One major concern identified was the potential impact on the lobster fishery. The principal benefit noted was the creation of 34 full-time long-term jobs. Of those interviewed, respondents on Digby Neck and Islands proved least receptive to the Project. Petitions by community residents revealed support for each side of the issue, usually aligning in favour of jobs or against anticipated irrevocable social and environmental changes.

Five elected officials, representing three levels of government, appeared before the Panel; they unanimously opposed the Project. They argued that approval would be inconsistent with community values and local initiatives. Although some members of the Digby Neck and Islands population support the Project, many residents, along with their elected officials, appear to oppose the development of a large quarry in this location. The Bear River First Nation is opposed to the Project.

Adequacy Analysis:
Although the Proponent may have intended to create a consultative process, the Panel found little evidence that the EIS adequately addressed community concerns. The Proponent provided considerable amounts of information, but community members described a dismissive, if not openly hostile, response to their concerns from the Proponent. The Proponent's defamation suit against a community member further undermined the willingness of local residents to enter into meaningful discussions with the Proponent, and hardened local attitudes against the Project.

Problems with the EIS
The Panel found that the EIS and other submissions from the Proponent presented a confusing picture of some of the commissioned surveys. Numbers of respondents for the attitudinal survey were inconsistent from document to document. For instance, the survey was variously described as having 457, 458 or 461 respondents. In response to a request for clarification of numbers and refusal rates, the Panel received a response in the form of "Undertaking 48" from the Proponent, which says, "The total numbers attempted for this project were 5,447." Assessments of sampling error vary across documents.

Tables summarizing the data are equally confusing and incomplete. High refusal rates on the attitude survey and markedly different sample sizes in 2005 and 2006 cast doubt on the significance of the offered results. With a high margin of error due to small sample sizes, the data is of limited use as a means of establishing changing attitudes over a one-year period.

The traditional knowledge surveys missed an important repository of information because of the reluctance of many residents of Digby Neck and Islands to participate directly with the Proponent and its agents. Consequently, a large number of the people interviewed by the Proponent did not live on Digby Neck and Islands and often had little personal knowledge of the quarry site. A community member who

surveyed Little River households reported to the Panel that only one person from the village—the nearest settlement to the project site—participated in the survey.

Some community members perceived the consultant who conducted the survey to be a spokesperson for the Proponent. Interview notes included in the EIS raise questions about whether the interviews were designed to inform the project design or persuade respondents to support the Project; for instance, on page 70 of Reference Volume IV Tab 21, the consultant wrote, “Using some of the diagrams and the minutes of the CLC, the interviewer was able to change some of the perceptions of the development.” The perception of fairness and objectivity is important to both the credibility of conclusions presented and the creation of conditions that support open and full public participation.

As one presenter reminded the Panel, “Public involvement in this process is a right, not a privilege.” The Proponent’s responsibility under the *Canadian Environmental Assessment Act* and as reinforced in the EIS Guidelines was to consult the community in a meaningful way. Although the Proponent held many meetings and interviewed or surveyed many community members, the EIS dismissed some concerns raised (such as the problems with the archaeological studies).

The Proponent proposed to reconstitute the CLC as a mitigative mechanism for continuing community involvement and consultation. The Panel believes that the CLC as proposed cannot work effectively as a mitigation measure. The EIS affords the CLC with little in the way of independence or functionality, so its role and responsibilities in monitoring and mitigation of potential project effects is unclear. Current Nova Scotia government guidelines may be unable to ensure that CLCs have independent memberships, mandates and means to play an effective role in monitoring and mitigating development effects.

2.3.2 Community Health and Wellness

Residents of Digby Neck and Islands enjoy a high quality of rural life. The basis of the region’s ability to attract retirees and summer residents is its peace, natural beauty and environmental quality. Residents repeatedly expressed concerns that the proposed Project could undermine these qualities. They indicated their lack of confidence in government regulators, who possess limited resources, to enforce proper standards or to safeguard the quality of life that residents currently enjoy in the region. Air quality, well water quantity and quality, noise, light and traffic were special concerns for residents. The Warden of the District of Digby told the Panel that “this project can negatively impact the quality of life of the residents of Digby Neck and Islands”.

The EIS provides relatively little socio-cultural information, such as patterns of family and community life, despite the fact that the EIS Guidelines specifically requested a profile. The Proponent offered no information on social relations between residents (seasonal and year-round) and between generations. The Panel supplemented the EIS information with evidence from other submissions in order to conduct its assessment.

Health records provided in the EIS showed, as one might expect, that diseases associated with an aging population are more prevalent in the Digby region than in the province as a whole. The 150 individuals who were asked about their

quality of life were very positive, but small sample sizes make generalizations problematic. The Proponent did not accept the premise that the Project might affect quality of life, socio-cultural patterns, or community health and wellness, and hence proposed no mitigation. The EIS predicts that improvements to employment options would result in benefits to the region.

Air Quality

The EIS argued that the Project can meet air quality standards. Based on information provided in the EIS, Health Canada concluded that standards could be met. Interveners at the hearings suggested that dust and emissions from engines or ships could alter air quality in and around the site and nearby properties, thereby lowering what traditional knowledge suggested is excellent air quality (except for occasional hazes blowing north from New England).

Adequacy Analysis:

Although the EIS Guidelines requested background information on current air quality in the region, the EIS provided relatively little. The EIS did not clarify the size of aggregate fines to be stored in open piles. Based on its evaluation of the EIS, Health Canada reported that if effects predictions are correct and the mitigation measures proposed are effective, human health should not be adversely affected. However, during the hearings the Proponent provided detailed evidence that some of the stockpiled material would be very fine and that all the stockpiles would contain a residual fraction of extremely small material. Appropriate modeling of the dispersion patterns of these very fine particles in local wind conditions would be necessary to quantify the distance and directions these particles could travel. If particles reached nearby communities they would have the potential to create health effects on humans. No detailed studies were provided to the Panel or to the regulatory agencies evaluating the EIS.

While the Proponent committed to enclosing equipment and attempting to manage dust, the Panel believes that several components of the quarry activities would generate extremely fine particles that are likely to become windborne and that present a serious risk of creating adverse environmental effects on human receptors. Mitigation of this effect by wetting storage piles would help but cannot eliminate the problem, especially during ship loading. Appropriate and technically feasible mitigation measures to eliminate the risk of windborne particles would increase the cost of the Project.

Noise, Vibration, Light and Traffic

The Project would change noise, light and traffic levels in the area. Digby Neck is a quiet, light-free rural area. During construction and operation, noise and light would carry some distance from the site. The nearest residences are less than 1 km from the proposed site, but North Mountain would act as a noise buffer and deflect sound waves upward and away from nearby houses. The Proponent proposed normal operations from 0600 – 2200 hours six days a week, although some ship loading could occur overnight or on Sunday. Workers would, of necessity, commute before and after those hours. (Health Canada noted that between 2200 and 0700 hours is normally considered “night” for regulatory requirements.) Noise levels would change from the current “quiet rural” level that Health Canada suggests currently applies, to a continuous noise environment for some receptors. Periodic blasting would create episodic noises and vibrations that would likely be heard and felt some distance away.

Truck traffic during the construction period would impact those living on Highway 217,

a designated scenic drive. Over 800 heavy truck loads would be required during the 18-month period. During operations, trucks would deliver fuel and explosives bi-weekly to the site and would remove wastes. Residents along the road expressed concerns about traffic safety and noise. The transportation of explosives over local roads creates special concerns, and some anxieties, for residents.

Adequacy Analysis:
The EIS used generic information levels from similar projects to determine whether the proposed Project could meet regulatory requirements for noise at the edge of the site and at the nearest potential receptors. Regulators indicated that the data was adequate to assess potential effects and meet regulatory requirements.

The Proponent noted that although there are no regulations regarding light, it proposes to minimize night glow. Vegetation buffers around the site, and the height of the mountain, would help reduce both noise and light. The Proponent informed the Panel that it purchased additional properties around the site, in part to mitigate concerns about noise and dust. Such measures undoubtedly increase distance to receptors but also fuel latent anxieties among those who fear that such purchases are a prelude to quarry expansion.

Given the change likely in the rural community if the Project proceeds, the Panel believes that the Project would affect the ability of residents within one kilometre of the Project to enjoy their property in the way they do now. Noise, dust, light and traffic would disrupt the life residents have come to know and love in Digby Neck and Islands. This change could constitute an adverse environmental effect.

Water Wells
Residents on Digby Neck depend on groundwater derived from a mixture of drilled and dug wells. Most wells have good quality and quantity, but some of the dug wells surveyed showed quality problems from surface contamination.

Adequacy Analysis:
The EIS provided baseline data on water quality for wells nearest to the site. However, as noted earlier, it failed to adequately document the full range of potential groundwater impacts, especially those related to water quantity. The Proponent accepted the possibility that the Project may affect water supplies on Digby Neck and proposed to maintain a supply of water to residents within a defined distance of the quarry face. The nature of the compensation program, described in the hearings, differed from that presented in the EIS documents. The Proponent proposed no other mitigation measures to avoid water problems.

The Panel believes that in cases where mining has the potential to affect groundwater, regulators should insist that Proponents present technically and economically feasible mitigation measures along with a comprehensive strategy to compensate for losses to water quality or supply in areas that could be affected. Clear determination of affected areas needs to follow appropriate testing and modelling of the groundwater system. The risk of loss of groundwater is an adverse environmental effect that would continue long after the Project concluded.

Economy
Digby Neck and Islands has received national and international recognition for its sustainable economic development strategy. The fishery is the mainstay of the regional economy. Tourism (especially associated with eco-tourism) has generally

been growing, even though the last few years experienced some weakness. Manufacturing has struggled following several recent closures. Mining is currently a small part of the regional economy, mostly associated with local demand for construction aggregate.

Many participants told the Panel that the Digby Neck area needs good-paying jobs. Jobs in the quarry offer that prospect to local youths, helping them to stay in the area instead of migrating elsewhere for work.

In the context of the regional economy, the overall impact of proposed Project employment would be relatively small. During the 18 months of construction, the Project would generate about 225 person-years of employment, with 65 to 80 jobs in Nova Scotia and 45 of those in the Digby region. During operation, the Proponent would hire 34 employees for about 44 weeks per year. Because the Proponent would build a “state of the art” facility, the number of employees would be small relative to other quarries. About half the employees would be laid off for 8 weeks a year during the annual maintenance period; they would become eligible to draw employment insurance benefits at that time. The EIS’s economic model suggested the Project would induce additional indirect jobs. The annual operating payroll would be on the order of $1.2 million.

Construction of the site would cost about $40.6 million and would contribute $14.5 million to the GDP. Operating costs would be about $20 million annually, with a $6.3 million contribution to GDP. The major returns to government would come from income taxes paid by quarry employees and taxes on inputs like fuel. The EIS stated that during construction the federal government would receive $2 million and the province $1.6 million. The EIS predicted that during normal operation the federal government would receive $1 million and the province $800,000 annually in taxes. No royalties, fees or taxes currently apply to basalt extraction.

Much of the operating budget for the Project, estimated to be approximately $20 million annually, would be spent in shipping; these expenditures would be unlikely to deliver economic benefits to Canada since the company is not expected to be Canadian owned.

Decommissioning of the Project after 50 years would remove any jobs created; the tax status of the land at that time is difficult to predict.

Adequacy Analysis:
The Project could represent a modest economic boost for the years the Project operates. A hiring strategy targeting women proposes new employment opportunities for an under-employed segment of the population. Any beneficial effects would end when the site was decommissioned.

The Proponent projected municipal property taxes of $400,000 a year, although municipal authorities placed that estimate as low as $130,000. In addition, municipalities expressed some concerns about the possible costs that could be generated by the Project. The Proponent proposed no mitigation for economic effects. It argued that job creation and taxes received by governments would constitute positive benefits, but it did not consider potential costs to government for wear on roads or other improvements required.

The Panel believes the Project would have a modest beneficial effect on the economy.

Fishing and Harvesting
Periwinkle harvesters (winklers) and collectors of dulse seaweed operate along the Whites Cove shore. Winkling and

dulsing are activities some local residents use to augment their incomes. Presenters expressed concerns about the impacts of dust and sediment run-off from the site on harvesting activities, and worried that access to the shore could be more difficult if the Proponent takes over the Whites Cove Road.

Fishing is the mainstay of the economy in southwest Nova Scotia and is at the heart of the region's plans for a sustainable economy. Lobster Fishing Area 34, which includes the Bay of Fundy adjacent to the proposed site and nearby St. Mary's Bay, is the highest-value fishing area in Atlantic Canada. In 2004-5, it realized a landed value of over $252 million. DFO experts told the Panel that the waters between the site and the shipping lanes are "of high value relative to adjacent Lobster Fishing Areas". Many fishing boats work the waters around the site, and some families have fished for generations off Whites Cove.

Whites Cove Fisher
"*My father, my grandfather, my great-grandfather and me have fished that same stretch of shore, five miles long and about a mile, a mile and a half out, and I see no reason to leave my home and my area because you want rock."*

Adequacy Analysis:
Although the Proponent indicated that it had consulted local fishers, the fishers and several representatives of fishing organizations stated in the hearings that they had not been consulted. The EIS states (section 9.3, page 73) that "an agreement had been reached with the lobster fishers of Whites Cove with respect to potential damage to gear", but fishers from Lobster Fishing Area 34 told the Panel they had not agreed to a proposed compensation plan. The accuracy and reliability of evidence provided in an EIS is fundamental to the validity and integrity of the environmental assessment process. The Panel concludes that some elements of the EIS may be inaccurate.

The Proponent offered some mitigation for the fishery by proposing a call-in line that would advise fishers when ships are scheduled to arrive at the terminal. The Panel predicts that this mitigation strategy may not be technically feasible, given the nature of fishing activities. At times the ship would be forced to stand off because weather or ocean conditions would not permit it to dock, thereby leaving fishers unable to check gear for long periods (and losing access to the income from the resource). A changing shipping schedule would greatly complicate fishers' attempts to obtain the latest information available. Since some fishers would lose access to current fishing areas in part or in total, mitigation measures would need to go further than the proposals in the EIS. The Project offers limited economic benefits but considerable economic risks and costs for the fishery in the zone of influence from the ship route to and from the terminal. The Panel believes that the Project would have a disruptive effect on people involved in the fisheries in the area. One family which for four generations has set lobster traps primarily in the waters off Whites Cove could lose access to a substantial portion of its livelihood. Other fishers could be displaced from waters that provide substantial income to their households. The proposed compensation scheme does not address the adverse effects in income losses generated to the many households involved. The Panel believes that addressing all potential effects on fishers using the waters around the site would require a comprehensive compensation plan capable of remunerating fishers for loss of income, opportunity and gear throughout the duration of the Project.

Although the Proponent proposed a compensation plan for lost lobster traps, the EIS did not offer any mitigation measures for other fisheries, nor did it comment on potential effects on other fisheries in the Bay of Fundy. Fishers indicated, for example, that the area adjacent to the project site contains a working herring weir; they worry that noise and light from the proposed quarry could frighten herring away from the coast. Monitoring of periwinkles for contaminants could identify potential problems but the Proponent offered no mitigation or compensation measures if project activities were to displace traditional winkling and dulsing activities from the site, as seems likely.

The range of the effect on the fishery would have environmental repercussions that extend throughout Lobster Fishing Area 34. Displacement of fishers from Whites Cove and shipping access areas would force fishers to relocate; this could put greater pressure on stocks in other areas of LFA 34. The effect would last throughout the operation of the Project. Any risk to the lobster stock that may come with invasive species could affect the fishery throughout the Bay of Fundy. The Panel concludes that the Project is likely to have an adverse environmental effect on the socio-economic health and viability of some of the fishing communities of Digby Neck and Islands.

Tourism

In recent decades the tourism industry has become an increasingly important component of the local economy. Whale watching is at the core of this growing eco-tourism development. Eco-tourism depends upon local environmental quality. The Tourism Association of Canada conferred its 2006 award for sustainable development on the Bay of Fundy Tourism Partnership Council.

The EIS discussed the businesses involved in tourism in the region. It identified a workforce of 80 people involved in the industry in Digby Neck and Islands, representing an estimated payroll of $1.2 million annually. Nova Scotia Tourism, Culture and Heritage reported that the Digby region receives about $38 million in tourism revenues annually, and has about 1000 jobs in the industry. The provincial tourism industry is currently worth $1.3 billion.

Community representatives expressed concerns about a host of potential effects on tourism from the proposed Project, including impacts on whales, views of the coast from the Bay, migratory birds, and environmental activities in the planning stage (such as sea kayaking and bird watching). Elected representatives from the area suggested that the Project was inconsistent with the eco-tourism thrust of the region. Tourism industry spokespersons feared that the quarry would disturb the image of the area as a pristine and peaceful sanctuary. Any activities that might frighten whales away from the coast could undermine the regional tourism economy. Many presenters pointed to the role of the precautionary principle in decision-making as it applies to the fundamentals of this industry and the environment upon which it relies.

Provincial and local authorities made forceful representations to the Panel regarding the importance of environmental quality and the sustainability of marine ecosystems to the growth of the tourism industry. Nova Scotia Tourism has linked its “brand” directly to coastal environmental quality, especially in the Bay of Fundy.

Nova Scotia Department of Tourism, Culture and Heritage presentation
"*This development is not consistent with our international tourism promotion and positioning as Canada's Seacoast."*

Adequacy Analysis:
The Proponent did accept the possibility that the Project could affect tourism, and proposed a tourism representative on the CLC as mitigation. Given the Panel's views on the effectiveness of the CLC, described elsewhere, the proposed mitigation is likely to be ineffective. Hence, no mitigation was considered. The Proponent offered to work with tourism officials to monitor potential effects, but proposed no strategy to do so.

