



**SEA-TO-SKY
HIGHWAY IMPROVEMENT PROJECT
ENVIRONMENTAL MANAGEMENT PLAN**

DB1

(LARSEN CREEK TO ANSELL PLACE)

PHASE II-STAGE 2

**CLEAR, GRUB, EARTHWORKS, DRAINAGE,
STRUCTURES AND ROADWORKS**

(REV. 2)

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1.0 INTRODUCTION

1.1 OVERVIEW

This environmental management plan (EMP) addresses the environmental management for construction activities within design/build section one (DB1), Nelson Creek to Ansell Place, of the Sea To Sky Highway Improvement Project (the Project). Figure 1 illustrates the location of the DB1 section relative to the overall Project corridor.

The design/build contractor, Peter Kiewit Sons Co. (PKS) chose to approach construction activities in DB1 in two phases. Phase I consists of work within the existing highway right-of-way near the Pasco Road and Eagleridge interchanges. Phase II includes all work in the off-alignment section from Eagleridge Bluffs to Pasco Road and the widening of the existing highway from Pasco Road to Ansell Place (including Larsen Creek Bridge). Due to logistical and constructability concerns, Phase II work was further divided into two stages: Stage 1 (Eagleridge Bluffs to Black Mountain Trail and Stage 2 (Black Mountain Trail to Ansell Place). In following with this approach and in order to appropriately address environmental issues in the design/build framework, environmental management for DB1 was similarly organized with three EMPs, as follows:

- EMP DB1 (Nelson Creek to Ansell Place) - Phase 1 Clear, Grub, Earthworks, Drainage and Roadworks, Eagleridge and Pasco Road;
- EMP DB1 (Off-Alignment Section - Including Larsen Creek To Eagleridge Interchange) - Phase II - Stage 1 Clear, grub and Earthworks; and
- EMP DB1 (Larsen Creek To Ansell Place) - Phase II - Stage 2 Clear, Grub, Earthworks, Drainage, Structures and Roadworks (this document).

Phase I and Phase II-Stage 1 work is proceeding within the parameters set out in the EMP for each of those sections, both of which were previously reviewed by the Province and accepted by the lead regulatory agencies for this Project, Fisheries and Oceans Canada (DFO), Environment Canada (EC) and BC Ministry of Environment (MoE).. Figure 2 illustrates the relative location of Phase I, Phase II-Stage 1, and Phase II-Stage 2 areas within DB1.

This EMP is intended to cover specific environmental issues and mitigation for the construction activities identified for the Stage II-Phase 2 construction activities along the off-alignment section from the Black Mountain Trail to Pasco Road and the existing highway from Pasco Road to Ansell Place. This work is scheduled to commence after May 29, 2006.

General initiatives, goals, and mitigation for overall environmental management of the Project are provided in the Environmental Management Plan Guidance Manual (EMPGM), previously submitted to the Province and responsible

regulatory agencies. Where appropriate, certain sections of the EMPGM are referenced for further guidance on environmental management issues and best management practices (BMPs) not described in this EMP.

Figure 1 Sea-to-Sky Highway Improvement Project design/build sections.

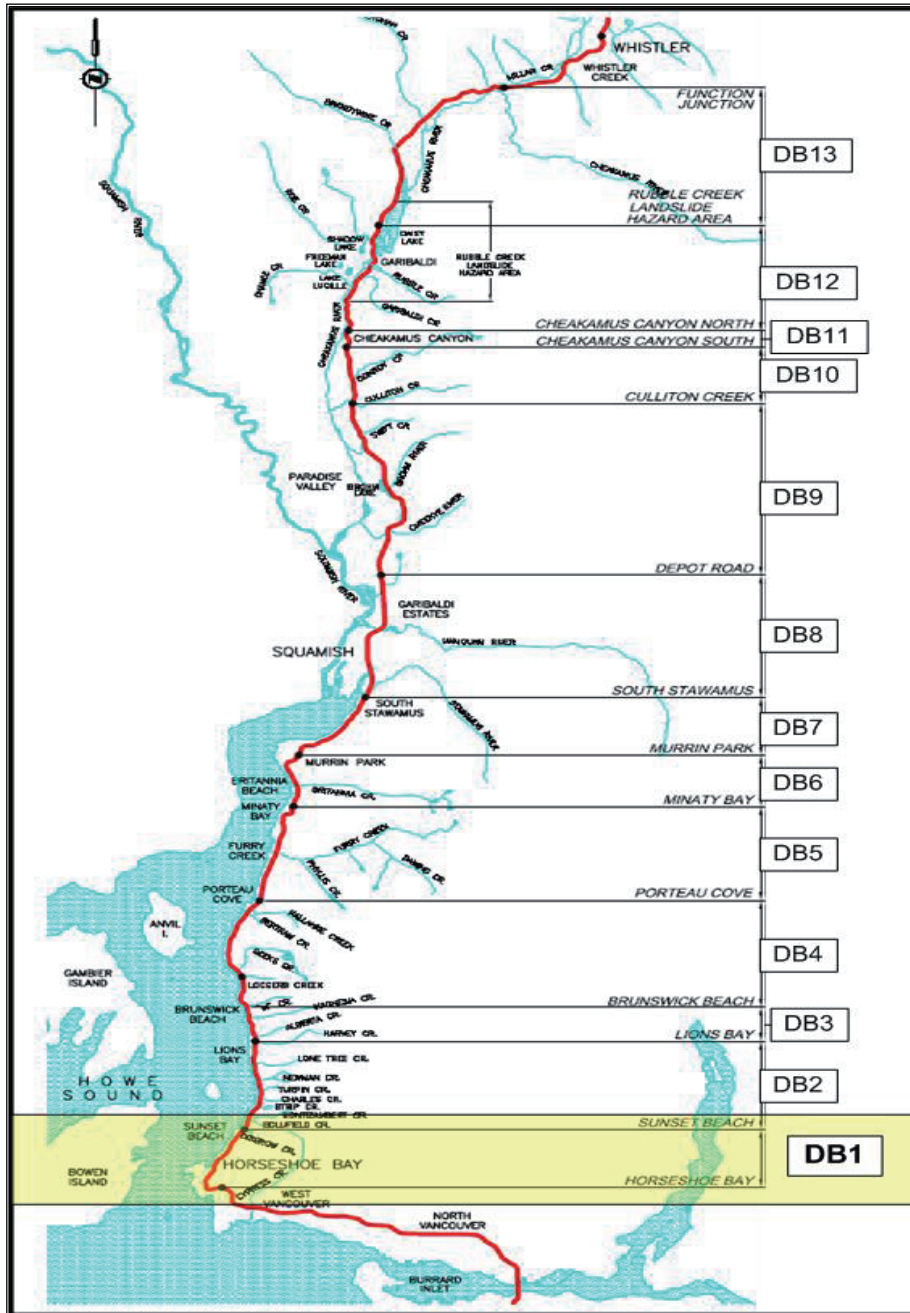
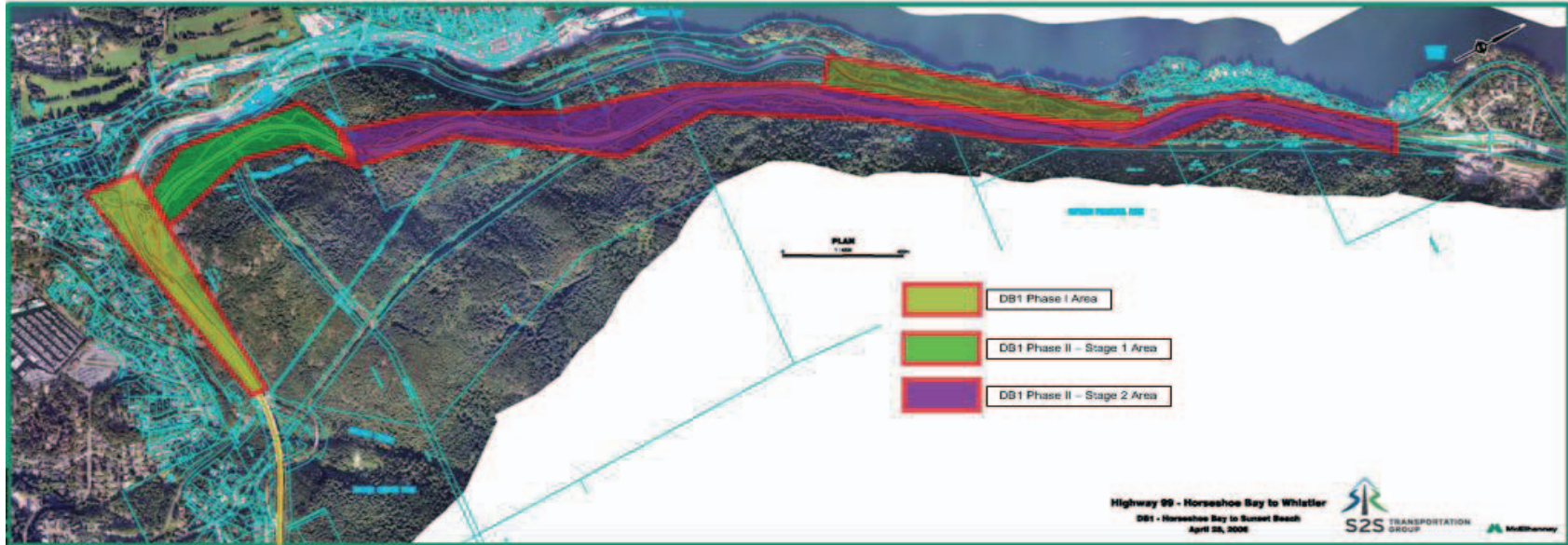


Figure 2 Locations of Phase I, Phase II-Stage 1, and Phase II-Stage 2 areas within DB1.



