

SEA-TO-SKY HIGHWAY IMPROVEMENT PROJECT

**ENVIRONMENTAL MANAGEMENT PLAN
DB1 (NELSON CREEK TO ANSELL PLACE)**

**PHASE 1 CLEAR, GRUB, EARTHWORKS,
DRAINAGE AND ROADWORKS**

EAGLERIDGE AND PASCO ROAD

(REV. 2)

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1.0 INTRODUCTION

1.1 OVERVIEW

The Sea-To-Sky Highway Improvement Project (the Project), Design/Build Section 1 (DB1) extends between Nelson Creek Bridge and Ansell Place, and includes the off-alignment section from Eagleridge to Pasco Road. The Contractor has elected to construct this section of the Project using a phased approach. *Phase 1* includes work in the northern (Pasco Road) and southern (Nelson Creek to Eagleridge) sections of DB1 within the existing highway right-of-way. *Phase II* activities, planned to commence on April 18, 2006 will encompass the 3.5km of highway construction in the off-alignment section from Eagleridge to Pasco Road.

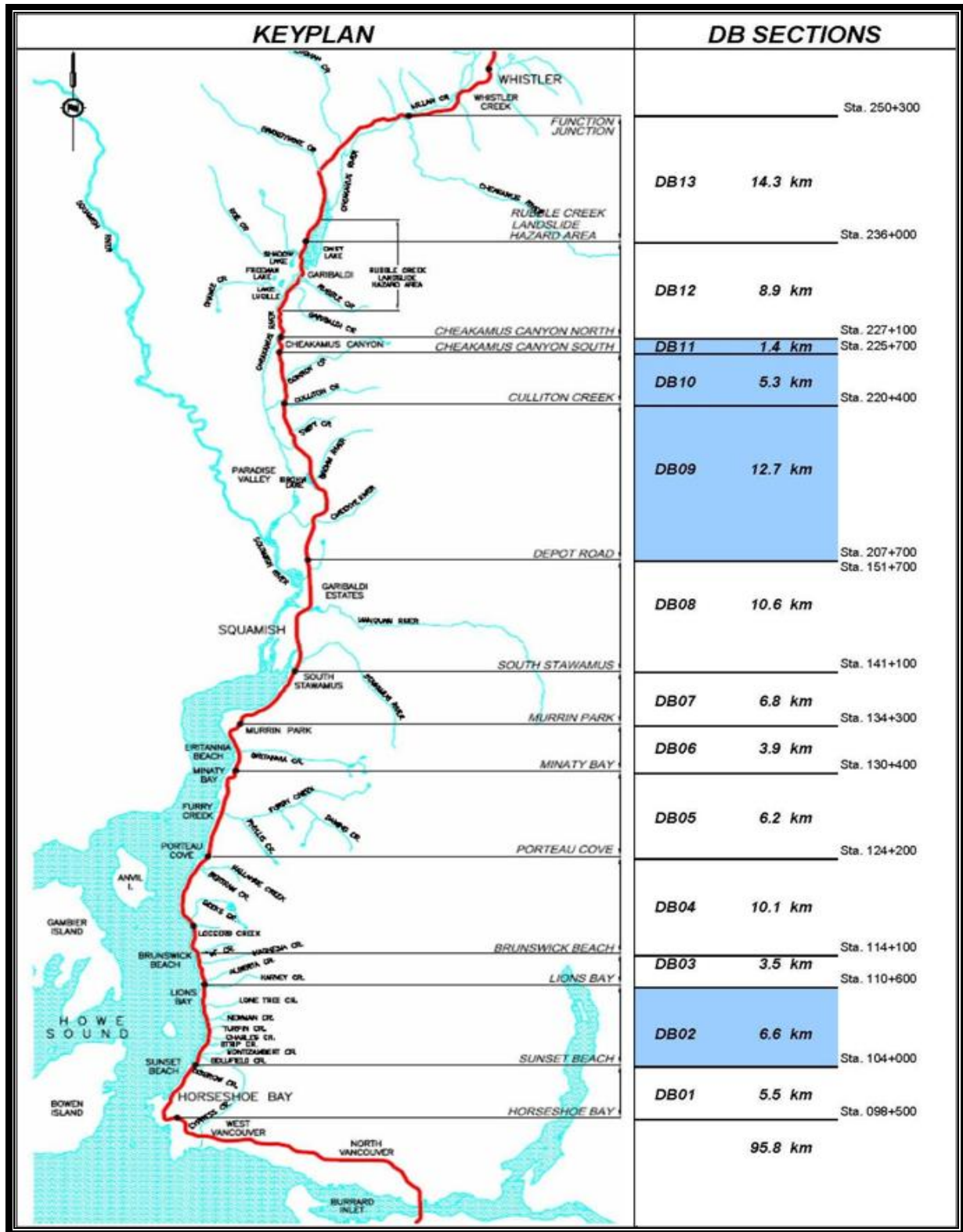
This EMP is intended to address environmental management activities associated specifically with the *Phase 1* work commencing between March 1, 2006 and April 1, 2006. Environmental management of *Phase II* activities will be addressed in a separate document. As the work schedule evolves, amendments to this EMP will update the construction schedule and any additional protection measures that may be required. Figure 1 illustrates the location of the DB1 design/build section relative to the overall Project area.