The Proponent suggested in the EIS that the coastal buffer zone could serve, in part, as a visual barrier to mask the site from tourists on whale watching boats. Given the harsh conditions of the site and the upward-sloping terrain away from the coast, the Panel concludes that a coastal vegetation zone is unlikely to offer adequate visual screening of the site. Incremental site reclamation would help to re-establish vegetation but would not completely hide the operating facilities for those on the water offshore of the site. The potential effects of the Project on the tourism industry are difficult to predict with any certainty, given the many factors involved, but the Panel acknowledges that those involved in the tourism industry believe that the Project is not consistent with articulated provincial and local policy.

Training and Skills
The Proponent proposed to hire local residents for most of the jobs associated with normal quarry operations. The EIS identified various job categories along with the skills required for potential employees. Some submissions expressed concern that the Project could take skilled workers away from other local businesses.

Fig. 2-14 - *The Bayside quarry in New Brunswick produces aggregate for export.*

Adequacy Analysis:
The Proponent committed to hiring and training local residents to work in the Project. Training would be provided by local community colleges and by the employer. Some of the skills learned may be transferable.

Property Values
The Proponent acknowledged that the Project has the potential to affect property values in the vicinity of the quarry; those opposing the quarry argued the effect extends along much of Digby Neck. The Proponent has been actively purchasing property around the site and has indicated interest in acquiring more. These purchases fuelled community concerns that the Proponent is acquiring land to expand the quarry activities into adjacent property.

Although the quarry property is privately owned, the land fulfilled a quasi-public function for many decades. As one local fisherman put it in the hearings, "I see a shoreline around Whites Cove, both on land and in the water, that we have always taken as being public property, disappearing."

Adequacy Analysis:
The Panel believes that the controversy around the Project makes it difficult to establish accurate baseline data on "pre-project" property values and to separate project effects from other trends in real estate. The revised EIS provided information on property sales in the region. The Proponent's purchases of several properties in the area (at higher than normal market prices, according to several interveners) could be affecting current values.

The Proponent's mitigation measure proposed to compensate those whose values are adversely affected. However, the Panel believes that the measure may prove difficult to implement. The EIS provided few details of the proposed compensation plan, except that it would affect properties 800 m or less from the active quarry face and be applied after five years. (The Proponent's comments during the hearings regarding the operation, duration and particulars of the program differed somewhat from those provided in the EIS.)

The Panel believes that the Project would have an adverse effect on property values. Potential impacts on property value resulting from the proposed Project could extend beyond the immediate vicinity of the site to the limits of noise, dust and traffic from quarry activities. The Panel believes that a fair and workable compensation program for potential losses of property values from development projects would require that regulators work with the Proponent and community representatives.

Infrastructure
The Proponent would contract with Nova Scotia Power to upgrade electrical service to the site to meet its needs. It would train its own staff to respond to on-site emergencies such as fire or oil spills. The EIS suggests that local schools, police and medical services are adequate to deal with the quarry workforce, since most employees would be hired locally. Additional infrastructure demands are projected as unlikely or limited.

Adequacy Analysis:
The EIS adequately described local infrastructure for emergency services and health care. The status of this infrastructure is in flux, complicating the effort to keep the data current. For instance, a recent shortage of doctors resulted in partial closure of the Digby Hospital emergency service. The Panel believes that there would be a limited effect from the Project on existing infrastructure.

2.3.3 TRANSPORTATION

The Project would increase vehicular traffic to the site for project deliveries and for employee commuting. Highway 217 has not been designated for upgrading in the near future. Provincial authorities noted that they have an accumulated road maintenance deficit of over $1 billion.

The Proponent indicated that it would improve the entrance to the Whites Cove Road; if it could acquire the road, it would upgrade it and then close it to public use. At present, the Whites Cove Road is in very poor condition but it does offer public access to the shore. The Province declined to sell the road to the Proponent. If the road remains on site it would sit on a pedestal, in some places 90 m above the operational quarry floor. This could present a safety hazard after decommissioning.

Large bulk carriers would be expected to load aggregates at the site from 44 to 50 times per year. The ships would navigate waters extensively travelled by fishing boats, whale watching boats and other cargo vessels. The Proponent proposed to designate the route the bulk carrier would

traverse upon leaving the shipping lanes. A work boat would be located on site to facilitate docking of the ship and to participate in marine mammal and bird observations before blasting or docking.

Adequacy Analysis:
The EIS generally provided sufficient evidence about transportation issues on land, but did not indicate potential adverse effects of construction traffic on the quality or safety of Highway 217. Proposals to upgrade the entrance to Whites Cove Road would be reasonable. If the Whites Cove Road were to remain public, the mitigation strategies proposed may be technically feasible but the Panel believes that the high cliffs that blasting would produce would create considerable risk for future users. Unless appropriate management measures are included in the reclamation plan, long-term maintenance and safety of the site after decommissioning would become a public responsibility.

The Panel found the EIS discussion of issues related to marine transportation incomplete. At the hearings, the Panel heard extensive evidence of concern about transportation issues in the marine environment. The Proponent has not detailed appropriate mitigation strategies for dealing with potential vessel interactions in the vicinity of the site. The Panel concludes that the Proponent could not provide sufficient information about the Project to clarify the potential for adverse environmental effects from marine transportation. The Panel believes that there are risks associated with ship docking over a significant portion of the year. In the event of an accident, this would result in an adverse environmental effect on the ecosystem and the local fishery.

2.4 CUMULATIVE EFFECTS

The Proponent's approach to cumulative effects assessment reflected its understanding that relevant effects would be "of broader influence than those of the direct effects of the project footprint". This understanding led the Proponent to focus its presentation at the regional level. The Proponent predicted likely positive effects for floral species at risk, employment, municipal tax revenue and social capital. It predicted possible negative cumulative impacts for greenhouse gas emissions, Bay of Fundy aesthetics and tourism.

The Sierra Club of Canada (SCC) argued that the Proponent's treatment of the cumulative impacts did not address the EIS Guidelines and was inadequate. SCC provided information to support its position that an increasing demand for aggregate would increase the likelihood of the North Mountain basalt extraction activities, a scenario not addressed in the EIS. The Canadian Parks and Wilderness Society, Nova Scotia Chapter, found the Proponent's cumulative effects assessment flawed. The Ecology Action Centre recommended that the Proponent make greater effort to assess cumulative impacts relating to invasive species. Other reviewers of the EIS criticized the EIS's assessment of the potential for cumulative effects on specific Valued Environmental Components (VECs).

The Panel found that the Proponent's analysis of cumulative effects did not follow the EIS Guidelines, and directed the Proponent to submit a revised analysis.

The Proponent's revised approach to cumulative effects began with a scoping exercise to identify VECs to be considered, and to identify other projects or activities whose environmental effects could potentially act on those same VECs. This

was followed by a screening exercise considering the type of effects likely to arise from the various projects and activities, and the potential for spatial and temporal overlaps with the potential effects arising from the quarry project. The EIS supplement then considered potential cumulative effects relating to climate, marine mammals, marine species at risk and tourism resulting from the Project, acting in combination with the potential effects of four industrial developments on the other shore of the Bay of Fundy. Those projects were three LNG developments—one in Saint John, New Brunswick[5] and two in Maine, close to the New Brunswick border—and a new oil refinery (also in Saint John).

2.4.1 Effects on Climate

The revised analysis stated that the GHG emissions of the Saint John LNG project would be 386,000 tonnes of carbon dioxide equivalents, or approximately four times those of the quarry project. Based on this information, the EIS assumed that emissions from the other two LNG projects would be much higher than those from the quarry and that the emissions of the fourth project (the refinery) would significantly exceed the emissions of the LNG projects.

2.4.2 Effects on Marine Mammals and Marine Species at Risk

The Proponent tabulated existing and expected Bay of Fundy large vessel traffic. The sources of the expected traffic increases were associated with the proposed Project and the three LNG terminals. The Project results in an incremental increase in traffic of 6% over existing traffic levels. With the Project and three LNG projects combined, vessel traffic would increase 52% overall. The EIS used the predicted increases in traffic levels to assess cumulative mortalities of marine mammals in the Bay of Fundy due to vessel strikes. It argued that the significance of the 52% increase in overall shipping is unknown, in part due to incomplete scientific understanding of marine mammals.

2.4.3 Tourism

The Proponent identified a possible link between the potential cumulative effect on whale populations due to vessel strikes and potential effects on tourism through reduced opportunity for whale watching. The EIS suggested that, while the cumulative effect on whale populations from vessel strikes was unknown, the contribution to that effect from the quarry vessel traffic would be minimal.

Following direction from the Panel, the Proponent examined cumulative effects on aesthetic aspects of the Project but identified none.

Adequacy Analysis:
The Proponent asserted that its quarrying and shipping activities would add only small, and therefore insignificant, increments to the GHG emissions and potential whale/ship collisions in the Bay of Fundy region. Both of these issues are the focus of considerable concern and mitigation efforts by the national and international community. The Panel was disappointed that their prominence did not impel the Proponent to exceptional mitigation or compensation efforts.

Participants in the environmental review were generally critical of the cumulative effects assessment, more for what was omitted than what was covered. A representative of the Partnership described

[5] The Saint John LNG includes a multi-purpose marine terminal. Vessel traffic other than LNG tankers is included as part of the project.

the assessment as “narrow” because it identified only known or potential projects. The Sierra Club advised that the Proponent failed to meet the requirements of the EIS Guidelines and the Canadian Environmental Assessment Agency’s guidelines. It commented that the “opening nature” of the Project would certainly lead to induced developments. This concern about what some called “quarry creep” reflected the concern of many who believe that, due to the availability of basalt along the North Mountain combined with access to the coast, an approval for the Project would lead to similar activities both locally and regionally. The Partnership noted that the Proponent had not provided much discussion of reasonably foreseeable developments that could interact with its Project.

The Partnership addressed the linkages between induced developments, cumulative effects and sustainability. Using the Mackenzie Gas Project as an example, it identified two requirements for an overall positive contribution to sustainability: avoidance and mitigation of negative effects so that there is no lasting damage; and direct, indirect and cumulative effects of the Project, building longer-term opportunities and capacities for sustainable livelihoods. With respect to induced effects, the Partnership described three plausible future scenarios: the Proponent could expand the scale and/or extent of the operation; the Proponent, or others, could seek approval for one or more additional quarries, or new or expanded shipping facilities; the Project could encounter technical or economic difficulties that undermine its viability (forcing an early closure).

The Panel believes that the Proponent’s analysis of the cumulative effects of the Project acting in concert with activities that should be considered as reasonably foreseeable was not adequate. Section 37 of the August 2004 lease that the Proponent holds on the property states, “The parties acknowledge that BNS (the Proponent) may wish to mine other properties, adjacent to or near the Premises (the Project site).” The Proponent made clear that its parent organization needs approximately 2 million tonnes of aggregate per year for the next 50 years. While the quarry property contains the resource required to address that need, the Proponent has acknowledged that the 800-metre separation zone specified in the provincial Pit and Quarry Guidelines may constrain its ability to work parts of the property. The Panel received no information from the Proponent or government representatives that would suggest this requirement might be waived. The document Digby Neck/Islands Economic Profile, submitted by the Proponent as part of its EIS, states that the Proponent would spend annually approximately $20 million (Canadian) to operate the quarry facility. With production of aggregate estimated to be approximately 2 million tonnes annually, the unit costs would be $10 (Canadian) per ton. In response to an undertaking, the Proponent stated that the 2007 price of “stone” in New Jersey ranges from $6.23 to $10.00 (US) per ton FOB point of sale. The Panel is not in a position to draw conclusions on the economic viability of the Project, as numerous factors other than operating costs and the price of stone in New Jersey need to be considered. However, the Panel notes that a comparison of the two key factors of unit costs and unit price adds to the uncertainty that the Project as described can advance without modification and without expansion of the quarry to neighbouring sites.

The Proponent has potential opportunity for expanding its proposed operation, has acknowledged an interest in expanding

operations, has recognized that there may be constraints in working the proposed site, and has possible economic needs to modify its Project. The Project description changed repeatedly through the review process. The Panel thus concludes that the Project as assessed may not be the Project as implemented. The Panel finds that the Proponent's cumulative effects assessment was too narrowly focused and believes development of adjacent properties, likely by the Proponent, is a reasonably foreseeable activity that should have been considered. The Panel believes that the Project is likely to induce further aggregate extraction activities in the region.

The Department of Foreign Affairs and International Trade advised the Panel that Canada, as a party to NAFTA, can decide what it needs to do to achieve its environmental objectives and that NAFTA is not a threat or a constraint to setting environmental standards. The Panel's own expert advisor on NAFTA provided similar advice. The Panel accepts the expert advice received, that NAFTA would not influence the establishment of new coastal quarries in the region or government's ability to evaluate such proposals. Nevertheless, the Panel heard evidence from NSDNR pointing to the likelihood of coastal quarries being established within the region. Good quality rock is abundant on North Mountain and elsewhere in the province to serve export markets. The Bay of Fundy is near a major market for aggregate. The region has dealt with earlier proposals for quarries on the St. Mary's Bay side of Digby Neck and at nearby Victoria Beach. NSDNR advised the Panel it had received recent expressions of interest in the development of coastal quarries. In the CLC minutes, the Proponent commented that there is an "order of magnitude difference" in the difficulty of obtaining a quarry permit in the United States as compared to in Nova Scotia. If this statement is accurate, the Canadian regulatory climate may induce further development of quarries. The Panel concludes that the establishment of an expanded or additional quarry or quarries is reasonably foreseeable; such possibilities should have been considered in the cumulative effects assessment.

The Panel believes that the effects from the Project on local social conditions are likely to be adverse and significant. Expansion or modification of the Project would likely be seen by many in the community as evidence that their interests and policy decisions are not being respected. Establishment of other coastal quarries on the Bay of Fundy would likely lead to local community responses similar to those that have occurred on Digby Neck and Islands, and could be expected to be adverse. The Panel expects that induced activities would add to the severity of predicted adverse social effects on the fishery and tourism in the region.

Induced activities would interact with other project-related environmental effects. The Panel believes that those cumulative effects, should they occur, are unlikely to change the nature of the project-related effects.

2.5 ADEQUACY SUMMARY

The EIS Guidelines established that the onus of proof to demonstrate that the Project could proceed without the likelihood of significant adverse environmental effects rested with the Proponent. The Panel's analysis of the Project has identified the adverse and positive environmental effects expected from the Project. While the Panel accepts that with effective application of appropriate mitigation measures, competent project management and appropriate regulatory oversight, most

project effects should not be judged “significant”, the accumulation of concerns about adequacy leads the Panel to question the Project. Given the Panel’s concerns about the evidence provided during the assessment process, the following table is provided to review the adequacy of the Proponent’s responses (Table 2.1).

The Panel concludes that while the environmental impact statement provided considerable data, in many ways the information provided by the Proponent was inadequate for the requirements of an environmental assessment. The Proponent declined to provide some of the information requested by the Panel, forcing the Panel to obtain required information from government officials, interveners and holders of traditional knowledge, during public hearings. The Panel believes that while it acquired adequate information to assess the likely environmental effects of the Project, a more adequate EIS document and responses to information requests would have facilitated the review process.

Table 2-1: Summary of Panel concerns from the terrestrial, marine and human effects assessment

For some project effects, the Proponent failed to provide consistent or complete information on the character of the Project.	Blasting Site drainage Ship manoeuvring and docking Site reclamation and reuse after decommissioning Use of adjacent properties Project economic viability
For some project effects, the Proponent failed to provide adequate data to demonstrate that it appropriately characterized the environment in its own analysis of potential effects.	Ocean conditions Climatic conditions and extremes Groundwater Coastal fen Community social networks Negotiations with fishers Cumulative effects: other projects
For some project effects, the Proponent failed to demonstrate that it can implement technically or economically feasible mitigation measures.	Visual monitoring for marine species at risk Compensation for opportunity loss in the fisheries Preventing airborne particulate matter from fines Preventing scouring of near-shore bottom from ship propellers Managing greenhouse gases Protecting rare plant species Re-vegetating the site in reclamation Community Liaison Committee Groundwater
For some project effects, the Proponent failed to demonstrate that it can meet regulatory standards.	Noise from blasting Vibration from blasting
In some cases, the Proponent assumed that the likelihood of accidents was low and therefore did not fully consider environmental effects.	Ship docking Berm failure Sedimentation pond breach Release of invasive species Residual ammonium nitrate from blasting
For some project effects, the Project is likely to adversely affect the reasonable enjoyment of life or property for those in the vicinity of the Project.	Loss of community's peaceful enjoyment Nearby fishing communities (LFA 34)

3 ANALYSIS

3.1 ENVIRONMENTAL IMPACT STATEMENT

The Panel's Terms of Reference (Appendix 1) identified and defined the scope of this environmental assessment and the factors to be considered in the review. Those factors were clearly enunciated in the EIS Guidelines, where they formed the starting point for the Panel's subsequent assessment of various inputs obtained throughout the Joint Panel process, from scoping sessions, hearings, the EIS and many written contributions that totalled more than 6,000 pages.

