

**ORCA SAND AND GRAVEL PROJECT**

**COMPREHENSIVE STUDY REPORT**

**WITH RESPECT TO**  
**THE REQUIREMENTS OF A COMPREHENSIVE STUDY PURSUANT TO THE**  
*CANADIAN ENVIRONMENTAL ASSESSMENT ACT*

**JUNE 30, 2005**



<b>EXECUTIVE SUMMARY .....</b>	<b>i</b>
<b>Part A – Comprehensive Study Background .....</b>	<b>1</b>
<b>1. Introduction.....</b>	<b>2</b>
1.1 Purpose of the Comprehensive Study Report .....	2
1.2 The Federal Review Process .....	5
1.3 The Provincial Review Process .....	6
1.4 The Federal/Provincial Cooperation Agreement .....	6
<b>2. Project Description and Scope of Assessment .....</b>	<b>7</b>
2.1 The Proponent.....	7
2.2 Project Overview .....	7
2.3 Project Need/Alternatives Assessment .....	10
2.3.1 Project Need/Purpose.....	10
2.3.2 Alternatives To the Project .....	10
2.3.3 Alternative Means of Carrying Out the Project .....	12
2.4 Scope of Project .....	14
2.5 Scope of Assessment.....	15
2.5.1 Factors to be Considered.....	15
2.5.2 Scope of Factors to be Considered.....	15
<b>3. Information Distribution and Consultation .....</b>	<b>17</b>
3.1 Federal Coordination .....	17
3.2 Public Consultation in Accordance With The CEA Act.....	17
3.2.1 Section 21 – Public Participation Regarding Proposed Scope of Project .....	17
3.2.2 Section 21.2 – Public Participation in the Comprehensive Study .....	18
3.2.3 Section 22 – Public Access to Comprehensive Study Report.....	19
3.3 Provincial Consultation Measures .....	19
3.4 Consultation Measures Undertaken by Proponent.....	20
3.5 First Nation Consultation and Project Review.....	20
<b>Part B – Comprehensive Study Assessment .....</b>	<b>22</b>
<b>1. Description of the Existing Environment .....</b>	<b>23</b>
1.1 Description of the Biophysical Environment.....	23
1.1.1 Hydrology and Water Resources .....	23
1.1.2 Geology and Soils .....	24
1.1.3 Vegetation .....	25
1.1.4 Species at Risk .....	26
1.1.5 Fish and Fish Habitat .....	26
1.1.5.1 Freshwater Ecosystem .....	26
1.1.5.2 Marine Ecosystem.....	28
1.1.6 Wildlife and Wildlife Management .....	31
1.1.7 Waste Management.....	34
1.1.8 Noise .....	34
1.1.9 Air Quality .....	35
1.2 Description of Socio-Economic and Cultural Environment .....	35
1.2.1 Current Use of Lands and Resources for Traditional Purposes .....	35
1.2.2 Land and Resource Use .....	37
1.2.3 Local Communities .....	38
1.2.4 Public Health and Safety.....	38
1.2.5 Navigation.....	39

1.2.6 Archaeological, Heritage and Historical Cultural Resources .....	39
<b>2. Environmental Effects and Mitigation.....</b>	<b>41</b>
2.1 Environmental Effects and Mitigation for the Biophysical Environment .....	41
2.1.1 Hydrology and Water Resources .....	41
2.1.2 Soils.....	42
2.1.3 Species at Risk .....	43
2.1.4 Fish and Fish Habitat .....	44
2.1.5 Wildlife and Wildlife Management and Vegetation.....	46
2.1.6 Waste Management.....	47
2.1.7 Noise .....	48
2.1.8 Air Quality .....	50
2.2 Environmental Effects and Mitigation for the Socio-Economic and Cultural Environment.....	50
2.2.1 Current Use of Lands and Resources for Traditional Purposes.....	50
2.2.2 Land and Resource Use .....	51
2.2.3 Public Health and Safety.....	52
2.2.4 Navigation.....	52
2.2.5 Archaeological, Heritage and Historical Cultural Resources .....	53
<b>3. Cumulative Environmental Effects Assessment .....</b>	<b>54</b>
3.1 Introduction.....	54
3.2 Methodology .....	54
3.3 Discussion .....	57
3.4 Conclusion .....	66
<b>4. Effects of the Environment on the Project .....</b>	<b>67</b>
4.1 Cluxewe River Bank Erosion.....	67
4.2 High Winds .....	67
4.3 High Precipitation .....	67
4.4 High Waves.....	67
4.5 Seismic Events .....	68
4.6 Conclusions.....	68
<b>5. Environmental Effects of Accidents and Malfunctions.....</b>	<b>68</b>
5.1 Hydrocarbon spills.....	69
5.2 Accidental Forest Fires .....	70
5.3 Concrete Spills.....	70
5.4 Discharge of Sediments to Marine Environment.....	71
5.5 Discharges from Ships .....	71
5.6 Grounding of Ships.....	71
5.7 Risk of accidents and malfunctions during decommissioning.....	72
5.8 Conclusions.....	72
<b>6. Environmental Monitoring and Follow-up Program .....</b>	<b>73</b>
<b>Part C – Responsible Authorities Conclusions.....</b>	<b>81</b>
1. General.....	82
2. Monitoring and Follow-up Program .....	82
3. Overall Conclusion .....	82
<b>APPENDIX A .....</b>	<b>83</b>
<b>APPENDIX B .....</b>	<b>85</b>
<b>APPENDIX C .....</b>	<b>96</b>

## **EXECUTIVE SUMMARY**

### **PROJECT**

Orca Sand and Gravel Ltd. (the Proponent) proposes to construct, operate and decommission a sand and gravel quarry and associated ship loading facilities for the production and export of construction aggregates (the Project), approximately 4 kilometres west of Port McNeill, on Northern Vancouver Island (the Project).

The Project was subject to review under both the *Canadian Environmental Assessment Act* (CEA Act) and the *BC Environmental Assessment Act* (BCEAA). A single coordinated environmental assessment was conducted pursuant to the *Canada-British Columbia Agreement for Environmental Assessment Cooperation*.

The Project includes the following on-site and off-site components:

- ship loading facility and associated conveyor;
- gravel/sand deposit extraction;
- processing plant;
- land-based conveyor system; and
- all other works associated with the construction, operation, and decommissioning of the Project (e.g. settling ponds, stockpile area, water supply, site access, power supply and any off-site or on-site compensation and mitigation works as required).

The Project would be located on private lands owned by Western Forest Products Ltd, with the exception of the ship loading facility, which is proposed for provincial Crown foreshore and nearshore in Broughton Strait. The Project's lifespan is anticipated to be 30 years, with annual production capacity estimated at 4-6 million tonnes. The Proponent anticipates that construction aggregates from the quarry will be shipped to Pacific coast markets, particularly California. The Project location is shown in Figure 1.

The scope of the environmental assessment included: hydrology and water resources; geology and soils; vegetation; species at risk; fish and fish habitat; wildlife and wildlife habitat; waste management; air quality, visuals, noise, navigation, and public health and safety; and, social, economic, cultural and heritage values. The following were also included to meet CEA Act requirements: alternative means of carrying out the Project; effects of the Project on the environment; environmental effects of accidents and malfunctions; cumulative environmental effects; and, the requirements of a follow-up program.

Capital cost of the Project was estimated by the Proponent as approximately \$55 million, which would be invested during a one year construction program, with annual expenditures in the local economy estimated at \$11 million. The Project is expected to create 50 direct, non-seasonal jobs over the anticipated 30-year lifespan.

Orca Sand and Gravel Ltd. is a private company, incorporated in British Columbia in 2004, and is the vehicle through which the Project's co-proponents Polaris Minerals Corporation and the 'Namgis First Nation hold their partnership interests in the Project.

#### **INFORMATION DISTRIBUTION AND CONSULTATION**

Orca Sand and Gravel Ltd., and its predecessor, Polaris Minerals Corporation conducted a consultation program over a period of more than three years with relevant levels of government, First Nations, community organizations, and the general public. Public consultation included the operation of a Port McNeill office / information centre, provision of field tours and presentations, and numerous meetings to collect local knowledge and information. During development of the Application and its review, the Proponent continued to meet with these interests and agencies.

Since 2002, the Proponent has maintained dialogue and sought advice from federal, provincial, and local government agencies. An inter-agency / First Nations project working group was established as the primary source of policy and technical expertise for assessment of the Project. The Orca Sand and Gravel Project Working Group (WG) was comprised of representatives of federal, provincial and local government agencies and the First Nations. WG meetings were held in August and September of 2004, and in February and March of 2005 to identify specific issues and concerns, provide information, and resolve issues.

The Project area lies within the Douglas Treaty area, the asserted traditional territory of the Kwakiutl First Nation (Fort Rupert) and the 'Namgis First Nation. The two First Nations were invited to, and participated in the Project Working Group and thereby provided with opportunities for formal review and comment on the Application.

#### **PUBLIC ACCESS TO INFORMATION**

Relevant information, meeting records, and correspondence related to the Project were made available electronically through the EAO electronic Project Information Centre (ePIC) and on the Proponent's web site ([www.orcasand.ca](http://www.orcasand.ca)) and the federal Canadian Environmental Assessment Registry. The public was notified of the availability of information and the opportunity to comment on the Scoping Document, the Application and the Comprehensive Study Report.

During the Application Review stage, the public was invited to provide comments on the Application during a formal public comment period. In general, the public comments expressed support for the Project. The few expressions of public concern, primarily made at the open houses, were focused on possible impacts on the Cluxewe River, on ground water levels, on foreshore marine habitat and marine mammals, on public health, on the Cluxewe Resort, and on the nature of job creation and economic benefits. Responsible authorities are satisfied that public comments received during the environmental assessment review have been properly considered.

Appendix B of this report contains a complete list of issues identified by the public during the review of the Proponent's Application, as well as the Proponent's response to those issues. All issues raised by the public during the review of the Project, that were deemed to be within the scope of the review, were considered in the Application review process and the documents generated became part of the review.

#### **SUMMARY OF KEY ISSUES CONSIDERED DURING THE REVIEW**

Key issues considered during the Project review are described below.

#### **Environmental Effects and Mitigation for the Biophysical Environment (see Part B – Section 2.1)**

The primary issues raised were related to water and freshwater ecosystem effects, marine ecosystems and marine mammals, and terrestrial ecosystem components. Water and freshwater ecosystem issues included: effects on groundwater levels, and on water levels in the Cluxewe River and Mills Creek; impacts on Cluxewe River and Mills Creek fisheries and habitat; effects on other groundwater users; and the quality and quantity of water used in operations and possible effects of it being discharged into the environment.

Commitments were made to ensure pit excavation remains above the groundwater table; to undertake monthly groundwater level monitoring during construction and operation; to maintain buffers along the Cluxewe River; to monitor groundwater quality on an annual basis; to regularly assess bank stability of the Cluxewe River; and to discharge process water only into sediment control ponds or other on-site locations for infiltration and not into the Cluxewe River or Mills Creek.

Marine ecosystems and marine mammal issues included: design for minimizing effects on the inter-tidal and sub-tidal habitat; requirements for construction of marine works; requirements for marine habitat compensation; noise effects from the conveyor system and ship loading activities on fish and marine mammals and their migration routes; refuelling, sewage and bilge water discharge from ships at the loading facility, and the potential effect on shellfish harvesting; and effects on *Species at Risk Act* (SARA) marine protected species and their ecosystems, and monitoring requirements.

Commitments were made to: utilize pile drilling, as opposed to pile driving, during construction of the ship loading facility; to conduct Project construction in the marine environment using marine construction methodology approved by DFO, including timing windows, mitigation, and monitoring; to provide underwater noise monitoring; to adapt construction to avoid noise impacts on marine mammals; to design mooring buoys to minimize underwater noise; and to discuss additional orca monitoring requirements associated with SARA.

Terrestrial ecosystem issues included: effects of the conveyor system on large mammal migration and RC ecosystem (poorly drained sitka spruce-skunk cabbage ecosystem);

effects on habitat fragmentation; effects on migratory birds and bird habitat; and effects on SARA protected species, and rare, endangered or threatened species.

Commitments were made to design the conveyor system to minimize effects on the RC ecosystem; to monitor drainage and vegetation changes and alter conditions if noticeable ecosystem changes occur; to allow for large mammal passage at two locations along the conveyor; to conduct a bird nest survey prior to any tree clearing along the conveyor line taking place between April 1 and July 31; to comply with the BC *Wildlife Act* and the federal *Migratory Birds Convention Act* regarding protection and buffering of inactive and active nests of protected bird species along the conveyor line; and to monitor the presence of Harlequin Ducks. It is noted that the pit area being cleared by the land owner, Western Forest Products (WFP), is also governed by provincial and federal laws respecting timber harvesting and fish and wildlife management.

### **Environmental Effects and Mitigation for the Socio-Economic and Cultural Environment (see Part B – Section 2.2)**

The primary issues raised were related to: air quality impacts to human health, noise effects, visual effects, economic effects, navigation effects, effects on archaeological resources; and effects to First Nations current use of lands and resources for traditional purposes.

The air quality issues included: dust from the Project, and its potentially adverse effect on the Cluxewe Resort; and airborne emissions from plant machinery.

Commitments were made to use the wet processing plant to control dust emissions, and use water sprays during hot weather, if necessary; and to operate the plant with low emission engines on site, and encourage similar equipment to be used by contractors.

The noise issue was focussed on a potential noise level increase and its effects on the Cluxewe Resort and on residents of Pulteney Point on Malcolm Island.

Commitments were made to undertake an independent baseline noise study at these locations; and to implement further noise mitigation measures when operations commence, if pit and ship loading noise becomes an issue at these locations.

The visual effects issue related primarily to ship loader lighting and its potential effects on visual quality at the Cluxewe Resort and on residents of Pulteney Point on Malcolm Island.

Commitments were made to design the ship loader to minimize use of lighting especially over water; and to minimize lights on the ships.



Economic effects issues included: effects on local employment and contracting opportunities; potential adverse effect on local commercial fisheries activities; and potential adverse effects on private property values on land near Pulteney Point.

Commitments were made to recruit the majority of employees from the North Island; to provide training for operational positions where necessary; to give preference to North Island businesses for contracting opportunities; to uphold First Nations employment agreements; to avoid effects on fisheries through design of the ship loader; and to minimize property value effects through noise and visual impact mitigation measures.

Regarding navigation, the primary issue raised was the possible effect of the ship docking and loading facility on navigation and traffic in Broughton Strait.

Commitments were made to avoid adverse navigational effects through design and location of the ship loader, and to comply with Transport Canada NWPA requirements.

The primary issues raised by First Nations that related to environmental, public safety and health, socio-economic, navigable waters, and other aspects of the review were incorporated into those sections. Related issues raised by First Nations outside of these specific topics included: inclusion of plants traditionally used by First Nations in reclamation and potential for dust from conveyor system to negatively affect the quality and palatability of traditionally harvested edible seaweed..

The Proponent committed to agreements with First Nations respecting employment opportunities and other matters; to encourage WFP to consult First Nations on replanting of native plant species; to provide opportunities for possible First Nation companies to salvage native plants ahead of operations; to provide an archaeologist to monitor the two areas of moderate archaeological potential; and to follow protocol and legal requirements if artefacts or human remains are found during earth moving.

The 'Namgis First Nation provided a letter on March 24, 2005 indicating that it had been adequately consulted and accommodated by the Proponent and the federal and provincial governments with respect to the Project. On March 23, 2005 the Kwakiutl First Nation provided a letter of support for the Project and confirmed that it had been adequately consulted and accommodated by the Proponent and that federal and provincial Crown obligations related to consultation and accommodation had been fulfilled with respect to the Project.

**Additional CEA Act Requirements**  
**(see Part A – Section 2.3 & Part B – Sections 3, 4, 5 & 6)**

The CEA Act has specific requirements that also must be considered in the environmental assessment, including: effects of the Project on the environment; environmental effects of potential accidents or malfunctions; and cumulative environmental effects. As well, a comprehensive study under the CEA Act has further

requirements for consideration, including: the purpose of the Project, alternative means of carrying out the Project; and the requirements of a follow-up program. These topics were discussed by the Working Group, and in some cases, the public and First Nations also raised a number of issues. Where appropriate, the Proponent has made commitments to minimize or mitigate associated effects to address these issues.

### **CONCLUSIONS**

Based on the information contained in the Application; communications with agencies and First Nations, and the public; and the Proponent's responses and commitments, the responsible authorities concluded that the Project is not likely to cause any significant adverse environmental effects.

# **Part A – Comprehensive Study Background**

## **1. Introduction**

Orca Sand and Gravel Ltd. (the Proponent) proposes to construct, operate and decommission a sand and gravel extraction operation and associated ship-loading facilities for the production and export of construction aggregates on northern Vancouver Island (the Project).

The Project includes the construction and operation of a 15,000 to 22,000 tonnes per day processing plant (4 to 6 million tonnes per annum) and an associated marine terminal designed to handle vessels larger than 25,000 tonnes deadweight (DWT). The extraction site and marine terminal are located immediately alongside Highway 19, the Island Highway, 3.8 kilometres west of Port McNeill (see Figure 1). The proposed Project lies within the asserted territories of the Kwakwilt and 'Namgis First Nations.

Transport Canada initiated the federal environmental assessment process pursuant to the *Canadian Environmental Assessment Act* (the CEA Act) in relation to the Project. The CEA Act triggers and the associated responsible authorities include: a possible subsection 5(1) approval pursuant to the *Navigable Waters Protection Act* from Transport Canada for the construction of the marine terminal; a possible subsection 35(2) authorization pursuant to the *Fisheries Act* from Fisheries and Oceans Canada (DFO) for works associated with the marine terminal; and, possible funding under the Major Business Projects Program from Indian and Northern Affairs Canada (INAC). To assist in the environmental assessment process, Environment Canada has provided expert advice in relation to the Project. The proposed Project was also subject to review under the B.C. *Environmental Assessment Act*.

### **1.1 Purpose of the Comprehensive Study Report**

In accordance with sections 16 and 21 of the CEA Act, when a project is described in the Comprehensive Study List Regulations, the responsible authorities must ensure that a Comprehensive Study Report (CSR) is prepared in relation to the project. The CSR must identify the potential environmental effects of the project including the environmental effects of any malfunctions or accidents that may occur in connection with the project and any cumulative environmental effects that are likely to result from the project in combination with other projects or activities that have been or will be carried out. The Report must also describe measures that are technically and economically feasible to mitigate any significant adverse environmental effects of the project.

The responsible authorities must also report on all public concerns raised in relation to the project and how they have been addressed. Based on the CSR and the public comments the responsible authorities must then provide conclusions with respect to whether the project is likely to result in significant adverse environmental effects. Responsible authorities must also assess the need for and requirements of any follow-up program, as defined by the CEA Act.

The Minister of the Environment then reviews the CSR and any public comments filed in relation to its contents. If the Minister is of the opinion that additional information is necessary or actions are needed to address public concerns, the Minister may request the responsible authorities or the proponent address these concerns. Once any concerns are addressed, the Minister issues an environmental assessment decision statement that includes:

- the Minister's opinion as to whether the project is likely to cause significant adverse environmental effects; and
- any additional mitigation measures or follow-up program that the Minister considers appropriate.

The Minister then refers the project back to the responsible authorities for a course of action or decision.

If it has been determined that the project is not likely to cause significant adverse environmental effects, a responsible authority may exercise any power or perform any duty or function that would permit the project, or part of the project, to be carried out. With respect to the Orca Sand & Gravel Project, DFO may issue its *Fisheries Act* authorization for potential impacts to fish habitat associated with the marine terminal, Transport Canada may issue its *Navigable Waters Protection Act* approval for construction of the marine terminal, and INAC may release the funding under the Major Business Projects Program.

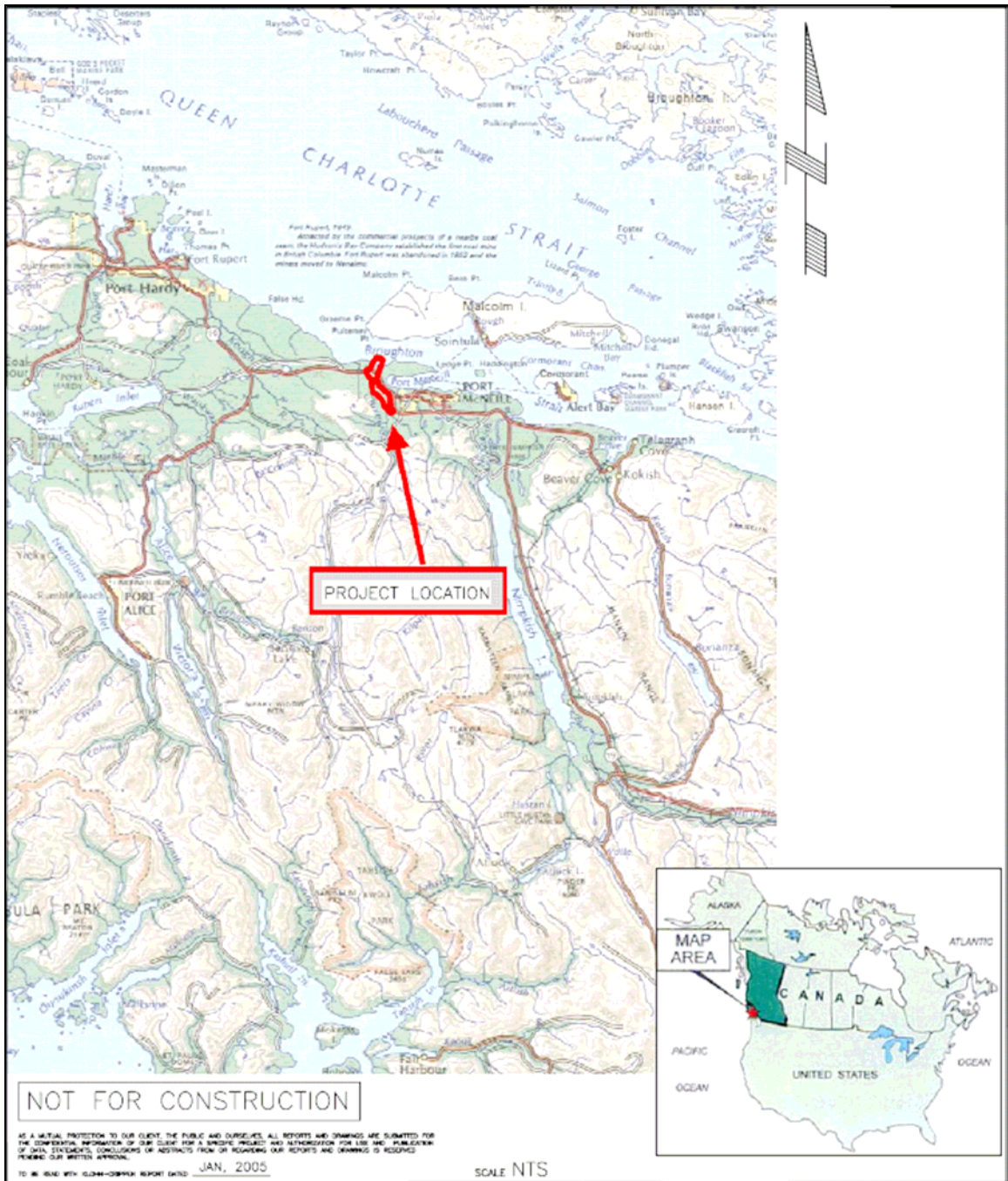


Figure 1. Project Location Map (Orca Sand & Gravel Ltd., 2004).

## 1.2 The Federal Review Process

An environmental assessment (EA) of a project is required under the CEA Act, if a federal authority will be required to exercise certain powers or perform certain duties or functions in respect of a project for the purposes of enabling the project to be carried out, in whole or in part.

Transport Canada, DFO and INAC will be required to exercise the following powers or perform the following duties or functions with respect to the Project:

- the proposed ship loading facility will require a formal approval by Transport Canada pursuant to paragraph 5(1)(a) of the *Navigable Waters Protection Act*;
- any disturbance to fish habitat from construction of the ship loading facility will require formal approval from the Department of Fisheries and Oceans under ss. 35(2) of the *Fisheries Act*; and,
- a federal funding request under the Major Business Projects Program to Indian and Northern Affairs Canada (INAC) from the ‘Namgis First Nation.

By triggering the CEA Act, Transport Canada, DFO and INAC became responsible authorities thus requiring them to undertake an environmental assessment of the Project. A comprehensive study under the CEA Act is required when a proposed project meets at least one of the requirements in the Comprehensive Study List Regulation. In this case, the Project meets two sections of the regulation because it proposes to construct, decommission or abandon both:

- a stone quarry or gravel or sand pit with a production capacity of 1 000 000 t/a or more (s.18(i)); and,
- a marine terminal designed to handle vessels larger than 25 000 DWT unless the terminal is located on lands that are routinely and have been historically used as a marine terminal or that are designated for such use in a land-use plan that has been the subject of public consultation (s.28(c)).

The comprehensive study process requires public consultation with respect to the proposed scope of project for the purpose of the EA, the factors proposed to be considered, the proposed scope of those factors, and the ability of the comprehensive study process to address the issues relating to the project. To accomplish this, responsible authorities prepare a “project scoping document” that is made available to the public for review and comment. Following public consultation, responsible authorities prepare a report and recommendation, which is submitted to the federal Minister of the Environment. The Minister then determines whether the assessment will continue as a comprehensive study or whether the project will be referred to a mediator or a review panel.

If the assessment is continued as a comprehensive study, responsible authorities must ensure that a CSR is prepared. The CSR is submitted to the Canadian Environmental Assessment Agency, which administers a public comment period on the report. Upon completion of public review, the CSR and the comments filed in relation to it are forwarded to the Minister of the Environment for a decision.

For the Orca Sand and Gravel Project, Transport Canada and DFO, in consultation with the CEA Agency, prepared the Project scoping document, and advertised its availability for public review. A 21 day public review period ended on October 20, 2004. The ensuing report to the Minister of the Environment led to confirmation, on January 13, 2005, that the environmental assessment under the CEA Act would continue as a comprehensive study. Indian and Northern Affairs declared itself a responsible authority on April 7, 2005.

### **1.3 The Provincial Review Process**

On September 30, 2003, the B.C. Environmental Assessment Office (BCEAO) issued an order under section 10(1)(c) of the British Columbia *Environmental Assessment Act* (BCEA Act), designating the Project as reviewable under the BCEA Act, and requiring the Proponent to obtain an environmental assessment certificate before proceeding with the Project.

On November 24, 2004, the BCEAO issued an order under section 11 of the BCEA Act outlining the scope, procedures and methods to be applied in the pre-Application and Application review stages of the BCEA Act assessment.

Terms of Reference for the Application were developed by the Proponent, with input from the BCEAO, federal and provincial agencies, local governments and First Nations. These Terms of Reference were approved by the BCEAO in November 2004 as the information required under section 16(2) of the BCEA Act. Federal agencies provided approval-in-principle only at that time, pending the outcome of a public review of the proposed scope of the review, as required under the CEA Act and final confirmation by the federal Minister of the Environment of the appropriate level of review.

In December 2004, the Proponent submitted an Application to the BCEAO. The Application was screened against the Terms of Reference, and accepted by the BCEAO with minor revisions on January 17, 2005.

### **1.4 The Federal/Provincial Cooperation Agreement**

The Canada-British Columbia Agreement for Environmental Assessment Cooperation (2004) provides for a coordinated environmental assessment process to avoid uncertainty and duplication where a project is subject to review under both the BCEA Act and the CEA Act.



The cooperative assessment of the Project was conducted in accordance with a joint federal-provincial work plan.

During the cooperative review process, the BCEAO developed an Assessment Report (AR) to report on the results of the EA. That report was developed collaboratively to meet the requirements of an AR under the BCEA Act and to inform the Comprehensive Study Report (CSR) under the CEA Act. The federal responsible authorities considered the provincial AR and used it as a basis for the CSR. The CSR is meant to fully describe the federal environmental assessment process that was undertaken and the conclusions of the federal responsible authorities with respect to whether the Project is likely to result in significant adverse environmental effects.

## **2. Project Description and Scope of Assessment**

### **2.1 The Proponent**

Orca Sand and Gravel Ltd. (the Proponent) is a private company incorporated in British Columbia in 2004. It is the vehicle through which the Project's co-proponents (Polaris Minerals Corporation and the 'Namgis First Nation) hold their partnership interests in the Project. Polaris is a private company based in Vancouver, incorporated in 1999 to pursue the establishment of a coastal aggregates export business. The Kwakiutl First Nation (Fort Rupert) and 'Namgis were offered equal equity partnership interests in the Project by Polaris. An Impacts and Benefits Agreement (IBA), dated March 9, 2005 was negotiated between the Kwakiutl and the Proponent, and ratified by Kwakiutl community members on February 26, 2005. The Kwakiutl provided a formal letter of support for the Project on March 23, 2005.

### **2.2 Project Overview**

The Project is located 4 kilometres west of the town of Port McNeill, on North Vancouver Island, British Columbia on private lands owned by Western Forest Products Ltd, with the exception of the ship loading facility, which is proposed for provincial Crown foreshore and nearshore in Broughton Strait. The area is shown in **Figure 1**.

The Project site is adjacent to and accessed from the Island Highway (Highway 19), a paved provincial highway that runs the length of Vancouver Island from Victoria to Port Hardy. Products will be transported under Highway 19 by conveyor to the stockpile and ship loading facilities which will be situated north of the Highway.

The sand and gravel lies in a terrace approximately 3,000 metres in length by 800 metres wide. The proposed quarry site is forested with second growth and covered with organic overburden 1 to 3 metres thick. An initial forest area will be cleared, organic overburden carefully removed and stockpiled for future progressive reclamation, exposing the high quality sand and gravel deposit.

The quarry will be mined at a rate of up to 15 - 22,000 tonnes per operating day. The exposed sand and gravel will be removed with mobile equipment, such as scrapers and loaders, and placed onto a field conveyor system for delivery to the processing plant. During normal operations the production operations will operate on a two-shift basis, totalling 16 hours per day and up to seven days per week.

Processing will consist of using water to liberate the sand from gravel, which will then be screened with any oversize gravels being crushed. The sand will be classified and dewatered to remove silt size fractions with the wash water being sent to sedimentation ponds for settling out of any silt and recycling of water. This water will be recycled through a settling pond and filtration system to remove fine particulate matter prior to any excess water discharge into the receiving environment. The source of process water will be natural precipitation retained in settling ponds. Any additional make-up water during the dry summer period will be obtained from boreholes within the resource area. There is very little silt material in the deposit and the site lends itself to progressive reclamation of the land back to productive forest cover.

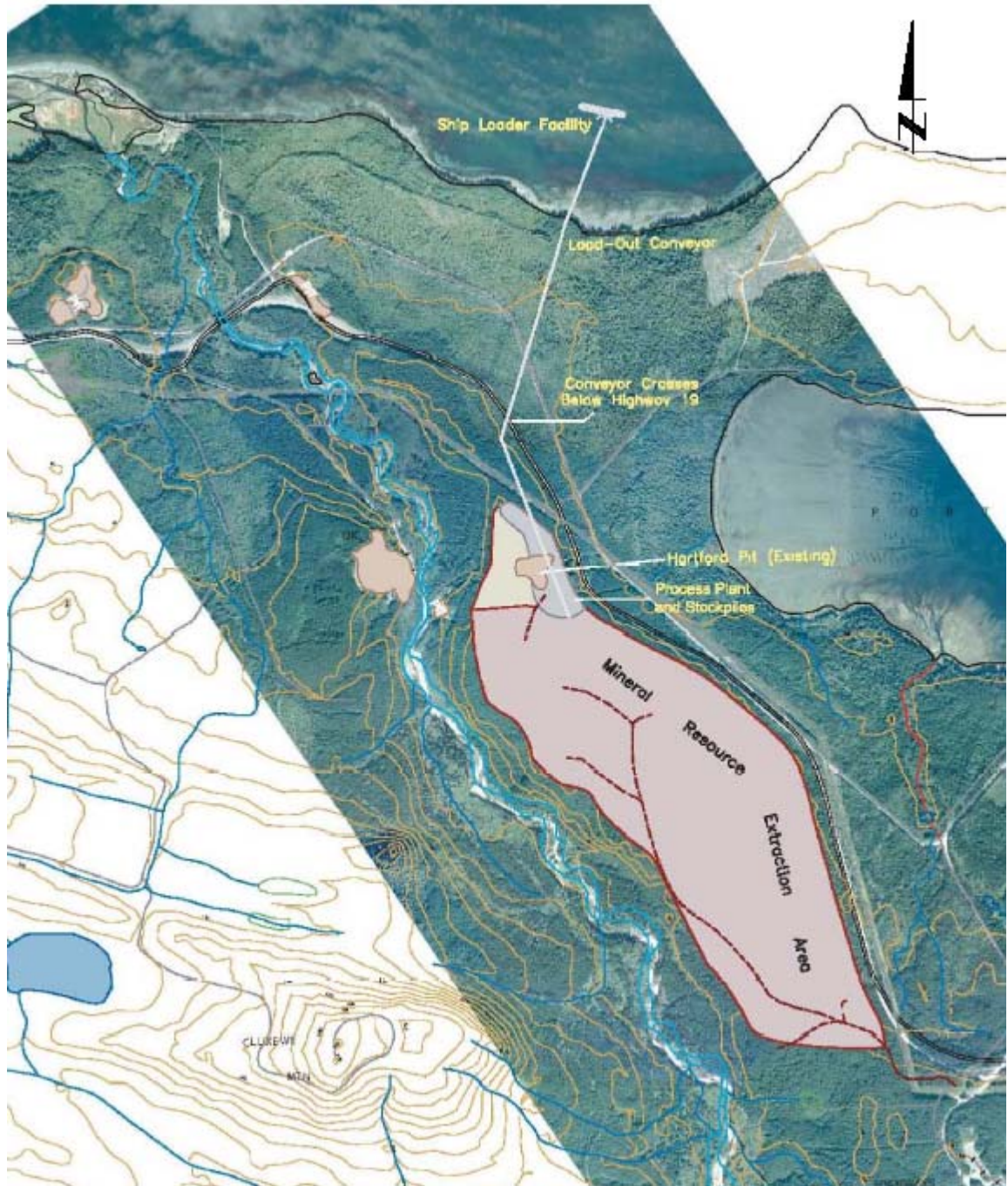
Products will be stored in individual stockpiles in preparation for shipping. A conveyor reclaim system will deliver the product to Panamax class ships for distribution. At maximum production rates, the operation will expect to load two vessels per week each being at berth for up to 24 hours.

The ship loading facility has been located so that it is a) east of a developed campground (Cluxewe Resort) on Kwakiutl Indian Reserve #7 and b) largely hidden from line of sight by the topography of the shoreline. The ship loading facility will be visible from Broughton Strait, part of the "Inside Passage", a deep water navigable channel used extensively by large vessels, particularly during the cruising season.

All products will be shipped from the operation in ocean going bulk carriers, although small quantities could be utilized to maintain the local road network. The Proponent anticipates that construction aggregates from the quarry will be shipped to Pacific coast markets, particularly California.

BC Hydro power lines run throughout the area, and electrical power to the plant site is anticipated to be directly available from the BC Hydro power grid.

The Project's lifespan is anticipated to be 30 years, with annual production capacity estimated at 4-6 million tonnes.



**Figure 2 – Project Overview (Orca Sand & Gravel Ltd., 2004)**

## **2.3 Project Need/Alternatives Assessment**

### ***2.3.1 Project Need/Purpose***

The Proponent described the need for the Project as being directly related to the emerging market for imported construction aggregates, particularly sand and gravel, along the western seaboard of the United States. Aggregate demand in California was described as growing by over four million tonnes per year, driven principally by the continuing growth in population. The Proponent contended that this increased demand, when coupled with the accelerating depletion of the local aggregate resources in California, will force the need for a significant increase in the external supplies of aggregate products to the California markets.

The Proponent stated that the purpose of this Project was to develop a sand and gravel export business capable of winning a significant market share of the identified demand along the U.S. western seaboard.

### ***2.3.2 Alternatives To the Project***

Based on the ongoing need for construction aggregates in the California market, alternatives to undertaking the Project would include moving sand and gravel to coastal California markets from inland California sources via truck or train, or shipping from alternative sources along the western Canada, U.S. or Mexico coastline.

The Proponent conducted an extensive site selection study of a large number of potential aggregate producing sites from Alaska to Mexico, and selected Vancouver Island as the most favourable source area on the Pacific coast of North America. The site selection study included:

- evaluation of the markets for aggregates in California;
- considerations relating to the development of reception docks in the San Francisco Bay and Los Angeles markets;
- review of the geological and resource data, and physical testing of samples;
- review of the options for shipping;
- review of the appropriate quarrying, processing and reclamation plans; and,
- review of the social, economic, infrastructure and environmental planning factors.

The Proponent focussed on development of a coastal resource that would deliver aggregates to its intended markets via large ocean freighters. The Proponent described how, in many areas of the developed world, including the eastern coast of the United States, local aggregate supplies had been supplemented or replaced entirely by aggregates delivered by ocean-going vessels. Low shipping costs, using large self-discharging bulk carriers, had made this an economically competitive and viable option compared to land transportation in the major coastal urban centers of California. In fact, the Proponent

noted that aggregate exports by sea from British Columbia to the western United States were already underway. Shipments of sand and gravel commenced in 2000 from Sechelt, British Columbia to San Francisco Bay, and crushed rock was being shipped from quarries on Texada Island to the ports of Los Angeles and Long Beach. As well, British Columbia had serviced much of the Puget Sound area (Washington State) demand with shipments of these materials for years.

During the site search, the Proponent enlisted local consultants to help evaluate potential sites in Mexico, particularly the Baja California peninsula, which was judged to be within economic shipping distance of the target markets. During this evaluation, it was quickly determined that the geology was unsuitable and that there was little established infrastructure, compounded by a severe shortage of the fresh water required for washing aggregate. The evaluation of potential sites in Alaska identified the economic disadvantages of much greater shipping distances, the complications of the U.S. *Jones Act* (which requires that cargo moving between U.S. ports be carried in ships which are U.S.-owned, U.S.-built and U.S.-crewed) and by significant adverse weather and infrastructure considerations.

The Proponent determined that the coast of British Columbia had several good quality sand and gravel deposits that could potentially meet the emerging demand from the California markets. However, the number of economically viable and commercially competitive sites was determined to be severely limited. To be capable of successful development by the Proponent, a site needed to meet the following criteria:

- the deposit must be adjacent to the ocean shoreline;
- the location must have deep and safe water which allows for loading large ocean-going bulk vessels up to Panamax Class (75,000 DWT);
- the deposit must be large enough to achieve economies of scale and justify large-scale and long-term investment;
- the deposit must be relatively consistent and homogeneous;
- the operation must have minimal impact on the environment;
- the site topography must allow for low cost open pit extraction methods;
- the project must produce a product that meets all California and US national specification requirements;
- the project must have local support;
- the project area must have appropriate infrastructure and labour availability; and
- the project must satisfactorily address and accommodate any Aboriginal title and rights.

A small number of potential deposits were identified on the B.C. mainland coast, but initial screening eliminated all of them from further consideration due to problems with tenure or serious environmental concerns. The Orca Sand & Gravel Project site was the only potential resource identified which met all of the site selection criteria and was considered by the Proponent to have the best potential to be a viable investment.

The Proponent selected the Project site for the following principle reasons:

1. The sand and gravel was adjacent to navigable tidewater suitable for large vessels with a capacity of up to 75,000 Deadweight (DWT) tonnes.
2. The site lent itself to minimizing effects on the environment. There were no habitations within close vicinity and the Project area did not contain any surface water flows and therefore no fish-bearing streams. Logging of old growth had already taken place over the entire Project area.
3. Bathymetric surveys subsequently confirmed that the area was an ideal location for the ship loading facility.
4. The topography of the site was ideal for the intended purpose.
5. The quality of the sand and gravel significantly exceeded all California and U.S. national specifications. Products would include concrete sand and two sizes of gravel up to a maximum diameter of 1 inch (25 mm).
6. The identified resource would have a life expectancy of approximately 30 years, sufficient to justify the required capital expenditure.
7. Positive relationships with First Nations, in whose asserted traditional territory the Project lies, were established at the outset. No significant cultural or traditional use values were identified.
8. Port McNeill and its surrounding area had an established industrial base offering a labour force and all necessary services. In addition, it was seeking new industries to diversify the industrial base and reduce the dependency on the logging industry.

### ***2.3.3 Alternative Means of Carrying Out the Project***

The CEA Act considers alternative means of carrying out a project as the various ways, which are technically and economically feasible, that a project can be implemented or carried out. This could include alternative locations, routes and methods of development, implementation and mitigation.

Given that the location of the resource was fixed, the Proponent considered whether or not there was an alternative development possible by relocating the ship loader. Studies of the cost of aggregate production at coastal locations have consistently confirmed that the economics demand that the vessels be loaded by conveyor directly from the processing plant. To the west of the chosen ship loading site in Soldier Bay is the Cluxewe Resort and estuary and further west is an environmental conservation area. The

presence of these areas prevents consideration of moving the ship loading facility further west. To the east is Port McNeill which has only shallow water depths and is quite unsuitable for the self-discharge vessels essential to the Project. To move further east than the port would require the use of a large fleet of highway trucks which would add significant costs to the Project, making it uneconomical for the Proponent. Therefore it was concluded that the use of Soldier Bay was the only acceptable means to undertake the ship-loading aspect of the Project.

Table 1 outlines the various alternative means of carrying out the Project that were examined by the Proponent. A brief description of the economic feasibility and potential environmental effects associated with each alternative is also included.

**Table 1 Alternative Means of Carrying out the Orca Sand & Gravel Project**

<b>ALTERNATIVE MEANS</b>	<b>ECONOMIC FEASIBILITY</b>	<b>POTENTIAL ENVIRONMENTAL EFFECTS</b>
Extend extraction area closer to the Cluxewe River	Economically feasible	Potential effects on bank stability. Potentially reduced important riparian zone for aquatic resources and wildlife (such as elk).
Extraction to a shallower depth than proposed	Not as economically viable	No change in environmental effect.
Extraction to a deeper depth than proposed	Economically feasible	If extraction is below groundwater table, remediation would not allow for reforestation.
Extraction of water from the Cluxewe River rather than groundwater	Economically feasible	Year-round reduction in flows in the Cluxewe River.
Trucking from stockpiles to existing port (Port McNeill)	Project not economically viable as port is too shallow.	Increased traffic, noise, emissions and dust plus possibilities for collisions.
Conveyor moved to east or west of current location	Economically feasible	Potential to cross wetland area west of conveyor near shore.
Ship loading facility moved	Cannot be moved to shallower water east, south or west of proposed location. Could move to deeper water, but at greater cost.	Moving facility to deeper water would result in a longer conveyor over the water and greater changes to habitat with more piles.

Based on the above exercise, the Proponent concluded that the proposed means of undertaking the Project was the most economically feasible of the options outlined. As well, all of the other economically feasible options outlined would result in greater environmental, and in some cases social, impacts than the proposed Project.

#### **2.4 Scope of Project**

Transport Canada's regulatory trigger under the Law List Regulation of the CEA Act for the Project was the need for a subsection 5(1) approval under the *Navigable Waters Protection Act* for construction of the marine terminal and conveyor system.

DFO's regulatory trigger was the need for a subsection 35(2) authorization under the *Fisheries Act* for the potential Harmful Alteration, Disruption or Destruction (HADD) of fish habitat in the intertidal and subtidal marine environment that would result from construction of the marine terminal and conveyor system. INAC also became a responsible authority due to a federal funding request under the Major Business Projects Program with respect to the Project from the 'Namgis First Nation.

As noted previously, Transport Canada evaluated information provided by the Proponent and determined that the Project met the thresholds of two of the sections of the Comprehensive Study List Regulations, and therefore required that a comprehensive study assessment track be undertaken.

In accordance with section 15 of the CEA Act, the responsible authorities determined that the scope of the proposed Project would be the following physical activities not associated with physical works, and the construction, operation, maintenance / modification and decommissioning of the following physical works:

- *Ship Loading Facility and Associated Conveyor:* The conveyor would carry product from a land-based storage area, across the intertidal and subtidal area to the ship berth, which would have the capacity to handle vessels up to or larger than 75 000 DWT. At maximum production rates the operation is expected to load two vessels per week, each being at the berth for up to 24 hours.
- *Gravel/Sand Deposit Extraction:* 200 hectares of second growth forest and organic overburden layers will be removed in phases for sand and gravel extraction.
- *Processing Plant:* A processing plant will be constructed for washing and sizing of extracted gravel, and limited crushing of oversized gravel.
- *Land-based Conveyor System:* A land-based conveyor system will be used to transport washed and sized products from the processing plant to the stockpile area; another system will be used to transport products from the stockpiles to the ship loader.
- All other works associated with the construction, operation, and decommissioning of the Project (e.g. settling ponds, stockpile area, water supply, site access, power supply and any off-site or on-site compensation and mitigation works as required,



and any other physical works or activities which form an integral part of the Project).

## **2.5 Scope of Assessment**

### **2.5.1 Factors to be Considered**

As defined under the CEA Act, “environmental effect” means, in respect of a project:

- a) *any change that the project may cause in the environment, including any change it may cause to a listed wildlife species, its critical habitat or the residences of individuals of that species, as those terms are defined in subsection 2(1) of the Species at Risk Act*
- b) *any effect of any change referred to in paragraph (a) on*
  - i. *health and socio-economic conditions*
  - ii. *physical and cultural heritage*
  - iii. *the current use of lands and resources for traditional purposes by aboriginal persons, or*
  - iv. *any structure, site or thing that is of historical, archaeological, palaeontological or architectural significance, or*
- c) *any change to the project that may be caused by the environment*

The factors considered in the environmental assessment, pursuant to section 16 of the CEA Act, were the following:

- *the environmental effects of the Project, including the environmental effects of malfunctions or accidents that may occur in connection with the Project and any cumulative environmental effects that are likely to result from the Project in combination with other projects or activities that have been or will be carried out;*
- *the significance of the environmental effects referred to above;*
- *comments from the public that are received in accordance with this Act and the regulations;*
- *measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the Project;*
- *the purpose of the Project;*
- *alternative means of carrying out the Project that are technically and economically feasible and the environmental effects of any such alternative means;*
- *the need for, and the requirements of, any follow-up program in respect of the Project; and,*
- *the capacity of renewable resources that is likely to be significantly affected by the Project to meet the needs of the present and those of the future.*

### **2.5.2 Scope of Factors to be Considered**

The following outlines the scope of the factors considered in the environmental assessment.

- hydrology and water resources;
- geology;

- soils;
- vegetation;
- species listed on Schedule 1 of SARA;
- fish and fish habitat;
- wildlife and wildlife habitat;
- waste management;
- noise;
- air quality;
- current use of lands and resources for traditional purposes by Aboriginal persons;
- land and resource use;
- local communities;
- worker health and safety;
- public health and safety;
- navigation;
- heritage and historical cultural resources;
- palaeontological resources.

#### Malfunctions and Accidents

The probability of possible malfunctions or accidents associated with the Project, and the potential adverse environmental effects of these events (e.g. accidental spills, contingency measures for responding to emergencies, and risks of facility malfunctions).

#### Effects of the Environment on the Project

The environmental hazards that may affect the Project and their predicted effects, including: seismic activity, icing and winter operations, erosion, fire, flooding, and slope stability.

#### Cumulative Environmental Effects

The cumulative environmental effects that are likely to result from the Project in combination with other projects or activities that have been or will be carried out.

#### Spatial and Temporal Boundaries

##### *Spatial boundaries:*

The main Project site was bounded to the west by the Cluxewe River, to the east by the Island Highway, to the north by Broughton Strait, and to the south by the southern extent of private lands under the administration of Western Forest Products Ltd. The environmental assessment covered the ecological footprint of the Project.

##### *Temporal boundaries:*

The temporal boundaries encompassed the lifespan of the Project (expected to be approximately 30 years). The environmental assessment examined potential effects of the Project beginning with the construction phase and throughout the operations phase

(including maintenance and/or modifications) and through to the completion of the decommissioning phase.

#### Follow-up Program

The environmental assessment included the consideration of the need for and requirements of an environmental monitoring and follow-up program.

### **3. Information Distribution and Consultation**

#### **3.1 Federal Coordination**

Transport Canada initiated the federal environmental assessment process on August 10, 2004 by posting the Notice of Commencement on the Canadian Environmental Assessment Registry. Federal Coordination Letters were also sent out on August 10, 2004 to DFO, INAC, Natural Resources Canada, Health Canada and Environment Canada. The CEA Agency acted as the federal environmental assessment coordinator for the Project.

On August 17, 2004, DFO declared itself a responsible authority for the Project as it would likely be required to authorize, under subsection 35(2) of the *Fisheries Act*, the potential HADD of fish habitat in the intertidal and subtidal marine environment that would result from construction of the Marine Terminal and Conveyer system. Within the overall scope of project and assessment, DFO focused its assessment on project components that would require DFO regulatory approvals.

Environment Canada provided specialist knowledge and information which informed the federal-provincial harmonized environmental assessment.

On April 7, 2005, INAC declared itself a responsible authority for the Project, as defined in Section 5 of the CEA Act resulting from the 'Namgis First Nation applying for funding under the Major Business Projects Program. INAC determined that the scope of project undertaken by Transport Canada and DFO was satisfactory and it was not necessary to redefine the scope of project or scope of assessment.

#### **3.2 Public Consultation in Accordance With The CEA Act**

##### *3.2.1 Section 21 – Public Participation Regarding Proposed Scope of Project*

Under subsection 21(1) of the CEA Act, for a comprehensive study, responsible authorities must ensure public consultation on the proposed scope of the project, the proposed factors to be considered in the environmental assessment, the proposed scope of those factors and the ability of the comprehensive study to address issues relating to the Project. An invitation for members of the public to review and comment on a scoping document was advertised in community newspapers, during the weeks of September 27 through October 11, 2004 and also placed on the Canadian Environmental Assessment

Registry (CEAR). At the same time, members of the public were made aware of the availability of Participant Funding for public participation in the comprehensive study process and review of the comprehensive study report. The notice appeared in the North Island Gazette, Victoria Times Columnist, and L'Express du Pacifique. The Project Registry included a notice for the public to contact Transport Canada for a copy of the scoping document. Copies of the scoping document were made available at the following locations: an Open House held September 23, 2004 in Port McNeill, the Proponent's project office in Port McNeill, the 'Namgis and Kwakiutl First Nations' Band offices, the Town of Port McNeill office and the local DFO office. A 21-day review period was provided which concluded on October 20, 2004.

Three sets of public comments on the scoping document were received. Most comments related to improving the wording of future scoping documents with one exception requesting that Mills (Bear) Creek be included within the scope of the assessment. As Mills (Bear) Creek was not specifically excluded from the originally proposed scope of assessment, this request did not result in any change to the scope, but the responsible authorities clarified that the potential effects of the Project on Mills (Bear) Creek would be considered during the conduct of the comprehensive study.

The Environmental Assessment Track Report was submitted to the Minister of the Environment on November 19, 2004. This report reflected the opinion of the responsible authorities, in consultation with the expert federal authorities, that the comprehensive study could fully address issues related to the Project.

Transport Canada and DFO received a letter dated January 6, 2005, from the Minister of the Environment, stating that the Orca Sand and Gravel Project review should continue as a comprehensive study pursuant to the CEA Act.

### ***3.2.2 Section 21.2 – Public Participation in the Comprehensive Study***

As part of the cooperative provincial/federal review of the Project, the responsible authorities shared the formal public comment period on the Application as prescribed in the BCEA Act. In the Application Review stage, the public was provided the opportunity to review and comment on the Application during a 30-day public comment period from January 29 to February 28, 2005. The BCEAO received 56 written comments from members of the public during this period, in addition to a number of comments provided during five open house meetings held in local communities. These comments were provided to the responsible authorities and the CEA Agency. In general, the public comments expressed support for the Project. The few expressions of public concern, primarily made at the open houses, were focused on possible impacts on the Cluxewe River, on groundwater levels, on foreshore marine habitat and marine mammals, on public health (dust and noise), on the Cluxewe Resort, and on the nature of economic benefits (job creation).

In written submissions and at public meetings, members of the public identified six issues about the Project description and potential accidents related to the Project; five issues about reclamation and potential Project-related impacts on wildlife and vegetation; nine issues about potential Project effects on rivers and groundwater; seven issues about potential Project effects on marine habitat and life; one issue related to the potential Project impacts on culture and heritage; and twelve issues on the Project's potential socio-economic effects.

Issues raised by members of the public during the environmental assessment were fully considered by the responsible authorities during the review of the Application. All issues raised by members of the public during the course of the review and the means by which those issues were addressed have been tabulated and included in Appendix B.

### ***3.2.3 Section 22 – Public Access to Comprehensive Study Report***

A third opportunity for public input on the Project and the associated environmental assessment is through commentary on this report. The CEA Agency will facilitate public access to the CSR, including administering a formal public comment period. All comments submitted will be provided to the responsible authorities and considered public and will become part of the public registry for the Project.

### **3.3 Provincial Consultation Measures**

The BCEAO, as the provincial agency coordinating major project environmental assessment in British Columbia, also consulted with First Nations, the public and local, provincial and federal government representatives. The BCEAO established an inter-agency / First Nations project working group as the primary source of policy and technical expertise for assessment of the Project. The responsible authorities participated in the working group which provided a means to obtain the views of federal expert authorities, other government agencies and First Nations.

The BCEAO carried out public consultation in accordance with its November 25, 2004 section 11 order. The BCEAO made the certificate Application available for public comment during a 30 day review and comment period from January 29, 2005 until February 28, 2005, and participated in and monitored the February 7-11, 2005 open houses that it required the Proponent to hold. Representatives of the federal government (DFO, EC and CEA Agency) participated the open houses held in Alert Bay and Port McNeill on February 8 and February 9, 2005 respectively.

The BCEAO utilized its electronic Project Information Centre (ePIC) to post relevant information, meeting records and correspondence related to the Project. The Proponent also utilized a web site ([www.orcasand.ca](http://www.orcasand.ca)) and other means of public distribution throughout the process, in accordance with BCEAO requirements. Both BCEAO and the Proponent notified the public of the availability of information and opportunity to comment on the Application.

