Keystone Environmental
Knowledge-Driven Results

December 31, 2014

Ms. Ashley Rabey
Public Works and Government Services Canada
401 – 1230 Government Street
Victoria, BC V8W 3X4

Dear Ms. Rabey:

Re: Environmental Impact Assessment
Highway 4 Repair Project
Pacific Rim National Park Reserve, Vancouver Island, BC
Project No. 12345

We have enclosed the report titled *Environmental Impact Assessment – Highway 4 Repair Project, Pacific Rim National Park Reserve, Vancouver Island, BC* for work conducted under the 'Task Authorization Contract No. E0276-132638/001/VAN'. We appreciate the opportunity to work with you on this Project and are pleased to submit this report to Public Works and Government Services Canada.

Please contact us with any questions.

Sincerely,

Keystone Environmental Ltd.

Original signed by

Billi Gowans, M.Sc., R.P.Bio.
Project Manager

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Environmental Consulting
Engineering Solutions
Assessment & Protection

Keystone Environmental
Knowledge-Driven Results

ENVIRONMENTAL IMPACT ASSESSMENT
HIGHWAY 4 REPAIR PROJECT

Pacific Rim National Park Reserve
Vancouver Island, BC

Prepared for:

PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
401 – 1230 Government Street
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Project No. 12345

December 2014

EXECUTIVE SUMMARY

Parks Canada is preparing to repair a 21.5 km long strip of Highway 4 located in the Pacific Rim National Park Reserve on the west coast of Vancouver Island, British Columbia. The construction works will involve resurfacing alligator cracking, joint cracking, birdbaths and profile dips, and the repair/replacement of 5 culverts. Documented occurrences of species at risk and fish habitat are present throughout the Park including the specific locations of culvert works. Keystone Environmental Ltd. was retained by Public Works and Government Services Canada on behalf of the Parks Canada Agency to perform a desktop Environmental Impact Assessment to support the project.

The desktop review has identified the potential presence of rare and endangered wildlife and plant species within the Park. Thirty eight federally and provincially listed species have the potential to occur within the Highway 4 road works assessment area. Eight fish species are potentially present at a number of culvert repair or replacement locations.

Mitigation measures are prescribed to reduce or avoid potential impacts from the project on the environment. It is recommended that detailed field surveys be performed prior to any construction activities to determine if species and/or environmental sensitivities are present (e.g., raptor nests, amphibians, fish). For in-water culvert works, fish and amphibian capture and relocation may be required and works must be isolated from stream flows. An environmental monitor must be present for any inwater works. Least-risk timing windows are recommended for performing tasks within sensitive riparian areas and wildlife.

The Environmental Impact Assessment has concluded, based on the information available, that project impacts are minimal and the potential adverse effects from Highway 4 road repair works are anticipated to be not significant, provided mitigation measures are successfully implemented and adhered to throughout the Project.

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LIST OF ACRONYMS

BC	British Columbia
BMP	Best Management Practice
CDC	Conservation Data Centre
CMN	Community Mapping Network
DFO	Fisheries and Oceans Canada
FISS	Fisheries Information Summary System
MFLNRO	BC Ministry of Forests, Lands and Natural Resource Operations
MOE	BC Ministry of Environment
PCA	Parks Canada Agency
PRNPR	Pacific Rim National Park Reserve
PWGSC	Public Works and Government Services Canada
SARA	*Species at Risk Act*
SHIM	Sensitive Habitat Inventory Mapping
VEC	Valued Ecosystem Component
WMA	Wildlife Management Area

1. INTRODUCTION

Keystone Environmental Ltd. (Keystone Environmental) was retained by Public Works and Government Services Canada (PWGSC), on behalf of Parks Canada Agency (PCA), to complete an Environmental Impact Assessment (EIA) for the repair of Highway 4 (the Project) in the Pacific Rim National Park Reserve (PRNPR) on Vancouver Island, BC (the Project Area).

As requested by PWGSC, this assessment has been prepared as a desktop study to determine potential environmental impacts for the resurfacing of Highway 4, culvert repairs and culvert replacements, by examining online databases and background reports. The assessment describes potential effects from construction/repair works, identifies information gaps with regard to data about site-specific sensitivities, and provides recommendations for mitigation measures, such as the requirement for on-site environmental monitoring, to be implemented by the construction contractor during in-water works to avoid impacts to known environmental values. Mitigation measures will form part of the future PCA Highway 4 Repair tender specifications and subsequently guide the development of an Environmental Protection Plan (EPP) to be prepared by the selected contractor prior to construction.

Where normally an environmental impact assessment would include the three phases of a Project: construction, operation and decommissioning, this assessment is focused only on construction, as requested in the scope of work. Operation of Highway 4 is long term and is evaluated annually by the park and other means separate from this assessment. The road structures are not planned to be decommissioned in the foreseeable future.

1.1 Project Rationale

Highway 4 has deteriorated since major highway repairs and upgrades were performed in 1984. Maintaining the highway is important to local residents and visitors. The highway is the only vehicle access to Tofino and many parts of the PRNPR. Alligator cracks, joint cracks, birdbaths and profile dips have recently been identified and scheduled for repair. A number of blocked or damaged culverts also require repair or replacement. The proposed works will improve the function of the highway for all highway users.

1.2 Objective of the Environmental Impact Assessment

The objective of this Environmental Impact Assessment is to provide PWGSC, and PCA, with the information required to reach a conclusion pursuant to the CEAA with regards to potential environmental impacts from Highway 4 road repairs and conclude whether the project activities are likely to result in significant adverse effects to the environment. This information will allow the respective authorities to decide if the project can proceed as designed.

1.3 Scope of Work

Historical information pertaining to the areas in the vicinity of the highway surfacing, culvert repairs and culvert replacements must be reviewed for potential historical or cultural impacts. The review will be conducted to ensure the highway repairs take place with appropriate mitigation efforts, minimizing negative environmental impact. The review findings will be scribed in a report to depict ecological values at the site, potential effects from construction/repair works

and mitigation measures to be employed by the construction contractor. The report will be provided to the construction contractor to guide the development of an EPP to be prepared by the contractor prior to construction.

1.4 Limitations

Limitations of the scope of work include the following statements.

- As requested, field investigations have not been conducted in the scope of work. This assessment is purely based on a desktop review and; therefore, the description of site conditions and recommendations are limited to available documented and online information. It is highly recommended that site conditions are verified through pre-construction field surveys as described throughout this assessment.
- As requested, Archeology and First Nations considerations have not been included in the scope of work. The project proponent must ensure that all works are performed in compliance with First Nation requirements as described in the *Canadian Environmental Assessment Act.*
- As requested, public use considerations such as socio-economic conditions are not included in the scope of work. Any such requirements described in the *Canadian Environmental Assessment Act* shall remain the responsibility of the proponent.
- No permits will be applied for, or secured, as part of this scope of work. It is the responsibility of the proponent to secure all necessary approvals and permits required to perform these works. Permit requirements are included in Section 7.4.

1.5 Project Description

The Highway 4 study area encompasses a 21.5 km long strip of highway through the PRNPR. Construction activities will include:

- Resurfacing at locations with alligator cracking, joint cracking, birdbaths and profile dips.
- Repairing 5 culverts (culverts 20, 23, 28, 29 and 59), two of which have been identified as potential fish habitat (28 and 59).

Resurfacing activities will involve 50 mm milling and replacement with a 60 mm thick hot mix AC. The average paved road width is roughly 8.6 m with a granular shoulder of 0.3 m. The planned work will be conducted in areas of existing development. All staging areas for stockpiling are in parking lots, and the main staging and gravel sources are outside Park boundaries.

Culvert repairs may involve replacement of the inlet or outlet of the culvert. Culvert replacement will require some clearing of vegetation, excavation of the road bed and associated soil, excavation beside the culvert inlet and outlet, diversion of the watercourse, grading of the culvert bed including clay, placement of the culvert, placement of soils around the culvert, placement of riprap at the mouth of the culvert, resurfacing of the highway, and replacing/replanting of exposed areas.

Recommended repairs to each of the 5 culverts are described in the Detailed Design Memo from WSP Group Engineering (WSP) dated September 2014. A summary of culvert repairs/replacement works is presented in Table 1 below.

Table 1 Recommended Repairs from WSP 2014 Report

Site	Existing Diameter	Existing Culvert Length (m)	Hwy 4 Station (Km)	Recommendation
20	1350 Span x 850	16.2	16.11	Replace with 1200 mm HDPE pipe
23	750	12.7	15.66	Repair inlet. Excavate end and add 2 m extension.
28	450	14.2	13.86	Replace culvert with 600 mm x 15 m HDPE pipe.
29	450	13.6	13.58	Replace culvert with 600 mm x 15 m HDPE pipe.
59	1800	36.0	9.43	Repair inlet. Cut off and replace 3 m end section.

The plans and specifications for the project shall take precedence over any project descriptions provided in this Environmental Impact Assessment.

2. BACKGROUND REVIEW

The project team reviewed reports provided by PWGSC. Additionally, online databases and mapping utilities, photographs, maps, plans and guidance documents were reviewed to derive Valued Ecosystem Components (VECs).

2.1 Previous Reports

The following reports relating to the Project area were reviewed to identify environmental sensitivities:

Pacific Rim Culvert Inspection Report 2014 – WSP Engineering

The report provides an inventory of culverts located within PRNPR.

Draft Detailed Design Memo September 2014 – WSP Group Engineering

These instructions and specifications describe in detail the construction materials, schedules, methods, and general mitigation measures. The information was used to develop an understanding of the Project.

Pacific Rim Drainage Assessment 2002 – D.R. Clough Consulting

This assessment provides information on culvert type, watercourse, and fish/amphibian presence at over 65 culvert locations along Highway 4. The results do not describe which species are present and do not discuss connectivity to fish habitat or the presence of barriers to fish habitat upstream or downstream. Information on the 5 culverts that require repair/replacement are summarized in Table 2 below.

Table 2 Summary of Watercourse Descriptions for 5 Culvert Locations

Site	Culvert Type*	Culvert Diameter**	Access Barrier	Access Details	Fish / Amphibian Presence	Watershed
20	CMP	1.5 x 0.8	Yes	Okay	Small creek that may contain fish. Amphibians are present.	Long Beach
23	CMP	0.8	No	Okay	Channel that is not expected to contain fish, but does contain amphibians.	Long Beach
28	WBC	1 x 1	Yes	Collapsed	Contains fish and amphibians.	Long Beach
29	CMP	0.45	No	Okay	A roadside ditch that is not providing fish habitat, and may be providing amphibian habitat.	Long Beach
59	CMP	1.8	No	Baffles	A creek that likely contains fish and does contain amphibians	Combers

*CMP = Corrugated Metal Pipe; WBC = Wood Box Culvert
** Culvert Dimensions in Metres

Pacific Rim National Park of Canada Management Plan 2010 – Parks Canada

This document outlines the management strategy for the three park units within PRNPR, and provides information on ecological resources that may be impacted by the Project works for considering VECs for this assessment.

Recovery Strategy for the Pink Sand-verbena (Ambronia umbellata) in Canada 2007 – Parks Canada

This document identifies requirements to arrest the decline of Pink Sand-verbena (*Ambronia umbellata)* in Canada. The report describes a potentially extirpated population in the Clo-oose Beach and Cheewhat River area.

2.2 Information and Database Review

The following section describes a number of resources accessed during desktop searches and specific comments or results relevant for those datasets.

Soils of Southern Vancouver Island, Kennedy Lake 1986 - Maps BC

This map was reviewed to obtain soil conditions along Highway 4.

EcoCat: The Ecological Reports Catalogue – BC Ministry of Environment

The EcoCat database was searched for reports relevant to PRNPR. No relevant information was found.

MAPSTER Version 3.1 – Fisheries and Oceans Canada

A review of the Fisheries and Oceans Canada (DFO) online mapping tool identified recorded fish presence within creeks located near the project alignment. Specific searches were conducted near the five culverts that are scheduled for repair/replacement (Culverts 20, 23, 28, 29, and 59).

Fisheries Information Summary System, Fisheries and Oceans Canada (DFO)

The Fisheries Information Summary System (FISS) single watershed database was reviewed for information on watercourses near culverts repair/replacement locations.

Pacific Coastal Resources Atlas for BC, CMN

This atlas was reviewed to identify coastal resources such as estuaries, eelgrass beds, and FISS salmonid distribution data points in and around Highway 4 and associated linear structures. Watershed codes retrieved for the road repair Sites were used in the FISS Single Watershed Database for additional fisheries background review.

Sensitive Habitat Inventory and Mapping (SHIM) Atlas, CMN

The SHIM Atlas was reviewed to obtain information on sensitive habitats and resources within the Project area including fish data and reports specific to the Project repair Sites and the PRNPR in general.

Google Earth

Google Earth was examined to determine the distance, elevation and approximate slope of each watercourse between the culvert and the ocean, to assist in identifying barriers to fish, and to determine if information on fish habitat connectivity is visible from aerial imagery.

Community Mapping Network Habitat Atlas

The online mapping atlas identified important bird areas in the assessment area, including the Cleland Island and Southeast Cayoquot Sound, and Tofino mudflats.

iMapBC 2.0, DataBC

The online mapping tool from DataBC provided information on biogeoclimatic zones, soils, stream length, and 20 m elevation contours within the Project area, as well as information contained within other databases such as fish presence and distribution, and potential species at risk. The soils, biogeoclimatic zones, and stream data are summarized in Sections below.

BC Species and Ecosystems Explorer (MOE)

These databases were reviewed to identify rare species with the potential to be present within the Project Area. The potential presence of rare species of plants and wildlife have been determined at the Highway 4 repair Sites based on habitats understood to be present from available online maps and for documented occurrences within the South Island Forest District (CDC, 2014). A full listing of species and ecological communities of conservation concern within the South Island Forest District and associated biogeoclimatic subzones are included in Appendix B.

The BC Conservation Data Centre (CDC) rare element occurrence mapping resource was accessed to obtain records of provincially listed rare wildlife, plants, and ecosystems on or adjacent to Highway 4 and the site-specific conditions at culvert repair sites (to 2.5 km radius).

The CDC tracking system includes species or ecosystems that are Red- and Blue-Listed in BC. The Red-List includes indigenous elements considered to be Extirpated, Endangered or Threatened in BC. Endangered elements are facing imminent extirpation or extinction, whereas Threatened elements are likely to become endangered if limiting factors are not reversed. Species on the Blue-List are considered to be vulnerable or particularly sensitive to human activities or natural events.

Species at Risk Act Public Registry, Government of Canada

The Public Registry of the SARA was accessed to collect information on rare species that may occur on Vancouver Island and to determine their current status under the SARA. Species listed in Schedule 1 of the federal SARA and their critical habitats are protected in the PRNPR.

Federally listed species are designated as being Extinct, Extirpated, Endangered, Threatened, or of Special Concern. An Extinct wildlife species no longer exists, while an Extirpated wildlife species no longer exists in the wild in Canada, but occurs elsewhere. An Endangered species is facing imminent extirpation or extinction, a Threatened species is likely to become endangered if limiting factors are not reversed and a species of Special Concern may become threatened or endangered because of a combination of biological characteristics and identified threats.

The webpage of the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) was accessed to determine the status of species placed on Schedules 1 of the SARA and to review status reports and habitat requisites of species listed by the occurrence records.

Pacific Coastal Resources Atlas for BC, CMN

This atlas was reviewed to identify coastal resources such as salmonid distribution data points along the five culverts scheduled for repair or replacement and along the Highway 4 project alignment. No resources were found utilizing the Pacific Coastal Resources Atlas at culvert repair/replacement locations. Watershed codes were cross-referenced with the FISS Single Watershed Database.

Sensitive Habitat Inventory and Mapping Atlas, CMN

The Sensitive Habitat Inventory and mapping Atlas (SHIM) was reviewed for sensitive habitats and resources within the Project area. Sensitivities, including fish resources, were searched for reports and data specific to the Project alignment, and specific to culverts that are to be repaired or replaced, along Highway 4 within the PRNPR in general. No reports were found relating to conditions at the culvert repair or re-surfacing Sites.

Species at Risk and Local Government Atlas, CMN

This atlas provided a list of species at risk potentially occurring in the Project area, and was cross-referenced with the results from the BC Species and Ecosystems Explorer.

2.3 Environmental Setting

This section combines the data obtained from the literature review into a comprehensive description for each Valued Ecosystem Component. These results are based on a desktop review only and do not include any results from field investigatio1ns performed by Keystone Environmental as per the scope of work.

