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EIS Reference: Volume V, Chapter 7.0 and Section 7.0 Revised Project Description

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Joint Review Panel letter dated December 19, 2006 – Re: Information Requests IR-1 to IR10

The Whites Point Quarry and Marine Terminal Joint Review Panel has reviewed the Revised Project Description (November 2006) and submits the attached ten information requests for your response. These information requests represent specific deficiencies in certain aspects of the Revised Project Description and are not meant to form an exhaustive list. I remind you that a complete Project Description realized in an appropriate level of detail is required by the Joint Review Panel at the earliest possible date. I refer you to our July 28, 2006, EIS Information Request in this regard.

Moreover, as detailed in our July 28, 2006, information request to you (Item 7.1), the Joint Review Panel had intended to determine if further information would be required to support the assessment of alternative means of undertaking the Project after we received the revised Project Description. In the interest of efficiency, the Panel now requests that a consideration of the technically and economically feasible alternative means of carrying out the project and the environmental effects of these alternative means be included in or with the Project Description. Refer to section 7.2 of the EIS Guidelines (March 2005) for further instructions.

RESPONSE

Section 7.2 of the EIS Guidelines (March 2005) requires an identification of the technically and economically feasible ways that the Project can be carried out and the potential environmental impacts associated with them. In accordance with the Guidelines the alternative means have been discussed for a number of Project works and activities:

- Aggregate sites
  - White Point Site
  - Other sites in Nova Scotia and Atlantic Provinces
- Extraction methods
  - Surface quarry operation
  - Underground mining operation
- Rock fragmentation
  - Use of explosions
  - Ripping
  - Plasma torching / water cutting
- Rock processing (beneficiation)
  - No on-site beneficiation
  - On-site beneficiation
- Waste materials management and utilization
  - Recycling (sediments, vegetation/topsoil)
  - Off-site transport and disposal/recycling

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- Waste water treatment (sanitary)
  - Use of municipal system
  - Use of on-site treatment system
- Process water treatment / management
  - Supply by well and discharge to surface water
  - Recycling
- Transportation modes
  - Land-based transportation (truck)
  - Land-based transportation (pipeline)
  - Marine-based transportation
- Transportation routes (marine)
  - Shortest route to designated shipping channel
  - Other routes to destination
- Ship loading methods
  - Conveyor belt loading
  - Loading with crane & clam shell
  - Trucking to other marine terminal
- Terminal Construction
  - Pipe pile construction
  - Construction methods using caisson, crib, fill and other techniques
- Timing & Scheduling (quarry operation)
  - 10 months operation, 2 months maintenance
  - Seasonal operation
- Reclamation Timing
  - Incremental reclamation
  - Upon completion of quarry activities
- Reclamation Objectives
  - Natural succession based/ minimal interference
  - Managed reclamation / active habitat management
- Decommissioning
  - Removal of all site infrastructure and developments
  - Partial removal of site infrastructure and developments

The decision to proceed with the alternative means as described in the Project description was based on their evaluation against the following evaluation criteria:

- **Technical feasibility**, which considers the means with respect to its suitability, reliability, and safety; and
- **Economic feasibility**, which includes an assessment of the cost (development and operating costs), the commercial viability, and the commercial risk.

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The determination of the most appropriate (preferred) alternative Project works and activities has been conducted on the basis of a screening process. If an alternative was deemed to be technically unfeasible, the economic feasibility and environmental effects were not considered. If the alternative was considered technically feasible but not economically feasible, environmental effects (i.e., economic, social, health and ecological) were also not investigated. The environmental effects were evaluated when the alternative was considered both, technically and economically feasible.

If for a particular Project work/component only one alternative was considered feasible (technically and economically), it became part of the Project description and was subjected to a detailed assessment of its environmental effects as part of the EA process. In those cases where two or more alternatives were deemed feasible, key environmental effects were considered for each alternative. Where the environmental advantages of one versus another alternative were considered obvious, the environmentally more beneficial alternative was selected as the preferred. This alternative then was subjected to the detailed environmental assessment in the EA report.

If the environmental advantages of one versus another alternative would have not been immediately apparent, both alternative means would have been subjected to a full assessment in the EA process, at the end of which the preferred alternative would have been determined. This full environmental assessment of two or more technically and economically feasible alternative means became not necessary. In all cases the team was able to determine the preferred alternative based on technical and economic feasibility and a coarse initial consideration of environmental implications. The results of the screening are presented in Table 1 along with a summary of the initial technical, economic and environmental considerations.

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TABLE 1: Alternative Means

#	Alternative	Technical Feasibility (Suitability, Reliability, Safety)	Economic Feasibility (Cost; Commercially Viable; Commercial Risk)	Environmental Effects	Feasible? Preferred?
1	**Aggregate Sites**				
	Whites Point	Technically feasible: • Suitable site (rock characteristics; land and marine access; engineering feasibility, land availability, size of land base)	Economically feasible: • Development cost: low • Operating cost: moderate • Commercially viable Commercial risk: low	See EIS	Yes Preferred
	Other sites in Nova Scotia and Atlantic Provinces	• Alternative sites have been identified as technically feasible or not feasible depending on the individual site; most frequent limitations relate to • suitable rock type • land and marine access; • land availability; • size of land base;	Economically NOT feasible: • Development cost: low to high (e.g., land access; wharf development, environmental constraints) • Operating cost: moderate to high (e.g., transport distance unfavourable) • Commercially viability uncertain • Commercial risk: low to high	Not assessed	No
2	**Extraction Methods**				
	Surface quarry operation	Technically feasible: • Suitable technology • Reliable (good track record; limited equipment/ infrastructure requirements) • No safety concerns (high safety standards; excellent safety records)	Economically feasible: • Development cost: low • Operating cost: moderate • Commercially viable • Commercial risk: low	See EIS	Yes Preferred
	Underground mining operation	Technically feasible: • Suitable technology available • Bedrock geology may not be favourable • Uncertain track record; • Specialized equipment/ infrastructure	Economically NOT feasible: • No corporate expertise • Development cost: high (large up front development costs) • Operating cost: moderate • Commercial viability uncertain	Not assessed	No

