PART E–ENVIRONMENTAL MANAGEMENT, MONITORING AND FOLLOW-UP

16.0 ENVIRONMENTAL MANAGEMENT PROGRAM

16.1.1 Introduction and Purpose

Gravel is a non-renewal natural resource and is not found everywhere. It must be located, developed and reclaimed in a responsible manner. All levels of government regulate the gravel industry. Environmental protection through adherence to applicable legislation, Best Management Practices (BMPs) and Environmental Assessment Certificate (EAC) Commitments and Assurances is an important component of the development and operation of the Proposed Project. The purpose of the Environmental Management Program is to assist BURNCO and its contractors in adhering to applicable environmental legislations and Proposed Project Commitments and Assurances specified in the EAC Application by providing performance-based environmental requirements, standard protocols, and mitigation measures to avoid and reduce the potential for environmental effects throughout the Proposed Project. Effective planning and application of Construction and Operational Environmental Management Programs through the implementation of 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. The CEMP also provides the basis for the development of the Contractor's EPPs/ EMP Component Plans to be prepared prior to the commencement of construction activities. The EPPs and EMP Component Plans will provide prescriptive details for how specific construction activities would be undertaken to comply with the CEMP, regulatory approvals, and BMPs.

The CEMP and the OEMP will be drafted in consultation with relevant permitting agencies, local governments, the *Sḵwx̱wú7mesh* (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. A Reclamation and Effective Closure Plan will also be finalized prior to any removal of Proposed Project infrastructure or construction activities in accordance with all applicable regulations and guidelines relevant at the time of closure. A preliminary Reclamation and Effective Closure Plan is provided in Volume 4, Part G – Section 22.0: Appendix 4.

Figure 16-1 presents the Environmental Management Program for the Proposed Project.

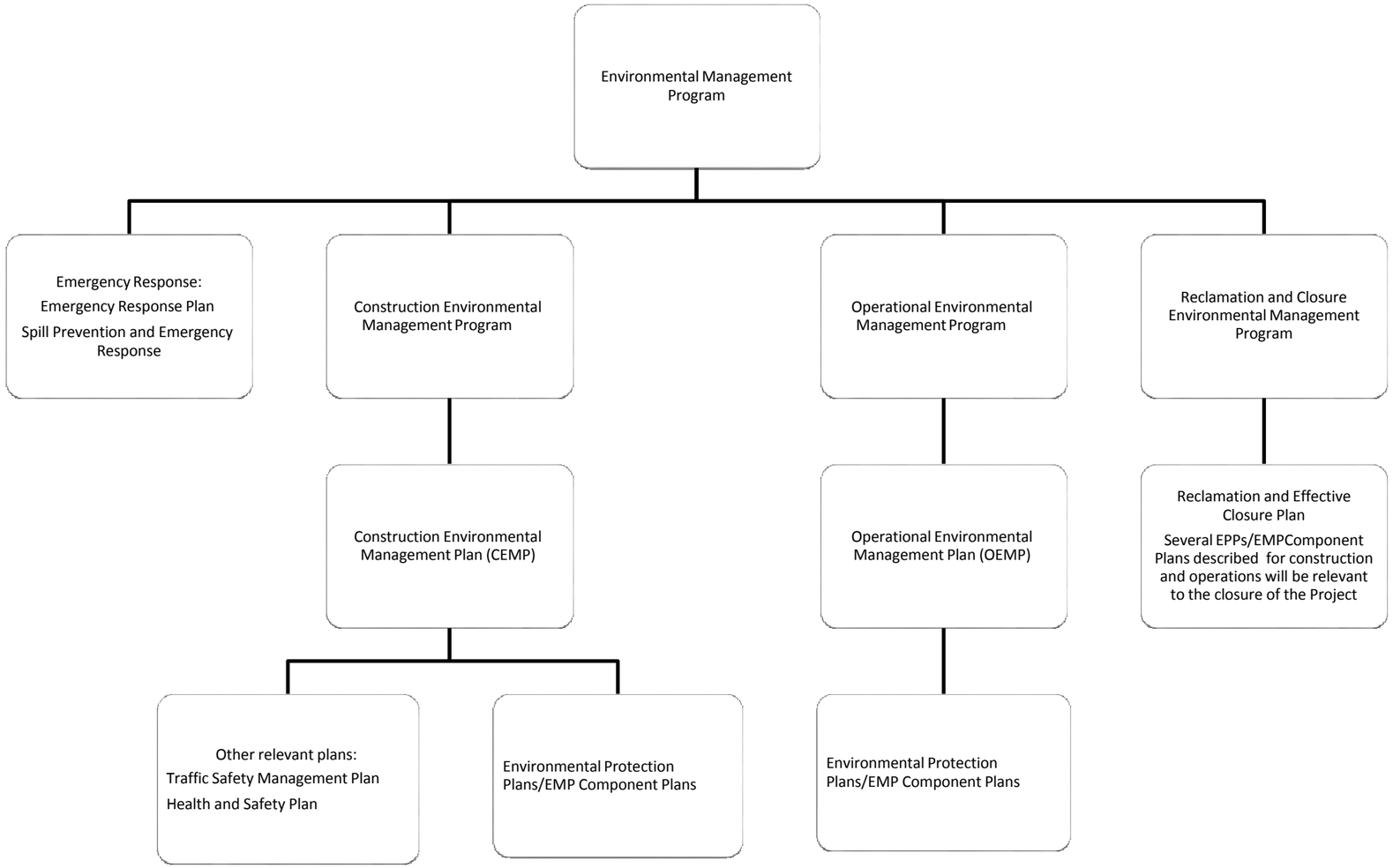

Figure 16-1: Proposed Environmental Management Program for the Proposed Project

16.2 Construction Environmental Management Program

The construction environmental program will consist of a CEMP and several site or activity-specific Environmental Protection Plans (EPPs)/EMP Component Plans.

Legislation, BMP guides, industry standards and other documentation used to develop the construction environmental management program would likely include, but are not limited to:

- Mitigation measures and Commitments and Assurances specified in the EAC Application;
- *Federal Fisheries Act;*
- *Federal Migratory Birds Convention Act;*
- *Federal Navigation Protection Act;*
- *Federal Species at Risk Act;*
- *Canadian Environmental Assessment Act;*
- *Canadian Environmental Protection Act;*
- National Fire Code;
- *British Columbia Environmental Assessment Act*;
- *BC Environmental Management Act* and *Spill Reporting Regulation*;
- BC Fire Code;
- *BC Wildfire Act;*
- *BC Forest Act*;
- *BC Heritage Conservation Act;*
- *BC Transportation of Dangerous Goods Act;*
- *BC Water Sustainability Act* and its' regulations;
- *BC Weed Control Act;*
- *BC Wildlife Act*;
- *Occupational Health and Safety Regulation*;
- Land Development Guidelines for the Protection of Aquatic Habitat (DFO 1993);
- CCME Canadian Environmental Quality Guidelines for the Protection of Aquatic Life;
- BC Approved Water Quality Guidelines (BC MoE 2015);
- CCME Environmental Code of Practice (Update) for Above Ground Storage
- *Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations* (2008);

- Workplace Hazardous Materials Information System (WHMIS);
- Standards and Best Practices for Instream Works (BC MWLAP 2004);
- Sea to Sky Land and Resource Management Plan (LRMP);
- Community planning initiatives across Howe Sound and
- Local Government Legislation and Bylaws.