2.0 ENVIRONMENTAL GOVERNANCE AND GUIDANCE DOCUMENTS

This EMP, in concert with the EMPGM, are the reference documents for the environmental management practices to be implemented by the DB Contractor for the Project during construction activities carried out between early May and late September 2006. The measures described in this EMP are supplemental to the environmental provisions and requirements stipulated in the following key documents:

- Project Concession Agreement between the Sea-to-Sky Highway Investment Limited Partnership (the Concessionaire) and the Ministry of Transportation (the Province); and
- Sea-to-Sky Environmental Assessment Certificate (EAC) T04-01 including Table 1 'Owner's Commitments and Responsibilities'.

Additional guidance for project-related environmental management practices and activities will be determined by the terms and conditions of relevant permits, licenses and approvals as they are acquired. Supplementary environmental standards, guidelines and best management practices (BMPs) are also contained in the following documents:

- *Best Management Practices for Highway Maintenance Activities*, Ministry of Transportation document, July 2004;
- *Habitat Conservation and Protection Guidelines*, Department of Fisheries and Oceans Canada, 1998;
- *Standards and Best Management Practices for Instream Works*, Ministry of Water, Land and Air Protection, March 2004;
- *Practitioners Guide to Habitat Compensation for DFO Habitat Management Staff*, Department of Fisheries and Oceans Canada, 2002;
- *Best Management Practices for Amphibians and Reptiles in Urban and Rural Environments in British Columbia*, Ministry of Water, Land and Air Protection, 2004;
- Recommended best practices information bulletins, publications, checklists and forms available at:
http://srmwww.gov.bc.ca/sry/csd/forms/#info_bul;
- SS165 *Protection of the Environment* of the Ministry's Standard specifications. The Highway is classified as a 'designated environmentally sensitive area' in accordance with SS165.01.04 and is subject to all restrictions set out in SS165;

- Instream Works Windows Information Bulletin available at <http://wlapwww.gov.bc.ca/sry/fwh/hp/iwn.htm>;
- *Land Development Guidelines for the Protection of Aquatic Habitat*, Department of Fisheries and Oceans Canada and Ministry of Environment, Lands and Parks, 1992; and
- *Manual of Control of Erosion and Shallow Slope Movement*, Ministry of Transportation (and Highways), August 22, 1997.

Environmental specialist sub-consultant reports pertinent to the proposed construction activities are appended in this document and referenced where appropriate. As construction proceeds, new or updated specialist surveys and reports may be required and will be included in EMP update submittals, as required.

3.0 PROJECT WIDE ENVIRONMENTAL MANAGEMENT

Throughout all phases of construction, the DB Contractor will comply with all federal, provincial and municipal regulations, permits, authorizations, conditions, and agreements with respect to environmental protection as outlined in the contract and supporting documentation listed in Section 2.0. A list of definitions and acronyms used in this document is provided on page vii of the EMPGM.

General environmental management activities not covered in this EMP are provided in the EMPGM. These include, but are not limited to:

- Environmental Process and Risk Management including environmental monitoring and reporting (EMPGM Section 1.2);
- Roles and Responsibilities of the Environmental Team and the DB Contractor (EMPGM Section 1.3); and
- Regulatory Review and Permitting (EMPGM Section 1.4).

Each environmental sub-component plan is individually addressed in the EMP for the defined areas of construction. Relevant references to the EMPGM are provided.

3.1 PROJECT CONTACTS

The project contact list for the works proposed in this EMP is provided below in Table 1. This list will be updated and revised as appropriate.

Table 1 Project Contact List.

Organization	Position	Name	Telephone Number
Peter Kiewit Sons	Segment Manager DB1	Brad Mytko	604-833-1349
	Project Engineer DB1	Mark Crabtree	604-202-2023
	Environmental Coordinator	Liz Kovics	604-786-1800
Hatfield Consultants	Environmental Manager	Andrew Allan	604-315-3265
	Assistant Environmental Manager	Cristian Puga	604-926-3261
	Environmental Monitor	Alex Sartori	604-220-0199
Ministry of Transportation	Environmental Manager	Isobel Doyle	250-652-4345
	Environmental Field Auditor	Duncan Sutherland	604-815-3608
Department of Fisheries and Oceans	Major Projects Agency Liaison	Patricia Lim	604-666-6529
	Fisheries Officer, Squamish	David Loop	604-892-3230
	DFO Radio Room		1-800-465-4336
Ministry of Environment	Ecosystem Biologist	Michael Willcox	604-582-5200
	Conservation Officer, Squamish		604-898-2175
	Provincial Emergency Program (PEP) Spill Response		1-800-663-3456

4.0 DESCRIPTION OF CONSTRUCTION ACTIVITIES

This EMP applies to all DB1 Phase II-Stage 2 construction activities including site clearing, grubbing and stripping, access pioneering, grading drainage, rock excavation, wall and bridge construction. In particular, this EMP covers all works for the Larsen Creek Bridge and north approaches adjacent to the Larsen Creek wetland. Construction activities proposed under this EMP are summarized in Table 2. A general construction schedule for all activities to be carried out during the first year of operation in the DB1 Phase II-Stage 2 area is provided in Section 5.4 of this EMP.

The set of 900 series drawings (environmental construction drawings) included in Appendix 1, show clear and grub boundaries and other construction-related specifications, as well as environmentally sensitive features contained within the areas of construction activity. Any works other than those described in this document identified by the contractor for construction during this period within these areas will be addressed in amendments to this EMP.

Table 2 Proposed Phase II-Stage 2 construction activities covered under this EMP.

DB Section	Site Description	Type of Work	Stationing	Drawings	Proposed Start Date
DB 1	Larsen Creek to Ansell Place	Clearing, grubbing, drill and shoot, excavation, drainage, MSE wall, bridge, roadworks and culverts	100+500 to 104+021	46DD-DB01-0907 to 46DD-DB01-0916	May 2006

The potential for impact to sensitive environmental features and environmental issues has been reviewed according to the Project environmental documentation and field surveys. Key environmental features contained within those areas, including potential impacts and mitigation activities, are addressed in this EMP.

Any additional sites or changes in design resulting from differing site conditions, Province change orders or other changes required in the design will be reviewed by the environmental team as to their impacts to ensure that they are within the footprint of the clear and grub boundaries detailed in Section 4.2. The assessment of these additional works and any required environmental mitigation measures and plans will be provided to the Province and appropriate regulatory agencies as the information becomes available.

For the works covered under this EMP, the most sensitive areas of potential impact is Larsen Creek, the pond at the intersection of Black Mountain trail and Baden Powell trail, and the Larsen Creek wetland (Dwg# 46DD-DB01-0907 and 0908). It is at these locations where the construction zone is closest to Larsen Creek and the Larsen Creek wetland/swamp ecosystem. Given the relative sensitivity of Larsen Creek and downstream fish values, as well as the wetland ecosystem, environmental mitigation efforts will be focused around establishing setback distances, flagging, fencing and drainage as described in this EMP.

4.1 SITE ACCESS

The Black Mountain trail will be the primary ingress and egress route for all machinery and personnel entering the Phase II construction zone until a suitable access can be established at the northern end of the off-alignment section near Pasco Road. The location for the north access point will be established once clearing is complete and more accurate geotechnical information can be collected.

Other than logging trucks transporting merchantable timber out of the construction site, the DB Contractor will endeavor to institute a one-pass entry to the site for heavy machinery brought into the off-alignment section.

Until the Larsen Creek Bridge is complete, vehicle traffic will access the Phase II-Stage 2 construction zone up the Black Mountain Trail to where it intersects the Baden Powell Trail (Stn. 100+500) and then north along the Baden Powell Trail to

Stn 100+900 (approx. 400m). From Stn. 100+500 to Stn. 100+700, the Baden Powell Trail is outside of the Project footprint but within the limits allowed by the established construction easement.

Once the construction of the Larsen Creek Bridge is complete, all vehicle traffic will access areas north of Black Mountain trail via the bridge and the 200m section of the Baden Powell Trail previously used to access the site will be decommissioned in accordance with final design prescriptions.

During Phase II-Stage 1 activities, the Black Mountain Trail was capped with a layer of coarse rock to minimize erosion resulting for the increase in vehicle traffic. The portion of the Baden Powell Trail used for access to the site will receive the same treatment. Site-specific trail protection efforts are required at the Larsen Creek culvert crossing location (Stn. 100+520). These improvements are discussed further with the discussion on the Larsen Creek culvert in Section 4.6 (Drainage) of this document.

Once the access routes are established and environmental mitigation efforts have stabilized the area, clearing activities will proceed along the newly acquired right-of-way. The clearing limits are illustrated on the set of environmental construction drawings provided in Appendix 1. A sediment and drainage management plan that includes measures to mitigate impacts to the environment adjacent to the access road to the site is provided in Appendix 2.

4.2 CLEARING AND GRUBBING

The purpose of the clear and grub work is to provide access to work areas within the highway right-of-way for construction. It is proposed that clearing grub and striping activities for DB1 Phase II-Stage 2 will be completed early October of 2006. Clearing and grubbing boundaries for the overall project footprint have been marked on the environmental construction drawings (900 series) provided in Appendix 1 and clearly flagged in the field. In addition, 15m no clearing and 50m no grubbing buffers have been established adjacent to a number of sensitive watercourse features within the proposed work area. Clearing within these buffer zones will only occur when construction activity warrants (i.e., construction equipment access and excavation is required) and appropriate sediment and erosion control measures are in place.

The flagging of clear and grub buffer boundaries will be verified in the field by the environmental monitor and/or environmental coordinator to ensure that the environmentally sensitive features are adequately protected.

4.3 EARTH WORKS

Earthworks activities involve the excavation and moving of rock and soil. Examples of such activities include digging, drilling, blasting, building of embankment fill slopes and slope stabilization. Environmental mitigation measures related to earthwork activities are described in the sub-component plans within this EMP.

4.4 MSE WALLS

Mechanically stabilized earthen (MSE) walls are constructed with "reinforced soil." Reinforcing elements include such things as steel strips, steel or polymeric grids, and geotextile sheets and are placed in the soil to improve tensile resistance. Placement of reinforcing elements significantly strengthens the soil allowing construction on very steep slopes and avoids the need for large, conventional, fill areas.