2.3.1 Soils

There are three broad units of land and shoreline within the PRNPR: Long Beach, the Broken Group Islands, and the West Coast Trail. Highway 4, also known as the Pacific Rim Highway, runs across the Long Beach unit. Soils in the Project area consist of two zones (Maps BC, 1986).

North of Sandhill Creek

This zone consists of orthic homo-ferric podzol soil which originated from the sea. These soils are developed mainly on coarse-textured, iron-rich, non-calcareous or materials where carbonates have been removed. They are characterized by the accumulation of iron and aluminum in the brownish-coloured B horizon. The most common texture is clay. The soil is moderately well drained with excess moisture for a short but significant period of the year.

South of Sandhill Creek

This zone consists of ortstein ferro-humic podzol which is fluvial in origin. Ortstein (German: *ort*-place, *stein*-stone) is defined as all or part of the spodic horizon, when moist, it is at least weakly cemented into a massive horizon that is present in more than half of each pedon. Ferro-humic podzol soils have a dark-colored podzolic B horizon with a high content of organic C and an appreciable amount of extractable Fe and Al. The most common texture is very gravelly sandy loam. The soil is moderately well drained with excess moisture for a short but significant period of the year.

2.3.2 Vegetation

The study area lies within the Coastal Western Hemlock Very Wet Hypermaritime Southern Biogeoclimatic Subzone Variant (CWHvh1). CWHvh1 occurs in maritime areas of the south coast, restricted to a narrow fringe on the outer coast of Vancouver Island. Forests are dominated by western hemlock with subdominant Amabilis fir (*Abies amabilis*), western redcedar (*Thuja plicata*), and minor amounts of yellow-cedar (*Cupressus nootkatensis*). Major understory species include salal (*Gaultheria shallon*), Alaskan blueberry (*Vaccinium alaskaense*), red huckleberry (*Vaccinium parvifolium*), and deer fern (*Blechnum spicant*). Bog ecosystems occur commonly on subdued terrain. Floodplain ecosystems occur throughout and old-growth high bench sites are scattered along river tributaries. Low bench floodplains dominated by red alder (*Alnus rubra*) are found adjacent to gravel bars. Red alder and salmonberry (*Rubus spectabilis*) dominated slope failures are scattered throughout. Poorly drained bog forests are common where the terrain is hummocky. Several herbaceous wetland types occur. The most common ecosystem is rich mesic forest on shallow to deep soils, on hummocky terrain and steep sites. The very dry pine ecosystem occurs in submesic areas and rock outcrops.

The forests of the park are divided into six communities which are predominantly old-growth in age. Along the coastal edge, giant Sitka spruce (*Picea sitchensis*) (50–90 m tall) dominates the *Spruce Fringe forest community.* An understory of salal, black twinberry (*Lonicera involucrate*) and shrubby Pacific crabapple (*Malus fusca*) are present. The most exposed shoulder is stunted by wind and spray, forming a distinct, wind-sheared krummholz.

The *Cedar-Hemlock forest community* is further inland where salt-tolerant Sitka spruce transition to western hemlock (*Tsuga heterophylla*) and western redcedar. There is an understory of red huckleberry, salmonberry, Alaskan blueberry and salal. Stressed by strong winds, heavy rainfall, low nutrient conditions and a high water table, western redcedar develop twisted trunks and multiple, gray-weathered crowns.

Where soil depths and fertility are optimal, western redcedar and western hemlock are joined by amabilis fir to form the *Climax Rainforest community*. The understory is comprised of western yew (*Taxus brevifolia*), salal, false azalea (*Rhododendron albillorum*), blueberry and epiphytic mosses and ferns. The forest is characterized by an irregular, multi layered canopy, giant conifers, standing snags, and fallen nurse logs with rooted seedlings.

The *Wooded Bog community* develops in areas with poor drainage. Stunted shore pine (*Pinus contorta*) grow among sphagnum moss (*Sphagnum* spp.), Labrador tea (*Rhododendron groenlandicum*), and bog-laurel (*Kalmia polifolia*) specially adapted to the wet acidic conditions of the bog. Evergreen huckleberry (*Vaccinium ovatum*) fills the transitional margin into other forest zones.

The *Stream Banks and Roadside forest communities* are dominated by red alder that become ingrown with shrubby willows, cascara, salmonberry and thimbleberry. Some disturbed forests are areas of past human settlement or commercial harvest before the established reserve with Douglas-fir (*Pseudotsuga menziesii*), amabalis fir and Sitka spruce planted after harvest with regenerating western hemlock and redcedar as more shade-tolerant indigenous species.

The shoreline ecosystems serves as a transition areas between terrestrial and marine ecosystems that support shorebirds foraging along beaches and unique plant communities including along shifting sand dunes. Where sand dunes have developed, deep-rooted grasses provide stabilization and closer to the water's edge, beach rye (*Leymus mollis*), beach pea (*Lathyrus littoralis*) and giant vetch (*Vicia nigricans*) grow around driftwood. Where roads meet the marine interface, sand dunes may contain listed plant species such as Pink sand-verbena (*Abronia umbellata var. breviflora) or black* knotweed *(Polygonum paronychia).*

Logging is extensive throughout the area including the Kennedy/beach areas and Tofino. Numerous development areas, trails and roads exist throughout the assessment area. Roadside vegetation is early successional alder dominated forest with drainage ditches, small wetlands and swales. Introduced species of vegetation are beginning to become established.

2.3.3 Wildlife

Mixed old-growth forests, riparian areas, windthrow openings, natural insects and disease result in a forest structure of uneven age that provides diverse habitats for wildlife. The forest ecosystem is dominated by old-growth stands that support invertebrates, amphibians, birds, and mammals. Lake and wetland ecosystems contain foraging sites for aquatic birds and forest mammals. The Project area supports abundant mammals including moose (*Alces alces*), black-tailed deer (*Odocoileus hemionus columbianus*), black bear (*Ursus americanus*), gray wolf (*Canis lupus*), cougar (*Puma concolor*), American marten (*Martes pennanti*), squirrels, hares, beaver (*Castor canadensis*), muskrat (*Ondatra zibethicus*), raccoon (*Procyon lotor*), weasels,

voles and bats. There are 250 bird species recorded including marine birds, songbirds and raptors. The bald eagle (*Haliaeetus leucocephalus*), garter snakes, Pacific treefrogs (*Pseudacris regilla*) and several species of salamanders commonly inhabit the forests. Many bird species overwinter and breed in the Park.

2.3.4 Rare and Endangered Species

The BC Conservation Data Centre has documented occurrences of 13 provincially and federally listed species at risk (six plant species and seven wildlife species) in the assessment area with the potential to occur within the highway repair footprints, where suitable habitat is present. Seven species are provincially Red-listed and of those seven, four are listed as Endangered and one Threatened under Schedule 1 of the *SARA*. All other species are provincially Blue-listed; two of these remaining six species are listed as wildlife species of Special Concern under the *SARA*.

The dromedary jumping slug (*Hemphillia dromedarius*) is the most predominantly recorded species within the assessment area, documented at six locations within the long beach unit of the PRNPR; although it has been documented at other locations within the other two units, such as the West Coast Trail. Habitat for this species is primarily mixed old-growth forest with abundant coarse woody debris; however, recent sightings have also been in second-growth cover types and along trails.

Table 3 BC CDC Documented Occurrences within 2.5 km of Each Culvert Repair

Common Name	Scientific Name	BC List Status	SARA List Status, Schedule1	Habitat Type
Plants				
Pink sand-verbena	*Abronia umbellata* var. *breviflora*	Red	Endangered (May 2004)	Driftwood zone, dunes on exposed coast shoreline, upper beach
Grey beach peavine	*Lathyrus littoralis*	Red	-	Beaches, dunes and nearby spits along the coastal shoreline
Yellow sand-verbena	*Abronia latifolia*	Blue	-	Terrestrial shoreline habitat, on dunes and west coast shoreline
Black knotweed	*Polygonum paronychia*	Blue	-	Lowland terrestrial, sand dunes
California wax-myrtle	*Myrica californica*	Blue	-	rock outcrop, top of sandy beach, front edge of forest in alder/shrub
Paintbrush owl-clover	*Castilleja ambigua ssp. ambigua*	Blue	-	Herbaceous wetland and river mouths
Wildlife				
American water shrew	*Sorex palustris brooksi*	Red	-	aquatic/riparian habitat, creeks, restricted to Vancouver Island
Seaside centipede	*Heterodermia sitchensis*	Red	Endangered (Apr 2006)	Sitka spruce forest, lowland terrestrial, needleleaf, epiphytic, sheltered marine

Common Name	Scientific Name	BC List Status	SARA List Status, Schedule1	Habitat Type
Edwards' beach moth	*Anarta edwardsii*	Red	Endangered (April 2009)	Sparsely vegetated sandy beach dunes and coastal shorelines
Sand-verbena moth	*Copablepharon fuscum*	Red	Endangered (Nov 2013)	Beach, sparsely vegetated, sand-dominated coastal marine habitats,
Dromedary jumping-slug	*Hemphillia dromedarius*	Red	Threatened (May 2014)	Terrestrial, Second-growth and old-growth cedar-hemlock forests with abundant coarse woody debris
Warty jumping-slug	*Hemphillia glandulosa*	Blue	Special Concern (Apr 2013)	Young, second-growth mixed forest; seral riparian. Dominant red alder, redcedar
Northern red-legged frog	*Rana aurora*	Blue	Special Concern (Nov 2004)	Terrestrial mixed forest, riverine, creek, red alder, redcedar dominant cover, *Rubus* bushes and fern ground cover

Provincially and federally listed wildlife in the general area of streams and roadside mature forests include marbled murrelet (*Brachyramphus marmoratus*), northern goshawk (*Accipiter gentilis laingi*), American water shrew (*Sorex palustris brooksi*), northern red-legged frog (*Rana aurora*) and the dromedary jumping-slug. Where roads interface with the marine environment, there may be several species of shorebirds present along the beaches and intertidal zones, and bald eagle nests in adjacent trees.

There are 22 rare wildlife species, including amphibians, birds, mammals and invertebrates, that have the potential to be present at the Highway 4 repair Sites depending on the availability of habitat suitable to support them. Snails and slug species are the most sensitive. Sixteen rare plants may also be present depending on whether marine shoreline/dune habitat is predominant at the Site or riparian forest. Dune species are the most sensitive.

Table 4 Wildlife of Concern Potentially Present in the Project Area

Common Name	Scientific Name	COSEWIC Status	SARA Status	BC List
Amphibians				
Northern Red-legged Frog	*Rana aurora*	SC (Nov 2004)	1-SC (Jan 2005)	Blue
Wandering Salamander	*Aneides vagrans*	SC (May 2014)		Blue
Western Toad	*Anaxyrus boreas*	SC (Nov 2012)	1-SC (Jan 2005)	Blue
Birds				
Northern Goshawk	*Accipiter gentilis laingi*	T (Apr 2013)	1-T (Jun 2003)	Red
American Bittern	*Botaurus lentiginosus*			Blue
Band-tailed Pigeon	*Patagioenas fasciata*	SC (Nov 2008)	1-SC (Feb 2011)	Blue
Barn Swallow	*Hirundo rústica*	T (May 2011)		Blue

Common Name	Scientific Name	COSEWIC Status	SARA Status	BC List
Great Blue Heron	*Ardea herodias fannini*	SC (Mar 2008)	1-SC (Feb 2010)	Blue
Green Heron	*Butorides virescens*			Blue
Marbled Murrelet	*Brachyramphus marmoratus*	T (May 2012)	1-T (Jun 2003)	Blue
Northern Pygmy-Owl	*Glaucidium gnoma swarthi*			Blue
Olive-sided Flycatcher	*Contopus cooperi*	T (Nov 2007)	1-T (Feb 2010)	Blue
Sooty Grouse	*Dendragapus fuliginosus*			Blue
Western Screech-Owl	*Megascops kennicottii kennicottii*	T (May 2012)	1-SC (Jan 2005)	Blue
Mammals				
American Water Shrew	*Sorex palustris brooksi*			Red
Keen's Myotis	*Myotis keenii*	DD (Nov 2003)	3 (Mar 2005)	Blue
Invertebrates				
Dromedary Jumping-slug	*Hemphillia dromedarius*	T (May 2014)	1-T (Jan 2005)	Red
Oregon Forestsnail	*Allogona townsendiana*	E (Apr 2013)	1-E (Jan 2005)	Red
Seaside centipede	*Heterodermia sitchensis*	E (Apr 2006)	1-E (Jun 2003)	Red
Autumn Meadowhawk	*Sympetrum vicinum*			Blue
Pacific Sideband	*Monadenia fidelis*			Blue
Warty Jumping-slug	*Hemphillia glandulosa*	SC (Apr 2013)	1-SC (Jan 2005)	Blue
Plants				
grey beach peavine	*Lathyrus littoralis*	T (Apr 2013)		Red
river bulrush	*Bolboschoenus fluviatilis*			Red
American glehnia	*Glehnia littoralis* ssp. *leiocarpa*			Blue
angled bittercress	*Cardamine angulata*			Blue
beach bindweed	*Calystegia soldanella*			Blue
black knotweed	*Polygonum paronychia*			Blue
California wax-myrtle	*Myrica californica*			Blue
Menzies' burnet	*Sanguisorba menziesii*			Blue
nodding semaphoregrass	*Pleuropogon refractus*			Blue
paintbrush owl-clover	*Castilleja ambigua* ssp. *ambigua*			Blue
redwood sorrel	*Oxalis oregana*			Blue
Smith's fairybells	*Prosartes smithii*			Blue
smooth willowherb	*Epilobium glaberrimum* ssp. *fastigiatum*			Blue
snow bramble	*Rubus nivalis*			Blue
tooth-leaved monkey-flower	*Mimulus dentatus*			Blue
water bur-reed	*Sparganium fluctuans*			Blue

Several seabird colonies were identified by the BC Community Mapping Network at Cleland Island including black oystercatcher (*Haematopus bachmani*), Cassin's auklet (*Ptychoramphus aleuticus*), fork-tailed storm-petrel (*Oceanodroma furcata*), glaucous-winged gull (*Larus glaucescens*), Leach's storm-petrel (*Oceanodroma leucorhoa*), pelagic cormorant (*Phalacrocorax pelagicus*), pigeon guillemot (*Cepphus columba*), rhinoceros auklet (*Cerorhinca monocerata*), tufted puffin (*Fratercula cirrhata*). The Tofino mudflats seasonally support many thousands of shorebirds of many species each year.

2.3.1 Rare Plant Communities

Thirteen plant communities have the potential occur at each of the Highway 4 culvert repair/installation Sites depending on the predominant terrain, e.g., wet forest, riparian, marine shoreline, dune, or wetland.

Table 5 Summary of Plant Communities of Concern Potentially Present in the Project Area

Common Name	Scientific Name	BC List Status
dune bluegrass Herbaceous Vegetation	*Poa macrantha* Herbaceous Vegetation	Red
dune wildrye - beach pea	*Leymus mollis* ssp. *mollis - Lathyrus japonicus*	Red
large-headed sedge Herbaceous Vegetation	*Carex macrocephala* Herbaceous Vegetation	Red
Sitka spruce / false lily-of-the-valley	*Picea sitchensis / Maianthemum dilatatum* Very Wet Hypermaritime 1	Red
Sitka spruce / Oregon beaked-moss	*Picea sitchensis / Eurhynchium oreganum*	Blue
Sitka spruce / Pacific crab apple	*Picea sitchensis / Malus fusca*	Blue
Sitka spruce / Pacific reedgrass	*Picea sitchensis / Calamagrostis nutkaensis*	Blue
Sitka spruce / salal	*Picea sitchensis / Gaultheria shallon*	Blue
Sitka spruce / slough sedge	*Picea sitchensis / Carex obnupta*	Blue
Sitka spruce / sword fern	*Picea sitchensis / Polystichum munitum*	Blue
western hemlock - Sitka spruce / lanky moss	*Tsuga heterophylla - Picea sitchensis / Rhytidiadelphus loreus*	Blue
western redcedar - Sitka spruce / devil's club Very Wet Hypermaritime 1	*Thuja plicata - Picea sitchensis / Oplopanax horridus* Very Wet Hypermaritime 1	Blue
western redcedar - Sitka spruce / sword fern	*Thuja plicata - Picea sitchensis / Polystichum munitum*	Blue

2.3.2 *Freshwater*

Fresh Water Fish and Fish Habitat

Watercourse information (Table 6) was obtained for Sandhill Creek, Lost Shoe Creek, Morningstar Creek, Kennedy Lake (Kennedy Flats Watershed) and an unnamed watercourse. Watercourse locations are identified in Figure 1 and nearby culverts are identified in Table 6.