Any substantial diversion from the construction activities contained in this work plan will be referred to the Province and regulatory agencies for further review. No construction activities outside of this plan will occur without review and approval by responsible agencies.

This EMP is intended to cover specific environmental issues and mitigation for the construction activities identified. 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).

The DB Contractor is committed to complying with all applicable legislation, guidelines and policy and all environmental mitigation measures as outlined in this EMP and the Project EMPGM.

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



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. 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.

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 in the table below. 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 SCOPE OF THE EMP AND PROPOSED CONSTRUCTION ACTIVITIES

This EMP applies to clearing/grubbing/stripping, pioneering works, earthworks, drainage and roadwork, and other general works at specific locations within the Project area. Further detail on works scheduling as a phased approach is provided in Section 5.4 of this EMP. Environmental specialist sub-consultant reports pertinent to the DB1 construction activities are appended in this document and referenced where appropriate.

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

The potential for impact to sensitive environmental features and environmental issues has been reviewed in accordance with the established Project environmental review process as outlined in the EMPGM. Environmental discipline specialists have conducted pre-construction field surveys and provided recommendations regarding appropriate mitigation measures in their

field of expertise. These recommendations have been incorporated in this EMP and any applicable measures have been included on the drawings in Appendix 1.

As design and construction advances, S2S will provide the Province and responsible regulatory agencies with regular updates of current and upcoming construction activities including any additional site-specific or issue-specific environmental protection and mitigation measures.

4.1 CLEARING AND GRUBBING

In order to comply with the EAC requirement of minimizing the project footprint, boundaries for clearing and grubbing will be marked on the environmental construction drawings and clearly flagged in the field.

Clearing and grubbing will be undertaken in two stages. During the first stage, the areas identified will be cleared of trees and brush with disposal in accordance to the Vegetation Debris Management Plan (Section 5.23). During the second stage, grubbing in cleared areas will proceed when construction activity warrants (e.g., construction equipment access and excavation is required). Some site-specific locations requiring immediate earthworks may receive both clear and grub treatments.

Spatial limits have been set on clearing and grubbing activities based on the potential for impacts to the environmentally sensitive features discussed in Section 5.7. These limits are illustrated on the set of environmental construction drawings provided in Appendix 1.

Table 2 Proposed areas for *Phase I* DB1 clear and grub activities

Station Start	Station End	Line	Length (km)	Drawing(s)
99+040	99+700	100	0.66	41DD-DB01-902 to 41DD-DB01-904
50+200	50+352	50	0.15	41DD-DB01-904
30+200	30+300	30	0.10	41DD-DB01-904
75+120	75+187	75	0.07	41DD-DB01-904
9+400	9+660	90	0.26	41DD-DB01-913
7+870	8+780	80	0.91	41DD-DB01-911 to 41DD-DB01-913
4+040	4+390	40	0.35	41DD-DB01-912 to 41DD-DB01-913
102+450	104+040	100	1.6	41DD-DB01-912 to 41DD-DB01-916

The various issues, as they relate to the clear and grub impacts are described in the sub-component plans contained within this EMP. The purpose of this clearing activity is for geotechnical survey needed to proceed with further detailed design and to prepare the area for future earth works. Providing water

quality and worker safety objectives can be met, it is anticipated that clear and grub activities will proceed regardless of weather conditions.

4.2 EARTHWORKS

A summary of the earthworks proposed for this period, including excavating, drilling, blasting, fills, slope stabilization and MSE walls is presented in Table 3. Environmental mitigation measures related to the described earthworks are described in the sub-component plans within this EMP.