The Environmental Impact Statement is a document intended to define a proposed Project in sufficient detail to permit its proper evaluation. The EIS is normally assembled according to instructions outlined in the EIS Guidelines document, which is itself assembled from an existing framework to which are added inputs from various sources, including individual and collective public involvement, notably from scoping sessions. The broad array of factors expected to be considered in the EIS includes definition and significance of environmental effects, public concerns, potential mitigative measures and any other matter relevant to the review process.

An important component of the review process involved the use of Information Requests. These were questions the Panel posed to the Proponent following the appearance of the EIS. They provided an important vehicle to engage interested parties, not least the public, in the overall process leading to the clarification of available information.

Adequacy Analysis:
The expectations of the Panel regarding the EIS were: that it should possess a certain amount of clarity and precision when addressing various features and intentions of the proposed project; that the data used would reflect appropriate choices; that it would be reliable and properly analysed; and that the scope and reliability of effects prediction would permit a meaningful assessment by the Panel. In addition, a measure of transparency and confidence in what the Project would entail would facilitate a meaningful review.

The changing nature of the Project, from its first formal presentation in the EIS through presentations made by the Proponent during the public hearings, created some serious problems for the Panel during the review process. Three prominent examples included: the layout of the project site (with special emphasis on the form and function of the sediment ponds); the mechanics and details of the planned operational blasting regimen; and a clear understanding of the local hydrogeology and the project-related activities that could influence it. All three examples went through repeated changes from their initial presentation in March 2006 to their final consideration in June 2007. Quantitative estimates, physical locations, timing of events, potential impacts and interconnectedness with other aspects of the Project varied to such an extent that the Panel's confidence in the conceptual design and associated quantitative underpinnings was undermined. Each change appeared to have been prompted by questions posed through the information request process or during the hearings. Each project revision

led to additional problems that the Proponent had not addressed. When repeated revisions failed to address key environmental concerns, the suitability of the conceptual design became an issue for the Panel.

Information requests were an important part of the assessment process, providing a vehicle to enable greater participation and input by interested parties. While the Proponent responded to those made by the Panel, those submitted by others often received the response of “noted” without further comment. This had the dual effect of reducing the amount of critical and substantive input into the process while exacerbating negative relations between the Proponent and members of the various communities who could be directly impacted by the Project.

3.2 APPLICATION OF GUIDING PRINCIPLES

The Environmental Impact Statement Guidelines provided a framework to assist the Proponent in the development of the EIS and to assist the Panel in its evaluation of the environmental effects of the proposed Project. The Guidelines identified five cross-cutting principles that, along with policies and legislation that emanated from three levels of government, the Panel considered fundamental to the process. The principles include: public involvement, traditional community knowledge, the ecosystem approach, sustainable development and the precautionary principle.

3.2.1 PUBLIC INVOLVEMENT

Public participation is a central objective of the overall environmental review process and a means by which the concerns and interests of the public are taken into account.

Adequacy Analysis:
The EIS Guidelines stated that, “The Panel process will be conducted in a manner that promotes public participation. Within the EIS the Proponent will demonstrate the nature and degree of consultation with residents, Aboriginal people, organizations and other stakeholders who are likely to be affected by the Project. The EIS will describe objectives, methods and results achieved in these consultations.”

The Panel found community involvement in the review process mixed and complicated. Comments were repeatedly offered to the Panel that this issue was at the heart of the contentiousness that marked the entire proceedings. The Panel recognized very early that the Digby Neck and Islands community was somewhat polarized over the quarry. This was evidenced by lawn signs for and against the Project, by anecdotal evidence presented in the hearings, by T-shirts emblazoned with a particular position, and by numerous references to the community schism that emerged around the Project proposal.

Community members who supported the Project spoke primarily about the possible introduction of 34 new jobs (skilled and unskilled) into a community where this is not a common occurrence. Those opposing the Project included a mixture of long-term residents, seasonal residents and full-time residents who had retired to the area; for some, their incomes do not depend on the local economy while others (such as fishers, winklers and tour boat operators) have a strong connection to the environment, especially its continuing pristine nature. A “pro” group became a visible participant in the process only during the hearings; the opposing group was active from the outset. Most of the Panel’s concerns about insufficient community

participation with the Proponent refer to the group that opposed the Project.

Participation in the Environmental Impact Assessment process (scoping sessions, submissions to the Panel, information requests and hearing interventions) by community members was highly engaged and interactive. However, interactions between the Proponent and the community members were marked by strong negative emotions on both sides that, the Panel concluded, led to a breakdown in communications on many occasions. An unsuccessful attempt to create a marine quarry on Digby Neck approximately a dozen years ago left residual hard feelings in the community. The present proposal emerged almost fully developed without the company consulting with the community, leading to concerns about a lack of transparency.

The principal vehicle for community consultation early in the development process was the Community Liaison Committee (CLC). It was chaired by a community member and populated with individuals representing both sides of the issue. It met on fifteen occasions, slowly losing representation from individuals against the proposal such that at the end they were no longer represented. Those in favour of the Project described the CLC as successful while those against claimed that it was dysfunctional. As a vehicle for community input and discussion, the CLC failed to engage a key segment of the population who could potentially be affected by the initiative. According to the Proponent, subsequent to the CLC's collapse (but before the creation of the Panel and for more than 30 months prior to the hearings), the process of public involvement was conducted at the Proponent's office, on the street, at social events or public presentations by the Proponent, or in any number of ad hoc situations.

When communication breaks down, issues of trust arise. The Panel heard many concerns about the lack of trust between the Proponent and community members that led to continuing fears about the ability of the parties to work together effectively if the Project was to proceed.

The Panel concludes that the Proponent's public participation activities met the letter but not the spirit of the guidelines. The Proponent did not effectively work with project opponents to find mutually agreeable solutions to identified problems.

3.2.2 Traditional Community Knowledge

Digby Neck has a long history of occupation by Aboriginal peoples, and people of Acadian, African-Canadian and Loyalist descent. Existing communities on Digby Neck and Islands have substantial and unique knowledge about the local environment, how it functions and the ecological relationships that characterize it. Traditional knowledge refers to the broad base of knowledge held by individuals and collectively by communities that is based on spiritual teachings, personal observation and/or life experience on land and sea, and which can be passed on from one generation to another through oral and/or written traditions. It includes information on traditional lifestyles and quality of life. To a degree, it represents core values held by those communities. Traditional community knowledge is dynamic, substantive and a distinct living knowledge.

Traditional knowledge, in combination with other information sources (such as scientific and engineering knowledge), is valuable to those seeking a better understanding of potential impacts of projects. It can, for

example, contribute to the description of existing physical, biological and human environments, natural cycles, resource distribution and abundance, long- and short-term trends, and the use of lands, the ocean and their resources. It can contribute to the evaluation of potential impacts and their significance. And, certain issues (such as harvesting of the land and sea, cultural well-being, land and ocean use and heritage resources) that are relevant to the review process are firmly grounded in traditional knowledge. Although traditional and science-based knowledge have different bases, both can, independently or collectively, contribute to understanding.

Adequacy Analysis:
The EIS guidelines required the Proponent to demonstrate an understanding of traditional uses, interests, values and concerns, and to recognize and respect them in preparing the EIS. In addition, the Proponent was requested:

- to make best efforts, with the co-operation of other parties, to incorporate into its EIS traditional knowledge to which it has access or which it may reasonably be expected to acquire through appropriate diligence, in keeping with appropriate ethical standards and without breaching obligations of confidentiality; and,
- alternatively, the Proponent could facilitate the presentation of such knowledge by persons and parties having access to this information to the Panel during the course of the review.

Individuals or groups of individuals (communities) often possess information that is difficult or impossible for the scientific community to duplicate. Their regular and continuing interaction with a specific environment, especially one as dynamic as a marine coastal setting, demands considerable attention to the vagaries of physical and biological systems, which can result in a long time-series of observations under widely varying conditions. To duplicate these observations scientists would have had to be present, or been represented by a wide array of surrogate instruments, at many locations for a similar period. Consequently, considerable value is placed on traditional community knowledge as a valuable and complementary source of information when addressing environmental issues.

The waters adjacent to the proposed Project site have been continuously fished for generations by people living on Digby Neck and Islands. Fishers repeatedly expressed two concerns: fear that impacts from proposed Project operations would, in addition to altering access to their fishing sites, negatively affect the quantity and quality of their targeted marine organisms; and fear that the weekly arrival and departure of a large ship on a lee shore in a dynamic and unpredictable setting would be fraught with danger.

The EIS shows little evidence of serious consultation with or input by local fishers. The Proponent, who bears the primary responsibility to ensure the availability of this information in the process, remarked that local fishers were hostile to the Project and unwilling to confer. The Proponent suggested that the location of the Bilcon office was well known and that fishers were free to take the initiative to drop by at any time to discuss any issues. The absence of meaningful consultation by the Proponent not only led to de facto exclusion from a large existing body of knowledge but also engendered a lack of confidence on the part of many reviewers of the EIS as to the thoroughness of the preparation,

completeness of the picture, and conformity to both CEAA's and the Panel's guidelines.

The Panel concludes that the Proponent's efforts to include traditional community knowledge in the process were inadequate.

3.2.3 Ecosystem Approach

For the purpose of some studies it may be convenient to compartmentalize the environment into physical, biological and human components. Certainly, the assessment process depends on identifying valued environmental components. However, such categorization masks the natural interactive complexities and synergies that make up ecosystems and communities. The boundaries chosen for specific organisms or ecosystems should accurately reflect the nature of the threats and effects being addressed within the proposed Project. Accordingly, while the ecosystem boundaries chosen for terrestrial plant communities might be defined locally with delineation of specific relevant factors, the boundaries selected for marine ecosystems might need to embrace the routing used by ships delivering a product to specific locations. A strong foundation of scientific knowledge is fundamental to the assessment of potential environmental effects that may affect ecosystem health and viability.

Adequacy Analysis:
The EIS Guidelines requested that the Project be evaluated in a holistic manner, using an ecosystem approach, where the interconnections receive as much attention as the discrete components. Evaluation of potential project impacts was to be based on:

- the interconnections between the physical environment, the biological environment and the human environment;
- the links between terrestrial, coastal zone and oceanic processes;
- the interchanges between the subsurface, the surface and the atmosphere; and
- the repercussion of potential local impacts at a regional, national and global level.

The Panel found that most of the information presented in the EIS that addressed organisms and their environment was presented without a sufficient sense of coherence or understanding of the unifying principles that link the constituent parts. In short, the ecosystem approach is rarely in evidence. The Panel believes that this omission is unfortunate since the coastal land, transitional inshore environment and the larger Bay are clearly an integrated whole with influences exerted in both onshore and offshore directions. The absence of consideration of the interconnected and integrated whole ignores the synergies that exist in a fully functioning system. Interconnections between the terrestrial, marine and human environment create the unique circumstances that characterize this region.

3.2.4 Sustainable Development

The principle of sustainable development urges communities to make decisions regarding the use and commitment of resources, especially those that contribute to social, economic and environmental health, with a clear understanding of their eventual application to the rights of other communities and future generations. Given the potential for disagreement about the implications of sustainable development approaches, the Panel found guidance in key policy documents adopted by federal, provincial and local governments and development agencies. Particular acts,

initiatives and interventions facilitated the Panel's analysis of the Project's contribution to sustainability in the region (Appendix 4).

This region of southwest Nova Scotia sought and received international recognition for its efforts to create a sustainable economy based on good management of fisheries and eco-tourism activities. Participants in the hearing process—including a local Member of Parliament, a Member of the Legislative Assembly and leaders of the local municipalities—spoke with pride of the region's accomplishments. External awards that recognize and endorse these community efforts include: UNESCO, UN Bio-Habitat, Smart Communities and an hour-long profile on the CBC's The Nature of Things.

Adequacy Analysis:
The EIS Guidelines stated that the Panel intended to evaluate the Project's contribution to sustainability on the basis of:

- the extent to which the Project makes a positive overall contribution towards the attainment of ecological and community sustainability, at both the local and regional levels;
- the effort made to enhance positive effects of the Project on the physical, biological and human environment, as well as mitigation of adverse effects;
- how the planning, design and operation of the Project will strengthen local and regional capacities and opportunities to achieve a sustainable future;
- how monitoring, management and reporting systems will attempt to ensure continuous progress towards sustainability; and
- appropriate indicators to determine whether this progress is being maintained.

Despite the Panel's guidance, the EIS rarely addressed the broader implications of the proposed Project on the long-term sustainable development of communities. The need to describe effects on valued environmental components does not obviate the need to consider the Project's contribution to sustainability. The EIS did not address the fundamental question of whether the Project will deliver long-term improvements to community sustainability. It did not consider how benefits derived from the Project over its lifetime might be used to create long-term sustainable employment opportunities while simultaneously maintaining a healthy and resilient environment. Instead, the EIS focused on employment opportunities linked to the operational phase, all of which would disappear with decommissioning.

Rather than using the proposed Project to build on and extend existing community strengths, the general tenor of the Proponent's EIS and various information responses appeared negative and dismissive, with little support for community lifestyle, history and previous attempts at community introspection, visioning and self-determination. The EIS suggested that the solution to these declining communities was a new direction or vision built around an industrial capacity to utilize the non-renewable basalt resource occurring in the North Mountain.

The Panel concludes that the Proponent's approach to sustainable development does not adequately account for the region's identified strategies for sustainability.

3.2.5 PRECAUTIONARY PRINCIPLE

Environmental decision-making must address the reality of scientific uncertainty and incomplete knowledge. The precautionary principle instructs the decision-maker to take a cautious approach, or to err on the side of caution, especially where there is a large degree of uncertainty or high risk. Further, it is widely understood that when threats are serious or might be potentially irreversible, lack of full scientific certainty should not be used as a reason for postponing cost-effective measures to prevent environmental degradation. The application of the precautionary principle requires: that the onus of proof rest with the Proponent to show that a proposed action will not lead to serious or irreversible environmental damage; verifiable scientific research and high-quality information; and access to information, public participation, and open and transparent decision-making.

Adequacy Analysis:
The EIS Guidelines requested that the Project conform to the precautionary principle in the following ways:

- give priority in design and operation to strategies that avoid creating adverse impacts;
- go beyond current emission standards in controlling harmful outputs or activities;
- address worst-case scenarios and include risk and uncertainty assessments in contingency plans;
- design monitoring programs to ensure rapid response and correction when necessary; and
- create liability and insurance regimes to hold the Proponent accountable for adverse effects.

The Proponent proposed to use adaptive management to implement the precautionary principle; the Panel concludes that the EIS treats these two concepts as virtually synonymous. In the EIS and hearings, the Proponent suggested that once a plan of action for an environmental issue had been defined, that course would be adhered to until problems arose, then a process of trial and error (adaptive management) would be employed until the process or issue once again conformed to original expectations. The Proponent described its approach as “precautionary”, with the capacity to address a wide variety of issues. The EIS and related documents identify the central role and preferred usage of adaptive management in the proposed project by citing its anticipated implementation on no fewer than 140 occasions.

Although the precautionary principle and adaptive management are neither identical nor synonymous, they do share important common ground: namely, they both address science-based risk management linked to scientific analysis and the scientific method. Decision-making is complicated by the inherent dynamic of science, especially by the lack of certainty on many issues. For that reason, a firm understanding of the scientific process is essential prior to implementing either approach. Solid scientific information must be acquired according to accepted practice. Baseline information is critical as a starting point against which future changes will be assessed. Hypotheses should be constructed, tested and utilized in the further application of the scientific approach.

The Panel found little evidence from the EIS, information requests or the hearings to indicate that the Proponent appreciates the difference between the precautionary principle and adaptive management, how each should be implemented or how

fundamental the role of science is in the proper implementation of each. The Panel believes that given the Proponent's flawed understanding, the eventual application of these tools would potentially negate any positive intention to offset potential environmental impacts. This could be especially true with regard to the scope and reliability of effects prediction, the appropriateness and technical feasibility of proposed mitigation measures, and the effectiveness of compliance enforcement.

3.3 INTERPLAY OF PLANNING, POLICIES, STRATEGIES, GUIDELINES& LEGISLATION

3.3.1 PLANNING

The subject of planning and policy making lies at the heart of the disagreement between the Proponent and community members opposed to the Project. The EIS stated that the communities on Digby Neck and Islands are failing, that population is decreasing, that the economy is in decline and that there is no evidence of concerted or unified effort to turn this situation around. The Proponent suggests that efforts at local and regional economic planning have been tried but to no avail and points to the termination of previous planning efforts as indicators of support for that view. The Proponent does not acknowledge community core values as defining features of these communities, and argues that approval of the Project would provide new directions and opportunities to enable these communities to turn things around.

The Panel received evidence to support the view that the communities comprising Digby Neck and Islands have been actively engaged, since well before the Whites Point Project was proposed, in planning and developing a vision to guide their future economic development. UNESCO identified Digby as a paradigm of North American communities (a "Smart Community") developing community-driven solutions to address impending change. Local planning has been facilitated through several community organizations such as the United Baptist Church of Little River, the Digby Neck Community Development Association and Bay of Fundy Inshore Fishers Association, the Digby Neck Community School, the Partnership for the Sustainable Development of Digby Neck and Islands Society and the Fire Hall.