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#	Alternative	Technical Feasibility (Suitability, Reliability, Safety)	Economic Feasibility (Cost; Commercially Viable; Commercial Risk)	Environmental Effects	Feasible? Preferred?
		requirements • Underground mine safety concerns	(reduction of recoverable basalt due to ground support considerations) • Commercial risk: high (safety concerns, technical and economic uncertainty)		
3	**Rock Fragmentation**				
	Use of explosives (see Project description)	Technically feasible: • Suitable technology • Reliable (good track record); limited equipment/ infrastructure requirements • Well known safety concerns (high safety standards; excellent safety records	Economically feasible: • Development cost: low • Operating cost: moderate • Commercially viable • Commercial risk: low	See EIS	Feasible Preferred
	Ripping	Technically NOT feasible: • Not suitable for basalt rock (suitable for softer rock types such as sediments shale and limestone)	Not assessed	Not assessed	No
	Plasma torch / water cutting	Technically NOT feasible: • Not suitable for basalt rock and aggregate generation (requires highly fractured rock; otherwise, generates too large rock fragments/blocks) • Additional water supply and clarification concerns • No operating experience in the area	Not assessed	Not assessed	No
4	**Rock Processing (Beneficiation)**				
	No on-site beneficiation (export of large blocks of basalt rock, crushing operation at receiving end)	Technically feasible: • Suitable technology • Requires different loading infrastructure (truck accessible pier as opposed to conveyor belt loading equipment)	Economically feasible: • Development cost: low • Operating cost: low • Commercially viable; • Commercial risk: low	• Increased adverse impact to marine environment as a result of the infill work for the required loading pier	Feasible No

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#	Alternative	Technical Feasibility (Suitability, Reliability, Safety)	Economic Feasibility (Cost; Commercially Viable; Commercial Risk)	Environmental Effects	Feasible? Preferred?
		• No safety concerns	• Other: Reduced contribution to economic sustainability of area		
	On-site beneficiation (rock crushing operation; see Project description)	Technically feasible: • Suitable technology • Reliable (good track record) • Requires proposed loading infrastructure • No safety concerns	Economically feasible: • Development cost: moderate • Operating cost: moderate • Commercially viable; • Commercial risk: low • Other: Value added contribution to economic sustainability of area	• Minimal adverse impact to marine environment as loading can employ conveyor belt, no infill work required • For further assessment – see EIS	Feasible Preferred
5	**Waste Materials Management and Utilization**				
	Recycling (removal and storage of sediments, topsoil, woodchips; reuse in site reclamation; see Project description)	Technically feasible: • Suitable technology • Reliable technology • No safety concern	Economically feasible: • Development cost: moderate • Operating cost: moderate • Commercially viable • Commercial risk: low • Other: application of sustainability development	See EIS	Yes Preferred
	Transport to off-site markets	Technically feasible • Suitable technology • Reliable technology • No safety concern	Economically NOT feasible: • Development cost: low • Operating cost: high (assumes low market value) • Commercially NOT viable • Commercial risk: low • Other: Not supportive of sustainable development objective	Not assessed	No
6	**Waste Water Treatment (Sanitary)**				
	Use of municipal system	Technically feasible; • Suitable technology requires installation of link to municipal system • Reliable technology	Economically NOT feasible: • Development cost: high (requires pipeline ROWs ; tie-in point too far) • Operating cost: low	Not assessed	No

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		• No safety concern	• Commercially NOT viable • Commercial risk: low		
	On-site treatment (septic system)	Technically feasible: • Suitable technology • Reliable technology • Well understood safety concern	Economically feasible: • Development cost: low • Operating cost: low • Commercially viable • Commercial risk: low	See EIS	Yes Preferred
7	**Waste Water Treatment / Process Water Management**				
	Water supply by wells, on-site treatment and discharge to surface water (sediment treatment same as below)	Technically feasible: • Suitable technology; requires installation and operation of on-site groundwater wells • Reliable technology • No safety concerns	Economically feasible: • Development cost: moderate • Operating cost: moderate • Commercially viable; • Commercial risk: moderate (potential for compensation if neighbouring wells are impacted)	• Not supportive of Bilcon's policy on sustainable development • Potential for adverse effects on groundwater regime at and adjacent to site • Potential for adverse effects on well yields of near-by residential properties	Feasible No
	Recycling of waste water (removal of sediments with high rate thickener; storage of sediments and reuse in site reclamation; reuse of wash water; see Project description)	Technically feasible: • Suitable technology; requires installation and operation of on-site groundwater wells • Reliable technology • No safety concerns	Economically feasible: • Development cost: moderate • Operating cost: moderate • Commercially viable • Commercial risk: low (low potential for compensation requirements)	• Supportive of Bilcon's policy on sustainability • No concerns for groundwater regime and /or groundwater wells at and adjacent to site • For further assessment- see EIS	Yes Preferred
8	**Transportation Modes**				
	Land-based transportation (truck)	Technically feasible: • Suitable technology • Reliable technology • No safety concerns	Economically NOT feasible: • Development cost: low • Operating cost: high (distance to markets, maintenance of large number of trucks)	Not assessed	No

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#	Alternative	Technical Feasibility (Suitability, Reliability, Safety)	Economic Feasibility (Cost; Commercially Viable; Commercial Risk)	Environmental Effects	Feasible? Preferred?
			• Commercially NOT viable • Commercial risk: low		
	Land-based transportation (pipeline)	Technically feasible: • Suitable technology but requires transport medium (e.g., water) • Reliable technology • No safety concerns	Economically NOT feasible: • Development cost: high (requires ROW for pipeline; no suitable harbour/market near-by) • Operating cost: high (transport distance) • Commercially NOT viable • Commercial risk: moderate (maintenance and repair requirements for long pipeline & pumping stations)	Not assessed	No
	Marine-based transportation (see Project description)	Technically feasible • Suitable technology • Reliable technology • Limited equipment/ site infrastructure requirements • No safety concerns	Economically feasible: • Development cost: high • Operating cost: moderate • Commercially viable • Commercial risk: low	See EIS	Yes Preferred
9	**Transportation Routes (Marine)**				
	Shipping channel & shortest connecting route (see Project description)	Technically feasible • No safety concern; • No navigational obstacles or other navigational challenges along proposed connector route; • Main channel well marked and designated for international shipping	Economically feasible: • Development cost: NA • Operating cost: moderate • Commercially viable • Commercial risk: low	See EIS	Feasible Preferred
	Other routes (e.g., shortest route to destination in the US; this would entail navigating along the Digby Neck coast)	Technically feasible: • Some safety concerns (potential for grounding and conflicts with small vessels traffic) • Commercial traffic must transit through established shipping lanes	Economically NOT feasible: • Development cost: NA • Operating cost: moderate • Commercially viable • Commercial risk: high (potential for compensation payments in case of	Not assessed	No

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			conflicts with fishing gear; risk for delays (e.g., collisions, grounding)		
10	**Ship Loading Methods**				
	Conveyor based	Technically feasible: • Suitable technology • Reliable technology • Limited wharf requirements • No safety concerns	Economically feasible: • Development cost: moderate • Operating cost: moderate • Commercially viable • Commercial risk: low	• Minimal impact on marine environment (use of steel pipe piling as opposed to infill work)	Feasible Preferred
	Crane & clam shell	Technically feasible: • Suitable technology • Reliable technology • Requires different loading infrastructure than proposed (pier as opposed to conveyor belt loading equipment) • No safety concern	Economically feasible: • Development cost: high • Operating cost: moderate • Commercially viable • Commercial risk: low	• Potential for increased adverse effects on marine environment as a result of the infill work for the required loading pier; • In comparison with conveyor belt system: Higher noise and higher dust impacts	Feasible No
	Trucking to other terminals	Technically feasible: • Suitable technology • Reliable technology • No safety concern	Economically NOT feasible: • Development cost: low (assumes no capital investment in development of other wharf location) • Operating cost: high (assumes long haul distance to loading dock) • Commercially NOT viable; • Commercial risk: low	Not assessed	No
11	**Terminal Construction Methods**				
	Pipe piling	Technically feasible: • Suitable technology • Reliable technology • No safety concern	Economically feasible: • Development cost: moderate • Operating cost: low • Commercially viable • Commercial risk: low	• Minimal footprint; minimal adverse impact to marine environment; minimal loss/alteration of marine habitat • For further assessment – see EIS	Feasible Preferred