Table 3 Proposed rock cuts, fills, slope stabilization and MSE walls locations within DB1.

Proposed Start Date	Station Start	Station End	Line	Drawing(s)	Comments
Earthworks					
Apr. 13/06	50+200	50+352	50	41DD-DB01-904	Excavation
Apr. 13/06	75+120	75+187	75	41DD-DB01-904	Excavation
Apr. 27/06	7+880	8+540	8	41DD-DB01-911 and 912	Excavation
Drainage and Roadwork					
May 20/06	50+200	50+352	50	41DD-DB01-904	Load/Haul/Place Sub-Base, Base, Asphalt
May 20/06	75+120	75+187	75	41DD-DB01-904	Load/Haul/Place Sub-Base, Base, Asphalt
May 13/06	50+310	-	50	41DD-DB01-904	Excavate, Lay, Backfill: New 600mm Culvert
May 13/06	50+250	-	50	41DD-DB01-904	Catch Basin
Slope Stabilization					
Apr. 20/06	50+200	50+352	50	41DD-DB01-904	Soil Nails: Eagle Ridge/ L-50 Ramp
Apr. 20/06	75+120	75+187	75	41DD-DB01-904	Soil Nails: Eagle Ridge/ L-50 Ramp
MSE Wall Construction					
Apr. 27/06	50+250	50+270	50	41DD-DB01-904	RW 502
Apr. 20/06	7+980 to	8+391	8	41DD-DB01-911 and 912	RW 82
Drilling and Pioneer MSE Access					
May 13/06	102+399	102+600	100	41DD-DB01-912 and 913	RW 1025

Proposed Start Date	Station Start	Station End	Line	Drawing(s)	Comments
May 13/06	102+620	102+752	100	41DD-DB01-912 and 913	RW 1027
May 1/06	99+210	99+336	100	41DD-DB01-913	RW 993 (Eagle Bluffs)
May 20/06	30+200	30+412	30	41DD-DB01-903 and 904	RW 303

Further discussions with the Province regarding property issues and/or traffic closures may alter the schedule of work activities within DB1 during the timeframe of this EMP. Any changes in the activities identified in Table 3 will be reviewed by the environmental team to ensure that any previously unidentified impacts are addressed and adequately mitigated. The assessment of these works and any required environmental mitigation measures/plans will be submitted to the Province and appropriate regulatory agencies as the information becomes available.

4.3 REGULATORY AGENCY REVIEW, NOTIFICATION AND APPROVAL

This EMP has been accepted by the lead regulatory agencies (DFO, EC and MoE). Any subsequent amendments will be submitted to these agencies for additional review and comment. As appropriate, regulatory agencies will be kept apprised of construction activities through monthly environmental management reports submitted by S2S to the lead agencies.

Agency permits required for the works covered under this EMP include a 'License to Cut' issued to the Project by the BC Ministry of Forests (MoF), Chiliwack Forest District for the clearing and grubbing activities. The 'License to Cut' from the BC Ministry of Forests authorizing PKS to cut trees on current and acquired right-of way is provided in Appendix 2.

As there are no watercourse crossings associated with *Phase 1* activities, *Water Act* Notifications, *Water Act* Approvals and/or DFO 35(2) authorizations are not required. Similarly, there are no wildlife or fish salvage permit requirements for *Phase I*.

For clearing activities that occur during bird breeding season (March 15 and July 31) of any given year, pre-approval is required by the Canadian Wildlife Service. The process by which this pre-approval is achieved is discussed in Section 5.26 (Wildlife Mitigation Plan) of this EMP.

5.0 ENVIRONMENTAL COMPONENTS

The following component plans reflect construction activities, potential environmental impacts and appropriate mitigation measures for the works specified in Section 4.0 of this EMP. The plans and mitigation measures outlined reflect items identified in the Concession Agreement and EAC T04-01, Table 1 'Owner's Commitments and Responsibilities' for the Project.

5.1 AIR QUALITY MONITORING AND MITIGATION PLAN (AQMP)

Given that clear, grub and earthworks activities will occur relatively close to the residential areas of Eagleridge (south end of DB1), Pasco Road (north end of DB1) and Ansell Place (north end of DB1), it is anticipated that air quality monitoring and mitigation measures will be required during the early construction work in DB1. S2S will install ambient air quality monitoring stations near Pasco Road and Eagleridge residences that are in close proximity to the construction zone. These monitoring stations are to be installed by mid April and will be monitored and maintained by the S2S air quality specialists. The S2S approach to air quality monitoring and mitigation is outlined in Section 2.1 of the EMPGM.