Table 6 Watercourse Information

Watershed Code	Gazetted Name	Waterbody Identifier	Waterbody ID	Stream length	Nearby Culverts
930-306400	Kennedy Lake	01168CLAY	319055	-	-
930-260600	Lost Shoe Creek	00000ALBN	319004	13.4 km	50, 49
920-470400	Morningstar Creek	00000PARK	307375	6.2 km	20, 23
930-264800	Sandhill Creek	00000ALBN	319013	6.7	28, 29, 59
930-268300	Unnamed watercourse	00000ALBN	319020	-	20 & 23, 28

DFO's FISS database provided fish presence for all of the above watersheds (Table 7).

Table 7 Fish Observations by Watercourse

Common Name	Scientific Name	Fish Use
Kennedy Flats Watershed		
Chinook Salmon	*Oncorhynchus tshawytscha*	Spawning and rearing
Coho Salmon	*Oncorhynchus kisutch*	Spawning and rearing
Cutthroat Trout	*Oncorhynchus clarkii clarkii*	Year round use
Kokanee	*Oncorhynchus nerka*	Year round use
Lamprey	*Petromyzontiformes*	Year round use
Peamouth Chub	*Mylocheilus caurinus*	Year round use
Steelhead	*Oncorhynchus mykiss*	Spawning and rearing
Sockeye Salmon	*Oncorhynchus nerka*	Spawning and rearing
Lost Shoe Creek		
Chum Salmon	*Oncorhynchus keta*	Spawning and rearing
Cutthroat trout	*Oncorhynchus clarkii clarkii*	Year round use
Coho Salmon	*Oncorhynchus kisutch*	Spawning and rearing
Lamprey	*Petromyzontiformes*	Year round use

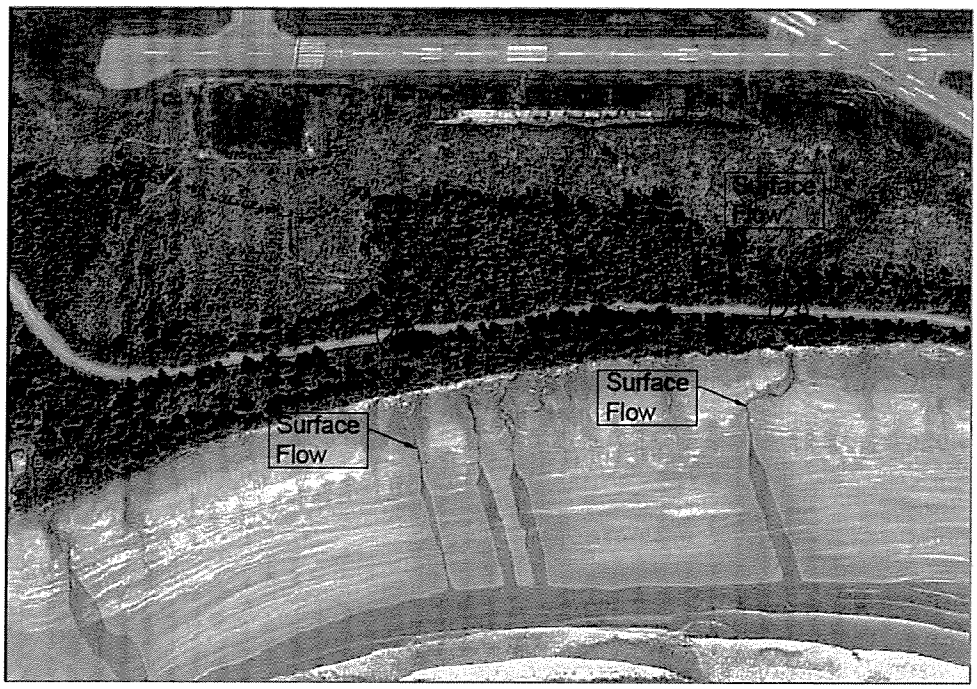
Common Name	Scientific Name	Fish Use
Pink Salmon	Oncorhynchus gorbuscha	Spawning and rearing
Rainbow Trout	Oncorhynchus mykiss	Year round use
Sculpin	Cottoidea spp.	Year round use
Steelhead	*Oncorhynchus mykiss*	Spawning and rearing
Morningstar Creek		
Coho Salmon	*Oncorhynchus kisutch*	Spawning and rearing
Cutthroat Trout	*Oncorhynchus clarkii clarkii*	Year round use
Sculpin	*Cottoidea spp.*	Year round use
Sandhill Creek		
Chum Salmon	*Oncorhynchus keta*	Spawning and rearing
Coho Salmon	*Oncorhynchus kisutch*	Spawning and rearing
Cutthroat Trout	*Oncorhynchus clarkii clarkii*	Year round use
Sculpin	*Cottoidea spp.*	Year round use
Steelhead	*Oncorhynchus mykiss*	Spawning and rearing

Google Earth was used to determine if information on fish habitat connectivity could be provided from aerial imagery. Waterflow is visible along Long Beach below culverts 20, 23, 28, and 59. Sandhill Creek runs horizontally along the High Water Mark below culvert 59. Results are shown below in Photos 1 through 3. Data obtained from Google Earth is presented below in Table 8).

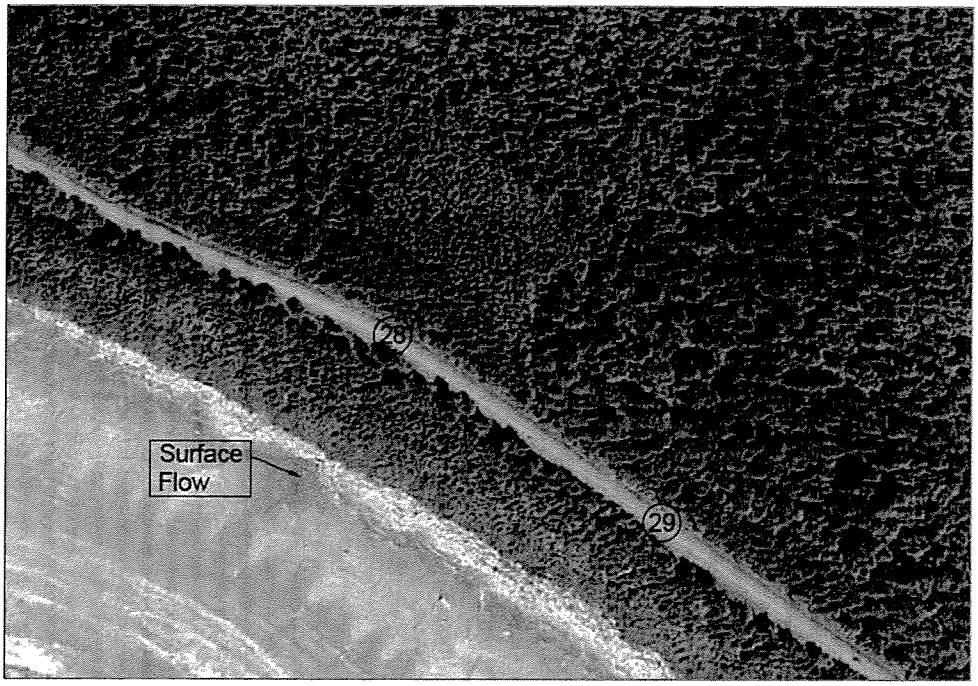
Table 8 Watercourse Information

Culvert	Distance to Ocean High Water Mark	Change in Elevation	Approximate Slope
20	60m	6m	10%
23	36m	6m	17%
28	75m	6m	8%
29	70m	6m	9%
59	340m	39m	11%

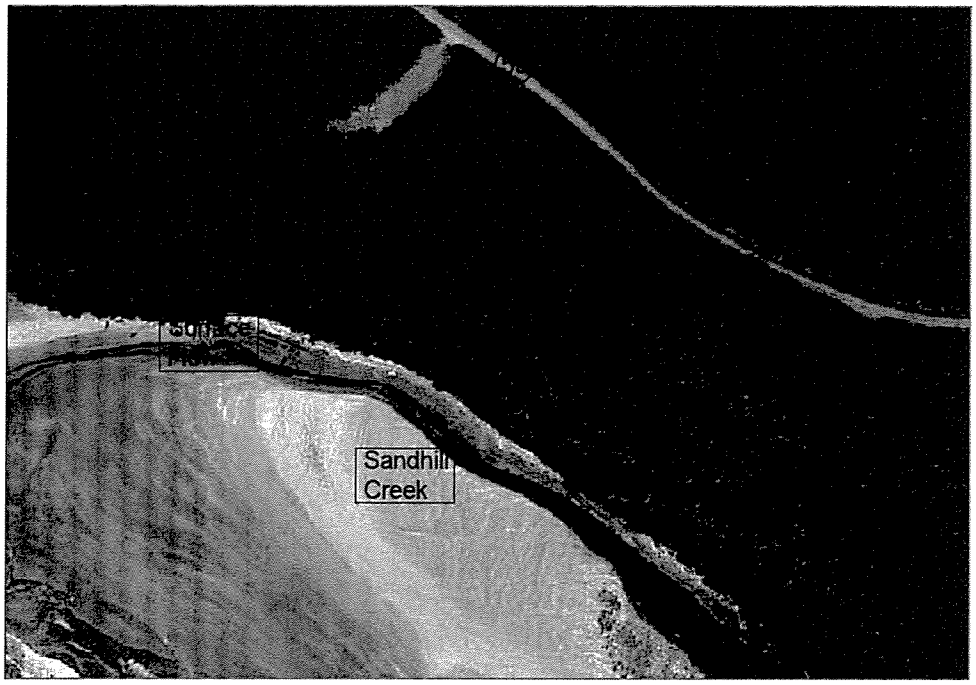
A review of the Canadian Hydrographic Services tide predictions for 2013 and 2014 for Tofino indicate High Tide is around 4.1m chart datum.



Photograph 1: Surface flow downstream of culverts 20 and 23.



Photograph 2: Surface flow downstream of culverts 28 and 29.



Photograph 3: Surface flow downstream of culvert 59.

All watercourses should be considered fish bearing and to provide fish habitat as defined by the *Fisheries Act* unless sufficient evidence exists to demonstrate otherwise. For the five proposed culvert repair/replacement locations, only 2 culverts (23 and 29) have comments in the 2002 Pacific Rim Drainage Assessment that indicated fish may not be present, and comments stating that a drainage does not provide fish habitat was only mentioned for culvert 29. A detailed description on how these statements were determined relative to existing practices for determining fish and fish habitat were not found.

Evidence of stream activity on the beach below culvert 29 was not visible on aerial photography but was visible for the other 4 culverts. The average gradient between the culverts and the ocean for all 5 sites was less than 20%, therefore fish passage cannot be discounted due to gradient. No information on barriers to fish passage are available in the reports or online literature reviewed. No evidence of fish trapping, electrofishing, or visual assessments of the five culvert watercourses were found.

Assuming the 2002 assessment used an acceptable standard for determining fish were not present, culverts 20, 28 and 59 should be treated as fish bearing and culverts 20, 23, 28, and 59 should be treated as providing fish habitat unless additional information can be provided to suggest otherwise.

The Kennedy Flats watershed is known to support regionally significant fish including Coho salmon (*Onocorhynchus mykiss)*, Chinook salmon (*Oncorhynchus tshawytscha)*, Sockeye salmon (*Oncorhynchus kisutch)*, Steelhead (*Oncorhynchus mykiss)*, and Cutthroat trout (*Oncorhynchus clarkii clarkii)*, Lamprey (*Petromyzontiformes)*, and Pea mouth chub (*Mylocheilus caurinus)*. Other fish such as three-spined stickleback (*Gasterosteus aculeatus)* and Sculpin (*Cottoidea spp.*) are also present in the watershed (Wartigg, 2002).

The creek at Culvert 59 discharges into Sandhill Creek near the High Water Mark of the ocean. Sandhill Creek is known to contain Chum salmon, Coho salmon, cutthroat trout, sculpins and Steelhead. It is unknown if barriers to fish passage are present based on the available online information.

Fresh Water Amphibians and Amphibian Habitat

Based on the 2002 assessment, culverts 20, 23, 28, 29, and 59 should be treated as amphibian habitat. Field investigations to determine which amphibians are present at these crossings were not found. The literature review indicates that Red-legged frog, northwestern salamander (*Ambystoma gracile*), Pacific treefrog, rough-skinned newt (*Taricha granulosa*), corixid diving beetles, notonectids and amphipods have been captured in wetlands near Highway 4 (Beasley, 2014). These species prefer slow moving or standing water. Red-legged frog egg masses may be present in watercourses during March and early April. Egg masses are typically located in water 0.5 m below the surface attached to emergent or submergent vegetation. After breeding, adult red-legged frogs migrate to riparian areas, with juveniles migrating later in the year (summer).

The Pacific treefrog is the most commonly found frog in the park. During spring breeding, treefrogs descend to the forest floor and into the water. Northwestern salamander egg masses may be present in watercourses during March and early April. Egg masses are typically in water 0.5 m below the surface attached to emergent or submergent vegetation. The larvae are aquatic, with large, feathery gills.

Fresh Water Mammals

The American water shrew has been observed within the park at one location and prefers aquatic and riparian habitat. It is extremely rare; only two individuals were found in traps during the mid-1990's, and is unlikely to occur within the construction footprint.

2.3.3 Marine Intertidal

The intertidal ecosystems along the shores of the PRNPR are narrow areas of sea bottom that are above water at high low tide and below water at high tide. This tidally influenced zone is complex and consists of many habitats including rocky shores, eelgrass meadows, and varying sediments. At low tide, sea stars, clams, mussels and hermit crabs are visible and become available to feeding birds and mammals. At high tide offshore mobile animals and small schools of fish feed on plankton, seaweed and kelp. The subtidal ecosystem is the most diverse complex of life forms such as kelp, seaweed, invertebrates, fish, marine mammals and birds.

2.3.4 Human-caused Disturbance

The PRNPR has a rich history of human influence and has served as a vital conduit between remote communities along the rugged west coast of southern Vancouver Island. The Nuu-chah-nulth First Nations territory extends throughout the Project area. It receives 800,000 visitors per year and Highway 4 provides the only road access through the Long Beach Unit of the park. Many visitors come between May and October to camp, while others are simply passing through on their way to Tofino or other nearby resorts. Long Beach is extensively used for recreational activity, which is supported by a number of trails and parking lots along the beach. Recreational activity is highest during the summer season (May through September) and there are areas of the highway and facilities in need of repair to improve safety, manage traffic and waste, and prevent impacts to valued resources in the PRNPR.

2.4 Potential Impacts

The potential impacts from the Project are derived to assist in scoping the effects pathways and focus the assessment on VECs that are relevant to the assessment and likely to be affected by the project. The project has the potential to interact with VECs through the following mechanisms:

- Physical changes in the structure of the terrain, soil erosion potential, soil compaction, changes in soil structure and organic matter content, introduced pollutants
- Downstream input of debris, pollutants and sediment to fish and amphibians
- Changes in the structure, hydrology and quality of fish habitat from stream bed alteration or adjacent terrain
- Disturbance to wildlife from noise, human activity, disruption in movement access during staging or construction
- Changes in the structure and quality of wildlife habitat from alteration of habitat or terrain
- Disturbance or harm to species at risk and changes in the structure and quality of critical habitat
- Damage or alteration to sensitive ecosystems, such as riparian areas, listed plant communities, during construction
- Changes to the visual effect of the local ecology
- Input of litter, garbage or other waste and debris during construction
- Downstream changes to marine shoreline through deposition of silt fines from watercourses
- Disturbance to fish and amphibians from instream works

2.5 Valued Ecosystem Components

A Valued Ecosystem Component (VEC) is an element of the environment that has scientific, economic, social or cultural significance. Those VECs that may be affected by the project's activities and are relevant, representative and responsive to potential effects are included in the

environmental assessment (Table 9). VECs were identified through background information, database searches, and Highway 4 roadside, culvert repair/replacement Site assessments, and based on the following, but not limited to:

- Rarity or uniqueness of a species or habitat that supports such species or is restricted in range
- Vulnerability of a species or habitat to disturbances
- Ecosystem function, areas of high productivity, areas of particularly critical function (i.e., spawning or feeding areas)
- Social or cultural importance
- Compliance with legal requirements (i.e., *Migratory Birds Convention Act, Fisheries Act*)

The Highway 4 section of the PRNPR includes fresh water crossings and coastal lowland forests. Ecological values along Highway 4 include sensitive terrain, such as wetlands, riparian plant communities, freshwater hydrology, fish and fish habitat, wildlife and wildlife habitat, and species at risk. These ecosystem components are important for sustained regional biodiversity, and to stakeholders such as First Nations and PCA. Some ecosystem components may be more sensitive seasonally, e.g., during fish migration or wildlife breeding seasons, such as raptor nesting. Construction may introduce noise and effects to air quality or visual quality along the highway.