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#	Alternative	Technical Feasibility (Suitability, Reliability, Safety)	Economic Feasibility (Cost; Commercially Viable; Commercial Risk)	Environmental Effects	Feasible? Preferred?
	Construction methods using caisson, crib, fill and other techniques	Technically feasible: • Suitable technology • Reliable technology • No safety concern	Economically feasible: • Development cost: high • Operating cost: low • Commercially viable • Commercial risk: low	• Increased footprint with increased adverse impact to marine environment (infill work for the required loading pier	Feasible No
12	**Timing, Scheduling (Quarry Operation)**				
	All year: 10 months operation; 2 months maintenance (winter); 2 shifts over 16 hours /day (6:00 to 22:00 hours)	Technically feasible: • Manageable operation scheme • No safety concern	Economically feasible: • Development cost: not affected • Operating cost: low • Commercially viable • Commercial risk: low	See EIS	Feasible Preferred
	Seasonal operation (longer winter break): overall shorter operational time	Technically feasible: • Manageable operation scheme • No safety concern • Requires higher production rates to meet annual targets	Economically NOT feasible: • Development cost: not affected • Operating cost: high (seasonal shut down and start up procedures; idle equipment) • Commercially NOT viable; • Commercial risk: low	Not assessed; however will impose increased vessel transits during season when marine mammals are most common	No
13	**Reclamation Timing**				
	Incremental (progressive) reclamation	Technically feasible: • Manageable reclamation scheme • No safety concern	Economically feasible: • Development cost: Low (storage areas for reclamation materials) • Operating cost: moderate • Commercially viable; • Commercial risk: low	• Supportive of Bilcon's policy on sustainable development • Effects on habitat, wildlife, and visual landscape qualities minimized	Feasible Preferred
	Reclamation at end of quarry operation	Technically feasible: • Manageable operation scheme • No safety concern	Economically feasible: • Development cost: Low to moderate (higher cost due to larger on-site storage requirements for reclamation materials) • Operating cost: low	• Not supportive of Bilcon's policy on sustainable development • Increased / prolonged adverse effects on terrestrial habitat, and visual landscape qualities	Feasible No

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#	Alternative	Technical Feasibility (Suitability, Reliability, Safety)	Economic Feasibility (Cost; Commercially Viable; Commercial Risk)	Environmental Effects	Feasible? Preferred?
			• Commercially viable • Commercial risk: low	• Not favored by regulators	
14	**Reclamation Objectives**				
	Natural succession based; minimal interference (minimal interference)	Technically feasible: • Manageable operation scheme • No safety concern	Economically feasible: • Development cost: low • Operating cost: low • Commercially viable • Commercial risk: low	• Reduced capacity for CO_2 sequestration • Approach would benefit other habitat types and associated birds, wildlife and plant life • Potential for increased / prolonged adverse effects on visual landscape qualities	Feasible No
	Managed reclamation; establishment of forest habitat; active habitat management	Technically feasible: • Manageable operation scheme • No safety concern	Economically feasible: • Development cost: moderate • Operating cost: moderate • Commercially viable • Commercial risk: low	• For further assessment and discussion of approach – see EIS; approach is to be detailed and finalized with input from regulators, community, and stakeholders	Feasible Preferred (preliminary decision)
15	**Decommissioning**				
	Removal of all site infrastructure and developments	Technically feasible: • Manageable operation scheme • No safety concern	Economically feasible: • Development (decommissioning) cost: moderate to high • Operating cost: not applicable • Commercially viable • Commercial risk: low	• Infrastructure may be of interest in context of certain after use scenarios (e.g., access road and mooring dolphins for residential development and marina development respectively) • Extent of infrastructure removal will be an outcome of the EA arising from the approval of the proponent's reclamation plan.	Feasible No
	Partial removal of site infrastructure and	Technically feasible: • Manageable operation scheme	Economically feasible: • Development (decommissioning) cost:	• Minimal adverse impact to environment as a result of	Feasible Preferred

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#	Alternative	Technical Feasibility (Suitability, Reliability, Safety)	Economic Feasibility (Cost; Commercially Viable; Commercial Risk)	Environmental Effects	Feasible? Preferred?
	developments (in full compliance with regulatory requirements)	• No safety concern (assumes restricted public access)	low to moderate • Operating cost: not applicable • Commercially viable • Commercial risk: low • Other: potential for cost savings in implementation of after use scenarios	decommissioning activities • For further assessment and discussion of approach – see EIS; final decommissioning approach is dependent on such factors as the after use concept and public preferences; to be detailed and finalized with input from regulators, community, and stakeholders • Extent of infrastructure removal will be an outcome of the EA arising from the approval of the proponent's reclamation plan.	(preliminary decision)

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Information Requests on the Revised Project Description

IR-1

The Sediment Disposal Area for years 1-20 (OP1 to OP4) is shown enclosed by berms but shows no provisions for drainage. The relocated sediment disposal area, after year 20, appears to be connected to the drainage system. Explain how precipitation accumulated in the sediment disposal area will be drained and demonstrate how the system would withstand the 100 year maximum 24 hr storm event.

RESPONSE

The sediment disposal area will be bermed on all four sides and hence the only catchment area will be that contained within the disposal area itself. The drainage from undisturbed areas upslope from the sediment disposal area will be routed around the exterior of the disposal area by means of drainage channels.

The sediment disposal area will be designed to maintain a one metre freeboard from the top of the sediment to the top of the berm. It should be recognized that the sediment will be used mixed with the stored topsoil to reclaim areas throughout the life of the quarry.

The 100 year maximum 24 hour rainfall is 191mm and this can be contained within the sediment disposal area. As a precautionary measure an overflow structure will be constructed in the surrounding berm, which will permit overflow to be channeled and to link up with the drainage channel to the east of the processing area.

IR-2

In plan OP-1-R1 the Watershed Drainage is shown to discharge into the coastal bog (environmental preservation zone) via underground drainage (pipe). As shown in Fig. IR8-1 this underground drainage appears to occur across the active quarry face for years 6-10. After quarrying terminates in this area, a +/- 27 metre cliff will separate the drainage channel from the pipe. Explain how adequate drainage is to be maintained during and after quarrying of this area.