The scheduling of these activities in the wetter part of the year (i.e. winter), offers an additional mitigation for the control of construction related air quality impacts. On behalf of S2S, Levelton Consultants Ltd. are the air quality specialists responsible for ambient air quality monitoring for the Sea-To-Sky Highway Improvement Project.

ARCHEOLOGY AND CMT MANAGEMENT PLAN (AMP)

There are no culturally modified trees (CMTs) located in the *Phase I* work area. 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)

The Environmental Field Coordinator will be informed of all bear sitings. Should bear sitings 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

The schedule for DB1 construction activities is provided in Figure 2. The current start date for these works is March 6, 2006. The construction activities have been broken down into two stages both of which entail clear and grub, rock excavation

(drill and blast), embankment fills and structure work. The schedule of vegetation clearing may be adjusted depending on the results of nest surveys during the bird breeding window.

Phase 1 activities will be within the current highway right-of-way at the south (Eagleridge interchange) and north (Pasco Road) ends of DB1. Construction access to these locations will be via the current highway alignment. Phase 2 activities will involve a continuation of Phase 1 activities and the start of off-alignment construction between Eagleridge and Pasco Road including the Larsen Creek Bridge. Access for Phase 2 work will be via the Phase 1 areas and the Black Mountain Trail.

Figure 2 Phase I construction schedule for DB1.

Activity	Mar-06				Apr-06				May-06			
	1	2	3	4	5	6	7	8	9	10	11	12
Drainage & Roadwork												
Load/Haul/Place Sub-Base, Base, Asphalt 50+200 to 50+352 / 75+120 to 75+187												
Excavate, Lay, Backfill: New 600mm Culvert (Sta.50+310), Catch Basin (Sta. 50+250)												
Earthwork												
Excavate Type A or D 50+200 to 50+352 / 75+120 to 75+187												
Excavate Type A or D 7+880 to 8+540												
Slope Stabilization												
Soil Nails: Eagle Ridge/ L-50 Ramp 50+200 to 50+352 / 75+120 to 75+187												
MSE Wall Construction												
RW 502 50+250 to 50+270												
D & S, Pioneer MSE Access												
RW 82 7+980 to 8+391												
RW 1025 102+399 to 102+600												
RW 1027 102+620 to 102+752												
RW 993 (Eagle Bluffs) 99+210 to 99+336												
RW 303 30+200 to 30+412												
Sitework												
Clear & Grub / Stripping 99+040 to 99+700/ 50+200 to 50+352 / 30+200 to 30+300 / 75+120 to 75+187												
Clear & Grub / Stripping 9+400 to 9+660 / 7+870 to 8+780 / 4+040 to 4+390												
Clear & Grub / Stripping 102+450 to 104+040 / 6+500 to 6+600												
Utility Relocation												
Relocate Hydro/ Telus Line Poles 102+100 to 104+020 / 7+800 to 8+000												
General												
Remove Eagle Ridge Slope Protection 50+200 to 50+352 / 75+120 to 75+187												
Temp Move PC Barriers 99+040 to 99+448 / 30+200 to 30+300												
Remove Signage & Sign Bridge, Stripe Removal/Line Paint 99+040 to 99+600 / 30+200 to 30+500												

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 *Phase I* clear construction activities are provided in Table 4.

Table 4 Environmentally sensitive areas within the Phase 1 DB1 construction area.

PA Station	Dwg.	Side Northbound	Sensitive Feature/Constraint	Comments
Vegetation and Wildlife				
99+165-99+409	902, 903	both	Sensitive ecosystem (Eagleridge Bluffs)	Polygons 406, 407, 408, 409, 418, 394
103+800	916	L	Bald eagle nest	Active in 2004 and 2005
Recreation				
99+700-101+100	PA1-1	R	Baden Powell/Black Mountain Trail network	Minimize encroachment on trails and manage access points.

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 5.16, Recreation Resource Management Plan;
- Section 5.18, Sensitive Ecosystem Management Plan;
- Section 5.19, Sediment and Drainage Management Plan; and
- Section 5.25, Water Quality Sampling Program.

