

ENVIRONMENTAL ASSESSMENT OF THE WHITES POINT QUARRY AND MARINE TERMINAL PROJECT



**JOINT REVIEW PANEL REPORT
EXECUTIVE SUMMARY
OCTOBER 2007**

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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

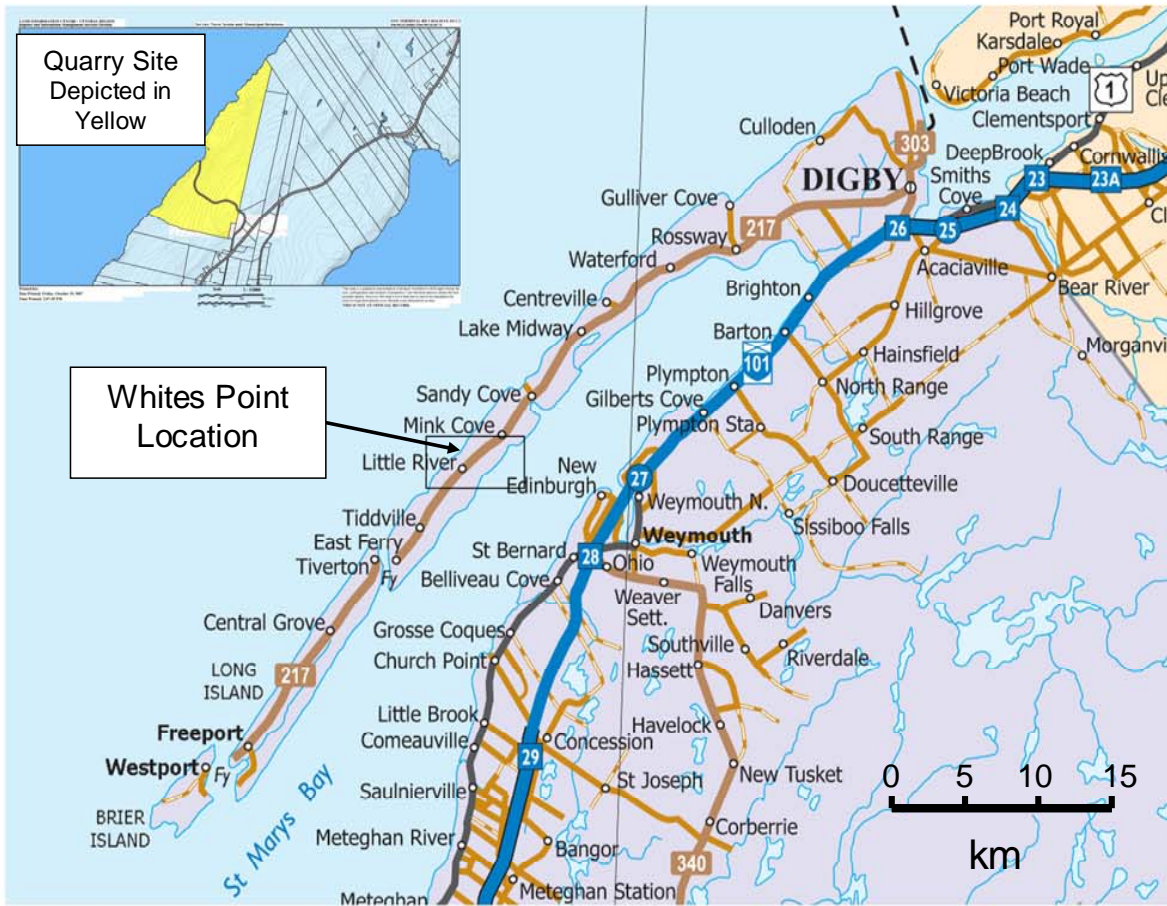
proposes to reclaim disturbed areas by covering them with a mixture of retained sediments, organic materials, and fines retained from aggregate washing, followed by planting with appropriate vegetation.

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.



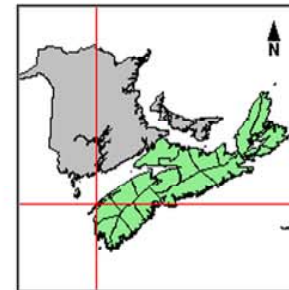
Quarry Site
Depicted in
Yellow

Whites Point
Location

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. Intervenors 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