Regional planning is best exemplified by the Western Valley Development Authority, the first of 14 regional development authorities created in 1994. It operated between two senior levels of government, seven municipal governments from Digby and Annapolis counties, and the public. In 1998 and 1999, it facilitated 23 community meetings to discuss values and hopes for the region's future. These efforts were followed by additional community meetings that addressed the role of culture in community development, a detailed survey of businesses to ensure the needs of the private sector were addressed, and finally, additional engagement of the community through an on-line dialogue. The outcome of these efforts was the document Building Tomorrow—*Vision 2000*: Multi-year Community Action Plan for Annapolis and Digby Counties. The plan addressed eight sectors of the human and natural environments. The four most relevant to the proposed Project are: business development; natural resources; environment; and tourism, heritage and culture. This full array of local and regional meetings, along with the *Vision 2000* document, provides insights into community core values. The reports strongly articulate the community's desire for cooperative self-determination, they reveal a strong need to build on existing traditional strengths, and

they exclude the general model of industrial resource utilization promulgated by the Proponent.

The Municipality of the District of Digby does not have a municipal development plan, zoning regulations or land-use planning guidelines. As municipal councillors told the Panel, however, the absence of these planning tools may be of limited importance since, under provincial legislation, quarrying is not included in the definition of “land use" that municipalities can control. Thus, municipalities in Nova Scotia have little direct influence over the establishment of a quarry.

3.3.2 Policies, Strategies, Guidelines and Legislation

Appendix 4 presents strategies, policies, guidelines and legislation germane to the review: *Minerals—A Policy for Nova Scotia (1996); Nova Scotia Community Development Policy (2004); Opportunities for Sustainable Prosperity (2006–2010); Towards a Sustainable Environment (2003); Nova Scotia Strategy for Sustainable Coastal Tourism Development (2006); and the Environmental Goals and Sustainable Prosperity Act (2007)*. These documents exhibit something of a common theme. For the most part, they encourage economic development while emphasizing the importance of a balanced approach (combining economic, social and cultural issues), building on community assets, with an emphasis on integration and social inclusiveness. They simultaneously advocate core values, quality of life and a sustainable environmental outcome. Each document varies in its emphasis but the collective message is clear: community development is a process in which all players should ideally cooperate, coordinate and collaborate around a common vision that reflects and builds on the core values of the community.

Although provincial legislation excludes quarrying from municipal control, the provincial Mineral Policy makes clear that quarrying is not viewed as a unilateral initiative, driven solely by corporate concerns of economic return, profitability, efficiency or any other accepted private-sector benchmark. The Policy advocates integrated land-use planning, protection of the environment, close cooperation among regulatory agencies, and good cooperative working relationships among stakeholders that result in compatible policies, decisions and actions. The Proponent cited the Nova Scotia Mineral Policy as evidence of support for the proposed Project and, by implication, the manner in which the review process proceeded.

The Nova Scotia Strategy for Sustainable Coastal Tourism Development in its branding statement for the Province refers to the Province as the possessor of “spectacular scenery, living tradition, maritime culture and lifestyle with a feeling of deep-down spiritual satisfaction”.

The Nova Scotia Community Development Policy endorses and commits to 11 principles for sustainable community development, of which the following are of special significance:

- Local leadership: in which the community plays a leadership role in its own development;
- Balance: integration of economic, social, environmental and cultural considerations;
- Respect for local values: respect and understanding for community values;
- Social inclusion: all community members have the opportunity to become engaged in development processes;

- Common vision: stakeholders working with a common vision for the future; and
- Focus on community assets: community development is built on existing community capacity and assets.

The *Environmental Goals and Sustainable Prosperity Act* was enacted by the Province in 2007. It identifies the long-term environmental and economic objective for the Province as fully integrating environmental sustainability and economic prosperity. The seven principles defined in the Act are as follows:

- The health of the economy, the health of the environment and the health of the people of the Province are interconnected.
- Environmentally sustainable economic development that recognizes the economic value of the Province's environmental assets is essential to the long-term prosperity of the Province.
- The environment and the economy of the Province are a shared responsibility of all levels of government, the private sector and all people of the Province.
- The environment and economy must be managed for the benefit of present and future generations.
- Innovative solutions are necessary to mutually reinforce the environment and the economy.
- A long-term approach to planning and decision-making is necessary to harmonize the Province's goals of economic prosperity and environmental sustainability.
- The management of goals for sustainable prosperity, such as emission reduction, energy efficiency programs and increasing the amount of legally protected land will preserve and improve the Province's environment and economy for future generations.

The Panel finds that the Project does not reflect serious consideration of community planning activities and policy outcomes, such as communally identified priorities, core values, vision statements or future goals. In other words, the process employed in the development of the Project and in evaluating it for the EIS appears to have been seriously at odds with the spirit and intent of policy, strategy, guideline and legislative documents adopted by various levels of government. The Panel concludes that the Project is generally not consistent with government or community policy about community economic development.

3.4 PROJECT BENEFITS AND BURDENS

The following tables compile the perceived benefits and burdens expected to occur if the proposed Project were to receive approval. The right column indicates the geographic extent of the impact conveyed by a given benefit/burden.

3.4.1 BALANCING BENEFITS AND BURDENS

Tables 3.1 and 3.2 identify the benefits and burdens the Panel expects to accrue if the proposed Project were to proceed. As Table 3.1 shows, with the exception of the economic diversification of Digby Neck and the benefits to the Proponent and shipping agent, each benefit identified would impact on multiple recipients (local communities, regional municipalities, and governments). The benefits would be dispersed, and only a select number of local recipients would benefit from the Project. Local communities would receive some short-term construction jobs, up to 34 long-term operational jobs,

some local expenditures, and municipal property taxes.

The greatest benefits would fall to the Proponent, who could acquire reliable 50-year access to 100 million tonnes of high-quality basalt aggregate that could be moved cheaply and easily to market by ship, and to the shipping agent contracted to move the aggregate to market.

Table 3.2 identifies the burdens expected to result from the Project. The Panel believes the burdens associated with the proposed Project would be principally local and regional in their focus. Burdens or impacts will be felt principally on Digby Neck and Islands and the associated marine environment. This appears to be an uneven arrangement for local communities, who would experience most of the burdens associated with the proposed project but few of the benefits.

Where a project confers important benefits on society, society may accept a level of inequity in the distribution of those benefits. In this case, however, the Panel finds that the potential impact on many species, from both terrestrial and marine environments, could be incommensurate with available benefits. The local community would experience social, cultural and economic concerns that would not be compensated by the projected gains. The province would have to cope with the environmental burdens of greenhouse gases and potential risks to the tourism industry; it could face continuing requirements to manage features on the site after decommissioning. At a national level, species at risk and the most successful lobster fishery in Atlantic Canada may be threatened for a project that would yield minimal benefits to the economy.

For the most part, the items presented in Table 3.2 have the potential for some form of future mitigation. With proper planning, creation of adequate baselines, regular monitoring and appropriate management practices, the burden represented by individual elements could be reduced. The Panel believes, however, that in some cases the costs associated with mitigation could become prohibitively expensive (thereby undermining the viability of the Project) or engender other environmental effects (requiring additional assessment that may lead to conclusions that the Project would have adverse effects). For example, the Panel notes that construction of an artificial breakwater to ensure ship safety on a risky coastline could reduce the risk of docking accidents but would involve significant costs; the presence of such a structure could seriously alter the local marine ecosystem, creating the potential for significant adverse environmental effects. The Panel believes that the sum of these burdens represents a substantial cost for those unlikely to benefit from the Project.

One burden repeatedly heard in the scoping sessions, in documents provided to the Panel, and in the hearings warrants further discussion as a significant adverse environmental effect: community core values.

3.5 CORE VALUES

Core values are beliefs shared by individuals within groups. Core values constitute defining features of communities since they reflect to some degree the manner in which the group has come to hold the attitudes, character, preferences and outlooks it has. Digby Neck and Islands has developed over many years as a result of conditions operating from the time it was first colonized by permanent settlers. Current livelihoods and lifestyles reflect that history of settlement. Formative conditions experienced by those communities over their lifetimes included limited economic

Table 3-1 Benefits Identified with Proposed Quarry

Benefits	Extent of Impact
Jobs (ranging from skilled to unskilled) will become available during the construction phase with 225 person-years of direct employment, and during the operational phase with 34 direct and 6.5 indirect.	Local, Regional, National
Annual operating tax revenues of $1 million to the federal government, $0.8 million to Nova Scotia and $0.13 to 0.4 million to the municipal government. Additional taxes will be paid during 18 months of construction	Local, Regional, National
Direct and indirect expenditures, e.g., heavy equipment, electrical power, ANFO explosive, fuel, and various services such as insurance etc.	Local, Regional, National
Corporate access to a reliable resource base that is accessible to ships, thereby helping to keep transportation costs low.	International
Economic development and diversification of Digby Neck through the creation of a new aggregate extraction capacity.	Local
66% of direct annual expenditures ($13.0 million) will accrue to the international shipping community.	International
Job training particularly for youths and females	Local

Table 3-2 Burdens Identified with Proposed Quarry

Burdens	Extent of Impact
Environmental threats to organisms at risk such as marine mammals, fish, birds and rare plant species.	Local, Regional, International
Perceived impact on tourism because proposed project would be at odds with marketed image of Nova Scotia as a pristine environmental setting.	Local, Regional
The presence of a marine quarry on Digby Neck would be discordant with external assessments of it as a Marine Conservation Area, as a World Biosphere Reserve and as a Smart Community	Local, Regional
The Project could add 80,000 tonnes of greenhouse gases to the Nova Scotia bottom line	Regional, National
The Project could add 20,000 tonnes of vessel generated greenhouse gases to the atmosphere	International
A serious coastal accident, during weekly approaches and departures of a 70,000 ton bulk carrier, is possible along a hazardous and unpredictable shore.	Local, Regional
Possible conflict with other sectors (e.g., fisheries, tourism) could lead to some jobs being lost that could offset any gains offered by the Project.	Local
Nova Scotia laws do not require any royalty payments, taxation or fees to be paid for the commercial extraction of basalt.	Local, Regional
The Aboriginal community fears loss of access to traditional resources through actions related to the Project.	Local, Regional
Creation of a marine coastal quarry at Whites Cove sets a precedent for future proposals to access North Mountain basalt.	Local, Regional
Surrounding local communities could, as a result of the Project's operational activities, experience a change in quality of life and property enjoyment through: altered air quality, reduced tranquility, increased vehicular and ship traffic, a brighter night sky, reduction in groundwater quantity and lower property values.	Local
Local fishers who have worked coastal waters for generations could experience environmental change, loss of commercial stocks, inconvenience or displacement resulting from marine terminal activities or ship movements.	Local
Wildlife displacement, which includes wintering water birds and migratory species, may come about through Project effects, such as blasting, artificial lighting, noise, loss of gear, contaminant runoff, on traditional habitats.	Local
The proposed project site harbours a coastal wetland (fen) that is at risk of possible alteration or destruction before a full evaluation of its ecological significance has been properly carried out.	Local
Direct conflict with community core values	Local
Project is unlikely to make a meaningful contribution to sustainability of Digby Neck and Islands	Local
6% increase in ship traffic in the Bay of Fundy	Local, Regional
Proponent's decommissioning plans include leaving the marine terminal in place, despite the lack of any convincing evidence that it would constitute a community asset	Local
Introduction of invasive marine species	Local, Regional

opportunities, dependence on diverse resource-based livelihoods, and a strong and dynamic sea-land connection. The small population developed a strong sense of mutual interconnectedness and interdependence based on making a living from local resources.

Communities articulate their defining core values most effectively in communal, introspective discussions by stakeholders: people from those communities who share common interests but have specific needs and goals. Communities on Digby Neck and Islands have been engaged for almost a decade in various activities that, although designed to encourage economic development, required a form of introspection that revealed the community's beliefs. *Vision 2000*, the multi-year community action plan produced by the Western Valley Development Authority for Digby and Annapolis counties, was just one of several such community vehicles. A close analysis of it and other presentations to the Panel revealed features that, considered collectively, constitute the community value system. Individuals repeatedly referred to the importance of community unity and the need for local participation in any decision process. People in Digby Neck and Islands believe strongly in self-determination and self-sufficiency. They referred often to the importance of a strong sense of place, a living connection with traditional lifestyles, harmony with environment coupled with a strong sense of stewardship as a way of life. Community members informed the Panel at every juncture that Digby Neck and Islands is a unique environment—some might call it a "sacred landscape".

"Sacred landscapes, then, are places that are consecrated by sacrifice and special treatment and endowed by a community with the power of highly revered convictions, values and virtues." (Randolph Hester, 2006, Design for Ecological Democracy. MIT Press, Cambridge, MA, p. 117)

Presentations made to the Panel were by turns angry, emotional, pleading, resigned and eloquent, usually accompanying people's descriptions of their way of life, its qualities and traditions. One issue raised repeatedly addressed the core value of community interdependency and unity which had characterized Digby Neck and Islands for generations. Beginning with the initial proposals for a quarry and marine terminal, a sharp difference of opinion appeared, polarizing those who viewed 34 jobs as a short-term adjustment to unemployment concerns, and those who saw the proposed change as a fundamental long-term transition away from community values and practices. Presentations to the Panel lamented the changes that had already occurred in the community as a result of the proposal, while also drawing attention to other values that the Project threatened (such as independence or self-determination of communities to choose their own path rather than having it imposed on them). These characteristics describe the attitudes in evidence throughout the Joint Panel process.

Policies reflecting community values show little support for an industrial-lifestyle model; most of the local focus is on small businesses that draw on local strengths and environmental quality. These communities are sufficiently unique that they are difficult to evaluate using an industrial model that values jobs and material gain as the primary measures of success, rather than traditional lifestyles and quality of life. The *Vision 2000* document enunciates the community's belief in the complex interdependence of economy, ecosystems and community values. The Panel heard strong collective support for the concept of sustainability and stewardship of land and ocean environments, with a strong emphasis on the tranquility of an unspoiled setting. Because Tourism Nova Scotia

recognizes that environmental quality and community character are things tourists identify as important reasons for their visits, as a provincial department it has committed to these values in its branding process. These policy goals of local and provincial agencies are a direct outgrowth of the community's core values. Core values expressed at the local, regional and national levels address the interplay of economic development, ecosystems and socio-cultural issues that communities have chosen to use to guide decision-making about development.

A Biological Analogy

The following analogy, although not perfect, provides a perspective on the potential impact of the proposed quarry and marine terminal on the communities of Digby Neck and Islands.

DNA occurring in all living cells can be thought of as the cell's "core values" in that it is a repository of information acquired through evolution that ultimately defines the form and function of that cell. The information contained in the DNA is transferred through the "expression" of specific protein molecules that eventually confer unique characteristics to that cell, thereby defining it relative to other cells. A community's core values are also acquired through time and interaction; they represent information that governs the uniqueness of the community. The information contained in a community's core values is "expressed" in the community through specific outcomes such as: the elaboration of a common community vision; an understanding as to the role of environment in economic development; or general acknowledgment of the importance of traditional values. These outcomes are characteristics that define and distinguish one community from another.

Unwanted changes often occur in DNA, resulting from chance mutations during cell division or as a result of some long-term environmental impact, e.g., exposure to toxic chemicals or excessive ultraviolet light. The changed DNA then produces altered protein molecules that irrevocably alter the cell's defining characteristics. In a similar way, unwanted long-term impacts on a community can bring about transformation of its core values, resulting in altered outcomes that irrevocably change the community.

Change is a natural and often welcomed occurrence in both cells and communities. In biology, it is the fundamental underpinning of the process of natural selection, a random process in which success is measured, over very long time spans, by an organism's "fitness" in its environment. Many mutations result in changes that create organisms totally unfit for their surroundings, and those organisms are unsuccessful; mutations that make an organism better adapted will be reproduced, contributing to evolutionary change.

With communities the analogy breaks down at this point because humans exercise reason and free will. People are free to take stock and they are free to make changes in concert with accepted community standards. In other words, community change need not be a random process. Deciding on development directions typically involves a process of thoughtful deliberation, community introspection and conscious decision-making. Such a participatory community development approach has been reinforced by higher levels of government and recognized nationally and internationally as integral to a model of sustainable community development.

The imposition of a major long-term industrial site on a community that has spoken in strong terms about its intention to take a different developmental path could transform the community with a randomness that communities seek to avoid by engaging in deliberative processes of visioning and planning to identify desirable futures.

The Panel considers the community's core values to be a Valued Environmental Component, as important to the broader ecosystem as any other part of the environment. From the body of accumulated evidence, the Panel concludes that the implementation of the proposed Whites Point Quarry and Marine Terminal complex would introduce a significant and dramatic change to Digby Neck and Islands, resulting in sufficiently important changes to that community's core values that warrant the Panel describing them collectively as a Significant Adverse Environmental Effect that cannot be mitigated.

4 CONCLUSIONS AND RECOMMENDATIONS

4.1 DETERMINATION REGARDING THE PROJECT

RECOMMENDATION 1

After considering all the information available through the scoping sessions, Environmental Impact Statement, information requests and responses, hearing transcripts and other items in the public record, the Panel concludes that it must advise the Minister of Environment (Canada) and the Minister of Environment and Labour (Nova Scotia) to reject the proposal made by Bilcon of Nova Scotia to create the Whites Point Quarry and Marine Terminal. The Panel believes that the Project would not make a net contribution to sustainability and that it is likely to cause a significant adverse environmental effect that, in the opinion of the Panel, cannot be justified in the circumstances.

Many factors influenced the Panel's decision. To guide its decision-making the Panel considered five guiding principles: use and respect for traditional and community environmental knowledge; public involvement; sustainable development; the ecosystem approach; and the precautionary approach. The Panel examined government and community policies, strategies, guidelines and legislation. Within this framework the Panel evaluated all aspects of the proposed Project: planned activities; impacts on land, ocean and human communities; affected renewable resources and their capacity to meet present and future needs; proposed mitigation measures; and cumulative effects. The Panel judged the information against the spirit and letter of the decision-making framework. The Panel determined that the Proponent did not adequately consider the principles in preparing and presenting its information.