16.2.1 Construction Environmental Management Plan

Prior to the initiation of Proposed Project construction a CEMP will be developed to assist BURNCO in constructing the Proposed Project in accordance with the mitigation measures and Commitments and Assurances specified in the EAC Application. The CEMP will be provided to all contractors submitting tenders for construction of any component of the Proposed Project. This will provide the contractors with details on the environmental sensitivities and requirements of the Proposed Project when developing their work plans, schedules, and budgets and material costs. The CEMP will be revised and updated from time to time to take account new information.

Prior to initial finalization, the CEMP will be distributed to appropriate regulatory agencies, local governments, and interested and affected First Nations for review and input. Mitigation measures and site-specific details will also be refined during detailed design based on the results of pre-construction surveys and additional information obtained from First Nations and regulatory agencies. The CEMP review and amendment process will be used to revise and improve the CEMP and other EPP/ EMP Component Plans in order to facilitate regulatory and permit compliance and continuous improvement. If the text or body of the CEMP is required to be updated at any stage of the Proposed Project, the revised sections will be made available for review by regulatory agencies, local governments, and interested and affected First Nations.

All Proposed Project personnel including all subcontractors have a responsibility to protect the environment, social resources, First Nations and heritage values. Environmental management roles and responsibilities will be clearly defined in CEMPs and specifically lay out who does what in the event of an emergency (e.g., a spill) or a non-compliance issue. Roles will be defined for (but not limited to):

- Senior Site Management;
- Senior Contractor(s) Management;
- Operations Management;
- Environmental Manager/Officer;
- Site Personnel;
- Environmental Monitoring Personnel; and
- Specific Contractors.

In general the CEMP will include:

- Provide introductory material on the Proposed Project and works to be completed including a Proposed Project description and schedule;
- List all relevant permits or authorizations and regulatory requirements;
- Describe environmental management roles and responsibilities;
- Provide a site communication plan include emergency contact information;
- Provides precautions, mitigation measures, and other applicable requirements for the Proposed Project;
- Provide up to date site mapping;
- Identify site wide training requirements;
- Outline applicable legislation and Commitments and Assurances of the EAC;
- Outline the monitoring plan;
- Outline the content of the relevant EPPs/ EMP Component Plans including mitigation measure to address those commitments; and
- Outline reporting requirements and how commitments and non-compliance issues will be tracked.

An overall Proposed Project commitment matrix will be developed as part of the CEMP in order to identify, track and report on Commitments and Assurances of the EAC or in other applicable permits and authorizations and link those commitments with specific mitigation measures outlined in the CEMP in regards to effectiveness and any recommendations for improvements as necessary. This matrix would be reviewed periodically to incorporate new conditions and remove conditions that are no longer are relevant. This would form part of the reporting to be undertaken during environmental monitoring.

16.2.2 Environmental Protection Plans/ EMP Component Plans

EPPs/EMP Component Plans will be prepared prior to the commencement of work activities in accordance with federal and provincial regulatory agency requirements, BURNCO's own policies, and reflect current guidelines and industry practices. These plans will be the responsibility of the Proponent and their contractors and should be prepared by qualified environmental professionals. The plans will provide site- and activity-specific details of planned work procedures and the necessary environmental mitigation measures to be implemented during construction to achieve compliance with the CEMP and regulatory approvals for the Proposed Project. BURNCO will also review and provide comment on these plans to ensure that the commitments made in the EA and other permits or approvals will be met. EPPs/ EMP Component Plans will be considered living documents in order to apply an adaptive management approach and will be modified as needed based on the results of monitoring programs, changes to construction activities, alteration in activity schedules etc.

In general, the EPPs/ EMP Component Plans will include:

- Description for the activity to be completed;
- Detailed schedule for the activity to be completed;
- Review of relevant legislation, BMPs or guidelines to be implemented;
- Copies of all relevant permits or authorizations and regulatory requirements to conduct the activity/work;
- Identification of roles and responsibilities of all contractors and environmental monitoring personnel (if required);
- Communication plan specific to the activity;
- Activity specific training requirements or qualifications (e.g., use of a qualified environmental professional, marine mammal observer);
- Mitigation measures and how they will be implemented (i.e., compliance monitoring requirements, equipment etc.); and
- Define reporting requirements.

The EPPs/ EMP Component Plans may need to be revised during construction in response to changes in such things as:

- Proposed Project design;
- Construction procedures and methods;
- Construction schedule;
- Mitigation measures; and/or
- Site conditions.

CEMP Component Plans will be prepared by qualified professionals retained by BURNCO prior to or during construction and would include details for planned work procedures and environmental mitigation measures to be implemented during or following construction to achieve compliance with the EAC Commitments and Assurances and regulatory approvals for the Proposed Project.

The following sections provide typical contents of the EPPs/ EMP Component Plans expected to be required for the construction phase of the Proposed Project. This is representative of the level and type of information that will be included in the CEMP.

16.2.2.1 Erosion and Sediment Control Plan

Proposed Project activities including vegetation clearing, soil excavation, and road upgrades have the potential to result in erosion and mobilization of fine grained material. Eroded soil carried into watercourses or wetlands can

degrade water quality and aquatic habitat through increased suspended sediment in the water, and deposition of sediment in the bed of the watercourses.

The Erosion and Sediment Control Plan will include mitigation measures to control run-off, minimize erosion on exposed slopes and substrates, and prevent inputs of silt, sediment or other deleterious materials entering into fresh and marine watercourses during Proposed Project activities. The plan will identify areas prone to erosion and sedimentation and provide mitigation for these areas.

The Erosion and Sediment Control Plan is provided in Volume 4, Part G – Section 22.0: Appendix 3 and includes information on, but is not be limited to:

- The nature and location of sediment and erosion control measures;
- Procedures to be used during excavation, clearing, and other construction activities with the potential to result in erosion and/or sedimentation;
- Water management at the site;
- Procedures to be used in around watercourses;
- Compliance monitoring requirements;
- Removal and disposal of temporary erosion and sediment control measures;
- Erosion protection for steep slopes, stockpiles, and disturbed areas during storm events; and
- Restoration of eroded or unstable soil to the equivalent of its original condition including re-vegetation.

16.2.2.2 Soil Management Plan

A Soil Management Plan will be developed within the Reclamation and Effective Closure Plan for the site prior to the commencement of construction. The objectives of this plan will be to prioritize soil replacement on the closure landscape, plan the stripping and sorting of topsoil, and mitigate potential changes to soil properties during storage. This will include maximizing the surface area of stockpiled soil and seeding it to minimize negative biological and chemical changes.

A conceptual Soil Management Plan is presented in Section 6.0 of the Reclamation and Effective Closure Plan provided in Volume 4, Part G - Section 22: Appendix 4.

16.2.2.3 Material Storage, Handling and Waste Management (including solid waste management and re-fueling procedures)

A Material Storage, Handling and Waste Management will be developed to ensure appropriate collection, storage, transportation and/or disposal of waste and hazardous materials to minimize environmental effects and meet appropriate regulations. Expected waste resulting from the Proposed Project includes industrial waste, domestic waste and sewage effluent. Other hazardous materials expected to be on-site includes fuels and lubricants, paints and solvents, and other chemicals. Wastes will be reduced, re-used and recycled as much as feasibly possible.