Due to the steep terrain and Project footprint constraints (e.g., railway and environmental), MSE walls will be constructed at some locations in DB1. During the first year of the Stage 2 work, pioneering for access to build the MSE walls and MSE wall construction will be carried out at the following sites:

- Pioneering MSE access work at a number of locations between stations 100+ and 103+; and
- MSE wall construction between 100+530 and 100+589, in association with the Larsen Creek Bridge.

4.5 BRIDGE WORKS

A clear span, four-lane bridge over Larsen Creek will be constructed as part of the DB1 Phase II-Stage 2 activities. The final design prepared for the Larsen Creek Bridge specifies a 27.8m span along the roadway centerline and a 20m span perpendicular to the abutment. Bridge construction is currently scheduled to begin in August of 2006 and continue through November 2006. The general arrangement design drawing for the bridge is provided in Appendix 3. No instream work is required for the construction of the bridge.

After clearing and grubbing is complete, the general construction sequencing for the bridge is as follows:

1. Excavate foundations for abutments on both north and south sides.
2. Install precast retaining wall panels and backfill with bridge end fill (3" minus rock).
3. Pour concrete abutments.
4. Install precast concrete 'I' girders.
5. Install precast bridge deck panels.
6. Pour concrete finishing layer on bridge deck.
7. Backfill and pour approach slabs.

The SDMP in Appendix 2 provides a more detailed description of the construction process and incorporates the environmental protection and mitigation measures that are associated with each stage of bridge construction.

4.6 DRAINAGE WORKS

As part of the drainage design for this section of the highway, the installation and/or modification of 34 culverts or cross drainage structures is required. Table 3 provides a summary of the proposed culvert work associated with an identified channel. These unnamed channels are identified with a HS# established for watercourses/drainages in the EA Application and labeled on the 900 series drawings.

Although there are no fish present at any of the culvert crossings identified in Table 3, water quality objectives will be maintained during culvert works due to the presence of fish populations in receiving waters.

Table 3 Culvert works at DB1 Phase II-Stage 2.

Station	Culvert Diameter (mm)	Drawing #	Culvert Extension (m)		Identifier and Description	Permits required
			U/S	D/S		
101+330	600	41DD-DB01-0109			HS 0.3 Steep dry channel, no fish access	-
7+485	600	41DD-DB01-0110		Yes	-	-
101+940	1000	41DD-DB01-0111			HS 1 Steep dry channel at Hwy, no visible channel at railway crossing	-
102+495	1200	41DD-DB01-0112			HS 4/5 No visible channel upstream of Hwy.	-
102+495	1200	41DD-DB01-0112			HS 4/5 No visible channel upstream of Hwy.	-
80+120	1200	41DD-DB01-0112			HS 4/5 No visible channel upstream of Hwy.	-
103+200	1200	41DD-DB01-0114			HS 9.1 Steep ephemeral channel at Hwy, no visible channel at railway crossing	-
103+340	600	41DD-DB01-0114		Yes	HS 9.2 Steep dry channel, roadside ditch upstream of Hwy.	-
103+610	1400	41DD-DB01-0115			HS 10.1 No visible channel	-
103+655	600	41DD-DB01-0115			HS 10.2 No visible channel	-
103+750	600	41DD-DB01-0115		Yes	HS 11 Steep dry channel, no visible channel downstream of Hwy.	-

In addition to the culverts listed in Table 3, the outlet of the Larsen Creek culvert under the Baden Powell Trail that provides drainage from a pond to downstream reaches of Larsen Creek has experienced significant erosion. The outlet of the culvert is currently perched approximately 1m above the streambed.

The DB Contractor's hydraulic consultant (Northwest Hydraulic Consultants [NHC]) recommended the following design modifications to prevent future failure and preserve the integrity of the upstream aquatic habitats.

- lowering the crown of Baden-Powell Trail by 0.3 m over a distance of 5m;
- recontouring the downstream embankment and resurfacing the trail using washed 150 mm minus rock; and
- armouring the downstream embankment with 500 mm to 600 mm diameter rock.

The inlet to the existing culvert will not be altered and will remain at its present elevation and conditions to maintain the annual water level regime in Larsen Pond and Larsen Wetland. An estimate of 3m culvert extension is required at the downstream side of the culvert to fit field conditions. The SDMP provided Appendix 2 outlines the environmental protection measures associated with the works identified at this culvert.

4.7 ROADWORKS AND PAVING

Roadwork and finishing activities include electrical, signage, landscaping and pavement markings. Most of these activities planned for DB1 Phase II-Stage 2 will be completed in the later half of 2007 and 2008. Minor roadworks, including grading, the placement of sub-base materials and paving will be carried out at a limited number of locations along the alignment in 2006.

All new paving is asphalt, except bridge decks, which are cast-in-place concrete. Recycling of existing pavement and base for use in the new roadway prism will be utilized to the maximum extent possible. Where existing pavement can be utilized in the final pavement structure, it is reshaped through milling or leveling. Where milling or leveling is not possible due to changes in profile grade or widening, full reclamation and reconstruction of the pavement structure is carried out. Reclamation is the blending of asphalt pavement/base materials to a depth in a single pass of a road reclaimer machine. This reclaimed material is reused as granular course of the new pavement structure.

4.8 REGULATORY AGENCY REVIEW, NOTIFICATION AND APPROVAL

This EMP and any subsequent amendments are subject to lead regulatory agencies (DFO, EC and MoE) review and comment. At a minimum, regulatory agencies will be kept apprised of construction activities through monthly environmental management reports and regularly scheduled meetings between the DB Contractor's environmental team and the lead agencies.

A 'License to Cut' issued to the Project by the BC Ministry of Forests (MoF), Chilliwack Forest District for the clearing and grubbing activities in this section of the Project has been obtained. A copy of the 'License to Cut' authorizing merchantable tree clearing on acquired lands is provided in Appendix 4.

A *Water Act* Notification was submitted to MoE for the Larsen Creek Bridge crossing. DFO was copied on the notification.

A Water Act Approval application has been received for the riprap placement at Larsen Pond culvert outlet.

DFO has provided the DB Contractor with written confirmation that a *Fisheries Act*, Section 35[2] authorizing a harmful alteration disruption or destruction (HADD) of fish habitat will not be required for the design and construction of the Larsen Creek Bridge.

An application for a amphibian and small mammal salvage permit under the BC Wildlife Act has been submitted to MoE. Salvage activities will be focused on Larsen Creek and the adjacent wetlands along the road alignment.

Copies of the salvage permit will be on site during any salvage operation, and all conditions specified in the permit will be strictly followed.

Pre-approval from the CWS will be required for any clearing during the bird-breeding window from March 15 to July 31.

5.0 ENVIRONMENTAL COMPONENTS

The following component plans reflect construction activities and potential environmental impacts for the works specified in Section 4.0 of this EMP. The plans and mitigation measures outlined below reflect items identified in the Concession Agreement and EAC T04-01, Table 1 'Owner's Commitments and Responsibilities' for the Project. The primary objective of this EMP is to address site and activity specific issues in the context of the overall environmental guidance documents for the Project provided in Section 1.1 of the EMPGM.

5.1 AIR QUALITY MONITORING AND MITIGATION PLAN (AQMP)

Clear, grub, earthworks, drainage and roadwork activities planned for the off-alignment portion of Phase II-Stage 2 will not be within 50 m of any residential area. Therefore, it is anticipated that site-specific air quality mitigation measures and monitoring will not be required in this area. However, there will be site preparation and construction activities carried out in the Pasco Road area that will be within 50 m of the community. In this area, air quality mitigation measures and monitoring will be required. In this regard, an ambient air quality monitoring station has been installed at Paso Road to monitor nuisance dust during DB1 activities.

The DB Contractor approach to air quality monitoring and mitigation is outlined in Section 2.1 of the EMPGM. Air quality monitoring schedule specific to the work outlined in this EMP will be submitted to the Province prior to the start of construction.

5.2 ARCHEOLOGY AND CMT MANAGEMENT PLAN (AMP)

The removal of eight culturally modified trees (CMTs) dated post-1846 is planned during the works covered under this EMP. Table 4 provides information on the location of these CMTs and required culturally sensitive removal and disposition procedures. Further detail on the location and the appropriate treatment of the CMTs is provided in a September 2006 report prepared by Arcas, the DB Contractor archeologists, which is attached in Appendix 5.

Table 4 Archeological features at DB1 Phase II-Stage 2 clear and grub limits.

DB Section	Station	Archeological Feature	Removal/Disposition Procedures
DB 01	100+575 to 100+630	5 Culturally Modified Trees	Prior to removal the Squamish, Tseil-Waututh, and Musqueam First Nations will be contacted by the DB Contractor Archeologist to arrange for a site ceremony and to finalize arrangements for disposition of the CMTs.
DB 01	100+675	Culturally Modified Tree	
DB 01	100+980	Culturally Modified Tree	
DB 01	101+025	Culturally Modified Tree	

A contingency plan to manage the possibility of encountering previously unidentified archaeological resources during construction is provided in Section 2.2 of the EMPGM.

5.3 BEAR/HUMAN CONFLICT REDUCTION PLAN (BHCRP)

As there are no plans for on-site centralized garbage containers, it is anticipated that bear/human conflict will not be an issue for the proposed clear and grub, excavation, and the other works covered under this EMP for DB1. All food wastes and garbage will be kept in pick-up trucks and removed from the site daily.

The Environmental Field Coordinator will be informed of all bear sightings. Should bear sightings become frequent or a 'problem bear' be identified, the Environmental Manager, will be notified and further steps for bear/human conflict mitigation will be in consultation with the local Conservation Officer.

Further details on the BHCRP are provided in Section 2.3 of the EMPGM.