The Panel considered the possible delineation of follow-up measures but in light of its recommendation to reject the Project has decided not to make any additional recommendations in that respect.

The Panel believes that the assessment would have benefited from more effective integration of traditional community knowledge into the EIS. The public consultation employed by the Proponent was not effective in creating a transparent process where community members felt that they could openly and freely express their opinions and concerns about the Project. Consequently, for example, information on ocean conditions during extreme weather events that the Panel believed essential to understanding the potential effects of the Project became available only during the hearings. The Proponent failed to incorporate vital information into its consideration of alternatives or into its project design.

Ambiguity about what the Proponent proposed raised significant problems for the Panel. The project description drifted in response to questions being asked, but not always in ways that resolved the Panel's concerns about adverse environmental effects. Effects prediction and appropriate mitigation measures depend on clarity in a project description. If projects are approved, companies then operate within a context

defined by the Project Description, the mitigations associated with predicted effects, and regulatory requirements set by government. Without certainty about what is proposed, parties cannot establish the trust and openness needed for cooperation to minimize the effects of a project through its operation. The Panel concluded that the Proponent did not adequately specify details about elements of the Project Description required for the assessment process.

The Panel found the Proponent's EIS inadequate in several respects. Although the EIS and other material provided to the Panel through various submissions offered sufficient information for the Panel to identify potential effects of concern, the Panel concluded that in some cases the EIS suffered from ambiguity, a lack of transparency, incomplete or incorrect information, and limited consideration of community sustainability. The Panel itemized its findings regarding its analysis of the adequacy of the EIS in chapter 2. The Panel concluded that the Proponent failed to meet the onus of proof that it could proceed with the Project with no risk of a significant adverse environmental effect.

The EIS presented to the Panel proved overwhelming in volume, with more than 3000 pages in the original submission and another 1000 pages in response to information requests. Its organization made navigating the information a challenge for the Panel and interested parties. At the same time, the Panel sometimes found the Proponent unresponsive to requests for specific information needed to understand potential effects. The EIS suggested that the risk of accidents and malfunctions was limited and therefore it gave relatively little attention to possible effects. Several information requests from the Panel met with negative responses: that the Proponent would provide data or conduct studies only after project approval. In these cases, the Panel looked to submissions from government agencies, expert presenters, and interveners in the process to supplement data available from the EIS.

Uncertainties remain about several project effects. For example, quarrying activity has the potential to alter groundwater regimes; effective mitigation would require long-term management strategies to prevent dewatering of the aquifer in ways that could affect future generations of residents in the area and habitats along Little River. Conserving rare floral species unique in the region would require continuous monitoring and micro-management. Reducing the risks of shipping accidents on the dangerous exposed shoreline (with consequent adverse effects on marine life and economic activities) would either require a different marine terminal design (not likely to receive federal approvals because of other environmental effects) or would require costly assistance from tugs. Compensating opportunity losses to fishing interests would require more robust compensation programs. As these examples illustrate, the mitigation measures that would be required for alternative means either present on-going obligations to the communities (local, provincial and federal) and/or entail significant additional costs to the Project. Given the very low value of the commodity being produced and the high potential cost of some mitigation measures that would be necessary to reduce adverse environmental effects, the Panel concludes that the Proponent has not demonstrated the economic viability or technical feasibility of the Project.

When evaluating whether projects should proceed in environments that provide habitat to species at risk, environmental assessments must pay special attention to

the precautionary principle. The Bay of Fundy hosts several endangered species such as the North Atlantic right whale, the inner Bay of Fundy salmon and the harlequin duck. Rare plant species were identified on the site. While the risk of incidents that could cause death to members of these species may be low, experts were less certain about the potential for adverse behavioural or habitat effects that could be caused by project activities. For instance, incremental additions to shipping traffic in the Bay of Fundy from a range of projects incrementally increase the risk of ship strikes with whales or the release of invasive organisms that could affect the lobster fishery, but at what point does the increase in vessel traffic become "significant"? The Panel concluded that in answering such questions it must consider whether the overall benefits from the Project may be worth the risks that the Project generates. Does the Project make a net contribution to sustainability? Given the limited economic and social benefits of the Project to the local communities, the province, and the country, the Panel found the Project should not proceed in a situation where endangered species and a local way of life would be at risk due to project effects.

A primary consideration influencing the Panel's decision to recommend rejection of this Project is the adverse impact on a Valued Environmental Component: the people, communities and economy of Digby Neck and Islands. This region of Nova Scotia is unique in its history and in its community development activities and trajectory. Its core values, defined by the people and their governments, support the principles of sustainable development based on the quality of the local environment. Local residents are deeply embedded within and dependent on the terrestrial and marine ecosystems of this region: human health and well-being is intrinsically linked with the viability of the ecosystem. The Panel believes that the Project as proposed would undermine community-driven economic development planning and threaten an area recognized and celebrated as a model of sustainability by local, regional, national and international authorities. The Project is inconsistent with many government policies and principles at local, provincial and national levels. The Project does not make a net contribution to sustainability and is likely to have a significant adverse environmental effect on the people and communities that comprise Digby Neck and Islands, which are without doubt integral, essential and valued components of that environment.

1. The Panel recommends that the Minister of Environment and Labour (Nova Scotia) reject the proposal made by Bilcon of Nova Scotia to create the Whites Point Quarry and Marine Terminal and recommends to the Government of Canada that the Project is likely to cause significant adverse environmental effects that, in the opinion of the Panel, cannot be justified in the circumstances.

4.2 OTHER RECOMMENDATIONS

RECOMMENDATION 2

Coastal zone management policies worldwide are thought to number 350, in 100 countries. Canada has no national policy and Nova Scotia has no provincial coastal zone policy. The Panel found that provincial departments in Nova Scotia currently differ in the priorities they set for the coastal zone, thus contributing to uncertainty for communities and investors about what kinds of uses should be permitted. Federal authorities promote free trade and community sustainability without acknowledging that in some cases those

objectives conflict. Panel members repeatedly heard from interveners that proposals for major industrial developments targeted at internationally recognized or environmentally important coastal regions should be deferred until a provincial plan on coastal management policy has been completed.

The Panel believes that with such an extensive coast line to manage, Nova Scotia needs to expedite planning for the coastal zone to facilitate decision-making. The development of such plans and policies would create a more predictable environment about what kinds of activities should occur where in the coastal zone. It could resolve debates about protecting rare coastal habitats, and could establish appropriate buffer zones and management practices for environmental protection of rare habitats and sensitive ecosystems in the coastal zone.

2. The Panel recommends that the Province of Nova Scotia develop and implement a comprehensive coastal zone management policy or plan for the Province.

RECOMMENDATION 3

Choices about where governments permit quarries must respond to identified priorities and should consider the results of community consultations. Coastal areas of Canada with good-quality stone and access to deep anchorage present opportunities for large coastal quarries that exclusively serve export markets. At the same time, however, these coastal areas are valued for their environmental quality and their contributions to the regional economy through fisheries and tourism. Coastal quarries represent a special case, principally because their environmental reach is magnified. In addition to a quarry's normal influence on terrestrial and atmospheric environments, coastal quarries exert direct effects on the marine environment through the extraction process and the involvement of large ships. In a marine setting, a quarry's influence will be felt on recreational activities, tourism, shipping, large mobile animals, the commercial fishing industry and local aesthetics (since a large-scale operation is a prominent coastal feature). Perhaps most importantly, there is always the potential for the creation of a downstream effect mediated by the circulation of local ocean currents. For these reasons, the Panel concludes that coastal quarries should be viewed as special cases, warranting special consideration, especially within the context of a coastal management policy that defines principles relating to coastal land use.

Many nations have recognized the economic prospects and the significant environmental challenges that accompany mega-quarries. Several countries have adopted special policies to manage the location and address the effects of such quarries in the context of competing uses and visions for the coastal zone. Although Nova Scotia is surrounded by water, it lacks guidelines for evaluating proposals for coastal quarries; this leaves economic planning bereft of local or regional input as to best practices. Given its proximity to markets in the United States, where aggregate demand is expected to increase dramatically in the next decades, Nova Scotia needs to consider how it will address proposals for coastal quarries while achieving the range of values that Nova Scotians believe are important in the coastal zone.

3. Because of the special issues associated with coastal quarries, the Panel recommends a moratorium on new approvals for development along

the North Mountain until the Province of Nova Scotia has thoroughly reviewed this type of initiative within the context of a comprehensive provincial coastal zone management policy, and established appropriate guidelines to facilitate decision-making.

RECOMMENDATION 4

Although the Panel recognizes that the provincial government has the mandate to make decisions about proposals for quarrying projects, the Panel concurs with representations that suggested that local governments and communities have a right to be consulted in the process. Local governments are given the responsibility to engage in land use planning but currently lack the authority to manage extraction projects that can influence their options for the future and potentially undermine decades of community development activities. Because local communities and municipal governments have no role in identifying where extraction can occur, they can become vocal opponents to proposals for mines; communities that avert approvals may unfairly pass the environmental costs onto neighbouring jurisdictions. Municipalities need to anticipate future local demand for aggregate extraction and plan for it in their land-use planning to avoid potential land-use conflicts. A more cooperative approach between NSEL and the municipalities could benefit the aggregate industry by reducing current uncertainties about where aggregate extraction can occur. The Nova Scotia economy requires that aggregate resources continue to be available when and where they are required, but fairness suggests that municipalities and community members have the right to participate in determining how that is achieved.

4. The Panel recommends that the Province of Nova Scotia develop and implement more effective mechanisms than those currently in place for consultation with local governments, communities and proponents in considering applications for quarry developments.

RECOMMENDATION 5

Quarries of any size have major environmental effects. Removing large amounts of stone changes the landscape and affects neighbouring communities and ecosystems. Current policy in Nova Scotia exempts small quarries (less than 4 hectares) from full environmental review. The Panel believes that the current policy facilitates “quarry creep”: that is, the incremental expansion of small quarries to larger ones. A comprehensive review of environmental effects for proposed Projects would provide opportunities for community and expert input that might identify important values that government needs to consider. Full review of requests for expansion allows communities and government to evaluate the effectiveness of earlier predictions and to consider the latest evidence on potential effects.

5. The Panel recommends that the Province of Nova Scotia modify its regulations to require an environmental assessment of quarry projects of any size.

RECOMMENDATION 6

The Proponent identified adaptive management as an important strategy to minimize risk and to ensure appropriate actions to counter potential environmental effects. The review process revealed a range of opinions about what adaptive management requires. Interveners argued that adaptive management can work only when basic conditions of scientific knowledge and environmental management

are met. The Proponent used the term more loosely to suggest a process of incremental adjustment based on learning from experience. The Panel concluded that participants in environmental review processes require greater clarity from government on what adaptive management means; an agency like CEAA could assist the environmental assessment process by producing guidance documents on adaptive management.

6. The Panel recommends that the Canadian Environmental Assessment Agency develop a guidance document on the application of adaptive management in environmental assessments and in environmental management following approvals.

RECOMMENDATION 7

Given the significant risk that invasive or unwanted species present to ecosystems and the economies that depend on them, the Panel urges government to consider ways to strengthen current ballast water regulations. While requiring 95% ballast exchange may slow down the rate of transmission of foreign organisms, it does not sufficiently reduce the risk. In the absence of effective ballast water management, every ship coming from ports or regions where disease organisms are found presents a significant risk to the lobster fishery of Atlantic Canada.

7. The Panel recommends that Transport Canada revise its ballast water regulations to ensure that ships transporting goods from waters with known risks take appropriate measures to significantly reduce the risk of transmission of unwanted species.

4.3 SUMMARY OF RECOMMENDATIONS

1. The Panel recommends that the Minister of Environment and Labour (Nova Scotia) reject the proposal made by Bilcon of Nova Scotia to create the Whites Point Quarry and Marine Terminal and recommends to the Government of Canada that the Project is likely to cause significant adverse environmental effects that, in the opinion of the Panel, cannot be justified in the circumstances.

2. The Panel recommends that the Province of Nova Scotia develop and implement a comprehensive coastal zone management policy or plan for the Province.

3. Because of the special issues associated with coastal quarries, the Panel recommends a moratorium on new approvals for development along the North Mountain until the Province of Nova Scotia has thoroughly reviewed this type of initiative within the context of a comprehensive provincial coastal zone management policy and established appropriate guidelines to facilitate decision-making.

4. The Panel recommends that the Province of Nova Scotia develop and implement more effective mechanisms than those currently in place for consultation with local governments, communities and proponents in considering applications for quarry developments.

5. The Panel recommends that the Province of Nova Scotia modify its regulations to require an environmental assessment of quarry projects of any size.

6. The Panel recommends that the Canadian Environmental Assessment Agency develop a guidance document on the application of adaptive management in environmental assessments and in environmental management following approvals.

7. The Panel recommends that Transport Canada revise its ballast water regulations to ensure that ships transporting goods from waters with known risks take appropriate measures to significantly reduce the risk of transmission of unwanted species

APPENDIX 1 – JOINT PANEL AGREEMENT

AGREEMENT

concerning

The Establishment of a Joint Review Panel
for the Whites Point Quarry and Marine Terminal Project

between

The Minister of the Environment, Canada

and

The Minister of Environment and Labour, Nova Scotia

PREAMBLE

WHEREAS the Minister of Environment and Labour, Nova Scotia, has statutory responsibilities pursuant to the Nova Scotia *Environment Act*; and

WHEREAS the Minister of the Environment, Canada, has statutory responsibilities pursuant to the *Canadian Environmental Assessment Act*; and

WHEREAS Bilcon of Nova Scotia Corporation (Proponent) is proposing to construct and operate a basalt quarry, processing facility and marine terminal located on Digby Neck in Digby County, Nova Scotia, which is subject to an environmental assessment under both the *Canadian Environmental Assessment Act* and the Nova Scotia *Environment Act*; and

WHEREAS the Whites Point Quarry and Marine Terminal project (Project) was referred to a review panel in accordance with section 21 of the *Canadian Environmental Assessment Act*; and

WHEREAS the Minister of Environment and Labour, Nova Scotia, may, pursuant to section 47 of the Nova Scotia *Environment Act*, enter into an agreement with another government agency to conduct a joint review and to adopt, for the purposes of the review, all or part of that government agency's procedures for environmental assessment; and

WHEREAS the Minister of Environment and Labour, Nova Scotia, may, pursuant to section 48 of the Nova Scotia *Environment Act*, enter into an agreement with another government agency to provide for a single hearing process; and

WHEREAS the Minister of Environment and Labour, Nova Scotia, and the Minister of the Environment, Canada, have determined that a joint review of the Project will ensure that the Project is evaluated according to the spirit and requirements of their respective legislation while avoiding unnecessary duplication, delays and confusion that could arise from separate environmental assessments; and

WHEREAS the Minister of the Environment, Canada, has determined that a joint review panel should be established pursuant to paragraph 40(2)*(a)* of the *Canadian Environmental Assessment Act*;

THEREFORE, the Minister of Environment and Labour, Nova Scotia, and the Minister of the Environment, Canada, hereby establish a joint review panel (Panel) for the assessment of the Project in accordance with the provisions of this Agreement and the Terms of Reference attached hereto as an Appendix.

1. Definitions

For the purpose of this Agreement and of the Appendix attached hereto,

"**Agency**" means the Canadian Environmental Assessment Agency.

"**Environmental Impact Statement**" means the document that presents the results of the environmental assessment conducted by the Proponent.

"**Federal Authority**" refers to such an authority as defined in the *Canadian Environmental Assessment Act.*

"Environmental Effect" means, in respect of the Project,

(a) any change that the Project may cause in the environment, including any change it may cause to a listed wildlife species, its critical habitat or the residence of individuals of that species, as those terms are defined in subsection 2(1) of the *Species at Risk Act*,

(b) any effect of any change referred to in paragraph (a) on

(i) health and socio-economic conditions

(ii) physical and cultural heritage

(iii) the current use of lands and resources for traditional purposes by aboriginal persons

(iv) any structure, site or thing that is of historical, archaeological, paleontological or architectural significance, or

(c) any change to the Project that may be caused by the environment,

Whether any such change or effect occurs within or outside Canada.

"Follow-up Program" means a program for

(a) verifying the accuracy of the environmental assessment of the Project, and

(b) determining the effectiveness of any measures taken to mitigate the adverse environmental effects of the Project.

"Panel" means the joint review panel established by the Minister of Environment and Labour, Nova Scotia, and the Minister of the Environment, Canada, pursuant to this Agreement.

"Mitigation" means, in respect of the Project, the elimination, reduction or control of the adverse environmental effects of the Project, and includes restitution for any damage to the environment caused by such effects through replacement, restoration, compensation or any other means.

"Parties" mean the signatories to this Agreement.

"Project" means the Whites Point Quarry and Marine Terminal project, located near Digby, Nova Scotia, as described in Part I of the Appendix attached hereto.

"Proponent" means Bilcon of Nova Scotia Corporation.

"Report" means the document produced by the Panel which shall contain the recommendations of the Panel pursuant to the Nova Scotia *Environment Act* and the Panel's rationale, conclusions and recommendations, including any mitigation measures and follow-up program, pursuant to the *Canadian Environmental Assessment Act* with respect to the environmental assessment of the Project.

"Responsible Authority" refers to such an authority as defined in the *Canadian Environmental Assessment Act*.