The Material Storage, Handling and Waste Management will include information on, but will not be limited to:

- Procedure for waste minimization and recycling;
- Maintenance of records identifying quantities of hazardous materials and wastes generated requiring storage or removal;
- Location of MSDS sheets for all hazardous materials on-site;
- Re-fuelling procedures;
- Identification of licensed waste material haulers and approved disposal facilities to be used;
- Schedule for equipment inspections and maintenance;
- Description of appropriate food storage (bear bins) to be used to avoid attracting wildlife;
- Proper containment requirements for wastes and hazardous materials relevant to the type of material being stored (i.e. paint stored away from heat source, management of oily rags);
- Waste removal schedule; and
- Mitigation measures to be used during the transportation of sewage offsite via barge by contracted barge operator.

Seaspan, for example, has implemented and maintained an Environmental Management System (EMS) that conforms to ISO 14001:2004, the recognized international standard for excellence in environmental management. They have the following in-house BMPs relevant to the removal of waste from site which are provided in Volume 4, Part G – Section 22.0: Appendix 16-A:

- BMP – 01: Hazardous Materials Management
- BMP – 02: Waste Management and Recycling
- BMP – 03: Spill Prevention and Response
- BMP – 04: Site Management and Housekeeping

16.2.2.4 Vegetation Management Plan (Tree and Vegetation Clearing)

Vegetation Management Plans will provide procedures to be implemented during construction activities to limit the impact on vegetation and the wildlife that use it as habitat and mitigate the potential for invasive species.

The Vegetation Management Plan will include information on, but will not be limited to:

- Weed control procedures;
- Sensitive vegetation areas that should be avoided;

- Procedures in the event a rare plant is encountered (note: rare plant surveying did not identify rare plants in the Proposed Project Area);
- Salvaging techniques for large woody debris,
- Clearing techniques, timelines and procedures on how to limit clearing of vegetation, when possible;
- Re-vegetation and seeding procedures;
- Progressive reclamation procedures;
- Tree removal techniques and procedures (i.e., removal of windthrow and tree topping);
- Compliance monitoring requirements; and
- Identify sensitive receptors and appropriate buffers.

16.2.2.4.1 Invasive Plant Species Management Plan

A site specific invasive species management will be provided in the Vegetation Management Plan and will be developed to mitigate the introduction, transportation, and proliferation of invasive species (including noxious weeds) to and from the site, as required. The objectives of this plan will be to detect, control (remove), and monitor invasive species on site.

The Invasive Species Management Plan will include information on, but will not be limited to:

- Cleaning/washing procedures for Proposed Project vehicles and equipment taken off-site to areas where weeds may be present. This may involve washing before arrival to grassland areas to minimize the potential for introduction and proliferation of invasive plants;
- Procedures for field equipment (work boots, rain and safety gear, and vests) such as cleaning before their use in a new area;
- Procedures on how to remove and properly dispose of invasive plants; and
- Re-vegetation procedures to avoid introduction and proliferation of invasive plants.

16.2.2.5 Pile Construction Management

A Pile Construction Management Plan will be developed to mitigate potential impacts to marine resources during the removal of old piles and the installation of piles for the conveyor and load-out jetty. Potential impacts associated with the installation of piles are associated with elevations in underwater noise, re-suspension of benthic sediments, and release of creosote.

The Pile Construction Management Plan will include information on, but will not be limited to:

- Whether or not the work will be conducted within the fisheries work-windows for in-water works for the Howe Sound Area and if not provide additional mitigation will be considered including those identified in Fisheries and Oceans (DFO) Measures to Avoid Causing Harm to Fish and Fish Habitat (DFO 2013);
- Sensitive areas that should be avoided when possible;
- Techniques to limit shading effects (i.e., grating of the jetty and walkway);
- Compliance monitoring requirements;
- Concrete curing procedures near water in accordance with MoE BMP for concrete works;
- Implementation of Best Management Practices for Pile Driving and Related Operations (DFO 2003);
- Pile removal procedures in compliance with “Guidelines to Protect Fish and Fish Habitat from Treated Wood Used in Aquatic Environments in the Pacific Region” will be followed (Hutton and Samis 2000);
- Procedures for Proposed Project vessels and barges in shallow waters to avoid disturbance to the seabed;
- Water quality compliance monitoring requirements and implementation of BC water quality guidelines for pH, turbidity and total suspended solids (TSS); and

- Implement of underwater noise mitigation to protect fish and marine mammals including:
  - Adopting a ramp-up / soft-start procedure where technically feasible;
  - Minimizing concurrent multiple underwater noise generating activities when practicable;
  - Underwater noise monitoring in adherence with underwater noise threshold for fish as presented in Best Management Practices for Pile Driving and Related Operations;
  - Monitoring for fish aggregation and spawning on equipment;
  - Underwater noise monitoring procedures; and
  - Implementation of a marine mammal monitoring program during impact pile driving activities (applying marine mammal safety zones, shut-down procedures etc.).

16.2.2.6 Fisheries Habitat Protection and Mitigation Plan

Construction activities including clearing, use of large and heavy equipment access road upgrades have the potential to encroach on and impact fisheries habitats within the Proposed Project Area. Site or activity specific Fisheries Habitat Protection and Mitigation Plans will be developed to mitigate potential impacts to freshwater fish and their habitats.

The Fisheries Habitat Protection and Mitigation Plan will include information on, but will not be limited to:

- Implementing the Fish Habitat Offset Plan provided in Volume 4, Part G – Section 22.0: Appendix 5.1-B;
- Sensitive areas to avoid when possible;
- Riparian clearing procedures;
- Implementation of setbacks around fish bearing watercourses, riparian areas and mature forest stands as defined by the *Forest and Range Practices Act* (2002) *Forest Planning and Practices Regulation* (2002, Division 3 — Riparian Areas - Section 47 of the regulation);
- Whether or not the work will be conducted within the fisheries work-windows for in-water works for the Howe Sound Area and if not then additional mitigation will be considered including those identified in DFO's Measures to Avoid Causing Harm to Fish and Fish Habitat (DFO 2013);
- In-water work and watercourse crossing procedures including installation procedures for culverts, bridges, or temporary fords;
- Watercourse dewatering or re-routing procedures for in-water works;
- Fish salvage procedures in the event of watercourse dewatering;
- Concrete curing procedures near water in accordance with MoE BMP for concrete works, such as:
  - Complete isolation of work area is required to ensure waterbodies do not become more alkaline.
  - pH should be monitored in surrounding waterbodies during concrete pouring.

- BMPs should be implemented during setting, mixing, and pouring of concrete to ensure activities meet requirements of applicable legislation.
- Pre-cast concrete structures whenever possible.
- Keep carbon dioxide tank with regulator, hose, and gas diffuser readily available during concrete works.

