

## **Purpose of the Application**

BURNCO Rock Products Ltd.'s (BURNCO, the Proponent) BURNCO Aggregate Project (Proposed Project) is subject to environmental assessment review under the British Columbia *Environmental Assessment Act* since the proposed production rate is greater than 500,000 tonnes/year of excavated sand and/or gravel. The Proposed Project is also subject to a comprehensive study review under the former *Canadian Environmental Assessment Act* as a result of a required approval under the *Fisheries Act* and a proposed production capacity greater than 1,000,000 tonnes per year. The Environmental Assessment Certificate Application / Environmental Impact Statement (EAC Application/EIS) is designed to provide information required to satisfy both federal and provincial EA processes.

Environmental assessment (EA) provides an integrated process for identifying and evaluating potential adverse environmental, economic, social, heritage and health effects that may occur during the life of a Proposed Project. The purpose of EA is to predict the significance of potential project-related effects and to identify measures to avoid or reduce these potential effects through redesign and operational improvements. Conclusions of the assessment inform decisions on whether or not a Proposed Project should proceed. The EA of the Proposed BURNCO Aggregate Project reflects accepted federal and provincial EA standards and guidelines.

## **Project Description**

BURNCO is proposing to construct and operate a sand and gravel mining operation within Lower McNab Valley located in Howe Sound, approximately 35 km northwest of Vancouver (Figure 1). The Proposed Project will be developed in 70 hectare (ha) of the southern portion of a 320 ha property that has been privately-owned by BURNCO since 2008 ("the Property"). Much of the Proposed Project area has been previously cleared. Logging operations in proximity to Proposed Project area continue to operate and to make use of the log handling area located on the western shore of the Property.

The Proposed Project will include an 30 ha aggregate pit within a flat glacial fan-delta deposit on the western shore of Thornbrough Channel, north of the existing BC Hydro transmission corridor that crosses the Property. Approximately 20 million tonnes of sand and gravel will be extracted over the 16 year life of the Proposed Project.

Because there is a relatively shallow water table in this area, once the site has been cleared the aggregate resource will be extracted using a clamshell dredge mounted on a floating barge. Aggregate materials will be conveyed to a processing area where sand and gravel products will be stockpiled (Figures 2 and 3). A high-efficiency wash plant will use 95% recycled washwater; fines and silt will be removed from the process water for on-site disposal and reclamation. No wash water will be discharged.

The processed aggregate material will be conveyed to barges for shipment to BURNCO's existing facilities in Burnaby or Langley (Figure 4). The Proposed Project will provide sand and gravel that will be used to meet the growing demands of the BC marketplace.

Progressive and ongoing reclamation activities will occur throughout all phases of the Proposed Project. A Reclamation and Effective Closure Plan has been prepared that describes measures to manage, maintain and monitor water management structures, remove surface facilities, and develop a functional ecosystem in the

freshwater pit that will remain. Visual simulations of the Proposed Project before, during and post operations are presented in Figures 5, Figure 6, and Figure 7, respectively.

## **Environmental Setting**

The Proposed Project is located in Howe Sound, north of Gambier Island. The Proposed Project site is a glacially-derived sand and gravel fan-delta near sea level (10 to 50 m above sea level [asl]) at the mouth of a glaciated coastal mountain valley, on the shore of a fjord. The mountain peaks that surround the valley reach a height of more than 1,500 m asl, although the topography of the Property is relatively flat.

The ecosystem of the Proposed Project area is Coastal Western Hemlock (CWH) very wet maritime biogeoclimatic zone, submontane (CWHvm1) variant. The CWH zone transitions, with increased elevation, to the Mountain Hemlock (MH) zone, which transitions to the Coastal Mountain-heather Alpine (CMA) zone. These ecosystems are composed of old growth forests, mature forest, wetlands, shrub-dominated sapling forest, and young forest structural stages, and un-vegetated or sparsely vegetated areas. Mature forest occurs mainly on the east side of McNab Creek and in the upper elevations. Much of the Proposed Project area is in various stages of regeneration following logging; it is dominated by shrubs, sapling forests, and young forests between 40 and 80 years old.

The summer climate in the Proposed Project area is typically warm and dry. Between June and late September, the average temperature is 20°C to 28°C. Winters between November and February are typically mild and wet, with an average temperature range between 0°C and 10°C. Although snowfall occurs occasionally, most of the precipitation is in the form of rain.

The Proposed Project is located in hydrologic subzone 9B, Southern Coastal Mountain and comprises a portion of the McNab valley and watershed (BC Watershed Code 900-106300). The McNab Creek watershed is further classified as part of the Southern Pacific Ranges Ecoregion, which is characterized by glaciated U-shape valleys. Upper valley slopes are generally steep, with a mantle of till glacial material or exposed bedrock. The lower valley slopes are generally flat with predominantly coarse substrate in the valley bottoms along the mainstream watercourses. McNab Creek flows along the east side of the Proposed Project area. Where it flows adjacent to the Proposed Project, McNab Creek has a low-gradient channel with gravel and cobble bars. McNab Creek is a 12.7-km long fourth-order watercourse that drains directly into the marine environment of Howe Sound.

There are no glaciers and few alpine areas of late-persisting snow within the watershed. Typical of coastal watersheds, the highest stream flow in McNab Creek occurs during the autumn/winter months (October through January), when rainfall is greatest. From February onward, average monthly flow declines until late summer (August), when the lowest flows occur. Flows increase abruptly with the onset of the autumn rains in September and October.

Much of the McNab Creek watershed is covered by thick forest, while the upper slope areas have limited vegetative cover, consistent with steep slopes nearing the alpine limit of forests.

The valley floor groundwater regime in the Proposed Project area during the summer months is characterized by an overall southward flow direction becoming progressively lower (i.e., flatter) toward the south. Within the central and southern portions, the regime is characterized by convergent southwest and southeastward flows (i.e., toward WC 2). The convergent flow is interpreted by WC 2 which is a deeply excavated channel that acts as an artificial groundwater drainage pathway that reduces groundwater levels in adjacent areas and alters both flow directions

and gradients. Groundwater flow patterns during the winter are similar to those observed during summer; however, the hydraulic heads are overall higher, in particular in the west portion of the valley fill aquifer.

On rare occasions between July and September, tidal elevations can exceed groundwater elevations. During these high tide intervals, the northward tidal gradient interferes with the groundwater regime in the immediate vicinity of the shoreline. However, the duration of the tidal gradient is less than the corresponding periods of southward groundwater gradient. Accordingly, the net groundwater flow direction remains southward toward the marine foreshore, despite the observed tidal influence.

The marine foreshore of the Proposed Project area comprises an intertidal sand, gravel and cobble beach that extends an average of 150 to 300 m outward from the high tide line. At its seaward edge (approximately 200 m from the high tide line), it drops off sharply to a depth of more than 200 m. The intertidal/subtidal area has been historically impacted by log booming and log dumping activities.

## Key Environmental Effects and Mitigation

Potential effects of all phases of the Proposed Project – Construction, Operations, and Reclamation and Closure – were assessed where there is a potential interaction with selected Valued Components. Summaries of potential effects assessed and proposed mitigation for each key issue is presented in Table 1-1 and Table 1-2, respectively. Brief summaries of predicted residual effects of the Proposed Project are provided below. Details are presented in Sections 5 to 9 of the EAC Application/EIS.

**Table 1-1: Summary of Potential Effects Assessed**

Valued Component	Potential Effects Assessed		
	Construction	Operations	Reclamation and Closure
<b>ENVIRONMENTAL</b>			
<b>Fisheries and Freshwater Habitat</b>			
Anadromous Chum Coho and Cutthroat Trout and their Habitats	<ul style="list-style-type: none"> <li>■ Changes to surface water quality - suspended sediments</li> <li>■ Changes to surface water quality - cementitious (alkaline) material</li> <li>■ Effects of artificial lighting</li> </ul>	<ul style="list-style-type: none"> <li>■ Loss of habitat</li> <li>■ Changes to surface water quality - suspended sediments</li> <li>■ Effects of artificial lighting</li> </ul>	<ul style="list-style-type: none"> <li>■ Loss of habitat</li> <li>■ Changes to surface water quality - suspended sediments</li> <li>■ Effects of artificial lighting</li> </ul>
Resident Cutthroat Trout and their Habitat	<ul style="list-style-type: none"> <li>■ Changes to surface water quality - suspended sediments</li> <li>■ Changes to surface water quality - cementitious (alkaline) material</li> <li>■ Effects of artificial lighting</li> </ul>	<ul style="list-style-type: none"> <li>■ Loss of habitat</li> <li>■ Changes to surface water quality - suspended sediments</li> <li>■ Effects of artificial lighting</li> </ul>	<ul style="list-style-type: none"> <li>■ Loss of habitat</li> <li>■ Changes to surface water quality - suspended sediments</li> <li>■ Effects of artificial lighting</li> </ul>
<b>Marine Resources</b>			
Marine Water and Sediment Quality	<ul style="list-style-type: none"> <li>■ Changes in marine water and sediment quality</li> </ul>	<ul style="list-style-type: none"> <li>■ Changes in marine water and sediment quality</li> </ul>	<ul style="list-style-type: none"> <li>■ Changes in marine water and sediment quality</li> </ul>
Benthic Communities	<ul style="list-style-type: none"> <li>■ Loss of habitat</li> <li>■ Changes in habitat quality - In-water works</li> </ul>	<ul style="list-style-type: none"> <li>■ Changes in habitat quality – Propeller scour</li> <li>■ Potential mortality – Propeller scour</li> </ul>	<ul style="list-style-type: none"> <li>■ Changes in habitat quality - In-water works</li> <li>■ Changes in habitat quality – Propeller scour</li> </ul>

Valued Component	Potential Effects Assessed		
	Construction	Operations	Reclamation and Closure
	<ul style="list-style-type: none"> <li>■ Changes in habitat quality – Propeller scour</li> <li>■ Potential mortality - In-water works</li> <li>■ Potential mortality – Propeller scour</li> </ul>		<ul style="list-style-type: none"> <li>■ Potential mortality - In-water works</li> <li>■ Potential mortality – Propeller scour</li> </ul>
Marine Fish	<ul style="list-style-type: none"> <li>■ Loss of habitat</li> <li>■ Changes in habitat quality - In-water works</li> <li>■ Changes in habitat quality – Propeller scour</li> <li>■ Mortality/injury – underwater noise (pile driving)</li> </ul>	<ul style="list-style-type: none"> <li>■ Changes in habitat quality – Propeller scour</li> </ul>	<ul style="list-style-type: none"> <li>■ Changes in habitat quality - In-water works</li> <li>■ Changes in habitat quality – Propeller scour</li> </ul>
Marine Mammals	<ul style="list-style-type: none"> <li>■ Mortality/injury – vessel strikes</li> <li>■ Mortality/injury – underwater noise (pile driving)</li> <li>■ Behavioural disturbance – underwater noise (pile driving, vessels)</li> </ul>	<ul style="list-style-type: none"> <li>■ Mortality/injury – vessel strikes</li> <li>■ Behavioural disturbance – underwater noise (vessels, barge loading)</li> </ul>	<ul style="list-style-type: none"> <li>■ Mortality/injury – vessel strikes</li> <li>■ Behavioural disturbance – underwater noise (vessels)</li> </ul>
Marine Birds	<ul style="list-style-type: none"> <li>■ Behavioural disturbance – in-air noise (pile driving, vessels)</li> </ul>	<ul style="list-style-type: none"> <li>■ Behavioural disturbance – in-air noise (vessels, barge loading)</li> </ul>	<ul style="list-style-type: none"> <li>■ Behavioural disturbance – in-air noise (vessels)</li> </ul>
Terrestrial Wildlife and Vegetation			
Amphibian species at risk (i.e., red-legged frog, western toad, Pacific tailed frog)	<ul style="list-style-type: none"> <li>■ Habitat loss</li> <li>■ Barriers to movement</li> <li>■ Change in mortality</li> </ul>	<ul style="list-style-type: none"> <li>■ Habitat loss</li> <li>■ Barriers to movement</li> <li>■ Change in mortality</li> </ul>	<ul style="list-style-type: none"> <li>■ Habitat loss</li> <li>■ Barriers to movement</li> <li>■ Change in mortality</li> </ul>
Western screech owl	<ul style="list-style-type: none"> <li>■ Habitat loss</li> <li>■ Barriers to movement</li> <li>■ Change in mortality</li> </ul>	<ul style="list-style-type: none"> <li>■ Habitat loss</li> <li>■ Barriers to movement</li> <li>■ Change in mortality</li> </ul>	<ul style="list-style-type: none"> <li>■ Habitat loss</li> <li>■ Barriers to movement</li> <li>■ Change in mortality</li> </ul>
Common nighthawk	<ul style="list-style-type: none"> <li>■ Habitat loss</li> <li>■ Barriers to movement</li> <li>■ Change in mortality</li> </ul>	<ul style="list-style-type: none"> <li>■ Habitat loss</li> <li>■ Barriers to movement</li> <li>■ Change in mortality</li> </ul>	<ul style="list-style-type: none"> <li>■ Habitat loss</li> <li>■ Barriers to movement</li> <li>■ Change in mortality</li> </ul>
Northern goshawk	<ul style="list-style-type: none"> <li>■ Habitat loss</li> <li>■ Barriers to movement</li> <li>■ Change in mortality</li> </ul>	<ul style="list-style-type: none"> <li>■ Habitat loss</li> <li>■ Barriers to movement</li> <li>■ Change in mortality</li> </ul>	<ul style="list-style-type: none"> <li>■ Habitat loss</li> <li>■ Barriers to movement</li> <li>■ Change in mortality</li> </ul>
Band-tailed pigeon	<ul style="list-style-type: none"> <li>■ Habitat loss</li> <li>■ Barriers to movement</li> <li>■ Change in mortality</li> </ul>	<ul style="list-style-type: none"> <li>■ Habitat loss</li> <li>■ Barriers to movement</li> <li>■ Change in mortality</li> </ul>	<ul style="list-style-type: none"> <li>■ Habitat loss</li> <li>■ Barriers to movement</li> <li>■ Change in mortality</li> </ul>
Marbled murrelet	<ul style="list-style-type: none"> <li>■ Habitat loss</li> <li>■ Barriers to movement</li> <li>■ Change in mortality</li> </ul>	<ul style="list-style-type: none"> <li>■ Habitat loss</li> <li>■ Barriers to movement</li> <li>■ Change in mortality</li> </ul>	<ul style="list-style-type: none"> <li>■ Habitat loss</li> <li>■ Barriers to movement</li> <li>■ Change in mortality</li> </ul>
Roosevelt elk	<ul style="list-style-type: none"> <li>■ Habitat loss</li> <li>■ Barriers to movement</li> <li>■ Change in mortality</li> </ul>	<ul style="list-style-type: none"> <li>■ Habitat loss</li> <li>■ Barriers to movement</li> <li>■ Change in mortality</li> </ul>	<ul style="list-style-type: none"> <li>■ Habitat loss</li> <li>■ Barriers to movement</li> <li>■ Change in mortality</li> </ul>
Grizzly bear	<ul style="list-style-type: none"> <li>■ Habitat loss</li> <li>■ Barriers to movement</li> <li>■ Change in mortality</li> </ul>	<ul style="list-style-type: none"> <li>■ Habitat loss</li> <li>■ Barriers to movement</li> <li>■ Change in mortality</li> </ul>	<ul style="list-style-type: none"> <li>■ Habitat loss</li> <li>■ Barriers to movement</li> <li>■ Change in mortality</li> </ul>
Environmentally sensitive ecosystems (wetlands,	<ul style="list-style-type: none"> <li>■ Loss of extent</li> </ul>	<ul style="list-style-type: none"> <li>■ Surface runoff</li> </ul>	<ul style="list-style-type: none"> <li>■ Introduction of dust</li> </ul>