2. Establishment of the Panel

2.1. A process is hereby established for the creation of a joint review panel, pursuant to sections 40, 41 and 42 of the *Canadian Environmental Assessment Act*, and sections 47 and 48 of the Nova Scotia *Environment Act*.

2.2. Nova Scotia Environment and Labour and the Agency will make arrangements for the coordination of joint announcements respecting the joint review of the Project.

3. Constitution of the Panel

3.1. The Panel shall consist of three members, one of whom shall be the chairperson.

3.2. Each of the Parties will provide a list of three nominees, and at least one nominee selected by each of the Parties will be appointed to the Panel. The Parties will agree on the nomination of one of the three final nominees to be chairperson. The Minister of the Environment, Canada, will appoint the members of the Panel, including the chairperson.

3.3. The Panel members shall be unbiased and free from any conflict of interest relative to the Project and are to have knowledge or experience relevant to the anticipated environmental effects of the Project.

4. Conduct of the Review by the Panel

4.1. The Panel shall conduct its review in a manner that discharges the requirements set out in the *Canadian Environmental Assessment Act,* Part IV of the Nova Scotia *Environment Act* and the Terms of Reference attached hereto as an Appendix.

4.2. All Panel hearings shall be public and shall provide for public participation.

4.3. The Panel shall have all the powers and duties of a panel set out in section 35 of the *Canadian Environmental Assessment Act*.

5. Secretariat and Administrative Matters

5.1. Administrative, technical, and procedural support for the Panel shall be provided by a Secretariat, and the establishment of the Secretariat shall be the responsibility of Nova Scotia Environment and Labour and the Agency.

5.2. The Secretariat shall report to the Panel and shall be structured so as to allow the Panel to conduct its review in an efficient and cost-effective manner.

5.3. Following the appointment of the Panel, the Parties shall finalize a budget, agreeable to both Parties, for the review.

5.4. Costs associated with the review will be apportioned between the Parties in accordance with a cost-sharing agreement to be finalized following the appointment of the Panel.

6. Record of Review and Report

6.1. A public registry consisting of all submissions, correspondence, hearing transcripts, exhibits and other information received by the Panel and all public information relating to the review of the Project shall be maintained by the Secretariat during the course of the review in a manner that provides for convenient public access, and for the purposes of compliance with section 55 of the *Canadian Environmental Assessment Act* and the practices of
Nova Scotia Environment and Labour.

6.2. On completion of the review of the Project, the Panel shall prepare a Report for submission to the Minister of Environment and Labour, Nova Scotia, and the Minister of the Environment, Canada.

6.3. The Report shall include recommendations on all factors set out in section 16 of the *Canadian Environmental Assessment Act* and, pursuant to Part IV of the Nova Scotia *Environment Act*, recommend either the approval, including mitigation measures, or rejection of the Project.

6.4. Once completed, the Panel will submit the Report, in both official languages, to the Minister of Environment and Labour, Nova Scotia, and the Minister of the Environment, Canada, and will make it public.

6.5. Once the Report is submitted to the Minister of Environment and Labour,
Nova Scotia, and the Minister of the Environment, Canada, the responsibility for the maintenance of the public registry, pursuant to the *Canadian Environmental Assessment Act*, will be transferred to the Responsible Authority.

6.6. The Responsible Authority shall take into consideration the Report submitted by the Panel and, with the approval of the Governor in Council, respond to the Report. Then, the Responsible Authority shall take one of the courses of action provided for in subsection 37(1) of the *Canadian Environmental Assessment Act* that is in conformity with the approval of the Governor in Council.

6.7. The Minister of Environment and Labour, Nova Scotia, shall consider the recommendation of the Panel, and either approve with conditions, or reject the Project.

7. Other Government Departments

7.1. At the request of the Panel, federal and provincial authorities having specialist knowledge with respect to the Project shall provide available information and knowledge in a manner acceptable to the Panel.

Subject to clause 7.1 of this Agreement and subsection 12(3) of the *Canadian Environmental Assessment Act*, nothing in this Agreement shall restrict participation by way of submission to the Panel by other federal or provincial government departments or bodies.

8. Participant Funding

8.1. Participant funding for the review will be administered by the Agency pursuant to the federal Participant Funding Program**.**

9. Amending this Agreement

9.1. The Parties may amend this Agreement by written memorandum executed by both the Minister of the Environment, Canada, and the Minister of Environment and Labour, Nova Scotia. Subject to section 27 of the *Canadian Environmental Assessment Act*, this Agreement may only be terminated by mutual agreement of the Parties.

In Witness whereof the Parties hereto have put their signatures this _____ day of _____ 2004.

Original signed by:

Minister of the Environment
Canada

Original signed by:

Minister of Environment and Labour,
Nova Scotia

APPENDIX - TERMS OF REFERENCE

Terms of Reference for the Joint Review Panel

Part I - Project Description

Bilcon of Nova Scotia Corporation is proposing to construct and operate a basalt quarry, processing facility and marine terminal located on Digby Neck in Digby County, Nova Scotia.

Quarrying is expected to take place on 120 hectares of land, with production expected to be 2 million tonnes of aggregate per year. Approximately 4 hectares of new quarry would be opened each year. The land-based quarry operations are expected to be year-round, with aggregate stockpiled for ship loading once per week. Drilling and blasting of basalt rock, loading, hauling, crushing, screening, washing and stockpiling would be done on-site.

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

Marine facilities would include a conveyor, ship loader, berthing dolphins and mooring buoys. Construction processes for the marine terminal infrastructure would include the anchoring of pile support structures to the basalt rock extending offshore, as well as the construction of concrete caps as dolphins. Approximately 40,000 tonnes of aggregate would be produced for loading each week.

Part II – Components of the Review

1. The Agency and Nova Scotia Environment and Labour shall prepare draft guidelines regarding the scope of the Environmental Impact Statement. The public and stakeholders shall be provided with forty-five (45) days to review the draft guidelines and provide comments to the Agency and Nova Scotia Environment and Labour. Comments received from the public and stakeholders will be provided to the Panel upon its appointment.

2. The Panel will hold scoping meetings in locations determined by the Panel within the area likely to be affected by the Project, or in any area reasonably close to where the Project is proposed to be carried out where appropriate.

3. After taking into account the comments received from the public and stakeholders, the Panel shall issue the Environmental Impact Statement guidelines.

4. The Panel shall require the Proponent to prepare the Environmental Impact Statement in accordance with the guidelines issued by the Panel. The Environmental Impact Statement shall be submitted to the Panel.

5. The Panel shall require the Proponent to distribute the Environmental Impact Statement for examination and comment by the public and stakeholders to determine whether additional information should be provided before convening public hearings. This information shall be made available for public examination and comment for a period of not less than sixty (60) days. Comments made by the public or stakeholders pursuant to this clause shall be filed in writing with the Panel.

6. Written comments received pursuant to clause 5 shall be immediately provided to the Proponent by the Panel. The Proponent shall, as appropriate, provide to the Panel its response to the written comments not later than fifteen (15) days following completion of the period for public examination and comment.

7. Should the Panel identify deficiencies after reviewing the Environmental Impact Statement, and in consideration of any comments received from the public, stakeholders or the Proponent pursuant to clauses 5 and 6, the Panel may require additional information from the Proponent. Any request for additional information shall be issued within fifteen (15) days following the expiration of the period for public examination and comment described in clause 5 or fifteen (15) days following receipt of written comments from the Proponent as described in clause 6, whichever occurs later. The Panel will determine the need, timing and location of any public meetings in connection with clauses 5, 6 and 7.

8. The Panel shall schedule and announce the start of public hearings once the Panel is satisfied that sufficient information has been provided. A minimum of thirty (30) days public notice will be provided prior to the start of the hearings.

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

10. The Panel shall deliver its Report to the Parties within ninety days (90) following the close of the public hearings.

11. For procedural matters not specifically addressed herein, the Panel shall be guided by the *Procedures for an Assessment by a Review Panel*, a Ministerial Guideline issued pursuant to paragraph 58(1)(a) of the *Canadian Environmental Assessment Act*.

Part III – Scope of the Environmental Assessment and Factors to be considered in the Review

The Minister of Environment and Labour, Nova Scotia, and the Minister of the Environment, Canada, have determined that the Panel shall include in its review of the Project, consideration of the following factors:

a) purpose of the Project;

b) need for the Project;

c) alternative means of carrying out the Project that are technically and economically feasible and the environmental effects of any such alternative means;

d) alternatives to the Project;

e) the location of the proposed undertaking and the nature and sensitivity of the surrounding area;

f) planned or existing land use in the area of the undertaking;

g) other undertakings in the area;

h) the environmental effects of the Project, including the environmental effects of malfunctions or accidents that may occur in connection with the Project and any cumulative environmental effects that are likely to result from the Project in combination with other projects or activities that have been or will be carried out;

i) the socio-economic effects of the Project;

j) the temporal and spatial boundaries of the study area(s);

k) comments from the public that are received during the review;

l) steps taken by the Proponent to address environmental concerns expressed by the public;

m) measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the Project;

n) follow-up and monitoring programs including the need for such programs;

o) the capacity of renewable resources that are likely to be significantly affected by the Project to meet the needs of the present and those of the future; and

p) residual adverse effects and their significance.

APPENDIX 2 – PANEL BIOGRAPHIES

Robert O. Fournier (Chair)

Dr. Fournier received a Ph.D. in Biological Oceanography from the University of Rhode Island in 1967. In 1971, he joined the teaching team of Dalhousie University in Halifax where he has been specializing in Oceanography.

Dr. Fournier has substantive experience with panel reviews. He chaired the National Energy Board-Canadian Environmental Assessment Agency joint review panel for the Sable Gas Project (1996-1998). He also chaired the provincial Electricity Marketplace Governance Committee (2002-2003), co-chaired and facilitated the Provincial Energy Strategy Public Meetings (2001) and chaired the Halifax Cleanup Task Force (1989-1990).

Dr. Fournier is also very well known for his media activities, contributing science commentaries to media including national and local radio, television and magazines since 1974. He is the author or co-author of more than sixty documents on topics ranging from biological oceanography to energy, electricity and the economy.

Jill Grant

Dr. Grant received a Ph.D. in Regional Planning and Resource Development from the University of Waterloo in 1991. Dr. Grant pursued teaching at the Nova Scotia College of Art and Design as a professor in Environmental Planning (1979-2001) and has been a professor at Dalhousie University's School of Planning and a member of the Graduate Faculty since 2001.

Dr. Grant is a member of the Canadian Institute of Planners and served on the editorial board of Plan Canada, which she chaired from 2001 to 2004. She has also been associated with numerous professional journals such as the Journal of the American Planning Association, the Landscape and Urban Planning Journal, the Journal of Industrial Ecology and the Journal of Environmental Management.

Gunter Muecke

Dr. Muecke started his teaching and research career as a field geologist for Shell Canada (1960-1963) and then became a lecturer in Mineralogy at Oxford University (1968-1970). In 1969, he received a D.Phil. in Geochemistry from Oxford University. He then pursued a teaching career at Dalhousie University, in the Department of Geology and Earth Sciences (1970-1998), and at the School of Resource and Environmental Studies (1985-1998). Since 1998, he has assumed post-retirement appointments as Associate Research Professor both at the School of Resource and Environmental Studies and at the Faculty of Science (Geographic Information Systems).

Dr. Muecke has a long-standing interest and involvement in the geological aspects of environmental issues. He has knowledge and direct experience of both the federal and provincial environmental assessment processes, having been an appointed member of the federal-provincial review panel for the Kelly's Mountain Coastal Superquarry Project (1991).

APPENDIX 3 – REGISTERED PARTICIPANTS

- Department of Foreign Affairs and International Trade
- Environment Canada
- Fisheries and Oceans Canada
- Health Canada
- Transport Canada
- Natural Resources Canada
- Nova Scotia Department of Natural Resources
- Nova Scotia Environment and Labour
- Nova Scotia Tourism, Culture and Heritage
- Nova Scotia Transportation and Public Works
- Municipality of the District of Digby
- Municipality of the County of Annapolis
- Town of Annapolis Royal
- Andi Reardon
- Andy Moir
- Andy Sharp
- Arthur Bull
- Ashraf Mahtab
- Atlantic Canada Chapter Sierra Club of Canada
- Bay of Fundy Inshore Fishermen's Association
- Bob Morsches
- Brian and Andrea Meeson
- Brogan Anderson
- Bruce Cunningham
- Calum MacKenzie
- Canadian Parks and Wilderness Society (CPAWS) – Nova Scotia
- Carol Littleton
- Chamber of Mineral Resources of Nova Scotia
- Cheryl Denton
- Chris Callaghan
- Chris Hudson
- Chris Miller
- Chris Taggart
- Chris Tidd
- Christine Igot
- Cindy Nesbitt and John Ivans
- Clean Annapolis River Project
- Climate Action Now
- Clytie Foster
- Confederacy of Mainland Mi'kmaq
- Danny Mills
- David and Linda Graham
- David Hill
- Dean Kenley
- Diane Theriault
- Digby Neck Community Development Association
- Don Mullin
- Dorothy Tidd
- Ecology Action Centre
- Eva Holzwarth
- Fred Ganley
- Freeport Community Development Association
- Fundy Fixed Gear Council
- Gerry Ackerman
- Green Party of Canada
- Green Party of Nova Scotia
- Harold Theriault
- Harold Rowe
- Heather Jenkins
- Heather Leblanc
- Heather Stewart
- Helen Whidden
- Henry Bradford
- Institute for Applied Sciences
- James Graham
- Jan Hermiston
- Janet Larkman
- Jill Klein
- Jim Fisher
- Joan Boutilier
- Jon Percy
- Judith Peach
- June Swift
- Kenneth Deveau
- Kevin Gidney
- L. Wayne Spinney
- Laurence Outhouse
- Laurie McGowan
- Le Conseil des Arts de la Baie
- Leo Glavine
- Leslie Wade
- Linda O'Neill
- Little River Residents Association
- Marilyn Stanton
- Mark Dittrick
- Mary and John Scott
- Mary Lynyak
- Mary MacCarthy
- Matthew Granger
- Maxine MacQuaid
- Michael Corbett
- Michael Hayden
- Micheale Kustudic

- Native Council of Nova Scotia (MERDS)
- Nature Nova Scotia
- Nora Peach
- North Mountain Preservation Group
- Paradise Women's Institute
- Partnership for the Sustainable Development of Digby Neck and Islands Society
- Patricia MacLean
- Penny Graham
- Rob Buckland-Nicks
- Robert Barkwell
- Robert Gibson
- Robert Thibault
- Roger Outhouse
- Scott Leslie
- Sherry Pictou
- Sierra Club of Canada
- Sister Barbara
- Sister Bonnie
- St. Croix Estuary Project, ACAP – St. Croix
- Steve Lewis
- Susan Davis
- Terry Farnsworth
- Tina Little
- Tom Vitiello
- Tom Haynes-Paton
- Tony Kelly
- Tourism Industry of Nova Scotia
- Trudy Bengivenni
- Wanda VanTassel
- William Denton
- William Hilden

APPENDIX 4 – POLICY AND LEGISLATIVE CONTEXT

To understand the context in which governments and communities identify the values used to make decisions about development projects, the Panel reviewed planning documents, policy frameworks, legislation and international agreements that affect the environments and communities potentially affected by the Project. The most important of these mechanisms are described here.

The Panel interpreted these policies, acts and documents as government expressions of community core values that set directions for development; the Panel looked to them for guidance in the assessment process.

PLANNING

The Project is subject to environmental assessment requirements established under provincial and federal legislation. Environmental assessment is a planning tool designed to encourage actions that promote sustainable development. The process identifies environmental, human health, land use, and socio-economic concerns from stakeholders. By considering these issues and concerns, governments can decide whether or not a project is compatible with the value that citizens place on environmental quality and whether or not a proposed development can proceed in a sustainable manner.

The Municipality of the District of Digby has not adopted a municipal planning strategy or zoning. Given that municipalities cannot regulate mining or quarrying, a community plan would not give the municipality any ability to control land use in this case. As participants in the review process argued, the lack of a plan does not mean that the people of Digby Neck and the Islands do not have a vision for their future. The Panel accepted this position and sought direction from other planning policies.

The mission of the local community development association is to promote and develop healthy communities and a healthy environment for Digby Neck. Its submission described planning workshops on community goals and objectives including those relating to community economic development. The association and political representatives for the communities suggested that these past activities provided a consistent message: economic development on Digby Neck should be based on local participation; a focus on small business; the principles that healthy economies and ecologies are intrinsically interconnected; and an integrated approach that combines economic, social and environmental objectives.

The Western Valley Development Authority was a regional development authority forged as a partnership among the two senior levels of government, the seven municipal governments found in Digby and Annapolis counties, and the public. In 1998 and 1999 it facilitated 23 community meetings to discuss values and hopes for the region's future. Additional activities addressed the role of culture in community building, surveyed businesses to assess the needs of the private sector, and engaged the community through an on-line dialogue. The outcome of these efforts was the document *Building Tomorrow -- Vision 2000: Multi-year Community Action Plan for Annapolis and Digby Counties*.

The action plan addressed eight sectors of the human and natural environments. The four most relevant to the proposed Project are described here. One goal is to develop a climate which supports local business development, entrepreneurship, investment, and the attraction of new business. Also of note are objectives to accelerate opportunities for growth through an export development strategy, to provide support for local entrepreneurs and to encourage a more diversified, year-round economy. Another goal is to develop a community-based plan for natural resource management that includes processing resources in the local area. The planning exercise recognized that opportunities exist within the region to develop primary industries, including mining, and that primary processing of natural resources can be carried out in a way that both maintains and even enhances the region's unique culture and environment. However, the residents of the area recognized that careful, sustainable use of the region's natural resources is required to ensure economic opportunities for many

generations to come. The action plan identified the need for the development and implementation of sustainable management plans for each resource use sector and for those plans to be placed in the context of the regional ecology.