A minimum of 15m buffer zones for clear and grub and 50m buffer for grubbing around sensitive watercourses will be maintained during clear and grub activities and until construction activities in those areas are carried out. Where required 'vegetation to remain' and 'no disturbance' zones in and around sensitive features are provided in the environmental construction drawings (Appendix 1). These features will be flagged in the field and verified by the Environmental Monitor, Environmental Coordinator and/or S2S 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 was held at the Westport Site Office on February 8, 2006. At this meeting the environmental management team including the Environmental Coordinator and Environmental Monitor met with senior construction personnel to review the EMP and proposed work plan. Topics covered at this meeting included impacts to sensitive features, environmental procedures that will be used to mitigate these impacts and agency approvals and/or notifications required during Phase 1 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. The first pre-activity meeting for clearing and grubbing was held on February 24th and are scheduled to occur one week prior to clearing in a new area.

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 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 re-fuelling of 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 has the potential to adversely impact environmentally sensitive areas is stored in a stable location away from these areas.

The storage, servicing and maintenance yard for heavy equipment and materials is at the DB1 site office located at the Westport pit. The Westport pit is situated adjacent to the east side of Hwy. 1, two kilometers south of Horseshoe Bay. The current Eagleridge parking area will be used as an ancillary equipment staging area. As of April 1, this parking facility will become an active construction area and will be closed to public for use as a parking area.

5.10 FISHERIES MITIGATION/COMPENSATION PLAN (FMCP)

There are no fish bearing watercourses within the boundaries of the Phase I construction zone. Implementation of the sediment and erosion control measures outlined in Section 5.19 of this EMP will ensure that there is no down slope release of sediment from the construction zone and that the receiving waters of Howe Sound are protected.

Three drainage systems (HS2, HS3 and HS4/5) that pass through the Pasco Road construction zone as identified on drawings 0911 and 0912. These watercourses are ephemeral and have no visible channel downslope of the highway.

5.11 INFRASTRUCTURE DEMOLITION MANAGEMENT PLAN (IDMP)

Infrastructure demolition planned for *Phase I* includes the demolition of S2S structure # 993 (MoT structure # 9450R) - Eagleridge half bridge (Stn. 99+230 to 99+300, west side) and the removal and reclamation of existing road surface asphalt associated with south interchange road works.

The demolition plans for the bridge structure is to have all concrete, rebar and associated demolished material temporarily stockpiled in the existing Eagleridge parking area for eventual removal to a commercial waste disposal facility. Overland flow stemming from the Eagleridge parking lot will be monitored for water quality by the Environmental Monitor. The drainage from the lot currently flows overland into the northbound highway ditch. This ditch will be the primary focus of any water quality mitigation efforts that may be required.

Asphalt will either be reclaimed on-site along with existing road base to form new road base in the Eagleridge area 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 a minimum of 15m from any water body top of bank to prevent material from entering the work area and/or the creek. Excavated materials will be stockpiled within the cleared right-of-way. 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. Noise impacts along

the rest of the construction zone will be minimal due to their relatively distant location from residential areas. Most *Phase I* activities in DB1 are scheduled for daytime. However, drilling, blasting, rock removal and other construction activities may require some nighttime work for the period defined in this EMP. A noise-monitoring program will be required to establish baseline levels and identify potential noise problems that may arise from certain work activities.

Noise mitigation measures during construction will follow those outlined in the EMPGM (Section 2.13). Acting as the S2S 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/MATAL LEACHING MATERIALS AND ACID ROCK DRAINAGE ADAPTIVE MANAGEMENT PLAN (PAG/MLMARDMP)

In DB1, there will be no excavation of rock exhibiting PAG or AG characteristics. 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.

5.15 RAPTOR/HERON MANAGEMENT PLAN (R/HMP)

S2S wildlife specialists, Cascade Environmental Resources Group (CERG) conducted pre-construction raptor nest surveys in August 2005 for DB1. Survey reports are provided in Appendix 3.

5.15.1 Nests and Nesting Behaviour

The August 2005 raptor nest survey crews did not observe any new raptor or heron nests in DB1. However, the presence of an existing eagle nest at the north end of DB1 (near Ansell Place) was reported in the EA Assessment for this Project (Table 5).

During WP2 construction in 2004/2005, the WP2 environmental team closely monitored this nest and any adult eagle activity in the area. Frequent updates on the monitoring results and expert review of the data were submitted to MoE for review. These reports, provided in Appendix 4, concluded that although adults were regularly witnessed on or near the nest, a clutch was not laid in 2005.

Table 5 Raptor/Heron nests potentially affected by DB1 construction activities.

DB Section	Station	Raptor Feature	Drawing	Comments / Mitigation
DB1	103+900	Bald Eagle Nest	41DD-DB01-0916	Nest was considered active in 2004. Adult eagles were present but monitoring did not conclusively establish the nest as active in 2005.

Item 4.5(b) of the Table of Commitments states “no clearing is to occur within 500m and no blasting within 1km of an active bald eagle, osprey, peregrine falcon, or heron nest between the January 31 to August 15 period unless otherwise pre-approved by CWS and MoE on the basis of review of nest survey information collected by the Contractor at the time.”

For the 2006 exclusion period, S2S has established monitoring protocols and has trained field personnel to act as nest monitors, if required. These protocols include standardized monitoring periods and data recording procedures. The Environmental Field Coordinator will be responsible for ensuring that the monitoring protocols are being followed. The Environmental Coordinator is responsible for maintaining and updating the database on monitoring activities.

Based on monitoring information, an exemption from the established exclusion window may be pursued. Should this be the case, a request for an exemption will be based on the S2S wildlife specialist’s opinion that construction activities will not negatively impact nesting behaviour. A report detailing the basis of this conclusion along with supporting monitoring documentation, site photographs and/or video by the S2S wildlife specialist will be submitted to MoE and CWS for review. No clearing or blasting within the exclusion zone will be undertaken until approved by these agencies.

5.15.2 Other

The habitats of provincially red-listed (northern spotted owl) and blue-listed (western screech owl) owl species have been identified within the DB1 clear and grub boundaries.

Northern Spotted Owl (*Strix occidentalis*)

On behalf of the Project, Robertson Environment Services Ltd. undertook spotted owl surveys in along the entire DB1 alignment corridor in 2004 and 2005. CERG also conducted spotted owl surveys in the northern portion of DB1 in August 2005.

Reports by Robertson Environment Services Ltd. summarizing survey results and memoranda on recommendations for future spotted owl survey requirements in DB1 are provided in Appendix 5. The CERG survey results are included in the raptor nest reports in Appendix 3.

According to Resource Inventory Standards Committee (RISC) standards (Survey protocol and Standards for the Northern Spotted Owl [*Strix occidentalis caurina*] in British Columbia, RISC, February 6, 2005), spotted owl surveys for occupancy and breeding are required between April 1 and September 30 of any given year.

The June 17, 2005 memorandum from Robertson Environmental Services to STS WP 1 Environmental Coordinator concluded that,

“Given that spotted owls were not detected during WP1 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).”

Further consultation with the MoE spotted owl biologists is required to determine if surveys are need for 2006.

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 or 2005 owl surveys for DB1.

Should future owl surveys report the presence of western screech owl within DB1, mitigation strategies for this species will be similar to those general strategies provided for spotted owl. In particular, pre-construction owl surveys will be conducted when construction activities have the potential to impact individuals during key life stages. Were possible, S2S will also maintain the deciduous, riparian type ecosystems already established in DB1.

5.16 RECREATION RESOURCE MANAGEMENT PLAN (RRMP)

All recreation sites identified within the DB1 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 6.

Table 6 Recreation features within the DB1 Phase 1 clear and grub limits

DB Section	Feature Type	Approx. Stationing	Drawing	Comments
DB1	Hiking Trail	99+700 to 101+100	41DD-DB01-0904	Baden Powell Trail head

The public will not be able to access the Baden Powell Trail from the Eagleridge parking lot during construction because the Eagleridge parking lot will be used to stage and mobilize construction equipment and as a storage/lay down area. The public will be directed to access the Baden Powell Trail north of Larsen Creek via the Black Mountain Trail. Currently there is parking for approximately 5 cars at the Black Mountain trailhead located across from the BC Ferries tollbooth. S2S is investigating opportunities to increase the size of this parking area in order to enhance parking capacity at this location. Any decision on construction and post-construction treatments of these trail networks is

pending review and approval by the Province, District of West Vancouver (DWV), and local landowners.

The Contractor will attempt to maintain access to this trail within public safety guidelines. Should construction activities limit access to these trail features, timely notifications of closure periods, alternative parking, access provisions, construction zones, and construction activities will be provided and communicated to the public. Signs will be installed at key locations to notify hikers of the construction area so that they do not commit to walking a portion of the trail from which they can not exit.

The communication program will be developed in consultation with user groups, DWV, S2S and the Province. Part of this program has been the establishment of a West Vancouver Community Liaison Committee 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 S2S Construction Team and a variety of community local stakeholder groups.

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

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

Terrestrial revegetation plans will be implemented after the completion of substantial road works, which will occur after clearing and grubbing. Additional mitigation measures are provided in Section 2.17 of the EMPGM.

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 6.

5.18 SENSITIVE ECOSYSTEM MANAGEMENT PLAN (SEMP)

Phase I activities covered under this EMP will not impact any red- or blue-listed ecosystems. A portion of the Douglas fir/arbutus woodland-rock outcrop ecosystem is within the clear and grub boundary at the Eagleridge interchange. As provided in Table 7, the CA provides for a maximum area of impact to this ecosystem. S2S 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 7 Impacts of the S2S design on sensitive ecosystems in DB1

Sensitive Ecosystem	CA Maximum Area of Impact (ha)	S2S Design Area of Impact (ha)
Red-listed plant ecosystem, including the Arbutus-Hairy Manzanita unit	0	0
Blue-listed plant ecosystem	0.70	0.69
Douglas Fir/Arbutus woodland-rock outcrop ecosystem	1.36	1.32
Wetted area of swamp habitat in Larsen Creek headwaters	0	0

The sensitive ecosystems (i.e., red- and blue-listed vegetation polygons) are identified on the set of drawings submitted with this EMP (Appendix 1) and cross-referenced with the clear and grub boundaries. 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 S2S 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 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.

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 I 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.

A review of site conditions by the Environmental Monitor and Operations Manager will be conducted 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 to 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 boundaries of Phase 1, 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 decommission, 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 15m 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 8.

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 8 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 as 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.

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, a copy of these procedures must be available at all times. In this regard, Section 2.21 of the EMPGM has been provided in Appendix 7.

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 in 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 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 early 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 is has been connected to District of West Vancouver sanitary sewer and potable water systems.

These procedures and other waste management measures 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 8.

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.

As there are no identified streams that flow year-round in the Phase 1 construction zone, no water quality sampling stations have been established. Rather, the *Phase I* 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 waterbodies or watercourses. The results of turbidity measurements will be provided in the weekly monitoring reports for submission to the Province and regulatory agencies. The location and frequency of the opportunistic sampling program will be up to the discretion of the Environmental Monitor.

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 sensitive 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, S2S 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 S2S 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 S2S 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 wildlife sightings and monitoring activities will be reported in monthly monitoring reports to the Province and regulatory agencies, as required.

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

Wildlife passage through existing wildlife corridors such as ravines and drainage channels will be maintained throughout the duration of construction activities. All construction personnel will be required to report wildlife sightings that may impact or be impacted by construction related activities. The S2S wildlife specialist will provide monitoring during key animal activity periods and/or where wildlife may impact or be impacted by construction activities.

5.26.1 Birds

Raptor and raptor nest mitigation is addressed separately in the Raptor/Heron Nest Management Plan (Section 5.15). S2S 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 S2S wildlife specialist will conduct a bird nesting survey prior to any clearing and grubbing activities that will commence after March 15, 2006. 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, S2S will notify CWS of the clearing and grubbing schedule as well as when and how often they should expect the bird breeding reports. Discussions with CWS are ongoing to determine the process by which pre-approval for clearing can be granted. 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.

5.26.2 Amphibians

There are no sensitive amphibian habitats within the boundaries of the *Phase I* construction zone. General approaches to the mitigation for amphibian habitats are provided in the EMPGM.

5.26.3 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.

5.26.4 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 described the following mitigation measures that can be applied to reduce the potential for windthrow during construction in DB1.

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

S2S has retained the services of Julian Dunster to advise on windthrow and windthrow mitigation strategies for this section of the Project. During clearing activities, Mr. Dunster will assess clearing areas and provide in-field consultation as to the treatment and/or retention of trees within the clearing boundaries.

6.0 SIGNATURE PAGE

The undersigned have read and accepted the Environmental Management Plan described in this document.

**Accepted
by:** S2S Transportation Group
Segment Manager

print name

signature

date

S2S Transportation Group
Environmental Manager

print name

signature

date

Appendices