5.4 CONSTRUCTION SCHEDULE

A general schedule for the first 12 months of DB1 Phase II-Stage 2 (north of Black Mountain Trail) construction activities addressed in this EMP is provided in Figure 3. The current start date for Phase II-Stage 2 works is shown as

May 1, 2006, however, this date will change based on the timing of the EMP review process. Given the comparatively long timeframe being covered under this EMP, construction activities have been grouped under a number of general headings and sub-headings in order to provide an indicative summary rather than exhaustive list.

5.5 CONTAMINATED SOILS MANAGEMENT PLAN (CSMP)

No existing contaminated sites were identified within the limits of DB1 construction area.

The DB Contractor retains a commercial contaminated soils and groundwater clean up company (Tri-Arrow Industrial Recovery Inc.) on a contingency basis to advise and act on remediation and disposal procedures in the event that soil contamination is encountered. Any activities associated with contaminated sites or materials will be reported in the weekly environmental monitoring report.

The Spill Contingency and Response Plan of the EMPGM (Section 2.21) provides detailed procedures and a contact list in case of an accidental spill or other situation that may result in soil/groundwater contamination resulting from construction activities.

5.6 ENVIRONMENTAL QUALITY MANAGEMENT PLAN (EQMP)

The EQMP for these works will follow those described in the EMPGM (Section 2.6). A stand alone 'Quality Management Plan - Environment' has been provided to the Province detailing the environmental quality objectives, plans and procedures.

5.7 ENVIRONMENTALLY SENSITIVE AREAS MANAGEMENT AND PROTECTION PLAN (ESAMPP)

Key environmentally sensitive areas that have the potential to be impacted by Stage 2 of Phase II construction activities are provided in Table 5.

Measures established to mitigate impacts to these sensitive areas are provided in the following sub-component plans in this EMP.

- Section 5.9, Equipment and Materials Plan;
- Section 5.10, Fisheries Mitigation/Compensation Plan;
- Section 5.16, Recreation Resource Management Plan;
- Section 5.15, Rapture/Heron Management Plan;
- Section 5.18, Sensitive Ecosystem Management Plan;
- Section 5.19, Sediment and Drainage Management Plan;
- Section 5.25, Water Quality Sampling Program; and
- Section 5.26, Wildlife Mitigation Plan.

Table 5 Environmentally sensitive areas within Phase II-Stage 2 construction area.

PA Station	Dwg.	Sensitive Feature/Constraint	Comments
Vegetation and Wildlife			
103+805	916	Bald eagle nest	Outside clear and grub boundaries Clearing exclusion window from Stn103+310 to the end of DB 01 at Stn 104+021.384 Blasting exclusion window from Stn102+795 to the end of DB 01 at Stn 104+021.384
100+520 – 100+900	907, 908	Larsen Creek wetland	Polygon 696 Installation of snow and silt fence along the entire length of the wetland adjacent to the alignment
100+600 – 102+130	907 to 911	Blue-listed ecosystems	Polygons 445, 698 and 702
Fisheries			
100+290	906, 907	Larsen Creek, Habitat Class 2A, Watercourse/Amphibian Habitat	Upper Larsen Crossing. Standard Type B – erosion protection
Recreation			
99+700-101+100	904 to 907	Baden Powell/Black Mountain Trail network	Minimize encroachment on trails and manage access points

Larsen Creek and associated wetlands is a key sensitive watercourse that may be impacted by construction activities. A buffer zone will be maintained during clear and grub activities, until construction in those areas is ready to proceed, erosion protection measures are in place and amphibian mitigation measures established. Where required 'vegetation to remain' and 'no disturbance' zones in and around sensitive features are provided in the environmental construction drawings (Appendix 1). Due to its sensitivity and ecological significance, the entire length of the Larsen Creek wetland adjacent to the alignment will be fenced-off with a combination of upslope snow fencing and downslope silt fencing.

These buffer zones will be flagged in the field and verified by the Environmental Monitor, Environmental Coordinator and/or environmental discipline specialist.

5.8 ENVIRONMENTAL TRAINING PLAN (ETP)

The environmental training plan for the works proposed for this period will follow the procedures outlined in the EMPGM (Section 2.8). The training is provided at three levels: design, pre-construction, and tailgate. As described in the EMPGM, the goal of environmental training program is to:

- inform design and construction personnel of the overall environmental obligations and goals for the Project; and
- provide the necessary resources to allow them to identify environmental issues and apply appropriate mitigation measures.

Through continual *check and act* procedures by the environmental management team, the goal of the environmental training program will be to enable project personnel to reach a level of confidence that can allow them to take the ultimate responsibility for environmental issues and mitigation procedures as they relate to their specific design or construction activity. As environmental or construction conditions can change, these procedures will go through continual review and modification throughout the clear and grub activities.

A pre-construction meeting will be held at the Westport Site Office several days prior to startup. At this meeting the environmental management team including the Environmental Coordinator and Environmental Monitor will meet with senior construction personnel to review the EMP and proposed work plan. Topics to be covered at this meeting include impacts to sensitive features, environmental procedures that will be used to mitigate these impacts and agency approvals and/or notifications required during Phase II-Stage 2 activities.

Site specific, pre-activity meetings will also be scheduled throughout the duration of work. At these meetings, the Environmental Field Coordinator and/or Environmental Monitor will review environmental issues for a specific activity and provide input on procedures that will be used to mitigate environmental impacts. The Environmental Monitor and/or Environmental

Field Coordinator will be available to provide direction on the appropriate application of these procedures and any new protection measures that may be required as the clear and grub activities proceed.

5.9 EQUIPMENT AND MATERIALS PLAN (EqMP)

The Equipment and Materials Plan outlines on-site management of vehicles, machinery (including fueling and operation), imported materials (including hazardous materials) and materials generated from construction activities. For clear and grub activities, large machinery may include pick-up trucks and skidders. Small, handheld machinery will include chainsaws and brush cutters. During construction activities a variety of large vehicles and machinery will be on-site, including excavators, drills, haul trucks and cranes for the bridge construction works.

Any heavy equipment working in close proximity (30 meters) to sensitive receiving waters (e.g., Larsen Creek and wetlands) will be in good working repair and free of oil, hydraulic fluid, grease and fuel leaks. The operator, Operations Manager and/or Environmental Monitor will inspect all machines daily before start-up to ensure that no potential exists for contamination of the stream banks or watercourse. Operators are responsible to ensure that no potential exists for oil, grease or other deleterious substances to enter any ditch, watercourse, ravine, or storm sewer system.

Buffer zones have been established around all sensitive environmental features and there will be no need to re-fuel heavy or hand-held machinery within 15m of any watercourse. The DB Contractor shall be responsible for ensuring that upon completion of each day's work equipment that have the potential to adversely impact environmentally sensitive areas are stored in a stable location away from these areas.

The primary works and maintenance yard for DB1 is located at the Westport Pit (approx. two kilometers south of Horseshoe Bay on the east side of Hwy 1). However, to minimize movement of heavy machinery up and down the Black Mountain Trail access, larger machines (e.g., back hoes) will be refueled and maintained within the Project footprint south of Larsen Creek at a location approved by the Environmental Monitor.

5.10 FISHERIES MITIGATION/COMPENSATION PLAN (FMCP)

One watercourse (Larsen Creek) that supports fish habitat has been identified in DB1 (Stn. 100+280, Dwg. #41DD-DB01-0906 and 0907). Although not fish bearing upstream of the existing highway, water quality must be maintained due to the presence of existing downstream fish populations and habitat enhancements east of Marine Drive. For the activities covered under this EMP, the greatest potential for impact to Larsen Creek will be the activities associated with the bridge construction.

Boundaries between the construction area and Larsen Creek are identified on the environmental construction drawings with a black dotted line. The black dotted line represents the buffer zones to be flagged in the field. Orange snow fence and silt fence will also be installed at key locations along this boundary. It is the responsibility of the Environmental Field Coordinator to ensure that flagging and fencing is installed and functioning as intended prior to the start of clear and grub activities. The buffer boundaries and treatments will be field verified by either the Environmental Monitor, Environmental Coordinator or fisheries discipline specialist.

As no instream work is planned for Larsen Creek (clear-span bridge design), the DB Contractor anticipates that there will be no requirement for instream compensation. Further to this, DFO has stated that authorization under Section 35[2] of the *Fisheries Act* will not be required for construction of the Larsen Creek Bridge. The riparian revegetation plan for Larsen Creek is discussed in Section 5.17 of this EMP.

5.11 INFRASTRUCTURE DEMOLITION MANAGEMENT PLAN (IDMP)

There is no major demolition work being carried out in the DB1 Phase II-Stage 2 Project area. The demolition of minor existing infrastructure (e.g., roadways, shoulders, wing walls, etc.) will follow procedures outlined in the EMPGM (Section 2.11). Asphalt will either be reclaimed on-site along with existing road base to form new road base within this section or recycled at the Contractor's asphalt plant facility in Squamish for mixing with new asphalt. The Contractor is permitted to include up to 20% recycled asphalt in new asphalt mixtures.

5.12 MATERIALS MANAGEMENT PLAN (MMP)

All storage piles of excavated material will be at least 30m from the top of bank of any sensitive water body to prevent material from entering the work area and/or the creek. Sediment control measures at these sites will be implemented to ensure that water quality objectives are met.

Excavated materials are to be stockpiled in designated areas and are to be limited in duration and spatial extent as much as possible. Storage piles located in close proximity to environmentally sensitive watercourses will be covered with plastic sheeting when not in use for more than 72 hours. To the discretion of the Environmental Monitors, silt fences will be installed at the bottom of any newly exposed slopes containing erodible material to contain sediment transfer.

5.13 NOISE CONTROL AND MITIGATION PLAN (NCMP)

The areas of potential noise concern in and around DB1 are the communities of Horseshoe Bay, Eagle Ridge, Pasco Road and Ansell Place. Phase II activities in DB1 are scheduled for both day and night shifts. Day shift will include all construction activities while night shift is to include drilling and wall construction with limited blasting for the period defined in this EMP.

During December 2005 and March 2006, baseline or existing noise monitoring levels were measured at five residential street locations in the Eagleridge interchange area including Cranley Drive, Bluebell Drive, Falcon Road (2), and Eagleridge Drive. Two sites in the Horseshoe Bay area including Gleneagles Elementary School and Libby Lodge were also included in the baseline study. These monitoring sites were selected to be representative of residences most directly exposed to existing highway traffic noise and relatively free from the influence of other noise sources in the community such as heat pumps or pool pumps and residential construction activities.

The establishment of baseline noise levels will allow the DB Contractor to compare construction noise levels with existing conditions, isolate problem noise areas and focus noise mitigation efforts on those areas or activities that are being impacted the greatest.

The noise monitoring and mitigation program as outlined in the EMPGM (Section 2.13) is provided in Appendix 6. Acting as the DB Contractor noise mitigation and monitoring specialists, Wakefield Acoustics is available to monitor noise and advise on noise mitigation measures should they be required.

5.14 POTENTIALLY ACID GENERATING/METAL LEACHING MATERIALS AND ACID ROCK DRAINAGE ADAPTIVE MANAGEMENT PLAN (PAG/MLMARDMP)

Although PAG rock does exist in DB1, no rock excavation activities in areas exhibiting PAG or AG materials are planned for construction of the DB1 section of the highway.

The existence of this material at the north end of DB1 was identified early in the design process and avoided by adjusting the highway alignment to the west (Howe Sound). This adjustment has resulted in larger fills and more wall structures in some areas of DB1 north. Given potential water quality implications at PAG cuts and that no environmentally sensitive elements exist in the adjacent downslope areas, the DB Contractor Team felt that avoidance of PAG material was the preferred design option.

5.15 RAPTOR/HERON MANAGEMENT PLAN (R/HMP)

5.15.1 Nests and Nesting Behaviour

The DB Contractor wildlife specialists (Cascade Environmental) conducted raptor nest surveys in October 2005 for DB1. The survey concluded that there were no new raptor nests identified within the clear and grub boundaries for DB1. Pre-construction raptor nest surveys for the 2006 season were completed in conjunction with songbird nest surveys for DB1. These surveys have been forwarded to MoE and CWS for review and comment. No new raptor nests were observed in DB1 during the 2006 surveys.

Previous surveys conducted under the EA identified an active bald eagle's nest within the area covered by this EMP. Table 6 provides a summary of information on the location and construction mitigation requirements for this nest.

Table 6 Raptor/heron features at DB1 clear and grub limits.

DB Section	Station	Raptor Feature	Drawing	Comments/Mitigation
DB 01	103+805	Bald Eagle Nest	46DD-DB01-0916	Outside clear and grub boundaries Clearing exclusion window from Stn103+310 to the end of DB 01 at Stn 104+021.384 Blasting exclusion window from Stn102+795 to the end of DB 01 at Stn 104+021.384

5.15.2 Other

The habitats of two provincially listed owl species, northern spotted owl (*Strix occidentalis caurina*) and western screech owl (*Magascops kennicottii kennicottii*), have been identified within the DB1 clear and grub boundaries. The BC Conservation Data Center (CDC) has reported the northern spotted owl as 'red-listed' (i.e., extirpated, endangered or threatened) and the western screech owl blue-listed (i.e., vulnerable). In addition to their provincial listing, these species have been categorized by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as endangered (spotted owl) and of special concern (screech owl) under the federal *Species at Risk Act* (SARA). Special habitat management measures are required if these species are found within the project area. Pre-construction surveys are used to determine the presence of these species within and near the construction footprint.

Northern Spotted Owl (Strix occidentalis)

The EAC Table of Commitments for the Project requires pre-construction surveys of spotted owls following Resource Inventory Standards Committee (RISC) Standards.

A June 17, 2005 memorandum by Robertson Environmental Services concluded that,

"Given that spotted owls were not detected during WP1 (DB1) surveys conducted over two consecutive years (2004 and 2005), with at least three surveys conducted per year, the habitat surrounding WP1 can be officially classified as being vacant (Hobbs *et al.* 2005)."

However, on the advice of MoE biologists, a third follow-up survey was required for 2006. The DB Contractor's wildlife specialists, Cascade Environmental Resources Group, conducted spotted owl surveys over a 10-day period, consistent with RISC standards [Survey protocol and Standards for the Northern Spotted Owl (*Strix occidentalis caurina*) in British Columbia, RISC, February 6, 2005] in April/May of 2006.

The report summarizing these survey results (Appendix 7) concluded that consistent with surveys done in 2004 and 2005 in this area, spotted owls were not detected in 2006 and the areas surveyed can be considered vacant of spotted owl for 2006. The report also states that surveys may be required in subsequent years. The requirement for futures surveys will be in consultation with MoE.

Western Screech Owl (*Otus kennicottii kennicottii*)

Anecdotal evidence reported the presence of western screech owl outside of the DB1 clearing boundary near Whyte Lake (approx. 500m east of Stn. 101+350). Owl surveys conducted during the EA Assessment for the Project were not able to confirm these findings. No western screech owl callbacks were reported during the 2004, 2005, or 2006 owl surveys for DB1.

5.16 RECREATION RESOURCE MANAGEMENT PLAN (RRMP)

All recreation sites identified within the work area are provided on the drawings in Appendix 1. A list of the recreation features within DB1 clear and grub limits is provided in Table 7.

Table 7 Recreation features within the DB1 Phase II-Stage 2 clear and grub limits.

DB Section	Feature Type	Approx. Stationing	Drawing	Comments
DB1	Hiking Trail	99+700 to 99+900	41DD-DB01-0904	Baden Powell Trail
DB1	Hiking Trail	100+280 to 100+550	41DD-DB01-0906 and 0907	Black Mountain Trail

On April 1, 2006, access to the Baden Powell Trail from the Eagleridge parking lot was discontinued due to public safety considerations. At that time, the public was directed to access the Baden Powell Trail north of Larsen Creek via the Black Mountain Trail trailhead located across from the BC Ferries tollbooth.

As of May 23, 2006 and in accordance to a court ordered injunction, the Black Mountain Trail will be permanently closed to public access for a minimum 12-month period. During this period, the Black Mountain Trail will be an active construction zone to facilitate ingress and egress of construction vehicles, including logging trucks for the off-alignment section of DB1. The current public access exclusion zone is illustrated in Figure 4. It is anticipated that once

construction proceeds north from the Black Mountain Trail, the exclusion zone will be expanded to include the portion of the Baden Powell Trail from Larsen Creek to the Whyte Lake access road.

In order to improve traffic safety for construction vehicles entering and exiting via the Black Mountain access point, the DB Contractor has gone ahead with localized widening of the trail and expanded the Black Mountain trailhead parking area. Environmental management efforts for this work was provided in a previous EMP submission (*EMP DB1 (Off-Alignment Section - Including Larsen Creek To Eagleridge Interchange) - Phase II – Stage 1 Clear, grub and Earthworks*) for this area.

Because construction activities will limit access to these trail features, timely notifications of closures, alternative parking, access provisions, construction and construction activities will be provided and communicated to the public. Signs will be installed at key locations (e.g., Whyte Lake area and Trans Canada Trail trailhead at Westport) to notify hikers of the construction area so that they do not commit to walking a portion of the trail from which they cannot exit. Figure 5 provides an example of the sign postings that will be placed at key trail locations.

On the Project website, a monthly recreation construction bulletin is posted that provides information and scheduling on trail closures and parking restrictions for recreational features. This bulletin can be accessed via the project website at www.seatoskyimprovements.ca.

The communication program, developed in consultation with user groups, DWV, the DB Contractor and the Province has included the establishment of a West Vancouver Community Liaison Committee (WVLC). The WVLC meets monthly to discuss construction related activities and what mitigation strategies will be implemented to limit impacts on socio-community issues in DB1. The WV Community Liaison Committee includes members of the Construction Team and a variety of community local stakeholder groups.

Figure 4 DB1 Horseshoe Bay to Sunset Beach, Highway Right-of-Way and Exclusion Zone Overview Plan 1.

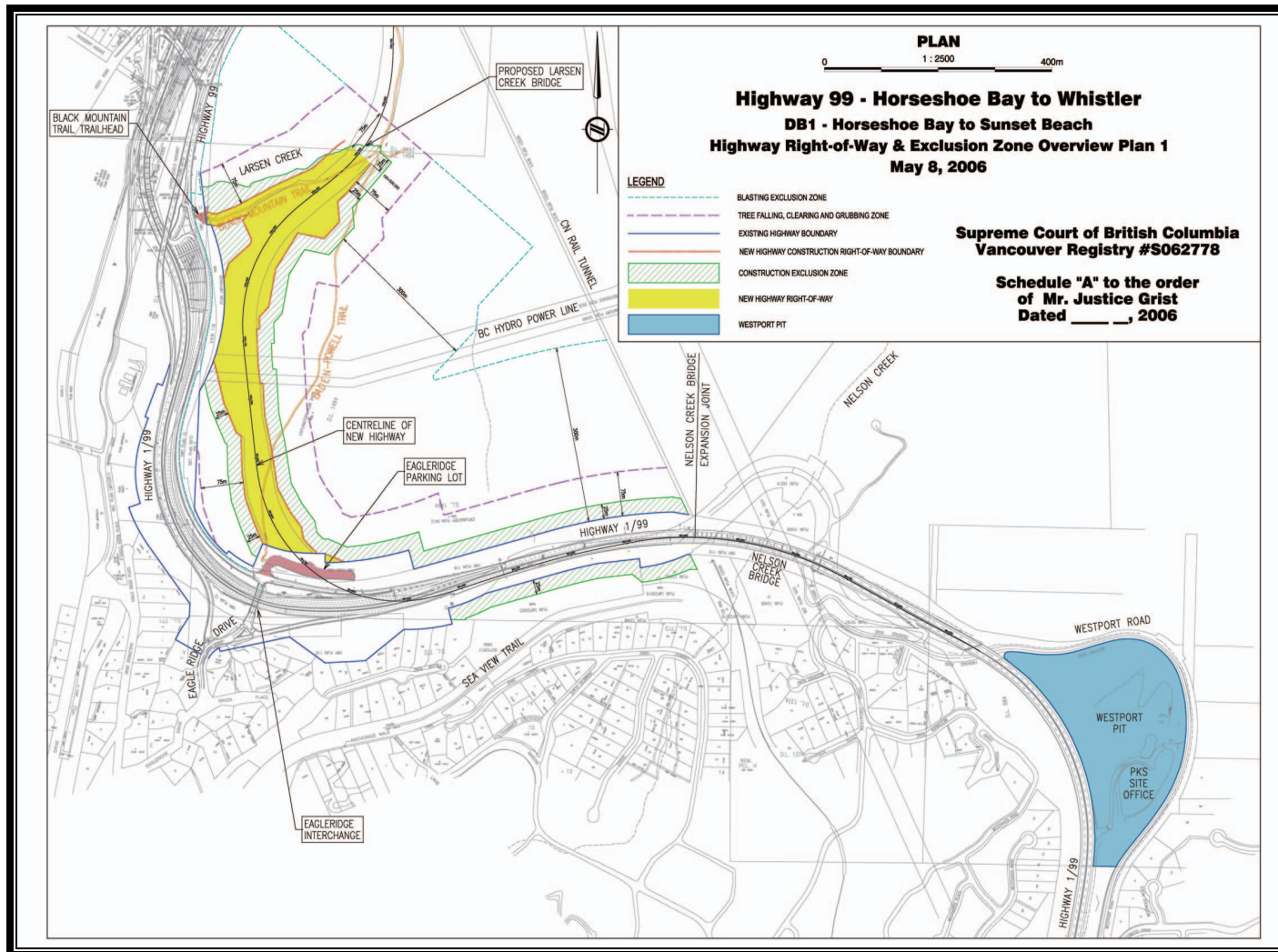


Figure 5 An example of a construction activity sign to be posted at key trail locations.



Additional communication strategies will involve community-signing, mail-outs, and email/website notices. An information 'hot-line' has been established to provide users a telephone number to call for further information on trail closures and construction activities.

Any decision on post-construction treatments of the Baden Powell Trail and the Black Mountain Trail requires review and approval by the Province, District of West Vancouver (DWV), and local landowners.

5.17 RIPARIAN RESTORATION AND TERRESTRIAL RECLAMATION/REVEGETATION PLAN (RRTRRP)

Revegetation plans for all of DB1 will be implemented after the completion of substantial road and bridge works. The basic approach to the revegetation plans with regards to wildlife values is provided in Section 2.17 of the EMPGM.

Preliminary riparian and terrestrial restoration plans at key wildlife habitat locations (e.g., riparian areas and movement corridor sites) have been prepared for disturbed areas at Larsen Creek, the Baden Powell Trail, along the western edge of the wetland and at the openings of the five wildlife culverts (Appendix 8). The DB Contractor's wildlife specialists provided recommendations on preferred planting criteria and large woody debris placements that would benefit amphibians, small mammals and large mammals. Finalized planting plans and any associated treatments (e.g., wildlife fencing) used to benefit wildlife in the area will be submitted to MoE for review and comment.

Section wide terrestrial revegetation plans for DB1 will involve first stage hydroseeding and second stage landscape planting in accordance with the landscape planting criteria established in the Project Concession Agreement.

Hydroseeding criteria for the Project as specified by the DB Contractor's landscape vegetation specialist are provided in Appendix 9. Landscape planting plans are currently under development by the landscape vegetation specialist. These plans will be reviewed by the environmental team's wildlife specialist to ensure that they do not conflict with wildlife habitat goals and preserve the integrity of native plant systems.

In order to control the spread of invasive plant species, vegetation reclamation will occur as close to the completion of construction activities as possible. Revegetation plans involve first stage hydroseeding and second stage landscape planting in terrestrial areas. The terrestrial treatments will depend upon community input derived during the West Vancouver public consultation process. An invasive species management plan is provided in Appendix 10.

5.18 SENSITIVE ECOSYSTEM MANAGEMENT PLAN (SEMP)

Phase II activities covered under this EMP will not impact any red-listed ecosystems but will have impacts on blue-listed ecosystems. A portion of blue listed ecosystem polygons 702, 698, and 445 are within the west side, clear and grub boundary in the off-alignment section from of Larsen Creek to Pasco Road (see Dwgs. 997 to 911). As provided in Table 8, the CA provides for a maximum area of impact to this ecosystem. The DB Contractor has been able to reduce the impact to this ecosystem during the design phase and will be looking for further impact reduction during the field phase of clear and grub boundary layout.

Table 8 Impacts of the DB Contractor design on sensitive ecosystems in DB1.

Sensitive Ecosystem	CA Maximum Area of Impact (ha)	DB Contractor Design Area of Impact (ha)
Red-listed plant ecosystem, including the Arbutus-Hairy Manzanita unit	0	0
Blue-listed plant ecosystem (Phase II area)	0.70	0.59
Douglas Fir/Arbutus woodland-rock outcrop ecosystem	1.36	1.21*
Wetted area of swamp habitat in Larsen Creek headwaters	0	0

* Field investigation confirmed a reduced area of impact (0.96ha as reported in the DB1 Phase 1 Stage 1 EMP) which includes 0.04ha of arbutus dominated, 0.15ha of herbaceous rock, and 0.77ha of mixed arbutus sensitive elements.

To ensure that the areas of impact are preserved, buffer strips indicating 'no disturbance' and 'vegetation to remain' have been established on the drawings. Field survey layout and boundary verification by the DB Contractor environmental team, the Contractor and Project arborist prior to clearing will identify the potential for further reduction in the clearing limits.

Once clear and grub boundaries have been flagged and sensitive ecosystem boundaries established continuing field verification surveys will be conducted to ensure that the construction limits are maintained.

5.19 SEDIMENT AND DRAINAGE MANAGEMENT PLAN (SDMP)

This SDMP is complimentary to the SDMP provided in the EMPGM and in compliance with Section 165 (Protection of the Environment) of the MoT's Standard Specifications for Highway Construction (2006). The EMPGM describes appropriate conditions for the use of various erosion protection techniques. All work and erosion protection measures will be scheduled with consideration to prevailing and forecasted weather conditions. A SDMP for the Larsen Creek Bridge, Larsen Creek culvert, access roads and the wetlands area covered under this EMP is provided in Appendix 2.

In general terms, DB1 is characterized by steep terrain dominated by bedrock overlain by shallow organic material. These geomorphologic conditions may be prone to accelerated runoff and associated down slope movement of sediment and fines during heavy rainfall events. The exposure of existing overburden resulting from construction activities can accelerate these natural erosion processes. Effective sediment and drainage management will be required to mitigate the potential for down-slope erosion of fines and sediments due to wind and rain.

During Phase II-Stage 2 clear and grub activities, sediment and drainage control will concentrate mitigation measures on areas that can be identified as prone to erosion and sediment transfer and in particular, the boundary between the construction zone and the established buffer along Larsen Creek and the Larsen Creek wetlands.

Due to its sensitivity and ecological significance in the Project area, particular attention will be paid to protection of the Larsen Creek wetlands during all site preparation and construction activities covered under this EMP. In addition to specific environmental training and awareness building for all on-site personnel prior to startup, the entire length of the wetland adjacent to the alignment will be fenced-off with a combination of upslope snow fencing and downslope silt fencing. The Environmental Monitor and Operations Manager will ensure that the fencing is properly installed, and maintained for as long as it is needed at the site.

In addition to the specific sediment and drainage management measures planned for the Larsen Creek wetlands, a review of site conditions will be conducted by the Environmental Monitor and Operations Manager to identify possible risk areas and conditions. High risk, erodible sites will be identified for immediate erosion protection and stabilization (e.g., silt fencing and drainage control). Once these areas are identified, the Environmental Monitor, in consultation with the Environmental Field Coordinator and/or Operations Manager will develop site-specific prescriptions to prevent and/or mitigate erosion at these locations.

The Environmental Monitor will regularly check these areas of risk in order to identify potential erosion and drainage problems before they occur. The Operations Manager or their designate will be made aware of these sites and any mitigation measures that are deemed appropriate to prevent sediment transfer.

The primary erosion protection measure will be to retain small vegetative debris and leaf litter on the soil surface after clear and grub work is completed. This material will act as a protective cover against direct impact of precipitation. Consideration will also be given to covering steep, exposed slopes during heavy precipitation events with plastic sheeting or intercepting run-off from these slopes with silt fencing or ditch blocks. More permanent slope stabilization and erosion control measures will be implemented during subsequent construction activities.

No silt-laden water generated during clear/grub or construction activities will be discharged into water bodies or watercourses. The water quality monitoring program (Section 5.25) will be used to assess the success of sediment control measures and the potential need for further actions.

5.19.1 Seepages and Drainage Culverts

Within the construction zone, many of the drainages are a combination of ephemeral flows and/or 'seepages' that appear and disappear depending on the weather, ground type or vegetation cover. These drainages often do not have a defined channel and are usually not attributed to one specific culvert crossing. During most wetted conditions, these seepages flow off the steep upslope rock faces into the roadside drainage ditch and then subsurface under the highway. Downslope of the highway, they may daylight at some point, continue to flow subsurface or a combination of both.

Cross drain culverts, used to pass ditch water emanating from these seepages and road runoff, are situated along the highway at key locations and are not associated with a defined channel at the outlet. Most of these cross drain culverts have their inlets at a level that is designed to only pass water during high flow conditions (i.e., snow melt or storm events). Depending upon highway drainage design, the decommissioning, relocation, replacement or extension of cross drain culverts may be required during construction.