Table 9 Valued Ecosystem Components Identified for the Highway 4 Repair Project

Valued Ecosystem Component	Justification
Air Quality	Receptors (e.g., fish, wildlife and plants) could be affected by increased dust levels from project activities during access, staging or construction
Noise & Vibration	Wildlife could be adversely affected (disturbed) by increased noise levels from project activities, especially during the sensitive breeding season during access, staging or construction
Soil Substrate	Soil is a pathway to aquatic and terrestrial VECs. Pollutants could be input to soils during construction.
Vegetation Communities	Plant biota present at or near the repair sites could be harmed or destroyed during access, staging or construction
Freshwater Hydrology	Hydrology is a pathway to aquatic and terrestrial VECs, especially potentially affecting fish and fish habitat downstream
Fish and Fish Habitat	Activities during access, staging or construction could potentially adversely affect fish and fish habitat downstream, such as sediment discharge
Marine shoreline	Activities during access, staging or construction could potentially adversely affect marine habitats downstream of the Sites
Wildlife and Wildlife Habitat	Species at Risk are present at or near the repairs site and could be disturbed or harmed during access, staging or construction
Rare and Endangered Species	Wildlife biota are present at or near the repairs site and could be disturbed or harmed during access, staging or construction

2.6 Evaluation of Significance

General evaluation criteria (FEARO 1994) include the Direction, Magnitude, Geographic Extent, Duration, Frequency, Reversibility, and Likelihood of the effect. These general evaluation criteria were used to determine the significance of Project-environmental residual effects in accordance with definitions provided in the Canadian Environmental Assessment Agency's *Reference Guide – Determining Whether a Project is Likely to Cause Significant Adverse Environmental Effects* (FEARO 1994).

Table 10 Significance Criteria for Assessment of Effects

Significance Parameter	Characterization
Direction	(A) *Adverse* (P) *Positive* (N) *Neutral*
Magnitude	(L) *Low*: Minimal or no impairment of VEC (M) *Moderate*: Measureable change in VEC (H) *High*: Serious impairment to VEC
Geographic Extent	(S) *Site-specific*: Environmental effects restricted to the Project site (i.e., Project footprint) (L) *Local*: Environmental effects extend beyond the Project footprint but remain localized within the Local Assessment Area (R) *Regional*: Environmental effects extend to the watershed/regional level
Duration	(ST) *Short-term*: Effects are measurable for <2 years (MT) *Medium-term*: Effects are measurable for 2 to 20 years (LT) *Long-term*: Effects are measurable for >20 years (P) *Permanent*: Effects are permanent
Frequency	(O) Occurs *once* (S) Occurs *sporadically* at irregular intervals (R) Occurs on a *regular* basis and at regular intervals (C) *Continuous*
Reversibility	(R) *Reversible* (I) *Irreversible*
Likelihood: *Based on professional judgment*	(L) *Low* probability of occurrence (M) *Medium* probability of occurrence (H) *High* probability of occurrence

Significance Parameter	Characterization
Significance	(N) *Not Significant* (S) *Significant*

Magnitude refers to the expected size or severity of the residual effect. The proportion of the VC affected is considered within the spatial boundaries and the relative effect (e.g., relative to natural annual variation in the magnitude of the VC or other relevant characteristic).
Geographic Extent refers to the spatial scale over which the residual effect is expected to occur.
Duration refers to the length of time the residual effect persists (which may be longer than the duration of the activity that gave rise to the residual effect).
Frequency refers to how often the residual effect occurs and is usually closely related to the frequency of the activity causing the residual effect.
Reversibility pertains to whether or not the residual effect on the VC can be reversed once the activity causing the disturbance ceases.
Likelihood refers to whether or not a residual effect is likely to occur influenced by a variety of factors, such as the likelihood of a causal disturbance occurring or the likelihood of mitigation being successful.
Significance a quantitative or qualitative threshold depending on the nature of the VEC. Residual effects characteristics are taken into consideration along with background information and relevant literature for each VEC.

2.6.1 Boundaries

Based on the proposed project schedule, the temporal boundary for the assessment includes the construction period commencing in early spring 2015 to be completed before October 10, 2015.

The spatial boundaries include the Local Assessment Area (LAA) for consideration of direct and indirect effects on the selected VECs, and a Regional Assessment Area (RAA) for consideration of cumulative effects. The LAA encompasses the zone of influence of the project, i.e., the direct footprint of repair works including a 30 m buffer around the footprint for which there may be adverse indirect effects of noise or erosion. The RAA should be at an appropriate scale that provides relevant context for useful and meaningful data on past, present and future projects which would reasonably be expected to interact with this Project, and which will be considered in the evaluation of cumulative effects. The RAA for this Project is considered to be the Highway 4 unit of the PRNPR.

Technical boundaries refer to the constraints imposed on an environmental assessment by limitations in the ability to predict the effects of a project. For this assessment those boundaries are represented by data gaps of site-specific biophysical information due to the lack of mapping data available for detailed interpretation, or missing on-the-ground evaluations as would be provided by a site reconnaissance visit, and the resulting uncertainties in site-specific assessments of effect.

3. REGULATORY FRAMEWORK

Based on the Project location within the PRNPR, the nature of the highway repair works and the ownership of the land, the following regulatory requirements have been identified for the Project.

BC Wildlife Act

As a due diligence measure, the assessment considers the potential effects from the Project on provincially Red- and Blue-listed species under the BC *Wildlife Act,* including Section 34, which protects the bird nests and their young.

Federal Fisheries Act

DFO does not require the submission of a project review for culvert replacement projects provided that the following conditions are met.

- No new fill placed below the High Water Mark.
- Channel realignment is not required.
- No narrowing of the channel.
- No complete obstruction to fish passage during timing windows.
- Fish passage is provided if restricted by the existing structure.
- Work can be done in isolation of flowing water.
- No increase in footprint below the High Water Mark.

All works must ensure that measures to avoid causing harm to fish and fish habitat are implemented regardless of whether an application for review is required. Information on best management practices is available at http//www.dfo-mpo.gc.ca/fno-ppe/measures-mesures/index-eng.html.

Federal Species at Risk Act, Schedule 1

This assessment considers the potential presence and protection of federally-listed species at risk and their critical habitats, including those included in Schedule 1 of the *Species at Risk Act.*

Federal Migratory Birds Convention Act

The assessment considers the protection of migratory birds, their eggs and their nests while conducting works along the roads and near marine shorelines.

Canada National Parks Act

Environments and species are protected in PRNPR by Schedule 3 of Section 26 (Protected Species) and Section 32 (Protection of the Environment) of the *Canada National Parks Act.*

Canadian Environmental Assessment Act 2012

The project is structured to consider and address the assessment of environmental effects as directed by the *Canadian Environmental Assessment Act* 2012 and associated guidelines except as noted in Section 1.4.

4. ENVIRONMENTAL IMPACTS AND EFFECTS ASSESSMENT

Key potential impacts associated with the repaving activities and culvert repairs or replacements are presented in the following subsections for each VEC. For potential adverse effects, there are established mitigation measures and federal and provincial Best Management Practices (BMPs) that will avoid or reduce residual adverse effects, and that the selected contractor will commit to implement. Residual effects are those effects remaining after the implementation of all mitigation measures. The significance of residual effects is considered on this basis.

4.1 Air Quality

Construction projects can impact air quality from a number of mechanisms from vehicle exhaust to releasing dust from construction activities. This section describes the impacts, mitigation measures and residual effects of air quality from the project.

4.1.1 Impacts

The project has the potential to have the following impacts on air quality:

- The emissions and the creation of dust particulate from construction vehicles and equipment have the potential to negatively impact local air quality. Increased idling time from traffic disruptions has the ability to produce increased emissions and adversely affect air quality. Construction along the entire length of Highway 4 is expected to have a similar probability for impacts to air quality from machinery exhaust. Emissions are expected to be released sporadically depending on when machinery is used.
- Dust from any excavation activities can be carried off by the wind during dry conditions.
- Trucks can create dust from uncovered loads while driving down the highway.
- Dust can be created from riprap that is not free of fines and is not placed carefully.

4.1.2 Mitigation Measures

In order to mitigate impacts to air quality, the following mitigation measures are required:

- Tarps or polyethylene sheeting may be used to cover particulate material generated during surficial preparations.
- Use of water as a dust suppression agent. Note water must not be taken from watercourse unless it does not result in serious harm to fish as defined by the *Fisheries Act* or any other relevant legislation.
- Trucks will be required to have their loads covered during transport.
- Trucks will keep their speed below 15 km/h when travelling off paved roads.
- All diesel vehicles must use ultra-low sulphur diesel fuel, when and where available.
- Ensure all riprap is free of fines.

- Ensure all riprap is lowered into position when performing culvert replacement activities.
- Ensure that machinery is in good condition.

4.1.3 Residual Effects

While mitigation measures can lower the amount of emissions from machinery, some greenhouse gases will still be emitted into the atmosphere throughout the project. Emissions are not expected to result in a measurable change to air quality. The abundance of natural vegetation surrounding the work area will help reabsorb carbon dioxide released into the atmosphere. The residual effects associated with the release of greenhouse gasses are not expected to be significant adverse effects on the environment over the scale of the project.

Residual effects from the release of dust to the atmosphere from construction activities is expected to be minor and short lived with the correct implementation of the prescribed mitigation measures. Potential adverse residual effects are anticipated to be not significant.

4.2 Noise and Vibration

Many construction activities generate noise and vibration which can affect sensitive species. This section describes the potential impacts, mitigation measures and residual effects that may occur from the project.

4.2.1 Impacts

The works has the potential to generate noise and vibration. Sources of noise may include construction machinery, placement of materials, or the use of hand tools. Impacts may include:

- Disruption to local wildlife from noise significantly louder than regular highway vehicle traffic.
- Disruption to the bladders of fish if pressure waves exceed 30 kPa.

4.2.2 Mitigation Measures

The following mitigation measures shall be employed on this project to ensure fish and wildlife are protected:

- Machinery should be in good condition prior to construction and contractors will not utilize excessively noisy equipment. Regular maintenance will be undertaken on all equipment, including lubrication and replacement of worn parts, especially exhaust systems.
- If only one piece of equipment can conduct the task and it has elevated noise levels, its use should be limited.
- All on-site workers should be trained to be aware of noise issues and how to minimize noise emissions where possible.
- The use of back-up beepers should be minimized, particularly during twilight and dark hours, as long as compliance with regulatory requirements is maintained.

- Any idling equipment should be turned off when not in use and in compliance with emission-reduction strategies.
- The use of noisy machinery or loud activities shall not occur during the breeding window of March 1 – September 31 (BC DWC 2013).
- Avoid banging materials together and lower all materials in place instead of dropping them.

4.2.3 Residual Effects

The project will create noise and vibration throughout the project. However, with the implementation of the recommended mitigation measures, impacts to fish and wildlife are expected to be minimal and especially if the works can be accomplished outside of the breeding window, or it is known that no raptor nests are present. Potential adverse residual effects are anticipated to be not significant.

4.3 Soil Substrate

Clean soil can be contaminated from many sources and can be eroded away during construction projects. This section describes the impacts, mitigation measures and residual effects anticipated for this project.

4.3.1 Impacts

The following impacts to soil have the potential to occur:

- Erosion from exposed or stockpiled materials.
- Compaction of adjacent soils from construction equipment.
- Contamination from accidental spills of deleterious material (i.e., oils, lubricants, or fuel).
- Anthropogenic materials mixing with existing soil during construction.
- Excess placement or leaching of asphalt materials onto adjacent soils.

4.3.2 Mitigation Measures

In order to mitigate potential impacts to existing soils, the following mitigation measures shall be used:

- Equipment shall be inspected to minimize hydraulic leaks.
- All debris shall be carefully collected and disposed at an appropriate facility.
- Care shall be taken when placing asphalt to ensure it is isolated to the work area.
- A spill management plan shall be in place and enforced throughout the project to quickly clean up any incidents that could occur.
- A spill kit shall be onsite at all times and operators must be trained and be prepared to use the kit immediately if required.
- If any suspect soils are discovered which appear to be contaminated, they shall be isolated from the work area in an acceptable manner to ensure no mixing with clean soils occurs.

4.3.3 Residual Effects

Provided all best management practices and mitigation measures are successfully implemented, there is a low risk that residual effects to soil will occur during this project. Potential adverse residual effects are anticipated to be not significant.

4.4 Vegetation Communities

A number of plants have been identified as potentially being present adjacent Highway 4 or in the vicinity of culvert repair sites. This section describes the potential impacts, mitigation measures and residual effects anticipated from the proposed construction activities.

4.4.1 Impacts

While the works will predominately occur within the existing road footprint, the following impacts to existing plant communities located in terrestrial or riparian environments may occur.

- Over time, existing vegetation has grown immediately adjacent the roadway, and in some cases has begun overtaking the margin on the side of the road. Removal of this vegetation may be required to resurface the road and provide an adequate shoulder. The exact area that will be required is unknown.
- There is potential for road paving works to temporarily disturb adjacent terrestrial habitats through parking of vehicles and stock piling materials beyond the footprint of the existing road bed. Smothering may result in the temporary loss of vegetation at those locations.
- Removal of riparian vegetation may be required at culvert replacement sites. Removal of vegetation at these sites will be temporary.

4.4.2 Mitigation Measures

In order to mitigate impacts to existing vegetation, the following mitigation measures shall be implemented:

- All work areas must be easily identified in the field. Any known sensitive areas must be isolated from the work site with a visible marker, fence, or other feature to delineate the site.
- No stockpiling of materials shall be permitted beyond the edge of the road.
- No temporary parking of heavy machinery shall be permitted beyond the edge of the road if vegetation exists.
- No vegetation shall be removed that is not in the existing footprint of the road or the road shoulder except where culvert replacement activities area required.
- No excavation of root systems of adjacent trees beyond the project footprint shall be permitted.

- Where culvert replacement activities require the removal of vegetation, the work area shall clearly be:
  - Inspected for sensitive species prior to removal.
  - Delineated by a fence or visible object to delineate the site.
  - All works shall be limited to within the work area.
  - Any disturbed vegetated areas must be replanted upon project completion using native species typical of the area prior to construction. Replanting activities shall be performed under the direction of the monitor. Plant density shall be 1 shrub per square meter. Plants must be obtained from an established nursery specializing in native plants. Care must be taken to ensure that plants are not damaged during transport and installation. Care must be taken to ensure that any plantings do not become desiccated due to prolonged periods without water, or excessive exposure to wind or sun, prior to planting.
  - Any remaining exposed sediments shall be covered with a suitable seed mix with a 70% survival rating for the existing conditions.
  - No vegetation shall be removed during the breeding period of March 1–August 31. If works are proposed during the bird nesting window, a survey should be conducted to confirm absence of active ground nests.

4.4.3 Residual Effects

Resurfacing of the road is not expected to require removal of vegetation beyond the road footprint; therefore, no residual effects are expected from this activity provided mitigation measures are implemented. Replacement of culverts may require the removal of vegetation. Provided these areas are replanted, residual effects will be temporary in nature provided the pre-construction survey indicates no sensitive plant species are present. Potential adverse residual effects area anticipated to be not significant.

4.5 Freshwater Hydrology

Instream works such as culvert replacement and repairs can change the hydrology of a watercourse. This section describes potential impacts, mitigation measures and residual effects that can be expected from the project.

4.5.1 Impacts

Works located in and around the culverts have the potential to impact the hydrology of the watercourse. The following impacts may occur:

- Permanent alteration of the amount of standing water available for amphibians.
- Permanent alteration to the speed of water flow.
- Permanent alteration to the volume of water flow if the culvert is partially or completely obstructed.

- Temporary restriction of access through the culvert for fish.
- A change in culvert gradients and lengths can impact fish passage.