- Optimal timing of construction activities to avoid impacts to fish and their habitats (i.e., conduct construction activities during frozen periods on wet terrain);
- Implementation of sediment and erosion control measures (see Section 16.2.2.1);
- Re-vegetation of riparian vegetation will follow the DFO guidance on Riparian Re-vegetation;
- Implementation of a invasive plant species control measures (see Section 16.2.2.4.1); and
- Compliance monitoring and reporting requirements in accordance with the recent revisions to the fisheries protection provisions of the *Fisheries Act* including:
  - Monitoring of all Proposed Project activities conducted below High Water;
  - Recording compliance to the contractor, in regards to construction activities in and around the marine environment and the application of identified mitigation measures;
  - The monitor will also assess the effectiveness of the mitigation measures being applied and confirm the Proposed Project footprint is as expected; and
  - The environmental monitor will prepare and submit to MoE and to DFO regular (based on an agreed to schedule) environmental monitoring reports. The regular reports will document construction activities, effectiveness of mitigation measures, incidents, non-compliant events, corrective action taken and photograph documentation.
  - In accordance with the recent revisions to the fisheries protection provisions of the *Fisheries Act*; in the event of a non-compliant incident the monitor will contact DFO's Observe, Record and Report (ORR) line (1-800-465-4336) and report the incident.
- The Plan will also include detailed procedures and guidelines concerning the collection and analysis of water quality samples during the Proposed Project related to turbidity and suspended solids. The Plan will include locations of water quality monitoring stations, sampling frequency, and the parameters to be analyzed. The results from water quality sampling will be compared to water quality guidelines (Table 16-1) to determine the effectiveness of sediment and erosion control measures in preventing the release of silt.
- Ongoing effects monitoring will be described in the Plan to ensure the effectiveness and functionality of these mitigation measures and is described in more detail in Section 17.0 below. Monitoring will occur at regular intervals and will be determined in conjunction with regulators and permit requirements.

Table 16-1: Summary of water quality guidelines for turbidity, suspended and benthic sediments

Water Use	Turbidity	Non-filterable residue (total suspended solids)	Streambed Substrate Composition
Aquatic life (fresh, marine, estuarine)	Change from background of 8 NTU at any one time for duration of 24 h in all waters during clear flows or in clear waters.	Change from background of 25 mg/L at any one time for duration of 24 h in all waters during clear flows or in clear waters.	% fines not to exceed: 10% <2 mm 19% <3 mm 28% <6.35 mm at salmonid spawning sites
	Change from background of 2 NTU at any one time for a duration of 30 d in all waters during clear flows or in clear waters	Change from background of 5 mg/L at any one time for a duration of 30 d in all waters during clear flows or in clear waters	Geometric mean diameter not less than 12 mm (minimum 30-d intragravel DO of 6 mg/L)
	Change from background of 5 NTU at any time when background is 8 to 50 NTU during high flows or in turbid waters	Change from background of 10 mg/L at any time when background is 25 - 100 mg/L during high flows or in turbid waters	Fredle number not less than 5 mm (minimum 30-d intragravel DO of 8 mg/L)
	Change from background of 10% when background is >50 NTU at any time during high flows or in turbid waters	Change from background of 10% when background is >100 mg/L at any time during high flows or in turbid waters	N/A

Notes: Extracted from the Ministry of Environment website (BC MoE 2001)

16.2.2.7 Wildlife Protection Plan

A Wildlife Protection Plan will be developed prior to the initiation of Proposed Project construction to provide details on wildlife mitigation measures, implementation methods and schedule relating to protection of terrestrial habitats and wildlife during construction. The Wildlife Protection Plan will include provisions for a compliance wildlife monitoring program described below and an effects wildlife monitoring program with the objective of measuring the effectiveness of mitigation and restoration measures on wildlife VCs. The effects wildlife monitoring strategy for the Proposed Project is discussed below in Section 17.0. The Wildlife Protection Plan will be written by a qualified environmental professional with experience in how to mitigate wildlife habitat loss, barriers to movement and mortality events and the development of wildlife enhancement strategies according to applicable standards and legislation such as the BC *Wildlife Act*, the *Migratory Birds Convention Act*, and the *Species at Risk Act*.

The Wildlife Protection Plan will include information on, but will not be limited to:

- Sensitive areas and timing windows where/when clearing activities should be avoided as per Develop with Care 2012" (BC MoE 2014b);
- Procedures on how to identify wildlife habitat features that could be used during the reclamation/closure phase;
- Implementation of Best Management Practices for Amphibians and Reptiles in Urban and Rural Environments in BC (BC MoE 2014a);
- Procedures on how to implement of vegetation buffers;

- Tree clearing procedures;
- Establish and retain vegetative buffers around raptor nests in accordance with "Guidelines for Raptor Conservation during Urban and Rural Land Development in British Columbia" (BC MoE 2013);
- Procedures on how to minimize habitat fragmentation between winter elk ranges;
- Progressive reclamation procedures including replanting suitable browse plant species. See Volume 4, Part G – Section 22.0: Appendix 4 (preliminary Reclamation and Effective Closure Plan);
- Proper equipment storage procedures;
- Techniques to establish amphibian road-crossing structures in appropriate locations to facilitate amphibian movement to and from breeding ponds, based on knowledge of target species (BC MoE 2014a);
- Wildlife encounter procedures;
- Bear management procedures;
- Compliance monitoring requirements;
- Hunting restriction;
- Amphibian salvage requirements; and
- Requirements, procedures and schedule for pre-clearing bird nest surveys and other wildlife surveys.

In addition to the mitigation measure outlined above, an amphibian habitat compensation plan will be developed and implemented prior to and during the reclamation and closure phase of the Proposed Project, with specific recommendations to address habitat compensation for species at risk. A Roosevelt elk habitat compensation plan will also be developed and implemented prior to and during the reclamation and closure phase of the Proposed Project.

16.2.2.8 Air Quality and Dust Control Plan

An Air Quality and Dust Control Plan will be established prior to the construction phase. Proposed Project activities including the maintenance of soil stockpiles, upgrades of access roads, vehicle and equipment operations, and other construction activities have the potential to effect air quality and increase dust and particulates in the air. The Plan will detail control measures that must be in place to control fugitive particulates.

The Air Quality and Dust Control Plan will include information on, but will not be limited to:

- Conveyor design specifications to limit dust emissions;
- Procedures on how to limit dust from aggregate (i.e., washing prior to being stockpiled);
- Speed restrictions for Proposed Project vehicles and equipment;

- Emission control practice (i.e., watering exposed areas, building berms along the pit and processing plant area, enclosing aggregate transfer points, and enclosing material processing equipment like the crusher and screens); and
- Emission rate control efficiencies as per the WRAP Fugitive Dust Handbook (Countess Environmental 2004), and Pits and Quarries Guidance Chapter 8 (Environment Canada 2009).

Effects monitoring and follow-up programs related to air quality are discussed below in Section 17.5.