The Vision exercise found that the residents of Annapolis and Digby counties wish to promote environmental stewardship practices which preserve the region's biological diversity and ecological heritage. They embrace the concept of sustainable development and see future economic activity carried out in a way that preserves and promotes ecological heritage. They recognize the need for an integrated approach to environmental management.

Is the Vision still valid?
The seven partnering municipalities in the region endorsed *Vision 2000* as a policy document for future developments. Subsequently, some municipal governments withdrew their funding for the development authority and the WVDA ceased to operate. A new community economic development organization is now in place with a new planning process initiated.

The Proponent suggested that the collapse of the WVDA was related to new businesses failing to materialize. This position was not supported by community political representatives or others. Submissions to the Panel indicated that support for the policies of *Vision 2000* remain strong.

Regardless of the current status of the development authority that facilitated the creation of the Vision, the Panel accepted that the *Vision 2000* document remained a valid expression of the residents of the region on their own future.

Vision 2000 establishes a goal of developing and promoting cultural heritage and tourism attractions. Tourism, especially eco-tourism, is singled out due to its importance to Digby Neck and the Islands. The planning document speaks to the need for great care to be taken to prevent economic growth and development from eroding the qualities that continue to draw people to the region.

A model of sustainability:
The communities of the region have received national and international attention and recognition for their approach to economic development. The Economic Developers Association and the Royal Bank named *Vision 2000* the best community plan of 2000. The 1998 CBC *Nature of Things* documentary *Beyond the Crisis* dealt with the activities of one of the local fishery organizations because, according to the Digby Neck Community Development Association, it was an example of local stewardship and local responsibility. During the public hearings an individual advised the Panel that the Federal Government designated the region as a "Smart Community". A former Executive Director of the Western Valley Development Authority stated that UNESCO singled out the area as a centre of study in the Management of Social Transformations Circumpolar Coping Processes Project; the World Bank asked Chinese officials to visit and study the community as a model of the interface between economic development and sustainability, and Habitat, or the United Nations Centre for Human Settlements, called the economic development approach used in the area with its emphasis on sustainable development one of the best 100 practices in the world for improving living conditions.

POLICIES, STRATEGIES AND GUIDELINES

Coastal Policy

Nova Scotia does not have a provincial coastal plan or policy to regulate development in the coastal zone. To understand the aspirations of communities, regions, and governments, the Panel therefore turned to the work of the Gulf of Maine Council on the Marine Environment. The Gulf of Maine Council is a model for multi-jurisdictional

cooperation and partnership which provides a forum for information exchange and discussion of regional issues of concern. The governors of Massachusetts, New Hampshire, and Maine and the premiers of New Brunswick and Nova Scotia created the council in 1989 as a partnership of government and non-government organizations working to maintain and enhance environmental quality in the Gulf of Maine to allow for sustainable resource use. Several principles help guide the council and participating agencies in their decisions involving the Gulf of Maine ecosystem. Each principle is congruent with international protocols and Nova Scotian and Canadian legislation.

Guiding principles for the Gulf of Maine:

- Ecologically sustainable development: The council seeks to meet the region's current social, cultural, and environmental needs without compromising the needs of future generations. Working in partnership with others, it strives to sustain ecological processes and enhance the region's quality of life.
- Ecosystem-based planning and management: The council supports collaborative management that integrates economics and ecological values and objectives, emphasizing natural rather than political boundaries.
- Environmental protection through precaution: The council supports conservation of the coastal and marine environment, and urges its members to proceed with caution when scientific information is incomplete to avoid environmental degradation.
- Public information and participation-based planning and management: The council is committed to a participatory process that informs and engages the public in setting priorities, forming policies, and pursuing efforts to conserve the Gulf's environment.

The *Gulf of Maine Council on the Marine Environment Action Plan 2007–2012* describes the goals, outcomes, and activities that the council will pursue through its committees and partnerships in the next five years. The plan incorporates public input and the findings of numerous studies, workshops, and key policy government policies. The goals and outcomes were taken from the mandates of the region's government agencies.

The plan contains three long-range goals. The first goal is to ensure that coastal and marine habitats are in a healthy, productive, and resilient condition. This goal focuses on three issues relevant to the proposed Project: invasive species (described as posing a major threat to the ecosystem and economic uses of the Gulf of Maine); human activities on land that may lead directly or indirectly to degradation of the Gulf of Maine; and marine habitat conservation through development and application of integrated and holistic approaches to management and policy.

The second goal of the Action Plan is to foster environmental and human health with a focus on preventing and reducing water pollution. The third goal is for Gulf of Maine coastal communities to be vibrant and have marine-dependent industries that are healthy and globally competitive: the plan suggests that natural capital must be incorporated into provincial and state statutes, policies, and programs.

The Panel identified the Action Plan as useful guidance to inform its analysis of the Project and as an appropriate policy context to guide subsequent decisions to be taken by governments.

Mineral Policy

Minerals - A Policy for Nova Scotia 1996 is the provincial government's blueprint to foster continued growth of the mineral industry and careful management of its mineral resources. The Proponent referred to the policy to support the Project.[1] The Native Council of Nova Scotia suggested that the mineral policy requirements had not been met.

[1] While the Proponent referred to the Minerals Policy as a 2005 document, the Panel only had access to the 1996 policy document posted on the website of the Department of Natural Resources.

The Provincial mineral policy reflects the Department's mission and goals by providing a vision for the future and a strategic direction for mineral resource development in the province. Industrial minerals, including crushed rock, have been consistent contributors to the province's mineral production and economy. The mineral policy identifies conditions to ensure a successful mineral resource sector in Nova Scotia and discusses policies and strategies needed over the long term to foster those conditions.

Mineral policy strategies most relevant to a property proposed for development:

- Encourage consultation and cooperative working arrangements between stakeholders
- Ensure protection of the environment
- Provide greater certainty of mineral rights tenure and access to land
- Make rational choices between multiple resource and conservation uses with an integrated decision-making system
- Resolve land-use conflicts based on the need to integrate social, economic, and environmental commitments in a sustainable way.
- Reach integrated land and resource management decisions by applying fair and effective processes open to all stakeholders.

Nova Scotia Community Development Policy

The Digby Neck Community Development Association identified the December 2004 *Nova Scotia Community Development Policy* as relevant to the proposed Project. The Government of Nova Scotia recognizes that sustainable communities are crucial to the future strength and prosperity of the province. The policy states that the provincial government is committed to principles of sustainable community development.

Principles of sustainable community development

1. The community plays the leadership role in its own development.
2. Government actively facilitates and supports community development through the provision of information, expertise, guidance, and other resources, as appropriate.
3. Community development builds on cooperation, coordination and collaboration between government and communities.
4. Community development builds on a balanced approach that addresses and integrates economic, social, environmental and cultural considerations.
5. Government strives to understand and respect community values.
6. All community members, regardless of gender, age, disability, race, culture, language or social and economic status, have the opportunity to become engaged in the community development process and are able to access its social and economic benefits.
7. Government involvement in community development encourages transparency, accountability, participation and evidence-based decision-making.
8. Community development engages the necessary partners at the community and government levels.
9. Community members and government define a common vision for the future.
10. Community development is built on existing community capacity and assets.
11. Community development values, respects, nurtures and encourages volunteerism.

The policy defines several terms: the Panel sees two as especially relevant to the environmental assessment:

Sustainable Community *is a community that takes a long-term perspective to safeguard the interests of future generations so that its social, cultural, economic and environmental resources create positive outcomes for community members and which has the potential to engage in community capacity building.*

Sustainable Community Development *is a process in which a community uses and enhances its social, cultural, economic and environmental resources to ensure a better quality of life for everyone, now and for generations to come. It seeks to meet four key objectives simultaneously: social progress that recognizes the needs of all, effective protection of the environment, prudent use of natural resources and the maintenance of high and stable levels of economic growth and employment.*

Opportunities for Sustainable Prosperity 2006

Opportunities for Sustainable Prosperity is Nova Scotia's economic strategy for the years 2006 to 2010. The Partnership for the Sustainable Development of Digby Neck and Islands Society and the Clean Annapolis River Project brought this strategy to the attention of the Panel. The strategy states that this new approach to sustainable prosperity aims to develop an economy that enhances the social and natural systems that support growth through new and emerging technologies, good stewardship, and good design.

Opportunities for Sustainable Prosperity has eight areas of strategic focus. Several themes are relevant to the proposed Project. A trade and competitiveness focus seeks to support economic growth through an integrated, collaborative approach to international trade, investment, and development of sustainable goods, services, and communities at world standards. Its priorities include export development, reducing barriers to trade, and attracting investment. The policy promotes a business climate that attracts out-of-province investors and encourages local businesses to start and grow in ways that support sustainable competitiveness. The strategy seeks to manage natural capital to sustain the provincial quality of life, the economy, and the environment. The social capital objectives hope to capitalize on ways to expand economic opportunity throughout the province, maintaining a balance in quality of life. The priorities identified include community development, regional planning and development, and entrepreneurship and small business.

Towards a Sustainable Environment

The Partnership for the Sustainable Development of Digby Neck and Islands Society and the Clean Annapolis River Project argued that the EIS should incorporate input from the province's Green Plan--Towards a Sustainable Environment. The 2003 document outlines the Province of Nova Scotia's approach to managing the environment.

Principles of *Towards a Sustainable Environment*:

- *Environmental protection is essential to the integrity of ecosystems, human health, and the socio-economic well being of society*
- *Managing the environment is a shared responsibility involving all citizens in Nova Scotia.*
- *An integrated approach that addresses environmental, social, and economic considerations is the most effective way to deal with environmental issues.*

The integrated management approach of the plan calls for collaboration among all provincial departments and agencies. The strategy addresses strengthening policy direction for environmental management, leading by example, working with stakeholders, and renewing legislation to meet current needs. Sustainable development is integral to the policy.

Nova Scotia Strategy for Sustainable Coastal Tourism Development (Draft Working Strategy)

The Canadian Parks and Wilderness Society identified the *Nova Scotia Strategy for Sustainable Coastal Tourism Development* 2006 as relevant to the assessment. The strategy is led by an industry advocacy group, an industry and government partnership group, and the Nova Scotia Department of Tourism, Culture and Heritage. The draft working strategy hopes to develop coastal tourism while preserving the natural and cultural heritage that brings tourists to Nova Scotia. The document describes the position of Nova Scotia in the global tourism market as an attractive, seacoast and nature tourism destination. The position is founded on maintaining the intrinsic scenic values and long term sustainability of natural resources; this provides the Nova Scotia branding statement.

During the hearing a representative from the Nova Scotia Department of Tourism, Culture and Heritage advised that the department was concerned that the proposed project has the potential to negatively impact the Nova Scotia Tourism Brand and that it is not consistent with positioning Nova Scotia as Canada's seacoast.

Nova Scotia Tourism Branding Statement:
"*To people who appreciate the sea, Nova Scotia is Canada's foremost seacoast destination that offers an authentic experience for your body and soul better than any other destination because only Nova Scotia uniquely combines spectacular scenery, living tradition, maritime culture and lifestyle with a feeling of deep-down spiritual satisfaction."*

Nova Scotia Pit and Quarry Guidelines

The Government of Nova Scotia manages environmental effects associated with quarry developments, in part, through application of the 1999 *Pit and Quarry Guidelines*. For quarry developments the guidelines identify criteria relating to separation distances, liquid effluent discharges, noise, air-borne particulates, blast generated ground vibrations and blast generated air concussions. There are requirements relating to a groundwater study for each development and site rehabilitation. Several elements of the guidelines influence the Project design and the environmental assessment.

NS Pit and Quarry Guidelines: specifications

- A separation distance of 30 metres is the minimum distance between quarry works and a public highway, the bank of a water course, the ordinary high water mark in coastal areas, and the quarry property boundary.
- Blasting is prohibited within 800 metres of the foundation of a structure. A structure is defined to include homes and cottages. The separation distance is measured from the working face of the quarry to the foundation or base of the structure.
- Blasting related separation distances may be relaxed. Blasting is allowed within 15 metres of an adjoining property provided there is no structure on that property. The provincial Department of Transportation and Public Works may reduce the distance separating the working face from a public highway. The 800-metre distance can be reduced if all individuals owning structures within 800 metres of the working face agree

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Federal Blasting Guidelines

In 1998 the federal government published the technical report *Guidelines for the Use of Explosives in or near Canadian Fisheries Waters*. [2] The document identifies possible blasting effects on fish eggs, fish larvae, adult fish, and marine mammals. Effects discussed range from behavioural changes to lethality. Lethal effects on shellfish and crustaceans are believed to be negligible but non-lethal effects including behavioural changes are little known or understood.

Federal blasting specifications receiving attention during the assessment:

- No use of ammonium nitrate-fuel oil mixtures occurs in or near water due to the production of toxic by-products (ammonia).
- No explosive is to be knowingly detonated within 500 metres of any marine mammal (or no visual contact from an observer using 7x35 power binoculars).
- No explosive is to be detonated in or near fish habitat that produces, or is likely to produce, an

[2] Wright. D.G. and G.E. Hopky. 1998. Can. Tech. Rep. Fish. Aquatic Sci. 2107:iv + 34p.

instantaneous pressure change (i.e. overpressure) greater than 100 kPa (15.5 psi) in the swim-bladder of a fish.
- No explosive is to be detonated, or is likely to produce, an peak particle velocity greater than 13 mm per second in a spawning bed during the period of egg incubation.

LAWS AND REGULATIONS

Environmental Assessment Legislation

Part IV of the Nova Scotia *Environment Act* and the Nova Scotia *Environmental Assessment Regulations* provide the legislative framework for environmental assessment. The A
ct and regulations govern the process to identify the environmental impacts associated with undertakings (that is, an enterprise, activity, project, structure, work or proposal that causes or may cause an adverse environmental effect). A provincial environmental assessment is required for the Project because the quarry is greater than 4 hectares in area.

The provincial *Environment Act* supports and promotes the protection, enhancement and prudent use of the environment. The Act promotes strategies including the precautionary principle, the pollution prevention principle, integration of sustainable development principles in public policy making, and the linkage between economic and environmental issues.

The federal environmental assessment process is governed by the *Canadian Environmental Assessment Act* and its associated regulations. If a certain federal approval (permit, licence, or authorization) is required for a specified activity or project, the federal government must ensure that an environmental assessment is conducted. The Project as proposed would require two federal approvals, both relating to the construction and operation of the marine terminal. Transport Canada would be requested to issue a *Navigable Waters Protection Act* permit as the marine terminal is likely to interfere with the public right of navigation. Under the federal *Fisheries Act*, it is unlawful to harmfully alter, disrupt or destroy fish habitat unless an approval is provided. Construction of the terminal would result in the loss of habitat and consequently the Proponent would need an authorization from Fisheries and Oceans Canada before construction could begin. The need for these approvals triggered application of the *Canadian Environmental Assessment Act*.

The federal legislation lists six purposes of the *Canadian Environmental Assessment Act* including to ensure projects are considered in a careful and precautionary manner in order to ensure that such projects do not cause significant adverse environmental effects and to encourage government departments and agencies take actions that promote sustainable development. The *Canadian Environmental Assessment Act* also speaks of preventing adverse environmental effects from crossing provincial and federal boundaries. The Act advocates public participation and promotes communication, coordination, and cooperation within the federal government, between the federal and provincial governments, and with Aboriginal peoples.

Preamble to the *Canadian Environmental Assessment Act* 1995:
"...The Government of Canada seeks to achieve sustainable development by conserving and enhancing environmental quality and by encouraging and promoting economic development that conserves and enhances environmental quality. ...Environmental assessment provides an effective means of integrating environmental factors into planning and decision-making processes in a manner that promotes sustainable development."

Both the provincial and federal environmental assessment processes focus on a project's potential adverse environmental effects. It is equally clear, however, that the Acts place environmental assessment in the context of sustainable development: assessment also considers whether a project makes an overall contribution to sustainability.

Mineral Resources Act

In Nova Scotia the rights to minerals are held by the provincial government. The province administers the *Mineral Resources Act* through which it collects fees and royalties (often referred to as mining taxes) on minerals.

Under the *Mineral Resource Act* the basalt is **not** considered a mineral, so no royalties apply. Nova Scotia does currently levy a tax on gypsum, another stone product excluded from royalties.

Environmental Goals and Sustainable Prosperity Act (2007)

The Act identifies the long-term environmental and economic objective of the province of Nova Scotia as fully integrating environmental sustainability and economic prosperity. The Act identifies 21 goals intended to achieve its long-term objective, including one to reduce greenhouse gas emissions by 2020 to ten percent below the levels emitted in the year 1990.

Principles of the *Environmental Goals and Sustainable Prosperity Act*

- The health of the economy, the health of the environment and the health of the people of the Province are interconnected.
- Environmentally sustainable economic development that recognizes the economic value of the Province's environmental assets is essential to the long-term prosperity of the Province.
- The environment and the economy of the Province are a shared responsibility of all levels of government, the private sector and all people of the Province.
- The environment and economy must be managed for the benefit of present and future generations.
- Innovative solutions are necessary to mutually reinforce the environment and the economy.
- A long-term approach to planning and decision-making is necessary to harmonize the Province's goals of economic prosperity and environmental sustainability.
- The management of goals for sustainable prosperity, such as emission reduction, energy efficiency programs and increasing the amount of legally protected land will preserve and improve the Province's environment and economy for future generations.

Environmental Conservation

The Department of Natural Resources administers the *Nova Scotia Endangered Species Act* while Fisheries and Oceans Canada, Environment Canada and Parks Canada administer the federal *Species at Risk Act*. Both acts provide special protection measures for species of conservation concern.

The *Species at Risk Act* (SARA) provides protection for species listed in Schedule 1 of the Act. The schedule consists of four parts—separate listings of species that are “Extirpated”, “Endangered”, “Threatened”, or of “Special Concern”. Listed species are protected in several ways; the two most important to the assessment are through a linkage to CEAA and by way of general prohibitions.

The federal government amended CEAA to ensure that the potential effects of a project on a SARA listed species, on the *critical habitat of a listed species or the residences (e.g. nests) of a listed species* were considered as part of all environmental assessments. SARA prohibits anyone from killing, harming, harassing, capturing or taking an individual of a wildlife species that is listed as extirpated, endangered or a threatened. It prohibits damaging or destroying a residence of a wildlife species that is listed as endangered species or threatened. The same prohibition against damaging or destroying a residence applies, with one qualification, to extirpated species. The Act does allow permits to be issued for activities that would otherwise be prohibited by SARA, but based on information presented to the Panel by Fisheries and Ocean Canada, there appears to be little likelihood that such a permit would be required for the Project.

The EIS indicates that no level of government has established protected areas or conservation areas on Digby Neck in the vicinity of the Project. Fisheries and Oceans Canada established the Right Whale Conservation Area in the Bay of Fundy approximately 12 kilometers west-northwest of the site in 1993 as part of efforts to protect the endangered North Atlantic Right Whale.

Environmental Protection

The Nova Scotia Department of Environment and Labour is the lead provincial department for environmental protection. The department's primary mechanism for regulating quarry activities is an industrial approval issued under Part V of the *Environment Act*. If following the environmental assessment process government issues an approval, the proposed activities would be subject to a second detailed technical review. A Part V approval is designed to address the effects of a quarry on air quality, fresh water and ground water, the terrestrial environment, human health, and the land-based socio-economic environment. Part V approvals are valid for a maximum of ten years and may be renewed.

Environmental criteria specified in the *Pit and Quarry Guidelines* would likely be incorporated into a Part V approval to manage separation distances, noise, dust, and wastewater quality. The scope of the industrial approval goes beyond that of the *Pit and Quarry Guidelines* and may require the establishment of a community liaison committee, project-specific environmental management plans, and other measures such as environmental assessment conditions of approval.

The federal government bears most of the responsibility for managing potential marine environmental effects. If the federal government approves the Project, Fisheries and Oceans Canada would issue an authorization under the *Fisheries Act* for harmful effects on fish habitat. The federal government would require that effects related to the loss of habitat be mitigated by way of a corresponding improvement or creation of habitat elsewhere.

The *Fisheries Act* prohibits deposit of a substance deleterious to fish in fish-bearing waters or to an area leading to fish-bearing waters. It also prohibits the destruction of fish by means other than fishing. The first condition could influence the manner in which settling pond discharges are managed and the federal government responses to spills. The latter condition could influence blasting, an activity with the potential to kill fish. Regulations prohibit disturbing a marine mammal, a stipulation that may affect blasting.

The *Migratory Birds Convention Act* prohibits the deposit of a harmful substance to an area or waters used by migratory birds. Regulations under the Act prohibit disturbing, destroying or taking the nest or eggs of migratory birds. This prohibition could influence the time during which areas of the quarry property are cleared.

Pilotage Act

The marine vessel traffic associated with the Project would be subject to requirements under international agreements, including those of the International Maritime Organization, the *Canada Shipping Act* and its many regulations, the *Marine Transportation Security Act* and other federal laws and regulations.

The Atlantic Pilotage Authority (APA) was established under the authority of the federal *Pilotage Act*. Its mandate is to establish, operate, maintain and administer in the interests of safety an efficient pilotage service within the designated waters of the Atlantic region. The APA appeared before the Panel to advise that the *Pilotage Act* empowers it to make regulations establishing compulsory areas within the APA's geographic boundaries. The criteria for determining if a port is to become compulsory are the degree of difficulty and the hazards in approaches within the port itself; the amount of vessel movement and manoeuvrability and size of those vessels; the nature of cargo carried on board; and the design of the wharves, slips and actual space available for manoeuvring.

At the time of the public hearings the APA had not determined the need for pilotage for the Project. It advised the Panel that the APA would need to complete a risk management review in order to establish the feasibility of pilotage and whether pilotage would be compulsory for the proposed marine terminal.

Canadian Ballast Water Control and Management Water Regulations

Transport Canada's presentation to the Panel included an overview of ballast regulations enacted in 2006 (after completion of the Proponent's EIS). The regulations specify that ballast water management consists of the exchange or treatment of ballast water, the discharge of ballast water to a reception facility or the retention of ballast water on board. Transport Canada advised that at this point the management of ballast water is limited to ballast water exchange.

Ballast regulations:
Regulations would apply to bulk carriers travelling between New Jersey and the Bay of Fundy. They require that a ship not discharge ballast water that is taken on board south of Cape Cod in Canadian waters unless the ship has conducted an exchange of ballast water in an area situated at least 50 nautical miles from shore where the water depth is at least 500 metres. If that option is impractical, or if it would compromise the stability of the ship or the safety of the ship or of persons on board, the ship may exchange ballast water south of 43^{o} 30' north latitude where the water depth is at least 1000 metres. The regulations expect that 95% of the ballast volume will be exchanged. Regulations also control the salinity of water being exchanged.

Navigable Waters Protection Act

The marine terminal would interfere with marine navigation. Transport Canada would need to authorize its construction by way of an approval issued in accordance with the *Navigable Waters Protection Act*. Such approvals normally include a condition requiring removal of a structure at the end of its working life.

INTERNATIONAL AGREEMENTS

North American Free Trade Agreement

Many participants in the environmental assessment process advised the Panel of their concerns with North American Free Trade Agreement (NAFTA). There is an obvious fear that establishment of the proposed quarry could lead to similar projects along the Fundy shore of Nova Scotia and possibly other locations along Canada's coasts. To assist in understanding the implications of NAFTA, the Panel commissioned a brief report providing an overview and analysis of the application of the NAFTA to the Project. The Panel also requested that the federal Department of Foreign Affairs and International Trade appear before the Panel during the public hearings to speak to this issue.

Canada, the United States and Mexico implemented NAFTA in 1994. Its general purpose is to strengthen the rules and procedures governing trade and investment among the parties to the agreement. Specific objectives include eliminating trade barriers, promoting conditions of fair competition, protecting intellectual property rights, and increasing investment opportunities.

The mandatory requirements of NAFTA Chapter 11 were of particular interest. Included in Chapter 11 are requirements to treat investors from a NAFTA country no less favourably than domestic investors or investors from any other country, requirements not to place conditions on foreign investment, and requirements relating to the expropriation of investments either directly or indirectly.

The agreement provides a dispute settlement mechanism that allows an investor from a NAFTA country to take legal action against the government of another NAFTA country should that investor believe requirements under NAFTA had not been respected. The legal action can be adjudicated through an international tribunal rather than through one of the domestic judicial systems of the three NAFTA countries.

The rights afforded foreign investors by NAFTA are not absolutes. The agreement recognizes the rights of governments to adopt, maintain, or enforce appropriate measures to ensure that an investment activity in its territory is undertaken in a manner sensitive to environmental concerns including measures necessary to protect human, animal or plant life or health.

APPENDIX 5 – SPECIES AT RISK

Whites Point Quarry
Species at Risk

	Species at Risk	Conservation Status
A	**MARINE SPECIES AT RISK**	
A1	**MARINE MAMMALS, FISH, MOLLUSCS, REPTILES**	
	North Atlantic Right Whale *(Eubalaena glacialis)*	1E
	Atlantic Salmon (iBoF) *(Salmo salar)*	1E
	Harbour Porpoise *(Phocoena phocoena)*	1SC
	Fin Whale *(Balaenoptera physalus)*	1SC
	Atlantic Cod *(Gadus morhua)*	1SC
	Squaw Foot *(Strophitus undulates)*	3R
	Striped Bass *(Morone saxatilis)*	1T, 3R
	Atlantic Sturgeon *(Acipenser oxyrhynchus)*	3R
	Pearl Dace *(Margariscus margarita)*	3Y
	Brook Trout *(Salveninus fontinalis)*	3Y
	Gaspereau *(Alosa pseudoharengus)*	3Y
	Leatherback	1
	Porbeagle Shark *(Lamna nascus)* **	1
	White Shark (Carcharodon carcharias) **	1
	Shortfin Mako *(Isurus oxyrinchus)* **	1T
	Winter Skate *(Leucoraja acellata)* **	1SC
	Atlantic Wolffish *(Anarhichas lupus)* **	1SC
	Blue Shark *(Prionace glauca)* **	1SC
	American Eel *(Anguilla rostrata)* **	1SC
A2	**WATERBIRDS**	
	Harlequin Duck *(Histrionicus histrionicus)*	1SC, 2E, 3Y
	Barrow=s Goldeneye (Bucephala islandica)	1SC, 3Y wintering

	Species at Risk	Conservation Status
	Atlantic Brant *(Branta bernicula)*	3Y
	Common Loon *(Gavia immer)*	3Y
	Arctic Tern *(Sterna paradisaea)*	3Y
	Razorbill *(Alca torda)*	3Y
	Atlantic Puffin *(Fratercula arctica)*	3Y
	Common Tern *(Sterna hirundo)*	3Y
	Red-necked Phalarope *(Phalaropus lobatus)*	3Y
	Red Phalarope *(Phalaropus fulicaria)*	3Y
	Red-necked grebe *(Podiceps grisegena)*	ACCDC Priority list
	Black guillemot *(Cepphus grylle)*	ACCDC Priority list
B	**TERRESTRIAL SPECIES AT RISK**	
B1	**TERRESTRIAL MAMMALS, AMPHIBIANS, REPTILES**	
	Little Brown Bat *(Myotis lucifugus)*	3Y
	Northern Long-eared Bat (Myotis septentrionalis)	3Y
B2	**TERRESTRIAL VASCULAR PLANTS, MOSSES, LICHENS**	
	Eastern Mountain Avens *(Geum peckii)*	1E,2T,3R
	Boreal Felt Lichen *(Erioderma pedicellatum)*	1
	Golden Crest (Lophiola aurea)	1T,2T,3R
	Creeping Sedge *(Carex chordorrhiza)*	3R
	Little Green Sedge *(Carex viridula brachyrrhyncha)*	3R
	Stout Wood Reed-Grass (Cinna arundinacea)	3R
	Downy Rattlesnake-Plantain (Goodyera pubenscens)	3R

	Species at Risk	Conservation Status
	Chestnut-Coloured Sedge *(Carex castanea)*	3R
	Northern Blueberry (Vaccinium boreale)	3R
	Northern White Cedar *(Thuja occidentalis)*	3R
	White Adder's Mouth *(Malaxis monophyllos)*	3R
	Southern Twayblade *(Listera australis)*	3R
	Slender Blue Flag *(Iris prismatica)*	3R/un-determined
	Foxtail Sedge *(Carex alopecoidea)*	3R
	Round-Leaved Liverleaf *(Hepatica americana)*	3R
	Low Spike-Moss *(Selaginella selagioides)*	3R
	Purple False Oats *(Graphephorum melicoides)*	3Y
	Purple-Leaf Willow-Herb *(Epilobium coloratum)*	3Y
	Swedish Dwarf Dogwood *(Cornus suecica)*	3Y
	Large Round-Leaved Orchid *(Platanthera orbiculata)*	3Y
	Pale Jewel-Weed *(Impatiens pallida)*	3Y
	Adder's Tongue *(Ophioglossum pusillum)*	3Y
	Fountain Miner's Lettuce *(Monita fontana)*	3Y
	A Bramble *(Rubus recurvicaulis)*	3Y
	Small-Flower Bitter-Cress *Cardamine parviflora*	3Y
	Arrow-Leaved Violet *(Viola sagittata*)*	Downgraded to G
	Pennsylvania Blackberry *(Rubus pensilvanicus*)*	Downgraded to G
	Grassleaf Rush *(Juncus marginatus)*	3Y
	Alpine Blueberry *(Vaccinium uliginosum)*	3Y
	Slender Cotton-Grass *(Eriophorum gracile)*	3Y
	Capitate Spikerush(*Eleocharis flavescens)*	3Y
	Slender Wedge Grass *(Sphenophosis obtusata)*	3Y
	Humped Bladderwort *(Utricularia gibba)*	3Y
	Dwarf Huckleberry *(Vaccinium cespitosum)*	3Y
	Silky Willow *(Salix sericea)*	3Y
	Bog Willow *(Salix pedicellaris)*	3Y
	Northern Bog Violet *(Viola nephrophylla)*	3Y
	White Mountain Saxifrage *(Saxifraga aizoon)*	3Y
	Northern Comandra *(Geocaulon lividum*	3Y
	White Bluegrass *(Poa glauca)*	3Y
	Field Milkwort *(Polygala sanguinea)*	3Y
	Purple Crowberry *(Empetrum rubrum)*	3Y
	Least Grape-Fern *(Botrychium simplex)*	3Y
	Yellow Nodding Ladies'-Tresses *(Spiranthes ochroleuca)*	3Y

	Species at Risk	Conservation Status
	Hemlock Parsley *(Conioselinum chinense)*	3Y evaluation
	Mountain Sandwort *(Arenaria groenlandica)*	3Y evaluation
	Glaucous Rattlesnake Root (Prenanthes racemosa)	NS GSR: Blue
	Rock Spike-moss *(Selaginella rupestris)*	Currently NS GSR: Red
	Bird=s-eye Primrose *(Primula laurentiana)***	ACCDC Priority
	Skunk Cabbage *(Symplocarpus foetidus)****	ACCDC Priority List
B3	**LAND BIRDS**	
	Peregrine Falcon *(Falco peregrinus anatum)*	1T, 2T, 3R
	Rusty Blackbird *(Euphagus carolinus)*	1SC (designated by COSEWIC
	Northern Goshawk *(Accipiter gentilis)*	3Y
	Nelson=s Sharp-tailed Sparrow *(Ammondramus nelsoni)*	3Y
	Bobolink *(Dolichouyx oryzivorus)*	3Y
	Boreal Chickadee *(Pocile hudsonica)****	ACCDC
B4	**BUTTERFLIES, DAMSELFLIES, DRAGONFLIES**	
	Hoary Comma *(Polygonia gracilis)*	3Y
	Black Meadowfly *(Sympetrum danae)*	3Y
	Zorro *Clubtail (Lauthus parvulus)*	3Y
	Greenstriped Darner *(Aeshua verticalis)*	3Y
	Zigzag Darner *(Aeshua sitchensis)*	3Y
	Harlequin Darner *(Gomphaeschua farcilata)*	3Y

Notes:

*Species have been downgraded by NSDNR from status Yellow to Green (Mark Elderkin *pers. comm.)* and therefore were not forwarded to the Short list/ further addressed in the EA.
** Not included in App 39 listing; added in response to WP 5141 Fisheries and Oceans Canada
Shade: Species selected for Short List (Table 2)
*** Species identified during field survey, included in ACCDC priority list (note: species from this list wereNOT included in the establishment of the initial list or regional occurring species)

Conservation Status

(1) COSEWIC - Committee on the Status of Endangered Wildlife in Canada
E= Endangered T= Threatened SC= Special Concern

(2) NS ESA - Nova Scotia *Endangered Species Act*
E= Endangered T= Threatened V= Vulnerable

(3) NS GSR - Nova Scotia General Species Ranks
R= Red Y= Yellow

APPENDIX 6 – ABBREVIATIONS AND ACRONYMS

ANFO	ammonium nitrate – fuel oil mixture
CBC	Canadian Broadcast Corporation
CEAA	Canadian Environmental Assessment Agency
CEAA process	*Canadian Environmental Assessment Act* process
CLC	Community Liaison Committee
cm	centimetres
CMM	Confederacy of Mainland Mi'kmaq
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
dBA	decibels
DFO	Fisheries and Oceans Canada
DNA	deoxyribonucleic acid
EIS	environmental impact statement
EPA	Environmental Protection Agency
FOB	free on board
GDP	gross domestic product
GHG	greenhouse gas
ha	hectare
iBoF salmon	inner Bay of Fundy salmon
kg	kilogram
km	kilometre
kph	kilometre per hour
kt	kilo tonnes
l/min	litre per minute
Leq	Equivalent Continuous Noise Level (4db exchange rate)
LFA 34	Lobster Fishing Area 34
m	metre
m^2	square metre
m^3/min	cubic metre per minute
MFU	Middle Flow Unit of the North Mountain basalt
mm	millimetre
mm/sec	millimetre per second
NAFTA	*North American Free Trade Agreement*
NRCan	Natural Resources Canada
NSDNR	Nova Scotia Department of Natural Resources
NSEL	Nova Scotia Environment and Labour
NSGSR	Nova Scotia General Species Ranks
PEI	Prince Edward Island
SARA	*Species at Risk Act*
SCC	The Sierra Club of Canada
TC	Transport Canada
µg/m^3	micrograms per cubic metre
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization
US	United States of America
VEC	Valued Environmental Components
yr	year

APPENDIX 7 – ACKNOWLEDGEMENTS

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