4.5.2 Mitigation Measures

The following mitigation measures will help ensure the impacts associated with hydrology are reduced:

- Ensure that the culvert design maintains a pool on either side of the culvert, where possible, if a pool is already present and fish or amphibians are present.
- Ensure that barriers to fish passage are not created.
- Perform a pre-construction survey to determine if standing water exists and, if so, include an area to replicate the standing water area for amphibians.
- Ensure water speeds through the culvert are not increased beyond the maximum speeds of fish that utilize the watercourse.
- Ensure the gradient of the culvert is suitable for fish passage if it is a fish stream.
- Ensure a sufficient depth of water column is maintained to support existing organisms.

4.5.3 Residual Effects

Low to nil residual effects on hydrology are expected with the implementation of the proposed mitigation measures. The works are expected to improve fish passage. Potential adverse residual effects area anticipated to be not significant.

4.6 Fish and Fish Habitat

Culvert repair and replacement works that require works within or adjacent to a watercourse that is connected to fish habitat has the potential to result in harm to fish. This section describes the impacts, mitigation measures and residual effects expected as a result of the project, and specifically culvert repair or replacement.

4.6.1 Impacts

Culvert repair and replacement works have the potential to affect fish and fish habitat through:

- Temporary and permanent changes to hydrology as previously discussed.
- Change in water quality during the project from the release of deleterious substances or sediments.
- Physical impalement of fish from construction equipment.
- Permanent change in substrate type and location.
- Removal of barriers to fish passage.
- Permanent and temporary alteration in riparian cover.

4.6.2 Mitigation Measures

The works shall be performed in accordance with the following mitigation measures:

- All works shall be conducted in accordance with the mitigation measures outlined in Standards and Best Practices for Instream Works, 2004.
- A qualified environmental monitor shall be onsite for any works located in or within 30 meters of a watercourse.
- The monitor shall have a pre-construction meeting with work crews prior to construction.
- All works shall be conducted incompliance with the following water quality standards:
  - Change from background of 8 NTU at any one time for a duration of 24 hours in all waters during clear flows or in clear waters.
  - Change from background of 2 NTU at any one time for a duration of 30 days in all waters during clear flows or in clear waters.
  - Change from background of 5 NTU at any time when background is 8–50 NTU during high flows or in turbid waters.
  - Change from background of 10% when background is >50 NTU at any time during high flows or in turbid waters.
- Machinery shall use environmentally safe biodegradable oil in all equipment during any works in and around a stream.
- Use sand bags or clean crush to create check dams on side ditches that may collect sediment laden waters during the works.
- Contractor shall ensure that equipment is steam cleaned, free of soil and seed from previous projects to prevent site contamination.
- The contractor shall ensure equipment is in good working order to minimize risk of hydraulic line failure.
- The contractor shall inspect equipment on a regular basis to minimize risk of hydraulic failure.
- The tracks of construction equipment shall not be permitted in the wetted channel of any watercourse.
- Riparian vegetation within 30 m of a watercourse shall be maintained wherever possible except as required to perform culvert replacement activities, in which case only the minimal disturbance area shall be impacted, and the area shall be restored (see Section 4.4).
- Works shall not be conducted during periods of extreme rainfall, defined as over 25mm in a 24-hour period, unless appropriate measures are in place to ensure compliance with water quality standards.
- Install fish exclusion nets upstream and downstream of the work site prior to construction. Maintain fish exclusion nets throughout any instream works.
- Fish and amphibian salvage shall occur prior to the commencement of any in-water works. All permits shall be obtained to salvage fish and amphibians. Fish and amphibians shall be relocated to a suitable location. Use electroshocking as a last resort as this can have adverse effects on amphibians.

- Do not wash equipment in or within 30 m of a watercourse.
- Do not dispose of any deleterious substances into any watercourse.
- Record any fish observations, which will be required as part of the DFO permitting.
- Perform permitted fish (and amphibian) capture and relocation efforts prior to performing instream works. Methodology to be determined by a Qualified Environmental Professional (QEP) and shall consider existing species and time of year.
- The contractor must have an acceptable spill response plan that will be executed in a timely fashion in the unlikely event of a spill.
- All equipment must be fitted with spill kits.
- Any rip rap used must not be acid drainage rock.
- The contractor must have an emergency response plan in place. Any contractors on site must be familiar with the plan and must execute the plan if required.
- Areas of excavation and exposed sediments shall be isolated from water flow.
- Erosion and sediment control plan must be created and measures shall be installed and regularly inspected during the works.
- Any riprap shall be clean material free of excess fines.
- All exposed areas shall be seeded upon completion of stripped soil material/chip compost placement.
- There shall be no refuelling within 30 m of a streams, wetlands, water bodies or waterways.
- Inwater works shall be performed during the least risk windows for fish as described in the table below.
- Stop works immediately if any works appear to be in contravention of the *Fisheries Act, or if* so directed by the environmental monitor or a fisheries officer.
- Ensure the site is left in a clean condition free of any anthropogenic materials.
- Take care to retain existing features that have value to fish including large woody debris.
- Report any killing of fish to DFO immediately.
- Document site activities while working around fish habitat to demonstrate that BMPs and mitigation measures were followed if audited by DFO.
- Ensure this Environmental Impact Assessment and construction plans are onsite incase requested by a Fisheries Officer.
- Notify the environmental monitor if any construction activities appear to be having an adverse impact on fish or fish habitat that are not identified in this assessment.
- If the requirements listed under Section 3 of this Environmental Impact Assessment (Fisheries Act Requirements) cannot be met, a project review will be required by DFO. All works must stop until such time that DFO is satisfied that the project may proceed and all DFO requirements will supersede this assessment.

Table 11 Reduced Risk Work Windows for Fish and Wildlife Vancouver Island

Location	Species	Reduced Risk Work Window	
		Start Date	Finish Date
Throughout	Steelhead	June 15	September 15
Throughout	Cutthroat Trout	August 15	September 15
Throughout	Chinook Salmon	July 15	September 15
Throughout	Chum Salmon	May 15	September 15
Throughout	Coho Salmon	June 15	September 15
Throughout	Pink Salmon	May 1	August 15
Throughout	Sockeye Salmon	June 1	August 15
Throughout	Kokanee	June 1	August 15

4.6.3 Residual Effects

The following residual effects may occur:

- Construction activities have the potential to create temporary disturbances through the release of fines and potential for spills from construction equipment. Provided the recommended mitigation measures are implemented properly, the effect of these disturbances can be minimized and no long term or residual effects are anticipated.
- The removal of barriers to fish passage is considered a benefit to fish.
- Changes to substrate types are expected to be minor (placement of riprap at mouth of culverts) and not expected to significantly change fish habitat use of the site.
- Changes to riparian cover will have temporary adverse effects and, provided the correct plant species are planted, benefits to fish.

With the use of the prescribed mitigation measures, residual effects should be minimal. Adverse residual effects are anticipated to be not significant provided the recommended mitigation measures are implemented.

4.7 Marine Shorelines

Works within a watercourse that discharges to the marine environment, or works on a highway in close proximity to the marine environment has the potential to impact sensitive species common to marine shorelines. This section describes the potential impacts, mitigation measures and residual effects expected from the project.

4.7.1 Impacts

While the works will not occur in the marine environment, the following impacts have the potential to occur:

- The culvert replacement works will be performed along creeks which discharge into the marine environment. Several of these discharges are visible on aerial photos. Silt may be flushed onto the beach. A number of species at risk located within the vicinity of the works are located along the riparian fringe of the marine shoreline.
- Trampling of sensitive plant species by construction crews could occur in areas where the road is near the marine shoreline.

4.7.2 Mitigation Measures

In order to mitigate impacts to the existing shoreline and marine environment, the following mitigation measures should be implemented:

- All works shall be conducted in compliance with the BC Water Quality Guidelines (see Fish and Fish Habitat Section).
- Utilize the current footprint to limit off-site sedimentation of construction fines and materials.
- Work crews will avoid trampling species at risk located along the marine shoreline. This will be identified by a QEP prior to construction works and outside the delineated work zone.
- Ensure works are isolated to the existing roadway except where culvert replacement is required.
- Ensure that appropriate measures to protect water quality are implemented.

4.7.3 Residual Effects

Minor deposition of fines may occur on dune and sand beach habitats. Fines will be removed by the tide. With the implementation of the prescribed mitigation measures, potential adverse residual effects are expected to be not significant.

4.8 Wildlife and Wildlife Habitat

Forest extent and condition are expected to support suitable habitat for several species of wildlife [northern goshawk (*Accipiter gentilis laingi)*, marbled murrelet, black bear, gray wolf, cougar, river otter {*Lontra Canadensis)]*. In the PRNPR, suitable nesting habitat for marbled murrelets is mostly found within the old-growth coniferous stands that contain large diameter tall trees with dense canopy cover. This section describes the impacts, mitigation measures and residual effects associated with the project.

4.8.1 Impacts

The potential impacts to wildlife and wildlife habitat include disturbance to birds, amphibians and small mammals through removal of vegetation, and the use of noisy or heavy equipment during construction works. It is anticipated that clearing of vegetation will affect mostly young trees or saplings and will likely be restricted to within the delineated work zone; therefore, the effects on the vegetation community are anticipated to be minimal. Impacts to wildlife and wildlife habitat that may occur during the project include:

- Generation of noise and vibration from equipment and activities.
- Changes to substrate types are expected to be minor (placement of riprap at mouth of culverts).
- Loss or change in vegetation through minor clearing within delineated zones.
- Changes to freshwater hydrology from stream isolation, potential dewatering or sediment input to the streams.

4.8.2 Mitigation Measures

To mitigate the impacts of the works on Wildlife and Wildlife Habitat, the following mitigation measures are recommended:

- Ensure that applicable best practices, mitigation strategies and responsibilities are identified and understood by all contractors involved in the Project in advance of the commencement of works.
- The use of noisy machinery or loud activities shall not occur during the breeding window of March 1–August 31. If works are proposed during the nesting window, a survey should be conducted to confirm absence of active bird nests.
- Any vegetation that will be removed will be inspected to ensure that no nests are present.
- Changes to hydrology must ensure standing water areas are maintained or replicated if amphibians are present.
- If fish/amphibians are expected to be present, have a qualified environmental monitor conduct a fish/amphibian capture and relocation program prior to conducting instream works to reduce the impact to wildlife/species at risk.
- Works shall be stopped if any wildlife appears to be in distress as a result of noise or other disturbances form the proposed works.
- Food/garbage shall be managed so as not to attract wildlife to the site.
- Allow at least 30 m of space between construction crews and birds/wildlife foraging and resting.

Provincial guidelines and BMPs applicable to this project and that will be implemented where appropriate for the protection of wildlife and their habitats are:

- Best Management Practices Guidelines for Pacific Water Shrew In Urban And Rural Areas. Working Draft: http://www.env.gov.bc.ca/wld/documents/recovery/rcvrystrat/pacific_water_shrew_rcvry_strat040609.pdf
- Guidelines for Amphibians and Reptile Conservation during Urban and Rural Land Development in British Columbia (2014): http://www.env.gov.bc.ca/wld/documents/bmp/HerptileBMP_complete.pdf
- COSEWIC Assessment and Status Report on the Oregon Forestsnail: http://www.sararegistry.gc.ca/virtual_sara/files/cosewic/sr_oregan_forestsnail_e.pdf
- Guidelines for Raptor Conservation during Urban and Rural Land Development in British Columbia (2013) http://www.env.gov.bc.ca/wld/documents/bmp/raptor_conservation_guidelines_2013.pdf
- Develop with Care 2014: Environmental Guidelines for Urban and Rural Land Development in British Columbia http://www.env.gov.bc.ca/wld/documents/bmp/devwithcare/
- Develop with Care, Appendix G Fact Sheets
- Fact Sheet 3 – Linear Developments (PDF 1.66MB)
- Fact Sheet 10 – Bald Eagles and Ospreys (PDF 1.63MB)
- Fact Sheet 11 – Herons (PDF 1.69MB)
- Fact Sheet 12 – Screech-Owl (PDF 1.88MB)
- Fact Sheet 13 – Western Toad (PDF 1.62MB)
- Fact Sheet 14 – Red-legged Frog (PDF 1.27MB)
- Fact Sheet 20 – Pacific Water Shrew (PDF 1.28MB)
- Standards and Best Management Practices for Instream Works, March 2004: http://www.env.gov.bc.ca/wld/documents/bmp/iswstdsbpsmarch2004.pdf

4.8.3 Residual Effects

Minor disturbances from noise may occur from project activities which cause wildlife to avoid the areas were works are occurring. With the use of the prescribed mitigation measures, residual effects should be minimal. Potential adverse residual effects are anticipated to be not significant provided the recommended mitigation measures are implemented.

4.9 Rare and Endangered Species

Rare and endangered species exist within the Pacific Rim National Park and have been identified throughout this report. This section describes the potential effects, mitigation measures and residual effects expected on rare and endangered species as a result of this project.

4.9.1 Potential Effects

Potential effects of the project on species at risk may include:

- Generation of noise and vibration from equipment and activities.
- Changes to substrate types are expected to be minor (placement of riprap at mouth of culverts).
- Loss or change in vegetation through minor clearing within delineated zones.
- Changes to freshwater hydrology from stream isolation, potential dewatering or sediment input to the streams.

4.9.2 Mitigation

To prevent harm to Species at Risk, the following mitigation strategies are recommended:

- Ensure that applicable best practices, mitigation strategies and responsibilities are identified and understood by all contractors involved in the Project in advance of the commencement of works.
- A pre-construction survey of any in-stream works must be completed prior to construction to determine if species at risk are present in the watercourse.
- Use as much of the current footprint as possible to reduce disturbance.
- Use a qualified environmental monitor, as required, to assess the effectiveness of mitigation strategies and best practices, and the on-going potential for harm to species of concern.
- Environmental monitors will have the authority to stop work when necessary to prevent harm to species at risk
- Clearing should be conducted outside of the breeding bird window (March 1–September 30). If works are proposed during the nesting window, a survey should be conducted to confirm absence of active ground nests.
- Changes to hydrology must ensure standing water areas are maintained or replicated if amphibians are present.
- If fish/amphibians are expected to be present, have a qualified environmental monitor conduct a fish/amphibian capture and relocation program prior to conducting instream works to reduce the impact to wildlife/species at risk.
- If provincially and/or federally listed plant or wildlife species are found within a proposed disturbance area, a management plan should be developed that protects the location while it is active or occupied or can be relocated to adjacent habitat. Where a recovery strategy has been developed for that species, the protocol will be followed. Where it is not possible to relocate the species to an adjacent similar habitat, it and its habitat will be protected indefinitely by redesign of road works.
- Provincial guidelines and BMPs applicable to this project, that will be implemented where appropriate for the protection of SAR and their habitats, are those listed in Section 4.8.2.

4.9.3 Residual Effects

Minor disturbances from noise may occur from project activities which cause wildlife to avoid the areas were works are occurring. With the use of the prescribed mitigation measures, residual effects should be minimal. Potential adverse significant effects are anticipated to be not significant provided the recommended mitigation measures are implemented.

4.10 Effects of the Environment on the Project

Environmental factors that could potentially affect the Project include extreme weather, seismic activity and tsunamis, and climate change and sea level rise.

4.10.1 Extreme Weather

Extreme weather events may include excessive fog, rainfall, snowfall, wind, or thunderstorms.

- Fog can reduce site safety and productivity. Fog is a regular occurrence in the park.
- Extreme rainfall events (25mm in a 24 hour period) can result in project shutdowns and project delays. Extreme rainfall is a regular occurrence in the park.
- Snowfall can cover construction sites and make it difficult to perform the work in an environmentally sound manner. Snowfall occurrences are limited to the winter months.
- Extreme winds can cause unsafe working conditions through windthrow. Extreme wind events are common in the park during the winter months.
- Thunderstorm events may cause forest fires which can be a safety hazard. Thunderstorms are not common in the park.

4.10.2 Seismic Activity

The Cascadia Subduction Zone runs offshore from somewhere near the top of Vancouver Island to northern California. Over the duration of the project, the risk of an earthquake occurring is expected to be low. Impacts to the project may include the creation of a Tsunamis, tree fall, loss of power, and restricted site access. Such an event could result in project delays.

4.10.3 Tsunamis

The west coast of Vancouver Island is a high risk area for Tsunamis. According to a paper entitled *Tsunami Hazard and Risk in Canada* by Clague et.al 2001, wave run-up of 1–15 metres can be expected, although areas along the outer coast would experience less run-up than areas within an inlet. Portions of Highway 4 are located less than 10 metres in elevation above high tide and potentially could be flooded during a Tsunamis.