16.2.2.9 Noise Management Plan

Noise will be managed during the construction and operational phases according to the Environmental Objectives and Best Management Practices for Aggregate Extraction in BC (BC MWLAP 2002). The primary noise sources associated with construction are various pieces of large off-road equipment such as graders, loaders, packers, dozers, and excavators, as well as large marine equipment such as marine cranes, tug boats, and pile drivers. Noise mitigation measures are detailed in Volume 2, Part B - Section 9.2 and include:

- Maintaining vegetation and trees around the active work areas to act as a noise buffer;
- Reducing the height aggregate falls along conveyors and within the crushing facility;
- Enclosing conveyors;
- The use of dirt berms to serve as noise screens;
- Minimizing speed on roadways;
- Operating equipment within specifications and maintaining level roads;
- Reducing idling time;
- Keeping noises to below 50dBA within 500m from the Proposed Project Area, when possible;
- Public notices procedures to advise nearby residents of particularly noisy activities;
- Procedures on when and how to limit particularly noisy activities (i.e., to daytime hours);
- Establish heavy equipment muster points at least 500 m from any receptor; and
- Use of mufflers or silencers.

16.2.2.10 Heritage Resource Chance Find Management Plan

Implementation of Heritage Resource Chance Find Management Plan will facilitate the effective management of resources to meet *Heritage Conservation Act* objectives for site protection. While the potential to impact heritage resources within the LSA has been examined through desktop and field level studies that resulted in no newly identified heritage resources, undetected heritage resources could still be encountered once ground-disturbing activities begin. In the event that unidentified heritage resources are encountered during construction the use of a heritage resource chance find management plan would be consulted, and a qualified archaeologist and/or

palaeontologist contacted to determine acceptable management strategy for heritage resources within the LSA and RSA.

Consistent with the intent of the HCA, the Heritage Resource Chance Find Management Plan will provide additional details regarding the following measures that should be undertaken in the event unforeseen heritage resources are encountered:

- Modify or stop any land-altering activities in the immediate vicinity of the previously unidentified heritage site such that it will not be adversely impacted;
- Notify the Archaeology Branch, the *Sḵwx̱wú7mesh* (Squamish) First Nation, and the Tsleil-Waututh Nation. If the resources are archaeological, a qualified archaeologist should also be notified, and if the resources are palaeontological, a qualified palaeontologist should be notified; and
- Determine in consultation with the Archaeology Branch, the *Sḵwx̱wú7mesh* (Squamish) First Nation, and the Tsleil-Waututh Nation an acceptable management strategy.

The Heritage Resource Chance Find Management Plan will outline the following management strategies and how each one may be considered; in consultation with the groups identified above; should an in unforeseen heritage resources are encountered:

- **Option 1:** Avoidance through partial project redesign or relocation. This results in minimal impact to the heritage site and is the preferred option from a cultural resource management perspective. It can also be the least expensive option from a construction or operations perspective. A site investigation may be required to define the heritage site limits.
- **Option 2:** Systematic data recovery (salvage or emergency excavation), if necessary. This option can delay construction or operations by up to several weeks. Consequently, salvage or emergency excavation is not a preferred option.
- **Option 3:** Monitoring of activities. This option may require a Site Alteration permit from the Archaeology Branch if an archaeological site is present. Monitoring is appropriate where project impacts cannot be predicted or evaluated before construction or operations, especially near the margins of a heritage site, or in cases where deeply buried deposits are expected that cannot be accessed without the assistance of heavy machinery. Monitoring may also be appropriate where systematic data recovery has been undertaken, but where significant heritage deposits (potentially archaeological or palaeontological) remain.

16.2.2.11 Marine Transport Management Plan

A Marine Transportation Management Plan will be prepared and implemented prior to construction activities. This plan will outline measures to ensure all operators of vessel traffic are aware of Proposed Project activities and that the marine control zone is established during construction. The plan will also provide details of the communications channels and the Proposed Project related safety procedures for vessels calling and loading at the terminal as well as describe mitigation regarding vessel operations around marine mammals.

The Marine Transportation Management Plan will include information on, but will not be limited to:

- Procedures for marine stakeholders (e.g., Summer Camp Operators identified on the RSA and Howe Sound marine search and rescue organizations). to consult with BURNCO regarding special events such as yacht races, regattas and marine based festivals to ensure that additional passage planning and scheduling can be reviewed;
- Details of communications channels to be used for all Proposed Project vessels;
- Proposed Project related safety procedures for vessels calling;
- Proposed Project related safety procedures for loading at the terminal;
- Procedures on how the construction marine control zone will be defined, marked and communicate to the public as per Transport Canada requirements;
- Requirements for aids and navigational lights as per the Navigation Protection Program permitting process;
- Lighting techniques to be undertaken at the terminal to reduce the interference from lighting on navigation;
- Requirements for Notices to Mariners and Notices to Shipping; and
- Marine mammal mitigation requirements such as: speed restrictions, avoiding marine mammals, and maintaining constant speeds and course.

Commercial shipping in Howe Sound is controlled by Marine Communications and Traffic Services (MCTS) in Vancouver, which provides marine safety communications and co-ordination between vessels. The Proposed Project's mined aggregate, materials and wastes will be shipped via Seaspan tugs and barges that are operated by highly experienced mariners who are familiar with the navigational routes in Howe Sound and regularly service the forestry industry. All Seaspan tugs will be equipped with systems to facilitate monitoring of marine traffic and navigation, follow applicable navigational rules and procedures, and have effective means of communication. Specifically tugs and barges will:

- Adhere to regulations for preventing collisions at sea, such as moving at a safe speed and keep a vigilant watch at all times;
- Possess up-to-date nautical charts and for each voyage a passage plan that respects safe navigation and the environment;
- Meet CCG reporting requirements and respect vessel routing measures that also help ensure safe navigation; and
- Be equipped with technology that, together with the passage plan, allows a vessel's progress to be closely monitored.

In addition, Seaspan has implemented and maintained an Environmental Management System (EMS) that conforms to ISO 14001:2004, the recognized international standard for excellence in environmental management. They are participants in the Green Marine program, a voluntary environmental program that is designed to

strengthen the maritime industry's environmental performance, and have the following in-house BMPs that will be applied to the Proposed Project:

- BMP – 01: Hazardous Materials Management;
- BMP – 02: Waste Management and Recycling;
- BMP – 03: Spill Prevention and Response; and
- BMP – 04: Site Management and Housekeeping.

16.2.2.12 Access Management Plan

Site-specific Access Management Plan will be prepared to address site access to the Proposed Project Area for all phases of the Proposed Project. Potentially affected public and/or commercial operators would be given the opportunity to review copies of these plans prior to them being finalized and would receive a copy of the final plan. Where appropriate, the Plans would include procedures and recommendations for:

- Public health and safety concerns related to site access;
- Timelines and schedules for site access restrictions;
- Signage or fencing requirements;
- Land and water access restrictions (including special access provisions as stated in Volume 2, Part B - Section 7.3);
- Access agreements (access to the log dump for forestry activities in the McNab Valley is also covered by an access agreement with MFLNRO that is set to expire in 2016); and
- Preventing or minimizing unauthorized access to private lands and environmentally sensitive areas around the Proposed Project Area.

16.2.2.13 Other Plans

There are several other plans that are relevant to the consecution phase of the Proposed Project. These include:

- Emergency Response Plan;
- Spill Prevention and Emergency Response; and
- Health and Safety Plan.

These plans will be developed and updated for the duration of the Proposed Project. Details reading these plans are provided below in Section 16.5, 16.6, and 16.7.

16.3 Operational Environmental Management Program

The Operational Environmental Management Program will be developed prior to the operational phase of the Proposed Project and will be developed based on the legislation, Commitments and Assurances of the EAC, BMP guides, industry standards and other documentation. It is expected that the development of the OEMP will follow similar mitigation strategies as laid out above for construction. In addition to those EPPs described above for construction, a Geotechnical and Pit Slope Stability Plan will be developed for the operational phase and is described below in Section 16.3.1.

EPPs expected to be required for the operations phase of the Proposed Project are:

- Erosion and Sediment Control Plan;
- Soil Management Plan;
- Material Storage, Handling and Waste Management (including solid waste management and re-fueling procedures);
- Access Management Plan;
- Vegetation Management Plan (Tree and Vegetation Clearing);
  - Invasive Plant Species Management Plan
- Fisheries Habitat Protection and Mitigation Plan;
- Wildlife Protection Plan;
- Air Quality and Dust Control Plan;
- Noise Management Plan;
- Heritage Resource Chance Find Management Plan;
- Marine Transport Management Plan;
- Access Management Plan; and
- Pit Slope Stability Monitoring Plan.

16.3.1 Geotechnical and Pit Slope Stability Monitoring Plan

The Geotechnical and Pit Slope Stability Monitoring Plan will be developed prior to the operational phase of the Proposed Project and will be based on the *Mines Act* and other applicable legislation, BMP guidelines, industry standards and other documentation, including but not limited to the applicable aspects of the Ministry of Energy, Mines and Petroleum Resources publication titled “Health and Safety, A Practical Guide for Aggregate Operations”, 2007 or subsequent updates.

Typical contents and requirements of the Geotechnical and Pit Slope Stability EMP expected to be required for the operations phase of the Proposed Project are:

- Development of the overall mine plan, including phasing of aggregate excavation, excavation methods, interim and final pit slope configuration, as well as site preparation, drainage control, and development or phasing of aggregate processing, stockpiling and transport facilities.
- Establishment of minimum offset distance(s) from mine property boundaries and maximum slope of the excavation from the setback based on applicable *Mines Act* requirements, BMP criteria and slope stability criteria determined by experienced professional engineering personnel;
- Development of an operational (bench) plan for daily or weekly operations, including requirements and criteria to monitor and record pit slope stability, as well as training and qualifications of workers and use of appropriate equipment;
- Preparation of a contingency pit slope stabilization plan, including stabilization options or alternatives, and expected equipment, materials and personnel requirements;
- Pit slope setback, buffer and pit slope stability monitoring points using permanent survey monuments or approved equivalent, to be installed prior to the start of aggregate excavation and slope development
- Criteria for the conduct and reporting of periodic surveys or equivalent measurements of pit slope stability monitoring to mine manager, applicable regulatory agencies, and pit slope stability consultant;
- Criteria and regulatory requirements for monitoring and reporting operations for consistency with approved mine plan, including production rate, tonnage, pit design;
- Conduct and record daily visual observations of slope conditions and report all observations or indications of adverse changes in pit slope stability (e.g., erosion, tension cracking, slumping) and other (poor site drainage, settlements, erosion) changes in site conditions to mine manager and applicable regulatory agencies

16.4 Reclamation and Effective Closure Plan

A Reclamation and Effective Closure Plan would also be prepared prior to any removal of Proposed Project infrastructure or construction activities in accordance with all applicable regulations and guidelines relevant at the time of closure.

The Reclamation and Effective Closure Plan is provided in Volume 4, Part G - Section 22: Appendix 4.

16.5 Emergency Response Plan

BURNCO will develop and implement Emergency Response Plan (ERP) that will assist in responding to land and water based accidents and emergency situations such as tsunamis, earthquakes, security incidences (bomb threats, sabotage, etc.), fire, as well as falls of ground, runs of muck, liquefied backfill, inrushes of water, and bulkhead fractures from Proposed Project construction and/or operational activities. BURNCO's corporate Health, Safety and Environmental Management Plan which includes information on what to do in the event of an emergency, is provided in Volume 4, Part G – Section 22.0: Appendix 16-B. The ERP will conform to best practice including the Canadian Standards Association (CSA) *Emergency Preparedness and Response: A National Standard of Canada* (CAN/CSA-Z731-03), is in accordance with the requirements of the *Mines Act* and the Health,

Safety and Reclamation Code, and will meet the regulatory requirements as stipulated by the British Columbia Ministry of Energy and Mines and supports (does not compromise) the emergency service delivery requirements for the population base within the LSA (as directed by local, regional and provincial emergency response authorities and service providers).

Developing an ERP involves examining each area of the mine for potential emergencies as well as possible means of prevention and protection. As conditions may change over time, this exercise is to be repeated periodically. All areas and processes of the mine are inspected to determine what risks are associated with the work environment. Once all risks are identified, control measures are considered to prevent emergency situations, and may include improved ground support and pillar design and/or the introduction of fire suppression systems. Appropriate training and procedures, safe working practices, an effective housekeeping program and first aid training are all examples of measures that will help prevent a minor emergency from becoming a crisis or a disaster (Ministry of Energy, Mines and Natural Gas 2013). All costs related to establishing, equipping, operating and maintaining mine rescue teams, mine rescue apparatus and equipment as prescribed by the Chief Inspector are the financial responsibility of the mine manager (Ministry of Energy, Mines and Natural Gas 2013).

The ERP will include details regarding the following:

- Emergencies that have the potential to occur at the Proposed Project site including water-based emergencies;
- Emergency response guidelines;
- Emergency systems and equipment to be used and their locations on-site;
- Emergency response training to be provided;
- A communication plan in the event of an incident;
- Posting requirements of the plan;
- Location of first aid trailer;
- An evacuation plan;
- Roles and responsibilities including the identification of the ERP coordinator to assist the mine manager in developing the ERP;
- Muster locations;
- Contact information for persons and organizations to be notified in the event of an incident;
- Notification and reporting requirements; and
- Containment and clean-up techniques/options where necessary (see Spill Prevention and Emergency Response Plan below).

The ERP will be developed in conjunction with the ERP coordinator, the mine manager, the Ministry of Energy, Mines and Natural Gas, as well as Seaspan and local, regional and provincial emergency response authorities, such as fire departments, municipal police and RCMP, Coastal Health Authority, and BCAS. The ERP will be

communicated to emergency response authorities and service providers for their review and comment. The Proposed Project will provide all emergency response services on site, including fire and emergency health care.

16.6 Spill Prevention and Emergency Response Plan

An integrated Spill Prevention and Emergency Response Plan (SERP) will be developed and implemented by the Proposed Project proponent. The SERP will encompass and coordinate applicable plans prepared by construction and marine transportation contractors and will include spill prevention and responses to accidental spills. The SERP will be developed and implemented in accordance with the requirements and provisions of the applicable regulations including the *BC Environmental Management Act* (2003), *Navigation Protection Act* (1985), *Fisheries Act* (1985) and *Canada Shipping Act* (2001) and the BC Guidelines for Industrial Emergency Response Contingency Plans (BC MWLAP 1992) and regulations and orders pursuant to the acts.

The regulation of marine oil spill response is primarily defined in the *Canada Shipping Act* (2001) and administered by Transport Canada (Western Canada Marine Response Corporation 2013a). Shippers are legally responsible for oil spill preparedness and response (Pacific States/British Columbia Oil Spill Task Force 2011), but the *Canada Shipping Act* defines the requirement for oil spill response organizations to be certified by the Minister and establishes planning standards that define minimum levels of capacity to be maintained by the response organization. Western Canada Marine Response Corporation (WCMRC) the only Transport Canada certified response organization in BC and is funded by the shipping industry through membership, bulk oil cargo and capital asset fees (Ministry of Environment 2012). WCMRC's mandate is to ensure there is a state of preparedness in place and to mitigate the impact when an oil spill occurs. This includes the protection of wildlife, economic and environmental sensitivities, and the safety of both the responders and the public (Western Canada Marine Response Corporation 2013b). The Proposed Project falls within the Western Canada Marine Response Corporation (WCMRC's) Primary Area of Response, which means for spills less than 2,500 tons deployment on scene must be within 18 hours, and for spills above 2,500 tones deployment on scene must be within 72 hours (Western Canada Marine Response Corporation 2013b).

The SERP will set measures and controls in place to (i) prevent release of toxic or deleterious substances into the environment as a result of an accidental events and (ii) contain and clean up spills and leaks in a case the release (accidental event) has taken place. The plan will includes measures laid out in Seaspans' BMPs provided in Appendix 16.0-A (BMP – 01: Hazardous Materials Management, BMP – 02: Waste Management and Recycling and BMP – 03: Spill Prevention and Response). The plan will include, but not limited to, the following measures and practices:

- The Spill Prevention and Emergency Response Plan will be posted on-site;
- All operations and that include handling and storage of hazardous materials will comply with the Workplace Hazardous Materials Information Systems (WHMIS), as established under the *Hazardous Products Act* (1985) and associated regulations;
- Transport and handling of any hazardous material will be in compliance with the *Transportation of Dangerous Goods Act* (1992);

- No washing of machinery or equipment will take place at the marine foreshore or near freshwater environments;
- Refueling will not be done adjacent to environmental buffers or waterways;
- Inspection of equipment being used on and off site will be continued through the reclamation phase as identified in the CEMPs (defined above for construction);
- Procedures to prevent health risks;
- Staff on site has appropriate training with spill containment measures and equipment;
- Emergency spill kits should be maintained on site. Operating personnel will be familiar with the contents and use of spill response equipment and the location and operation of emergency 'shut-offs';
- Provisions for contractors to stop work due to Health and Safety concerns based on weather or other conditions. The determination regarding whether to work based on weather or other conditions will be made by the contractor in coordination with the Proposed Project Proponent. The Proponent will direct the contractor to stop work if deemed necessary;
- All fuel, lubricant and other chemicals use, handling and transfer activities will be conducted by properly trained personnel according to pre-established formal procedures to prevent accidental releases and fire and explosion hazards. Documented procedures will include all aspects of the delivery or loading operation from arrival to departure, including connection of grounding systems, verification of proper hose connection and disconnection, and adherence to no-smoking and no-naked light policies;
- There will be an emergency response team onsite during work hours consisting of competent and trained personnel responsible to deal with emergency situations including fire, explosions and oil spills. The teams will be trained in using emergency equipment and spill kits and will undergo regular drills and practices;
- Tide tables, current tables and weather reports will be consulted prior to commencing work to avoid adverse environmental interactions such as vessel grounding. Works at the foreshore will not take place during times when adverse environmental conditions are present. Marine weather and sea conditions may change rapidly; forecasts will be consulted as necessary;
- The proponent will ensure that the vessels, equipment and machinery will arrive on site in a clean/good condition and are to be maintained free of fluid leaks and invasive species. Fuel tanks, lubricants and chemical storage containers and components will meet relevant safety standards for preventing uncontrolled release of stored materials during normal operation and during exposure to natural hazards and to prevent fires and explosions. Vessels and equipment will be inspected daily. The logged records of inspections will be maintained;
- Requirements for collision-prevention devices (e.g., lights, sound signals, radar reflectors), navigation safety aids, ships' structural conditions, personnel training and competence, documentation, radio equipment and communications, emergency systems, fire safety and lifesaving equipment, pollution prevention measures and alarms;

- Implementation of the Proposed Project Environmental Policy and management plans will be engaged through a company representative onsite. The measures will include regular toolbox meetings, trainings and inductions, inspections and audits of the contractors as necessary;
- A contact list of all local emergency spill response service providers (e.g., Western Canada Marine Response Corporation);
- All accidents, spills, and near-misses will be reported and recorded in the Proposed Project database. A formal investigation will be conducted, if necessary, to determine causes of an accident and adequate resources will be allocated to conduct the investigation;
- Implementation of Shoreline Cleanup and Assessment Technique (SCAT) survey in the event of a spill, if deemed necessary;
- In a case of a spill of a toxic or deleterious material, all efforts will be made to contain and recover the substance and act according to the plan and procedures that will encompass different scenarios of potential spills. The level of response will depend on the circumstances of the spill; and
- In a case of reportable spill, the closest Canadian Coast Guard Station (1-800-889-8852) or Emergency Coordination Centre (1-800-OILS-911) will be contacted. The spill contingency plan will list the amounts and types of reportable substances as defined by the *Spill Reporting Regulation* under the *Environmental Management Act*.

16.7 Health and Safety Plan

Site and activity specific Health and Safety Plans will be required throughout the Proposed Project. These plans will outline specific procedures and protocols for working around active construction sites. BURNCO's corporate Health, Safety and Environmental Management Plan is provided in Volume 4, Part G – Section 22.0: Appendix 16-B. Project specific health and safety plans will follow BURNCO's corporate Plan and will contain the following site and Proposed Project specific information:

- Contact details of all on-site personnel;
- Proposed Project work or activity details to be conducted;
- Site details including location of work;
- Check-in systems;
- Accommodation;
- Travel itineraries;
- Identification of potential hazards and associated risks;
- Personal protective equipment requirements;
- Training requirements;

- Incident and reporting requirements and frequency;
- Tailgate meeting outlines; and
- Incident and emergency management plans.

A site specific health and safety orientation will be administered to all workers prior to beginning work.

17.0 ENVIRONMENTAL MONITORING AND FOLLOW-UP PROGRAMS

Environment monitoring plans will be developed by qualified environmental professionals and implemented to achieve compliance with EAC Commitments and Assurances and with terms and conditions of regulatory permits and approvals, and monitor the effectiveness of mitigation measures. The effectiveness of proposed mitigation measures has been assessed for each potential residual effect and is presented in Volume 3, Part D – Section 15.1.5 (Tables 15-6 through 15-23). Specific linkages to the monitoring and follow-up programs described below are also provided in these tables.

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 Proposed Project activities as a part of the Proposed Project construction and operational EPPs as stated above in Section 16. 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 programs 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. The studies will be conducted with a Proposed Project study area (receiving environment) and a reference area. Monitoring plans will establish timelines and schedule for each monitoring activity (e.g., give years for post-construction monitoring). Monitoring data will be assessed against Proposed Project-specific guidelines which will be developed based on Canadian and BC guidelines and baseline benchmarks.

The sections below describe the effects monitoring and follow-up programs 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. Programs may commence during construction, operations or reclamation phase of the Proposed Project. The schedule and length of the program will be provided. Some additional monitoring programs may be suggested after the Proposed Project has commenced. Adaptive management techniques will be applied to all monitoring programs.