RESPONSE

Plan OP1 – R1 and Figure IR8 – 1 represent concept quarry plans for Years 1 – 5 of the quarry construction and operation. Construction, including site preparation, is scheduled for Year 1. During Year 1 construction, a temporary rock storage area on approximately 8.0 hectares will be the first order of construction in Quarry Area 1. As site preparation proceeds for the temporary rock storage area, excavation for sediment pond 5 and excavation and installation of the underground drainage pipe to the bog are planned. The Revised Project Description proposes that the excavation of sediment pond 5 and excavation and installation of the underground drainage pipe be during the transition phase from construction to operation in Years 2 – 5. After reviewing the construction scheduling, from an economic, engineering and environmental standpoint, the installation of the underground drainage pipe would best be completed during the site preparation of the temporary rock storage area in Year 1.

The overall intent of the proposed drainage is to maintain an adequate flow of water to the coastal bog until this area of the quarry is reclaimed (please refer to response to Panel Comment on Section 9.2.2.1 Aquatic Ecology – On-site Freshwater and response to Nova Scotia Department of Environment and Labour comments from their Environment and Natural Areas Management Division included in the Comment and Response Submittal for the EIS for further details).

Since a "water course diversion" permit may be required from the NSDEL three options are presented for consideration.

Option 1 – open channel drainage west and around sediment pond 5

Option 2 – underground drainage pipe through sediment pond 5

Option 3 – underground drainage pipe southeast/southwest of sediment pond 5

The three options are shown on **Plan IR – 2 RPD**. After further consideration and more detailed engineering and environmental analysis, Option 3 is preferred. A section of Option 3 is shown on **Figure IR – 2 RPD**. Option 1 (open channel) was rejected since the gradients were not adequate for surface flow. Option 2 (underground drainage through sediment pond 5) was also rejected because gradients and outfall inverts at the bog were not adequate. Option 3 (underground drainage pipe southwest of sediment pond 5) appears preferable as gradients and location of the outfall into the bog are most appropriate. It should be noted that all options would require the excavation shown on **Figure IR – 2 RPD** during site preparation in Year 1. This excavation will create a water fall down the rock face into a pool at the bottom of the water fall. Water will then be piped from the pool underground to a location near the head of the bog. On-site investigations indicate this may be a more appropriate location for the outfall than proposed on Plan OP1 – R1. Active quarrying in Years 6 – 10 can take place on either side of the waterfall and pool and the underground drainage pipe will be below the working ground elevation of land surrounding sediment pond 5.

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IR-3

The drainage from the Organic Disposal Area (Plan OP2-R1) is shown to discharge into Sediment Pond 5. During years 6-10 this drainage occurs across an active quarry area. Explain how the drainage can be maintained during the active quarrying in this area.

RESPONSE

Drainage from the Organic Disposal Area (Years 1 – 30) will discharge into sediment pond 5. Minimal runoff is expected from the organic disposal area since temporary erosion control measures are proposed for the stockpile. However, any runoff will be through an open channel adjacent to the west side of the quarry road to sediment pond 5. This channel will be located adjacent to the quarry road and thus not be in the active quarry area during Years 6 – 10. Water discharge from this channel will be over the rock face to the same entry point into sediment pond 5 as the lower drainage channel. **Plan IR – 2 RPD and Figure IR – 2 RPD** included with responses to the Revised Project Description should provide further clarification.

IR-4

Throughout the life of the quarry the main drainage is shown to be via a channel, immediately east of the sediment ponds, that initially discharges into Sediment Pond 4 and then into Sediment Pond 5. Elevation of Sediment Pond 5 is shown to be +/- 10 metres. In Plan IR-7 this channel is shown to have a 10 metre elevation as it crosses under the ship loader and it is shown to drain the live storage area which has a 10 metre base elevation. The flow in the sediments ponds adjacent to this channel is shown to be in the opposite direction. Using profiles and gradients (or other means) demonstrate the viability of the proposed drainage pattern under normal and extreme conditions.

RESPONSE

Normal operating level of Pond 5 would be plus or minus 9.8 metres. A pump station will be installed adjacent to Pond 1 which will pump water into the open drainage channel at that location to a second channel to the north at a higher elevation. This drainage channel will flow north to the vicinity of Pond 4 where water will be pumped via a pipe system to the head of pond 5.

Beginning in Year 16 under normal operating conditions, the water level in Pond 6 would be plus or minus 14.8 metres. Water would overflow from Pond 6 and flow by gravity (plus or minus 1% gradient) in an open, rock lined channel to the pump station at Pond 1. Water from Pond 6 and plant runoff would then be pumped to a higher elevation channel which will carry water to the pump station at Pond 4 where it will be pumped to Pond 5. If water is required from Pond 6 when the level is below the normal operating level (14.8m), a temporary pump will be used to pump from Pond 6 into the open channel and then by gravity to the pump station at sediment Pond 1.

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IR-5

In the sections (e.g. Fig. IR8-1 & IR8-4) the sediment ponds are shown to intersect the water table. Explain how groundwater infiltration will affect the storage capacity of the sediment ponds during storm events, such as the 100 year maximum 24hr storm event. Provide information on the effect of groundwater withdrawal by the sediment ponds on the local water table.

RESPONSE

Reference to Figures IR8-1 and IR8 – 4 shows that the ponds may intersect the water table if constructed to a depth of 4 metres. This could result in infiltration of groundwater into the ponds, depending on pond construction and native soils in the vicinity of each pond. This could act to reduce the storage capacity of the ponds, depending on the fluctuating groundwater level in the constructed ponds, as storage volume would be lost below this level.

As outlined previously, a complete geotechnical investigation will be carried out to assess the pond design requirements, which would include a seepage analysis to determine infiltration potential and rates. Based on this, a suitable liner system (i.e. clay material or synthetic) could be designed for the ponds to reduce groundwater infiltration if required. Alternatively, the ponds could be constructed above the groundwater table using berms. The liner system and/or construction above the water table would effectively eliminate any significant groundwater-surface water hydraulic interaction, minimizing effects of storage capacity of the ponds or on the local water table.

Please refer to Surface Water Information Summary – Conestoga Rovers, February 2007 in Section 12 of this document.

IR-6

The sediment ponds are stated to serve three purposes: sediment retention, process water storage, and surface water (including storm water) management. On p.78 it is stated that 1 metre is needed for sediment storage, 2.5 metres for permanent water storage for processing etc., and 1.9 metres to accommodate the 100 year maximum 24hr storm event. Explain how this can be achieved with sediment ponds having a 4 metre depth.

The consultant report by Conestoga-Rovers notes that "Given proposed pond design, sufficient capacity would exist to contain the 100-yr flood volume, assuming the ponds were or could be drawn down to sufficient levels to accommodate the flood flows." Is it the intention to 'flush' the system prior to each major storm? Will the ponds be equipped with pumps to achieve this?

RESPONSE

In order to achieve the multi-purpose use of the sediment ponds, proper management and monitoring of the ponds will be required. The ponds will be required to store sediment accumulated over time (prior to cleanout) and provide for storage of up to 2.5m of water

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(over a combined pond area of 9.6 ha) to satisfy project demand during drought conditions. However, part of the storage volume may also be required for use as emergency flood storage during a major event. Depending on pond water levels at the time, emergency drawdown may be required to ensure sufficient volume is available to handle the flood input. As a result, pumping will likely be required during these times, or additional emergency flood storage capacity will need to be incorporated into the pond design for example, by increasing the perimeter berm height.

Please refer to Surface Water Information Summary – Conestoga Rovers, February 2007 in Section 12 of this document.

IR-7

The maximum water volume which the system may have to handle has been determined using the 100 year maximum 24hr storm event (Conestoga-Rovers report). In view of the time lag between the precipitation event and final discharge into the ocean, a more appropriate prediction of the maximum volume the system may have to handle would be obtained from the 100 year maximum 5 day total precipitation event. Provide calculations of water volumes generate by such an event and the free depth in the sediment ponds needed to accommodate such a volume.

RESPONSE

Storm data for extended duration events was obtained from the Meteorological Service of Canada (MSC), based on a combined analysis for the two MSC stations at Yarmouth, NS (MSC ID# 8206500 and 8206490). The analysis indicated that the 100 year maximum 5-day total rainfall would be 191 mm. Assuming no abstraction losses (conservative estimate), the total runoff volume for the 143 ha north catchment area would be approximately 273,000 m^3. This would require a depth of approximately 2.8 m for each of the 5 operating ponds for flood storage.

Given the proposed maximum sediment storage depth of 1 m, a total pond depth of 3.8 m would be required, leaving only 0.2 m of freeboard. Increased sediment cleanout may be warranted, say a 6 year frequency or 0.7 m sediment storage capacity. This would provide for a 0.5 m freeboard allowance. Again, this assumes that pond level would be drawn down to provide for the full flood volume capacity, as required. Additional emergency storage may be warranted to increase operational flexibility for example by increasing the height of the perimeter berm.

Please refer to Surface Water Information Summary – Conestoga Rovers, February 2007 in Section 12 of this document.

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IR-8

The debris cycle schematics for years 1-20 (OP1-9-R1 etc.) show a slurry line from the High Rate Thickener to the Sediment Disposal Area. Provide information on the specific gravity of the slurry to be pumped, the gradient and distance of the line, and the equipment to be used. In years 11-15 the slurry line is shown to cross the active quarry area. Explain how the line can operate in an active quarry area.

RESPONSE

Bilcon anticipates a 60% solids slurry. The material will weigh approximately 60 lbs per cubic foot in slurry form and will dry to approximately 83 lbs per cubic foot.

The slurry will be transported approximately 800 metres by means of a 150mm diameter polymer pipe. The approximate head is 55 metres.

Bilcon anticipates that two horizontal shaft, rubber lined slurry pumps will be installed.

The slurry transport pipes will be laid on the surface or trenched and covered where crossing roads or active quarry areas. The pipe will be moved as necessary during mining progression.

IR-9

Prior to the first shipment of aggregate from the site, rock debris from site preparation is to be accumulated at the Temporary Rock Storage site. Rock debris will be generated from excavation of Sediment Ponds 2, 3 & 4 and the loading tunnel, leveling of the Plant Processing Area, the Live Storage Area, the Quarry Compound Area, the Organic Disposal Area, and the Sediment Disposal Area. Provide a breakdown of the volume of material generated from each of these sites, and a total volume of material designated for the Temporary Rock Storage site. Provide the footprint of the Temporary Rock Storage Site, the estimated height of the storage pile and its slopes. Provide details on the berms around the site and its drainage.

RESPONSE

As noted elsewhere in this document, sediment ponds 2, 3 and 4 will be constructed before work is carried out on the preparation of the rock processing area. The excavated material from the ponds will be used to construct the berm surrounding the ponds and to commence construction of the berm around the temporary rock storage area.

The rock initially removed from the construction of the plant processing area will be used to complete the berm surrounding the temporary rock storage area as shown on Plan **OP1-R1** in the Revised Project Description. This berm will be designed using the parameters set out elsewhere in this document and defined in the Surface Water Summary Information –

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Conestoga Rovers, 2007 in Section 12 – Reference Documents in this document. The berm will be constructed with an overflow structure to a drainage channel which will conduct water to pond 4.

The subsequent significant sections of rock removed from the plant processing area will be placed in the temporary rock storage area. This stage of rock removal will create an area of sufficient size in the rock processing area to allow the installation of a chassis mounted portable crusher. This portable crusher will produce varying sizes of materials crushed from the further opening up of the plant processing area for leveling, roadwork, drainage channel construction including check dams etc. It is estimated that 800,000 tonnes of crushed material will be required for this work.

The temporary storage area (~ 8 ha) is estimated to have a capacity of 400,000 cubic metres at an average pile height of 40 metres with a 1 to 1 slope. The balance of rock from the plant processing area which will not be used in site construction or cannot be stored in the temporary storage area or the organic disposal area not immediately required for organic materials will be crushed and shipped as rip rap.

Breakdown of Volume

Component	Material Generated
Sediment Ponds 2, 3 and 4	~70,000 cubic metres (~45,000 cubic metres used for berms around the ponds – balance to berm around rock storage area)
Organic Disposal Area	~37,500 cubic metres (total used in perimeter berm)
Sediment Disposal Area	~ 252,000 cubic metres (~48,000 cubic metres for berms and safety berm–balance stored temporarily in the same area – cell 2)
Quarry Compound Area	0 (Building – slab on grade, crushed rock fill to yard area)
Processing Area	~1,140,000 cubic metres (~400,000 cubic metres temporary storage area and completion of berm ~365,000 cubic metres crushed for site construction ~375,000 cubic metres stored on-site or shipped as rip rap)

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IR-10

On p.78 the sediment ponds are stated to require clean-out approximately every nine years. This assumption neglects the fact that the accumulation rate in the upper two ponds will far exceed that of the lower two. Provide detailed information on the clean-out procedure. How will the upper sediments ponds be bypassed during clean-out?

RESPONSE

The sediment ponds, based on a total storage capacity basis (for sediment and water storage), would require clean out every nine years. For ease of calculation and explanation it was assumed that each pond would contain the same depth of sediment. In reality the upper ponds will have a much higher accumulation rate and in fact baffles will be designed for pond #5 to create a forebay for enhanced deposition. The forebay will require cleanout on a much more frequent basis than the downstream ponds.

The cleanout procedure for the forebay will be carried out during a scheduled plant shutdown in dry weather as will the much less frequent cleanout of the downstream ponds. Since the plant will be shut down no plant water will enter pond #5 and since cleanout will only be carried out in dry weather, there will be no runoff into pond #5. No bypass of pond #5 will be required.

The cleanout procedure for each pond will involve lowering the water level in the pond to ensure that no turbid water flows to the next pond in the series during the cleanout. This will be achieved by lifting the planks in the overflow structures and replacing them before the cleanout commences. Cleanout will be by dragline and the material deposited in trucks which will discharge to the sediment disposal area.

Joint Review Panel letter dated Jan 9, 2007 Re: Information Requests IR-11 to IR-23

Further to my letter of December 19, 2006, the Whites Point Quarry and Marine Terminal Joint Review Panel submits the attached 13 additional information requests on the Revised Project description for your response.

IR-11

Although the revised project description discusses alternative regions where the Proponent might have identified appropriate alternative sites, it does not consider extensive areas of New England (such as the Maine coast) which have considerable potential as sources of aggregate. The Proponent is requested to discuss the potential of alternative sites (as requested in the guidelines) for the Maritimes and New England, north of New York and New Jersey.

RESPONSE

Bilcon considers that details of its investigations into specific alternate sites are proprietary information and confidential. The identification of specific sites involves not only general

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characteristics such as the availability of good quality rock and deep water for shipping, but also the availability of significant parcels of land with access from service roads. Quarries can not be staked as are mining claims and hence land options must be negotiated ahead of detailed investigations. Such negotiations are clearly confidential.

IR-12

Revised drawings of the project do not show connections from the access roads on the site to Highway 217 if the Whites Point Road does not become available to the Proponent. Nor does the report identify road access to the sediment disposal areas for most of the project life. The access road to the area south of the Whites Point Road cuts directly through the environmental preservation zone. The Proponent is requested to clarify proposed routing and issues related to these access roads within the site.

RESPONSE

In the event Bilcon is unable to acquire the Whites Cove Road right-of-way for access to the quarry property from Highway 217, an alternate access road location is shown on **Map 43.** This access road would connect Highway 217 with the Quarry Compound area and the main quarry road.

Road access within the quarry property to the sediment disposal area location for Years 1 – 20 and Years 21 – 49 is also shown on **Map 43.**

Road access within the quarry property to the organic disposal area location for Years 1 – 30 and Years 31 – 49 is also shown on **Map 43.**

Quarry roads crossing the Whites Cove Road will be at grade intersections and require approval from the Nova Scotia Department of Transportation and Public Works, if Bilcon is unable to acquire the Whites Cove Road right-of-way. Two at grade crossings within the quarry property would be necessary. Both of these roads would pass through the proposed environmental preservation zone if Bilcon is unable to acquire the Whites Cove Road right-of-way.

IR-13

An intervener submission, presented by C. Taggart, indicated that Map 4 (page 32) was neither complete nor up to date. The Panel notes that it is unchanged in the Revised Project Description. The Proponent is requested to ensure that the map of shipping routes and designated whale watching areas is accurate.

RESPONSE

An updated **Map 41** is included with this Comment and Response Submittal showing the present inbound/outbound shipping lanes and the traffic separation scheme in the area of the proposed Whites Point quarry. Reference to the source of mapping (Nautical Chart 4011 – Approaches to the Bay of Fundy) from which this information was derived, is indicated on **Map 41.** Longitude and latitude points for the shipping lanes are provided in "International Maritime Organization, Sub-Committee on Safety of Navigation. Routing of Ships, Ship Reporting and related Matters, Amendment to the Traffic Separation Scheme in the Bay of Fundy and Approaches". NAV 48/3/5. 5 April 2002.

The whale watching areas shown on Map 4 of the EIS are not "designated whale watching areas" as inferred by C. Taggart. As indicated in the Legend of Map 4, these areas are referred to as "popular whale watching areas". These areas were located based on traditional knowledge of whale watching activities in this area of the Bay of Fundy. The source of this traditional knowledge is Bay to Bay Adventures Ltd.

IR-14

The Proponent is requested to explain how erosion and run-off will be controlled on the basalt pedestal that will be created to carry the old Whites Point Road.

RESPONSE

If Bilcon is unable to acquire the Whites Cove Road right-of-way, existing drainage patterns parallel to the Whites Cove Road will remain the responsibility of Nova Scotia Department of Transportation and Public Works. On-site review of existing drainage indicates the majority of surface runoff is down or parallel to the Whites Cove Road. Road ditches should handle this runoff. Occasional runoff may flow perpendicular to the Whites Cove Road through drainage ways in the environmental preservation zone. Some erosion at the top of the cut face of the quarry may result. However, since the soil is thin over bedrock, this surface will stabilize to bedrock quickly. Any sediment laden runoff flowing over the cut face of the quarry would be collected in the sediment control structures i.e. channels, sediment ponds etc. and be cleansed before discharge from sediment pond 1, into the constructed wetland and then into the Bay.

IR-15

The Proponent is requested to clarify the comment presented near the bottom of page 52 regarding drainage: "An underground drainage pipe will be installed at this time for conveying any necessary surface water runoff to the coastal bog **or** *to sediment pond 5." How does a single pipe fulfill both purposes?*

RESPONSE

Prior to construction, water flow at the outfall of the coastal bog into the Bay of Fundy will be measured on a seasonal frequency. This will determine the flow to be maintained through the bog during construction and quarrying activities scheduled to take place in a portion of the bog watershed. It is planned to supply surface runoff from the off-site, undisturbed area of the bog watershed, if required, to meet the pre-construction flow. This would be done via an underground drainage pipe as shown on **Plan IR – 2 RPD and Figure IR – 2 RPD.** Incremental reclamation of the disturbed portion of the bog watershed is planned. Upon complete reclamation of the disturbed portion of the watershed, the supplemental flow to the bog may be discontinued. At this time, surface water runoff from the off-site watershed via the underground drainage pipe would be stopped from flowing into the bog, i.e. cap the pipe, and watershed runoff allowed to flow into sediment pond 5 for use in the wash water process.

IR-16

On page 72 quarry operations are stated to involve 37 full-time job equivalents, while on page 96 the workforce is given as 34. Resolve the difference. Eight weeks during each winter will be reserved for quarry maintenance. How many full-time positions will continue during this period?

RESPONSE

The reference to 37 full-time job equivalents on page 72 of the Revised Project Description reflects the impact of employment as discussed in Section 9.3.9.2 of the EIS, whereas the figure on page 96 refers to the actual number of persons employed based from the proposed operating requirements.

The figure of thirty-seven full-time equivalents was derived using the standard definition of total hours worked divided by the average annual hours worked in full-time jobs. A conservative figure of 2,100 hours worked on average per full-time job annually (this exceeds both the Provincial and National averages for 2005 of 2,045 and 2,058 hours worked respectively) was used and this figure was divided into the total number of hours worked (77,952 hours) based on the proposed operations schedule for the quarry.

The number of persons employed full-time at the quarry during the 8-week maintenance period is 16. Please refer to the response to the Panel's comment on Section 9.3.9.2 contained in the Comment and Response Submittal for a more complete response to this question.

IR-17

Constructed wetlands can play an important role in treating effluent before it is discharged into the natural environment. They are typically constructed to achieve particular objectives; to do that they require a design that manages the flow of water effectively. The Proponent is requested to clarify the objectives and functioning of its "500 metres of lineal aquatic habitat" to explain how it differs from a conventional ditch. Describe the nature and functioning of the "discharge structure" at its terminus.

RESPONSE

The objective of the proposed constructed wetland is for the creation of wildlife habitat/biodiversity. A further objective is to create additional coastal bog ecosystem, an ecosystem which is unusual along the Bay of Fundy coast. Incidental benefits of the wetland would result from further sediment retention and minimal nutrient absorption. As described in the response to the Panel's comment on section 9.2.2.1 and illustrated on **Plan IR - 7** and **Figure CB - 1**, the constructed wetland is intended to be a naturalistic wetland with native bog plants. Further, a bog wetland is not conducive to nutrient absorption or use in "polishing effluent".

As a side note, for many years Ducks Unlimited (D.U.) has been involved in creating wildlife habitat/biodiversity through their constructed wetlands development program. D.U. has constructed wetlands throughout the Maritimes with documented results of increased biodiversity. Approximately 90% of D.U.'s constructed wetlands function as wildlife habitat enhancement while approximately 10% function for effluent treatment (*pers com.* Rob Fraser, Ducks Unlimited Canada).

The proposed "discharge structure" referred to would be a concrete culvert placed near the terminus of the constructed wetland before water outfall into the Bay of Fundy. Monitoring equipment including turbidity and pH sensors and a flow meter would be installed in the culvert. Although seasonal flow is expected to be intermittent, these instruments coupled with data loggers would provide continuous monitoring of the above variables in relation to flow entering the Bay from the sediment pond discharge. Monitoring of Total Suspended Solids and pH will probably be required as part of the industrial permit by the Nova Scotia Department of Environment and Labour.

IR-18

On page 78 the risk of a 100 year storm is projected as "approximately 40%". On page 154, under a scenario of increasing climate change, "the 100 year return period event (115mm) in the base climate period 1961-90 is projected to recur once every 10 years by the 2050's, a reduction in the return period by a factor of about 10. " The Proponent is requested to provide an estimate of risk for a 100 year storm event over the life of the project that accommodates the scenario of increasing climate change.

RESPONSE

The 40% risk calculated on pg. 78 reflects the risk of a 100-yr storm (as currently defined) occurring at least once during the project life of 50 years. Based on the climate change guidance documents, the current 100-yr storm is projected to become the equivalent of a 10-yr storm by the 2050's (i.e. 2040 - 2069). The guidance document does not provide information on projected change in recurrence interval during the 2020's (i.e. 2010 - 2039), but does indicate that the maximum 5-day precipitation increases by 15% by the 2020's and remains steady in subsequent time periods.

Assuming the project life will be from 2010 - 2060, and assuming no change in the recurrence interval for the current 100-yr storm in the first 25 years (i.e. 2010 - 2035), the risk of occurrence of the 100-yr storm during this period would be approximately 22%. For the latter 25 years of the project life (i.e. 2036 - 2060), the risk of occurrence of the current 100-yr storm (i.e. a 10-yr storm during that period) would rise to approximately 93%. If we assume the current 100-yr storm will have a recurrence interval of 10 years over the full project life (i.e. 2010 - 2060), the risk of occurrence would be approximately 99%.

IR-19

Map SR-1 (page 104) presents an ideal turning radius for the ship. Given wind patterns and strong tidal currents that are known to exist in the area, the Panel expects that in some sea states the ship will require additional room to maneuver. The Proponent is requested to clarify the zone of interference the ship will need to occupy during heightened conditions when it is still possible for it to moor at the terminal. Under extreme conditions when the ship will be forced to stand off, where will it go? (What wind and tidal levels will be considered sufficiently hazardous to prevent docking?)

RESPONSE

It must be emphasized that the decision as to whether the ship can safely approach the terminal, load and return to the shipping lanes is strictly one for the master of the ship. Bilcon will have no part in this decision. If the ship must stand off, the master will make the decision as to whether to anchor, proceed to Saint John or indeed to proceed to another port to pick up an alternate cargo. The issue of wind and tidal conditions would be a matter for the ship's master only.

Bilcon has been advised that under safe conditions when a ship will proceed to the Whites Point terminal it will be able to adhere closely to the designated route to and from the shipping lanes and also closely to the turning circle set out on Map SR-1. It should be noted that modern bulk carriers are equipped with bow thrusters enabling much greater maneuverability.

IR-20

Figure 5-Rl (page 112) shows elevations for part of the quarry at reclamation. The Proponent is requested to provide a plan view showing the projected contours of the site after reclamation is complete.

RESPONSE

A contour plan of the quarry area after reclamation is shown on **Plan CP – 1 RPD** contained in this Comment and Response Submittal. It is envisioned that head walls, side walls, and the quarry floor steps will be vertical cuts in the basalt bedrock as shown in the series of sections (Figures IR8 – 1 through IR8 – 7) provided with the Revised Project Description. Display of individual contour lines at 1 metre interval is practically impossible due to the vertical aspect of the cut faces. This would result in many contour lines coinciding one on top of the other. Thus, the groups of contour lines on the plan indicate the bottom and top contour elevation of the quarry floor steps.

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IR-21

On page 145 the following information request is addressed: "The proponent should identify whether these areas [sediment stockpiles] are expected to contain water. If so, mitigative measures should be identified to ensure they do not fail or overflow during periods of unusually heavy precipitation." The Proponent is requested to clarify the issue of drainage from sediment disposal areas and to explain all of the planned measures that have been developed to ensure the integrity of the dykes and berms.

RESPONSE

Please refer to the response to IR1 and the details of the design procedures to be undertaken in Section 7.0 Revised Project Description and in Section 12 – Reference Document - Conestoga Rovers & Associates – Surface Water Information Summary, February 2007

IR-22

While the Panel accepts the Proponent's suggestion that the engineering design of the marine terminal will come later, it does require additional clarification on the specifications that will be set for the structure. Identify the extremes of wind, waves, tides, and storm surges that the terminal will be required to accommodate.

RESPONSE

While as noted in earlier submissions detailed engineering design of the marine terminal has not been carried out, the Panel is correct in assuming that Bilcon has reviewed data identifying various extremes in the Bay of Fundy that the terminal will be required to accommodate. It should be noted, however, that extremes identified are for locations at some distance from Whites Cove. Further studies will be required to extrapolate this data to set the parameters for extremes at the Whites Point location. Examples of wind, waves, tides, and storm surges identified as set out below.

Wind and Waves

Data regarding wind and wave frequency in the Bay of Fundy was abstracted from the AES40 database from Environment Canada/Atlantic Region (*pers. comm.* Rick Fleetwood, Regional Climatologist). The data is from AE Gpt 5314, Lat. 44.375n, Long. 66.6667w, Depth 1000m. The period of coverage is 1954 to 2003. The wind speed (m/s) and significant wave height (m) is presented in Table WWO – 1 and WWF – 1.

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Table WWO – 1, Wind Speed (m/s) & Significant Wave Height (m) - Observations 1954-2003

	Wind (m/s)	*0.000*	*5.000*	*10.000*	*15.000*	*20.000*	*25.000*	*30.000*	
Sig. Wave Ht. (m)									**Total**
0.000 – 0.9999		6157	24946	269	2	0	0	0	31374
1.000 – 1.9999		919	16274	10494	134	0	0	0	27821
2.000 – 2.9999		35	1220	5747	1610	15	0	0	8627
3.000 – 3.9999		0	121	1033	1508	103	0	0	2765
4.000 – 4.9999		0	11	158	456	159	3	0	787
5.000 – 5.9999		0	0	19	67	71	3	1	161
6.000 – 6.9999		0	0	5	12	12	4	0	33
7.000 – 7.9999		0	0	0	3	9	1	0	13
8.000 – 8.9999		0	0	0	1	4	1	0	6
9.000 – 9.9999		0	0	0	0	1	0	0	1
Total		7111	42572	17725	3793	374	12	1	71588

Source: Environment Canada/Atlantic Region

Table WWF – 1, Wind Speed (m/s) & Significant Wave Height (m) - Frequency 1954-2003

	Wind m/s	***0.000***	***5.000***	***10.000***	***15.000***	***20.000***	***25.000***	***30.000***	***Total***
Sig. Wave Ht. (m)									
0.000 – 0.9999		.0860	.3485	.0038	.0000	.0000	.0000	.0000	.4383
1.000 – 1.9999		.0128	.2273	.1466	.0019	.0000	.0000	.0000	.3886
2.000 – 2.9999		.0005	.0170	.0803	.0225	.0002	.0000	.0000	.1205
3.000 – 3.9999		.0000	.0017	.0144	.0211	.0014	.0000	.0000	.0386
4.000 – 4.9999		.0000	.0002	.0022	.0064	.0022	.0000	.0000	.0110
5.000 – 5.9999		.0000	.0000	.0003	.0009	.0010	.0000	.0000	.0022
6.000 – 6.9999		.0000	.0000	.0001	.0002	.0002	.0001	.0000	.0005
7.000 – 7.9999		.0000	.0000	.0000	.0000	.0001	.0000	.0000	.0002
8.000 – 8.9999		.0000	.0000	.0000	.0000	.0001	.0000	.0000	.0001
9.000 – 9.9999		.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000
Total		.0993	.5947	.2476	.0530	.0052	.0002	.0000	1.000

Source: Environment Canada/Atlantic Region

Tides

Tides at Saint John are typically in the range of 6.7 metres to 8.5 metres above chart datum. However, the mathematical upper bound is 10.04 metres above chart datum.

Storm Surges

The average storm surge measured from all recording stations in the Bay of Fundy is 0.6 metres for a 1 in 20 year event and 1.2 metres for a 1 in 100 year event. A storm surge of over 2 metres was recorded in the 1869 Saxby Gale at the extreme head of the Bay of Fundy.

Clearly Bilcon will be engaging the necessary experts at the detailed design stage to refine the available data with respect to historic extremes and with respect to anticipated changes in these extremes due to predicted climate change.

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IR-23

The Panel requires additional specific information on the nature and number of pieces of stationary and mobile equipment to be used during the operational phase. For example, what type of crushers will be used (impact or percussion), identify their size (capacity), how many will be needed, will they be enclosed, etc? For each type of equipment provide noise levels when operating at maximum capacity.

RESPONSE

Stationary Equipment

The stationary equipment is designed to produce approximately 500 stph net finished product of <3/4 inch. The plant will include the following equipment:

1	jaw crusher primary approximately 48 X 60 inch opening powered by 350 horsepower electric motor
3	60 inch cone and bowl type crushers powered by 500 horsepower electric motors
1	8 X 24 foot primary double deck incline screen
2	8 X 24 foot close circuit incline screens
3	8 X 24 foot incline wash screens
2	6 X 16 foot reverse slope dewatering screens
1	50 foot high rate thicker
~ 35	conveyor belts of 3, 4, and 5 foot width.

Noise Levels

All conveyor belts will be covered where possible to eliminate dust and noise. All screens will use rubber and urethane screen media to reduce noise. Currently most aggregate producers in Nova Scotia meet the noise regulations and guidelines without enclosing their crushers and screens. Bilcon has elected to enclose all the crushers and screens in the operational phase to limit noise and dust. Reference to EIS Volume VI, 9.1.10.2, shows that noise generated by the equipment at the processing plant site inside the enclosures is expected to be a maximum of 85 dB. Enclosure will significantly reduce this level at the plant site outside the enclosures.

Mobile Equipment

Bilcon will use the newest type of mobile equipment available for their primary production pieces. These will be the same type and manufacture as most other aggregate producers use in Nova Scotia and meet the current regulations and guidelines. These units are:

1	Caterpillar 990 front end loader,
3	Caterpillar 775 haul trucks
1	Caterpillar D-9T bulldozer with ripper
1	Caterpillar 385C excavator,
1	Caterpillar 988 front end loader
1	Caterpillar IT 38 tool carrier

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1 5000 gal water truck

Noise Levels
Spectator (exterior) Sound Level

Machine	Test Standard	Test Mode	dB(A)
990H	SAE J88	mid-gear moving	82 average sound pressure
988H	ISO 6395	dynamic	112 sound power
980H	ISO 6395	dynamic	112 sound power
D9T	SAE J88	mid-gear moving	87 average sound pressure
775E	SAE J88	mid gear moving	84 avg. sound pressure
IT38G Series II	ISO 6393	static	110 sound power
385C	No test data available		

Note 1
The SAE J88 test procedure listed is a machine empty forward travel drive-by test with the transmission in mid range gear. Two microphones are placed at a distance of 50 ft from the sides of the machine. The reported value is the average of the two microphone readings.

The ISO 6393 test results in a "sound power" level. This is not the sound level at a set distance from the machine, but a total sound energy being radiated from the machine. This test has one part, the machine is stationary with the engine at rated speed.

The ISO 6395 test results in a "sound power" level. This is not the sound level at a set distance from the machine, but a total sound energy being radiated from the machine. Backup and travel alarms are disabled during this test. This test has different parts depending on machine type:

- for loaders: the machine moving in 1st gear under no load and a cycle of raising/lowering an empty bucket
- for dozers: the machine moving in 1st gear under no load
- excavators: machine stationary and bucket position varied under no load

Note 2
This data is not a guaranteed machine sound level, but data that was measured on a single sample new machine in a typical North America machine configuration. Experience has indicated there is some variability in sound levels from machine to machine of the same model and exact same configuration. This data is only applicable for machine operations as specified in the actual test method (standard and test mode) listed above.