4.10.4 Climate Change and Sea Level Rise

The moderate, maritime climate includes cool, foggy summers and mild but dramatically wet winters with dark clouds, intense windstorms. The average summer temperature is 14°C. An abundance of life is due to an average annual precipitation of 330 cm with heavy rainfall at any time and frequently in May and June. Floodwaters and fog are commonly occurring, especially in July and August. Forest fires are rare due to the mild, wet climate, and abundant moisture retained within the soil and debris.

As this assessment is focusing primarily on construction, climate change will occur at a rate that will not affect the project.

4.11 Summary of Environmental Effects

There are a number of potential project effects that have been considered during this assessment. The contributing physical works range from paving activities to culvert replacement. Proven best management practices and mitigation measures have been identified for each potential project effect and the left over residual effects are, in general, short lived and low in magnitude. A summary of associated residual effects for each VEC is presented in Table 12 below.

Table 12 Summary of Activities Associated with Residual Effects on VECs

VEC	Potential Project Effect	Contributing Physical Works	Proposed Mitigation	Residual Effect
Air Quality	Emissions from machinery	Paving activities, culvert replacement	Reduce vehicle idling, use vehicles that emit less emissions, follow BMPs.	Release of greenhouse gasses
Noise	Noise from machinery	Paving activities, culvert replacement	Avoid work during nesting period, perform preconstruction nest survey, follow BMPs.	Wildlife avoid construction site.
Soil	Contamination of soil from machinery or asphalt	Paving activities, culvert replacement	Maintain and inspect equipment, ensure no deleterious substances released from site, follow BMPs.	None
Plant Communities	Removal of plants	Paving activities, culvert replacement	Minimize disturbance, replant disturbed areas, follow BMPs.	Temporary loss of function
Marine Shoreline	Deposition of fines from watercourses running through sites	Paving activities, culvert replacement	Isolate work site from flow, follow BMPs.	Short lived minor turbidity

VEC	Potential Project Effect	Contributing Physical Works	Proposed Mitigation	Residual Effect
Freshwater Hydrology	Deposition of fines in watercourse	Culvert replacement	Retain hydraulic properties from site as best practically possible.	Minor change in hydrology
Fish and Fish Habitat	Deposition of fines in watercourse	Culvert replacement	Isolate work site from flow, perform fish salvage, implement an erosion and sediment control plan, follow BMPs.	Minor turbidity, temporary isolation from site, small change in substrate type.
Wildlife and Wildlife Habitat	Noise from machinery	Paving activities, culvert replacement	Avoid work during nesting period or perform preconstruction nest survey, follow BMPs.	Temporarily avoid construction site.
Species at Risk	Change in noise, soil, plant communities, marine shoreline, hydrology, fish habitat, wildlife habitat.	Paving activities, culvert replacement	Follow BMPs, develop management strategies if required.	None

The residual environmental effects of the Project provided in this environmental impact assessment have been determined, in general, to be low in magnitude, Site-specific, short-term and reversible. Overall, there is not anticipated to be significant environmental effects from the Project on the environment.

An analysis has been performed comparing each VEC to the direction (positive or negative), magnitude, geographic extent, duration, frequency, reversibility, significance and likelihood of constituting adverse environmental effects:

- All VECS identified were determined to be adverse because they are not a benefit to the environment, with the exception of improvements to fish passage from culvert works.
- The majority of VECS were low in magnitude with the exception of residual effects to plant communities and freshwater hydrology which had a moderate residual magnitude. Plants take time to re-establish and minor changes to hydrology can have a large effect on species that use the watercourse.
- The geographic extent of the majority of VECs were local (extending beyond the project footprint) with the exception of soil substrate and plant communities which were site specific only. Most of the VECs extend beyond the project footprint but are a reasonable distance from the site.
- The duration of most VECs is short term with the exception of soil substrate and plant communities which were medium-term. Vegetation can take a while to grow back and changes to soil occur over a longer time frame.

- The frequency of most VECs was assessed as being once (minimal), with the exception of air quality and noise, which will occur sporadically throughout the project, depending on when equipment is being used.
- It is our opinion that the potential residual effects from the Project on VECs will not be permanent, nor is the Project likely to cause adverse environmental effects that are significant, assuming mitigation measures, such as pre-construction field surveys, are conducted appropriately.

Table 13 Summary of Project Residual Effects on VECs

VEC Residual Effect	Characterization of Residual Effects								Monitoring Recommendations
	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Significance	Likelihood	
Air Quality	A	L	L	ST	S	R	N	L	Ensure equipment is maintained.
Noise	A	L	L	ST	S	R	N	L	Perform pre-construction survey
Soil Substrate	A	L	S	MT	O	R	N	L	Ensure equipment is inspected.
Plant Communities	A	M	S	MT	O	R	N	L	Perform pre-construction survey. Avoid or reduce clearing
Marine Shoreline	A	L	L	ST	O	R	N	L	Follow BMPs, keep construction crews off marine shoreline.
Freshwater Hydrology	A	M	L	ST	O	R	N	L	Ensure water flow speeds and amount of standing water does not change significantly.
Fish and Fish Habitat	A	L	L	ST	O	R	N	L	Fish salvage, ensure fish isolated from works, work in dry as much as possible, and monitor works.
Wildlife and Wildlife Habitat	A	L	L	ST	O	R	N	L	Perform pre-construction survey. Delineate work area.
Species at Risk	A	L	L	ST	O	R	N	L	Perform pre-construction survey Delineate work area.

Note: Refer to Table 10 for definitions.
Direction: P=Positive; N=Neutral; A=Adverse
Magnitude: L=Low; M=Moderate; H-High
Geographic Extent: S=Site-specific; L=Local; R=Regional
Frequency: O=Once; S = Socratic; R=Regular; C=Continuous
Duration: S=Short-term; M=Medium-term; L=Long-term
Reversibility: R=Reversible; I=Irreversible
Significant: Y=Yes, N=No

5. CUMULATIVE ENVIRONMENTAL EFFECTS

Cumulative effects are changes to the environment that are caused by an action in combination with other past, present and future human actions. Previous construction projects located within the Park have included:

- In 1959 Highway 4 was constructed providing access to Long Beach.
- In 1972, Highway 4 was paved.
- In 1984, highway upgrades included grade improvements, replacement of the majority of the culverts, and paving occurred on Highway 4.
- In or around 2007, restoration of streambeds and shorelines of Sandhill and Lostshoe creeks.

Future projects located within the Park are anticipated as follows:

- The remaining culverts will need to be replaced in 10–20 years.
- The new highway overlay will last 20–25 years.
- It is unlikely that additional highways will be constructed through the park.

The works will be reoccurring on a 20–30 year cycle. The type of works involve repairs to an existing highway with no permanent changes proposed. Residual effects associated with the project were determined to be minimal. The project is located in a protected park; therefore, major development projects that may contribute to cumulative effects are expected to be managed and minimal.

Overall, due to the lack of permanent changes associated with highway repairs, the lack of future projects anticipated, special separation between highway repair projects, and the expectation of minimal residual effects, cumulative effects associated with the Project are anticipated to be not significant.

6. ENVIRONMENTAL PROTECTION PLAN (EPP) FOR CONSTRUCTION

Adequate environmental mitigation requirements will be included in the tender specification for the Highway 4 Repair project such that the selected contractor will be able to develop an effective environmental protection plan (EPP) in accordance with Section 01 35 43 – Environmental Procedures of the Detailed Design Report. The report will be used as a basis of mitigation measures that will be followed to determine compliance during project work.

6.1 General Construction Monitoring

A monitor should be present during Project works to provide recommendations, and report on the implementation of the preceding mitigation measures and requirements under applicable permits and approvals, in order to minimize impacts to environmental values. The monitor will assess the effectiveness of the mitigation measures proposed during routine monitoring and confirm that work is being conducted in compliance with the project EPP.

The overall objectives of the monitoring program are protection of aquatic species and their habitats, general oversight of works conducted in and around water specifically at project locations where culverts are being repaired or replaced, ensuring that mitigation measures are being appropriately applied and are effective, documenting and responding to environmental emergencies and concerns (including follow up reporting as applicable), and providing records and reports to PWGSC.

The general responsibilities of the environmental monitor will include:

- Confirming that the environmental measures, controls, and specifications are correctly implemented, as per the terms and conditions of regulatory permits and approvals.
- Monitoring works to evaluate and report on compliance with permits and approvals issued for the Project and reporting back to PWGSC.
- Providing guidance to PWGSC on environmental matters within the scope of the Project, and recommendations to PWGSC for modifying and/or improving environmental mitigation measures as necessary.
- Documentation of construction activities with field notes and a photographic log.
- Recommending to PWGSC that construction activities should be suspended if they are causing, or have the potential to cause, environmental damage.
- Preparing environmental monitoring summary reports, which summarizes the above activities.
- Measuring of water quality parameters (e.g., turbidity, pH, and total suspended solids) to determine compliance with BMPs and project requirements.

6.1.1 Pre-clearing Surveys

Vegetation surveys should be completed prior to construction activities where minor clearing may be required, specifically where sensitive habitats have been documented, prior to the commencement of project activities. The limits of disturbance (buffer zones/delineated work zones) to sensitive habitats (particularly around culverts that are scheduled to be repaired or replaced) will be clearly delineated in the field to ensure that no additional disturbance occurs as a result of the proposed works. It is not anticipated that extensive vegetation clearing will be required along the project alignment as the majority of the project will occur along the existing footprint of Highway 4.

Environmental Monitor Qualifications:

The environmental monitor should be familiar with local vegetation, habitat and wildlife, particularly in areas that have been identified as sensitive areas along the project alignment. The monitor should be trained and familiar with species at risk and sensitive wildlife, such as breeding birds, that may be present within construction areas. A qualified environmental monitor may be required to conduct pre-clearing bird nest surveys.

6.1.2 Instream Works Monitoring

It is anticipated that some instream works will be required for culverts that have been identified as requiring repair or complete replacement. The environmental monitor will conduct full time monitoring during instream works to confirm compliance with best management practices for working instream. The environmental monitor may conduct instream works sampling, as needed, for stormwater run-off and water that may be affected from construction occurring instream. Where needed, water quality will be tested for potential contaminants and the results compared to the British Columbia Water Quality Guidelines (BCWQG).

The BCWQG include the following freshwater turbidity criteria for sustained aquatic life:

- Change of 8 Nephelometric Turbidity Units (NTU) from any one background measure for a period of 24 h in all waters during clear flows or in clear waters.
- Change of 2 NTU from any one background measure for a duration of 30 days in all waters during clear flows or in clear waters.
- Change of 5 NTU at any time when background ranges from 8 NTU to 50 NTU during high flows or in turbid waters.
- Change of 10% when background is >50 NTU at any time during high flows or in turbid waters.

Environmental Monitor Qualifications:

When work is occurring instream or within the vicinity of an identified watercourse, an environmental monitor should be monitoring work full time. A QEP should be proficient in in situ water quality sampling and familiar with the BCWQG for freshwater life. The environmental monitor should be capable of identifying wildlife, specifically species at risk that may be present within watercourses and be proficient in identifying fish and/or fish potential.

6.1.3 Culvert Repair and Replacement Monitoring

All culvert repairs and replacements shall be installed using BMPs for working instream, and ensure culvert replacement is done by minimizing the amount of sedimentation and damage to the riparian areas of the watercourse. The culverts shall be installed using best management practices for placement, including consideration of aquatic ecology. An environmental monitor should be present to provide guidance and recommendations based on site observations and conditions to limit disturbance to the existing environment.

Environmental Monitor Qualifications:

A qualified environmental monitor should be available during culvert replacements and repairs in and around watercourses and identified fish habitat. An environmental monitor should be trained in the identification of fish species and be qualified to perform a fish/amphibian salvage if required.

6.1.4 Asphalt Resurfacing Monitoring

Prior to Highway 4 re-surfacing, work limits and paving areas will be delineated to ensure trespass and migration of construction materials does not occur. The following are proactive measures that can be implemented prior to and during asphalt paving:

- Prevent any deleterious materials associated from migrating off-site or into streams, rivers, wetlands or watercourses by providing an appropriate storage area for equipment and materials related to asphalt resurfacing work.
- Provide appropriate containment for asphalt and concrete during rain events and during transport.
- Provide containment berms for asphalt containment and catchment areas.

Environmental Monitor Qualifications:

The qualified environmental monitor should be trained in best management practices for road work and be familiar with highway paving projects. This includes the ability to provide recommendations for appropriate storage locations for asphalt and materials, handling procedures and cleanup.

6.1.5 Erosion and Sediment Control Monitoring

The following are proactive ESC measures than can be implemented prior to commencing construction activities and can be implemented in anticipation of heavy rainfall:

- Install silt fencing along watercourse and along sensitive areas to prevent Site runoff from disturbing or entering sensitive areas.
- Protect un-used stockpiles with polyethylene sheeting.

- Confirm that CBs located within, and downstream of the construction zone, have been fitted with filter protection.
- In response to a heavy rain event, the environmental monitor shall confirm ESC devices are checked for effectiveness and replaced/re-installed as required.

Environmental Monitor Qualifications:

The qualified environmental monitor shall be versed in erosion and sediment control devices and be competent in monitoring the effectiveness of erosion and sediment control during works specific to this project. The monitor should be capable of making recommendations to enhance and improve erosion and sediment control measures throughout the course of project work.

6.2 Best Management Practices

BMPs have been developed for a large number of industries, and for environmentally sensitive activities by both industry associations and government agencies. As these BMPs are so numerous and are being updated on a continuous basis, only a few have been included for reference in this document. For additional BMPs, It is recommended that contractors contact their suppliers and, if applicable, their respective associations for current BMPs relevant to their particular field or activity.

The following are BMPs that may apply during Highway 4 re-surfacing works:

- Develop with Care – Environmental Guidelines for Urban and Rural Land Development in British Columbia, provides a comprehensive set of guidelines and BMPs (e.g., Fuel Handling, Transportation and Storage Guidelines), 2014.
- DFO Land Development Guidelines for the Protection of Aquatic Habitat, 1993.
- Provincial MOE Standards and Best Management Practices for Instream Works, 2004.
- Environmental Best Management Practices for Highway Maintenance Activities, 2010.

6.3 Environmental Reporting Requirements

As part of the detailed work plan, progress reports shall be provided to PWGSC by the monitor on a weekly basis. Reports will include observed work, location of work and any recommendations, response to environmental emergencies and concerns (including follow up reporting as applicable).

7. PERMITTING REQUIREMENTS

BC Wildlife Act

- A *Wildlife Act* sundry permit will be required for amphibian capture and relocation during any instream works.
- A *Wildlife Act* fish collection permit will also be required for the capture and relocation of fish during instream works.

Federal Fisheries Act

- A fish collection permit must be obtained from Fisheries and Oceans Canada (DFO) prior to conducting any fish capture and relocation activities during instream works.

8. CONCLUSIONS

This assessment has been completed without performing a field reconnaissance visit and without consulting First Nations. The limitations of information for site-specific concerns from a desktop review should be considered by anyone relying on this report for a full assessment of effects. Pre-construction field surveys will provide valuable information not available at this time and, depending on the results of those field surveys, management strategies may need to be developed. In addition, pre-construction surveys may reveal that fish or fish habitat are not actually present at culvert locations, which would reduce the level of effort required to ensure compliance with the federal *Fisheries Act*.

Based on the information available, and limited by the scope of work, the following conclusions are made:

- A number of potential impacts have been identified throughout this Environmental Impact Assessment. These conditions may change based on actual site conditions.
- The implementation of Best Management Practices and mitigation measures is critical to ensuring compliance with this Environmental Impact Assessment, and relevant Acts and Regulations that apply to these works. Failure to comply with the mitigation measures prescribed may result in residual effects that are significant.
- Provided mitigation measures are implemented successfully, residual effects were assessed as being low to nil on a temporal and spatial scale.
- Cumulative effects are minor given that the project involves repair works only.

Statement of Significant Effects

With the implementation of the recommended Best Management Practices and mitigation measures, it is our opinion that:

X Works can be completed without significant adverse environmental effects, provided all mitigation measures are successfully implemented.

___ Works cannot be completed without significant adverse environmental effects, even with the successful implementation of all mitigation measures.

It is our recommendation that works be allowed to proceed, pending the implementation of recommendations provided. This assessment does not relieve the proponent from any obligations to secure permits or approvals associated with this Project.