Valued Component	Potential Effects Assessed		
	Construction	Operations	Reclamation and Closure
riparian ecosystems, old growth forest)	<ul style="list-style-type: none"> <li>■ Surface runoff</li> <li>■ Introduction of dust</li> <li>■ Invasive species</li> <li>■ Soil disturbance</li> <li>■ Windthrow</li> <li>■ Introduction of deleterious substances</li> </ul>	<ul style="list-style-type: none"> <li>■ Introduction of dust</li> <li>■ Invasive species</li> <li>■ Soil disturbance</li> <li>■ Windthrow</li> <li>■ Introduction of deleterious substances</li> </ul>	<ul style="list-style-type: none"> <li>■ Invasive species</li> <li>■ Soil disturbance</li> <li>■ Introduction of deleterious substances</li> </ul>
Ecosystems at-risk	<ul style="list-style-type: none"> <li>■ Loss of extent</li> <li>■ Surface runoff</li> <li>■ Introduction of dust</li> <li>■ Invasive species</li> <li>■ Soil disturbance</li> <li>■ Windthrow</li> <li>■ Introduction of deleterious substances</li> </ul>	<ul style="list-style-type: none"> <li>■ Loss of extent</li> <li>■ Surface runoff</li> <li>■ Introduction of dust</li> <li>■ Invasive species</li> <li>■ Soil disturbance</li> <li>■ Windthrow</li> <li>■ Introduction of deleterious substances</li> </ul>	<ul style="list-style-type: none"> <li>■ Introduction of dust</li> <li>■ Invasive species</li> <li>■ Soil disturbance</li> <li>■ Windthrow</li> <li>■ Introduction of deleterious substances</li> </ul>
Plant Species at Risk	<ul style="list-style-type: none"> <li>■ Loss of extent</li> <li>■ Introduction of deleterious substances</li> </ul>	<ul style="list-style-type: none"> <li>■ Introduction of deleterious substances</li> </ul>	<ul style="list-style-type: none"> <li>■ Introduction of deleterious substances</li> </ul>
<b>Geotechnical and Natural Hazards</b>			
Earthquakes and tsunamis	<ul style="list-style-type: none"> <li>■ Increased ground movement during earthquake event</li> <li>■ Increased shoreline erosion and offshore debris deposition during earthquake or landslide generated tsunami</li> <li>■ Initiation of submarine landslides</li> </ul>	<ul style="list-style-type: none"> <li>■ Increased ground movement during earthquake event</li> <li>■ Increased shoreline erosion and offshore debris deposition during earthquake or landslide generated tsunami</li> <li>■ Initiation of submarine landslides</li> </ul>	<ul style="list-style-type: none"> <li>■ Increased ground movement during earthquake event</li> <li>■ Increased shoreline erosion and offshore debris deposition during earthquake or landslide generated tsunami</li> <li>■ Initiation of submarine landslides</li> </ul>
Terrain stability	<ul style="list-style-type: none"> <li>■ Land-based mass movement - Terrain stability:                             <ul style="list-style-type: none"> <li>○ changes to slope morphology or drainage conditions</li> <li>○ changes to debris flow-debris flood transport or run out zones</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>■ Land-based mass movement - Terrain stability:                             <ul style="list-style-type: none"> <li>○ changes to slope morphology or drainage conditions</li> <li>○ changes to debris flow-debris flood transport or run out zones</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>■ Land-based mass movement - Terrain stability:                             <ul style="list-style-type: none"> <li>○ changes to slope morphology or drainage conditions</li> <li>○ changes to debris flow-debris flood transport or run out zones</li> </ul> </li> </ul>
Climate	<ul style="list-style-type: none"> <li>■ None or negligible</li> </ul>	<ul style="list-style-type: none"> <li>■ None or negligible</li> </ul>	<ul style="list-style-type: none"> <li>■ None or negligible</li> </ul>
<b>Surface Water Resources</b>			
Surface Water Flow	<ul style="list-style-type: none"> <li>■ Changes in baseflow in WC2</li> </ul>	<ul style="list-style-type: none"> <li>■ Changes in baseflow in WC2</li> </ul>	<ul style="list-style-type: none"> <li>■ Changes in baseflow in WC2</li> </ul>
Surface Water Quality	<ul style="list-style-type: none"> <li>■ Changes to water quality – suspended sediments</li> <li>■ Changes to water quality - spills</li> </ul>	<ul style="list-style-type: none"> <li>■ Changes to water quality – suspended sediments</li> <li>■ Changes to water quality - spills</li> </ul>	<ul style="list-style-type: none"> <li>■ Changes to water quality – suspended sediments</li> <li>■ Changes to water quality - spills</li> </ul>
Aquatic Health	<ul style="list-style-type: none"> <li>■ Direct toxicity-related effects</li> <li>■ Nutrient enrichment-related effects</li> </ul>	<ul style="list-style-type: none"> <li>■ Direct toxicity-related effects</li> <li>■ Nutrient enrichment-related effects</li> </ul>	<ul style="list-style-type: none"> <li>■ Direct toxicity-related effects</li> <li>■ Nutrient enrichment-related effects</li> </ul>

Valued Component	Potential Effects Assessed		
	Construction	Operations	Reclamation and Closure
<b>Groundwater Resources</b>			
Groundwater Flow	<ul style="list-style-type: none"> <li>■ Changes in groundwater flow</li> </ul>	<ul style="list-style-type: none"> <li>■ Changes in groundwater flow</li> </ul>	<ul style="list-style-type: none"> <li>■ Changes in groundwater flow</li> </ul>
Groundwater Quality	<ul style="list-style-type: none"> <li>■ Changes in groundwater quality</li> </ul>	<ul style="list-style-type: none"> <li>■ Changes in groundwater quality</li> </ul>	<ul style="list-style-type: none"> <li>■ Changes in groundwater quality</li> </ul>
<b>Air Quality</b>			
Air Quality Indicators	<ul style="list-style-type: none"> <li>■ Increase in PM2.5 – 24-hour</li> <li>■ Increase in PM2.5 – Annual</li> <li>■ Increase in PM10 – 24-hour</li> <li>■ Increase in TSP – 24-hour</li> <li>■ Increase in TSP – Annual</li> <li>■ Increase in NO2 – 1-hour, tug boats</li> <li>■ Increase in NO2 – Annual, tug boats</li> <li>■ Increase in NO2 – 1-hour, tug boats</li> </ul>	<ul style="list-style-type: none"> <li>■ Increase in PM2.5 – 24-hour</li> <li>■ Increase in PM2.5 – Annual</li> <li>■ Increase in PM10 – 24-hour</li> <li>■ Increase in TSP – 24-hour</li> <li>■ Increase in TSP – Annual</li> <li>■ Increase in NO2 – 1-hour, tug boats</li> <li>■ Increase in NO2 – Annual, tug boats</li> <li>■ Increase in NO2 – 1-hour, tug boats</li> </ul>	<ul style="list-style-type: none"> <li>■ Increase in PM2.5 – 24-hour</li> <li>■ Increase in PM2.5 – Annual</li> <li>■ Increase in PM10 – 24-hour</li> <li>■ Increase in TSP – 24-hour</li> <li>■ Increase in TSP – Annual</li> <li>■ Increase in NO2 – 1-hour, tug boats</li> <li>■ Increase in NO2 – Annual, tug boats</li> <li>■ Increase in NO2 – 1-hour, tug boats</li> </ul>
<b>Climate Change</b>			
GHG Emissions	<ul style="list-style-type: none"> <li>■ Change in GHG emissions</li> </ul>	<ul style="list-style-type: none"> <li>■ Change in GHG emissions</li> </ul>	<ul style="list-style-type: none"> <li>■ Change in GHG emissions</li> </ul>
<b>ECONOMIC</b>			
<b>Sustainable Economy</b>			
Regional Economic Development	<ul style="list-style-type: none"> <li>■ Positive</li> </ul>	<ul style="list-style-type: none"> <li>■ Positive</li> </ul>	<ul style="list-style-type: none"> <li>■ None or negligible</li> </ul>
Labour Market	<ul style="list-style-type: none"> <li>■ Employment and income generating opportunities for local residents                             <ul style="list-style-type: none"> <li>○ Direct employment</li> <li>○ Indirect employment</li> <li>○ Induced employment</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>■ Employment and income generating opportunities for local residents                             <ul style="list-style-type: none"> <li>○ Direct employment</li> <li>○ Indirect employment</li> <li>○ Induced employment</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>■ None or negligible</li> </ul>
Local Government Revenue	<ul style="list-style-type: none"> <li>■ Positive</li> </ul>	<ul style="list-style-type: none"> <li>■ Positive</li> </ul>	<ul style="list-style-type: none"> <li>■ None or negligible</li> </ul>
Real Estate	<ul style="list-style-type: none"> <li>■ Construction activities would generate effects on noise, air quality and visual resources, thereby potentially affecting financial value of real estate adjacent to the Proposed Project area.</li> </ul>	<ul style="list-style-type: none"> <li>■ Operational activities would result in a change in land use and zoning of the Property and generate effects on noise, air quality and visual resources, thereby potentially affecting financial value of real estate adjacent to the Proposed Project area.</li> </ul>	<ul style="list-style-type: none"> <li>■ None or negligible</li> </ul>
<b>SOCIAL</b>			
<b>Social Conditions</b>			
Housing and Accommodations	<ul style="list-style-type: none"> <li>■ Change in demand for housing and temporary accommodation affecting</li> </ul>	<ul style="list-style-type: none"> <li>■ Change in demand for housing and temporary accommodation affecting</li> </ul>	<ul style="list-style-type: none"> <li>■ Change in demand for housing and temporary accommodation affecting</li> </ul>

Valued Component	Potential Effects Assessed		
	Construction	Operations	Reclamation and Closure
	housing affordability and availability	housing affordability and availability	housing affordability and availability
Emergency Services	<ul style="list-style-type: none"> <li>Change in demand for emergency services exceeding supply/capacity</li> </ul>	<ul style="list-style-type: none"> <li>Change in demand for emergency services exceeding supply/capacity</li> </ul>	<ul style="list-style-type: none"> <li>None or negligible</li> </ul>
<b>Marine Transportation</b>			
Marine Navigation	<ul style="list-style-type: none"> <li>Interference with navigation use and navigability due to Project-related vessel traffic</li> <li>Interference with navigation use and navigability due to Project-related infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>Interference with navigation use and navigability due to Project-related vessel traffic</li> <li>Interference with navigation use and navigability due to Project-related infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>Interference with navigation use and navigability due to Project-related vessel traffic</li> <li>Interference with navigation use and navigability due to Project-related infrastructure</li> </ul>
Vessel Wake	<ul style="list-style-type: none"> <li>None or negligible</li> </ul>	<ul style="list-style-type: none"> <li>None or negligible</li> </ul>	<ul style="list-style-type: none"> <li>None or negligible</li> </ul>
<b>Non-Traditional Land and Resource Use</b>			
Forestry	<ul style="list-style-type: none"> <li>None or negligible</li> </ul>	<ul style="list-style-type: none"> <li>None or negligible</li> </ul>	<ul style="list-style-type: none"> <li>None or negligible</li> </ul>
Harvesting Fish and Wildlife	<ul style="list-style-type: none"> <li>Change in quality of environmental setting</li> </ul>	<ul style="list-style-type: none"> <li>Change in quality of environmental setting</li> </ul>	<ul style="list-style-type: none"> <li>Change in quality of environmental setting</li> </ul>
Recreation and Tourism	<ul style="list-style-type: none"> <li>Change in quality of environmental setting</li> </ul>	<ul style="list-style-type: none"> <li>Change in quality of environmental setting</li> </ul>	<ul style="list-style-type: none"> <li>Change in quality of environmental setting</li> </ul>
Minerals and Aggregates	<ul style="list-style-type: none"> <li>None or negligible</li> </ul>	<ul style="list-style-type: none"> <li>None or negligible</li> </ul>	<ul style="list-style-type: none"> <li>None or negligible</li> </ul>
<b>Visual Resources</b>			
Visual Quality	<ul style="list-style-type: none"> <li>Change in visual quality</li> </ul>	<ul style="list-style-type: none"> <li>Change in visual quality</li> </ul>	<ul style="list-style-type: none"> <li>Positive</li> </ul>
<b>HERITAGE</b>			
<b>Heritage Resources</b>			
Heritage Resources	<ul style="list-style-type: none"> <li>Changes to integrity</li> <li>Changes to context</li> <li>Changes to accessibility</li> </ul>	<ul style="list-style-type: none"> <li>Changes to integrity</li> <li>Changes to context</li> <li>Changes to accessibility</li> </ul>	<ul style="list-style-type: none"> <li>Changes to integrity</li> <li>Changes to context</li> <li>Changes to accessibility</li> </ul>
<b>HEALTH</b>			
<b>Public Health</b>			
People	<ul style="list-style-type: none"> <li>Human Health – Air Quality</li> <li>Human Health – Particulate Matter</li> <li>Human Health – Multimedia</li> </ul>	<ul style="list-style-type: none"> <li>Human Health – Air Quality</li> <li>Human Health – Particulate Matter</li> <li>Human Health – Multimedia</li> </ul>	<ul style="list-style-type: none"> <li>Human Health – Air Quality</li> <li>Human Health – Particulate Matter</li> <li>Human Health – Multimedia</li> </ul>
<b>Noise</b>			
Noise Levels	<ul style="list-style-type: none"> <li>Increase in noise levels</li> </ul>	<ul style="list-style-type: none"> <li>Increase in noise levels</li> </ul>	<ul style="list-style-type: none"> <li>Increase in noise levels</li> </ul>

**Table 1-2: Summary of Proposed Mitigation**

Proposed Mitigation	
No.	Description
<b>ENVIRONMENTAL</b>	
<b>Fisheries and Freshwater Habitat</b>	
M-5.1-01	Implementation of the Fish Habitat Offset Plan (Volume 4, Part G – Section 22.0: Appendix 5.1-B). Extension of the lower segment WC 2 will collect surface flow diverted through loss of the upper segment and will increase the wetted area within the extension and the lower segment of WC 2.
M-5.1-02	Designing the pit lake such that lake elevation can be used to manage hydrostatic pressure through the course of operations so changes to groundwater flow does not lead to a loss of flow within McNab Creek.
M-5.1-03	Similarly, the elevation of the pit lake will be used to manage baseflows in the natural groundwater watercourses below the pit lake.
M-5.1-04	Disturbed areas should be vegetated as soon as possible and where possible by planting and seeding with native trees, shrubs, and grasses.
M-5.1-05	Disturbed areas adjacent to watercourses should be covered with mulch for sediment control.
M-5.1-06	Develop and implement an Erosion and Sediment Control Plan (See Volume 4, Part G – Section 22.0: Appendix 3). Measures should be maintained until re-vegetation is achieved.
M-5.1-08	Fines/silt cakes berm should be vegetated as soon as possible and where possible by planting and seeding with native trees, shrubs, and grasses.
M-5.1-09	Placement of erosion control blankets on the berm to prevent dust.
M-5.1-11	Crushing area should receive water-misting during dry weather events to reduce dust release.
M-5.1-12	Complete isolation of work area is required to ensure waterbodies do not become more alkaline.
M-5.1-13	pH should be monitored in surrounding waterbodies during concrete pouring.
M-5.1-14	Best Management Plans (BMPs) should be implemented during setting, mixing, and pouring of concrete to ensure activities meet requirements of applicable legislation.
M-5.1-15	Pre-cast concrete structures whenever possible.
M-5.1-16	Keep carbon dioxide tank with regulator, hose, and gas diffuser readily available during concrete works.
M-5.1-17	Lighting for the purposes of the aggregate mining will not be permitted between dusk to dawn at seasonally appropriate times.
M-5.1-18	All Lighting nearby waterbodies will have baffles to direct light away from the water surface.
M-5.1-19	Limited Lighting will be maintained through the night only for safety purposes.
M-5.1-20	Develop and implement a Spill Prevention and Emergency Response Plan (Volume 3, Part E – Section 16.0).
M-5.7-01	Develop and implement an Air Quality and Dust Control Management Plan (Volume 3, Part E – Section 16.0) that will detail measures to control fugitive particulates (e.g., watering and speed controls).
<b>Marine Resources</b>	
M-5.1-01	Develop a Fish Habitat Offset Plan to offset unavoidable permanent alteration or destruction of fish habitat from Project works (Volume 4, Part G – Section 22.0: Appendix 5.1-B).
M-5.1-20	Develop and implement a Spill Prevention and Emergency Response Plan (Volume 3, Part E – Section 16.0).
M-5.2-01	Mitigation through design: <ul style="list-style-type: none"> <li>■ Utilize existing disturbed features - installation of barge load-out jetty in low value habitat (existing log dump)</li> <li>■ Use of piles instead of fill to reduce seabed disturbance</li> <li>■ Height and orientation of walkway/conveyor designed to maximize ambient light penetration</li> </ul>