As the potential for environmental impacts resulting from construction work involving seepages and cross drains are generally low, a general 'field screening' approach will be used to address sediment and drainage management at these locations. This approach can be implemented as field conditions warrant and can be applied as field conditions change.

The following process and procedures will be utilized to address encounters with localized seepages and cross drains.

1. An assessment by the Environmental Monitor or Environment Field Coordinator regarding the environmental sensitivities of the location.
2. Providing the sensitivity is low, a site-specific treatment will be developed in consultation with the Environmental Monitor and/or Environment Field Coordinator.

3. Environment Field Coordinator will ensure that required equipment, materials, and manpower are on site or accessible to the work site.
4. Work will not start until the Environmental Monitor and/or Environmental Field Coordinator are satisfied that site conditions are appropriate and that any dewatering measures are functioning as required.
5. If dewatering of the site is required, the preferred method is to divert water away from the work area. Ditches can be blocked diverting flow from one cross drain to another. A less preferred dewatering method, but one that can be used is pumping the water away from the site.
6. If a seepage area is encountered and crossing of the area is necessary with machinery, the seepage will be dewatered to allow the installation of culverts and/or other drainage feature(s) that will convey flow through and past the work zone.
7. Other means of traversing a seepage area may involve the use of temporary bridge type structures constructed of logs or other suitable materials.

All the methods and procedures can be implemented providing water quality objectives are being met.

5.20 SOIL CONSERVATION/STRIPPED ORGANIC MATERIAL MANAGEMENT PLAN (SCSOMMP)

Earthworks (drilling, blasting and material removal/placement) will require the stripping of overburden (soil and organics). Soil conservation will be achieved through the onsite stockpiling and associated erosion protection of the stockpiles. Stripped organic material will be removed and stored within the established clear and grub boundary. These storage piles, located no closer than 30m from any environmentally sensitive watercourse, will be tarped to prevent the downslope movement of material. This material will be utilized for future use as top dressing during landscaping and fill slope treatments. Identified locations within DB1 for temporary storage of this material are provided in Table 9.

Parking lots and pullouts proposed for organic material storage during construction will be signed accordingly indicating alternative parking/pull out provisions. Final pullout treatments will follow those outlined in Schedule 5, Part 1, Table 8-5 of the Concession Agreement.

Table 9 Sites selected as potential locations for temporary storage of soil and organic material.

Area	Station	Description
Westport Pit	98+300	Site office/lay down area south of Nelson Creek bridge.
Eagleridge parking lot	98+650	Parking area presently at Eagleridge to be closed during construction and used at storage/lay down..
Off alignment right-of-way	98+800 to 102+400	Non-sensitive areas to be selected in consultation with Environmental Monitor.
View Pullout	103+800	Pullout immediately south of Ansell Place on the west side of the current alignment. This site was used during WP2 construction to store rock and overburden (activity restrictions during eagle nesting window).

5.21 SPILL CONTINGENCY AND RESPONSE PLAN (SCRP)

The spill contingency and response plan is outlined in the EMPGM, Section 2.21. Considering that effective spill contingency and response is a key environmental element in environmental protection, it is important to make a copy of these procedures available at all times. In this regard, Section 2.21 of the EMPGM has been provided in Appendix 11.

5.22 TAILED FROG MANAGEMENT PLAN (TFMP)

Tailed frog survey information provided for the Project by Ascaphus Consulting Ltd. (May 11, 2004) reported no tailed frog streams in DB1. However, the Environmental Monitors will perform opportunistic field checks (i.e., during water quality sampling events) of any watercourse that has the potential to support tailed frog populations.

5.23 VEGETATION DEBRIS MANAGEMENT PLAN (VDMP)

Vegetation debris will be generated during clear and grub activities. Clearing and grubbing includes brush, tree and stump removal.

No wood waste will be deposited into sensitive watercourses. No falling is permitted in or across watercourses and should this occur accidentally, the timber will be removed so as not to disturb the streambed or bank. Wood waste will be separated into merchantable and non-merchantable material and stored within the highway right-of-way. These storage areas will be situated in well-drained sites free of standing water. Until removal off-site, merchantable timber will be temporarily cold-decked within the highway right-of-way out of running and standing water to prevent undue generation of tannin and lignin leachate.

In an attempt to maintain the overall balance of organic material within DB1, the first option for non-merchantable vegetation debris disposal will be on-site chipping or tub grinding for use as topdressing on fill slopes or mixed with soil

for landscape treatments. Secondary disposal options included removal off-site to an approved commercial vegetation disposal facility. The DB Contractor has committed to no burning of vegetation within DB1.

5.24 WASTE MANAGEMENT PLAN (WMP)

The guiding principle for waste management is to maximize opportunity for reduction, re-use and recycling of solid waste. It is anticipated that waste generation as a result of construction will be minimal. Daily removal of lunch waste including recyclables will be the responsibility of all construction personnel during construction.

Portable toilet facilities will be provided on-site at appropriate locations away from sensitive environmental features. These facilities will be maintained and emptied by a commercial waste contractor for the duration of clear and grub activities. The site office at Westport Pit has been connected to District of West Vancouver sanitary sewer and potable water systems.

These procedures and other waste management measures including the recycling program are provided in further detail in Section 2.24 of the EMPGM.

5.25 WATER QUALITY SAMPLING PROGRAM (WQMP)

Water quality field sampling will follow protocols and parameters established in the Project document, *Water Quality Monitoring Program Sea-to-Sky Highway Improvement Project* (May 12, 2004) (provided by the Province) to track conformance to water quality guidelines. These protocols, summarized in Section 2.25 of the Project EMPGM, are also provided in Appendix 12.

Because the clear and grub work avoids riparian areas and watercourses through the establishment of buffer strips, the water quality monitoring program is focused around weekly suspended sediment measurements at key locations and opportunistic sampling during storm events or at the discharge point of water emanating from sediment and drainage control features. Larsen Creek is the key aquatic feature in DB1 and as such will be subject to weekly water sampling during Phase II activities. The locations of water quality sampling stations on Larsen Creek are shown on the environmental drawings provided in Appendix 1.

As there are no other identified streams that flow year-round in the Phase II-Stage 2 construction zone, no other routine water quality sampling stations have been established. Rather, the water quality program will be on an opportunistic basis (e.g., during storm events) and focus on turbidity and TSS sampling in areas that have the potential to impact downstream water bodies or watercourses.

Also, water quality field sampling for pH and conductivity will be conducted in Larsen Creek when concrete washwater associated with bridge construction has the potential to enter receiving waters. Two (one on either side of Larsen Creek)

poly-lined sumps will be established to detain concrete washwater. This washwater will be treated with CO₂ (to adjust pH values between 6 and 9) prior to discharge. According to the British Columbia Approved Water Quality Guidelines (1998), fresh water aquatic life threshold level for pH is between 6.5 and 9.0. There is presently no threshold determined for conductivity, however, conductivity can be an indicator of total dissolved (as apposed to suspended) solids in water.

The results of water quality measurements will be provided in the weekly monitoring reports for submission to the Province and regulatory agencies.

5.26 WILDLIFE MITIGATION PLAN (WiMP)

This plan addresses specific wildlife measures that will be implemented to mitigate potential impacts to some wildlife and wildlife habitats during construction in DB1. The management of raptors, herons, tailed frogs and their habitats are not addressed in this section. Specific plans for these species are provided in the Raptor/Heron Management Plan (Section 5.15) and Tailed Frog Management Plan (Section 5.22) of this EMP.

General mitigation measures regarding management and mitigation for wildlife mortalities associated with vehicle collisions, wildlife habitat fragmentation, impacts to amphibians and amphibian habitats (including the blue-listed red-legged frog), and exclusion periods during construction are discussed in this plan. In addition, some design related mitigation measures are described in this plan. Further discussion on wildlife mitigation during design can be found in the applicable sections of the EMPGM.

Throughout DB1, the DB Contractor is committed to wildlife mitigation activities and strategies as they relate to construction impacts including:

- field assessments to confirm the presence of sensitive species and their habitats;
- field assessments to confirm that impacts of the specific design features and construction methods proposed by the DB Contractor do not exceed those assumed in the EAC;
- the identification of construction mitigation measures (general and site specific) including timing restrictions, wildlife salvage, and buffer retention; and
- the inclusion of wildlife enhancement considerations in site rehabilitation and restoration planning.

The sensitivity of wildlife and associated habitats to disturbance varies depending upon the type and life stage of any particular animal. The Environmental Manager will continue to consult with the DB Contractor wildlife

specialist on appropriate avoidance or mitigation measures that can be implemented to eliminate or reduce the risk of construction related impacts to sensitive wildlife habitat features.

All construction personnel will be required to report wildlife sightings that may impact or be impacted by construction related activities. Wildlife sightings and monitoring activities will be reported in monthly monitoring reports to the Province and regulatory agencies, as required.

The DB Contractor wildlife specialist is available to provide monitoring during key animal activity periods and/or where wildlife may impact or be impacted by construction activities.

Light Pollution

In order to complete the Project within the specified time period, night work may be required. Light pollution resulting from nighttime lighting may impact wildlife habitat and corridor use. The following procedures and equipment will be used to minimize light spill to wildlife habitat:

- minimizing nighttime construction activity in and around stream crossings;
- using directional lights to focus lighting on the construction area and away from stream crossings unless the work is associated with the stream crossing;
- utilizing only the necessary amount of lighting; and
- switching off unnecessary lighting.

Passage and Corridors

During construction, wildlife passage through existing wildlife corridor such as ravines and drainage channels will be maintained. A CERG report on wildlife corridor movement in DB1 off-alignment area reported that due to the steep topography, the general movement of wildlife would be along the slopes, in a north/south direction until they encountered corridor that would facilitate access in a east/west direction. There are not many east/west corridors features in DB1. The CERG report lists Larsen Creek as the key passage feature and Ansell Place as ancillary route. The DB Contractor will ensure that access up and down these key east/west passage features is maintained throughout construction.

Measures such as wildlife culverts and site rehabilitation to mitigate the potential for permanent impacts resulting from the isolation of wildlife habitat features has been addressed during the development of Project design in consultation with regulatory agencies.

5.26.1 Species at Risk

The Environmental Assessment (EA) for the Project identified the potential for presence of two SARA listed owl species in or near the Larsen Creek watershed. The mitigation measures for construction impacts to these species are addressed in the Raptor/Heron Management Plan in this EMP. The EA did not identify any other SARA listed species near Larsen Creek.

Post EA field surveys have subsequently reported the presence of adult red-legged frog (*Rana aurora aurora*) in the riparian and upland zones adjacent to Larsen Creek and the wetland. No red-legged frog egg masses have been found in the Larsen Creek pond. The red-legged frog is considered 'blue-listed' (i.e., vulnerable) by the BC CDC and a 'Species of Concern' under SARA.

Similarly, a post EA review of the wetland ecosystem has determined that the western red-cedar/skunk cabbage vegetation complex is within the range for Pacific water shrew (*Sorex bendirii*). The Pacific water shrew is considered 'red-listed' by the BC CDC and 'threatened' under SARA. Although the presence of habitat exists, to date, Pacific water shrew has not been documented in the Larsen Creek wetland.

The wetland feature in the Larsen Creek drainage is considered moderate to high value habitat for red-legged frog and Pacific water shrew. The Project will have no direct impact to this habitat. In addition, a pre-cautionary approach is being taken when constructing the highway in the adjacent upland areas west of the wetland habitat.

The mitigation strategies for temporary, construction related impacts to red-legged frog and Pacific water shrew based on the pre-cautionary principle are addressed in Section 5.26.5 Wildlife Mitigation and Salvage of this EMP. These measures, developed in consultation with the Project wildlife specialists and MoE personnel responsible for the management of SARA listed species, are focused on habitat isolation and species salvage.

5.26.2 Birds

Raptor and raptor nest mitigation is addressed separately in the Raptor/Heron Nest Management Plan (Section 5.15). The DB Contractor will comply with Table 1 "Owner's Commitments and Responsibilities" stating that no clearing of vegetation is permitted during the general bird breeding time period of March 15 to July 31 unless pre-approved by Canadian Wildlife Service on the basis of review of nest survey information collected by the Contractor at the time.

The DB Contractor wildlife specialist will conduct a bird nesting survey prior to any clearing and grubbing activities that will commence between March 15 and July 31 of any given year. Songbird nesting survey protocols have been developed in consultation with CWS. These protocols are provided in Appendix 13.

A report of survey activities will be forwarded to CWS for review and comment. It is essential that these surveys be conducted as close to clearing activities as possible so that appropriate avoidance and mitigation strategies can be applied accordingly. In order to facilitate a relatively quick referral, the DB Contractor will notify CWS of the clearing and grubbing schedule as well as when and how often they should expect the bird breeding reports. In addition to providing these survey results to CWS, bird nesting monitoring activities will be reported in monthly monitoring reports.

General, avian habitat protection BMPs include clear marking of clear and grub boundaries on plan drawings, minimizing vegetation removal (including wildlife trees), minimizing the loss of the largest trees and the re-establishment of native plant species within riparian zones and on tote roads.

5.26.3 Amphibians and Small Mammals

The environmental assessment for the Project confirmed the presence of northwestern salamander (*Amblystoma gracile*) and salamander egg masses in the pond near the intersection of the Baden Powell Trail and Black Mountain Trail. The presence of amphibians at this site is identified on Dwg# 46DD-DB01-0907 (Appendix 1) east of Stn. 100+520.

It is anticipated that work activities described in this EMP have the potential to impact sensitive amphibian and small mammal habitats in the area of Larsen Creek and the Larsen Creek wetlands. To minimize the potential for impact to the creek ecosystem, the DB1 Phase II - Stage 1 EMP established the northern edge of the Black Mountain Trail as the buffer boundary for work activities. This boundary will be maintained during Phase II - Stage 2 activities until clearing for the Larsen Creek Bridge and approaches is required. In preparation for construction in the vicinity of Larsen Creek and the wetland (Stn. 100+460 to Stn. 101+000), a boundary of silt and snow fence will be established as described in the SDMP and indicated on Dwg# 46DD-DB01-0907. This boundary will be maintained throughout construction in the area and until erosion protection measures (e.g., planting) have stabilized disturbed areas. General approaches to the mitigation for amphibian and small mammal habitats are also provided in the EMPGM (Section 2.26.5).

5.26.4 Snakes

Potential impacts are greatest in rocky areas where snake hibernacula may be located and in damp forests (the preferred habitat for several local reptile species). Mitigation will include retention and possible creation of rock and woody debris piles. Other mitigation activities are similar to those for amphibians including relocation.

5.26.5 Wildlife Mitigation and Salvage

Prior to initiating work in the vicinity of Larsen Creek and the wetland, a comprehensive amphibian and small mammal salvage will be carried out based on specifications provided by the Project wildlife specialists. These protocols will be reviewed by MoE prior to implementation and form the basis of the salvage permit needed from the BC Ministry of Environment. The salvage permit is to be available onsite during all salvage activities.

The silt fencing boundary used to protect the wetland and creek from sediment transfer will also act as an isolation boundary preventing animals from entering the work area.

As a precaution to avoid potential impacts to small mammals and amphibians the following salvage protocols are proposed.

- Isolate the wetland area using silt fencing placed along the eastern edge of the alignment (the western edge of the wetland) beginning at Station 100+500 and extend to 101+000 along the eastern edge of the highway right-of-way. At both ends (e.g. Station 100+500 and Station 100+940 the fence should be angled back towards the wetland to direct any individuals back into the wetland and in doing so further reduce the potential for individuals to access the alignment by moving around the end of the fencing.
- The fencing should be located along the “temporary warning tape” line (See construction drawings 41DD-DB01-107 and 41DD-DB01-108).
- An environmental monitor is to be on site during installation of the fence.
- The fence should be maintained for the duration of the project.
- Fencing is to be installed by hand. No machinery is to be used during installation.
- Crews installing the fencing are to remain outside the wetted perimeter of the wetland).
- The salvage is to occur between Stations 100+500 and 101+000 within the cut and grub boundaries of the right of way as illustrated on maps 41DD-DB01-107 and 41DD-DB01-108.
- The salvage will be conducted by qualified biologists and technicians.
- The interval between the salvage and the onset of construction should be as short as possible.
- All coarse woody debris (> 15cm diameter) and other cover objects (e.g., slash piles, cobbles and large rocks) will be lifted and searched for individuals (all individuals, regardless of species will be captured and relocated outside the salvage area).

- If coarse woody debris are too large to be lifted by hand (e.g., by two people), machine assistance is recommended. As feasible the machine should remain on the Baden Powell Trail and use it's arm and bucket to lift logs too large to be lifted by hand. If the logs are too far to be reached from the trail the machine will have to move into the area via areas in which the salvage has just occurred. Buried coarse woody debris should be gently pried apart using a hand held three pronged garden tool.
- Separate buckets are to be used for shrews and amphibians, to prevent predation.
- Buckets are to be outfitted with litter to allow individuals to seek cover. Individuals are to be relocated into suitable habitats east of the right-of-way, as soon as possible after capture as feasible (no longer than 5 minutes).
- The salvage should commence at one end of the area and systematically move across and forward through the area.
- Once the salvage is complete construction can commence.
- The isolation fencing is to remain, intact, for the duration of construction.

5.26.6 Wildlife Restoration Planning

It is recognized that erosion control may require preliminary hydroseeding to mitigate sediment inputs to streams. Fish and wildlife mitigation will require additional revegetation at streams and other sensitive areas using native species. Where possible, restoration will also include features beneficial to wildlife (e.g., a LWD component). Locally produced seed and/or plants will be obtained that are adapted to the climate of the areas for which they will be used (e.g., rock outcrops will be planted with species that occur naturally on rock outcrops of the region). To minimize potential for vehicle/wildlife collisions, revegetation adjacent to the ROW will not use species palatable to black-tailed deer and black bear.

The Environmental Monitor will provide on-going monitoring of restored areas throughout the project life noting presence of wildlife and wildlife activities.

5.27 WINDTHROW REDUCTION PLAN

During the EA process, an increase in the potential for windthrow as a result of clearing in the off-alignment section of DB1 near the Larsen Creek wetland was identified. Further to this, a report (Larsen Creek Wetland Windthrow Prediction and Assessment Study, Option B, Revision PB Alignment [Dunster 2005]) by a certified arborist (Julian Dunster) was commissioned to assess potential for windthrow and provide management and mitigation strategies for minimizing windthrow.

The report concluded that “widespread, catastrophic windthrow as a result of road construction is not predicted” and “the current windthrow pattern is predicted to continue, especially in the Larsen Creek wetland, even if the road is not constructed.” In a subsequent assessment to that report, the arborist concluded that the DB Contractor design did not change the conclusions made in the report.

The report also describes the following mitigation measures that can be applied to reduce the potential for windthrow resulting from construction in DB1.

- selective grooming of small stems;
- create wavy forest edge rather than straight cut lines;
- minimizing the width of gaps within a continuous forest canopy;
- thin the crown foliage of selected trees; and
- modify the clearing practices.

The DB Contractor has retained the services of Julian Dunster to advise on windthrow and windthrow mitigation strategies for this section of the Project. Windthrow assessments will be ongoing throughout construction in DB1.

On a daily basis and as clearing proceeds, the arborist will be available to review the clearing plans and conduct regular field visits to identify areas of potential windthrow. The arborist will also assess the cleared edge of the logged area to establish any tree specific mitigation treatments that may be used to minimize the potential for windthrow. The arborist assessments and recommendations for site-specific clearing and windthrow mitigation measures will be conveyed to the clearing crews.

Private property landowners and the District of West Vancouver will be kept apprised of the windthrow management program and be consulted in cases where mitigation measures impact trees on their lands. Further details on the windthrow reduction plan will be provided as construction methods are developed.