### **3.4 Consultation Measures Undertaken by Proponent**

Orca Sand and Gravel Ltd., and predecessor, Polaris Minerals Corporation initiated and conducted a consultation program over a period of more than three years with relevant levels of government, First Nations, community organizations and the general public. Public consultation included the operation of a Port McNeill office / information centre, provision of field tours and presentations, and numerous meetings to collect local knowledge and information. During development of the Application and its review, the Proponent continued to meet with these interests and agencies. Such meetings included a September 2004 combined open house and public forum in Port McNeill, attended by approximately 350 visitors. The Proponent held public open houses in Fort Rupert, Alert Bay, Port McNeill, Sointula and Port Hardy during the period of February 7-11, 2005 to provide opportunities for formal public comment on the Application. These meetings were attended by approximately 274 people.

Since 2002, the Proponent has maintained dialogue and sought advice from federal, provincial and local government agencies. A day-long presentation, meeting and site tour was held in March, 2004 and attended by agency personnel, as well as First Nations leaders and their advisors. The Proponent has actively participated in the government agency and First Nations working group established by the BCEAO to review the Project.

### **3.5 First Nation Consultation and Project Review**

The Project area lies within the Douglas Treaty area, and is within the asserted traditional territories of the 'Namgis First Nation and the Kwakiutl First Nation (Fort Rupert).

Transport Canada initiated the environmental assessment process on August 10, 2004 and contacted the 'Namgis First Nation and Kwakiutl First Nation indicating the commencement of the federal review on September 17, 2004.

As per section 21 of the CEA Act, the responsible authorities provided opportunities to the two First Nations to comment on the scope of the project, the scope of assessment and the ability of the comprehensive study process to address the issues. Copies of the scoping document were deposited in each Band office for the length of the 21 day comment period.

The responsible authorities were also able to work with First Nations members of the Orca Sand and Gravel Project Working Group to identify issues of concern during the environmental assessment. All First Nations comments on the Application submitted during the 60 day comment period were considered by the responsible authorities when developing conclusions.

DFO also met with the 'Namgis First Nation and Kwakiutl First Nation on February 8 and 9, 2005 respectively, and with both First Nations again on June 6, 2005, in accordance with its responsibilities under the *Fisheries Act*. DFO continues to work with both First Nations in developing appropriate compensation works for fish habitat impacted by the ship loading facility.

The Proponent also devoted considerable effort and resources to consulting First Nations and securing their support for the Project. This included the funding of independent studies and professional advisors for both Bands and developing agreements and business arrangements. Kwakiutl and 'Namgis members participated in virtually all phases of Project evaluation, including exploration, environmental, archaeological, traditional use, socioeconomic studies, as well as in Project coordination and office assistance. Information meetings included an orientation field tour attended by First Nation representatives and agencies in March, 2004, an open house meeting for all First Nations people in the Port McNeill area in February, 2004, and numerous other events.

Both the Kwakiutl First Nation and the 'Namgis First Nation have provided letters to the federal responsible authorities and the BCEAO indicating that they have been adequately consulted and accommodated with respect to the Project by the Proponent and by the provincial and federal governments.

**Part B – Comprehensive Study Assessment**



## **1. Description of the Existing Environment**

### **1.1 Description of the Biophysical Environment**

#### ***1.1.1 Hydrology and Water Resources***

##### **Watersheds**

##### **Cluxewe Watershed**

The Cluxewe River is 27.1 km long and drains northward into Broughton Strait. The watershed has an area of approximately 95 km<sup>2</sup> and, except for the approximate 40 ha of Kwakiutl First Nation Reserve land at the lower end, is entirely managed by Weyerhaeuser Company (approximately 70%) and Western Forest Products Limited (approximately 30 %).

The watershed has a long narrow north trending shape. Small tributaries and streams drain directly into the Cluxewe River. There are two tributary sub-basins in the portion of the watershed in the Project footprint, about a kilometre upstream of the southern Project boundary, on the east and west sides of the river. There are no identified streams or tributaries within the project area.

The portion of the watershed in the Project area consists of bedrock, till, and the glaciofluvial deposits that make up the Project area. Bedrock in the watershed includes siltstone, shale and limestone. Cluxewe Mountain, located on the west side of the watershed, is an isolated volcanic cone.

The headwaters of the river originate in moderately steep mountainous terrain and the highest point in the watershed is 1356 metres above sea level at the southern most point. The western side of the watershed consists of sub-parallel till drumlins. The river cuts through deep glaciofluvial deposits, which occur along the western Project boundary. Slopes to the east of the river are moderate to gentle with steep slopes acting as escarpments along the river. The river has a low-gradient channel with low terraces and extensive channel bars.

Eighty-two percent of the watershed is forested; the balance is above the tree-line. As there are no glaciers or areas of late-persisting snow and as the area of lakes is less than 1% of the watershed area, there is no significant water storage except in the form of groundwater reserves through infiltration. Infiltration of rainfall and snowmelt into the deep soil deposits sustain streamflow during dry periods.

##### **Mills Creek Watershed**

A portion of the Project area lies in the Mills Creek Watershed (locally known as Bear Creek). This watershed has an area of 16 km<sup>2</sup> and is located east of the lower Cluxewe watershed. The watershed extends from the shoreline approximately 12 km to the south. Less than 1% of the watershed area is covered by lakes.

## **Stream Characteristics**

### **Runoff Coefficients and Stream Flows**

Regional stream flow data are not available for Cluxewe River or Mills Creek and therefore estimates of stream flow rates were developed on the basis of catchment areas, runoff coefficients, and estimated evapo-transpiration rates. The catchment areas of Cluxewe River and Mills Creek are primarily comprised of forested regions. It was assumed that the flow from these catchments areas would be a result of the net runoff from precipitation, with evaporation/evapo-transpiration taking place over the entire catchment area.

Mean annual precipitation and evaporation were estimated to be 1654 mm and 463 mm, respectively. Considering the above assumptions, the net runoff would be equivalent to 1191 mm and the average runoff coefficient would be 0.72. This runoff coefficient can be then used for extended monthly or annual hydrologic modeling. For short durations, less than 24 hours, a runoff coefficient of 1.0 may be considered.

### **Flow Estimation for Cluxewe River and Mills Creek**

To estimate the average monthly flow of the Cluxewe River and Mills Creek, the mean monthly precipitation data was employed, and compared to monthly flow data from the Nimpkish River. It was found that the monthly precipitation closely correlated to the monthly flows, suggesting that snowmelt is a minor contributor to the runoff.

### **Surface Water Use**

The only known licensed user of water from the Cluxewe River is the OK asphalt plant located on the west side of the river.

## ***1.1.2 Geology and Soils***

The regional geology of the Project area consists of landforms and deposits resulting from two cycles of glaciation during the Quaternary period. However, the absence of multiple till sections, indicating more than one glaciation, implies that the area north of Quatsino Sound has been glaciated only once, most likely during the Late Wisconsin. The near-surface Port McNeill till and Port McNeill de-glacial sediments relate to the last phase of glaciation and de-glaciation, the Fraser Glaciation, which occurred 25,000 to 9,000 years ago.

The site deposits were probably formed by sediment-laden water channelled down the Cluxewe and Nimpkish Rivers from the receding mountain glaciers, 12,000 to 9,000 years ago. The deposit has features that are typical of esker and kame deposits. An esker has been identified to the southeast of the project area, with an orientation that indicates flow towards the project site.

Sand and gravel, between 60 to 100 m in thickness was deposited in a delta at the mouth of the Cluxewe River, bounded by stagnant ice and bedrock highs to the west and a large

stagnant ice mass to the east. The deposits rest on flat lying Cretaceous Age sediments of the Nanaimo Group. These sedimentary rocks consist primarily of coarse sandstone grit with minor intercalated shales and coal seams. These sediments have been intruded by a series of Tertiary Age intrusives that were emplaced along a northeast structural trend through the north central part of Vancouver Island.

Thick sand and gravel, between 60 to 100 m in thickness is present in the Project Area overlaying flat lying sandstone bedrock. The sand and gravel deposit is overlain by up to 2.5 m of overburden material consisting of podzolic soils that are formed under cold and temperate coniferous forest conditions from the degradation of needles.

### ***1.1.3 Vegetation***

The Project Area is situated within the Coastal Western Hemlock biogeoclimatic zone (CWHvm), – submontane variant (CWHvm1), the most common biogeoclimatic unit in the Vancouver Forest Region and found at low to middle elevations roughly between sea level and 900 m. In general, western hemlock, which regenerates freely under a canopy of mature stands, is the dominant tree species. Western red cedar also occurs frequently throughout the zone, as does Douglas fir although it is most abundant in drier areas. Amabilis fir and yellow-cedar are common only in wetter parts of the zone, while grand fir, western white pine, and bigleaf maple occur in warmer and drier southern parts of the zone. Shore pine is present within subzones, primarily in wet boggy areas. Other tree species that occur to various degrees in this zone are western yew and, in disturbed areas (i.e., areas impacted by logging, development and settlement), red alder. The floral characteristics of the CWHvm biogeoclimatic zone are a predominance of western hemlock, a relatively sparse herb layer, and the common occurrence of several moss species, especially step moss and lanky moss.

Shrubs, flowering plants, ferns, sedges, grasses, lichens and mosses comprise the understory plants. Salal is ubiquitous throughout the area and occupies a high percentage of ground cover. Common fruit-bearing shrubs include gooseberry, salmonberry, thimbleberry, blackberry, blackcap, Pacific crabapple, red huckleberry, Alaskan blueberry, bunchberry, and wild strawberry plants. Skunk cabbage and devil's club also occur in moist areas.

The project site falls into the “Enhanced Forestry” Resource Management Zone in the Vancouver Island Land Use Plan. The area was logged in the 1930's through 1960's. Currently, a relatively dense coniferous canopy and a vegetation-poor forest floor covers the proposed extraction area. The fluvial terraces of the Cluxewe River, west of the project area, are more productive and include Western hemlock, amabilis fir, and Sitka spruce on the upper terraces and mostly red alders on medium to low terraces, where the disturbances are more recent. The region to the north of the project area experiences very wet conditions as a result of groundwater discharging from higher elevations. Cover includes western red cedar, western hemlock, shore pine, salal, red huckleberry and false

azalea. A small artificial wetland, created by the impedance of drainage by a logging road parallel to the shoreline, occurs adjacent to the site and is rich in skunk cabbage and other plant species.

#### ***1.1.4 Species at Risk***

Species of concern are those listed provincially (red or blue-listed species) and federally through the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and the *Species at Risk Act* (SARA), as well as those specifically identified by regulators, First Nations, and stakeholders during preliminary meetings and discussions.

Species at risk are classified at the federal level by COSEWIC, and at the provincial level by the B.C. Conservation Data Centre in Victoria. COSEWIC defines species at risk as endangered, threatened, or vulnerable. Species defined by COSEWIC receive legal protection when the species is accepted for listing on Schedule 1 of SARA. British Columbia fauna and flora that are considered at risk are classified as either "red-listed" or "blue-listed". Blue-listed species are considered to be vulnerable and sensitive to disturbance. Populations of red-listed species are considered to be endangered and threatened in British Columbia.

The Proponent queried the B.C. Conservation Data Centre but it identified no known occurrences of rare, threatened and endangered species in the project study area. As well, the Proponent found no rare, threatened or endangered plant species during the field survey.

Terrain Ecosystem Mapping undertaken by the Proponent within the Port McNeill Forest District revealed that one red-listed and two blue-listed plant communities occurred within the terrestrial resources study areas. The red-listed community, Sitka spruce/salmonberry, occurs on the high fluvial terraces of the Cluxewe River. One of the blue-listed communities (Black cottonwood/red-osier dogwood) also occurs on the terraces and shares many of the same important qualities as the red-listed community. The other blue-listed community, Western red cedar, Sitka spruce – skunk cabbage, occurs north of the pit area and west of the conveyor area, in the vicinity of the small artificial wetland (just south of the old logging road). Deer, black bear and Roosevelt elk are likely to occur in the Project study area. Harlequin ducks, which may soon be listed as a species of concern under SARA, are found in the Project study area, along with several migratory bird species. The Northern red legged frog, also a species of concern under SARA, occurs in some wetlands outside the Project area.

#### ***1.1.5 Fish and Fish Habitat***

##### ***1.1.5.1 Freshwater Ecosystem***

While no watercourses were identified within the Project area, several watercourses are located nearby, draining the areas surrounding the deposit and upstream of the deposit, or

potentially receiving groundwater from the project area. The watercourse of greatest significance is the Cluxewe River, whose channel is located adjacent to the western edge of the deposit. Mills Creek (Bear Creek) located to the east of the deposit, may receive groundwater from the project area. A number of small streams located to the west of Mills Creek may also be affected by groundwater from the deposit.

#### *Cluxewe River*

The Cluxewe River watershed encompasses an area of 96.3 km<sup>2</sup>. It originates in moderately steep, mountainous terrain to the southeast of the Project area, and empties into Broughton Strait northwest of Port McNeill. The lower 6 km of the Cluxewe River is a low-gradient, alluvial channel with low, erodable terraces and extensive channel bars. Short sections of the channel are confined by high till or glaciofluvial banks. Less than 1% of the watershed area consists of lakes, and the Cluxewe system therefore has limited water storage.

The Cluxewe River supports significant runs of pink salmon, as well as small runs of coho and chum salmon. Chinook and sockeye salmon are also present but in very low numbers. Summer and winter run steelhead are also present in significant, but declining numbers.

Fish habitat surveys undertaken by the Proponent indicated that fish habitat within the lower reaches of the Cluxewe River has been impacted by historical logging practices. The river was described as currently exhibiting the following habitat features:

- limited pool frequency and pool area;
- limited in-stream large woody debris;
- lack of in-stream cover;
- moderate to severe aggradation;
- lateral channel instability; and
- alder dominated riparian vegetation (young seral stage).

The Proponent noted that although there are abundant quantities of spawning substrate, the quality of these substrates is somewhat degraded by the significant quantity of fines associated with the gravel. The gravel is also highly mobile, further reducing its overall quality.

The Proponent identified ample evidence of channel over-widening was observed in both historical air photos and during its field assessment. The presence of flats vegetated in pole-sapling alder and younger alder forest is indicative of their relatively recent inclusion in an area of mainstem flow.

Despite the degraded quality of fish habitat within the lower reaches of the Cluxewe River, the Proponent provided evidence that the river and associated riparian zone is beginning to recover from the effects of historical logging practices. For example, the growth of shrubs and young forest (primarily alder) on benched flats along the river

indicates the start of riparian recovery and channel belt width narrowing. The Proponent noted however, that the benches are also characterized by significant deposits of woody debris, isolated ponds, infilled (vegetated) back channels, and old braids, indicating that these areas are still at least partially inundated during flood events.

### *Mills Creek*

Mills Creek arises in moderately steep, mountainous terrain to the south of the Project and drains into McNeill Bay to the west of Port McNeill. A community hatchery is currently in operation on Mills Creek, enhancing the stream's pink salmon and coho salmon stocks.

Chum, coho, pink and sockeye salmon are known to be present in this stream. Of these species, coho and pink salmon are the most abundant. The numbers of coho, chum and pink salmon spawners within this system have been highly variable over the period of available data.

Fish habitat surveys undertaken by the Proponent characterized the west branch of Mills Creek as a confined, well-shaded, sinuous channel, with channel substrates and channel banks consisting of ~99% coarse sand, organic fines, silts and clays and ~1% small gravels. The channel gradient was estimated at 1-2 %. The riparian vegetation was characterized by a mixed mature forest, and Large Woody Debris (LWD) was frequently found in the channel. The channel appeared stable, with little evidence of channel migration.

The water was described as being clear, with a slightly basic pH and high dissolved oxygen content during the survey period. No barriers were noted, with the exception of steep gradients and diffuse flows (undefined channel) near the headwaters at Highway 19. No fish were observed during the Proponent's survey. While in-stream and overhead cover was plentiful, the available in-stream fish habitat was limited due to limited stream depths and absence of significant pools.

### **1.1.5.2 Marine Ecosystem**

Background information on the marine environment in the study area was obtained by the Proponent from a variety of sources, including DFO, the Northern Island Straits Coastal Plan, First Nations, and local stakeholders. In addition, intertidal and subtidal surveys were undertaken by the Proponent in the vicinity of the proposed conveyor and ship-loading facility in order to assess existing habitat values.

### *Intertidal*

A wide variety of flora and fauna were observed along the shoreline during the intertidal assessments including numerous types/species of macroalgae (i.e., seaweed), invertebrates, and fish. A total of thirty-one species of seaweeds were identified in the study intertidal area. The majority of these species were restricted to the lower intertidal zone. The subtidal assessment identified an additional four species: thick ribbed kelp, sugar wrack, wrinkled kelp, and "macrophyte green on eelgrass". Several flowering

plants (Anthophyta) were also identified, including surfgrass and eelgrass. Of particular importance is the presence of eelgrass within the study area. Edible seaweeds, which are of considerable importance to First Nations, were also found in the study

A wide range of invertebrates were collected and observed in the intertidal area including: Sponges; Cnidarians (e.g., anemones); Worms (e.g., sand worms and tube worms); Mollusks (e.g., chitons, limpets, clams); Arthropods (e.g., crabs, amphipods, isopods, barnacles); Bryozoans; Echinoderms (e.g., starfish, urchins, sea cucumber); and Tunicates. Common invertebrates included periwinkles, dogwinkles, limpets, barnacles, amphipods, and isopods. Purple shore crab was also observed in large numbers in the intertidal area, particularly the mid-intertidal zone.

The presence/absence of shellfish was assessed in the small areas of sand that exist within the study area, both to the west and east of the proposed loading/conveyor. Each area was evaluated at low tide, and several species of shellfish were observed including littleneck and butter clams, although in relatively low numbers. Based on the findings of the survey and discussions with local stakeholders, the Proponent determined that the area in the vicinity of the proposed ship loading facility did not appear to provide significant habitat for a productive shellfish community.

Several species of fish were also observed along the shoreline during the intertidal assessment including: pricklebacks; gunnels; Pacific clingfish; and sculpins). Pricklebacks, gunnels and clingfish were found under larger boulders and cobbles along all sections of shoreline at low tide. The sculpins were found in small pools throughout the intertidal area.

### *Subtidal*

Subtidal surveys conducted by the Proponent identified the substrates of the subtidal area to be highly variable, ranging from sandstone bedrock outcrops to areas of sand and gravel. Sands and gravels were found to be the dominant substrate types in the subtidal area and these coarser materials tended to be correlated well with higher densities of eelgrass. Eelgrass, in turn, supports macrophyte algae that provide food and protection to a large variety of animals (fish, anemones, nudibranchs, and crabs). Solid substrate (rock and boulder) areas showed colonization of sessile (attached) invertebrates and larger algae. Invertebrate biological activity in this area was limited to relatively small, low profile organisms such as sea stars, urchins, small crabs, and anemones.

Deeper subtidal areas contained larger boulders and rock, which provided invertebrates protection from prevailing currents. The larger substrates also provided habitat for larger anemones, urchins, and octopus. In addition, the larger rocks and boulders were found to be the main attachment substrate for algae (seaweed). It was noted that larger seaweeds, such as kelp, provide protection and food for other marine organisms (urchins, fish and crabs). Pipefish, hydroids, bryozoans, snails, and crabs were all observed in or near the kelp patches.

Particularly noted by the Proponent was the presence of northern abalone. This species is generally found clinging to rocks in kelp beds along exposed and semi-exposed coasts within 6 m of the surface. Abalone has been closed to all forms of harvest since 1990 due to chronically low stocks. In April 1999 the northern abalone became the first Canadian marine invertebrate to be designated by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as “threatened”. The northern abalone is protected in Canada under the federal *Species at Risk Act*. (SARA).

The Proponent identified eelgrass and kelp beds during its intertidal and subtidal surveys, but determined that these were not “significant” in comparison to other coastal areas. Eelgrass and kelp beds were noted as providing important habitat for a range of marine organisms. In the Application, the Proponent summarized some of the existing studies and literature regarding the use of eelgrass and kelp beds by fish. The emphasis was on salmon and rockfish, although other fish species and invertebrates also rely on these types of habitat.

The Application also included a discussion of the use of near-shore habitat by juvenile salmonids and other fish species based on a review of relevant literature and other information sources. It was noted that juveniles of all five species of Pacific salmon and anadromous cutthroat trout are known to use nearshore habitats as part of their migration route from their natal streams into marine offshore waters. Further, estuaries and nearshore coastal waters are important rearing habitats for juvenile salmon, particularly from Spring to Fall. Steelhead trout, in contrast, pass through nearshore areas very quickly, but are known to feed on small fish migrating and rearing in these areas. Holding areas for juvenile fish likely correspond to the presence of areas of kelp and eelgrass.

The Application also discussed the use of near-shore habitat by adult salmon, noting that all five species of salmon, as well as cutthroat trout and steelhead may be found in Broughton Strait and Queen Charlotte Strait at some time of the year. However, with the exception of a resident chinook population (‘winter chinook’), all of these species are migratory fish, appearing in the straits only as mature animals in summer and fall months en route to spawning beds in many north Island rivers, in particular the Cluxewe, Keogh and Nimpkish. Coastal areas near the mouths of salmon spawning streams can provide important holding areas for adult salmon prior to spawning. In many cases, these holding areas can be located in a bay or behind a point of land that will provide a back-eddy from opposing tidal flow. With respect to the Project area, Nimpkish River sockeye have been observed to stage in the proposed ship loading areas prior to moving into the river. Nimpkish River chum are also reported to stage in the proposed ship loading area prior to moving into the river.

The Application included an overview of the presence of marine mammals in the vicinity of the Project. Most information was taken from the BC Cetacean Sightings Network and this was supplemented with scientific literature, field observations, and interviews



with people knowledgeable about marine mammal fauna of the region. As well, in early September 2003, a reconnaissance flight using a fixed wing aircraft was flown along the coastline, within approximately 5 km of the proposed marine ship-loading facility. The flight was completed to survey the vicinity of the project area for marine mammals and to identify potentially important habitat areas (e.g., seal haul-out locations). Observations of marine mammals were also made by the project team fisheries biologists during other field surveys.

The Application described the relatively diverse number of marine mammals that are found in the vicinity of the Project. The species identified included: toothed cetaceans (whales, dolphins, porpoises); baleen whales; seals; sea lions; and sea otters.

#### ***1.1.6 Wildlife and Wildlife Management***

The Proponent made use of various sources of existing information on wildlife and wildlife habitat in the general vicinity of the Project area as well as conducting several project-specific studies for amphibians and birds (breeding birds and marine birds) with general surveys for the occurrence of or evidence of use by other terrestrial wildlife such as ungulates and carnivores.

##### ***Amphibians***

Amphibians were surveyed using two Resource Inventory Standards Committee (RISC) survey techniques: systematic surveys, and time-constrained searches. One western red-backed salamander, a terrestrial species, was found within the proposed sand and gravel extraction area. However, only a limited amount of searching was devoted to this area because of the lack of breeding habitat for listed amphibian species (*i.e.*, red-legged frog). The clouded salamander is the only other terrestrial salamander occurring on northern Vancouver Island and may occur in the project area. All other salamanders were located in the lowland buffer between the escarpment and the river or north of the proposed extraction area.

The only listed amphibian species on northern Vancouver Island is the red-legged frog. It is blue-listed (threatened) by the CDC and classified as a species of special concern on SARA Schedule 3. Red-legged frogs were only recorded in a pond outside the Project area (approximately 600 m west of proposed conveyor route). Ponds along the Cluxewe River provided some potential red-legged frog habitat although, overall, they were less suitable because of the paucity of aquatic vegetation required for egg attachment. This species prefers forests with abundant vegetation and ground litter, which occur along the ocean shoreline and in the lowland forests along the Cluxewe River. The Application noted that no ponds or wetlands occur within the project footprint and that the extensive riparian buffer proposed for the Project will protect wetland habitat along the Cluxewe River.

The Application stated that northwestern salamanders were by far the most abundant and ubiquitous amphibian species. Their egg masses occurred in most forested ponds encountered, but were absent from the ponds occurring at the edge of the river gravel

bars. They occurred in some backwater ponds that exhibited very little flows with the exception of the confluence with the mainstem Cluxewe River. One adult was found near a beaver pond adjacent to the Cluxewe River, to the northwest of the proposed Project Area. The Proponent concluded that resource extraction activities in the proposed Project Area would have little, if any, impact on this species.

Three other species of amphibians occur on northern Vancouver Island: long-toed salamander, western toad, and Pacific tree frog. Of these species, evidence was found only of Pacific tree frogs. Eggs were found in the ponds behind the beach access road. Croaking was reported in the gravel pit pond by the river, west of Hartford Pit, but no eggs were found and the pond was not considered to provide suitable quality habitat. The extraction area provides poor habitat for these three aquatic-breeding species.

### *Birds*

The Proponent conducted surveys for possible breeding Harlequin Ducks along the Cluxewe River in May/June and August 2003 but no Harlequin ducks were observed during these surveys. The Proponent concluded that this indicated that the river adjacent to the proposed Project did not appear to provide appropriate nesting habitat for Harlequin Ducks. Although no Harlequin Ducks or broods were observed during the surveys, three riverine bird species (Belted Kingfisher, Spotted Sandpiper, and American Dipper) and Bald Eagles were recorded during the August survey.

The Proponent conducted waterbird surveys along the Soldier Bay shoreline and Cluxewe River estuary in 2003 and 2004. These surveys identified several species of marine birds that winter in Soldier Bay and the adjacent shoreline east of Cluxewe Spit. Based on bird densities for all surveys, Soldier Bay appeared to receive as much as 50% more use per unit length of shoreline than east of Cluxewe Spit. Within Soldier Bay, the central rocky intertidal area received more use by more species than other parts of the bay. The proposed conveyor passes through the west edge of the central rocky area.

The relative abundance of species in the area east of Cluxewe Spit and Soldier Bay during the August to early May survey, and during mid-May to early June surveys between Cluxewe Spit and Lady Ellen Point, had many similarities. During all surveys conducted in these areas, Harlequin Ducks and Surf Scoters were observed to be the most abundant species, while White-winged Scoters and Buffleheads also consistently ranked high in abundance.

Breeding bird surveys were completed at the end of May and in mid June, 2003. Twenty-nine (29) breeding bird species were observed during the spring 2003 surveys within the Project area. None of these species are blue or red-listed by the BC Conservation Data Centre or federally listed under SARA. Some of the most common species observed on the surveys included: Winter Wren; Golden-crowned Kinglet; Chestnut-backed Chickadee; Swainson's Thrush; and, American Robin. Additional breeding bird species observed beyond the survey points included Bald Eagle, Canada Goose, Common Loon,

Common Raven, Common Yellowthroat, Glaucous-winged Gull, Great Horned Owl, Northern Flicker, Northwestern Crow, and Red-breasted Nuthatch.

The Proponent also conducted raptor nest surveys and call-back surveys within the Project footprint and along the Cluxewe River. During the spring 2003 survey an active Bald Eagle nest was located at the west end of a small island in the Cluxewe Estuary. No other nests of raptors were located during the surveys. A previous aerial survey conducted by Western Forest Products (WFP) has detected most eagle nests in the Project area. None of the nests mapped by WFP occur in the Project area or in line with the proposed conveyor.

In May 2003, the Proponent completed a survey to detect the presence of Great Blue Heron within the Project footprint. The Great Blue Heron is provincially blue-listed and is also listed as a species of special concern under the federal *Species at Risk Act*. Although no Great Blue Heron were observed within the Project footprint, several were observed during shoreline surveys in Soldier Bay, McNeill Bay, and the Cluxewe River Estuary.

#### *Terrestrial Mammals*

General wildlife reconnaissance surveys were conducted by the Proponent in conjunction with other field surveys. The Proponent noted that wildlife species richness was about four times greater in the riparian and lowland forests along the Cluxewe River than in the interior areas where gravel extraction is proposed. Wildlife abundance, although not quantified, appeared to follow a similar trend. The interior coniferous forest had lower wildlife diversity because of the lack of habitat diversity. Interior forests were uniform and dense, with little undergrowth in most areas. No wetlands were present. No species of provincial or federal management concern were located in the interior forest.

The lowland and riparian forests, in contrast, contained diverse habitat features, including seasonal wetlands, a beaver pond, stands of coniferous, deciduous, and mixed forest, coniferous blow down, and open river edge. Animal trails occurred along the river's edge and along the interior hillside overlooking the river. Along the river trail, evidence of use was noted for four mammal species: wolf (1 scat), black bear, deer, and an unidentified mammal, possibly a member of the weasel family (1 scat). Black bear signs were fresh and abundant, consisting of scats, often with huckleberry seeds (scats near the ocean contained salal berry seeds); a possible back-rubbed tree; and wasps' nests dug out of the ground.

Terrain Ecosystem Mapping (TEM) was completed for the entire Project area in early July 2003. This was used as a framework for applying habitat capability and suitability ratings. Capability is defined as the ability of the habitat, under optimal natural conditions, to provide the life requisites of a species, regardless of its current habitat condition. Suitability is defined as the ability of the habitat, in its current condition, to provide the life requisites of a species. Habitat polygons identified by the TEM mapping

were evaluated in further detail by a wildlife biologist to allow the completion of suitability and capability assessments for black-tailed deer and black bear.

The resource extraction area is covered almost entirely by a young, second-growth western hemlock and amabilis fir forest with a fairly sparse understory. Consequently, there is good shelter from precipitation but little food. Near the resource extraction area, habitats in the buffer zone adjacent to the Cluxewe River provide high-quality food and cover. The conveyor will pass over mainly wet habitat with early structural vegetation stages (e.g., shrubs, sedges, skunk cabbage, horsetail, etc.) that produce deer forage in early spring and late summer-fall, but overall, this wet habitat is of limited value to deer. The habitat adjacent to the shoreline provides limited food for deer, mainly on the edge facing Broughton Strait. The most valuable habitat for Black-tailed Deer is that found within the proposed buffer zone adjacent to the Cluxewe River.

With respect to black bears, there is some food-producing habitat in the Project area, but denning habitat (large diameter western red cedar and yellow cedar) is lacking. The resource extraction area provides good shelter from precipitation but little food for bears. Near the resource extraction area, habitats in the buffer zone adjacent to the Cluxewe River provide high-quality food and cover for bears. For bears, food is particularly abundant when migrating salmon enter the river; at such time they use the adjacent areas for travel and as secure places to consume salmon. The stockpile area has relatively low potential to support bears. The dense tall shrub and pole-sapling structural vegetation stage dominant in this area provides some food and cover value during spring and summer. Early structural vegetation stages (e.g., shrubs, sedges, skunk cabbage) produce food for bears in spring and fall. Habitat adjacent to the shoreline also provides cover and resting places for bears and they frequently forage in the intertidal zone. The most valuable habitats for black bears are those in the buffer zone adjacent to the Cluxewe River, which is protected under the project development plan.

#### ***1.1.7 Waste Management***

Reference to existing local waste management was included in the Application. The Proponent noted that local contractors carry out solid waste collection in the local communities and the rural areas. The regional district operates the Seven-Mile landfill and recycling facility off Highway 19, between the Port Alice and Port McNeill junctions with Highway 19. All non-hazardous solid waste generated within the regional district is disposed of in the Seven-Mile landfill.

#### ***1.1.8 Noise***

In the Application, the Proponent provided a brief description of the ambient noise levels in the Project area. The Proponent noted that currently, the only significant sources of noise are from the paved and unpaved roads in the area. Highway 19 runs south of Port McNeill, east past the Project site and south of the Klickseewy IR #7. This highway is used by all types of road compliant vehicles. One unpaved road (Rupert Main) runs parallel to Highway #19 and these are used by both logging trucks and private vehicles.

The Proponent also stated that additional background noise sources in the area may include cargo and passenger ships traveling through Broughton Strait, local fishing boats in Broughton Strait, local aircraft, and equipment at existing gravel pits to the northwest and southeast of the Project site.

### ***1.1.9 Air Quality***

In the Application, the Proponent stated that the only significant sources of air pollutants currently in the Project area are from the roads adjacent to and on the Project site. The unpaved roads are primarily east of and adjacent to Highway 19 and are used by logging trucks during the day, and by private vehicles during both the day and night. The sole paved road near the Project area is Highway 19. Western Forest Products and Weyerhaeuser indicated that approximately 80 logging trucks and an estimated 160 private vehicles per day drive on the Rupert Main unpaved road. Statistics collected by the Ministry of Transportation indicate that the average annual daily traffic for north and southbound traffic on Highway 19 is approximately 2,100 private vehicles. Pollutants include dust (PM<sub>10</sub> particles), and gaseous emissions, including NO<sub>x</sub>, SO<sub>x</sub>, and CO. Other sources of air pollution near the Project area include recreational boats/water vehicles, commercial fishing vessels, container and cruise ships traveling through Broughton Strait, and local transportation vessels.

The Proponent compiled an emissions inventory for the unpaved and paved road traffic based on its current use. The results indicated that: 123 tonnes of PM<sub>10</sub>, 46 tonnes of NO<sub>x</sub>, 3 tonnes of SO<sub>x</sub> and 31 tonnes of CO are produced per year. Using a simple air quality prediction equation for linear sources based on the elevation of the road and assuming a wind direction from the perpendicular to the road, concentrations at a distance 1 km from the unpaved and paved roads of PM<sub>10</sub>, NO<sub>x</sub>, SO<sub>x</sub> and CO were estimated. The estimated values were compared to the Canadian Council of Ministers of the Environment (CCME) guidelines for PM<sub>10</sub>, NO<sub>x</sub>, SO<sub>x</sub> and CO. All estimated values were significantly lower than CCME guidelines (refer to Table 2).

Table 2 Current Air Quality Estimates (Orca Sand and Gravel Ltd. 2004)

<b>PARAMETER</b>	<b>ESTIMATED VALUE</b>	<b>CCME GUIDELINE</b>
PM <sub>10</sub>	0.06 – 16 µg/m <sup>3</sup>	25 µg/m <sup>3</sup>
NO <sub>x</sub>	0.02 – 5.9 µg/m <sup>3</sup>	60 µg/m <sup>3</sup>
SO <sub>x</sub>	0.002 – 0.42 µg/m <sup>3</sup>	30 µg/m <sup>3</sup>
CO	0.02 – 4.1 µg/m <sup>3</sup>	6,000 µg/m <sup>3</sup>

## **1.2 Description of Socio-Economic and Cultural Environment**

### ***1.2.1 Current Use of Lands and Resources for Traditional Purposes***

The Proponent undertook *Heritage Overview Assessments* (HOAs) of the Kwakiutl and ‘Namgis First Nations to identify and record the archaeological sites, ethnographic sites, and traditional use areas in and around the Project area. The objective of these

assessments was to identify any heritage areas that could potentially be impacted by the proposed Project. The Proponent collated published ethnographic, historic, and Traditional Use Site information for the study area and consulted with Elders from both First Nations. This consultation involved the gathering of any information they wished to share on known archaeological and traditional use sites in the area, and discussions with each group regarding the significance of any sites found during the study.

### **‘Namgis Traditional Use**

In addition to the two HOA studies, the ‘Namgis First Nation conducted a series of interviews during the summer of 2004 with a wide range of band members including ‘Namgis Elders in order to gather Project specific information. While TUS information was recorded based on the interviews, additional information was drawn from written texts.

#### Fishing and Seafood Collecting

The Dłąksiwe’ (Cluxewe River) and nearby marine areas, located approximately 2.5 km west of the Project area, were identified as a notable area for salmon fishing. Fishing for ground fish at the mouth of the Dłąksiwe’, located more than 2.5 km west of the Project footprint and near Lady Ellen Point, some 500 metres east of the Project area, was also recorded. In addition, most of those interviewed identified collecting sites at the mouth of the Dłąksiwe’ for a variety of seafood including clams, mussels, eelgrass and seaweed.

#### Berry and Plant Gathering

There were several locations near the Project area where berry and plant gathering activities historically took place. Berry picking and plant gathering were carried out all around the Dłąksiwe’ area. The following plants are known to have been collected in the area:

- Stinging nettles - used for making fishing line/nets;
- Alder - used for smoking fish and to make wooden spoons;
- Cedar - used as gifts for the potlatch in various ways;
- Berries - dried berries were treats of the past;
- Red ochre; and
- Apple trees and plum trees were planted in the area.

#### Medicinal Plants

Most native medicinal plants are found around the swampy areas south of the mouth of the Dłąksiwe’ including:

- Balsam bark - the outer bark was used as a drink for arthritis and tuberculosis;
- Gum/pitch - used to heal sores;
- Devil’s Club – used to treat digestive tract ailments; and
- Stinging Nettles – used for back problems.

In addition to the ‘Namgis traditional use of this area, Kwakiutl members are also known to collect traditional use medicinal plants from the Cluxewe estuary.

### Cluxewe River (Dłaksiwe')

The Dłaksiwe' was identified as a very important traditional area to First Nations. In addition to its value as a source of seafood, the river had a myriad of uses including:

- Ceremonial - use for ceremonial bathing initiation for certain dances;
- Spiritual - the river was a place where many went upstream for vision quests;
- Medicinal - water from the Dłaksiwe' was identified for medical and therapeutic uses;
- Water Supply - the Dłaksiwe' was identified as a traditional source of potable water and a main water supply;
- Transportation Routes – part of a trail from Dłaksiwe' to Nimpkish River; and
- Traplines - went along the foreshore and up the Dłaksiwe'.

Information related to specific sites was not revealed due to the confidential nature of the information. It should also be noted that many of the places mentioned by Elders are stated in terms of approximate locations, because band members did not wish to state the exact location or because the terrain had either changed or been logged over. In general, the 'Namgis 2004 TUS survey suggested that the majority of TUS sites were outside of the Project footprint.

### **Kwakiutl Traditional Use**

As part of the environmental assessment process, the Kwakiutl First Nation undertook an independent study that provided an overview of the traditional use and socio-economic setting relevant to the proposed undertaking. The results of the study indicated that throughout its history the area around the Project was widely used by the Kwakiutl First Nation. Fishing, inter-tidal gathering, plant harvesting, hunting and trapping activities were identified as common traditional uses in, and around, the Cluxewe River and Port McNeill Bay; many of these traditional uses have been carried on to this day.

### CMT Survey

The project area was logged in the 1930s through 1960s. However, to establish certainty that no culturally modified trees (CMTs) remained in the Project area, a 100% CMT inventory was conducted by the 'Namgis CMT crew with a Kwakiutl participant. No CMTs were found during this inventory and the complete absence of CMTs in the Project area was confirmed. Evidence of logging was observed throughout the entire area and all of the trees appeared to be second growth. The few cedar present were inspected for evidence of cultural modification with negative results.

### **1.2.2 Land and Resource Use**

An overview of the existing land and resource use in the region was included in the Application. The Project would be located on private property owned by Western Forest Products Inc. within its Tree Farm Licence (TFL 6 Block 2). The ship loading facility portion of the Project would be an exception as it would be located over Crown foreshore land.

Forestry supports the largest percentage of the workforce in this important timber

producing area. Commercial fishing has declined over recent years. Salmon and shellfish aquaculture is one of the few growing industries in the region. The largest mining operation, Island Copper, closed in 1995 and mining is currently limited to small-scale industrial mineral production at a few locations. Two wind energy projects were approved in Fall 2004 near the northern tip of Vancouver Island. Tourism has grown slowly over the last 20 years, with whale watching and sport fishing being popular activities. However, Soldier Bay is rarely visited by tourists for any of these activities.

The Cluxewe Resort, at the mouth of the Cluxewe River, is a summer campground owned and operated by the Kwakiutl First Nation and situated on their reserve, Klickseewy IR #7. This is the closest recreation site to the Project and is located 2 km west of the conveyor alignment at the beach. The Cluxewe Salt Marsh, a nature preserve located west of the Cluxewe estuary, is the closest protected area.

Highway 19 is the main transportation artery connecting the North Island and crosses through the project area. Broughton Strait is a commercial shipping channel and is also crossed numerous times daily by a ferry connecting the town of Port McNeill with Alert Bay and Sointula.

The North Island Straits Coastal Plan designated the unit within which the Project area is located as: “characterized by concentrated coastal uses that should be managed to accommodate a variety of existing uses and activities”. The Regional District’s A-1 classification of the Project area allows for mineral extraction and processing activities.

### ***1.2.3 Local Communities***

The Application included an overview description of local communities located near the Project. The Project is located in the Regional District of Mount Waddington which has a population of just over 13,000. Port Hardy, Port McNeill, Alert Bay, Port Alice, Sointula and Fort Rupert are the larger communities within the regional district. Unemployment is higher than the British Columbia average, at 10.7% in 2001. This reflects a generally declining local economy which has historically been dependent on primary resource industries such as: forestry, mining and fishing.

The Kwakiutl First Nation and the ‘Namgis First Nation, with 639 and 1532 members respectively, have both asserted traditional territory rights over the Project land, as detailed in their Statements of Intent filed with the BC Treaty Commission. The Kwakiutl First Nation services ten reserves with the main community at Kippase IR#2 at Fort Rupert. The ‘Namgis First Nation has eight reserves, with the main community on reserves on Cormorant Island.

### ***1.2.4 Public Health and Safety***

Existing community emergency services were described in the Application. The Project Area is within the administrative boundaries of the Vancouver Island Health Authority. There are hospitals in Port Hardy, Port McNeill, and Port Alice, all of which provide various medical diagnostic and treatment services. Cormorant Island Community Health



Centre located in Alert Bay provides emergency services and out-patient rehabilitation services and extended care. Port Hardy also has a regional health unit/community centre, while a home support program operates out of Port McNeill.

RCMP detachments and volunteer fire departments are located in Port McNeill, Port Hardy and Alert Bay. The BC Forest Service operates a forest fire base camp in Campbell River.

### ***1.2.5 Navigation***

An overview of existing shipping and navigation in the vicinity of the Project was included in the Application. The chosen location for the ship loading facility is in a bay on the south side of Broughton Strait, approximately 1 km west of Lady Ellen Point. This site is sheltered by Malcolm Island, Lady Ellen Point and Ledge Point, which offers protection from north and easterly winds. The site may occasionally be subject to heavy weather from storms from the northwest. A monitoring buoy was anchored on the ship berth station from October 2003 to May 2004 in order to record sea and meteorological conditions over a winter period. Data from the buoy indicated that during a normal year conditions will not be extreme. The site is well clear of the Broughton Strait shipping channel and does not interfere with navigation. A bathymetric survey confirmed the water depth and bottom profile in a 2½ km wide area centered on Soldier Bay. Inclement weather is normally from the south-southwest and heavy rainfall can occur at any time of the year. Tides range up to a maximum of 6 m.

Broughton Strait is part of the “inside passage” between Vancouver Island and mainland British Columbia. This is the main shipping route between Vancouver, Puget Sound and Seattle, and the north coast of North America and Alaska. As such, large vessels transit the strait on a daily basis. Pilots are picked up and dropped off at one of several pilot stations including Victoria, Pine Island and Port Hardy, depending upon seasonal traffic patterns and the intended journey route.

### ***1.2.6 Archaeological, Heritage and Historical Cultural Resources***

In June 2004, the Proponent conducted a detailed Archaeological Impact Assessment (AIA) to identify and record the archaeological sites, defined as physical evidence of past human activities within the proposed Project area. The objectives of the AIA were to identify, record and evaluate the archaeological resources within the area.

Involvement by both the Kwakiutl First Nation and the ‘Namgis First Nation included the selection of the archaeologist, the gathering of any information they wished to share on known archaeological and traditional use sites in the area, and use of Band members in all field work. All information gathered was incorporated, wherever possible, into the AIA, while respecting the confidential nature of the information provided.

An archaeological survey of the aggregate extraction and processing plant area was conducted along pre-cut lines that had been prepared for the seismic resource investigation. All seismic pit exposures and natural (tree throw) exposures along these

seismic lines were thoroughly checked for cultural material. Cutbanks within the seismic holes were shovel cleared and deposits screened at many tree throws.

Where no suitable exposures already existed, subsurface shovel or auger tests were conducted at 50 m intervals. In addition to the seismic lines, traverses were made following the road system through the extraction part of the project area, around the margins of an existing gravel pit, and along the east bank (the terrace edge, rather than the channel margin) of the Cluxewe River. The roads have large flanking soil exposures that provided excellent sub-surface visibility. Additional sub-surface testing was conducted using auger and shovel tests in areas that were deemed to have higher archaeological potential.

The cleared conveyor centre line was walked and carefully checked for any soil exposures. Testing was completed along the centreline and up to 10m to either side at intervals of approximately 50m. The modern day shoreline and beach exposures were also thoroughly checked for cultural resources.

No archaeological resources were identified during the survey of the proposed aggregate extraction and processing area, and based on the intensive level of survey and subsurface visibility completed, the potential for undiscovered archaeological deposits is deemed to be low.

The conveyor line that extends from the north portion of the aggregate extraction area north to the highway was found to have low archaeological potential. About 10 subsurface tests were placed throughout this area and all tested negative for cultural material. North of the highway, the proposed conveyor route extending approximately 730 m, was also judged to be low in archaeological potential. Ten subsurface tests were conducted and all of these tested negative for cultural material.

The intertidal zone is a mix of sandstone shelf and sand/cobble beach. No archaeological features or materials were observed in the intertidal zone. Additional examinations were conducted away from the proposed conveyor route on the beach and inland, given the higher archaeological potential for this area. An archaeological site (named EdSs-T1 by the archaeologists) was discovered 8 m from the high tide line, to the east of the centre line of the conveyor route. This site consists of a small pocket of ash 10 cm below the surface, and fire cracked rock (boiling stones) scattered over a small area measuring about 4 m E-W by 3 m N-S.

In summary, the Proponent did not identify any archaeological resources during the survey of the extraction and processing area. Based on an intensive survey and sub-surface sampling, the potential for undiscovered archaeological deposits was deemed to be low.

## **2. Environmental Effects and Mitigation**

### **2.1 Environmental Effects and Mitigation for the Biophysical Environment**

#### ***2.1.1 Hydrology and Water Resources***

##### *Description of Potential Effects:*

The gravel extraction activities associated with the Project were identified as having the potential to impact groundwater quantity and quality as well as possibly affecting the water levels in the Cluxewe River and Mills Creek. There was also concern that any effects to groundwater in the vicinity of the Project would also impact neighbouring groundwater users in Port McNeill, the Cluxewe Resort and on Malcolm Island. There was also some concern expressed over the quality and quantity of water used in the operations and possible effects of it being discharged into the environment.

##### *Description of Proposed Mitigation:*

The Proponent committed to undertake a monthly groundwater monitoring program using eight established wells in the Project footprint during construction and operation (until removed during extraction), and to use these and one up-gradient well for annual groundwater quality analysis during operations. In addition, the Proponent committed to mine only above the winter groundwater table, therefore eliminating potential for direct impact on the groundwater table.

Groundwater monitoring studies indicated that the flow to groundwater wells servicing Port McNeill, Cluxewe Resort and on Malcolm Island would not be affected by the Project as they are “up gradient” from the Project. In addition, the Proponent has committed to collect water samples from wells and analyze for key quality parameters once per year.

The sand and gravel is naturally wet in the ground and contains 3% moisture by weight when extracted. A net loss of water from the Project of 390,000 cubic metres per year at maximum capacity would arise because the sand and gravel is damp, after washing, when loaded onto the ships. The Project’s operations would require the discharge of process water into sediment control ponds or infiltration. All process water would be recycled, so there would be no discharge of wastewater from the Project.

The Proponent identified the main sources of sediment as being the washing process for the aggregates and to a much lesser degree, the sediment associated with extreme rainfall events. Sediment from surface runoff will be contained on site and will settle on the floor of the active quarry area. A thickener will be used to accelerate settling of sediment and reduce the size of settling ponds that would otherwise be required.

It is proposed that two sedimentation ponds be used. A pond 40 m long, 20 m wide and 3 m deep will receive the thickener underflow containing 60% solids. A secondary

sedimentation pond 115 m long, 35 m wide and 3 m deep will receive thickener overflow for final settling and water recycle. The ponds will be created by excavation into the pit floor level therefore no dykes or impoundments will be created and silts cannot be carried off site because of the surrounding, higher, buffer zones.

Lining of the sedimentation ponds may be required to limit seepage losses and reduce makeup water requirements. The liner could consist of low permeability soils or a combination of using the settled silt for lining the base of the pond and using an HDPE geomembrane or soil liner on the slopes of the pond. Cleanout of the sedimentation ponds will produce sediments that will be incorporated into site reclamation. This will involve placement of a 1 m to 2 m thick layer of silt over the areas to be reclaimed, prior to placement of the stockpiled soils, organic materials and re-vegetation.

*Conclusion:*

During the environmental assessment, the responsible authorities have considered: the Application; additional Project review material listed in Appendix A; public, First Nations, and government agency comments on the potential effects of the Project; responses by the Proponent; and the discussions of the Working Group.

Based on this information and provided that the Proponent implements the actions described in the summary of commitments listed in Appendix C - Table of Commitments, the responsible authorities are satisfied that there will not likely be any significant adverse effects to hydrology and water resources.

**2.1.2 Soils**

*Description of Potential Effects:*

As the Project site is cleared of trees by Western Forest Products and mined for gravel by the Proponent, the site has the potential to lose all natural topsoil and nutrients for future reclamation activities of the site.

*Description of Proposed Mitigation:*

Over the life of the project sand and gravel will be removed resulting in the establishment of an area with flatter site topography. Progressive reclamation activities at the site are proposed to re-vegetate all disturbed areas with native species of trees, shrubs, and, where applicable, grasses.

Soil from the first two phases of operation will be recovered and stored for future use in reclamation activities. Topsoil will be recovered and stored separately from the lower subsoil horizons whenever practicable given the limited soil development over much of this site. Organic material, such as non-merchantable trees, brush and stumps, will be chipped and composted, or burned, and added to reclaimed soil. Because there is a limited supply of natural soil, sediment from the water recycle ponds will be used to

supplement and improve the reclamation materials. Additionally, the Company will seek to identify other locally available amendment materials that will increase soil nutrient content, to the extent that such materials are practicable and economic

*Conclusion:*

During the environmental assessment, the responsible authorities have considered: the Application; additional Project review material listed in Appendix A; public, First Nations, and government agency comments on the potential effects of the Project, responses by the Proponent; and the discussions of the Working Group.

Based on this information and provided that the Proponent implements the actions described in the summary of commitments listed in Appendix C - Table of Commitments, the responsible authorities are satisfied that the Project is not likely to cause significant adverse effects to soil resources.

**2.1.3 Species at Risk**

*Description of Potential Effects:*

During the course of the environmental assessment, several possible effects of the Project on species at risk and their ecosystems were identified. Three marine species listed as threatened under the *Species at Risk Act* (SARA) were located in and around the Project area, specifically northern abalone and orca – northern resident and transient populations. Possible effects of the Project on terrestrial species at risk were also considered. The marbled murrelet (threatened), great blue heron (species of special concern), and red-legged frog (species of special concern) were identified within or adjacent to the Project footprint (conveyor/loadout area). Potential effects to the blue-listed RC (western red cedar-sitka spruce-skunk cabbage) vegetative community were also considered (refer to s. 2.1.5 for this discussion).

*Description of Proposed Mitigation:*

The Proponent is currently working with DFO and other stakeholders with regard to the identified aquatic marine species. Appropriate mitigation and monitoring measures for these marine species will form an integral component of the DFO *Fisheries Act* Authorization. The Proponent has made commitments to incorporate noise and light mitigation measures for orcas during construction and operations. The Proponent added commitments to document orca sightings from the ship loader on a year round basis for the first three years of operation. Additional monitoring requirements during the Project construction will be established under the *Fisheries Act* authorization in adherence with provisions set out in the SARA.

Both the Marbled Murrelet and Great Blue Heron were observed using the marine habitat on occasions. Given the small numbers of individuals observed and the low potential for interaction with project activities (i.e., ship loading), the potential impact to these species was considered very low. However, there may be minor, short-term disruption to Harlequin Duck habitat during Project construction, although the use of pile drilling (rather than pile driving) for the ship loading structure should minimize noise and the

potential for habitat disturbance. During operations, it is expected that Harlequin Ducks and other marine bird species will become habituated to the narrow, elevated load out structure and ship loading activities. The Proponent committed to monitoring the presence of Harlequin Ducks near the marine construction site and adjusting seasonal construction timing accordingly. In the spring of the first operating year, Harlequin Duck presence will also be monitored during ship loading to determine any timing adjustments.

Wetlands occupied by the Northern red-legged frog were outside the Project footprint, approximately 600 m west of the proposed conveyor route. Project-related construction and operations would not impact the wetland/pond area in which the frogs were located. Further, the existing forested border around the wetlands and along the Cluxewe River would not be disturbed. As a result, the Project was not expected to negatively affect the identified red-legged frog habitat.

*Conclusion:*

During the environmental assessment, the responsible authorities have considered: the Application; additional Project review material listed in Appendix A; public, First Nations, and government agency comments on the potential effects of the Project, responses by the Proponent; and the discussions of the Working Group.

Based on this information and provided that the Proponent implements the actions described in the summary of commitments listed in Appendix C - Table of Commitments, the responsible authorities are satisfied that the Project is not likely to cause significant adverse effects to species at risk.

**2.1.4 Fish and Fish Habitat**

*Description of Potential Effects:*

The potential impacts of the gravel extraction operations on fish and fish habitat in the Cluxewe River and Mills Creek were examined. Similarly, potential Project effects to the inter-tidal and sub-tidal habitat in the bay in which the ship loading facility was to be located were assessed. Eelgrass and kelp beds were specifically identified as important marine habitat that would be potentially impacted.

Approximately 75.5 m<sup>2</sup> of intertidal/subtidal habitats will be impacted, of which, 5.7 m<sup>2</sup> is comprised of eelgrass, 17.2 m<sup>2</sup> of kelp and 14.4 m<sup>2</sup> of surfgrass/edible seaweed. Through the review of technical information provided by the Proponent, DFO concluded that a harmful alteration, disruption and destruction (HADD) of fish habitat would occur within the marine environment. Accordingly, the Proponent must obtain an “authorization” for the HADD of fish habitat from DFO as per subsection 35(2) of the *Fisheries Act*.

In accordance with its No Net Loss (NNL) policy, DFO requires the Proponent to develop suitable measures to compensate for fish habitat loss attributable to the proposed Project. Under the NNL policy, DFO ensures that compensatory measures equal or exceed the productive capacity of the habitats affected. Using its hierarchy of

preferences, the standard approach is to replace “like for like” habitats, within the same ecological unit, specifically the immediate area of habitat loss. The second option for compensation is to create or increase the productive capacity of “unlike” habitat in the same ecological unit. This involves compensating for one type of fish habitat with habitat of a different type. The final option of preference is to create or increase the productive capacity of habitat in a different ecological unit. In some cases, the final compensation plan could include elements of several options, with some like for like habitat and some unlike habitat created. In addition to the above, the ecological importance or value of the existing habitats affected must be considered when determining the appropriate compensation ratio to ensure NNL.

*Description of Proposed Mitigation:*

The Project was specifically designed to avoid any disturbance to the Cluxewe River and Mills Creek. The Proponent committed to maintain a 70 m wide fisheries sensitive zone along the Cluxewe, with the pit and plant boundaries approximately 150-350m from the edge of the Cluxewe River. It also committed to annual inspection of the Cluxewe channel to document changes and to assess bank stability every 5 years in the vicinity of the operating area.

The proposed ship berth design was submitted as an alternative to a rock fill jetty, which would create a larger footprint and greatly increased habitat destruction. The conveyor option design would offer the least habitat impact and shading commensurate with structural integrity. Minor alterations would include changes to the pile spacing and number of piles, based on engineering considerations that could result in slightly more or less of a footprint in eelgrass areas.

The Proponent has prepared a draft marine construction methodology for DFO review, which includes information on types of marine construction proposed, timing, and mitigation and monitoring (based on priorities set by DFO, the Province, and First Nations). In addition, the Proponent committed to employing and empowering an independent Environmental Supervisor (ES) to oversee and ensure compliance with terms and conditions of marine construction that are authorized by DFO. Details of the construction methodology, timing of operations and habitat compensation will be described within the *Fisheries Act* subsection 35(2) authorization. Inclusion of SARA-listed marine species, such as Northern Abalone, will also be considered in this authorization.

The Proponent will continue to work with DFO, the Provincial government and with First Nations to determine the appropriate marine habitat compensation that will be outlined in any *Fisheries Act* authorization by DFO. This is reflected in the Proponent’s commitment to develop a construction methodology that includes compensation measures, as well as commitments respecting post-construction monitoring to ensure that any constructed compensatory works are functioning as designed.

*Conclusion:*

During the environmental assessment, the responsible authorities have considered: the Application; additional Project review material listed in Appendix A; public, First Nations, and government agency comments on the potential effects of the Project, responses by the Proponent; and the discussions of the Working Group.

Based on this information and provided that the Proponent implements the actions described in the summary of commitments listed in Appendix C - Table of Commitments, the responsible authorities are satisfied that the Project is not likely to cause any significant adverse effects to fish and fish habitat.

**2.1.5 Wildlife and Wildlife Management and Vegetation**

*Description of Potential Effects:*

A concern was brought up during the review of the application on the possible effects of the conveyor system on large mammal migration and habitat fragmentation. Possible effects on the Project on the RC (western red cedar-sitka spruce-skunk cabbage) ecosystem were also considered. Activities associated with the project were also identified as having a possible effect on migratory birds and bird habitat.

*Description of Proposed Mitigation:*

Studies done by the Proponent indicate that the conveyor system will have no impacts on large mammal migration, including black bear and Roosevelt elk. The Proponent has committed to design the conveyor to provide passage at two locations, near shore and 250m from the beach at a bluff to allow large mammals to access to the inter-tidal area for foraging.

The conveyor system had been designed and located to minimize effects on the RC (poorly drained western red cedar-sitka spruce-skunk cabbage) ecosystem. The Proponent has relocated the conveyor as far as possible east to stay on Western Forest Products lands (lease area) and minimize the crossing of the RC ecosystem. Based on field studies, it is estimated that 0.14 hectares out of the 57 ha RC ecosystem will be lost. Culverts will be installed to maintain water movement in and around the conveyor system and not alter water levels in this ecosystem. In addition, the Proponent has committed to measuring and monitoring disturbance along the conveyor in summer and winter during construction, and to determine any changes in the first year of operation. Drainage alterations will be made across the conveyor and access road if a noticeable change in RC habitat type is observed.

Terrestrial habitat that will be altered by the Project footprint is low quality for most wildlife species. Proposed progressive reclamation will limit the area that is cleared at one time (estimated 30 ha at one time). Once extraction is completed, an area will be reclaimed and planted. Reclaimed areas will provide a variety of habitat types for small mammals and other wildlife. Higher quality habitat near the Cluxewe River and along the foreshore will be maintained and reduce habitat fragmentation.



Clearing of the Project area to allow the extraction of sand and gravel will be completed by WFP, under its harvesting licence. Harvesting is regulated by the Ministry of Forests. The Proponent made a number of commitments to address bird habitats and migratory bird concerns, including undertaking a bird nest survey prior to any tree clearing that would take place between April 1 and July 31 (the breeding period). Tree clearing would be required to adhere to Section 34(b) of the Provincial *Wildlife Act*, which requires protection and appropriate buffering of inactive and active nests of bird species protected under that legislation.

*Conclusion:*

During the environmental assessment, the responsible authorities have considered: the Application; additional Project review material listed in Appendix A; public, First Nations, and government agency comments on the potential effects of the Project, responses by the Proponent; and the discussions of the Working Group.

Based on this information and provided that the Proponent implements the actions described in the summary of commitments listed in Appendix C - Table of Commitments, the responsible authorities are satisfied that the Project is not likely to cause significant adverse effects to wildlife or vegetation resources.

**2.1.6 Waste Management**

*Description of Potential Effects:*

The Proponent addressed waste management issues related to the Project, including land-based operations as well as the shipping component. Specific issues raised during the course of the environmental assessment included the potential impacts to shellfish and shellfish harvesting from ship refuelling and/or sewage and bilge water discharge from ships at the loading facility.

*Description of Proposed Mitigation:*

Wastes generated at through Project operations would be relatively limited. Generally, the production of construction aggregates is a natural process that does not use chemicals. However, ancillary operations, such as the clarification of process wash water, could require the addition of small doses of a reagent such as a flocculent to maximize efficacy. The Proponent noted that if this were necessary, it would attempt to identify a reagent that was biodegradable, or could be recycled, or was produced through an environmentally sustainable process.

Numerous hydrocarbon, inorganic and organic substances would be utilized for lubrication. There would be generally little toxic effect associated with lubricants because of the small volumes used. All waste oils would be collected in dedicated tank facilities and returned for recycling. The handling of lubricants would take place in a limited number of specific areas in the operation, such as the workshop, equipment wash area and processing plant around drives and gearboxes. As well, containment procedures would be in place in these areas and spills would be dealt with under a Spill Contingency Plan. Accumulated ground contamination would be dealt with under a Reclamation Plan.

The Proponent also stated that waste management systems for the handling and disposal of domestic, sanitary and hazardous wastes would be installed. Waste collection and disposal companies provide service in the local area and the Proponent intends to contract with them for provision of suitable dumpsters and collection of wastes. Scrap metal would be collected and recycled together with glass, plastic and paper. Used oils would be held in a suitable tank for return to a recycler.

Primary flows of wastewater would consist of washroom discharge and gray water from wash facilities. Sewage would be disposed of in a septic type system designed to accommodate the anticipated workforce. Volumes are expected to be a maximum of 8000 L per day. Approvals would be subject to the Ministry of Health.

Cleaning of mobile equipment would take place in a designated area. Wash water would be collected in a special purpose sump and an oil/water separator would be used when removing collected wash water to the main holding pond.

The Proponent also addressed the waste management issues associated with the bulk freighters that would be conveying the aggregates to the U.S. It was noted that, by law, bilge water cannot be discharged in Canadian coastal waters but must be pumped out in mid-ocean. In addition, the Proponent would require in its shipping contracts that ships include and adhere to Transport Canada's national ballast water management guidelines. The contracted ships would be required to have Transport Canada-approved sewage treatment plants that discharge only potable quality water. Further, the Proponent would not provide vessel fuelling or bilge discharge facilities at the ship loading facility. Working Group discussions confirmed that there is no automatic closure for shellfish harvesting since the proposed conveyor loading facility is not considered a dock, and the terminus of the facility will be located offshore, well beyond the 200m radius from known harvestable beaches.

*Conclusion:*

During the environmental assessment, the responsible authorities have considered: the Application; additional Project review material listed in Appendix A; public, First Nations, and government agency comments on the potential effects of the Project, responses by the Proponent; and the discussions of the Working Group.

Based on this information and provided that the Proponent implements the actions described in the summary of commitments listed in Appendix C - Table of Commitments, the responsible authorities are satisfied that the Project is not likely to cause significant adverse effects with respect to waste and waste management.

**2.1.7 Noise**

*Description of Potential Effects:*

The potential effects of noise from the conveyor system and ship loading activities on fish and marine mammals and their migration routes was identified during the

environmental assessment. As well, the Cluxewe resort and residents of Pulteney Point on Malcolm Island had concerns about a possible noise level increase impacting their business and current standard of living.

*Description of Proposed Mitigation:*

The Proponent has designed the conveyor and loading facility so that it would not impact fish or mammal passages and would not result in measurable shading or light to impact fish. The Proponent has also committed to limit noise impacts on whales and returning salmon to minimal sensory disturbance from construction activities and ship loading. These commitments include underwater noise monitoring, pile drilling instead of pile driving, monitoring of fish behaviour during construction, and monitoring of Orca presence and behaviour during any construction between July and November. Noise levels that are considered to be of concern for marine mammals would be discussed with DFO and used to set the construction timing for some activities.

Construction would be stopped under conditions associated with orca presence, as determined by and agreed upon with DFO. The Proponent has redesigned the loudest part of the ship loading facility, the mooring buoys, to reduce noise as a result of an underwater acoustic study on a similar, approved facility in Sechelt. With this design change, marine mammals may be able to hear some loading for a distance, but it is not expected to be any louder than movements of other ships.

The construction and operation of the Project is expected to generate localized increases in ambient noise levels. A noise survey was undertaken, which demonstrated that loading operations should not be heard at the Cluxewe Resort or Pulteney Point. Noise from the processing plant will be buffered by the edges of the pit and surrounding forest and will not be audible at these locations. Some noise may be heard during the four months of ship loader construction, and the Proponent has committed to pile drilling (rather than traditional pile driving) and no night construction work on the ship loader. The Proponent has redesigned the mooring buoys to minimize noise during ship loader operations.

As a result of the continued noise concerns, the Proponent committed to undertake an independent baseline noise study at the Cluxewe Resort and Pulteney Point to determine baseline noise levels. This will be used as a comparison for any future noise studies requested during Project activities, including ship loading and pit operations. The Proponent committed to implement further noise mitigation measures once operational, if feasible, if noise at these locations is an issue during operations and other mitigation measures are unsuccessful.

*Conclusion:*

During the environmental assessment, the responsible authorities have considered: the Application; additional Project review material listed in Appendix A; public, First Nations, and government agency comments on the potential effects of the Project, responses by the Proponent; and the discussions of the Working Group.

Based on this information and provided that the Proponent implements the actions described in the summary of commitments listed in Appendix C - Table of Commitments, the responsible authorities are satisfied that the Project is not likely to cause significant adverse noise-related effects to the surrounding environment and community.

### **2.1.8 Air Quality**

#### *Description of Potential Effects:*

Concerns about potential effects from dust from the Project were considered in respect to the Cluxewe Resort during the environmental assessment. As well, the construction and operation of the Project is expected to generate some airborne emissions from increased highway vehicle traffic, extraction activities, pit vehicles, and ship loading activities including conveyor operations and ship's engines and generators.

#### *Description of Proposed Mitigation:*

The Proponent has committed to use the wet processing plant to control dust at the Project site, and to use additional water sprays during hot, dry periods if required. All materials being transported by conveyor and loaded onto ships will be wet, so dust should not be an issue.

The Project was designed to operate the plant with low-emission engines on site, and to encourage similar equipment to be used by construction contractors. The use of a conveyor system to transport material to the loading site eliminates trucking of product and an associated increase in engine emissions.

#### *Conclusion:*

During the environmental assessment, the responsible authorities have considered: the Application; additional Project review material listed in Appendix A; public, First Nations, and government agency comments on the potential effects of the Project, responses by the Proponent; and the discussions of the Working Group.

Based on this information and provided that the Proponent implements the actions described in the summary of commitments listed in Appendix C - Table of Commitments, the responsible authorities are satisfied that the Project is not likely to cause significant adverse effects to air quality.

## **2.2 Environmental Effects and Mitigation for the Socio-Economic and Cultural Environment**

### **2.2.1 Current Use of Lands and Resources for Traditional Purposes**

#### *Description of Potential Effects:*

Within the Proponent's application it was noted that traditional use concerns are often unique to individual First Nation communities. Contemporary and historical traditional

uses are often considered sacred and secret and thus it was not possible to openly address these issues as part of the environmental assessment process.

While there was no identified contemporary traditional use in the project area for plant sustenance activities such as berry picking and cedar harvesting, the project may result in a reduction of opportunities to pursue such activities in the future. It was identified that there needed to be some consideration in having plants traditionally used by First Nations included in the site reclamation.

One other concern brought forward during the environmental assessment was the potential for sand and grit to fall from the conveyor during operation and possibly affect the quality and palatability of seaweed.

*Description of Proposed Mitigation:*

The Proponent's replanting is governed by an agreement with Western Forest Products (WFP) to plant harvestable native tree species under their direction. The interviews and studies led by the Kwakiutl did not identify current use of the Project land. However, the Proponent has committed to encouraging WFP to consult the First Nations regarding replanting of native species. The Proponent will also provide opportunities for possible First Nation companies to salvage native plants ahead of operations, where such plants are not being harvested by WFP.

The Proponent has also designed the project to ensure that the conveyor route will avoid potential impacts to areas where edible seaweed occurs.

*Conclusion:*

During the environmental assessment, the responsible authorities have considered: the Application; additional Project review material listed in Appendix A; public, First Nations, and government agency comments on the potential effects of the Project, responses by the Proponent; and the discussions of the Working Group.

Based on this information and provided that the Proponent implements the actions described in the summary of commitments listed in Appendix C - Table of Commitments, the responsible authorities are satisfied that the Project is not likely to cause significant adverse effects to the current use of lands and resources for traditional purposes.

### ***2.2.2 Land and Resource Use***

The Project will be located on private property owned by WFP within its Tree Farm Licence (TFL 6 Block 2). WFP will log the property in phases throughout the lifetime of the gravel mine operation. Harvesting is regulated by the Ministry of Forests. Tree clearing is required to adhere to Section 34(b) of the Provincial *Wildlife Act*, which requires protection and appropriate buffering of inactive and active nests of bird species protected under that legislation.

The Proponent would depend upon the harvesting of the current forest to conduct its business. The Project therefore would have no potential effects on the current land and resource use of the site intended for the gravel mining.

### **2.2.3 Public Health and Safety**

#### *Description of Potential Effects:*

The issues raised with respect to public health and safety were limited to potential health effects resulting from impacts to air quality and potential public safety issues associated with the operation of the conveyor system.

The environmental assessment under the CEA Act is limited to considering impacts that result from an environmental effect. As the safety concern with respect to the conveyor system was not related to an environmental effect, it was deemed outside of the scope of assessment for the CEA Act review. As the provincial environmental assessment legislation has no such restriction, the issue was addressed during the course of the harmonized review (refer to Commitment 16.2 in Appendix C).

Refer to section 2.1.8 for the discussion on Air Quality.

### **2.2.4 Navigation**

#### *Description of Potential Effects:*

The design and location of the ship docking and loading facility may have a possible effect on navigation and traffic in Broughton Strait.

#### *Description of Proposed Mitigation:*

The Proponent located the ship docking and loading facility as close as possible to the shoreline, to avoid interference with navigation while maintaining required depths for docking. It is well outside the main navigational lane and should present no significant interference to navigation.

The Proponent would adhere to conditions established by Transport Canada for approval of the ship loading facility under the *Navigable Waters Protection Act*. The Approval provided by Transport Canada would also outline the provision of lighting for increased navigational safety.

#### *Conclusion:*

During the environmental assessment, the responsible authorities have considered: the Application; additional Project review material listed in Appendix A; public, First Nations, and government agency comments on the potential effects of the Project, responses by the Proponent; and the discussions of the Working Group.

Based on this information and provided that the Proponent implements the actions described in the summary of commitments listed in Appendix C - Table of Commitments, the responsible authorities are satisfied that the Project is not likely to cause significant adverse effects to navigation.

### ***2.2.5 Archaeological, Heritage and Historical Cultural Resources***

#### *Description of Potential Effects:*

Following traditional use and heritage overview studies, an archaeological investigation was completed on the Project footprint and key areas beside the Cluxewe River and marine shoreline. The traditional use and heritage overview studies, an archaeological investigation, including elder interviews, did not indicate any burial grounds on or near the Project site. Despite this indication, the Proponent is still aware that the Project may have a potential to impact unknown archaeological sites, including burial grounds.

#### *Description of Proposed Mitigation:*

The Proponent has committed to having an archaeologist on site during earth moving at two small areas identified as having moderate potential (area adjacent to the beach and area 250m from the beach). The archaeologist will look for any archaeological materials and follow protocol (including halting work and contacting First Nations) if any artefacts or human remains are encountered.

The Proponent will also comply with all Provincial requirements, including contacting the Archaeology Branch, Ministry of Sustainable Resource Management in the event of an archaeological site being disturbed, and to provide an archaeologist to oversee activities in and near the site.

#### *Conclusion:*

During the environmental assessment, the responsible authorities have considered: the Application; additional Project review material listed in Appendix A; public, First Nations, and government agency comments on the potential effects of the Project, responses by the Proponent; and the discussions of the Working Group.

Based on this information and provided that the Proponent implements the actions described in the summary of commitments listed in Appendix C - Table of Commitments, the responsible authorities are satisfied that the Project is not likely to cause any significant adverse effects to archaeological, heritage and historical cultural resources.

### **3. Cumulative Environmental Effects Assessment**

#### **3.1 Introduction**

Section 16(1) of the CEA Act, requires any screening or comprehensive study to include consideration of “any cumulative environmental effects that are likely to result from the project in combination with other projects or activities that have been or will be carried out”. Cumulative environmental effects are changes to the biophysical environment or socio-economic setting (only from a biophysical change) caused by an activity in association with other, past, present and future human activities. A cumulative effects assessment is done to ensure the incremental effects resulting from the combined influences of various actions are considered. These combined effects may be significant even though the effects of each action, when individually assessed, are considered insignificant.

#### **3.2 Methodology**

The Proponent focussed its cumulative effects assessment on the Valued Ecosystem Components (VECs) and Valued Socio-Economic Components (VSCs) selected for the environmental assessment. VECs and VSCs are basically the features of the regional environmental and socio-economic setting that were deemed to have ecological, social and economic value and that would be potentially affected by the Project. VECs focus on the ecological attributes of the biophysical environment, while VSCs are cultural, social, economic or health attributes which, if affected by the Project, would be a concern to local human populations and/or government regulators. As per CEA Act requirements, only those VSCs that would be affected as a result of a biophysical change from the Project were carried through to the cumulative effects assessment.

As described in Part B - Section 2 of this report, no significant adverse environmental effects were identified with individual VECs/VSCs. However, there was the potential for minor or “residual” effects, when combined with those of other existing or planned projects, to result in significant effects. Thus, this cumulative effects assessment was undertaken for those VECs/VSCs where residual effects were expected.

Temporal boundaries were set as those from start of construction to end of closure activities for the Project. Spatial boundaries for the cumulative effects assessment were set specifically for each VEC or VSC, based on “regional” pressures on the specific VEC/VSC and consultation with public, agencies and First Nations.

Other activities where effects occur on the VECs or VSCs within the temporal and spatial boundaries were outlined and effects noted. The cumulative effects were then discussed and their significance determined.

The residual effects discussed in the sections above were summarized and are found in Table 3.1.



Under a cumulative effects assessment, the effects from other existing, certain or reasonably foreseeable projects and activities on receptors (VECs and VSCs in this case) where residual effects are expected from the Project are considered.

The temporal scope of this cumulative effects assessment was from construction to closure. The geographic scope of the assessment varied by component as noted in Table 3.2.

Certain future projects are those approved, currently under regulatory review for approval, submission for review is imminent, or intent to proceed announced by a proponent to regulatory agencies. Reasonably foreseeable future projects are those directly associated with a project under review but conditional on project approval, identified in a development plan where approval is imminent, or not directly associated with a project under review but may proceed if that project is approved (induced).

Based on discussions with Western Forest Products and the Regional District of Mount Waddington, no certain or reasonably foreseeable future projects were identified when developing the cumulative effects assessment and were therefore not included.

**Table 3.1 Project Residual Effects**

ENVIRONMENTAL/ SOCIAL COMPONENT	VEC/VSC	PREDICTED RESIDUAL ADVERSE EFFECT
Atmospheric environment	Air quality	Some emissions from activity during project life outlined for operations.
	Noise	Some noise from activity during project life – projected from operations at ship-loader as 1.48 km before attenuation to background.
Hydrogeology	Groundwater flow	No residual effect - no measurable change in groundwater flow at edge of project boundary.
Fresh water environment	Salmonids in the Cluxewe River	No residual effect – as a result of no changes expected in hydrology, water quality and physical habitat.
Vegetation	RC ecosystem (Western red cedar/Sitka spruce-skunk cabbage)	0.14 ha lost/disturbed due to conveyor.
Wildlife	Harlequin Duck	Potential disturbance at shoreline from construction and ship loading.
	Black Bear (including habitat)	Minimal changes to passage – conveyor will allow passage under at beach, open forest beside beach, bench 250 m from beach and transmission lines as well as Hwy. 19 and Rupert Main. Gravel roadway along conveyor will provide a further migration route. Minimal loss of vegetation in areas frequented by bears. – Bears are most prevalent along the beach and 75 m wide adjacent forest, the old road parallel to the beach, the transmission lines and possible the Cluxewe River in the project footprint and vicinity. There will be a 10 m wide band of vegetation clearing along the conveyor route, affecting only the open SK ecosystem that allows bears to easily pass through at the beach. Clearing at the processing plant and pit area will be minimized to approximately 30 ha at one time.
Marine foreshore	Marine intertidal and subtidal habitat including eelgrass and kelp beds	No residual effect – habitat compensation plan to be prepared with DFO; habitat created on structure.
Marine communities	Salmon juveniles and adults	Potential sensory disturbance from construction, loading and ship movement.
	Marine mammals	Some sound generated from loading and ship movement and presence of ships which cause sensory disturbance.
Socio-economics	Employment and expenditures	No effect from biophysical change plus no adverse residual effect.
	Marine transportation	No effect from biophysical change.
	Visual Impact	Change in topography over time.
	Commercial fisheries	No effect from biophysical change plus no residual effect – no commercial fishing in ship loading or vessel transportation route.
Cultural and heritage resources	Traditional Use	No residual effect. Edible seaweed – No residual effect – No seaweed species of importance in path of conveyor.

### **3.3 Discussion**

The Proponent provided a summary of the results of the cumulative effects assessment (see Table 3.2). It outlines the VECs/VSCs with anticipated residual adverse effects and describes the potential additional effects to those VECs/VSCs from previous and existing activities in the study area.

**Table 3.2 Potential Effects of Past or Existing Activities within the Geographic Scope of the Assessment**

VEC/VSC WITH RESIDUAL EFFECTS	GEOGRAPHIC SCOPE OF ASSESSMENT	OTHER EXISTING PROJECTS IN GEOGRAPHIC SCOPE	POTENTIAL EFFECTS OF OTHER PROJECTS ON VEC/VSC
Air quality	“Project environmental study area” including Broughton Strait, the lower Cluxewe watershed to the West Main Bridge and the Mills Creek watershed. Town of Port McNeill is excluded.	Highway 19	<ul style="list-style-type: none"> <li>• Emissions from vehicles.</li> </ul>
		Rupert Main and West Main logging roads	<ul style="list-style-type: none"> <li>• Emissions from vehicles.</li> <li>• Dust from vehicle travel on gravel roads on dry days</li> </ul>
		OK Pit	<ul style="list-style-type: none"> <li>• Dust from aggregate extraction</li> <li>• Emissions from machinery incl. asphalt plant</li> </ul>
		Weyerhaeuser dryland sort	<ul style="list-style-type: none"> <li>• Emissions from vehicles</li> </ul>
		Other gravel pits and rock quarry nearby	<ul style="list-style-type: none"> <li>• Dust from aggregate extraction</li> <li>• Emissions from machinery</li> </ul>
		Shipping	<ul style="list-style-type: none"> <li>• Emissions from ships</li> </ul>
Noise (in air) and associated disturbance to humans and wildlife	“Project environmental study area” including Broughton Strait, the lower Cluxewe watershed to the West Main Bridge and the Mills Creek watershed. Town of Port McNeill is excluded.	Highway 19	<ul style="list-style-type: none"> <li>• Vehicle noise</li> </ul>
		Rupert Main and West Main logging roads	<ul style="list-style-type: none"> <li>• Vehicle noise</li> </ul>
		OK Pit	<ul style="list-style-type: none"> <li>• Vehicle and machinery noise</li> </ul>
		Weyerhaeuser dryland sort	<ul style="list-style-type: none"> <li>• Vehicle and machinery noise</li> </ul>
		Other gravel pits and rock quarry nearby	<ul style="list-style-type: none"> <li>• Vehicle and machinery noise</li> </ul>
		Shipping	<ul style="list-style-type: none"> <li>• Noise from ship engines.</li> </ul>
RC ecosystem	TEM study area on WFP land – Cluxewe to shoreline to edge of TFL 6	Highway 19	<ul style="list-style-type: none"> <li>• No known impact.</li> </ul>
		Rupert Main and West Main logging roads	<ul style="list-style-type: none"> <li>• No known impact.</li> </ul>
		Logging	<ul style="list-style-type: none"> <li>• Potential disturbance to RC ecosystems in past but possible creation of RC ecosystem near shore from construction of road changing water flows.</li> </ul>
Harlequin Duck	Shoreline area from west of Cluxewe estuary to east of Port McNeill	Cluxewe Campground	<ul style="list-style-type: none"> <li>• Change in habitat from development of campground</li> <li>• Presence of humans and associated sensory disturbance.</li> </ul>
		Town of Port McNeill (including log boom area, docks, residences and sewage effluent)	<ul style="list-style-type: none"> <li>• Change in shoreline habitat from development</li> <li>• Presence of humans and associated sensory disturbance from boats, planes and shoreline activity</li> </ul>

VEC/VSC WITH RESIDUAL EFFECTS	GEOGRAPHIC SCOPE OF ASSESSMENT	OTHER EXISTING PROJECTS IN GEOGRAPHIC SCOPE	POTENTIAL EFFECTS OF OTHER PROJECTS ON VEC/VSC
Black Bear	Cluxewe Watershed and foreshore (Cluxewe estuary to Lady Ellen Point)	Highway 19	<ul style="list-style-type: none"> <li>• Potential loss of habitat, potential creation of edge habitat for food</li> <li>• Sensory disturbance from noise and vehicle travel</li> <li>• Potential for injury or death from vehicle impact</li> <li>• Creation of access corridor</li> </ul>
		Rupert Main and West Main logging roads	<ul style="list-style-type: none"> <li>• Potential loss of habitat, potential creation of edge habitat for food</li> <li>• Sensory disturbance from noise and vehicle travel</li> <li>• Potential for injury or death from vehicle impact</li> <li>• Creation of access corridor</li> </ul>
		OK Pit and other gravel pits	<ul style="list-style-type: none"> <li>• Loss of habitat</li> <li>• Sensory disturbance</li> </ul>
		Cluxewe Campground	<ul style="list-style-type: none"> <li>• Disturbance from human activity including additional food sources</li> </ul>
		Logging and additional roads in the Cluxewe Watershed	<ul style="list-style-type: none"> <li>• Loss and fragmentation of forest habitat</li> <li>• Sensory disturbance</li> <li>• Potential for injury or death from vehicle impact</li> <li>• Creation of access corridor</li> </ul>
Marine salmon - juveniles and adults	Broughton Strait	Cluxewe Campground	<ul style="list-style-type: none"> <li>• Fishing pressure</li> </ul>
		Shipping in Broughton Strait	<ul style="list-style-type: none"> <li>• Potential sensory disturbance</li> </ul>
		Fin fish and shellfish harvesting in Broughton Strait	<ul style="list-style-type: none"> <li>• fishing pressure</li> </ul>
		Town of Port McNeill (including log boom area, docks, boats, residences and any effluent/runoff)	<ul style="list-style-type: none"> <li>• Loss of habitat and water quality impacts</li> <li>• Potential sensory disturbance</li> </ul>
		Hyde Creek	<ul style="list-style-type: none"> <li>• No notable impacts</li> </ul>
		Haddington Island quarry	<ul style="list-style-type: none"> <li>• Change in habitat with rock in water but now heavily used by some fish (Lingcod)</li> <li>• Sensory disturbance</li> </ul>
		Town of Sointula	<ul style="list-style-type: none"> <li>• Loss of habitat and water quality impacts</li> <li>• Potential sensory disturbance</li> </ul>

VEC/VSC WITH RESIDUAL EFFECTS	GEOGRAPHIC SCOPE OF ASSESSMENT	OTHER EXISTING PROJECTS IN GEOGRAPHIC SCOPE	POTENTIAL EFFECTS OF OTHER PROJECTS ON VEC/VSC
Marine mammals	Broughton Strait	Cluxewe Campground	<ul style="list-style-type: none"> <li>• Little disturbance likely</li> </ul>
		Shipping in Broughton Strait	<ul style="list-style-type: none"> <li>• Sensory disturbance</li> </ul>
		Fin fish harvesting in Broughton Strait	<ul style="list-style-type: none"> <li>• Loss of food for some species and food chain effect for others</li> </ul>
		Town of Port McNeill	<ul style="list-style-type: none"> <li>• Minimal sensory disturbances other than boats</li> </ul>
		Hyde Creek	<ul style="list-style-type: none"> <li>• No disturbance likely</li> </ul>
		Sointula	<ul style="list-style-type: none"> <li>• Minimal sensory disturbances other than boats</li> </ul>
Visual Impact	View from a ship traveling through Broughton Strait	Cluxewe Campground	<ul style="list-style-type: none"> <li>• Some cabins and campsites visible when passing</li> </ul>
		Town of Port McNeill	<ul style="list-style-type: none"> <li>• Much of town including homes, roads, commercial development, industry, marina and lights visible from east of Ledge Point</li> </ul>
		Hyde Creek	<ul style="list-style-type: none"> <li>• Homes, roads and lights visible when passing</li> </ul>
		Sointula (and Pulteney Point Lighthouse)	<ul style="list-style-type: none"> <li>• Homes, roads and lights visible from much of Strait</li> </ul>
		Logging on Vancouver Island, Malcolm Island and Haddington Island	<ul style="list-style-type: none"> <li>• Minimal based on visual quality objectives from viewpoints on Broughton Strait</li> </ul>

Air Quality

Public use of the area surrounding the Project involves vehicle traffic along the highways, the Cluxewe River and adjacent forested areas. The Cluxewe River upstream of the Highway 19 bridge was chosen as the worst case scenario for potential air quality impacts as it was commonly used by the public for fishing, it likely was already subject to dusty conditions due to its proximity to the Rupert Main bridge, and it was located near the intersection of the Project model boundary and Highway 19.

The air quality concentrations based on the cumulative effects of the baseline conditions and Project emissions is summarized in Table 3.3. Due to the conservative assumptions made in the baseline and project modeled emission calculations, the cumulative air quality effects area was considered to be conservative and the upper ranges should be viewed as absolute maximums (very dry and windy days at a time a logging truck has passed and all dust is blown up the river). It is important to note that the PM<sub>10</sub> calculations did not consider watering for dust suppression on the site. As part of the Project operations, watering would take place to ensure PM<sub>10</sub> emissions are at the low end of the range during dry and windy conditions.

**Table 3.3 Summary of Cumulative Air Quality Effects**

PARAMETER	AVERAGING TIME	CANADIAN ENVIRONMENTAL GUIDELINES (µg/m <sup>3</sup> )	RESULTS OF AIR QUALITY MODELING		
			BASELINE EMISSION (µg/m <sup>3</sup> )	PROJECT EMISSION (µg/m <sup>3</sup> )	CUMULATIVE AIR QUALITY CONCENTRATION (µg/m <sup>3</sup> )
PM <sub>10</sub>	24 hr	25	0.1 – 16.0	0.03 – 8.4	0.03 - 24.4
SO <sub>x</sub>	Annual Desirable	30	0.0 – 0.4	0.01 – 1.4	0.01 - 1.8
	Annual Acceptable	60			
NO <sub>x</sub>	Annual Desirable	60	0.0 – 5.9	0.07 – 19.3	0.07 - 25.2
	Annual Acceptable	100			
CO	24 hr Desirable	6000	0.0 – 4.1	0.03 – 8.8	0.03 - 12.9
	24 hr Acceptable	15,000			

The Proponent noted that currently approximately 2,000 large vessels (freighters, cruise ships, fishing boats over 24 m, yachts over 30 m and tugs) travel past Pulteney Point annually. There were 23 cross-channel trips (12 round-trips) made by the Port McNeill ferry each day, or 4,380 return trips per year, the greatest traffic from a large vessel in Broughton Strait. In addition, a number of smaller craft (charter, private, whale watching, Coast Guard) travel the channel daily, with most traffic in the summer months. At maximum production, the Project would add two ships per week (104 per year) to traffic in the Broughton Strait.

Based on this, Project-related shipping would involve a maximum 1.6% increase in large vessel and ferry traffic in Broughton Strait. This led the Proponent to conclude that air quality impacts from large ship emissions in Broughton Strait are expected to increase by approximately 1.6% above current levels. Although air quality data was not available for Broughton Strait, given the low ship and road traffic and wind patterns, air quality in the Strait was not deemed to be a concern.

Based on the above factors, the Proponent concluded that the significance of cumulative air quality effects on land and in Broughton Strait would be low.

### Noise

In the marine environment, noise from the Project operation will result from ship loading and movement. Based on the 1.6% increase in shipping traffic in Broughton Strait noted in the air quality section above, noise levels from ship movement would increase by approximately 1.6% above current levels within the Strait. Noise from shipping varies depending on location as ferry traffic occurs in southern Broughton Strait only and ship noise can only be heard above background noise (waves, wind, anthropogenic noise) within a varying proximity of the ships.

The Project land operations would generate noise from the mobile equipment working in the pit (scrapers, loaders, conveyors), from the crushing and screening operation and from product reclaim for ship loading. These activities would be located behind forest buffer strips, 150 – 350m wide along the Cluxewe river and 50m wide along Highway 19. It is expected that the operation would be audible from both the river and Highway 19, however the noise levels would not be expected to be heard above passing highway traffic for a pedestrian and would not be heard from within a vehicle. Anyone on the Cluxewe River may hear Project operations above the sound of the river at times, but it would be difficult to detect given the land and tree buffer. Any active operations at the existing OK Pit would likely be heard over the Project noise. It is unlikely that the Project noise will be additive to any existing activities on land.

Based on the above, the Proponent concluded that the significance of cumulative noise effects would be low.

### RC Ecosystem

The Proponent stated that within the 158 ha study area of the TEM mapping, for which detailed habitat types are available, an estimated 0.14 ha of the total 57 ha of RC (western red cedar/Sitka spruce – skunk cabbage) ecosystem will be disturbed. Measures would be in place to prevent impacts to the adjacent RC habitat (flows allowed to pass under conveyor and gravel road via frequently placed culverts) and the conveyor and road would be removed during closure/final reclamation.

The Proponent noted that the current WFP biodiversity plan included management strategies for ecologically sensitive areas (including the RC ecosystem) and species at



risk. This would minimize the potential for loss of the RC ecosystem. However, the area that includes the RC ecosystem within and adjacent to the Project would not likely be logged for 50 to 60 more years, outside of the temporal scope of this assessment.

The loss to the RC ecosystem as a result of the Project is a small area (0.14 ha), 0.25% of the immediate RC ecosystem. The Proponent concluded that the significance of the cumulative effect of this loss to the total habitat area would be low.

#### Harlequin Duck

The Proponent stated that, with respect to Harlequin Ducks, there would be a very small amount of shoreline habitat impacted by the conveyor pilings (approximately 25 m<sup>2</sup>) over a 10 m shore length, although they could also be disturbed from noise and movement during construction, operation and decommissioning of the Project. Habitat disturbance and sensory disturbance from human presence at the Cluxewe campground, on the Cluxewe estuary could also have impacts on Harlequin Ducks. Development and activities along the Port McNeill waterfront also could have habitat and sensory disturbance impacts.

The Proponent noted that Harlequin Ducks are one of the most frequently observed waterbird species along the Cluxewe to McNeill Bay shoreline, foraging in the shallow waters. The Project would have minimal habitat impacts over the 10 m shore length. Shoreline modifications have occurred at the Cluxewe Resort and at the Town of Port McNeill. These two developments may have resulted in a disturbance of approximately 600 m of the shoreline area from the west side of the Cluxewe River to the east side of the Town of Port McNeill (approximately 14 km), a 4.3% disturbance in shoreline area. The 10 m length of habitat disturbance from the Project would only be a 0.007% disturbance over this 14 km shoreline.

Disturbance from shore and near-shore human activity is currently limited to foot traffic, pets and land vehicles at the campground, and foot traffic, pets, boats, float planes and nearby vehicles at Port McNeill over this 14 km shoreline. Sensory disturbances during construction would be temporary. Loading activities would occur over a maximum of 48 hours per week at the Project ship loader. Harlequin Ducks are known to become habituated to human-related activity.

Due to the small areas of impact over the 14 km shoreline area, and the non-continuous nature of sensory disturbance at the Project ship loader, the Proponent concluded that the significance of cumulative effects on Harlequin Ducks would be low.

#### Black Bear

The Proponent noted that although the Project would result in some vegetation loss, there would be minimal loss of vegetation in areas frequented by bears. The areas where bears are most prevalent in and adjacent to the Project footprint include: the beach, the 75 m wide adjacent forest, the old road parallel to the beach, the transmission line corridor and

possibly the Cluxewe River. There would be a 10 m wide band of vegetation clearing along the conveyor route, affecting only the open SK ecosystem that allows bears to easily pass through at the beach. The best habitat for bears – the beach and the Cluxewe River riparian area outside of the Project area, would not be impacted by the Project.

Clearing at the processing plant and pit area would be minimized to approximately 30 ha at one time. The progressive pit clearing would form part of the WFP forestry plan each year that logging would take place, and would consider cumulative vegetation and wildlife impacts over the TFL. Based on this, the Proponent concluded that the cumulative effects to bear habitat would be not be significant.

The Proponent also stated that only minimal adverse effects on bear movements would be expected from the Project. The conveyor would be constructed to allow passage at several locations: the beach, a 10 m wide area in the open forest beside the beach, a bench 250 m from beach, and under the transmission lines. With the exception of the bench, which may not be accessed currently due to dense salal, the other three areas are currently frequented by bears. Although not ideal, passage would also be allowed at Highway 19 and Rupert Main, where the conveyor would go under the roads. The gravel roadway along conveyor would provide a further migration route. This line was cut in spring of 2004 and was subsequently frequented by bears.

The Proponent also noted that bears could be disturbed by activities such as vehicle and conveyor movement, pit extraction and plant operations. During construction and operation, the pit, processing plant and conveyor would likely be avoided by bears when operating but would allow bear access and passage at non-active times. In addition, vehicle movement would pose a risk of injury and death from collisions. To address this, vehicles would be minimized at the site and the portions of the conveyors that are dangerous for humans or wildlife would be surrounded by high fencing.

Existing roads, such as Highway 19, Rupert and West Main, and other logging roads would also affect bear passage in the Cluxewe Watershed (area for cumulative assessment on bears). These roads create access corridors, often with food enjoyed by bears growing along the sides, but could result in sensory disturbance and can be dangerous due to the potential for collisions.

The Cluxewe Campground and OK Pit are areas with human presence that could cause sensory disturbance in bears.

The Proponent determined that there are a number of existing activities that affect the movement of bears and can cause sensory disturbance in the Cluxewe Watershed and foreshore area of the WFP TFL 6, but the effects of the Project would be minor and reversible. Although the Project effects were considered minor, given the existing moderate disturbance to black bears in the cumulative effects study area, the Proponent concluded that the significance of the cumulative effects on bears would be moderate.

### Marine Salmon Juveniles and Adults

As per the requirements of the *Fisheries Act*, with habitat compensation undertaken, the Project would not result in any net loss of fish habitat for salmon. Sensory disturbance may occur during construction and ship loading activities but the expected noise levels would not be in the range to cause impacts on fish health. Fish could move away from an area if disturbances were not acceptable. As well, ship loading would not be located in the kelp bed, an area where juveniles are known to travel.

Additional pressures on salmon within Broughton Strait include: recreational and Native food fishing, shoreline impacts at the Town of Port McNeill, the Haddington Island quarry and Sointula, effluent from the Port McNeill sewage treatment plant and sensory disturbances from movement of various sized ships.

Given the small area of shoreline habitat disturbance in Broughton Strait, minimal water quality impacts, minimal fishing pressure compared to other areas (no commercial fishing in the Strait) and the ability for fish to move away from sensory disturbance such as ship movement, the Proponent concluded that the significance of cumulative effects on marine salmon juveniles and adults would be low.

### Marine Mammals

Ship movements and associated noise during construction and operation of the Project could result in sensory disturbance to marine mammals. However, as previously discussed, ship movements would be slow and measures would be in place to minimize underwater noise.

Other activities in Broughton Strait that could affect marine mammals include fish and shellfish harvesting (removing food) and shipping and shore activities in Port McNeill and Sointula (creating noise). Marine mammals such as harbour seals, sea lions and white-sided dolphins are not often disturbed by human activity and are often attracted to it. With the exception of harbour seals and sea lions, marine mammals within Broughton Strait would generally stay away from shallower areas, such as the vicinity of the ship loader and the harbours of Sointula and Port McNeill. Therefore, the potential effects would be predominantly restricted to sensory disturbance to marine mammals in the open channel from ship movement and shoreline activity.

The estimated 1.6% increase in large vessel traffic within Broughton Strait resulting from the Project could result in a corresponding increase in marine mammal disturbances. However, it is difficult to accurately state the potential impacts on marine mammals, such as Orcas, from increased shipping.

Based on this, the Proponent concluded that the significance of cumulative impacts on marine mammals would be low.

### Visual Impacts

As viewed from specific points in Broughton Strait, changes in topography from the Project over time would be visible from some locations. An extraction area would be visible from some viewpoints. The ship loading facility, and when present, the ship, would be visible from some viewpoints, north and west of the facility during daylight hours. At night, minimal lights for loading would be seen from these viewpoints. When a ship is not berthed, lights would be minimized to navigation lights.

Currently, as a ship travels through Broughton Strait, some blocks of younger trees are visible along Vancouver Island, Malcolm Island and Haddington Island. WFP manages forestry activities based on a landscape inventory analysis. As well, the Ministry of Forests can declare scenic areas. Within the spatial boundaries of this cumulative effects assessment, areas are given landscape sensitivity ratings and a visual quality objective based on viewpoints from near the centre of Broughton Strait. Each visual quality objective includes a strategy varying from complete modification (including roads, tree removal and structures) to preservation. Therefore, visual impacts from forestry activities along Broughton Strait are kept to a minimum.

Sointula is visible during the day and night from most locations west and south of the town. The Cluxewe Campground is only likely visible from the west end of the Strait. Port McNeill and Hyde Creek are visible from many points east of Ledge Point. Buildings, roads and marinas (at Sointula and Port McNeill) are seen during the day and lighting is seen at night. The Pulteney Point Lighthouse is visible for navigational purposes.

The regional zoning and North Island Straits Coastal Plan allow for a docking facility in the area of the proposed ship loader. This planning went through public consultation, which considered cumulative impacts of changes to the view from Broughton Strait.

Based on the above factors, the Proponent concluded that the significance of the cumulative effects to visual resources would be low.

### **3.4 Conclusion**

During the environmental assessment, the responsible authorities have considered: the Application; additional Project review material listed in Appendix A; public, First Nations, and government agency comments on the potential effects of the Project, responses by the Proponent; and the discussions of the Working Group.

Based on this information and provided that the Proponent implements the actions described in the summary of commitments listed in Appendix C - Table of Commitments, the responsible authorities are satisfied that the Project is not likely to result in any significant cumulative effects.

#### **4. Effects of the Environment on the Project**

The Proponent has considered various environmental conditions or events that may have the potential of occurring in the Project area and therefore have the potential to affect the Project. The Proponent considered the following:

- Cluxewe River bank erosion;
- High winds;
- High precipitation;
- Lightning;
- High waves;
- Seismic events; and
- Climate change.

##### **4.1 Cluxewe River Bank Erosion**

The Project is designed so that the pit would be 150 to 350 m from the current high water mark of the Cluxewe River, whereas the processing plant would be approximately 500 m away. In addition, the Kwakiutl First Nation has initiated a Fisheries-Based Watershed Sustainability Plan, which will include selecting high priority areas for habitat enhancement.

The Proponent is also committed to frequent monitoring of the river banks and bank stability. It is highly unlikely that the bank will erode close enough to the Project boundary to affect the Project.

##### **4.2 High Winds**

As trees are cut throughout the life of the project, windthrow potential would be assessed, including for catastrophic winds. Forest edges would be managed to reduce windthrow, including removing trees in narrow strips of high risk areas, and thinning and cutting trees along other edges. If trees do come down on the active site, they would be removed. Equipment can be easily repaired. Pilots would not bring vessels to, or away from, the dock in adverse wind conditions and a fully loaded vessel carrying 70,000 tonnes of aggregates would not be unduly susceptible to wind forces.

##### **4.3 High Precipitation**

The pit and processing area contours were designed so that any surface water would flow towards the sediment control ponds and/or active extraction area during extreme events, preventing flooding of the processing area and runoff from the site.

##### **4.4 High Waves**

Safe operation of a ship is the ship master's and ship owner's responsibility. All vessels arriving or departing would be under the control of a BC Coast Pilot (a mandatory requirement), and be assisted by two tugs. The BC Coast Pilots have advised that in poor weather conditions (e.g. strong north-westerly winds), they would not pass beyond Hardy Bay, where a safe anchorage is available. They would wait there for suitable safe weather before proceeding. The risk of a grounding was considered extremely small.

Tugs at present would have to come from Campbell River or Vancouver, however, the Proponent is working with interested parties to have at least one tug stationed close to the project and hopefully two. The Proponent has committed to developing and implementing an environmental contingency plan that would include this issue.

#### **4.5 Seismic Events**

The ship loader was designed according to the BC Building Code under which Port McNeill is presently in the highest category for seismic design standards. Tidal waves are not considered to be a significant risk because the shape and depth of the Broughton Strait reduces the potential for large waves in this area and the loader sits well above the water, even at high tide, and is a relatively open structure through which the waters can pass.

#### **4.6 Conclusions**

During the environmental assessment, the responsible authorities have considered: the Application; additional Project review material listed in Appendix A; public, First Nations, and government agency comments on the potential effects of the Project, responses by the Proponent; and the discussions of the Working Group.

Based on this information and provided that the Proponent implements the actions described in the summary of commitments listed in Appendix C - Table of Commitments, the responsible authorities are satisfied that the environment is not likely to cause significant adverse effects to the project.

### **5. Environmental Effects of Accidents and Malfunctions**

As per section 16(1) of the CEA Act, the environmental effects of malfunctions or accidents that may occur in connection with the Project were considered as part of the environmental assessment. Accidents or malfunctions could result from human activities undertaken either during the one year construction phase or the following operating phase of approximately 30 years. The Proponent considered the environmental effects of the following potential accidents and malfunctions:

- spills of hydrocarbons (diesel fuel, light or medium oils, hydraulic fluids or lubricants);
- accidental forest fires;
- spills of liquid concrete during construction of the ship loading facility;
- discharge of sediments during construction of the ship loading facility;
- discharges from ships; and
- ships going aground during arrival at, or departure from, the berth.

### **5.1 Hydrocarbon spills**

The operation of a mobile plant during the construction or operation phases could result in accidents, malfunctions or other incidents. These would most likely occur during the storage and transfer of fuels that could result in accidental spills of hydrocarbons (e.g. diesel fuel, light or medium oils, hydraulic fluid or lubricants). Spills of these hydrocarbons could potentially impact soils, vegetation, aquatic life or wildlife.

The Project assessment considered the terrestrial environment and the marine environment separately in this context.

#### Terrestrial Environment

The Project was designed specifically to ensure that no operations would take place within the Cluxewe River channel or the 150 – 350m wide forested buffer zone presenting a high barrier between the Project operations and the river. There are no streams draining the Project area. The potential environmental effects of terrestrial hydrocarbon spills would most likely be limited to localized, short-term and reversible contamination of surface vegetation, soils and the underlying sand and gravel strata dependent on the size of the spill. The Proponent has committed to develop a Spill Contingency Plan to address this potentiality.

The Project site would be favourable for limiting any such spill to a localized area from which the soils and other strata could be quickly removed for remediation. Spill kits would be on site at high risk locations during construction and operation.

The risk of spills would also be minimized through the Proponent's proposed Best Management Practices including:

- diesel fuel will be stored and dispensed from truck equipped with a double walled storage tank meeting applicable Federal and Provincial requirements;
- all mobile equipment will be inspected for leaks on a regular basis and maintained in good working order; and
- mobile equipment will be refuelled, lubricated and serviced at designated and approved locations.

#### Marine Environment

The ship loader and equipment would contain only small quantities of hydrocarbons, unlikely to exceed 500 litres in total. Only hydraulic fluid and medium oils (for gearboxes) would be used. The hydraulic fluid storage would be located within an equipment room and provided with secondary containment of at least 110% of the tank's capacity. Gearboxes would be provided with catchment trays as would bearings where regular greasing occurs.

The limited quantities involved, and infrequent oil changes, mean that the potential for a spill into the marine environment would be very low. A spill in this area would be, however, very difficult to contain and recover. The Spill Contingency Plan would outline

appropriate responses. During construction, spill kits would be on the barges and service boats.

In summary, the design and topographic features associated with this Project make it unlikely that significant spills of hydrocarbons into either the terrestrial or marine aquatic environments would occur. Consequently, the Proponent considered it equally unlikely that any potentially significant residual environmental effects to soils, vegetation, aquatic life or wildlife would occur within the Project area.

## **5.2 Accidental Forest Fires**

The Proponent cited Ministry of Forests information which indicated that approximately 48% of wildfires in British Columbia were caused by human activity, but also noted that the Project area had never suffered a significant fire. The high level of rainfall and relatively low human presence in the area were cited as likely reasons. Forest fires are a naturally occurring phenomenon, but can have negative impacts on wildlife and their habitat.

During construction and operation, all activities taking place would be required to comply with the applicable provisions of the Forest Practices Code of BC and particularly the Forest Fire Prevention and Suppression Regulation. The following aspects of the operation would also mitigate the possibility of fires:

- the sand and gravel would be produced in a wet process plant;
- a large volume of water would be stored on site in the process ponds and available if needed for fire suppression;
- the mobile plant would be equipped with fire extinguishers; and
- the fixed plant would contain little combustible material.

Based on this, the Proponent determined that the risk of the Project causing an accidental fire would be low during all phases of the Project.

## **5.3 Concrete Spills**

The risk of concrete spills at the Project site would be limited to the construction phase, as no concrete would likely be placed once the Project is operational. The quantity of concrete to be placed would be small relative to the capital cost of the Project since much of the plant was designed to be modular steel units requiring minimal concrete foundations.

Uncured liquid concrete is toxic to fish life due to its alkaline nature and therefore it should be prevented from entering the marine environment. This would be achieved by constructing concrete formwork required for the pile caps in a manner that would prevent fresh concrete or cement paste from leaking into the ocean. Chutes or concrete pump delivery lines would have joints and connections sealed and locked and crews would ensure that concrete forms would not be overfilled. Tools would be washed in fresh water that would be disposed in a suitably approved location on land.



The Proponent considered the risk of liquid concrete entering the freshwater aquatic environment to be very low as no work was planned in or near any watercourse. Tools would be washed at an appropriate location so that no wash water enters the aquatic environment.

#### **5.4 Discharge of Sediments to Marine Environment**

The discharge of a large volume of sediments into the marine environment would have the potential for negative effects to marine flora and fauna within a localized area. To address this, the pilings required to carry the ship loader would be placed by drilling, as opposed to pile driving, because the seabed in this location consists of sandstone bedrock which is either exposed or overlain by only a thin layer of sediments. The pile drilling equipment would return the cuttings to the surface where it would be settled-out in tanks on board the barge rig. The settled water would be returned from these settlement tanks to the sea and monitored for compliance with agreed turbidity limits prior to discharge. The cuttings would be disposed of in a local landfill.

The Proponent determined that there would be very little risk of sediments being released to the marine environment with the proposed method of pile placement.

#### **5.5 Discharges from Ships**

A potentially serious environmental problem arises when ballast water containing foreign aquatic species is discharged into coastal waters. An introduced species could become invasive, out-competing native species and negatively impacting the existing ecosystem. Ships transporting aggregates from the Project would be required to existing Transport Canada regulations which require mid-ocean ballast exchange for vessels entering Canadian waters. Other possible discharges, which could include bilge water and sewage, would be forbidden while at berth or within the jurisdiction of the Port McNeill Harbour Authority. No refuelling facilities would be available for vessels at the Project's ship loading facility.

#### **5.6 Grounding of Ships**

The grounding of a large transport vessel could have negative environmental impacts associated with potential fuel leaks or damage to marine habitat. The waters of Broughton Strait where the ship berth would be located are relatively sheltered. All vessels would be under the control of an experienced pilot from Pacific Pilotage during arrival and departure. At these times the vessels would be moving extremely slowly and accompanied by tugboats. These large vessels would represent a very high level of investment to their owners and would be equipped with extensive and modern radar and navigation aids. Given all these factors, the Proponent determined that the risk of a vessel going aground in the Project area would be extremely low.

### **5.7 Risk of accidents and malfunctions during decommissioning.**

The processing plant and equipment would not contain any hazardous materials and should pose no significant risk for accident. Parts of the ship loading equipment could be dropped in the marine waters during removal, with some minor habitat disturbance prior to recovery. Although the risk of decommissioning failure is considered low by the Proponent, it committed to discuss closure and decommissioning with various agencies prior to its occurrence. This way, the most up-to-date practices for addressing possible accidents and malfunctions could be implemented for this phase of work.

### **5.8 Conclusions**

During the environmental assessment, the responsible authorities have considered: the Application; additional Project review material listed in Appendix A; public, First Nations, and government agency comments on the potential effects of the Project, responses by the Proponent; and the discussions of the Working Group.

Based on this information and provided that the Proponent implements the actions described in the summary of commitments listed in Appendix C - Table of Commitments, the responsible authorities are satisfied that potential accidents or malfunctions associated with the Project would not likely result in any significant adverse environmental effects.

## **6. Environmental Monitoring and Follow-up Program**

The CEA Act requires that the need for, and requirements of, a follow-up program be considered during a comprehensive study. A follow-up program is different than compliance monitoring in that, compliance monitoring verifies the proper implementation of mitigation measures, whereas a follow-up program is used to determine the accuracy of environmental assessment conclusions and the efficacy of the required mitigation measures.

The Proponent's proposed environmental monitoring program was intended to collect data and compile information to detect potential Project impacts measured against an established baseline. Triggers for action were outlined so that appropriate action and adaptive management (developing improved techniques while conducting management activities) could be undertaken to reduce or eliminate environmental impacts.

The Proponent committed (see #17.1 in Appendix C) to undertake follow-up monitoring to determine the accuracy of the predicted environmental effects of the Project and efficacy of the proposed mitigation. With both environmental and follow-up monitoring, it is important to clearly define objectives, responsibility, methods, timing, reporting, triggers for action and planned actions.

In addition, some monitoring would take place for project planning purposes. For example, the total depth of excavation would be partially guided by groundwater level data collected during operations.

Table 4 provides a summary of the environmental monitoring, project planning and follow-up monitoring for the Project as proposed in the Application. The program was developed to answer specific questions related to the Project site and to meet the criteria outlined above. The intent would not be to monitor all components of the environment, but to focus efforts on those areas where VECs are expected to be affected from Project activities. The "triggers for action" would be key to a successful adaptive management strategy.

**Table 4 Summary of Proposed Environmental Monitoring and Follow-up Program**

COMPONENT AND PURPOSE	PROJECT PHASE	OBJECTIVES / HYPOTHESIS	MONITORING LOCATION AND PARAMETERS	FREQUENCY	TRIGGERS FOR ACTION / ACTION
Physical					
Groundwater Levels (environmental monitoring, project planning)	Construction	To continue to track groundwater levels within the Project footprint.	Water levels in 8 established wells within Project footprint.	Monthly	Adjust planned pit bottom, if required, to stay above water table.
	Operation	To continue to track groundwater levels within the Project footprint. Hypothesis is that groundwater level will rise with gravel extraction.	Continue to monitor water levels in wells not yet removed from extraction. Water supply well will also be monitored.	Monthly	Adjust planned pit bottom, if required, to stay above water table
Groundwater Quality (environmental monitoring)	Operation	To address potential concerns regarding groundwater quality, such as the introduction of hydrocarbons from fuelling. Predict that groundwater quality will not change during operation.	Details of monitoring including wells to be sampled, parameters, frequency, methods and QA/QC will be determined with regulator input during environmental assessment review.	Annually and as indicated by site activities.	Annually and as indicated by site activities.
Physical Stream Habitat (project planning)	Operation	Monitor movement of Cluxewe Channel over the life-span of project. Build upon interpretation of historical photos completed as part of the Environmental Assessment. Hypothesis is that the channel may move but not enough to be close enough for the extraction to affect river banks.	Evaluate subsequently available air photos for the area. Compare channel movement with previous air photos, with a focus on east bank location and stability between West Main and Highway 19 bridges.	Every 5 years (Frequency will depend on availability of air photos). Annual inspection of river banks adjacent to operating area	Channel movement has the potential to impact bank stability and remove streamside vegetation. Severe changes could cut in closer to the Project footprint. If excessive river movement and erosion noted, a field verification survey will be initiated. In the event that the channel has moved enough that there is a geotechnical risk of the extraction impacting river banks, remedial action such as rip-rap may be required.

COMPONENT AND PURPOSE	PROJECT PHASE	OBJECTIVES / HYPOTHESIS	MONITORING LOCATION AND PARAMETERS	FREQUENCY	TRIGGERS FOR ACTION / ACTION
Terrestrial					
Vegetation (follow-up and environmental monitoring)	Construction	Initial survey to provide baseline for future monitoring activities. Hypothesis is that 0.14 ha of RC habitat will be disturbed.	Measure area of RC habitat disturbance along conveyor and note vegetation type on both sides.	Twice: when skunk cabbage is out (summer) and when forest floor is wettest (winter) during construction	None proposed; initial surveys will provide baseline for future monitoring activities.
	Operation	Ensure no significant changes to blue-listed RC community (Western red cedar/Sitka spruce - skunk cabbage) adjacent to the conveyor. Predicted that adjacent RC habitat will not change.	Note vegetation type on both sides of conveyor through RC habitat to determine any changes.	Twice: summer and winter in first year of operation.	Change in vegetation from the RC habitat type (e.g., loss of skunk cabbage) or lack of surface water flow would trigger improvements to drainage across conveyor and access road.
	Operation	Ensure long-term success of progressive reclamation plan by making changes as required to ensure plant survival, growth, etc. Predicted that reclaimed forest will grow successfully, but some adjustments to plan may be needed to improve growth through Project life.	Monitor success of planted forest (survival, growth, health, spacing) in reclaimed areas. Details to be determined by a Professional Forester.	Annually by a Professional Forester.	Low/reduced survival of planted vegetation will trigger additional enhancement activities. Reduced success would trigger changes to plan such as species planted, use of soil enhancements, etc.
	Operation	Ensure long-term stability of proposed vegetated buffers and confirm predictions of windthrow study. Hypothesis is that with proposed mitigation in place, there is a reduced chance of windthrow but it could still occur.	Monitor health and integrity of the buffer along the Cluxewe River and the Highway 19. Details will be determined by a Professional Forester.	Annually by a Professional Forester.	Excessive blow-down/tree loss will trigger re-analysis of windthrow potential and activities (planting of additional trees, pruning, etc.)

COMPONENT AND PURPOSE	PROJECT PHASE	OBJECTIVES / HYPOTHESIS	MONITORING LOCATION AND PARAMETERS	FREQUENCY	TRIGGERS FOR ACTION / ACTION
	Closure	Ensure long-term success of progressive reclamation plan and the return of Project footprint to active forestry.	Monitor success of planted forest (survival, growth, health, spacing) in reclaimed areas. Details to be determined by a Professional Forester.	Annually for two years following final reclamation by a Professional Forester.	Silviculture activities to promote a harvestable forest, where deemed necessary by Forester.
Bird Nests / Nesting Birds (environmental monitoring)	Construction	Ensure compliance with the Wildlife Act. Predicted that with mitigation, Project will be compliant with the Wildlife Act.	Bird nest survey over any area to be cleared if clearing to be conducted April 1 to July 31.	If required.	No cutting trees with active birds nests or inactive eagle nests; maintain appropriate buffers around active trees.
	Operation	Ensure compliance with the Wildlife Act. Hypothesis is that with mitigation, Project will be compliant with the Wildlife Act.	Bird nest survey over area to be cleared if clearing to be conducted April 1 to July 31.	If required.	No cutting trees with active birds nests or inactive eagle nests; maintain appropriate buffers around active trees.
Marine Environment					
Harlequin Ducks (follow-up monitoring)	Construction	Confirm prediction that Harlequin ducks (and other shorebirds) could move temporarily during marine construction activities.	Count number of Harlequin Ducks present near construction and a control site (near shore and offshore) during active and non-active times. Methods will follow those conducted for the baseline study.	One during activity and one during equipment presence but no activity; timing will depend on construction window.	No specific trigger proposed. Data will provide information on accuracy of impact assessment.
	Operation	Confirm prediction that Harlequin ducks (and other shorebirds) could move temporarily during ship loading activities.	Count number of Harlequin Ducks near construction and control site during loading and non-loading times.	Two times during loading and two times when no ship present – all in spring of first year.	No specific trigger proposed. Data will provide information on accuracy of impact assessment.
Underwater Acoustics (environmental)	Construction	Part of marine construction monitoring program. Ensure that no excessive underwater	Evaluate underwater noise levels during pile drilling at several distances from equipment (e.g.,	During three pile placements (shallow, mid-	Threshold levels at specified distances from equipment to be determined by DFO based on salmon presence.

COMPONENT AND PURPOSE	PROJECT PHASE	OBJECTIVES / HYPOTHESIS	MONITORING LOCATION AND PARAMETERS	FREQUENCY	TRIGGERS FOR ACTION / ACTION
monitoring)		noise is generated during pile drilling activities. Hypothesis is that noise levels from drilling will be lower than pile driving data collected by DFO in BC.	25, 50, 100 and 200 m) and several depths (near bottom, mid-water and near surface).	depth and deep). If thresholds are exceeded, increased frequency as discussed with DFO and Environmental Supervisor.	If levels are exceeded, specified mitigation measures will be followed, such as halting work while salmon are present. Details will be included in Fisheries Act Authorization.
Marine Fish Presence (follow-up and environmental monitoring)	Construction	Part of marine construction monitoring program. Predicted that fish will move away from areas they are not comfortable being in due to noise or machinery movement but that there will be no injured or killed fish.	Visual observations regarding fish presence and behaviour in the vicinity of construction activities. From water surface or with an underwater camera, where possible.	During three noise level measurements.	Presence of salmon within a certain distance from pile placement activity will be used to set noise threshold levels. Work will be halted if there are any fish kills or behaviour indicative of injured fish observed.
	Operation	Address concern regarding the potential for lighting to attract and congregate fish, resulting in increased predation. Predicted that increased fish pooling will not be observed due to lighting.	Observations of fish congregations in and around lighted areas compared to un-lit areas. Also observations of birds or marine mammals in the area to determine if predation is an issue.	Two early ship loadings.	If large congregations of fish are noted, initiate simple mitigation measures that are within safety requirements, such as adjustments of lights over walking path beside conveyor.
Marine Water Quality (environmental monitoring)	Construction	Part of marine construction monitoring program. Predicted that some turbidity and oil sheens will be noted but can be mitigated to be acceptable to DFO.	Turbidity during pile placement; observed oil sheens on water.	As required; determined by Environmental Supervisor based on conditions.	Acceptable turbidity levels at specified distances from equipment and discharge points to be determined by DFO. If acceptable levels are exceeded, specified mitigation measures will be followed, such as halting work temporarily or discharging onto land. Prevention of oil and fuel entering water.

COMPONENT AND PURPOSE	PROJECT PHASE	OBJECTIVES / HYPOTHESIS	MONITORING LOCATION AND PARAMETERS	FREQUENCY	TRIGGERS FOR ACTION / ACTION
Intertidal/ Subtidal Habitat (follow-up)	Operation	Habitat survey of pilings and compensation structures will be completed. Hypothesis is that piles will be colonized by marine life.	Fish habitat compensation to be monitored. Parameters (stability, fish use etc. depend on the type and location of compensation). Colonization and use of underwater ship loading facility structures (piles) to be determined through dive observations as required.	Compensation monitored annually for structural integrity for 5 years. Pilings monitored annually for 2 years.	Instability/degradation of compensation to trigger improvement works.
	Closure	Part of marine demolition monitoring program.	To be determined by DFO if/when loading facility is removed.	As required.	As determined in demolition plan.
Social					
Archaeology	Construction	Moderate potential for archaeology sites along conveyor line adjacent to beach and at a bench 250 m inland.	Archaeologist on site for earth movement adjacent to beach and 250 m from beach to look for archaeological resources.	Once	If potential resources noted during earth movement, work to be halted in area and Archaeologist to determine significance and disposition of material.



During the course of the environmental assessment, the requirements of the environmental monitoring and follow-up program were refined and several new components were added. With respect to groundwater quality monitoring, further specific requirements were developed. These included: groundwater samples would be collected from wells in operational areas and from an up-gradient well as a control for water quality analysis once per year – the proposed parameters would include general chemistry, PAH and metals (see Appendix C - #5.5).

To address concern regarding the potential effects of the Project on marine mammals, specifically orca, several monitoring and follow-up procedures were developed. Although some of the details were left to be developed through the *Fisheries Act* authorization. With respect to noise, independent monitoring of orca presence and behaviour would take place during any construction activities between July and November. Noise levels considered to be of issue for marine mammals would be discussed with DFO and used to set the timing for some marine construction activities. Construction would be stopped under conditions related to orca presence) to be determined and agreed upon with DFO (see Appendix C - #9.7).

The Proponent also committed to document orca sightings from the ship loader on a year round basis during times when people were present on the ship loader during daylight hours. As well, the Proponent was required to pursue mitigation options for orca disturbance during Project construction and operations. This would include any anticipated orca monitoring requirements associated with the implementation of the *Species at Risk Act* (see Appendix C - #9.12 & #9.13).

The Proponent committed to undertake further measures to address potential noise impacts to the neighbouring Cluxewe Resort and the residents of Pulteney Point on Malcolm Island. Specifically, the Proponent would provide for independent baseline noise monitoring to be undertaken at the Cluxewe Resort and Pulteney Point prior to construction. This would be used as a comparison for future noise level studies if warranted. If noise levels from the pit or ship loading operations exceed acceptable levels and other noise mitigation measures are unsuccessful, the Proponent committed to implement further noise mitigation measures, if feasible (see Appendix C - #12.1 & #12.4).

The detailed requirements of all marine construction activities would follow the section 35(2) Fisheries Act authorization required for the Project. Subject to a positive CEAA conclusion, the authorization would confirm the compensatory works that have been negotiated and agreed upon by DFO and the Proponent. The authorization would also outline in detail the necessary post-construction monitoring measures to be completed by the Proponent to ensure that any compensatory works are functioning as designed.

For the constructions phase of the Project, and independent Environmental Supervisor (ES) would oversee environmental components. For works associated with the marine environment, the ES would be empowered to ensure compliance with the terms and conditions of the DFO authorization. The ES would also be empowered to stop work and

direct implementation of any mitigation measures that are deemed necessary. The ES would provide weekly reports to agencies, First Nations and other stakeholders. For the non-marine construction period, where environmental monitoring will be less frequent, reports will be made monthly instead of weekly.

The Proponent would provide a draft construction methodology to DFO for review prior to finalizing the *Fisheries Act* authorization and would include information on types of marine construction, mitigation, proposed timing (based on priorities set by DFO and First Nations) and monitoring and follow-up requirements.

*Conclusion:*

During the environmental assessment, the responsible authorities have considered: the Application; additional Project review material listed in Appendix A; public, First Nations, and government agency comments on the potential effects of the Project, responses by the Proponent; and the discussions of the Working Group.

Based on this information, and provided that the Proponent implements the actions described in the summary of commitments listed in Appendix C - Table of Commitments, the responsible authorities are satisfied that the mitigation, monitoring and follow-up program developed during the environmental assessment, specific components of which will become further developed in the subsequent *Fisheries Act* authorization, will be sufficient to address any potential adverse environmental effects of the Project.

## **Part C – Responsible Authorities Conclusions**

### **1. General**

The conclusions from the review of the Project pursuant to the federal *Canadian Environmental Assessment Act* are based on the following documents and review process:

- the Proponent's Environmental Impact Assessment Application;
- all review material submitted by the Proponent and listed in Appendix A;
- the Proponent's Table of Commitments and Consultation Commitments, as updated and consolidated in Appendix C;
- input from members of the public during the course of the review;
- letters of support for the Project submitted by the Kwakiutl First Nation and the 'Namgis First Nation, acknowledging adequate consultation and accommodation by the Proponent and the Crown; and
- the environmental assessment collectively carried out by the Working Group of federal, provincial and local government agencies and First Nations.

### **2. Monitoring and Follow-up Program**

As part of the mitigation measures summarized in Appendix C, the Proponent has committed to develop an Environmental Management Plan prior to the start of construction that provides a more detailed description of how various environmental impacts will be avoided, managed and mitigated. The Proponent would also undertake monitoring activities to identify environmental impacts that may occur and ensure that the implementation of mitigation measures are having the intended results and adequately mitigating potential impacts.

In addition to the Proponent's commitment's towards environmental management and monitoring, the Proponent would also be required to comply with specific mitigation, monitoring and reporting requirements for pre & post construction operations, habitat compensation operations, as well as those requirements identified for SARA listed species, as determined in the *Fisheries Act* Authorization.

### **3. Overall Conclusion**

On the basis of this comprehensive study, the responsible authorities have determined that the Project is not likely to cause significant adverse environmental effects.

## APPENDIX A

### Review Documentation

August 5, 2004	Summary of Working Group Meeting #1
September 23, 2004	Letter from Marco Romero (Polaris Minerals Corporation) to John Bones (BCEAO) indicating that the Project Proponent has changed from Polaris Minerals Corporation to Orca Sand and Gravel Ltd.
September 24, 2004	Summary of Working Group Meeting #2
January 17, 2005	Application and supporting appendices for Environmental Assessment Certificate from Orca Sand and Gravel Ltd.
January 17, 2005	Letter from Herb Wilson (Orca Sand and Gravel Ltd.) to John Bones (BCEAO) requesting concurrent review of, and providing copies of: <ul style="list-style-type: none"><li>• Application to LWBC for foreshore tenure; and</li><li>• Application to MEM for mine permit.</li></ul>
January 17, 2005	Letter from John Bones (BCEAO) re: Acceptance of revised Application for a Project Approval Certificate for the Orca Sand and Gravel Project, and acceptance of application for concurrent review of MEM permit and LWBC tenure applications.
February 9, 2005	Summary of Working Group Meeting #3
March 22, 2005	Report on Post-Application Consultation on Environmental Assessment Certificate Application. Orca Sand and Gravel Ltd.
March 23, 2005	Letter from Chief Marion Wright (Kwakiutl Band) to John Bones (BCEAO) advising of an Impacts and Benefits Agreement with Orca Sand and Gravel Ltd. The Letter provides support for permits or tenure acquisitions required by Orca, and acknowledges the Band has been adequately consulted and accommodated by Orca and by federal and provincial Crown with respect to the Project.

March 24, 2005	Letter from Chief William Cranmer ('Namgis First Nation) to John Bones (BCEAO) confirming the 'Namgis have been adequately consulted and accommodated by Polaris Minerals Corporation and federal and provincial governments regarding the Orca Sand and Gravel Project.
March 31, 2005	Summary of Working Group Meeting #4

**APPENDIX B**  
**Public Issues Tracking Summary**  
**(From Proponent's Report on Consultation) found at:**

#	DATE	RAISED BY	ISSUE RAISED	OSG RESPONSE	PROPOSED ACTION
<b>TOPIC: PROJECT DESCRIPTION AND ACCIDENTS</b>					
1	9-Feb. 05	Port McNeill open house. Audience question.	What will happen if the conveyor belt breaks down? Is there spillage and what will happen to any spillage?	The conveyor system is computer controlled and monitored and the system will immediately stop if any one belt has a problem. The transfer points from one conveyor to the next have a hopper which will catch the material if the receiving belt stops. The belt over the foreshore is provided with spill trays along its full length to catch any spillage.	No action required
2	9-Feb. 05	Port McNeill open house. Audience question.	Is the conveyor hydraulic? How many transfer points are there?	All conveyors will have electric drives. The over the foreshore will have a drive situated at the tail end, that is on-shore amongst the trees. There are three transfer points on the system.	No action required
3	9-Feb. 05	Port McNeill open house. Audience question.	Is there any revenue to the Crown?	The project is essentially situated on private land leased from WFP, however, the Crown will receive lease payments for the foreshore lands.	No action required
4	9-Feb. 05	Port McNeill open house. Audience question.	How will you control the electrolysis on the pilings?	The pilings are designed for strength in accordance with the BC Building Code and the appropriate seismic (earthquake) zone. After that either (i) the metal can be increased in thickness by 25% to allow for corrosion or, (ii) zinc sacrificial anodes can be used as they are on all steel hulled ships.	No action required

#	DATE	RAISED BY	ISSUE RAISED	OSG RESPONSE	PROPOSED ACTION
5	9-Feb. 05	Port McNeill open house. Audience question.	How does the loading work?	The loading is computerized with a conveyor underneath the stockpiles of products which then transfers required amounts of material along the conveyor system and into the hold of the ship.	No action required
6	9-Feb. 05	Port McNeill open house. Audience question.	Where are Canada Steamship Lines registered?	CSL is a Canadian public company with headquarters in Montreal. The registration of the vessels is not an issue for the proponent to consider.	No action required
<b>TOPIC: ENVIRONMENT – WILDLIFE, VEGETATION AND RECLAMATION</b>					
7	25-Jan. 05	Port Hardy Council meeting. Audience question.	Do you foresee any species at risk?	No. Section 3 of the “Application Report” details the studies which reviewed potential wildlife species at risk in the regional marine and land areas. Terrestrial species and key habitats were not found within the project footprint although this does not mean that species cannot access the site or pass through. Marine species such as transient orcas use Broughton Strait. Abalone used to be abundant in Soldier Bay but the population has declined drastically. A single individual was observed in the sub-tidal area during one of the dive surveys.	No action required
8	9-Feb. 05	Port McNeill open house. Audience question.	Are you creating places for animals to wander?	Section 7 of the “Application Report” states that existing travel routes/passages will not be blocked by the conveyor which passes underneath the BC Hydro transmission line, Highway 19 and also the Rupert Main logging road. It will be raised above the beach and behind the foreshore. An additional passage will be created 250 m from the beach. The conveyor runs through dense salal where no wildlife trails were found.	Existing commitment



#	DATE	RAISED BY	ISSUE RAISED	OSG RESPONSE	PROPOSED ACTION
9	9-Feb. 05	Port McNeill open house. Audience question.	You have stated that 0.14 hectares of a sensitive habitat will be disturbed. Won't it be more with access to road and conveyor belt?	Refer to Section 7 of the "Application Report". The area disturbed includes the allowance for a maintenance access road along the conveyor. The 0.14 hectares is the footprint of the conveyor and access road within the "RC" ecosystem.	No action required
10	9-Feb. 05	Port McNeill open house. Audience question.	What will be done with the silt?	As described in Section 2 of the "Application Report", the silt will be added to the overburden soils from the site and placed on areas where extraction is completed prior to replanting. Replanting of forest will be done in phases. Replanting with native forest species will be done in phases with the involvement of WFP and a forester.	Existing commitment
11	11-Feb. 05	Port Hardy open house. Audience question.	How will the area be replanted?	It will be returned to productive forest consist with its status within TFL 6. Species to be planted will be agreed with the landowner, WFP.	Existing commitment
<b>TOPIC: ENVIRONMENT – RIVERS AND GROUNDWATER</b>					
12	10-Feb. 05	Sointula open house. Audience question.	Where will the water come from to wash to gravel?	Sections 2, 3 and 7 of the "Application Report" deal with the site water balance and groundwater issues. Appendix VII-3 presents the Groundwater Report in full.  All process water is recycled and rain water will be captured as much as possible. Make-up water will be taken from a well approximately 750 m east of the Cluxewe River. All other water, such as drainage from stockpiles, is recycled back into the environment.	No action required
13 and 14	9-Feb. 05	Port McNeill open house. Audience questions.	Where will the extracted groundwater go? Concerned about exports of water. How much fresh water	The sand and gravel is naturally wet in the ground and contains 3% moisture by weight when extracted. A net loss of water from the project of 390,000 cubic metres per year at maximum capacity arises because the sand and gravel is damp, after washing, when loaded onto the ships.	No action required  Existing commitment – no surface wastewater

#	DATE	RAISED BY	ISSUE RAISED	OSG RESPONSE	PROPOSED ACTION
			used/discharged and where will flows go?	All process water is recycled. There will be no discharge of wastewater from the project.	discharge
15	9-Feb. 05	Port McNeill open house. Audience question.	Who will be responsible for monitoring the water level at the Cluxewe?	A groundwater monitoring plan will be developed through several government agencies. The Ministry of Energy and Mines have indicated that they may link the annual monitoring requirement to the Mine Permit which is renewed every 5 years thus providing an ongoing regulatory oversight.	Existing commitment
16	9-Feb. 05	Port McNeill open house. Audience question.	Will you be monitoring the groundwater from the Port McNeill side as well as the Cluxewe?	The Town of Port McNeill wells are not affected as they are located on the far side (east) of Mills Creek and up-gradient from the project.	No action required
17	9-Feb. 05	BCEAO comment form from Bill W. Hawkins.	Requesting information on how much fresh water is used, where do the flows go and is there a net gain or loss.	The sand and gravel is naturally wet in the ground and contains 3% moisture by weight when extracted. A net loss of water from the project of 390,000 cubic metres per year at maximum capacity arises because the sand and gravel is damp, after washing, when loaded onto the ships. All process water is recycled.	No action required
18	24-Feb. 05	BCEAO comment form from Stephanie Coe.	Concerned that the project is sending significant quantities of water to the US without compensation and that a right to the water could be created under NAFTA. (Comment summarized by proponent).	The water is an integral part of the aggregate products (as is the significant water content in exported lumber) which are sold on a per tonne basis thus the water is treated as if it were also a product. BC has been exporting several million tonnes per year of washed construction aggregates to the US for many years now from Texada Island, Sechelt and Victoria and this has not created concerns under NAFTA.	No action required

#	DATE	RAISED BY	ISSUE RAISED	OSG RESPONSE	PROPOSED ACTION
19	24-Feb. 05	BCEAO comment form from Dale Scow.	Has anyone taken into consideration the fact that without the sand and gravel and top layer of foliage the water table will rise (not if) to leave a bigger buffer from the rising water table, and if so has the total tonnage of the area been recalculated?	Groundwater levels will continue to be monitored monthly in the existing wells located on the site by OSG. The groundwater modelling demonstrates that during operation the groundwater levels will rise. This has been incorporated into the mining plan and the resource calculation reflects the change, however, these are subject to correction while working and the operation will stay at least 3 metres above the winter water table whatever level that proves to be in practice.	Existing commitment – for monitoring and staying above water table
20	28-Feb. 05	Email to BCEAO from Robert McGregor.	Have any studies been carried out on the potential effects of the project on the groundwater supply from Kaisla Spring on Malcolm Island?	No studies have been carried out regarding Kaisla Spring. If the source of this spring is on Vancouver Island then it would be reasonable to assume that the same conclusions apply to the groundwater resource here as at the project area. The groundwater quantity is predicted to increase with levels rising slightly during operation and no adverse effects to water quality are predicted.	No action required
<b>TOPIC: ENVIRONMENT – MARINE HABITAT AND LIFE</b>					
21	9-Feb. 05	Port McNeill open house. Audience question	Will there be impacts on whales? What about returning salmon?	Section 7 of the “Application Report” discusses these issues. Impacts on whales and returning salmon are expected to be limited to minimal sensory disturbance from construction activities and ship loading.	Existing commitment
22	24-Feb. 05	BCEAO comment form from Don Ford.	Loss of habitat for migrating salmon and whales due to construction and loading facilities.	Measures are proposed to minimize noise during construction and loading. The conveyor and loading facility has been designed so that it will not impact fish or mammal passages and will not result in measurable shading or light to impact fish. There will be no net loss of habitat arising from the project as compensation will be provided for the small area only which is disturbed.	Existing commitment

#	DATE	RAISED BY	ISSUE RAISED	OSG RESPONSE	PROPOSED ACTION
23	9-Feb. 05	Port McNeill open house. Audience question.	Will there be any bilge water from the ships?	Bilge water is pumped out in mid-ocean, discharge in Canadian coastal waters is not allowed. The CSL ships have coast guard approved sewage treatment plants that discharge only potable quality water.	Existing commitment
24	21-Feb. 05	BCEAO comment form from Leslie and Jean Wilson.	It is important that these vessels (ships carrying products) are closely checked by the relevant government agencies to forestall oil spills, polluted water, or any other significant contamination of the area environment.	OSG has made it a condition of its shipping contract that the carrier must comply with the federal environmental guidelines for ballast water. Enforcement will remain the responsibility of the appropriate agency. The selected shipper is a Canadian public company and the largest operator of these specialist vessels in the world and operates in many Canadian ports on a daily basis.	Existing commitment
25	24-Feb. 05	BCEAO comment form from Don Ford.	Winds in the loading bay area can exceed 100 knots for prolonged periods every four or five years. If damage or grounding occurred who would be responsible and where would tugs be dispatched from? How would an oil spill be contained?	Safe operation of a ship is always the Masters responsibility and therefore the ship owners. All vessels arriving or departing will be under the control of a BC Coast Pilot, which is a mandatory requirement, and be assisted by two tugs. The BC Coast Pilots have advised that in poor weather conditions, such as strong north-westerly winds, they will not pass beyond Hardy Bay, where a safe anchorage is available, while they wait for suitable safe weather before proceeding. The risk of a grounding is considered extremely small. Tugs at present would have to come from Campbell River or Vancouver, however, OSG is working with interested parties to have at least one tug stationed close to the project and hopefully two. OSG will be implementing a spill prevention and control plan. Marine spill prevention equipment is already available in many north Island locations.	Existing commitments – use of pilots, spill plan  New commitment – safe anchorage locations

#	DATE	RAISED BY	ISSUE RAISED	OSG RESPONSE	PROPOSED ACTION
26	9-Feb. 05	BCEAO comment form from Dan House.	One of my greatest concerns is the impact with the local fisheries and stream habitat.	No river or stream habitat will be impacted by the project - it is specifically designed to avoid any disturbance to the Cluxewe River. There will be a small loss of marine habitat due to placing the ship loading facility pilings and a habitat compensation plan is being developed together with Fisheries and Oceans Canada.	Existing commitment Permit issue
27	10-Feb. 05	BCEAO comment form from Lawrie Garrett.	Lady Ellen Point is an area of some recreational sport fishing opportunity.	The area around Lady Ellen Point will not be affected by the project and this sport fishing opportunity will continue to be available. The large vessels visiting the project will not be approaching close to the point.	No action required
<b>TOPIC: CULTURAL AND HERITAGE SETTING</b>					
28	15-Feb. 05	Email to BCEAO from Buster Wilson.	How can First Nations protect their land and heritage when mining projects are proposed and how can we be sure that the promised jobs will actually be created? (Comment summarized by proponent).	<p>Sections 5 and 7 of the “Application Report” present the archaeological studies completed. Initially a Heritage Overview Assessment was completed by an archaeologist approved by the two bands who assert traditional territory rights over the project area. This HOA did not identify any known traditional use sites but recommended an Archaeological Impact Assessment (AIV) be carried out. The AIV was completed by an experienced archaeologist under a provincial permit and all field crews included members of both bands. The bands also completed their own intensive Culturally Modified Tree survey and none were found.</p> <p>This project has one of the First Nations as a co-owner and the second has recently ratified an Impacts and Benefits Agreement with OSG. The company is bound through legal agreements to honour its jobs commitment and will be monitored by its First Nation partners.</p>	<p>Existing commitment – archaeology, ‘Namgis jobs</p> <p>New commitment – jobs with Kwakiutl IBA ratified</p>

#	DATE	RAISED BY	ISSUE RAISED	OSG RESPONSE	PROPOSED ACTION
<b>TOPIC: SOCIO-ECONOMICS</b>					
29	9-Feb. 05	Port McNeill open house. Audience question.	Air quality, noise and light – what would be the worst-case scenario for each?	<p>Sections 2 and 7 of the “Application Report” refer to air quality, noise and lighting of the operations.</p> <p>The operation will have only a small amount of mobile plant items with modern, well-maintained, low-emission engines and no change to air quality is predicted at locations where people may be, such as the Cluxewe Resort. The wet processing plant will control dust and additional water sprays will be used during hot, dry periods if required.</p> <p>When no ship loading is taking place, navigation marker lights on the mooring dolphins will be the only lights. Lighting will be minimal during ship loading – one light from the loader shining into the ship hold. The ships will have deck lights for safe movement of the crew. Lights will be guarded as much as possible to avoid light “spilling”.</p> <p>Please refer to Question 30 below for noise assessment.</p>	Existing commitments
30	24-Feb. 05	BCEAO comment form from Shirley Ford.	I am concerned about noise, especially if it affects the Cluxewe Resort. Noise travels.	Based on a study completed at the very similar Sechelt operation, sounds from the ship loading may be heard up to 1.4 km away over water, less on windy or rainy days and probably further on calm days. The closest people are at Cluxewe Resort and Pulteney Point, each 2 km away. Noise from the processing plant will be buffered by the edges of the pit and surrounding forest and won’t be audible at the Cluxewe Resort. It is difficult to predict noise levels under all conditions because they are not only influenced by weather conditions but also by the surrounding terrain which is much more wooded than at	<p>Existing commitments – further mitigation if required</p> <p>New commitment – baseline monitoring</p>

#	DATE	RAISED BY	ISSUE RAISED	OSG RESPONSE	PROPOSED ACTION
				Sechelt where the measurements were over open water only. OSG intends to carry out baseline monitoring at the Resort and also at Pulteney Point prior to operations commencing and will develop mitigation measures once operational, if required.	
31	24-Feb. 05	BCEAO comment form from Don Ford	Compensation to Cluxewe Resort for loss of revenue due to noise and dust pollution.	Noise and dust pollution are not predicted to be issues at the Cluxewe Resort, the owners of which are the Kwakiutl whose members recently ratified an Impacts and Benefits Agreement with OSG which provides significant economic benefits from the project.	Existing commitment – noise mitigation  New commitment – Kwakiutl IBA ratified
32	10-Feb. 05	Sointula open house. Audience question.	Your presentation states that there will be no impact on the Cluxewe Resort. How can you possibly take the position that there will be no impact?	Section 7 of the “Application Report” details the assessment’s findings. There are no impacts predicted on the Resort based upon: no changes to air quality; a noise survey which demonstrated that loading operations should not be heard (noted above); no trucking traffic created; and the loading facility being 2 km away. Some noise may be heard during construction (4 months at ship loader) but measures are proposed to keep this to a minimum (pile drilling rather than traditional pile driving) and no night working. OSG will undertake baseline noise monitoring and thereafter develop a mitigation plan if noise is a problem.	Existing commitments  New commitment – baseline monitoring
33	28-Feb. 05	Email to BCEAO from Robert McGregor.	I believe there will be a permanent (for the life of the operation) detrimental alteration of the ambient noise levels at my property (Pulteney Point).	Pulteney Point is the same distance from the project as the Cluxewe Resort and similar conditions are predicted. This location will also be covered in the proposed baseline noise monitoring survey.	Existing commitments – noise mitigation New commitment – baseline monitoring

#	DATE	RAISED BY	ISSUE RAISED	OSG RESPONSE	PROPOSED ACTION
34	26-Jan. 05  10-Feb. 05	Port McNeill Rotary meeting.  Sointula open house. Audience question.	Individuals concerned about impacts to property values from Project to land which is near Pulteney Point and feels there will be impacts on Cluxewe Resort. Kwakiutl will be compensated with IBA, what about impacts to the individual?	Section 7 of the “Application Report” summarizes the proponents assessment of potential impacts. Cluxewe Resort guests should not be able to hear operations. OSG will undertake monitoring and then mitigation to the greatest extent possible if noise is perceived as a problem. The ship loader and ship will be visible from Pulteney Point, but the structure and lighting will appear minimal and these viewpoints are 2 km. away. The Kwakiutl IBA recognizes unresolved aboriginal rights claims, impacts to individual land values are outside of the scope of the environmental assessment process.	Existing commitments
35	28-Feb. 05	Email to BCEAO from Robert McGregor.	The visual impact on the view corridor from my property will also be negatively affected .... the ship loading operation will run 24 hours two times per week which will require bright lighting. This will significantly degrade the visual aspect from what it presently is.	The sand and gravel pit will be hidden from view from Pulteney Point, the ship loader will be visible but at a distance of 2 km and with only low-level navigation lights showing when loading is not taking place. The operation will be somewhat more visible when a ship is at the berth but lighting during night loading will be kept to the minimum for safety. Pulteney Point sits on a commercial shipping lane and the operation of the proposed vessels and loading facilities are “acceptable uses and activities” as described in the publicly approved North Island Straits Coastal Plan (December 2002).	Existing commitments
36	9-Feb. 05	Port McNeill open house. Audience question.	What impact will you have on the cruise ships?	None. The ship loader is well outside of the navigational channel that cruise ships and other vessels use.	No action required
37	9-Feb. 05	Port McNeill open house. Audience	Where will the work force come from? Project is needed for the economy.	OSG intends to hire the majority of all employees from the North Island, the availability of suitable and skilled labour is a major attraction of the location. Local contractors will be used for a number of services such as	Existing commitments



#	DATE	RAISED BY	ISSUE RAISED	OSG RESPONSE	PROPOSED ACTION
		question.		overburden stripping, tree planting and maintenance and fuel supply. OSG hopes that tugboats can be supplied locally, this would be another major local contract.	
38	10-Feb. 05	Sointula open house. Audience question.	How will you ensure 50% First Nations employment if another company takes over?	This undertaking is enshrined in legally binding agreements with the 'Namgis First Nation and those pending with the Kwakiutl following the positive ratification vote on February 26.	Existing commitment – with 'Namgis agreement New commitment – with Kwakiutl IBA ratification vote
39	10-Feb. 05	Sointula open house. Audience question.	Will there be any direct benefits to Malcolm Island residents?	As with other north island communities, Malcolm Island residents can apply for jobs and bid on service contracts if interested.	No action required
40	10-Feb. 05	Sointula open house. Audience question.	Will there be an open bidding competition for contractors?	Yes.	No action required

**APPENDIX C  
PROPONENT COMMITMENTS FOR THE ORCA SAND AND GRAVEL PROJECT**

Commitment Number	Project Phase	Proponent (OSG) Commitment	Responsibility	Approving Agency/Group
<b>1. PROJECT DESIGN</b>				
1.1	Construction Operation Closure	Orca Sand & Gravel Ltd. (OSG) will design, construct, operate and decommission the Project as described in the Application Report including subsequent specific alterations required in forthcoming agency permits or authorizations.	OSG	All Agencies
1.2	Construction Operation Closure	The Project construction, operations, closure and reclamation will follow conditions to be provided by BC Ministry of Energy and Mines in the Mine Permit.	OSG	MEM
1.3	Construction	The ship loader will be designed and built to meet the BC Building Code under which Port McNeill is presently in the highest category for seismic design standards.	OSG	MEM TC
1.4	Operation	Orca Sand & Gravel Ltd. will develop the facility management and environmental monitoring plans indicated in the Application Report in association with the relevant agencies. The plans will be implemented fully at the appropriate time.	OSG	All Agencies
1.5	Operation	Operations will follow an environmental quality assurance program meeting ISO 14001 or similar standards.	OSG	MEM
1.6	Operation	Fuel storage and handling will follow Federal and Provincial requirements (Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Products) and the BC Fire Code.	OSG	MEM, WLAP, EC
1.7	Operation	Waste management systems for handling and disposal of domestic, sanitary and hazardous wastes will be installed.	OSG	MEM, WLAP, EC

<b>Commitment Number</b>	<b>Project Phase</b>	<b>Proponent (OSG) Commitment</b>	<b>Responsibility</b>	<b>Approving Agency/Group</b>
1.8	Operation	Environmental contingency and spill response plans will be developed.	OSG	MEM, WLAP
1.9	Operation	No trucks will be used to move the product to ships.	OSG	MOT
1.10	Closure and Decommissioning	OSG will discuss closure and decommissioning with affected agencies prior to their occurrence, in order to apply and implement the most up-to-date practices for this phase of the Project.	OSG	MEM, WLAP, DFO, EC
<b>2. VEGETATION</b>				
2.1	Construction	Monitoring - RC habitat disturbance along the conveyor will be measured and the vegetation type on both sides documented when the skunk cabbage is out (summer) and when forest floor is wettest (winter) during construction year.	OSG	WLAP
2.2	Operation	Monitoring - Vegetation type on both sides of the conveyor through RC habitat will be documented to determine any changes twice (summer and winter) in first year of operation.	OSG	WLAP
2.3	Operation	Improvements to drainage across conveyor and access road will be made if monitoring shows a noticeable change in vegetation from the RC habitat type (e.g., loss of skunk cabbage) or lack of surface water flow.	OSG	WLAP
2.4	Operation	Monitoring – The health and integrity of the trees within the buffers along the Cluxewe River and Highway 19 will be documented by a Professional Forester.	OSG	MEM, WLAP
2.5	Operation	Re-analysis of the windthrow potential and activities (planting of additional trees, pruning, etc.) will be undertaken if monitoring shows excessive blow-down/tree loss within the buffers.	OSG	MEM, WLAP DFO

Commitment Number	Project Phase	Proponent (OSG) Commitment	Responsibility	Approving Agency/Group
<b>3. RECLAMATION</b>				
3.1	Operation Closure	No soils will be removed from the site. All soils will be stripped by type - topsoil separately from sub-soils, and either used immediately for reclamation or stored for final reclamation. Sub-soil quality will be augmented by the addition of the silts recovered from the settling ponds. Native plant salvage will be permitted ahead of operations, if a First Nations company wishes to take plants not to be harvested by WFP.	OSG	MEM
3.2	Operation Closure	Vegetation will be planted as part of the reclamation plan. Revegetation will be governed by an agreement with WFP to plant harvestable native tree species under WFP direction. OSG will encourage WFP to consult First Nations regarding replanting.	OSG	MEM
3.3	Operation Closure	The reclamation program will include a plan for the control of noxious weeds.	OSG	MEM
3.4	Operation Closure	The success of planted forest (survival, growth, health, spacing) will be monitored in reclaimed areas annually by a Professional Forester and for two years following closure (through WFP).	OSG	MEM
3.5	Operation Closure	Within planted areas, silviculture activities to promote a harvestable forest will be undertaken, where deemed necessary by a Professional Forester (through WFP). Additional enhancement activities will be undertaken if monitoring shows a low / reduced survival of planted vegetation. Reduced success during operations will trigger changes to future areas to be reclaimed such as species planted, use of soil enhancements, etc as recommended by forester.	OSG	MEM

Commitment Number	Project Phase	Proponent (OSG) Commitment	Responsibility	Approving Agency/Group
<b>4. WILDLIFE</b>				
4.1	Operation	Passage for large mammals under the conveyor will be incorporated into the design at two locations (near shore and 250 m from shore). Existing passage along the beach, at the BC Hydro transmission line RoW, Highway 19 and Rupert Main (at ground level) will not be obstructed by Project operations.	OSG	WLAP
4.2	Construction Operation	<p>The construction of the conveyor line will require the clearing of a path approximately 15 m in width from the plant site to the foreshore. The clearing of trees and vegetation along the conveyor line (approximately 15 m width) is the responsibility of OSG. A bird nest survey will be conducted prior to any tree clearing that takes place between April 1 and July 31 (the breeding window) and results reported to BC WLAP and EC for review and guidance.</p> <p>During clearing of the conveyor line, OSG will comply with all relevant federal and provincial legislation protecting birds, nests and eggs, including, section 34 of the BC <i>Wildlife Act</i>, section 5 of the federal <i>Migratory Birds Convention Act</i>, and section 6 of the attendant Migratory Birds Regulation.</p>	OSG	WLAP EC
4.3	Construction	Monitoring - Harlequin Ducks presence (#) near the marine construction and a control site (near shore and offshore) will be documented once during activity and once during equipment presence with no activity. Methods will follow those conducted for the baseline study and seasonal timing will depend on construction window determined by DFO.	OSG	EC
4.4	Operation	Monitoring - Harlequin Ducks presence (i.e. numbers) near the marine ship loader and a control site will be documented twice during loading and twice during non-loading times (no ship present). Methods will follow those conducted for the baseline study and timing will be the spring of the first year of operation.	OSG	EC

<b>Commitment Number</b>	<b>Project Phase</b>	<b>Proponent (OSG) Commitment</b>	<b>Responsibility</b>	<b>Approving Agency/Group</b>
<b>5. GROUNDWATER</b>				
5.1	Operation	Pit excavation will only occur above the groundwater table.	OSG	MEM
5.2	Operation	As much as possible, processing water will be recycled from the sediment control ponds with make up water from a groundwater source.	OSG	MEM
5.3	Construction Operation	Monitoring - Groundwater levels in the existing wells on site will continue to be monitored on a monthly basis until removed during extraction.	OSG	MEM
5.4	Operation	The planned pit bottom will be adjusted to stay above water table if monitoring indicates an effect on groundwater levels that is associated with the depth of excavation.	OSG	MEM
5.5	Operation	Monitoring – Ground water samples will be collected from wells in operational areas and from an upgradient well as a control for water quality analysis once per year. Proposed parameters will include general chemistry, PAH and metals.	OSG	MEM
<b>6. RIVERS AND CREEKS</b>				
6.1	Operation	Process water will be discharged to sediment control ponds or other locations on-site for infiltration, not to the Cluxewe River or Mills Creek, during the life of the Project.	OSG	MEM, WLAP DFO
6.2	Operation	Pit excavations will be located outside of the 70 m wide fisheries sensitive zone (as defined by the Forest Practices Code) for the Cluxewe River.	OSG	MEM, WLAP DFO
6.3	Operation	Monitoring - The Cluxewe channel will be inspected annually adjacent to the operating area to document any changes. Inspection information will be provided to WLAP and DFO.	OSG	WLAP DFO

<b>Commitment Number</b>	<b>Project Phase</b>	<b>Proponent (OSG) Commitment</b>	<b>Responsibility</b>	<b>Approving Agency/Group</b>
6.4	Operation	A review and comparison of available air photos for the Cluxewe channel between West Main and Highway 19 bridges will be undertaken approximately every 5 years or as air photos are available. The focus will be on identifying any changes to east bank location and stability. Observations will be provided to WLAP and DFO.	OSG	WLAP DFO
<b>7. MARINE WATER QUALITY</b>				
7.1	Construction	Monitoring - Turbidity levels will be monitored during pile placement and visual inspections for oil sheens on water will be undertaken during marine construction. The frequency will be determined by the Environmental Supervisor based on activity and conditions.	OSG Pile contractor	DFO
7.2	Construction	Acceptable turbidity levels at specified distances from equipment and discharge points will be determined by DFO. If turbidity level monitoring indicates that acceptable levels are exceeded, mitigation measures specified by DFO will be followed, such as halting work temporarily or discharging onto land, and prevention of oil and fuel entering water.	OSG Pile contractor and other marine contractors	DFO
7.3	Operation	OSG will not provide fuelling or bilge discharge facilities at the Project loading facility.	OSG	EC, TC
7.4	Operation	OSG will require in its contract for services with the shipping company that all ships used in the Project are to comply with Transport Canada guidelines for ballast water management.	OSG	TC

Commitment Number	Project Phase	Proponent (OSG) Commitment	Responsibility	Approving Agency/Group
<b>8. MARINE FISH HABITAT</b>				
8.1	Construction	Marine construction activities will follow the Section 35(2) <i>Fisheries Act</i> Authorization required for the Project. The Authorization will confirm the compensatory works that have been negotiated and agreed upon by DFO and OSG. The Authorization will also outline in detail the necessary post-construction monitoring measures to be completed by OSG to ensure that any constructed compensatory works are functioning as designed.	OSG	DFO
8.2	Construction	Monitoring - For the construction phase of the Project, an independent Environmental Supervisor (ES) will oversee environmental components. For works associated with the marine environment, the ES will be empowered to ensure compliance with the terms and conditions of the DFO Authorization. The ES will also be empowered to stop work and direct implementation of any mitigation measures that are deemed necessary. The ES will provide weekly reports to agencies, First Nations and other stakeholders. For the non marine construction period, where environmental monitoring will be less frequent, reports will be made monthly instead of weekly.	OSG Pile contractor	DFO
8.3	Construction	A draft construction methodology will be provided to DFO for review prior to finalizing the <i>Fisheries Act</i> Authorization and will include information on types of marine construction, mitigation, proposed timing (based on priorities set by DFO and First Nations) and monitoring. Once an independent environmental supervisor has been selected, OSG will sign a letter stating that the supervisor has the authority to halt work.	OSG	DFO
8.4	Operation	A spill tray will be installed under the conveyor and dust covers over the conveyor, where it is located over marine water.	OSG	MEM DFO



<b>Commitment Number</b>	<b>Project Phase</b>	<b>Proponent (OSG) Commitment</b>	<b>Responsibility</b>	<b>Approving Agency/Group</b>
8.5	Operation	Monitoring - Fish habitat compensation will be monitored. Parameters (stability, fish use etc.), duration and frequency will be determined on the basis of the type and location of compensation.	OSG	DFO
8.6	Operation	Monitoring - Colonization and use of the underwater ship loading facility structures (piles) will be determined through dive observations – proposed annually during first two years of operation, to be confirmed by DFO.	OSG	DFO
8.7	Closure	Environmental mitigation requirements will be determined through consultation with DFO when the loading facility is removed.	OSG	DFO
<b>9. MARINE SPECIES</b>				
9.1	Construction	Construction in the marine environment will be conducted within a timing window approved by DFO and with mitigative measures to be approved by DFO.	OSG	DFO
9.2	Construction	Pile drilling, as opposed to pile driving, will be used during construction at the ship loading facility.	OSG	DFO
9.3	Construction	Monitoring - Underwater noise levels (dB) will be evaluated during pile drilling at several distances from equipment (e.g., 25, 50, 100 and 200 m or further) and several depths (near bottom, mid-water and near surface) during three pile placements (shallow, mid-depth and deep).	OSG	DFO
9.4	Construction	Threshold noise levels (dB) at specified distances from equipment will be determined by DFO based on salmon presence. If noise monitoring indicates that levels are exceeded, specified mitigation measures will be followed, such as halting work while salmon are present.	OSG	DFO

<b>Commitment Number</b>	<b>Project Phase</b>	<b>Proponent (OSG) Commitment</b>	<b>Responsibility</b>	<b>Approving Agency/Group</b>
9.5	Construction	Monitoring - Visual observations will be made for fish presence and behaviour in the vicinity of pile drilling during noise level measurements. Observations will be made from water surface or with an underwater camera, where possible.	OSG	DFO
9.6	Construction	Presence of salmon within a certain distance from pile placement activity (to be determined by DFO) will be used to set noise threshold levels. Work will be halted if monitoring observations indicates there are any fish kills or behaviour indicative of injured fish.	OSG	DFO
9.7	Construction	Independent monitoring of orca presence and behaviour will take place during any construction between July and November. Noise levels that are considered to be of issue for marine mammals are to be discussed with DFO and used to set the timing for some marine construction activities. Construction will be stopped under conditions (related to orca presence) to be determined and agreed upon with DFO.	OSG	DFO
9.8	Operation	The mooring buoys (determined to be the loudest source of operational underwater noise at Sechelt), will be designed to minimize noise.	OSG	DFO TC
9.9	Operation	Navigation marker lights will be the only lights used on the mooring dolphins when no ship loading is taking place. Lighting will be minimal during ship loading, with one light from the loader shining into the ship hold. The ships will have deck lights for safe movement of the crew. Lights will be guarded as much as possible to avoid light “spilling”.	OSG	TC MEM
9.10	Operation	Monitoring - Observations of fish congregations in and around lighted areas will be compared to un-lit areas at night during two ship loadings early in operations.	OSG	DFO

<b>Commitment Number</b>	<b>Project Phase</b>	<b>Proponent (OSG) Commitment</b>	<b>Responsibility</b>	<b>Approving Agency/Group</b>
9.11	Operation	If large congregations of fish are noted during light monitoring, simple mitigation measures will be initiated that are within safety requirements, such as adjustments of lights over walking path beside conveyor.	OSG	DFO
9.12	Operation	Orca sightings from the ship loader will be documented year round (when persons at ship loader during daylight hours) and will include location, number and activity for the first three years of operation.	OSG	DFO
9.13	Construction Operation	OSG will discuss options to mitigate for disturbance of orcas with DFO, including any anticipated orca monitoring requirements associated with implementation of the <i>Species at Risk Act</i> .	OSG	DFO
<b>10. AIR QUALITY</b>				
10.1	Operation	Pit and plant area roadways will be watered, as required, during dry periods to minimize dust.	OSG	MEM
10.2	Operation	All materials from the pit site will be damp-loaded onto ships, to avoid dust creation.	OSG	MEM
10.3	Construction Operation	Modern diesel equipment with low-emission engines will be used during operations on site. OSG will encourage similar equipment to be used by the successful bidder for the construction phase.	OSG	MEM
<b>11. VIEWSHED</b>				
11.1	Operation	Lighting will be minimal on the ship loading structure; and limited to navigation lights when a ship is not in berth and lights for ship operations, safety and loading when a ship is in berth.	OSG	TC MEM
11.2	Operation Closure	The visibility of the pit site will be minimized through the use of phased reclamation.	OSG	MEM

<b>Commitment Number</b>	<b>Project Phase</b>	<b>Proponent (OSG) Commitment</b>	<b>Responsibility</b>	<b>Approving Agency/Group</b>
<b>12. NOISE</b>				
12.1	Pre-construction	Monitoring - OSG will provide for independent baseline noise monitoring to be carried out at the Cluxewe Resort and at Pulteney Point prior to construction.	OSG	MEM
12.2	Construction	Noise impacts during construction at the ship loader will be minimized by the use of pile drilling (rather than traditional pile driving) and no night working.	OSG Pile contractor	MEM DFO
12.3	Operation	The mooring buoys will be designed to minimize noise effects on nearby facilities and communities.	OSG	MEM
12.4	Operations	OSG will conduct additional noise surveys at Cluxewe Resort and Pulteney Point on the request of MEM. If noise levels from the pit or ship loading operations are considered by MEM to exceed acceptable levels, OSG will determine with MEM any additional, feasible noise mitigation measures to be applied during operations.	OSG	MEM
<b>13. EMPLOYMENT</b>				
13.1	Operation	OSG will focus its Project job recruitment activities on the North Island.	OSG	
13.2	Operation	Training will be provided for many of the Project's operational positions either on the job, through the equipment manufacturer or at a local community college facility.	OSG	
<b>14. ARCHAEOLOGY</b>				
14.1	Construction	Monitoring – An archaeologist will be provided to look for archaeological resources during earth movement related to conveyor construction, at two sites with moderate archaeological potential (area adjacent to the beach and area 250 m from beach).	OSG	MSRM

<b>Commitment Number</b>	<b>Project Phase</b>	<b>Proponent (OSG) Commitment</b>	<b>Responsibility</b>	<b>Approving Agency/Group</b>
14.2	Construction Operation	If an archaeological site is identified during monitoring, an archaeologist will oversee activities in and near the site, under direction from the Archaeology Branch, if required. The archaeologist will contact the First Nations and will follow provincial legislative requirements if sites are disturbed.	OSG	MSRM
<b>15. FIRST NATIONS</b>				
15.1	Operation	OSG has made commitments to employment opportunities for Kwakiutl members and 'Namgis First Nations members, through agreements and business arrangements. These commitments include training programs. OSG will honour these commitments through its legal obligations to the First Nations.	OSG	Kwakiutl First Nation 'Namgis First Nation
<b>16. SAFETY</b>				
16.1	Operation	An occupational health and safety plan will be developed, including occupational health management, safety committee, wildlife management and training components.	OSG	MEM
16.2	Operation	At conveyor nip points, the conveyor will be guarded and securely fenced and locked. Sections under roads will be fenced and gated. The remainder will have a full length emergency stop cord. The conveyor line will be travelled and inspected before start up. Full fencing may be provided if safety concerns arise during operations. Prior to operations commencing, the conveyor installation will be inspected for safe access and additional fencing provided as necessary.	OSG	MEM
<b>17. FOLLOW-UP MONITORING</b>				
17.1	Operation Closure	Follow-up monitoring will be undertaken as proposed to determine the accuracy of predicted effects and efficacy of mitigation.	OSG	CEAA