Proposed Mitigation	
No.	Description
	■ Maintain tree buffer on foreshore to limit noise and dust emissions to marine environment.
M-5.2-02	Develop and adherence to Construction Environmental Management Plan (CEMP; Volume 3, Part E – Section 16.0).
M-5.2-03	Develop and adherence to Pile Construction Management Plan (Volume 3, Part E – Section 16.0).
M-5.2-04	Environmental monitoring by a qualified Environmental Monitor (EM).
M-5.2-05	Prevent release of construction debris and deleterious substances into the marine environment.
M-5.2-06	Adherence to BMP for Pile Driving and Related Operations (DFO 2003).
M-5.2-07	Adherence to Erosion and Sediment Control Plan (Volume 4, Part G – Section 22.0: Appendix 3) during road and other facilities construction, maintenance and upgrade.
M-5.2-09	Optimal use of pre-cast concrete for construction and installation of facilities within the intertidal and subtidal zones.
M-5.2-10	Concrete will be poured during suitable tides.
M-5.2-11	Concrete is not to be poured directly into tidal waters.
M-5.2-12	Pumping hoses will be equipped with a shut-off valve to stop flow should a spill occur.
M-5.2-13	Short term portable concrete batch plant will be constructed on-site, so no concrete pumping will be conducted by barge.
M-5.2-14	Use of tight-fitting formwork that is lined (e.g., with polyethylene) and that has gasket joints to prevent contact between concrete and tidal water.
M-5.2-15	Barriers will be used as appropriate to prevent splashing of the concrete over the forms and into the water or intertidal area during pouring.
M-5.2-16	Fast curing concrete intended/formulated for marine applications will be used.
M-5.2-17	Following placement of concrete, forms will be left in place isolating the concrete from tidal waters for a minimum of 24 h or time required for the particular material used such that the concrete is cured before it is exposed to tidal waters.
M-5.2-18	Wash down of equipment and tools that have come into contact with concrete will be conducted in a designated area away from intertidal drainages so that concrete products are prevented from entering watercourses.
M-5.2-19	Excess or spilled concrete will be immediately cleaned up / removed from the intertidal area.
M-5.2-20	During removal and storage of creosote pilings, adherence to DFO BMP “Guidelines to Protect Fish and Fish Habitat from Treated Wood Used in Aquatic Environments in the Pacific Region”.
M-5.2-21	Vessels involved in in-water works will be positioned in a manner to prevent disturbance to benthic communities and benthic habitats.
M-5.2-22	Work crews will monitor the position of barges and account for height of tidal waters, magnitude of prevailing winds, and direction of tidal currents or other factors that may influence vessel positioning.
M-5.2-23	Maneuvering of vessels in shallow areas will be minimized in order to avoid propeller scour and potential re-suspension of sediments or physical disturbance to shallow submerged marine vegetation.
M-5.2-24	All equipment will be maintained in proper conditions to prevent leaking or spilling of hydrocarbons and other potentially toxic substances in the marine environment.
M-5.2-25	All hydrocarbon products, fueling equipment and other chemical substances will be stored and handled in accordance with all applicable legislation, guidelines and BMP’s to prevent their release and toxic effect in the marine environment.
M-5.2-27	During in-water works with potential to result in increased turbidity or suspended sediment, specific water quality performance objectives (based on BC Water Quality Guidelines) will be applied at set distances from

<b>Proposed Mitigation</b>	
<b>No.</b>	<b>Description</b>
	in-water works. In-water works will be halted if objectives are not achieved. Where objectives cannot be practically met, work areas will be isolated from tidal waters with silt curtains or other silt control measures.
M-5.2-28	Implementation of ramp-up / soft-start procedure during impact pile driving
M-5.2-29	Avoid concurrent multiple underwater noise generating activities (sequence where possible).
M-5.2-30	Impact pile driving should not exceed 30 kPa at 10 m from pile. Otherwise, additional mitigation will be implemented such as the use of a vibratory hammer in place of an impact hammer or installation of bubble curtains around the wetted pile.
M-5.2-31	Impact pile driving activities will be temporarily suspended if aggregations of fish (e.g., herring or salmonids) are spotted within the immediate work area or if any herring spawn is observed attached to equipment or structures in the water.
M-5.2-32	Monitoring for marine mammals (MM) during all impact pile driving activities by a qualified and experienced Marine Mammal Observer (MMO).
M-5.2-33	Implementation of a MM Safety Zone based on injury threshold criteria (180 dB re 1 µPa SPLrms for cetaceans and 190 dB re 1 µPa SPLrms for pinnipeds). The occurrence of MM within the safety zone will trigger specific mitigation actions (e.g., shut-downs).
M-5.2-34	Shut-down procedures – impact pile driving will be temporarily suspended when a MM is located within the safety zone until which time it moves outside the safety zone.
M-5.2-35	Conduct a pre-operational search for marine mammals prior to start-up of active impact pile driving. If a marine mammal is spotted within the safety zone during the pre-ops search, the ramp-up procedure will be delayed 20 minutes from the time the marine mammal left the safety zone, or was last sighted in the safety zone
M-5.2-36	MMO will periodically verify underwater sound levels in the field using a hydrophone and a real-time sound monitor to confirm that sound levels at the modeled safety zone radius are below the established injury thresholds for MM. If necessary, the safety zone distance will be adjusted accordingly.
M-5.2-37	Plan operations during daylight hours to maximize detection ability of marine mammals in Project Area.
M-5.2-38	Avoid peak seasonal timing when marine mammals are most likely to be in or adjacent to the Project Area.
M-5.2-39	Speed restrictions for tug-assisted barges in Regional Study Area (RSA) (<12 knots).
M-5.2-40	Vessels will follow established shipping lanes/navigational routes in Regional Study Area (RSA).
M-5.2-41	Vessels will maintain a constant course and constant speed in Regional Study Area (RSA).
M-5.2-42	Project vessels will not approach within 100 m of any marine mammal.
M-5.2-43	If marine mammals approach within 100 m of a Project vessel, the vessel will reduce its speed and, if possible, cautiously move away from the animal. If it is not possible for a vessel to move away from or detour around a stationary marine mammal or group of mammals, the vessel will reduce its speed and wait until the animal(s) moves at least 100 m from the vessel prior to resuming speed.
M-5.2-44	Prevent release of debris and deleterious substances into the marine environment.
M-9.2-01 to M-9.2-09	Refer to Volume 2, Part B - Section 9.2 (Noise).
<b>Terrestrial Wildlife and Vegetation</b>	
M-5.1-06	Develop and implement an Erosion and Sediment Control Plan (See Volume 4, Part G – Section 22.0: Appendix 3).
M-5.1-20	Develop and implement a Spill Prevention and Emergency Response Plan (Volume 3, Part E – Section 16.0).
M-5.3-01	Identify and retain, where feasible, wildlife habitat features.



<b>Proposed Mitigation</b>	
<b>No.</b>	<b>Description</b>
M-5.3-02	Utilize existing disturbed areas.
M-5.3-03	Maintain riparian vegetation, vegetation buffers and other important habitat features.
M-5.3-04	Minimize clearing through Project planning.
M-5.3-05	Develop a Vegetation Management Plan including an Invasive Plant Species Management Plan (Volume 3, Part E - Section 16.0).
M-5.3-06	Avoid clearing wildlife habitat during sensitive wildlife periods such as breeding and calving periods, bird nesting periods, and Roosevelt elk overwintering.
M-5.3-07	Restrict construction to daylight hours.
M-5.3-08	Limit Proposed Project area access to a single point, and to employees and contractors.
M-5.3-09	Manage noise through implementation of Best Management Practices (BMPs) and mitigation outlined in Volume 2, Part B - Section 9.2.
M-5.3-10	Maintain vegetation linkages and buffers.
M-5.3-11	Demarcate habitat features to be retained.
M-5.3-12	Identify habitat feature (i.e., woody debris) to retain.
M-5.3-15	Follow appropriate Best Management Practices (BMPs).
M-5.3-16	Fall trees away from sensitive habitat.
M-5.3-17	Develop a Wildlife Management Plan (Volume 3, Part E - Section 16.0).
M-5.3-17a	Mature forest to be cleared will be surveyed for tree cavities that may provide suitable nesting opportunities for Western screech-owl. A density of potentially suitable nest trees will be estimated for the mature forest that will be cleared.
M-5.3-17b	Construct and install nest boxes for Western screech-owl in nearby forest habitat, where appropriate.
M-5.3-18	Develop and implement a progressive Reclamation Plan (Volume 4, Part G – Section 22.0: Appendix 3).
M-5.3-19	Develop and implement a water quality monitoring program in remaining amphibian breeding ponds.
M-5.3-20	Develop and implement a wildlife monitoring program with the objective of measuring the effectiveness of mitigation and restoration measures on wildlife valued components (VCs) within the Local Study Area (LSA).
M-5.3-21	Minimize fugitive dusts from exposed soil, equipment and Project facilities.
M-5.3-22	Monitor water quality in the pit lake.
M-5.3-23	Limit operational hours to daylight hours. Limit nighttime lighting to where lighting is required for safety and security.
M-5.3-24	Night time lights will be fitted with shades to direct light towards the ground.
M-5.3-25	Monitor water quality in the Pit Lake and other water bodies in and around the Proposed Project area.
M-5.3-26	Develop and implement a Habitat Compensation Plan to address the loss of amphibian breeding habitat and Roosevelt elk habitat.
M-5.3-27	Reclaim the Proposed Project area to enhance wildlife habitat.
M-5.3-28	Develop and implement a progressive Reclamation Plan (Volume 4, Part G – Section 22.0: Appendix 3).
M-5.3-29	Store equipment in designated areas.
M-5.3-30	Design and establish amphibian passageways, where appropriate.

Proposed Mitigation	
No.	Description
M-5.3-31	Maintain vegetation linkages and buffers.
M-5.3-32	Bury linear features.
M-5.3-33	Develop and implement a Material Storage, Handling and Waste Management Plan and Develop and implement an Erosion and Sediment Control Plan (See Volume 4, Part G – Section 22.0: Appendix 3).
M-5.3-34	Prohibit harassment and feeding of wildlife by Project employees.
M-5.3-35	Report wildlife observations.
M-5.3-36	Develop a Wildlife Management Plan (Volume 3, Part E - Section 16.0).
M-5.3-37	All employees and contractors will be prohibited from hunting, including Roosevelt elk and grizzly bear, within the Local Study Area (LSA).
M-5.3-38	Install amphibian isolation fencing along roadways.
M-5.3-39	Clear during avifauna least risk windows; avoid clearing during sensitive wildlife periods.
M-5.3-40	Control traffic speeds on roads.
M-5.3-43	Train staff to be Bear Aware™.
M-5.3-44	Post educational signage.
M-5.3-46	Conduct a pre-clearing salvage of amphibians in amphibian ponds within the Proposed Project area.
M-5.3-49	Restrict public access to the Proposed Project area.
M-5.3-51	Develop a wildlife mortality reporting program.
M-5.3-52	Obtain a yearly permit to salvage amphibians.
M-5.3-53	Limit nighttime road travel.
M-5.3-54	Maintain vegetative buffers around all raptor nests and other active bird nests.
M-5.3-55	Design the perimeter of the pit lake to allow for an escape route for large mammals.
M-5.3-56	Develop a Material Storage, Handling and Waste Management Plan (Volume 3, Part E - Section 16.0).
M-5.3-57	Project design aims to utilize disturbed areas and avoid sensitive ecosystems.
M-5.3-58	Activities will be contained within surveyed Project boundary.
M-5.3-59	Standing vegetation will be retained for as long as possible.
M-5.3-60	Reclamation planning will aim to re-establish functional listed ecosystems at the same proportion at which they were removed, where final design allows.
M-5.3-61	Ecological units will be created during the reclamation phase similar to those present prior to Project construction.
M-5.3-62	Develop and implement a vegetation monitoring program to assess the success of mine reclamation.
M-5.3-64	An independent Environmental Monitor (EM) will be on-site during sensitive works.
M-5.3-65	An Air Quality and Dust Control Management Plan will be prepared and implemented during construction, operations and reclamation.
M-5.3-66	Progressive reclamation to be conducted during operations to reduce ambient dust.
M-5.3-67	A site specific Invasive Plant Management Plan will be developed.
M-5.3-68	Progressive reclamation to be conducted during operation to reduce risk of invasive species establishment.

<b>Proposed Mitigation</b>	
<b>No.</b>	<b>Description</b>
M-5.3-69	A Soil Management Plan, including the Reclamation Plan, will be developed and implemented during construction. The Soil Management Plan will be employed during reclamation and closure.
M-5.3-70	Trees susceptible to windthrow will be removed from treeline edges.
M-5.3-71	Sensitive receptors (i.e., streams) will be buffered so that impacts are minimized.
M-5.3-72	Monitoring of treeline edges will be conducted in order to evaluate potential windthrow effects and adaptive management will be employed, if necessary.
M-5.3-73	A Construction Environment Management Plan (CEMP) will be developed which will include regular inspections of equipment.
M-5.3-75	An independent Environmental Monitor (EM) will be on-site.
M-5.3-76	An Operation Environmental Management Plan will be prepared that includes regular scheduled equipment inspections.
M-5.3-77	Communication and planning with other proponents within McNab Valley.
M-5.3-78	Access management planning with other proponents within McNab Valley.
<b>Geotechnical and Natural Hazards</b>	
M-5.4-01	Conduct detailed geotechnical subsurface investigations (drilling and geophysical programs) where required.
M-5.4-02	Prepare approved engineered design and plans to achieve Proposed Project engineering design and performance requirements and for mitigation, as required by provincial and federal accepted standards
M-5.4-03	Conduct appropriate detailed investigations of terrain stability and geotechnical conditions.
M-5.4-04	Prepare approved engineered design and plans to achieve Proposed Project performance requirements and for mitigation, as required.
M-5.4-05	Conduct appropriate on-site assessments to identify connectivity of site earth works to watercourses.
M-5.4-06	Conduct on-site assessment of terrain stability conditions along watercourse banks and connectivity to planned site activities.
M-5.4-07	Conduct appropriate debris flow/ flood hazard and effect assessments including hydrotechnical assessments that would include peak discharge and sediment concentration estimates.
M-5.4-08	Prepare engineered designs and plans by qualified and experienced professionals for mitigation (e.g., diversion and catchment structures), as required.
M-5.4-09	Conduct operations in conformance with detailed geotechnical designs.
M-5.4-10	Monitor performance during operations and update or modify designs if required to achieve Proposed Project performance requirements and for mitigation, as required.
M-5.4-11	Conduct appropriate monitoring and ongoing investigations of terrain stability and geotechnical conditions to achieve Proposed Project performance requirements and for mitigation, as required.
M-5.4-12	Conduct recommended monitoring and ongoing debris flow/ flood hazard assessments of watercourse side banks and drainage of changing site conditions were warranted.
M-5.4-13	Conduct reclamation and closure in conformance based on detailed geotechnical designs, monitor performance during reclamation and update or modify designs if required to achieve Proposed Project performance requirements and for mitigation, as required.
M-5.4-14	Based on stockpile location and earth works affecting or indirectly connected to side banks of watercourses, conduct site assessment of terrain stability conditions and soil erosion plans.
M-5.4-15	Includes conducting appropriate on-site assessments to identify connectivity of site earth works to watercourses. For potential debris flow / flood catchment structures, conduct appropriate decommissioning or ongoing monitoring of structures where warranted.

<b>Proposed Mitigation</b>	
<b>No.</b>	<b>Description</b>
M-5.4-16	As required, prepare engineered designs and plans by qualified and experienced professionals for removal or ongoing mitigation of site.
<b>Surface Water Resources</b>	
M-5.1-01	Implementation of the Fish Habitat Offset Plan (Volume 4, Part G – Section 22.0: Appendix 5.1-B). Extension of the lower segment WC 2 will collect surface flow diverted through loss of the upper segment and will increase the wetted area within the extension and the lower segment of WC 2.
M-5.1-06	Develop and implement an Erosion and Sediment Control Plan (See Volume 4, Part G – Section 22.0: Appendix 3).
M-5.5-01	Proposed Project design elements, including: <ul style="list-style-type: none"> <li>■ During aggregate mining operations, runoff from within the active mining area will be directed to the pit. The proposed pit has been designed such that all runoff would be retained within the pit without a discharge of surface flows. Water accumulating within the pit area during storm events would infiltrate into the pit wall and be filtered naturally through the native granular soils.</li> <li>■ The potential for sediment laden runoff from the conveyor system would be managed by directing runoff either to the pit or the process area storm water management system. Conveyor crossing of any watercourses will be designed and constructed to prevent runoff being discharged to watercourses.</li> <li>■ Drainage works surrounding the pit will be constructed such that clean runoff originating in areas unaffected by the Proposed Project will be directed around the active mining area.</li> <li>■ The processing of aggregate involves crushing, screening, washing and stockpiling material. The fines generated by these activities will be extracted from the wash water and compressed into sediment cakes. The dried sediment cakes will be stored in a covered on-site containment facility and re-used for progressive reclamation.</li> <li>■ Areas progressively reclaimed during the operational phase will be re-vegetated to control erosion.</li> </ul>
M-5.5-03	Material Storage, Handling and Waste Management Plan (Volume 3, Part E – Section 16.0)
M-5.5-04	Site specific Spill Prevention and Emergency Response Plan (Volume 3, Part E – Section 16.0)
<b>Ground Water Resources</b>	
M-5.6-01	Limit excavation to the southern portion of the delta/fan.
M-5.6-02	Implementation of a progressive Reclamation Plan (Volume 4, Part G - Section 22.0: Appendix 3).
M-5.6-03	Set overflow structure at 5.2m.
M-5.6-04	Fines deposited around the northern and eastern perimeter of the property but each year's deposition will be limited to small surface area. Fines will be mixed with a growing medium and seeded.
<b>Air Quality</b>	
M-5.7-01	Develop and implement an Air Quality and Dust Control Management Plan (Volume 3, Part E - Section 16.0) that will detail measures to control fugitive particulates (e.g., watering and speed controls).
M-5.7-02	Establish and on-site Air Quality and Meteorology Monitoring Program.
M-5.7-04	Processing plant crushing units will be partially enclosed.
M-5.7-05	Watering of 10 mm crushed gravel and 20 mm crushed gravel stockpiles.
M-5.7-06	Processing plant dry screening units will be partially enclosed.
M-5.7-07	Processing plant wet screening process.
M-5.7-08	Material handling will be partially enclosed with or without water (mist) spray.
<b>Climate Change</b>	
M-5.8-01	Major extraction and processing equipment such as the dredger, screens and crusher will be powered by electricity. Extracted and processed material will be transferred around the Project site using a network of electricity-powered conveyors instead of using haul vehicles.

<b>Proposed Mitigation</b>	
<b>No.</b>	<b>Description</b>
M-5.8-02	Ongoing routine maintenance of vehicles.
M-5.8-03	Minimize idling of vehicles and tugs
<b>ECONOMIC</b>	
<b>Sustainable Economy</b>	
M-5.7-01 to M-5.7-08	Measures outlined in Section 5.7 Air Quality.
M-6.1-01	Local hiring and procurement policies and practices.
M-6.1-02	Explore electricity distribution infrastructure and apply for a suitable interconnection to the BC Hydro 138 kV transmission line in order to potentially offer access to BC Hydro electricity service to McNab Creek Strata real estate owners. If this electricity service is realized for strata owners then reliance on generators would be diminished along with their associated noise and air emissions.
M-6.1-03	Implementation of an Access Management Plan to provide special access to certain parts of BURNCO's private property pursuant to discussions between BURNCO and strata residents on access arrangements.
M-6.1-04	Ongoing engagement with McNab Creek Strata residents regarding issues of benefit and concern.
M-7.4-01 to M-7.4-10	Measures outlined in Section 7.4 Visual Resources.
M-9.2-01 to M-9.2-09	Measures outlined in Section 9.2 Noise.
<b>SOCIAL</b>	
<b>Social Conditions</b>	
M-5.1-20	Develop and implement a Spill Prevention and Emergency Response Plan (Volume 3, Part E - Section 16.0).
M-6.1-01	Local hiring and procurement policies and practices. Local hiring of workforce will assist in reducing in-migration and out-migration, and associated effects on housing.
M-7.1-02	Develop and implement an Emergency Response Plan (Volume 3, Part E Section 16.0).
M-7.1-03	Develop and implement an Access Management Plan (Volume 3, Part E Section 16.0).
M-7.1-04	Aggregate transport by an experienced barge and tug operator that implements an Environmental Management System (EMS) in conformance with ISO 14001:2004.
<b>Marine Transportation</b>	
M-7.2-01	Consult with CCG, PPA, HPP, BC Ferries and Squamish Terminals along with other stakeholders regarding potential interference to identify operating practices or vessel route options that should be adopted.
M-7.2-02	Investigate further passage routing options to avoid busy recreational waters and BC Ferries routes particularly during the summer months.
M-7.2-03	Marine transportation management plan will include a procedure for marine stakeholders to consult with the proponent regarding special events such as, yacht races, regattas and marine based festivals.
M-7.2-04	Limit the number of water taxi movements traversing through Thornbrough Channel and to avoid peak recreational boating times, where possible.
M-7.2-05	Marine transportation management plan.
M-7.2-06	Project marine control zone will be marked using buoys subject to TC requirements.
M-7.2-07	Project-related infrastructure will incorporate recommendations of the Navigation Protection Program review process.
M-7.2-08	Dark sky shielded features will be installed in the Project area, where technically possible.
M-7.2-09	Relevant authorities will be notified so that Notices to Mariners and Notices to Shipping can be issued.

Proposed Mitigation	
No.	Description
M-7.2-10	CHS navigational charts and other appropriate nautical publications will be updated to show the terminal and other marine features, where appropriate.
Non-Traditional Land and Resource Use	
M-5.7-01 to M-5.7-08	Measures outlined in Section 5.7 Air Quality.
M-7.2-01 to M-7.2-10	Measures outlined in Section 7.2 Marine Transportation.
M-7.3-01	Barges will be loaded only on weekdays.
M-7.4-01 to M-7.4-10	Measures outlined in Section 7.4 Visual Resources.
M-9.2-01 to M-9.2-09	Measures outlined in Section 9.2 Noise.
Visual Resources	
M-7.4-01	Minimize removal of vegetation and topsoil to ensure that existing natural vegetation is retained and incorporated into site design.
M-7.4-02	Dust suppression techniques should be in place at all times during construction.
M-7.4-03	Keep the scale and size of infrastructure components and layout concentrated.
M-7.4-04	Any desired planting programs for vegetative screening of land-based structures should be considered as results will not be immediately effective.
M-7.4-05	Preserve the level of structure contrast of infrastructure components by re-finishing and maintaining external surfaces as required.
M-7.4-06	Maintain natural screening to decrease the visibility of extraction and processing activity.
M-7.4-07	Re-contour and re-vegetate throughout Operation if possible.
M-7.4-08	Planting of berms and temporary planting.
M-7.4-09	Keep the height of stockpiles low to avoid their visibility above existing screening.
M-7.4-10	Negative lighting impacts can be mitigated by installing fixtures that reduce light 'spillage' beyond the direct area of illumination.
HERITAGE	
Heritage Resources	
M-8.1-01	Implement Heritage Resource Chance Find Management Plan (Part E, Section 16.0) that provides management recommendations for avoidance, systematic data recovery or monitoring, in the event that undetected heritage resources are encountered during project activities.
HEALTH	
Public Health	
M-5.7-01 to M-5.7-08	Measures outlined in Air Quality section.
M-9.1-01	Confirmation that a Health and Safety Plan for workers covers the mitigation of exposure of workers to dust and particulate matter.
Noise	
M-9.2-01	Limit construction activity to daytime hours.
M-9.2-02	Schedule significant noise-causing activities to reduce disruption to nearby residents.
M-9.2-03	Position heavy equipment muster points at least 500 m from any receptor.
M-9.2-04	Fit equipment with standard mufflers or silencers and keep in good working order.



Proposed Mitigation	
No.	Description
M-9.2-05	Use acoustical screening from existing on-site barriers.
M-9.2-06	Construct a McNab Creek Flood Protection Dyke, approximately 830 m long and 5 m high on the north side of the aggregate pit.
M-9.2-07	Construct a Pit Lake Containment Berm, approximately 800 m long and 9 m high on the south side of the aggregate pit.
M-9.2-08	Construct a Processing Area Dirt Berm, approximately 230 m and 9 m high on the east side of the processing plant.
M-9.2-09	Dry screens and crusher in the processing plant will be housed in fabric enclosures.

## Fisheries and Freshwater Habitat

Early in the Proposed Project, Fisheries and Oceans Canada (DFO) expressed concerns about the Proposed Project's potential effect on fish and fish habitat as a result of the removal/infilling of the upper segment of WC 2. These concerns have been addressed as follows:

- 1) **“The proposed works will negatively impact fish habitat, consistent with the original High Risk ranking for the project. The extent of the impact is likely significantly greater than currently presented by BURNCO”**

BURNCO undertook several studies to understand the potential effects related to the Proposed Project on fish and fish habitat, this includes a mass-balance water quality model, hydrogeological model and a hydrodynamic model of the pit lake. Details regarding these models are provided in Volume 4, Part G – Section 22.0: Appendix 5.5-B, 5.5-D, and 5.6-D. The outcome of these models were used to assess the potential Project-related effects to fish and fish habitat which is provided in Volume 2, Part B – Section 5.1: Fisheries and Freshwater Habitat assessment.

- 2) **“The assessments conducted to date [i.e., late 2010] by the Proponent are not sufficient to completely characterize all of the impacts to fish and fish habitat”**

The models described above were completed to satisfy this concern. Additional Proposed Project design elements were used to avoid and reduce the potential effects to fish and fish habitat. These are described in Volume 2, Part B – Section 5.1.

- 3) **“Risks of avulsion for McNab Creek, saltwater intrusion, and to marine mammals – DFO acknowledges these are less than originally anticipated”**

An assessment of avulsion risk was conducted and is described in Volume 4, Part G – Section 22.0: Appendix 5.4-A. The potential for saltwater intrusion is considered in the surface water effects assessment and the hydrogeological model (Volume 2, Part B – Section 5.5 and Volume 4, Part G – Section 22.0: Appendix 5.6-D). Potential Project related effects on marine mammals is described in Volume 2, Part B – Section 5.2.

- 4) **“Options for adequate fish habitat compensation within McNab Creek or greater Howe Sound are severely limited and may not allow the proposed development to meet DFO's fish habitat policy objectives, including “No Net Loss” guiding principles”**

A Fish Habitat Offset Plan is provided in Volume 4, Part G – Section 22.0: Appendix 5.1-B. The plan was designed to offset the loss of habitat at a high ratio (i.e., more habitat created than will be lost).

**5) “The pit design detail and water/wastewater management plan require further development”**

Pit design details and the use and recycling of water for the Proposed Project is described above in Section 2.5.1. An Erosion and Sediment Control Plan is provided in Volume 4, Part G – Section 22.0: Appendix 3.

In addition to these general concerns outlined by DFO, five specific areas of interest have been identified by BURNCO. Table 1-3 summarizes these areas of interest and how they are addressed.

**Table 1-3: Summary of Areas of Interest Related to Fish and Fish Habitat**

Area of Interest	Summary	EAC Application /EIS Reference
1. Harlequin Creek	There are no proposed works in or drainages to Harlequin Creek. No flow changes to the creek are predicted.	Volume 2, Part B – Section 5.1
2. The freshwater inlets along the foreshore	There are no proposed works in these watercourses. A slight increase in flow is predicted to these watercourses.	Volume 2, Part B – Section 5.1 and Volume 2, Part B – Section 5.5
3. The upper and lower portions of the groundwater-fed watercourse (WC 2)	Removal of the upper segment of WC 2 will result in habitat loss. Reductions in flow in the lower segment of WC 2 will result in a decrease in wetted area which will be offset by a proposed new groundwater-fed channel extension.	Volume 2, Part B – Section 5.1 and Volume 4, Part G – Section 22.0: Appendix 5.1-B
4. Low flow conditions of McNab Creek	Baseflows in McNab Creek are predicted to remain above baseline conditions during operations and after reclamation and closure.	Volume 2, Part B – Section 5.5
5. Water management along the western slopes of the property	There are no proposed works in the watercourses around the western slope of the property. No potential effects to surface water were identified. How water will be managed at the site is described above in Section 2.5.1 and in the other section referenced in column 3 of this table.	Volume 2, Part B – Section 5.5 Volume 2, Part B – Section 5.6

The Proposed Project will not lead to a reduction in the quantity or quality of fish habitat. The Fisheries and Freshwater Habitat assessment included design and analysis to support a habitat offsetting program (extension of the lower segment of WC 2) to achieve no harm to fish or fish habitat. The loss of the riparian and instream habitat associated with the upper segment of WC 2 will be adequately offset by the extension of the lower segment of WC 2 (Figure 8). The extension is predicted to lead to an increase in both instream and riparian habitat for anadromous salmonids and resident Cutthroat Trout.

The majority of the Proposed Project-related residual effects can be mitigated through planning and implementation of known and effective mitigation measures, including a comprehensive Environmental Management Programme involving:

- Construction and Operational Management Plans (CEMPS and OEMPs);
- Fisheries Habitat Protection and Mitigation Plan;
- Spill Prevention and Emergency Response Plans (SPERP);

- Erosion and Sediment Control Plan (ESCP); and
- Fish Habitat Offset Plan.

All potential Project-related residual adverse effects were determined to be negligible. No residual effects were carried forward to a cumulative effects assessment.

A detailed assessment of potential fisheries and freshwater habitat effects of the Proposed Project is presented in Section 5.1 of the EAC Application/EIS.

### **Marine Resources**

The Proposed Project is not anticipated to lead to a reduction in the quality of marine habitat. Any habitat lost as a result of in-water structures will be limited to piles and will be offset as detailed in the Fish Habitat Offset Plan. In addition, the majority of the marine related effects are expected to be confined to intertidal and subtidal areas that have previously been impacted by log dumping activities and is considered to be of low habitat value. Potential injury effects on marine mammals and fish related to underwater noise will be effectively mitigated through the implementation of monitoring programs during pile driving activities in accordance with a Pile Driving Management Plan.

The majority of the Proposed Project-related residual effects can be mitigated through planning and implementation of known and effective mitigation measures, including:

- Construction and Operational Management Plans (CEMPS and OEMPs);
- Spill Prevention and Emergency Response Plans (SPERP);
- Erosion and Sediment Control Plan (ESCP); and
- Fish Habitat Offset Plan.

All potential residual effects on marine resources were predicted to be negligible or not significant given the magnitude, ecological context and likelihood of occurrence.

Potential cumulative effects of marine mammal disturbance from underwater noise were assessed and determined to not significant.

A detailed assessment of potential marine resource effects of the Proposed Project is presented in Section 5.2 of the EAC Application/EIS.

### **Terrestrial Wildlife**

Potential Project-related effects on amphibians, northern goshawk, marbled murrelet, band-tailed pigeon, western screech-owl, common nighthawks, Roosevelt elk and grizzly bears were assessed.

The Proposed Project will remove potential breeding habitat for amphibians. Compensation habitat, as detailed in the Fish Habitat Offset Plan, as well as the addition of the pit lake at closure, is expected to offset the loss of habitat. Amphibian salvaging will further reduce the potential for Project-related effects of mortality.

The Proposed Project is not predicted to result in the loss of northern goshawk or suitable marbled murrelet nesting habitat. After reclamation, northern goshawk and marbled murrelet are predicted to recover from disturbance effects experienced during construction and operational phases.

Construction of the Proposed Project will result in the loss of suitable band-tailed pigeon nesting and foraging habitat. It will not contribute to the loss of mineral sites or the proliferation of disease. Progressive reclamation will replace band-tailed pigeon foraging habitat as the Proposed Project proceeds.

The Proposed Project will remove mature forest habitat that may contain suitable nesting trees for western screech-owl. To mitigate this loss of habitat, the installation of nest boxes is proposed. After reclamation, western screech-owl are predicted to recover from disturbance effects experienced during construction and operational phases.

The Proposed Project will require removal of less than 0.1% of potential nesting habitat for common nighthawks in the region. After reclamation, common nighthawk populations are predicted to recover from disturbance effects experienced during construction and operational phases.

Project noise will affect approximately 3% of suitable Roosevelt elk winter habitat within the region and < 1% of suitable habitat will be lost due to clearing. Well planned and executed reclamation of the Proposed Project area will support restoration of suitable Roosevelt elk winter range habitat. After reclamation, Roosevelt elk populations are predicted to recover from disturbance effects experienced during construction and operational phases.

The Proposed Project area falls within the range of the Squamish-Lillooet Grizzly Bear Population Unit. Grizzly bear have not been recorded in the Proposed Project area over three years of survey data collection. They may occasionally move through the area or forage in McNab Creek. Potential effects of habitat loss and mortality during construction and operations were assessed. As grizzly bears are not expected to occur within the Proposed Project area, the Proposed Project is not predicted to contribute to the potential mortality of the species. After mitigation, the adverse effects of the Proposed Project are not likely to contribute to factors limiting the population and are therefore determined to be not significant. During reclamation and closure, wildlife habitat will return to at least a capability equivalent to baseline conditions.

The majority of the Project-related effects can be mitigated through Project planning, including:

- Construction and Operational Management Plans (CEMPS and OEMPs);
- Spill Prevention and Emergency Response Plans (SPERP);
- Erosion and Sediment Control Plan (ESCP);
- habitat enhancement for western screech-owl through the installation of nest boxes; and
- progressive reclamation and habitat compensation during Operation and Reclamation and Closure.

Net potential residual effects on terrestrial wildlife were determined to be negligible to not significant. Cumulative residual effects on amphibian species at risk, western screech-owl, and Roosevelt elk were assessed and determined to be not significant. Since the Squamish-Lillooet GBPU is considered threatened, the net cumulative residual effects to grizzly bear was determined to be significant. The development of new logging roads may increase vehicle collisions. Since grizzly bears are not expected to occur within the Proposed Project area, the Proposed Project is not predicted to contribute to the potential mortality of the species.

A detailed assessment of potential terrestrial wildlife effects of the Proposed Project is presented in Section 5.3 of the EAC Application/EIS.

### **Terrestrial Vegetation**

The Proposed Project will result in the temporary loss of 0.7 ha of riparian ecosystem and 0.88 ha of wetland ecosystem during the construction and operation of the Proposed Project, plus the time required for re-establishment post-reclamation. Re-establishment to current conditions is expected to occur within 150 years. Post-closure, a positive net effect to the sensitive ecosystems is predicted to result from the creation of 3.3 ha of new riparian area around the pit lake.

The key residual effect to terrestrial vegetation associated with the Proposed Project is the permanent loss of 23.7 ha of the blue-listed Western hemlock – Amabilis fir – Deer fern upland forest, and 0.2 ha of the provincially red-listed Sitka spruce – Salmonberry high fluvial bench forest due in the area of the proposed aggregate pit. The severity of this effect is mitigated by the Project design, which is sited entirely within areas previously disturbed by forest harvesting and other anthropogenic disturbance.

The Proposed Project will also result in the temporary loss of 20.6 ha of Western hemlock – Amabilis fir – Deer fern upland forest, 0.8 ha of Western red cedar – Sitka spruce – Skunk cabbage swamp forest, 0.3 ha of Sitka spruce – Pacific crab apple riparian forest, 0.08 ha of Tufted hair grass – Douglas' aster estuarine meadow, and 0.4 ha of Sitka spruce – Salmonberry high fluvial bench forest. The significance of this effect was determined to be not significant.

The potential risk for the introduction of deleterious substances will be controlled with the preparation of Construction and Operational Management Plans (CEMPS and OEMPs), on-site environmental monitoring, and scheduled equipment inspections and maintenance. These measures will reduce the likelihood of an accident or malfunction that would result in a spill. A Spill Prevention and Emergency Response Plan will also be prepared and implemented. It is expected that mitigation will reduce the likelihood of this occurrence to low; therefore, the significance rating of this effect is negligible.

All remaining potential terrestrial vegetation effects (i.e., increased dust, surface runoff, invasive species, windthrow, and soil disturbance) considered in this assessment were determined to be negligible with the application of appropriate mitigation.

Net potential cumulative effects on terrestrial vegetation was determined to be not significant.

A detailed assessment of potential terrestrial vegetation effects of the Proposed Project is presented in Section 5.3 of the EAC Application/EIS.

## **Geotechnical Hazards**

Although altering subsurface conditions could lead to rapid loss of soil strength resulting in amplified liquefaction, ground settlement or lateral shifts, potential detrimental changes to subsurface and stability conditions can be minimized or mitigated by appropriate design and construction measures. With the implementation of mitigation, potential residual effects related to increased ground movement during earthquake event (liquefaction, settlement, lateral movement, rupture) were determined to be negligible.

Although altering subsurface conditions could impact the volume of erodible shoreline soils during an earthquake or landslide initiated tsunami-related event and result in increased sedimentation of the marine environment, these potential effects can also be addressed through appropriate design and construction.

During earthquake events, slumping and instability of the steep fan-delta front submarine slopes may occur. However, under static loading conditions, submarine slopes are assumed to be stable. Geotechnical and geophysical subsurface investigations, engineered designs, and construction monitoring will be conducted where static loading conditions may be affected. Mitigation includes design of facility and structures to be built to specified building code for design level earthquakes with 1:2,475 to more than 1:5,000 year return periods. With the implementation of mitigation, potential residual effects related to Proposed Project-related initiation of Submarine Landslides were considered negligible.

A detailed assessment of potential geotechnical and natural hazard effects of the Proposed Project is presented in Section 5.4 of the EAC Application/EIS.

## **Terrain Stability**

No terrain stability concerns have been identified within the Proposed Project area. Proposed Project activities are not expected to induce land based mass wasting events such as landslides, snow avalanches, and debris flows and debris floods. Although geologic phenomena such as landslides, steep valley sidewall debris and rock slides and snow avalanches are common in the McNab Creek watershed, they are not expected to directly affect the Proposed Project area. The Proposed Project will increase the potential for initiating mass movement processes (landslides and snow avalanches).

It is unlikely that there is a significant potential for debris flows and debris floods to occur upstream of the Proposed Project area. Further investigation and assessment will be required to inform detailed engineering designs prior to construction. All potential terrain stability effects were determined to be negligible.

A detailed assessment of potential geotechnical and natural hazard effects of the Proposed Project is presented in Section 5.4 of the EAC Application/EIS.

## **Surface Water Resources**

The Proposed Project was predicted to have positive effects on the flows in McNab Creek by reducing the rate of flow loss to the groundwater system in the segment of McNab Creek adjacent to the proposed aggregate pit. Increase baseflows are also predicted in the foreshore minor streams.



During operations, the analysis indicates that the baseflow in WC 2 will be reduced in the range of 19% and 37% compared to pre-Proposed Project conditions. Despite the reductions in baseflow, other hydrologically significant variables including total wetted surface area and average flow depth of WC 2 are expected to increase with the implementation of proposed mitigation. Potential effects related to reductions in surface water flows are related to the most sensitive receiver in WC 2 identified as fish and fish habitat. All potential Project-related residual adverse effects on fish and fish habitat were determined to be negligible.

Potential effects on water quality related to suspended sediments and chemical spills were assessed. Throughout the life of the Proposed Project, measures are proposed to reduce the potential for sediment erosion, transport and deposition into any stream or watercourse and spills. Potential effect surface water quality were determined to be negligible with the development and implementation of effective control measures, including:

- Construction and Operational Management Plans (CEMPS and OEMPs);
- Spill Prevention and Emergency Response Plans (SPERP);
- Material Storage, Handling and Waste Management Plans (MSHWMPs);
- Erosion and Sediment Control Plan (ESCP); and
- Best Management Practices.

A detailed assessment of potential surface water resource effects of the Proposed Project is presented in Section 5.5 of the EAC Application/EIS.

### **Aquatic Health**

Potential effects assessed for aquatic health indicators (i.e., periphyton, benthic invertebrate communities and fish populations) included direct toxicity and nutrient enrichment related to changes in water quality. The aquatic health residual effects assessment used water quality predictions modelled for several locations within the receiving environment. These predictions were compared to water quality guidelines (WQG) for the protection of aquatic life. Most predictions were below applicable WQGs or were not distinguishable from baseline conditions. Predicted water quality concentrations without WQGs that were above baseline conditions were not expected to result in adverse effects on aquatic indicators. The magnitude of direct toxicity and nutrient enrichment-related effects on aquatic health is expected to be negligible. With the implementation of mitigation (e.g., surface water quality monitoring program, monitoring of periphyton biomass, and monitoring of benthic communities) all potential residual effects related to aquatic health were determined to be negligible. No residual effects on aquatic health were carried forward to a cumulative effects assessment.

A detailed assessment of potential surface water resource effects of the Proposed Project is presented in Section 5.5 of the EAC Application/EIS.

## Groundwater Resources

Potential effects of the Proposed Project on groundwater flow and groundwater quality were assessed.

A three-dimensional numerical hydrological model was developed to assess potential effects on groundwater flow/quantities. Although groundwater flow is predicted to be less than the baseline during the first 15 years of operation, reduced groundwater loss from McNab Creek are predicted to result in an overall benefit to the environment. In the last year of operations and through to reclamation and closure, groundwater flow is expected to increase by 2% from the baseline condition.

A mass-balance water quality model was developed to assess potential effects on groundwater quality, which were determined to be negligible; no water quality parameters were predicted to exceed British Columbia Water Quality or Canadian (BCWQ) or Council of Ministers of the Environment (CCME) guidelines throughout operations and reclamation and closure.

Proposed mitigation includes limiting excavation to the southern portion of the delta/fan, developing and implementing a Reclamation and Effective Closure Plan, and setting the height of the overflow structure at closure at 5.2 m to maintain groundwater flow rate. Proposed mitigation is considered effective and incorporates adaptive management techniques that can be undertaken if monitoring data indicates a different balance between losses from McNab Creek, changes in groundwater flow rates and the water flow in down gradient aquatic habitat need to be achieved.

The assessment of significance of potential effects on groundwater flow and groundwater quality used an approach that was conservative in nature so that there is a high level of confidence that the Proposed Project-related effects have not been underestimated. No residual effects on groundwater were carried forward to a cumulative effects assessment.

A detailed assessment of potential groundwater resource effects of the Proposed Project is presented in Section 5.6 of the EAC Application/EIS.

## Air Quality

Potential effects of the Proposed Project on air quality indicators were assessed. Proposed mitigation such as enclosing material drop areas and mist sprays were incorporated into the air quality model. An Air Quality and Dust Control Management Plan will be developed that will detail control measures, such as watering and speed controls that must be in place to limit fugitive particulates.

Particulate matter concentrations (TSP, PM<sub>10</sub> and PM<sub>2.5</sub>) at the nearest receptor site where people live (less than 0.37 km from the facility's fence-line) were predicted to be below ambient air quality standards. Potential residual effects were determined to be not significant.

Predictions for NO<sub>2</sub> and SO<sub>2</sub> at sensitive receptors were determined to be negligible (i.e., less than 25% of the respective air quality objectives). One additional tugboat trip per operational day (300 days per calendar year) on existing barging routes was determined to result in an increase in SO<sub>2</sub> and NO<sub>2</sub> emission rates of less than 5% in the Lower Fraser Valley.

Potential cumulative residual effects of particulate emissions are predicted to be of negligible magnitude and fully reversible; these potential effects were therefore also determined to be negligible.

A detailed assessment of potential air quality effects of the Proposed Project is presented in Section 5.7 of the EAC Application/EIS.

## **Climate Change**

The consideration of climate change was carried out in accordance with the general guidance document for practitioners prepared by the Federal-Provincial-Territorial Committee on Climate Change and Environmental Assessment.

The climate projections for the Proposed Project region were based on Pacific Climate Impacts Consortium (PCIC's) Regional Analysis tool. The future climate at the Proposed Project location was forecast to have higher temperatures and generally increased precipitation levels. Using the historical climate trends and the future climate projections, the effects of climate on the Proposed Project were analysed by developing a climate risk matrix to identifying potential climate infrastructure interactions. The effects of a potentially changing climate on the Proposed Project were determined to be not significant.

The direct and indirect Greenhouse Gas (GHG) emissions associated with the Proposed Project were quantified and compared to the current provincial, national sector and federal totals. The conservative estimate of Proposed Project GHG emissions is only 0.0082% of the BC emissions, 0.00072% of the total national emissions and 0.00001% of global emissions. The contribution of Proposed Project GHG emissions to the provincial and federal totals are considered negligible. Based on the calculation methodology for the Proposed Project GHG emissions, the confidence level is considered to be high. Therefore, the influence of the Proposed Project GHG emissions on totals was determined to be negligible.

The influence of the Proposed Project GHG emissions on climate change was assessed by determining whether any measurable change in climate could result from the Proposed Project GHG emissions. The relatively minor increase in global emissions associated with the Proposed Project would correspond to a change in climate that is unlikely to be measurable and was determined to be negligible. This conclusion is supported by federal guidance which indicates that "...unlike most project-related environmental effects, the contribution of an individual project to climate change cannot be measured," and the confidence level is considered to be high. Therefore, the influence of the Proposed Project GHG emissions on climate change was determined to be not significant.

Despite the negligible effect on climate change, the Proposed Project includes in-design mitigation measures that will reduce GHG emissions that are consistent with specific actions within the Sea-to-Sky Air Quality Management Plan (SSAQMP) (Sea to Sky Clean Air Society 2007).

A detailed assessment of potential climate change effects of the Proposed Project is presented in Section 5.8 of the EAC Application/EIS.

## **Sustainable Economy**

The Proposed Project would generate a total count of 119 jobs over the up to two year construction phase and an annual average of a total of 99 direct, indirect and induced jobs during the operations phase in BC. In general, the annual average figure can be viewed as the number of direct long-term jobs that would be generated through the operation of the new sand and gravel extraction and processing operation. An estimated total of the available 33

long-term jobs that are connected to the Proposed Project are expected to be filled by Sunshine Coast residents during its operation phase. Based on foreseen labour supply and capacity conditions, there is expected to be sufficient capacity within the Sunshine Coast Regional District (SCRD) labour force to meet BURNCO's hiring demand for labour during both construction and operation phases.

McNab Creek Strata is located to the east of McNab Creek, approximately half a kilometre from the northern boundary of the BURNCO property. McNab Creek Strata is a bare land strata and includes 16 lots, as well as 22 ha of adjacent forested land on the hill to the east of McNab Creek and is water access. The marketplace values of McNab Creek Strata real estate may be adversely affected by the Proposed Project's construction and operations due to the change in land use on the Property and perceived and/or actual changes to the environmental setting. While it is anticipated that proposed mitigation will help offset Proposed Project effects on real estate values by adding features that will likely enhance their marketplace value (e.g., access to BC Hydro electricity service and elimination of the use of fossil fuel fired generators), it is not currently known if these measures will fully offset any potential adverse effect on real estate values. Potential effects to real estate were determined to be not significant and the Proponent is committed to ongoing engagement with the McNab Creek Strata residents regarding issues of benefit and concern.

The potential cumulative residual effects on real estate values were assessed. A driver for the cumulative effect assessment is the visual disturbance generated through forestry activities. The assessment concluded that potential cumulative effects on real estate were not significant since there were no predicted cumulative effects on noise or air quality, and visual disturbances through forestry activities (that are managed for visual quality objectives on Crown lands) are a longstanding effect in the region.

A detailed assessment of potential economic effects of the Proposed Project is presented in Section 6.1 of the EAC Application/EIS.

## **Social Conditions**

Proposed Project construction and operations is expected to result in a negligible population change in the SCRD or the Town of Gibsons and Electoral Area F. No increase in demand on the housing and commercial accommodation market is anticipated.

BURNCO will provide a water taxi service from the SCRD for its workers during construction and operations. It is anticipated that most workers will be hired either from the Town of Gibsons, other nearby communities and/or the greater Vancouver area, and will commute daily to the water taxi pickup points. During construction, workers whose permanent residence is not in close proximity to the Proposed Project may decide to relocate to Gibsons or the Greater Vancouver area, using either rental accommodation or shorter-term arrangements such as hotels and motels. However, the proportion of workers making such arrangements would not be large enough to affect the local rental and recreational accommodation market.

A small number of operational workers who may not be from the area may relocate permanently to the Town of Gibsons or surrounding area, but the associated population effect and effect on the housing market would be small compared to the larger economic forces driving the housing market in the SCRD, such as retirement and demand for recreational properties. With proposed mitigation measures in place, Proposed Project effects on housing and accommodation were determined to be negligible.

Construction and operations activities could also potentially generate a demand for emergency services due to on-site emergencies, changes in population associated with in-migration of workers, and increased vessel traffic. To mitigate potential Proposed Project use of local emergency services, BURNCO will establish and implement an Emergency Response Plan (ERP) and provide all emergency response services at the Proposed Project site.

Population changes resulting from the Proposed Project are also not anticipated to increase the need for community-based emergency services. Larger vessel traffic through Howe Sound generated by the Proposed Project represents an increase of less than 3% during operations, and it is not expected to affect marine based emergency services. With proposed mitigation measures in place, Proposed Project effects on emergency services were determined to be negligible.

A detailed assessment of potential social effects of the Proposed Project is presented in Section 7.1 of the EAC Application/EIS.

## **Marine Transportation**

Effects considered in the marine transportation assessment included those related to wake effects from the Proposed Project-related vessel traffic on shoreline infrastructure, and interference with navigation use and navigability due to Proposed Project-related infrastructure and vessel traffic.

The maximum calculated wake energy associated with Project vessels was typically less than wind wave energy; wake wash energy from tug and barge movements is anticipated to be less than 1% when compared to the total energy from naturally occurring wind waves along both vessel routes. There is no potential interaction between potential wake effects and shoreline infrastructure, therefore the nature of this interaction was determined to be negligible.

The potential effects of the Proposed Project on navigation use and navigability associated with Project-related infrastructure was determined to be negligible following the implementation of proposed mitigation. Potential effects of the Proposed Project on navigation use and navigability due to Project associated vessel traffic during construction and operations was determined to be not significant as the frequency of small vessels changing direction and speed to move out of the paths of larger vessels is expected to increase only slightly.

Proposed Project-related barging may interact with Woodfibre LNG carriers along a small section of the Project's barging route. However, interactions between vessels associated with each project will occur intermittently when these vessels are simultaneously present in Collingwood Channel. Potential cumulative residual effects are expected to be not significant following implementation of mitigation measures.

A detailed assessment of potential marine transportation effects of the Proposed Project is presented in Section 7.2 of the EAC Application/EIS.

## **Non-Traditional Land and Resource Use**

The Proposed Project is occurring on private property owned by BURNCO that has allowed access into and through the Property for the purposes of forestry and industrial development and will continue to do so during construction and operation. As a result, no negative effects on forestry, mining or industrial development were identified.

Coastal Inlet Adventures, the guide outfitter with a tenure that overlaps the Proposed Project area, has the ability to access Crown lands via forestry roads in the north using a landing craft capable of carrying ATVs. Access via forestry roads from Salmon Inlet would not be restricted by the Proposed Project.

The eastern side of the Proposed Project area (outside of the Property), both in the marine waters and below the high tide mark on the beach near the mouth of McNab Creek is considered to have higher recreational use activity than the jetty area on the other side of the Property. During construction and operation, this area would remain available for public use, so no displacement of recreation due to the Proposed Project is expected in this area.

On an intermittent basis, the vessels and other watercraft of recreational marine-users are anticipated to have to make minor alterations in direction and/or speed when navigating at the same time as Project associated water taxis and barges. These temporary displacement effects due to the Proposed Project were determined to be negligible.

Potential adverse effects to the quality of the environmental setting of recreational marine harvesting and tourism activities are anticipated to result from changes in noise levels, air quality and visual quality. Measures proposed to address these key nuisance concerns also mitigate the potential effects on the quality of the environmental setting. As a result, the potential residual adverse effects were determined to be not significant; further, recreational and tourism activities are not expected to be displaced and the effect is expected to be limited to the life of the Proposed Project.

Potential cumulative effects on the quality of the environmental setting for recreational harvesting of fish and shellfish and tourism were assessed. A driver for the cumulative effect assessment is the visual disturbance of ongoing forestry activities. The assessment concluded that potential cumulative residual effects on recreational harvesting of fish and shellfish and tourism were not significant since no cumulative effects on noise or air quality are anticipated, and visual disturbances of forestry activities (that are managed for visual quality objectives on Crown lands) are a longstanding effect in the region.

A detailed assessment of potential non-traditional land and resource effects of the Proposed Project is presented in Section 7.3 of the EAC Application/EIS.

## **Visual Resources**

The Proposed Project is anticipated to be partially visible, with effects limited mostly to portions of marine and ancillary facilities and activities related to marine loading and lighting. There is the potential for adverse effects on visual quality since the Proposed Project components and activities related to construction and operation will present visible anthropogenic features to the existing landscape setting.

Following the application of proposed mitigation measures, the residual effects are predicted to present a relatively small level of visual change to the landscape with effects diminishing with increasing viewing distance from the Proposed Project site. Residents of McNab Creek Strata and recreational marine users in Thornbrough Channel are likely to be most affected, however potential residual effects were determined to be not significant.

The removal of land-based and marine infrastructure and site reclamation during the reclamation and closure phase are expected to reduce residual visual effects related to construction and operation phases of the Proposed Project and will rehabilitate the existing exposed area of the site to a more natural visual condition. There is the



potential to provide positive social and recreational effects related to an increase in scenic character of the Proposed Project site following closure.

The residual cumulative effects are predicted to present a regional, medium-term and moderate level of visual change to the landscape related to the residual visual effects of the Proposed Project contributing to residual visual effects with other certain or foreseeable developments including forestry activity and development of a run-of-river hydroelectric project. Within a context that demonstrates visible disturbance from past and current activities and has a high sensitivity to adverse visual change, the residual effects of the Proposed Project and the residual cumulative effects were not predicted to demonstrate an evident contrast with the current landscape character or to produce a noticeable decline in the current level of visual quality.

A detailed assessment of potential visual resource effects of the Proposed Project is presented in Section 7.4 of the EAC Application/EIS.

## **Heritage Resources**

No heritage resources were observed or identified in the Proposed Project area. Two areas of archaeological potential were identified; twenty-eight shovel tests were excavated, with negative results. Palaeontological desktop studies resulted in the development of palaeontological sensitivity ratings. Areas of high palaeontological sensitivity are noted within the Proposed Project area.

The significance of residual effects to heritage resources during the Proposed Project were determined to be not significant. While archaeological field studies have been completed and no archaeological sites were recorded, the Proposed Project area does retain potential to contain buried archaeological materials. If heritage resources are encountered during operations, potential effects mitigation would be mitigated through the development and implementation of a Heritage Resource Chance Find Management Plan.

Heritage resources within the region could be negatively impacted through wave-generated erosion causing a change to the integrity and to the context of the resources. Heritage resources within the region could also be negatively impacted in the event of a spill during operations resulting in a change in the integrity of the resource, causing a change to the integrity and to the context of the resources. Should a future spill occur resulting in potential impacts to inter-tidal or sub-tidal areas where heritage resources may be present, it is recommended that an appropriate management strategy be developed in consultation with the Archaeology Branch, the *Skwxwú7mesh* (Squamish) First Nation, and the Tsleil-Waututh Nation.

Cumulative residual effects on heritage resources could result from erosion of intertidal and near shore areas in combination with impacts as a result of log-dumping activities. All potential cumulative effects related to changes to heritage resource integrity, context and accessibility (if present) were assessed as not significant.

A detailed assessment of potential heritage resource effects of the Proposed Project is presented in Section 8.1 of the EAC Application/EIS.

## Public Health

Potential effects on human health assessed included Proposed Project activities contributing to emissions of constituents to air, and to deposition of particulate matter to terrestrial environments and emission of substances to aquatic environments. Since potential VCs and pathways do not have significant residual effects for each chemical of potential concern (COPC), it is considered unlikely that the Proposed Project will have a significant effect on human health. All potential effects related to human health were determined to be negligible or not significant.

It was not possible to conduct a quantitative cumulative effects assessment for human health, as there is insufficient information available to conduct water and air quality modelling of other certain and reasonably foreseeable projects and activities.

A detailed assessment of potential public health effects of the Proposed Project is presented in Section 9.1 of the EAC Application/EIS.

## Noise

Noise from Proposed Project construction and operations has been assessed in accordance with the Commission Guideline and Health Canada Guidance. In particular, Proposed Project construction and operation noise levels were predicted using computer noise models for eight construction phases and three operation scenarios. The cumulative noise levels were calculated and compared to relevant assessment criteria – i.e., the Commission Guideline Permissible Sound Levels (PSL), the Directive 038 Low Frequency Noise (LFN) threshold, and the Health Canada Guidance change in High Annoyance (%HA) and speech intelligibility metrics.

The important conclusions of the noise assessment are:

- The residual effect of the Proposed Project construction to the acoustic environment, as characterized via the noise levels VC, is found to be negligible and there is no significance to the effect;
- The residual effect of the Proposed Project operation to the acoustic environment, as characterized via the noise levels VC, is found to be negligible and there is no significance to the effect; and
- The residual effect of the Proposed Project reclamation and closure to the acoustic environment, as characterized via the noise levels VC, is found to be negligible and there is no significance to the effect.

The Sunshine Coast Regional District noise bylaw has also been considered in this assessment. As the magnitude of the Commission Guideline and HC Guidance assessments of the Proposed Project operations were negligible, the nuisance-based bylaw should be satisfied.

A detailed assessment of potential noise effects of the Proposed Project is presented in Section 9.2 of the EAC Application/EIS.

## Effects on Aboriginal Rights, including Current Use

Information on the Aboriginal Groups identified by BC EAO and the CEA Agency was compiled through consultation with the Aboriginal Groups and from publicly available sources. This information was used to

document use by *Skwxwú7mesh* Nation and by Tsleil-Waututh Nation, Musqueam Indian Band, Stz'uminus First Nation, Cowichan Tribes, Lyackson First Nation, Penelakut Tribe and Métis Nation British Columbia. This information formed the basis of the effects assessment on Aboriginal Rights, including current use, as a result of the Proposed Project.

Consultation activities during the Pre-Application stage focused mainly on the Aboriginal Groups listed in the Section 11 Order (Schedule B): *Skwxwú7mesh* Nation and Tsleil-Waututh Nation. Consultation with these Aboriginal Groups will continue throughout the Application Review stage and post-certification.

Potential effects on Aboriginal Rights, including current use, as a result of Proposed Project activities were identified for the *Skwxwú7mesh* Nation and the Tsleil-Waututh Nation. Following implementation of the recommended mitigation measures for *Skwxwú7mesh* Nation Aboriginal Rights and for Tsleil-Waututh Nation Aboriginal Rights, residual effects will remain. In the case of *Skwxwú7mesh* Nation Aboriginal Rights, the measurable residual effects following mitigation are considered not significant. No measurable residual effects are expected on Tsleil-Waututh Aboriginal Rights, including current use, following mitigation. The results of the effects assessment on Aboriginal Rights, including current use, are summarized in Section 14 of the EAC Application/EIS.

For *Skwxwú7mesh* Nation, the conclusion of “acceptable impacts” is contingent on the mitigation documented, most of which requires further implementation and/or deep consultation with *Skwxwú7mesh* Nation. It is also limited to the Proposed Project as defined: the size of operations and relatively short lifespan of the Proposed Project are very important considerations. Consequently, the conclusion of non-significant residual effects is presented with moderate confidence. Due to this uncertainty, *Skwxwú7mesh* Nation has reserved the right to revise this conclusion should new and important information be revealed, or should the Proposed Project details change.

Consultation activities are also the recommended mitigation between the Proponent and Tsleil-Waututh Nation to address incremental effects on quality of experience from the Proposed Project on Tsleil-Waututh Nation Aboriginal Rights. Without further consultation and, potentially, accommodation of Tsleil-Waututh's Aboriginal Rights, the Proposed Project may have ongoing effects on quality of current use experience for Tsleil-Waututh users of the Proposed Project area.

### **Environmental Management Programme**

An Environmental Management Programme is proposed to provide performance-based environmental requirements, standard protocols, and mitigation measures to avoid and reduce the potential for environmental effects throughout the Proposed Project. The development and implementation Construction and Operational Environmental Management Plans (CEMP and OEMP) will reduce the potential for adverse environmental effects. The CEMP would consist of the Management Plan and several site or activity-specific Environmental Protection Plans (EPPs) and EMP Component Plans. The CEMP for the Proposed Project provides performance-based environmental requirements to be met by Contractor(s) in conducting work in accordance with regulatory approvals, BMPs, Commitments and Assurances, and engineering specifications. Environmental management plans will be developed in consultation with relevant permitting agencies, local governments, the *Skwxwú7mesh* (Squamish) First Nation, and the Tsleil-Waututh Nation and will be considered living documents that can be adapted as necessary throughout the lifetime of the Proposed Project.

Environment monitoring plans will be developed by qualified environmental professionals and implemented to achieve compliance with EA conditions and with terms and conditions of regulatory permits and approvals. Monitoring will consist of two main components: compliance monitoring and effects monitoring. BURNCO commits to providing the funding for these monitoring initiatives.

Compliance monitoring will occur during all phases of the Proposed Project. Compliance monitoring will include assessment of Proponent and contractors' environmental performance using specifically developed performance indicators and benchmarks. Where possible, an adaptive management approach will be used to modify management plans as needed based on the results of the monitoring program. Monitoring programmes provide an opportunity for local community members and First Nations groups to be involved in the development and implementation of monitoring initiatives. This will be clearly defined within the final monitoring framework which will be developed for each of the areas described below.

Effects monitoring will include periodic sampling or studies on/of groundwater, vegetation, wildlife, fish, air quality, surface water and aquatic health. Monitoring plans will establish timelines and schedule for each monitoring activity. Programmes may commence during construction, operations or reclamation phase of the Proposed Project. The schedule and length of the programme will be provided. Some additional monitoring programmes may be suggested after the Proposed Project has commenced. Adaptive management techniques will be applied to all monitoring programmes.

### **Effects Monitoring (Follow-up Programmes)**

The sections below describe the effects monitoring and follow-up programmes that will be applied during the Proposed Project. This is in addition to the compliance monitoring that has been described above for construction and operations EMPs. Programmes may commence during construction, operations or reclamation phase of the Proposed Project. The schedule and length of the programme will be provided. Some additional monitoring programmes may be suggested after the Proposed Project has commenced. Adaptive management techniques will be applied to all monitoring programmes. Follow-up monitoring programmes will be developed for the following disciplines:

- **Groundwater** - Monitoring of the groundwater flow rates, hydraulic heads and quality will be completed during construction, operations and reclamation and closure. Adaptive management will be undertaken if necessary.
- **Vegetation** - Vegetation monitoring will include an assessment of windthrow as well as post-reclamation monitoring.
- **Wildlife** - Wildlife monitoring will include yearly monitoring of amphibians, birds and mammals within the LSA to track species presence, abundance and habitat use. A water quality monitoring program will be developed and implemented which includes monitoring temperature, pH and total suspended solids (at a minimum) in retained amphibian breeding locations.
- **Fish and Fish Habitat** - Monitoring plans will include clear objectives for monitoring the continued use of habitat by fish and the integrity of fish habitat. The plans will describe procedures for conducting community assessments of fish-bearing streams in the LSA with the objective of determining measurable changes to fish habitat structure and function. Monitoring plans will also describe the proposed use of flows from the pit lake outlet structure to maintain fish habitat within the proposed groundwater-fed channel extension (e.g., WC2 offset habitat). Habitat offset monitoring will be conducted to confirm that habitat offset measures outlined in the Habitat Offset Plan are implemented and to assess the functionality of the constructed offset habitat.

- **Air Quality** - Control of emissions during the construction phase will include the establishment of a continuous air quality and meteorological monitoring program. The program will be installed prior to the construction phase; this will allow data comparison between pre-construction and construction activities to better determine the impact of the construction activities.
- **Surface Water Quality** - The surface water quality monitoring program for the Proposed Project will include the collection of surface water samples for analytical chemistry and *in situ* measurements of water quality parameters.
- **Aquatic Resources** - Baseline monitoring of periphyton biomass will be undertaken in McNab Creek at stations MC-1 and MC-7 as well as a suitable location upstream of mine influence prior to construction. Algal biomass data will also be collected at MCF-6 and MCF-12 downstream of the pit lake under baseline conditions prior to construction of the fish offset habitat. These data will represent baseline data in a future biological monitoring program should a program be initiated.

## Project Benefits

The Proposed Project would have a positive effect on the local and B.C. economy, increasing the demand for goods, services and labour and generating tax revenue for all levels of government. During construction, total expenditures on goods and services by BURNCO are expected to be \$21.5 million. Total direct expenditures from the Proposed Project accruing to suppliers of B.C. produced goods and services would be approximately \$8.3 million during construction, and approximately \$13.0 million per year during operations. In total, there would be close to \$170 million in direct spending on materials, goods and services produced in B.C.

Employment will include approximately 80 and 360 person-years of direct employment during construction and operations respectively. Household spending of the Proposed Project's direct and indirect labour would provide another goods and services supply opportunity for businesses. Induced output over the two-year construction phase is expected to be an estimated \$1.9 million CDN in BC and about \$0.8 million CDN locally. The average annual induced output the Proposed Project operations is anticipated to be \$0.75 million CDN locally and \$2.1 million CDN province-wide.

BURNCO plans to implement the measures to enhance economic benefits generated by the Proposed Project for local residents and businesses, including hiring policies and practices to support local employment and policies and practices to support local procurement.

The assessed value of the Property for 2014 totalled approximately \$628,800, which reflects current use as a managed forest and property tax payments for 2014 totalled \$6,319<sup>1</sup>. The payments of property taxes to the SCRDC and the BC Government would be much higher for the Property as a result of the change in assessment class to light industry and the rise in assessed value based on the use for aggregate extraction and processing. From a local perspective, the Property is subject to electoral area tax, and defined service area taxes for regional planning, regional recreation, animal control and Sunshine Coast Hospital. In addition there would be property taxation by the BC Government for school and general purposes.

In addition to those economic benefits described above, other benefits or positive effects will include:

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<sup>1</sup> The shown assessed value is the aggregated value for the four individual parcels and one foreshore tenure.

- Increased baseflows, increase in wetted area and average flow depth, and reductions in predicted dry periods (i.e., greater water availability for aquatic habitat) in McNab Creek during project operations;
- Increased flows, wetted area and average depth in the foreshore minor streams (WC3, WC3-E, WC4-E, and WC 4-W and WC5);
- Increased wetted area and average flow depth within the lower segment of WC 2;
- New amphibian breeding habitat within the lentic zone of the pit lake at closure; and
- Improved aesthetic qualities of the Property after closure would likely have a positive effect on nearby property use and value.

## **Conclusions**

Federal and provincial EA reviews provide an integrated process for the evaluation, feedback and development of Proposed Projects by identifying and assessing potential adverse environmental, economic, social, heritage and health effects (i.e., five pillars), mitigation to avoid or reduce those effects through redesign and operational improvements, and the significance of the potential residual effects after mitigation. BURNCO is committed to avoiding, reducing or otherwise mitigating potential effects of the Proposed Project through design features, best management practices and other mitigation measures. The EAC Application/EIS provides technically and economically feasible mitigation measures which first avoid and second reduce potential adverse effects across each of the five pillars, assessed as valued components (VCs). VCs were assessed for all phases of the Proposed Project lifecycle (construction, operations, reclamation and closure), including Proposed Project activities, accidents and malfunctions and cumulative effects.

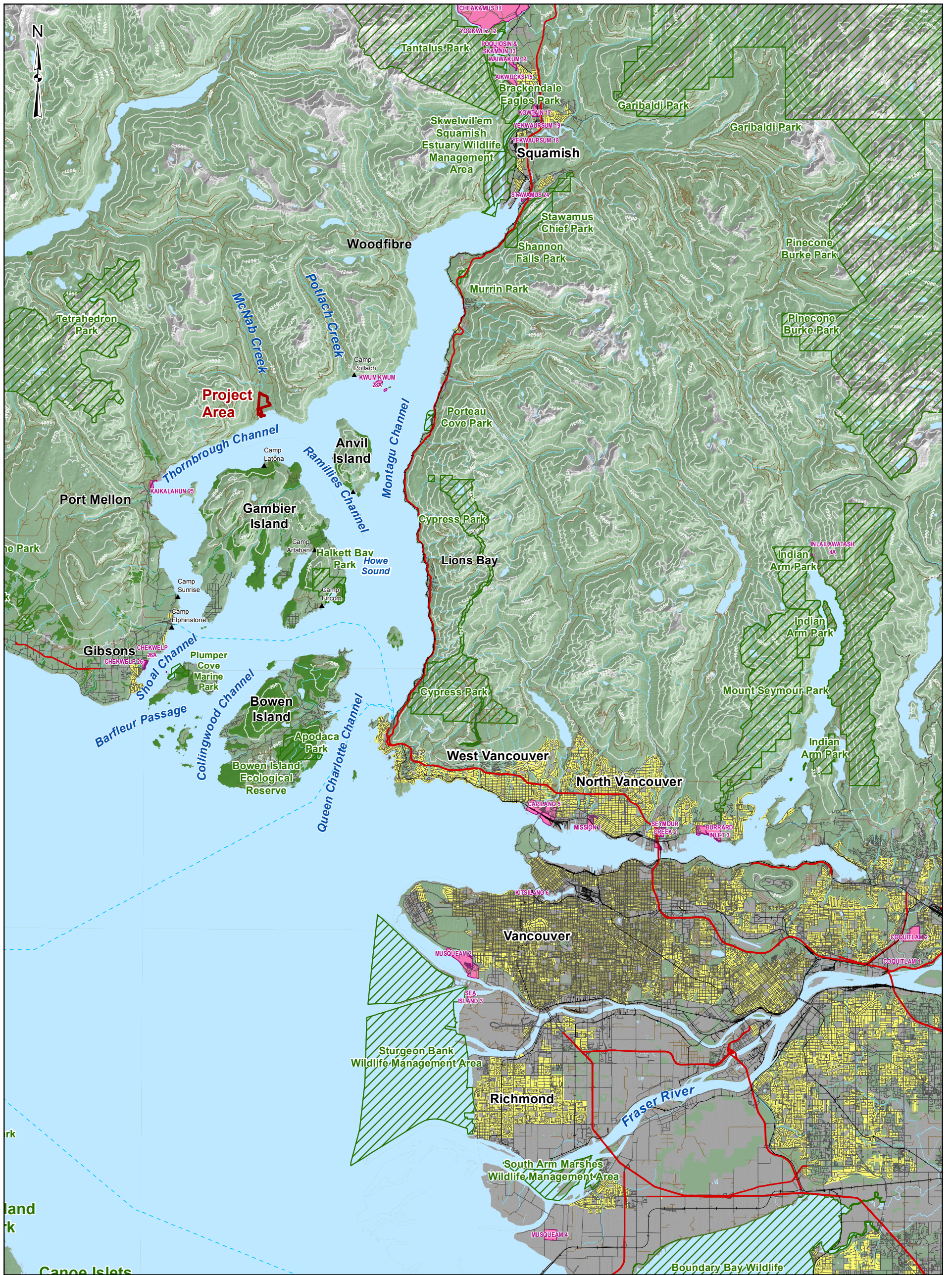
The conclusion of the assessment is that, with the application of design considerations and identified mitigation, no significant adverse effects will result from the Proposed Project.

Net cumulative residual effects for grizzly bear were determined to be significant as they contribute to the factors limiting the population, which is likely sensitive to imposed stresses. However, the Proposed Project is unlikely to contribute to the factor limiting the grizzly bear population (i.e., mortality).

Potential effects on Aboriginal rights, including current use have been considered and assessed in Part C of the EAC Application/EIS. It is predicted that potential effects on Aboriginal rights, including current use, will be addressed by identified mitigation and ongoing engagement.

# FIGURES

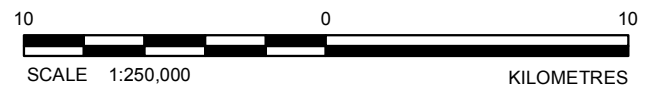




**LEGEND**

Project Area	Highway
Park / Protected Area	Road
Sensitive Environmental Area	Resource Road
Vegetation	Railway
Indian Reserve	Ferry
Residential Area	Watercourse
Waterbody	Contour (250m)
	Camp

**REFERENCE**  
 Parks/protected areas and sensitive areas from the Province of British Columbia. Elevation and indian reserves from Geobase.  
 Base data from CanVec. Projection: UTM Zone 10 Datum: NAD 83

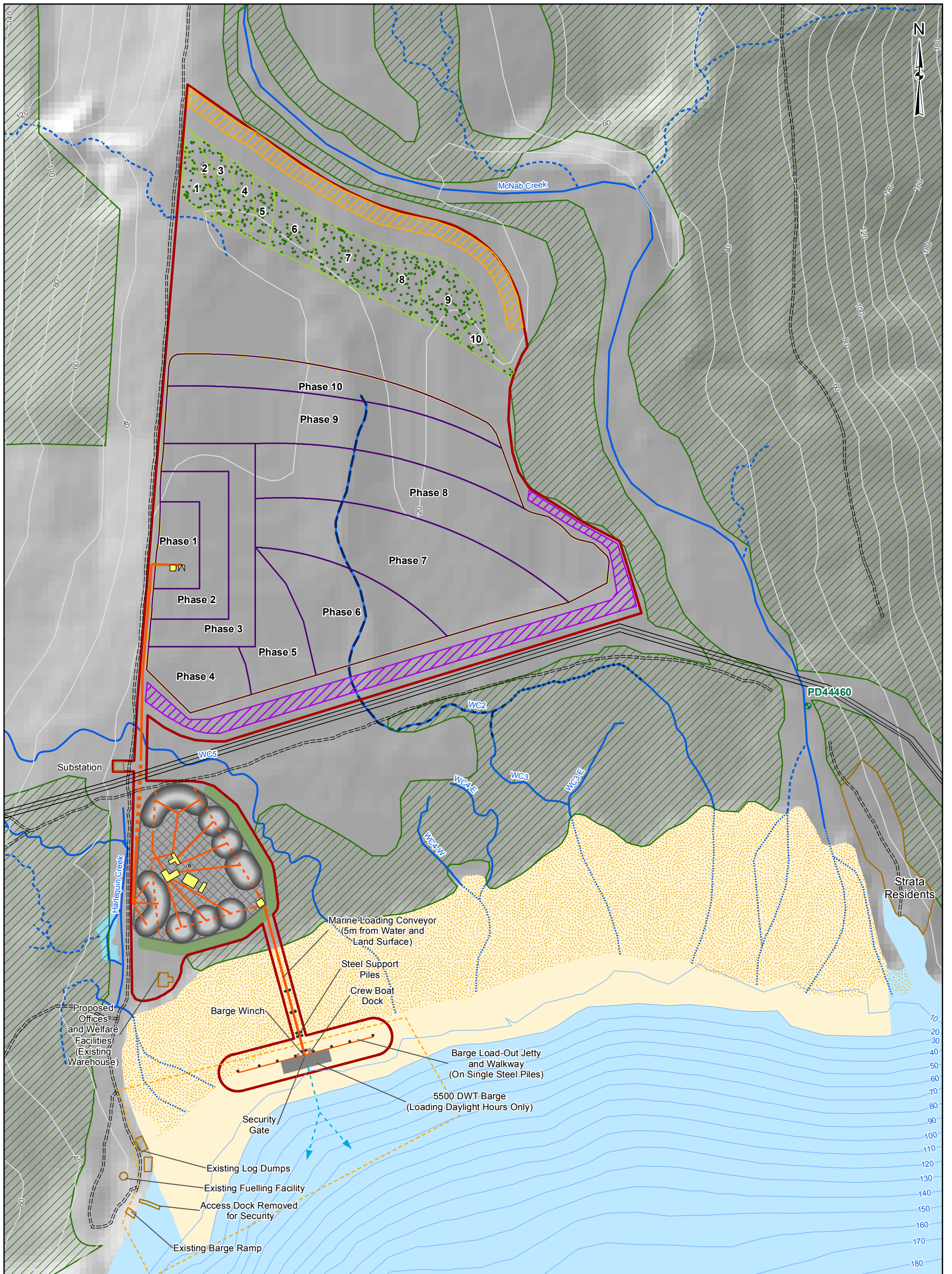


PROJECT			
BURNCO ROCK PRODUCTS LTD. BURNCO AGGREGATE PROJECT, HOWE SOUND, B.C.			
TITLE			
<b>LOCATION OF BURNCO AGGREGATE PROJECT</b>			
PROJECT NO. 11-1422-0046		PHASE No.	
DESIGN	MD	2 Nov. 2012	SCALE AS SHOWN
GIS	DL	06 May 2016	REV. 0
CHECK	AS	10 Jun. 2014	<b>FIGURE 1</b>
REVIEW	AC	10 Jun. 2014	



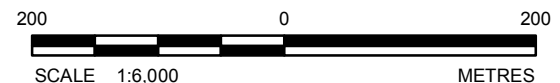
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LEGEND	
	Project Area
	Proposed Aggregate Pit Phase
	Final Pit Lake Outline
	McNab Creek Flood Protection Dyke
	Pit Lake Containment Berm
	Fines Storage Area
	Processing Area
	Existing Feature
	Existing Log Tenure Area
	Product Stockpiles
	Possible Processing Plant Configuration
	Processing Area Dirt Berm
	Mature Forest
	Intertidal Zone
	McNab Creek Estuary
	Elevated Conveyor
	Underground Conveyor
	Barge Load-out
	Transmission Line
	Road (existing)
	Contour (20m)
	Isobath Contour (10m)
	Barge Route
	Permanent / Perennial Watercourse
	Intermittent Watercourse
	Intertidal Watercourse
<b>Constructed Watercourse</b>	
	Phase 1 (1985)
	Phase 2 (1998)
	Phase 3 (2001 - 2003)
	Current Water Licence (POD)

**REFERENCE**  
 DEM from Geobase. Base data from the Province of British Columbia. Contours from TRIM positional data. Additional detailed site features provided by McElhanney. McNab Creek Estuary estimated based on the Province of British Columbia 1999.  
 Projection: UTM Zone 10 Datum: NAD 83

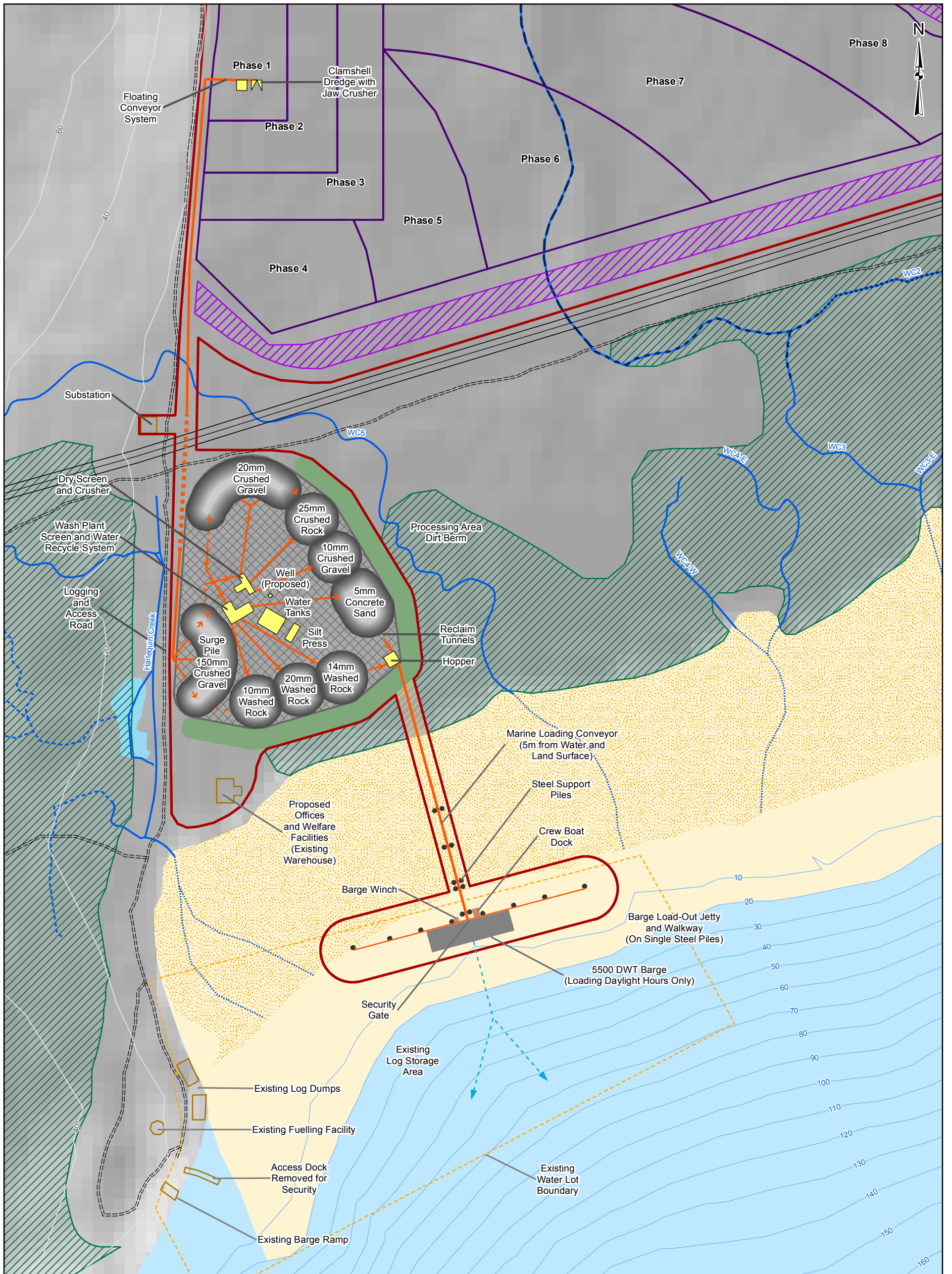


PROJECT		BURNCO ROCK PRODUCTS LTD. BURNCO AGGREGATE PROJECT, HOWE SOUND, B.C.	
TITLE		PROPOSED CONCEPTUAL SITE LAYOUT	
PROJECT NO. 11-1422-0046		PHASE No.	
DESIGN	MJ	2 Nov. 2012	SCALE AS SHOWN
GIS	DL	24 May 2016	REV. 1
CHECK	AS	10 Jun. 2014	<b>FIGURE 2</b>
REVIEW	AC	10 Jun. 2014	



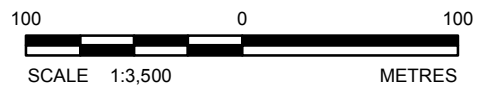
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LEGEND			
	Project Area		Mature Forest
	Proposed Aggregate Pit Area		Intertidal Zone
	Possible Processing Plant Configuration		McNab Creek Estuary
	Product Stockpiles		Conveyor Buffer
	Processing Area Dirt Berm		Elevated Conveyor
	Pit Lake Containment Berm		Underground Conveyor
	Processing Area		Barge Load-out
	Existing Log Tenure Area		Transmission Line
			Road (Existing)
			Contour (20m)
			Permanent / Perennial Watercourse
			Intermittent Watercourse
			Intertidal Watercourse
			Constructed Watercourse
			Phase 1 (1985)
			Phase 2 (1998)
			Phase 3 (2001 - 2003)
			Isobath Contour (10m)
			Barge Route

**REFERENCE**  
 DEM from Geobase. Base data from the Province of British Columbia. Contours from TRIM positional data. Additional detailed site features provided by McElhanney. McNab Creek Estuary estimated based on the Province of British Columbia 1999.  
 Projection: UTM Zone 10 Datum: NAD 83

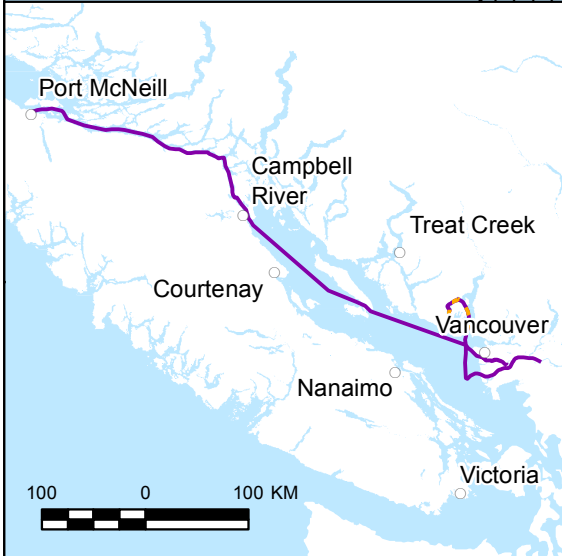
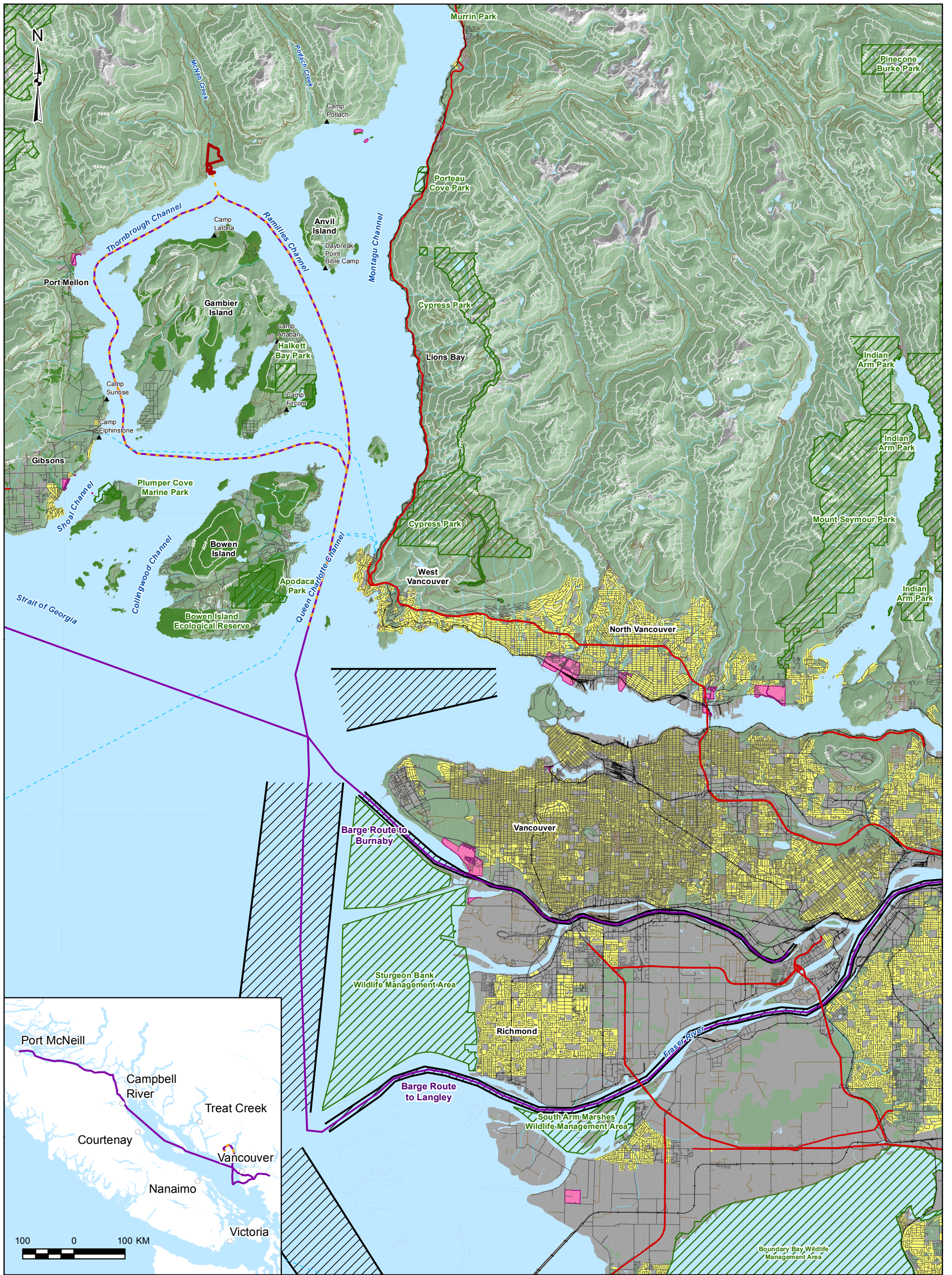


PROJECT		BURNCO ROCK PRODUCTS LTD. BURNCO AGGREGATE PROJECT, HOWE SOUND, B.C.	
TITLE		PROPOSED OPERATIONAL SITE LAYOUT	
PROJECT NO. 11-1422-0046		PHASE No.	
DESIGN	MJ 5 Jan. 2013	SCALE AS SHOWN	REV. 1
GIS	DL 24 May 2016	<b>FIGURE 3</b>	
CHECK	AS 10 Jun. 2014		
REVIEW	AC 10 Jun. 2014		



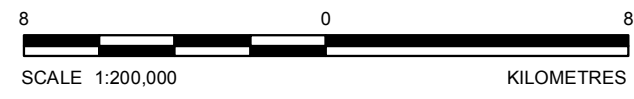
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- LEGEND**
- Project Area
  - Proposed Barging Route
  - Existing Barging Route
  - Existing Shipping Navigational Channels
  - Park / Protected Area
  - Sensitive Environmental Area
  - Vegetation
  - Indian Reserve
  - Residential Area
  - Highway
  - Road
  - Resource Road
  - Railway
  - Ferry
  - Contour (250m)
  - ▲ Camp

**REFERENCE**  
 Parks/protected areas and sensitive areas from the Province of British Columbia. Elevation and indian reserves from Geobase. Base data from CanVec. Projection: UTM Zone 10 Datum: NAD 83



<b>PROJECT</b>		BURNCO ROCK PRODUCTS LTD. BURNCO AGGREGATE PROJECT, HOWE SOUND, B.C.	
<b>TITLE</b>		<b>PROPOSED AND EXISTING BARGE SHIPPING ROUTES</b>	
		PROJECT NO. 11-1422-0046	PHASE No.
DESIGN	MD	2 Nov. 2012	SCALE AS SHOWN
GIS	DL	6 May. 2016	REV. 5
CHECK	AS	10 Jun. 2014	<b>FIGURE 4</b>
REVIEW	AC	10 Jun. 2014	

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Figure 5: Visual Simulation of Proposed Project Area: Pre-Construction.

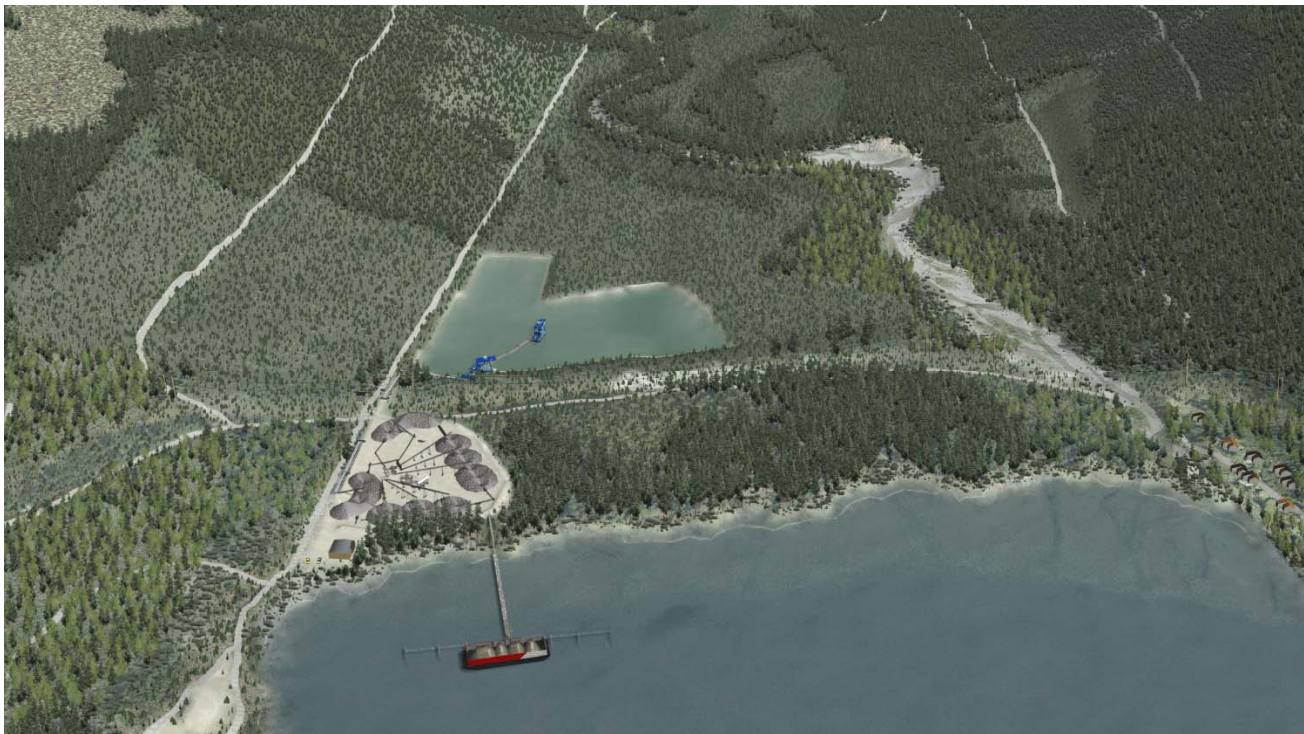


Figure 6: Visual Simulation of Proposed Project Area: Operations.



*Figure 7: Visual Simulation of Proposed Project Area: Post-Closure.*



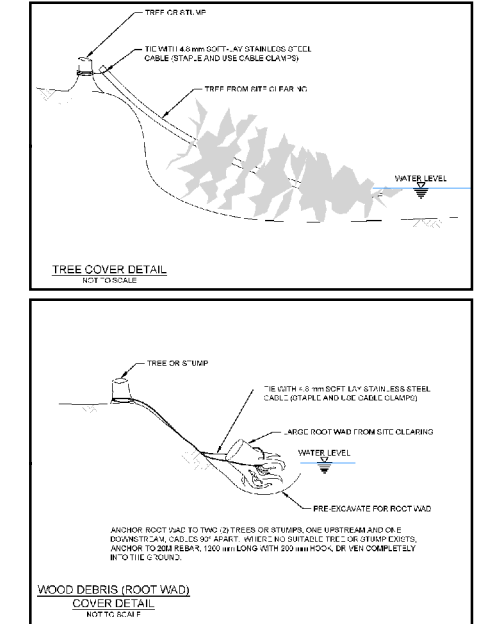
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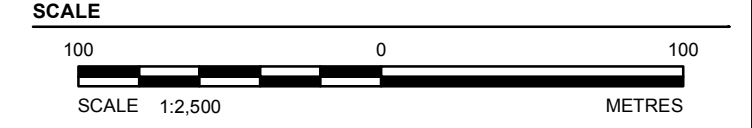
**LEGEND**

Project Area	Processing Area
<b>Proposed WC2 Extension (~770 m)</b>	Product Stockpiles
Proposed Channel Extension: Year 1 Channel Construction	Final Pit Lake Outline
Proposed Channel Extension: Project Closure Channel Construction	Proposed Aggregate Pit Phase
Top of Bank	Pit Lake Containment Berm
Riparian	Possible Processing Plant Configuration
Channel Infill, Riprap and Filter Zone	Intertidal Zone
Proposed Amphibian Pond (Combined Area ~1250 m²)	Elevated Conveyor
Outlet Structure with Spillway and Low-Level Outlet	Underground Conveyor
<b>Constructed Watercourse</b>	Transmission Line
Phase 1 (1985)	Road (Existing)
Phase 2 (1998)	
Phase 3 (2001 - 2003)	

**Generalized Features**



**REFERENCE**  
 WC2 Extension from Golder Associates Ltd. Base data from the Province of British Columbia. Watercourses from the Province of British Columbia and field data. Imagery and additional detailed site features provided by McElhanney. Projection: UTM Zone 10 Datum: NAD 83



PROJECT			
BURNCO ROCK PRODUCTS LTD. BURNCO AGGREGATE PROJECT, HOWE SOUND, B.C.			
TITLE			
<b>PROPOSED HABITAT OFFSET - EXTENSION OF WATERCOURSE 2</b>			
	PROJECT NO.	11-1422-0046	PHASE No.
	DESIGN	DC 09 Jan 2015	SCALE AS SHOWN
	GIS	DL 24 May 2016	REV. 1
	CHECK	DC 10 Mar 2016	<b>FIGURE 8</b>
	REVIEW	SR 10 Mar 2016	