17.1 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. This monitoring will include the following:

- Monitoring wells located both up-stream and down-stream of the open pit. This will include existing wells that will not be removed as part of the aggregate extraction and additional wells installed to monitor groundwater levels during operations;
- Additional monitoring wells installed at the bottom of the east facing slopes to monitor water quality inputs from the west;

- Monitoring of the water levels in the pit lake;
- Sampling of groundwater in select monitoring wells every 3 months throughout the Proposed Project and compare to baseline groundwater quality; and
- Data collected on the flows in the creeks down gradient of the open pit undertaken as part of the surface water monitoring program will be reviewed to compare with assessment predictions.

Data will be reviewed and compared to the predictions of groundwater quantities and quality. If observed water quality is poorer than predicted and/or the water flows are less than predicted, than adaptive management strategies will be undertaken.

17.2 Vegetation

Vegetation monitoring will include an assessment of windthrow as well as post-reclamation monitoring. Effectiveness monitoring will be employed to evaluate the severity and consequence of any potential windthrow along treeline edges formed by the Proposed Project. Adaptive management (i.e., tree topping) will be employed, if necessary, to control any potential negative effects identified by the monitoring.

The post-reclamation vegetation monitoring program will be designed and implemented to assess the success of reclamation activities and general vegetation conditions within the mine footprint, including:

- The establishment of appropriate vegetation within reclaimed areas with the aim of a self-sustaining native community;
- Potential encroachment of nuisance and noxious species and site specific mitigation and management strategies for dealing with these species, should they occur; and
- Identification of problem areas (i.e., soil issues) where vegetation establishment is not meeting reclamation criteria and site specific treatment options (i.e., site preparation, soil amelioration, etc.).

A five-year Reclamation and Effective Closure Plan is to be filed with the BC Ministry of Energy and Mines as a requirement of the Mine Permit. This plan provides details regarding planned progressive reclamation activities, end land-use goals (i.e., vegetation criteria) and will include a detailed monitoring plan. The Reclamation and Effective Closure Plan is provided in Volume 4, Part G - Section 22: Appendix 4.

17.3 Wildlife

The Wildlife Protection Plan will include provisions for a wildlife monitoring program with the objective of measuring the effectiveness of mitigation and restoration measures on wildlife VCs within the LSA. 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.

The results of the wildlife monitoring program will be evaluated annually to determine if changes in abundance for wildlife VCs are within acceptable limits. If the Proposed Project is determined to be having an effect on listed species for which adequate data are available, BURNCO will work with regulators to determine appropriate methods for applying additional mitigation or avoidance measures or to reduce these effects, where possible. BURNCO will consult with BC Ministry of Forest, Lands and Natural Resource Operations (FLNRO during the development of the wildlife monitoring program. Wildlife monitoring data and results collected by BURNCO will be provided to MFLNRO to support regional wildlife management efforts.

17.4 Fish and Fish Habitat

The fish and fish habitat monitoring plan will include the following:

- Clear objectives for monitoring the continued use of habitats by fish and integrity of fish habitat;
- Fish habitat assessments within the fish-bearing streams of the LSA to determine if there are any measurable changes to fish habitat structure and function occur;
- Procedures on the management of flush and flow strategies from the outlet structure of the pit lake to maintain fish habitat in the extensions (e.g., offset habitat). This may include adaptive management strategies to allow flush and flows to occur as a result of monitoring or it may include flush and flows to occur at regular set intervals. The strategy will be implemented in consultation with DFO.
- Fish community assessments within the fish-bearing streams of the LSA to determine if there are any measurable changes to fish abundance and distribution;
- Benthic macro-invertebrate sampling within the streams of the LSA to determine if there are any measurable changes to the food supply within the creeks; and
- A technical report, at the end of the monitoring period, detailing the results of the monitoring program and assessing the effectiveness of the mitigation measures and the Proposed Project effects on fish and fish habitat.

Follow-up monitoring will be used to identify the need for additional or alternate mitigation or contingencies to ensure no significant adverse residual effects occur to fish and fish habitat due to Proposed Project activities.

Habitat offset monitoring will be conducted for the offset habitat to confirm that habitat offset measures outlined in the Habitat Offset Plan are followed and to assess the functionality of the offset habitat over the long term. The habitat will be monitored upon completion of construction and an initial monitoring report with as-built drawings will be provided to MoE and DFO. The initial monitoring report will confirm whether the construction of the offset habitat meets the performance criteria outlined in the Habitat Offset Plan. The offset habitat will then be monitored during years 1, 2, 3 and 5 (if necessary) and monitoring reports will be provided to MoE and DFO. If the long-term performance objectives of the offset habitat are not being met, DFO and MoE will be consulted to identify

appropriate remediation measures. The Fish Habitat Offset Plan is provided in Volume 4, Part G - Section 22: Appendix 5.1-B.

17.5 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. On-site meteorological monitored data may also be used to determine high wind conditions and construction activities will be discontinued during high wind events.

17.6 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. Samples will be collected at the following locations:

- McNab Creek (MCF-1 and MCF-7);
- Pit lake (MCF-5);
- Downstream of the pit lake and within WC 2 (MCF-6); and
- Downstream of the pit lake along a permanent watercourse (MCF-12).

Surface water samples will be collected in accordance with procedures described in the *British Columbia Field Sampling Manual 2013* (BC MoE 2013). Water samples will be submitted to a laboratory accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA), for analysis of physical tests (pH, hardness, conductivity (µS/cm), alkalinity, and total suspended and dissolved solids), anions and nitrogen forms (nitrate, nitrite, ammonia, sulphate), phosphorus (total, dissolved and orthophosphate), organic carbon, and total metals and dissolved metals. Field replicates (i.e., side-by-side samples) will be collected at a different location during each sampling event and the results of analysis will be compared to evaluate the precision of the methods used.

During and prior to construction, water quality samples will be taken on a quarterly basis at the five LSA sampling locations listed above. Additional construction-related monitoring mainly related to suspended solids will also be undertaken during this time in accordance with the EMP. Additional recommendations for monitoring of water quality in relation to the Fish Habitat Offset Plan are provided in Volume 2, Part B - Section 5.1.

For the first two years of operations, monitoring effort will be focused on the pit lake (MCF-5) and downstream of the pit lake within WC 2 (MCF-6), where water samples will be collected on a monthly basis. In McNab Creek (MCF-1 and MCF-7) and downstream of the pit lake along a permanent watercourse (MCF-12), samples collection will be quarterly. After two years sampling, frequency will be re-evaluated in consultation with MoE and other regulatory agencies.

17.7 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. Monitoring of periphyton biomass and benthic invertebrate communities in McNab Creek and WC 2 during operations will be triggered by the following changes in surface water quality:

- Consistent exceedance of BC WQGs for one or more parameters that have the potential to result in toxicity-related effects on aquatic life; and
- An increasing trend in phosphorus concentrations that indicates a potential shift in trophic status in McNab Creek or WC 2 during construction or operations.

Additional recommendations for monitoring of fish and fish habitat and benthic invertebrate communities in relation to the Fish Habitat Offset Plan are provided in Volume 2, Part B - Section 5.1.