9. PROFESSIONAL STATEMENT

Findings presented in this environmental assessment are based upon (i) reviews of available documentation and discussions with available personnel and regulatory representatives, (ii) review of available records and the terms and conditions for the planned activities. Consequently, while conclusions and recommendations documented in this report have been prepared in a manner consistent with that level of care and skill normally exercised by other members of the environmental science and engineering profession, practising under similar circumstances in the area at the time of the performance of the work, this report is intended to provide information and to suggest mitigation strategies to reduce, but not necessarily eliminate, the potential for environmental impacts to occur as a result of planned activities in the Study Area. This management plan is meant to be a living and flexible document that can be used to provide guidance regarding appropriate management of species.

This environmental assessment has been prepared solely for the internal use of Public Works and Government Services Canada on behalf of Parks Canada Agency, and federal agencies providing expert advice to the project pursuant to the agreement between Keystone Environmental Ltd. and Public Works and Government Services Canada. Any use which other parties make of this report, or any reliance on or decisions made based on it, are the responsibility of such parties. Keystone Environmental Ltd. accepts no responsibility for damages, if any, suffered by other parties as a result of decisions made, or actions based, on this report.

December 31, 2014
Date

Original signed by

Billi Gowans, B.Sc., M.R.M., R.P. Bio.
Senior Ecologist

Original signed by

Warren Appleton, B.Sc., R.P.Bio
Terrestrial Biologist

Original signed by

Kyla Bryant, B.Sc., B.I.T
Field Technician

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APPENDIX A

FIGURE

LEGEND

- HIGHWAY 4 REPAIR PROJECT AREA
- PACIFIC RIM NATIONAL PARK RESERVE
- CULVERT LOCATIONS
- HIGHWAY 4
- WATERCOURSE

BC CDC - SPECIES OCCURRENCES

- ANIMAL
- PLANT

Keystone Environmental

NOTES:
1) THIS DRAWING IS FOR GENERAL INFORMATION ONLY. LOT BOUNDARIES AND FEATURES ARE APPROXIMATE.
2) BASE MAP PROVIDED BY NATURAL RESOURCES CANADA TOPORAMA WEB MAP SERVICES (2013).

1 0 1 2 3 4 5 km

SCALE: 1:75,000

Highway 4 Repair Project
Pacific Rim National Park, B C
PWGSC

REVISION No.	DATE	PROJECT No.
00	Nov. 2014	12345-01

Figure 1
Documented Species at Risk Observations

DRAWN BY: JM Document Path: I:\12300-12399\12345\Figs\12345-Fig1-Species Observations-R0.mxd

APPENDIX B

SPECIES AT RISK

Table B-1 Species at Risk in the South Island Forest District, Coastal Western Hemlock Biogeoclimatic Zone

Common Name	Scientific Name	COSEWIC Status	SARA Status	BC List
Amphibians				
Northern Red-legged Frog	*Rana aurora*	SC (Nov 2004)	1-SC (Jan 2005)	Blue
Wandering Salamander	*Aneides vagrans*	SC (May 2014)		Blue
Western Toad	*Anaxyrus boreas*	SC (Nov 2012)	1-SC (Jan 2005)	Blue
Reptiles				
Painted Turtle	*Chrysemys picta*	E/SC (Apr 2006)	1	
Gopher Snake	*Pituophis catenifer catenifer*	XT (May 2012)	1-X (Jan 2005)	Red
Painted Turtle	*Chrysemys picta pop. 1*	E (Apr 2006)	1-E (Dec 2007)	Red
Sharp-tailed Snake	*Contia tenuis*	E (Nov 2009)	1-E (Jun 2003)	Red
Birds				
Brandt's Cormorant	*Phalacrocorax penicillatus*			Red
Common Murre	*Uria aalge*			Red
Horned Lark	*Eremophila alpestris strigata*	E (Nov 2003)	1-E (Jul 2005)	Red
Northern Goshawk	*Accipiter gentilis laingi*	T (Apr 2013)	1-T (Jun 2003)	Red
Peregrine Falcon	*Falco peregrinus anatum*	SC (Apr 2007)	1-SC (Jun 2012)	Red
Vesper Sparrow	*Pooecetes gramineus affinis*	E (Apr 2006)	1-E (Dec 2007)	Red
American Bittern	*Botaurus lentiginosus*			Blue
Band-tailed Pigeon	*Patagioenas fasciata*	SC (Nov 2008)	1-SC (Feb 2011)	Blue
Barn Owl	*Tyto alba*	T (Nov 2010)	1-SC (Jun 2003)	Blue
Barn Swallow	*Hirundo rustica*	T (May 2011)		Blue
Brant	*Branta bernicla*			Blue
Caspian Tern	*Hydroprogne caspia*	NAR (May 1999)		Blue
Cassin's Auklet	*Ptychoramphus aleuticus*			Blue
Double-crested Cormorant	*Phalacrocorax auritus*	NAR (May 1978)		Blue

Common Name	Scientific Name	COSEWIC Status	SARA Status	BC List
Great Blue Heron	*Ardea herodias fannini*	SC (Mar 2008)	1-SC (Feb 2010)	Blue
Green Heron	*Butorides virescens*			Blue
Marbled Murrelet	*Brachyramphus marmoratus*	T (May 2012)	1-T (Jun 2003)	Blue
Northern Pygmy-Owl	*Glaucidium gnoma swarthi*			Blue
Olive-sided Flycatcher	*Contopus cooperi*	T (Nov 2007)	1-T (Feb 2010)	Blue
Peregrine Falcon	*Falco peregrinus pealei*	SC (Apr 2007)	1-SC (Jun 2003)	Blue
Purple Martin	*Progne subis*			Blue
Short-eared Owl	*Asio flammeus*	SC (Mar 2008)	1-SC (Jul 2012)	Blue
Sooty Grouse	*Dendragapus fuliginosus*			Blue
Tufted Puffin	*Fratercula cirrhata*			Blue
Western Screech-Owl	*Megascops kennicottii kennicottii*	T (May 2012)	1-SC (Jan 2005)	Blue
Common Nighthawk	*Chordeiles minor*	T (Apr 2007)	1-T (Feb 2010)	
Peregrine Falcon	*Falco peregrinus*	SC (Apr 2007)		
Western Screech-Owl	*Megascops kennicottii*	T (May 2012)	1	
Mammals				
American Water Shrew	*Sorex palustris brooksi*			Red
Wolverine	*Gulo gulo vancouverensis*	SC (May 2014)		Red
Ermine	*Mustela erminea anguinae*			Blue
Keen's Myotis	*Myotis keenii*	DD (Nov 2003)	3 (Mar 2005)	Blue
Roosevelt Elk	*Cervus elaphus roosevelti*			Blue
Steller Sea Lion	*Eumetopias jubatus*	SC (Nov 2013)	1-SC (Jul 2005)	Blue
Townsend's Big-eared Bat	*Corynorhinus townsendii*			Blue
Little Brown Myotis	*Myotis lucifugus*	E (Nov 2013)		
Wolverine	*Gulo gulo*	SC (May 2014)		

Common Name	Scientific Name	COSEWIC Status	SARA Status	BC List
Invertebrates				
Audouin's Night-stalking Tiger Beetle	*Omus audouini*	T (Nov 2013)		Red
Blue-grey Taildropper	*Prophysaon coeruleum*	E (Apr 2006)	1-E (Dec 2007)	Red
Common Ringlet	*Coenonympha tullia insulana*			Red
Common Wood-nymph	*Cercyonis pegala incana*			Red
Dromedary Jumping-slug	*Hemphillia dromedarius*	T (May 2014)	1-T (Jan 2005)	Red
Dun Skipper	*Euphyes vestris*	T (Apr 2013)	1-T (Jun 2003)	Red
Edith's Checkerspot	*Euphydryas editha taylori*	E (May 2011)	1-E (Jun 2003)	Red
Edwards' Beach Moth	*Anarta edwardsii*	E (Apr 2009)	1-E (Feb 2011)	Red
Greenish Blue	*Plebejus saepiolus insulanus*	E (May 2012)	1-E (Jun 2003)	Red
Johnson's Hairstreak	*Callophrys johnsoni*			Red
Large Marble	*Euchloe ausonides insulanus*	XT (Apr 2010)	1-X (Jun 2003)	Red
Northern Abalone	*Haliotis kamtschatkana*	T (May 2000)	1-T (Jun 2003)	Red
Oregon Forestsnail	*Allogona townsendiana*	E (Apr 2013)	1-E (Jan 2005)	Red
Propertius Duskywing	*Erynnis propertius*			Red
Puget Oregonian	*Cryptomastix devia*	XT (Apr 2013)	1-X (Jan 2005)	Red
seaside centipede	*Heterodermia sitchensis*	E (Apr 2006)	1-E (Jun 2003)	Red
Silver-spotted Skipper	*Epargyreus clarus californicus*			Red
Threaded Vertigo	*Nearctula* sp. 1	SC (Apr 2010)	1-SC (Jul 2012)	Red
Western Branded Skipper,	*Hesperia colorado oregonia*	E (Nov 2013)		Red
Zerene Fritillary	*Speyeria zerene bremnerii*			Red
Autumn Meadowhawk	*Sympetrum vicinum*			Blue
Beaverpond Baskettail	*Epitheca canis*			Blue
Black Gloss	*Zonitoides nitidus*			Blue
Blue Dasher	*Pachydiplax longipennis*			Blue
Boisduval's Blue	*Plebejus icarioides blackmorei*			Blue

Common Name	Scientific Name	COSEWIC Status	SARA Status	BC List
Broadwhorl Tightcoil	*Pristiloma johnsoni*			Blue
Clodius Parnassian	*Parnassius clodius claudianus*			Blue
Monarch	*Danaus plexippus*	SC (Apr 2010)	1-SC (Jun 2003)	Blue
Moss' Elfin	*Callophrys mossii mossii*			Blue
Pacific Sideband	*Monadenia fidelis*			Blue
Quatsino Cave amphipod	*Stygobromus quatsinensis*			Blue
Rocky Mountain Parnassian	*Parnassius smintheus olympiannus*			Blue
Scarletback Taildropper	*Prophysaon vanattae*			Blue
Silver-spotted Skipper	*Epargyreus clarus*			Blue
Warty Jumping-slug	*Hemphillia glandulosa*	SC (Apr 2013)	1-SC (Jan 2005)	Blue
Western Pine Elfin	*Callophrys eryphon sheltonensis*			Blue
Western Pondhawk	*Erythemis collocata*			Blue
Western Thorn	*Carychium occidentale*			Blue
Plants				
bog bird's-foot lotus	*Hosackia pinnata*	E (May 2004)	1-E (Jul 2005)	Red
branching montia	*Montia diffusa*			Red
Carolina meadow-foxtail	*Alopecurus carolinianus*			Red
common bluecup	*Githopsis specularioides*			Red
corrupt spleenwort	*Asplenium adulterinum*			Red
cup clover	*Trifolium cyathiferum*			Red
deltoid balsamroot	*Balsamorhiza deltoidea*	E (Apr 2009)	1-E (Jun 2003)	Red
dwarf maiden-hair fern	*Adiantum aleuticum* var. *subpumilum*			Red
dwarf trillium	*Trillium ovatum* var. *hibbersonii*			Red
Fernald's false manna	*Torreyochloa pallida*			Red
fringed pinesap	*Pleuricospora fimbriolata*			Red
graceful arrow-grass	*Triglochin concinna*			Red

Common Name	Scientific Name	COSEWIC Status	SARA Status	BC List
Gray's desert-parsley	*Lomatium grayi*	T (Nov 2008)	1-T (Feb 2011)	Red
green-fruited sedge	*Carex interrupta*			Red
grey beach peavine	*Lathyrus littoralis*	T (Apr 2013)		Red
knotgrass	*Paspalum distichum*			Red
Macoun's meadow-foam	*Limnanthes macounii*	T (Nov 2004)	1-T (Aug 2006)	Red
needle-leaved navarretia	*Navarretia intertexta*			Red
Nevada marsh fern	*Thelypteris nevadensis*			Red
Olney's bulrush	*Schoenoplectus americanus*			Red
Olympic onion	*Allium crenulatum*			Red
Oregon ash	*Fraxinus latifolia*			Red
Oregon selaginella	*Selaginella oregana*			Red
Pacific waterleaf	*Hydrophyllum tenuipes*			Red
phantom orchid	*Cephalanthera austiniae*	T (May 2000)	1-T (Jun 2003)	Red
pine broomrape	*Orobanche pinorum*			Red
pink sand-verbena	*Abronia umbellata* var. *breviflora*	E (May 2004)	1-E (Jul 2005)	Red
prairie lupine	*Lupinus lepidus*	E (Apr 2009)	1-E (Jun 2003)	Red
purple sanicle	*Sanicula bipinnatifida*	T (May 2001)	1-T (Jun 2003)	Red
rayless goldfields	*Lasthenia glaberrima*	E (Mar 2008)	1-E (Feb 2010)	Red
rigid apple moss	*Bartramia stricta*	E (Nov 2009)	1-E (Jun 2003)	Red
river bulrush	*Bolboschoenus fluviatilis*			Red
rough-leaved aster	*Eurybia radulina*			Red
salt marsh Philadelphia fleabane	*Erigeron philadelphicus* var. *glaber*			Red
sandmat	*Cardionema ramosissimum*			Red
scalepod	*Idahoa scapigera*			Red
short-seeded waterwort	*Elatine brachysperma*			Red
short-tailed rush	*Juncus brevicaudatus*			Red

Common Name	Scientific Name	COSEWIC Status	SARA Status	BC List
small-headed tarweed	*Hemizonella minima*			Red
streambank lupine	*Lupinus rivularis*	E (Nov 2002)	1-E (Jan 2005)	Red
tall woolly-heads	*Psilocarphus elatior*	E (May 2001)	1-E (Jun 2003)	Red
Washington springbeauty	*Claytonia washingtoniana*			Red
white meconella	*Meconella oregana*	E (May 2005)	1-E (Aug 2006)	Red
white-lip rein orchid	*Piperia candida*			Red
white-top aster	*Sericocarpus rigidus*	SC (Apr 2009)	1-SC (Jun 2003)	Red
wine-cup clarkia	*Clarkia purpurea* ssp. *quadrivulnera*			Red
yellow montane violet	*Viola praemorsa* ssp. *praemorsa*	E (Nov 2007)	1-E (Jun 2003)	Red
Pohlia spp.	*Pohlia pacifica*			Red
Spagnum spp.	*Sphagnum annulatum*			Red
Tortula spp.	*Tortula bolanderi*			Red
alpine anemone	*Anemone drummondii* var. *drummondii*			Blue
American glehnia	*Glehnia littoralis* ssp. *leiocarpa*			Blue
angled bittercress	*Cardamine angulata*			Blue
awned cyperus	*Cyperus squarrosus*			Blue
banded cord-moss	*Entosthodon fascicularis*	SC (May 2005)	1-SC (Aug 2006)	Blue
beach bindweed	*Calystegia soldanella*			Blue
beaked spike-rush	*Eleocharis rostellata*			Blue
black knotweed	*Polygonum paronychia*			Blue
blue vervain	*Verbena hastata* var. *scabra*			Blue
California hedge-parsley	*Yabea microcarpa*			Blue
California wax-myrtle	*Myrica californica*			Blue
California-tea	*Rupertia physodes*			Blue
chaffweed	*Anagallis minima*			Blue
Chamisso's montia	*Montia chamissoi*			Blue

Common Name	Scientific Name	COSEWIC Status	SARA Status	BC List
Dixon's scarlet paintbrush	*Castilleja miniata* var. *dixonii*			Blue
dwarf bramble	*Rubus lasiococcus*			Blue
dwarf red fescue	*Festuca rubra* ssp. *mediana*			Blue
field dodder	*Cuscuta campestris*			Blue
fleshy jaumea	*Jaumea carnosa*			Blue
flowering quillwort	*Lilaea scilloides*			Blue
four-leaved mare's-tail	*Hippuris tetraphylla*			Blue
Geyer's onion	*Allium geyeri* var. *tenerum*			Blue
giant chain fern	*Woodwardia fimbriata*			Blue
Gmelin's sedge	*Carex gmelinii*			Blue
green-sheathed sedge	*Carex feta*			Blue
hairy goldfields	*Lasthenia maritima*			Blue
Henderson's checker-mallow	*Sidalcea hendersonii*			Blue
heterocodon	*Heterocodon rariflorum*			Blue
Howell's violet	*Viola howellii*			Blue
leafy mitrewort	*Mitellastra caulescens*			Blue
least moonwort	*Botrychium simplex* var. *compositum*			Blue
Macoun's groundsel	*Packera macounii*			Blue
Macrae's clover	*Trifolium dichotomum*			Blue
Menzies' burnet	*Sanguisorba menziesii*			Blue
mountain sneezeweed	*Helenium autumnale* var. *grandiflorum*			Blue
nodding semaphoregrass	*Pleuropogon refractus*			Blue
northern adder's-tongue	*Ophioglossum pusillum*			Blue
Nuttall's quillwort	*Isoetes nuttallii*			Blue
Oakes' pondweed	*Potamogeton oakesianus*			Blue
oldgrowth specklebelly	*Pseudocyphellaria rainierensis*	SC (Apr 2010)	1-SC (Jul 2012)	Blue

Common Name	Scientific Name	COSEWIC Status	SARA Status	BC List
Olympic mountain aster	*Eucephalus paucicapitatus*			Blue
ovalpurse	*Hornungia procumbens*			Blue
paintbrush owl-clover	*Castilleja ambigua* ssp. *ambigua*			Blue
pointed rush	*Juncus oxymeris*			Blue
poison oak	*Toxicodendron diversilobum*			Blue
poverty clover	*Trifolium depauperatum* var. *depauperatum*			Blue
redwood sorrel	*Oxalis oregana*			Blue
shinleaf wintergreen	*Pyrola elliptica*			Blue
slender-spiked mannagrass	*Glyceria leptostachya*			Blue
slimleaf onion	*Allium amplectens*			Blue
small spike-rush	*Eleocharis parvula*			Blue
Smith's fairybells	*Prosartes smithii*			Blue
smooth willowherb	*Epilobium glaberrimum* ssp. *fastigiatum*			Blue
snow bramble	*Rubus nivalis*			Blue
Spanish-clover	*Acmispon americanus* var. *americanus*			Blue
spring hornwort	*Ceratophyllum echinatum*			Blue
Texas toadflax	*Nuttallanthus texanus*			Blue
three-flowered waterwort	*Elatine rubella*			Blue
thyme-leaved spurge	*Chamaesyce serpyllifolia* ssp. *serpyllifolia*			Blue
tooth-leaved monkey-flower	*Mimulus dentatus*			Blue
two-edged water-starwort	*Callitriche heterophylla* var. *heterophylla*			Blue
Ussurian water-milfoil	*Myriophyllum ussuriense*			Blue
Vancouver Island beggarticks	*Bidens amplissima*	SC (Nov 2001)	1-SC (Jun 2003)	Blue
water bur-reed	*Sparganium fluctuans*			Blue
waterwort water-milfoil	*Myriophyllum quitense*			Blue
western St. John's-wort	*Hypericum scouleri* ssp. *nortoniae*			Blue

Common Name	Scientific Name	COSEWIC Status	SARA Status	BC List
white adder's-mouth orchid	*Malaxis brachypoda*			Blue
white glacier lily	*Erythronium montanum*			Blue
yellow sand-verbena	*Abronia latifolia*			Blue
	Alsia californica			Blue
	Brachythecium holzingeri			Blue
	Bryum gemmiparum			Blue
	Dicranodontium asperulum			Blue
	Diphyscium foliosum			Blue
	Ditrichum schimperi			Blue
	Fissidens ventricosus			Blue
	Funaria muhlenbergii			Blue
	Grimmia anomala			Blue
	Homalothecium arenarium			Blue
	Orthotrichum rivulare			Blue
	Philonotis yezoana			Blue
	Platyhypnidium riparioides			Blue
	Pleuroziopsis ruthenica			Blue
	Ptychomitrium gardneri			Blue
	Racomitrium pacificum			Blue
	Rosulabryum erythroloma			Blue

Attestation and Proof of Compliance with Occupational Health and Safety (OHS)

Note: The following form must be completed and signed prior to commencing work on Parks Canada Sites.

Submission of this completed form, satisfactory to Parks Canada, is a condition of gaining access to the work place.

Parks Canada recognizes that federal OHS legislation places certain specific responsibilities upon Parks Canada as owner of the work place. In order to meet those responsibilities, Parks Canada is implementing a contractor safety regime that will ensure that roles and responsibilities assigned under Part II of the *Canada Labour Code* and the *Canada Occupational Health and Safety Regulations* are implemented and observed when involving contractor(s) to undertake works in Parks Canada work places.

Parks Canada Responsible Authority/Project Lead	Address	Contact Information
Project Manager/Contracting Authority (delete as required)		
Prime Contractor		
Subcontractor(s) (add additional fields as required)		

Location of Work
General Description of Work to be Completed

Mark "Yes" where applicable.

	A meeting has been held to discuss hazards and access to the work place and all known and foreseeable hazards have been identified to the Contractor and/or Subcontractor(s).

	The contractor and/or its subcontractor(s) will comply with all federal and provincial/territorial legislation and Parks Canada's policies and procedures, regarding occupational health and safety.
	The contractor and/or its subcontractor(s) will provide all prescribed safety materials, equipment, devices and clothing.
	The contractor and/or its subcontractor(s) will ensure that its employees are familiar with and use all prescribed safety materials, equipment, devices and clothing at all times.
	The contractor and/or its subcontractor(s) will ensure that its activities do not endanger the health and safety of Parks Canada employees.
	The contractor and/or its subcontractor(s) has inspected the site and has carried out a hazard assessment and has put in place a health and safety plan and informed its employees accordingly, prior to the commencement of the work.
	Where a contractor and/or its subcontractor(s) will be storing, handling or using hazardous substances in the work place, it will place warning signs at access points warning persons of the presence of the substances and any precautions to be taken to prevent or reduce any hazard of injury or death.
	The contractor and/or its subcontractor(s) will ensure that its employees are instructed in respect of any emergency procedures applicable to the site.

I, _____ (contractor), certify that I have read, understood and attest that my firm, employees and all sub-contractors will comply with the requirements set out in this document and the terms and conditions of the contract.

Name_____ Signature_____

Date_____

Environmental Protection Plan (EPP) - Checklist

Note: This checklist was developed to assist the Contractor in determining and mitigating environmental issues at site. It is considered a generic checklist and it is in the Contractor's best interest to review the PWGSC Environmental Effects Evaluation (EEE) and/or the Fish and Fish Habitat Report, as supporting documents in the completion of the site Environmental Protection Plan (EPP).

EPP Framework	Content Requirements	Yes	No	N/A
Project Setting and Site Activities				
Project Description	A brief description of the project and its location is provided.			
Environmental Sensitivities	Sensitive or protected features that could be impacted as a result of the Contractor's activities are described.			
Site Activities	A scope of work and a list of all construction or related activities to be undertaken during the project are provided.			
Project Schedule and Site Drawings				
Project Schedule	A project schedule is provided, including scheduled shut-downs and restricted work periods due to environmental.			
Site Drawing	One or more site drawings(s) are provided, indicating the site location; site set-up and layout; erosion and sediment controls; in-stream work areas; and environmental sensitivities.			
Potential Environmental Impacts and Controls				
Potential Environmental Issues and Impacts	The potential environmental issues and impacts that may result from the construction activities are described. Environmental Reports (Environmental Assessments; Fish Habitat and Compensation etc) will be provided to the contractor especially with respect to any in-stream work procedures that will be required. For example, in-stream works will impact fish and fish habitat in the surrounding ecosystem. It is the Contractor's responsibility to ensure the work is completed in a manner that causes the least impact on the ecosystem (see section on Mitigation).			
Permits, Approvals, and Authorizations	List required permits, approvals and authorizations. As applicable, environmental mitigation measures prescribed by regulatory agencies and included in project permits, approvals and authorizations are described. NOTE: DFO, MOE and NWPA approvals and authorizations for in-stream works are PWGSC's responsibility however, the Contractor must be aware of the requirements of these approvals/authorizations. Permitting for water withdrawal from the waterbody as part of construction activities is part of the Contractor's responsibility.			
Mitigation Strategies	Procedures, controls or best management practices (BMPs) to prevent or reduce adverse impacts on the			

EPP Framework	Content Requirements	Yes	No	N/A
	environment are provided. All work in BC must adhere to the BC MOE "Standards and Best Practices for Instream Work".			
Erosion and Sediment Control	Erosion and sediment controls are provided, as appropriate for the jurisdiction.			
Waste Management and Hazardous Materials				
Waste Management and Hazardous Materials.	Hazardous materials that will be used and/or stored on site are listed. Expected hazardous and non-hazardous waste materials along with proper handling, containment, storage, transportation and disposal methods are listed. As appropriate for the jurisdiction, estimated waste quantities and specific handling procedures are also provided. For example, re-fuelling of equipment will be conducted at least 100m away from any active drainage courses.			
EPP Implementation				
Site Representative	Name(s) and contact details for the person(s) who will be the Contractor's Site Representative(s) are provided.			
Training and Communication	Training and communication details are provided.			
Monitoring and Reporting	Monitoring and inspection procedures, including a schedule of monitoring activities and reporting procedures are provided. For example, this would include downstream monitoring activities for increased siltation during in-stream works.			
Documentation	Information and/or records that will be maintained relating to the EPP and end environmental matters on the project site are described.			
EPP Update	EPP review and update procedures are provided.			
Environmental Emergency Response Procedures				
Environmental Emergency Response Procedures	Potential incidents that may impact the environment are identified, and emergency response procedures to prevent and respond to incidents are provided. An environmental emergency response contact list is also provided.			

SS 505 APPENDIX 1

RAP MANAGEMENT BEST PRACTICES

A **best practice** in the context of this Standard Specification is a method or technique that has consistently shown results superior to those achieved with other means, and that is used as a benchmark. A "best" practice may evolve to become better as improvements are discovered. Best practice is considered to describe the process of developing and following a standard way of doing things that are commonly achieved in the industry.

RAP Sources - RAP may be obtained from several sources. The common sources of RAP are:

Cold Milling – This is the most common source of RAP. The milling process should be closely examined to make sure that the milled material is not contaminated with soil, base materials, paving geotextiles or other foreign material (sulphur, asbestos, rubber etc.). The milled material that becomes contaminated should be stockpiled separately from RAP to be used in asphalt mix.

A special milling operation may also be beneficial when it is desirable to mill the surface layer in one pass and the underlying layers in a second pass because the surface course millings may contain aggregates with higher fractured aggregates that could be incorporated in the new surface layers.

Full Depth Pavement Removal – RAP can also be obtained from the removal of the existing pavement using a bulldozer or a backhoe. This process typically results in large chunks of pavement that may be contaminated with underlying soils. This contaminated material should be stored in a separate stockpile and not to be used in the hot mix asphalt.

Asphalt Plant Waste – This includes the waste generated during plant start-up, transition between mixes, plant clean out, mix rejected from projects and excess mix produced that could not be placed.

This material usually has fewer fines than the typical RAP since it wasn't milled or broken up during pavement removal and the AC is less aged than RAP since it hasn't been subjected to environmental aging.

This material should be stockpiled and tested separately from the other RAP.

RAP Contamination – Best practice for RAP stockpiles is to keep them free from contaminants. RAP stockpiles should be treated as a valuable material. Truck drivers bringing the material on the site should ensure that unwanted debris or contaminated material does not end up in the RAP stockpile.

The plant QC personnel and the loader operators should continuously monitor processed and unprocessed RAP stockpiles to make sure that they do not contain deleterious materials. If any contaminants are found, they should be removed immediately so that they are not covered up with other RAP brought on to the yard.

RAP Categories – RAP obtained from MoT sources is referred to as **Classified RAP.** RAP obtained from non MoT sources or mixed with RAP from other projects is referred to as **Unclassified RAP.**

RAP Processing – Best practice for RAP processing involves one or more steps to create consistent materials. Screening is used to separate sizes. In some cases, it may be desirable to screen or fractionate RAP to coarse and fine fractions. RAP separation based on sizes increases quality and reduces variability in the RAP properties.

For stockpiles of RAP from multiple sources, particularly stockpiles containing oversize fragments of RAP or pavement slabs, the material should be processed to produce RAP with a maximum size of 37.5 mm for use in hot mix asphalt.

Further processing of RAP may include both screening and crushing to produce a uniform gradation, AC content and other properties. Since crushing RAP will create more aggregate fines, it is best to set up the crushing operation so that the RAP is screened before it enters the crusher.

RAP processing shall occur as early as possible in the construction planning process.

RAP Stockpiling – The best practice to minimize the accumulation of moisture in stockpiles is to cover the stockpile with a shelter, tarp or building to prevent precipitation from getting to the RAP.

APPENDIX 1 - RAP MANAGEMENT BEST PRACTICES

RAP stockpiles should be placed on a base with adequate drainage and constructed with minimal segregation. Arc-shaped, conical, uniform stockpiles are preferred for storing processed or unprocessed RAP. No contamination of the RAP from the stockpile base materials should occur.

Use of heavy equipment on top of the RAP stockpile should be minimized to avoid compaction of the RAP. It is also recommended that the RAP stockpiles be limited to 4 m in height to reduce the potential for self-consolidation of the stockpile.

RAP Sampling - Best practice is for representative RAP samples to be collected from the stockpile prepared for the project. At least one sample per 750 tonnes of RAP in the stockpile or a minimum of ten samples per stockpile should be taken and retained for testing.

If the asphalt mix from an existing pavement is to be used as RAP, 150 mm diameter cores should be extracted at a frequency of at least one core every 1.5 kilometer in each lane prior to the start of the project. The asphalt mix from the pavement lift to be recycled should be tested to determine the properties of the aggregates and the asphalt cement in the pavement.

Sampling Method – Best practice for sampling aggregates applies to the sampling of RAP as well. RAP stockpiles should be sampled as they are being built at the location where they will be fed into the asphalt plant. Sampling at the time the stockpile is built is the best practice and will be easier and more representative of the stockpile compared to samples taken later after the formation of the crust on the face of the RAP stockpile.

Proper sampling procedures normally used for virgin aggregates should also be used to sample RAP aggregates as included in *"AASHTO T2: Sampling of Aggregates", Standard Specifications for Transportation Materials and Methods of Sampling and Testing, 30th Edition.*

Minimum Test Frequencies – The quality control tests on the RAP and the extracted aggregates should be completed at the minimum frequencies specified in Table 505-C: Guidelines for Minimum Quality Control Test Frequencies.

All RAP aggregates retained after extraction should be combined together into one sample. The combined sample should then be sieved and split into coarse and fine fractions and used to determine the specific gravity of the recycled aggregates.

Stockpile Management – When a stockpile reaches the desired quantity and has been sampled and characterized, no additional RAP material should be added to it. Subsequent RAP material should be stockpiled in a separate stockpile and characterized in the same manner. This process should continue such that characterized stockpiles are not compromised by new RAP materials.

Samples from the RAP stockpile should be taken and the testing completed as per the minimum test frequencies specified in Table 505-C.

Table 505-C: Guidelines for Minimum Quality Control Test Frequencies

Test	Minimum Frequency
Asphalt Content	One per 750 tonnes
Gradation	One per 750 tonnes
Percent Fracture (%)	One per 750 tonnes
Specific Gravity of coarse fraction of RAP	Minimum of One per 3000 tonnes or three per stockpile
Specific Gravity of fine fraction of RAP	Minimum of One per 3000 tonnes or three per stockpile
Maximum Micro Deval Abrasion loss factor (%)	Minimum of One per 3000 tonnes or three per stockpile
Fine aggregate angularity	Minimum of One per 3000 tonnes or three per stockpile
Flat and elongated particles (For Superpave Only)	Minimum of One per 3000 tonnes or three per stockpile
AC Rheology	Minimum of One per 3000 tonnes of RAP or a minimum of three tests per project.

SS 505 APPENDIX II
RAP RECORD SHEET

This Appendix is part of the Standard Specification SS 505. The Contractor shall notify the Ministry Representative unless the project Special Provisions state differently, 14 days in advance of Paving if RAP will be used in the project, and shall fill all fields as applicable and sign this Appendix II – RAP RECORD SHEET and submit it to the Ministry Representative 10 days in advance unless the project Special Provisions state differently.

Contractor:

Ministry Representative:

Project Name per Signed Contract:

Project Number:

Numbered Highway Name: (if Applicable)

Road Name: (If Applicable)

Segment No.	Tonnage	RAP percentage	Classified RAP	Unclassified RAP	Top Lift %	Bottom Lift %	Left/Right LKI	Start LKI	Finish LKI

Filled by (Name and Date):

Address and Contacts

Submitted by:

Name:

Signature and Date: