

Prepared for:



Ministry of  
Transportation  
and Infrastructure

# Environmental Assessment Highway 1 Admirals-McKenzie Interchange Project, Saanich, BC.



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## Executive Summary

The Ministry of Transportation and Infrastructure (MOTI) is designing and planning construction of the Highway 1 Admirals-McKenzie Interchange project in Saanich, BC. McElhanney Consulting Services Ltd. (McElhanney) has been engaged by Urban Systems, the prime consultant, to provide environmental services for this project. The purpose of this environmental assessment (EA) was to identify environmentally sensitive features in and around the project footprint, determine potential impacts on environmental features that might be mitigated through design, identify potential impacts that cannot be mitigated through design and determine regulatory compliance requirements to facilitate the successful completion of the project.

This EA was based on determining the potential impacts associated with the largest proposed footprint for this interchange project. Drainage swales and culverts that direct water to stormwater treatment areas will be reconstructed to accommodate the new project footprint. There were no watercourses within the project footprint. Portage Inlet and the Colquitz River are two waterbodies near to the project. The EA focused on potential terrestrial and wildlife impacts within the project footprint.

Environmental sensitivities directly and indirectly impacted by project construction were identified in and around the project footprint. Direct footprint impacts to a provincially red-listed Garry Oak-Arbutus (*Quercus garryana*- *Arbutus menziesii*) ecosystem were identified. Removal of a portion of this ecosystem on a rocky knoll within and adjacent to the project alignment cannot be avoided. Garry Oak ecosystems are not protected by legislation, however public stewardship groups have been promoting their protection and rehabilitation. Other direct impacts include the loss of vegetation resources and wildlife habitat within the project footprint such as the removal of wildlife trees along the Galloping Goose Trail and in Cuthbert Holmes Park. Habitat offset plans for this project include provision of additional lands (land transfer) to be given to the Park and potential provision for habitat rehabilitation of an area of similar character within Cuthbert Holmes Park, in cooperation with the District of Saanich. There will be no net loss of the land area of Cuthbert Holmes Park as all park property removed for this project will be offset by transfer of adjacent lands to the park.

Indirect project impacts include the potential for disturbance of birds protected under legislation as follows: a) species listed under the federal *Species at Risk Act* and the provincially blue listed Great Blue Heron (*Ardea herodias*), b) birds protected under the *Migratory Birds Convention Act*, and c) birds and active nests protected under the provincial *Wildlife Act* 34. Indirect impacts of project construction may be mitigated through the application of best management practices such as construction phasing or scheduling to conduct certain noisy or potential disruptive construction activities outside the breeding season.

Environmental federal, provincial, or municipal permits, approvals or authorizations are not anticipated for the construction of this highway project. Culvert extensions for stormwater conveyance under the new roadway will require a notification to the Province under Part 3 of the *Water Sustainability Regulation* of the *Water Sustainability Act*. Construction of the project will be in compliance with all provincial and federal regulations. Construction compliance can be facilitated with the implementation of the best management practices as outlined in Section 165 of MOTI's '2012 Standard Specification for Highway Construction'.

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*Appendix B: Animals Species at Risk in the CDFmm Biogeoclimatic Zone of the Capital Regional District*

## List of Acronyms Used

AQP	Appropriately Qualified Professional
BC	British Columbia
BGC	Biogeoclimatic
BMPs	Best Management Practices
CDC	Conservation Data Centre (BC)
CRD	Capital Regional District
CDF	Coastal Douglas fir biogeoclimatic zone
CDFmm	Coastal Douglas fir moist maritime biogeoclimatic zone
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CHP	Cuthbert Holmes Park
CEMP	Construction Environmental Management Plan
EA	Environmental Assessment
ESC	Erosion and Sediment Control
FLNRO	Ministry of Forest, Lands and Natural Resource Operations (BC)
GGT	Galloping Goose Trail
GPS	Geographic Positioning System
MBCA	<i>Migratory Birds Convention Act</i>
MOE	Ministry of Environment (BC)
MOF	Ministry of Forests (BC)
MOTI	Ministry of Transportation and Infrastructure (BC)
SARA	<i>Species at Risk Act</i>

# 1. Introduction

An environmental assessment (EA) was conducted for the Ministry of Transportation and Infrastructure (MOTI) Highway 1 Admirals-McKenzie Interchange Project. McElhanney has been engaged by Urban Systems, the prime consultant to MOTI, to undertake environmental investigations to complete the design for this highway widening and interchange development at the McKenzie Avenue and Admirals Road intersection with Highway 1, Saanich BC.

The EA for this project was conducted to provide guidance concerning potential project impacts to the environment in and around the proposed project footprint and recommend avoidance or minimization of impacts to environmental features through alterations in design or construction activities. This EA was conducted to meet the following objectives:

- Provide environmental information to factor into the project design and facilitate the decision making process,
- Identify sensitive ecological features including species and ecosystems potentially located in and adjacent to the project footprint,
- Determine the potential impacts of the footprint on environmental features,
- Make recommendations to avoid or minimize potential environmental impacts on sensitive environmental features, and
- Identify environmental regulatory requirements for project construction.

## 1.1 Location

This MOTI project is located in the District of Saanich along Highway 1 at the Admirals Road and McKenzie Avenue intersection (*Figure 1*). This EA is based on the largest proposed project footprint as per the current conceptual design options of the project. The project footprint, while primarily within the current provincial highway right-of-way, does overlap with adjacent properties, necessitating property acquisition or right-of-way negotiations with private landowners and the District of Saanich.

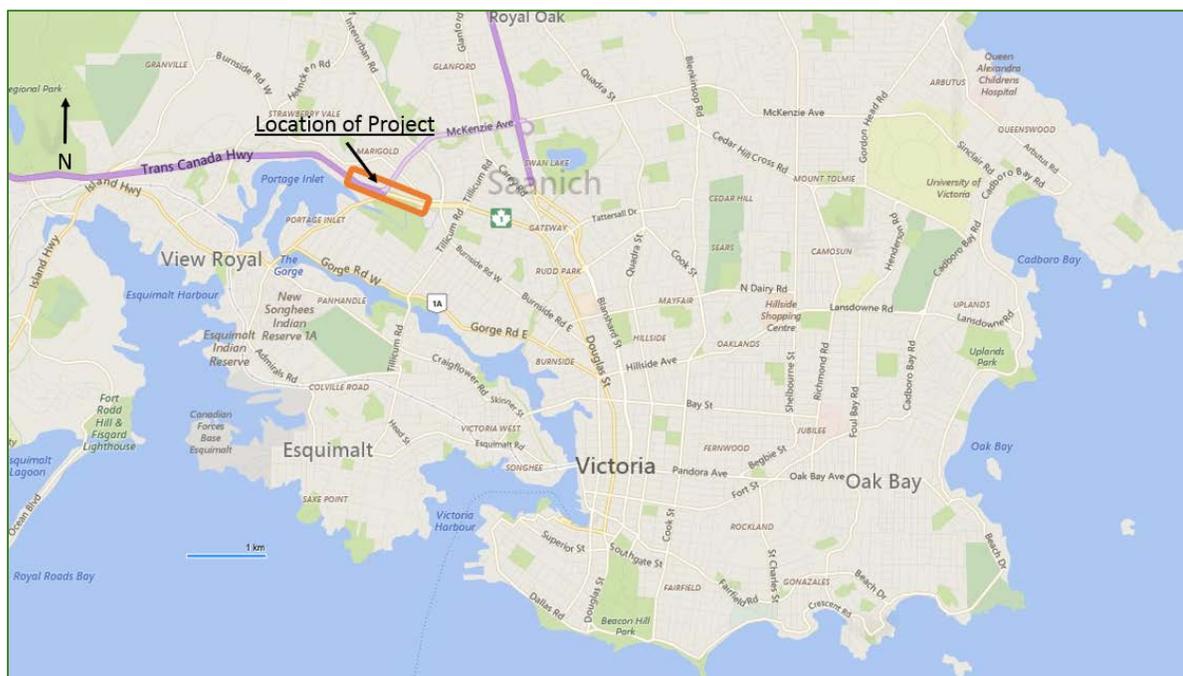


Figure 1. Location of Highway 1 Admirals-McKenzie Interchange Project in Saanich, BC. The orange rectangle approximates the location of the project.

## 2. Project Description

The following section describes the general design features for the Highway 1 Admirals-McKenzie Interchange project.

### 2.1 PROJECT OBJECTIVES

The project area was assessed for potential environmental impacts associated with the following project components:

- Highway 1 widening and development of approaches to the on and off ramps at Admirals Road and at McKenzie Avenue,
- Highway 1 (east/west alignment) passing under Admirals Road and McKenzie Avenue (north/south alignment),
- Development of on and off ramps from Highway 1 at McKenzie Avenue and Admirals Road,
- An overpass of McKenzie Avenue for Galloping Goose Trail (GGT), and
- A pedestrian overpass of Highway 1.

The engineering design features are under continuing development, and, until a final design has been tendered for construction, the final construction footprint and potential impacts on environmental resources will not be fully known. This report outlines the general construction activities and impacts that are associated with achieving the above-mentioned objectives within the proposed project footprint.

## 2.2 PROJECT OVERVIEW

This highway interchange project requires an increase in the existing highway footprint in an area constrained by private residential properties, institutional properties, municipal parkland, and physical features of rock outcroppings and topographic depressions. Development and construction of this project will include the following major components:

- Blasting of surface rock / rock outcrops,
- Clearing and grubbing of vegetation, removal of detached stumps and roots,
- Stripping to remove topsoil and overburden,
- Removal of structures currently within the project footprint,
- Grading as needed using cut and fill method. Preloading needed in the southeast quadrant and spot preloading in other locations,
- Pile driving for structural foundations,
- Construction of an overpass or underpass to accommodate the GGT crossing McKenzie Avenue,
- Construction of an overpass to accommodate pedestrian crossing of Highway 1,
- Construction of an overpass to accommodate Admirals / McKenzie roadway over Highway 1,
- Relocation of approximately 500 m of 990 mm diameter CRD water main from the highway median,
- Replacement or installation of road culverts,
- Drainage and utility installation,
- Paving and finishing,
- Electrical work associated with lighting and signals, and
- Final landscaping.

# 3. Scope and Methodology

## 3.1 PROJECT PHASES DESCRIBED

The following sections briefly describe the processes required for various phases of project construction. Construction and operational activities were considered for determination of potential impacts to various environmental components in Sections 5 and 6 of this report.

### 3.1.1 Site Preparation

#### Blasting and Crushing

In order to widen the highway, surface and sub-surface rock will need to be removed through a process of controlled blasts.

## Clearing and Grubbing

Removal of vegetation will be required to accommodate the horizontal expansion and vertical changes in the highway. Vegetated areas along the highway consisted primarily of remnant native ecosystems, municipal parkland, landscape plantings and vegetation characteristic of disturbed roadsides, including numerous invasive plant species.

## Stripping and grading

Overburden material such as organic soil and duff will be removed to expose underlying consolidated mineral soil. Stripping is commonly achieved by scraping surficial material with an excavator bucket.

## Removal of Existing Structures

Certain existing building structures, overpasses and paved areas within the project footprint are to be removed. Removal of these structures through general demolition will generate a considerable amount of building and pavement waste material, which will need to be appropriately handled. A section of the Capital Regional District (CRD) water main, located in the center median of the highway within the project area, will be relocated to the south side of the highway right of way to avoid the impacts of the interchange development.

## 3.1.2 Construction

### Grading, Cut and Fill

To achieve final road grade, it is common practice to redistribute mineral soil from areas above grade to areas below grade, a process called “cut and fill”. Roadway profiles, drawn at regular intervals along the proposed alignment, designate where fill must be placed or removed to achieve the final grade.

### Installation of Structures

The planned design for this interchange project includes a new pedestrian overpass of Highway 1 and the installation of a structure over McKenzie Avenue to accommodate the GGT (pedestrian and bikeway), replacement of a pedestrian overpass over Highway 1, and installation of underpass retaining walls.

### Culvert Extensions and Utilities Installation

Culvert replacement and extension will be required to route stormwater through the project area. Additional culverts and utilities will need to be installed to accommodate drainage and the addition of highway lighting along Highway 1.

### Gravel Road Base Installation

Sub-base and base course gravel is applied overtop of native soil or fills in areas designated to receive an asphalt surface layer.

### Asphalt Paving

An emulsion of solvent and suspended asphalt is applied to the gravel road base to protect the integrity of the underlying road base and to achieve a superior bond between road base and the paved asphalt surface. This is followed by application of bitumen-based levelling and subsequent “Lifts”.

## Landscaping

Areas of exposed native soil must be covered and stabilized once construction is complete. Common practice includes covering areas of final grade with an application of hydro-seed containing an appropriate seed mix for the area. Unavoidable impacts to natural ecosystems may require development of offsetting plans involving restoration of adjacent areas.

## 3.2 SCOPE OF THE ENVIRONMENTAL ASSESSMENT

To facilitate analysis of environmental impacts associated with the proposed pre-construction and construction activities, a project study area was developed providing a spatial boundary for the field assessment (*Figure 2*). Temporal boundaries of the assessment were limited to the construction and operation of the proposed highway interchange project. The environmental components of the assessment are described below.

### 3.2.1 Spatial Boundaries

The EA looked at the project alignment and impacts from several perspectives: i) the regional environmental resources of the area given the proximity to Portage Inlet, a designated area for the Victoria Migratory Bird Sanctuary, ii) location within the municipality, and iii) the project footprint, which guided the determination of direct and indirect project impacts on environmental resources.

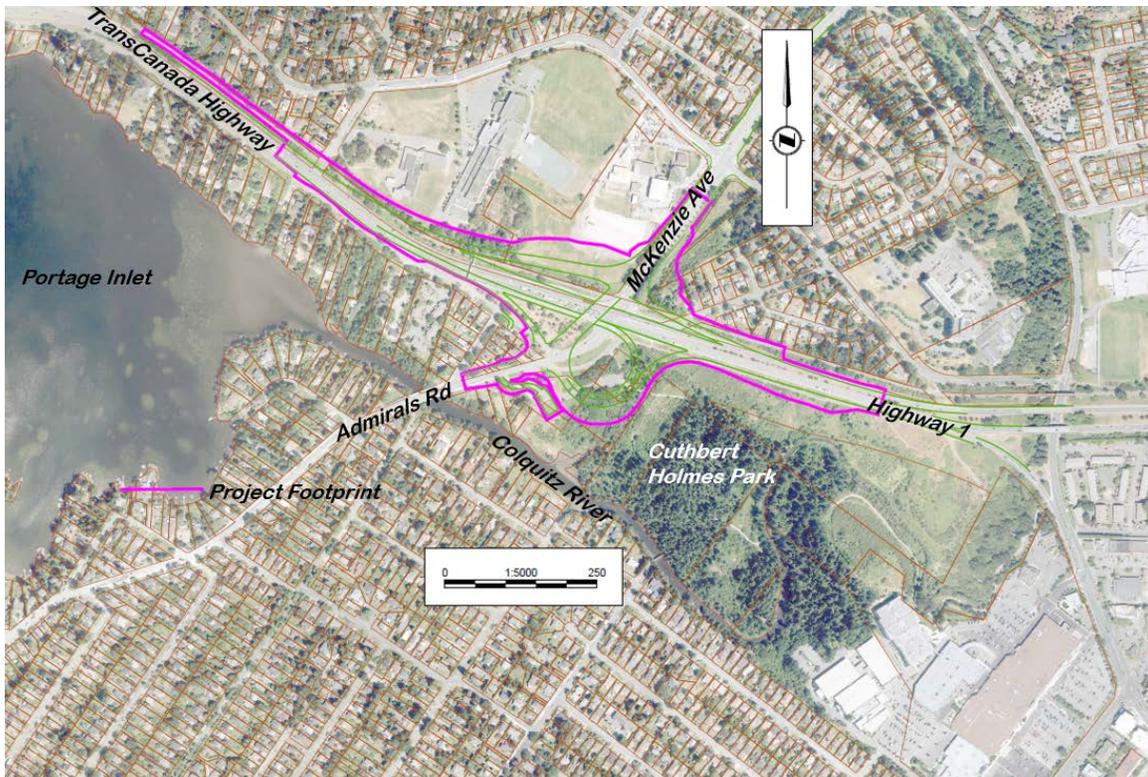


Figure 2. Project location and proposed design footprint outlined in pink.

### 3.2.2 Temporal Boundaries

The project is expected to begin construction in late 2016. Temporary impacts associated with construction, such as noise, would be of short duration. Permanent impacts associated with excavation, infills and placement of structures include removal of vegetation/ wildlife habitat.

### 3.2.3 Environmental Components

The scope of this EA encompasses the terrestrial wildlife, vegetation and adjacent water resource components of the project study area. Wildlife was defined as wildlife habitat and observations of animals within the urban landscape around the project. Vegetation was defined as plant species, plant communities, wetlands and plant species at risk. There were no watercourses or aquatic habitat observed within the project boundaries. Drainage swales directed stormwater to towards an outlet to Portage Inlet. Portage Inlet is nearby marine and estuary habitat and a federally designated migratory bird sanctuary. The Colquitz River, a nearby freshwater aquatic system (about 150 m from edge of the project footprint) connects to Portage Inlet. Both waterways are located downgradient from the project.

The following environmental components, located within and around the study area boundaries, were assessed in this report:

- Terrestrial vegetation resources,
- Terrestrial wildlife and wildlife habitat features including wildlife trees,
- Presence / habitat of endangered, threatened or vulnerable species provincially or federally designated, and
- General features of water resources in and around the project footprint.

The scope of this investigation included the following steps:

- Literature review and desktop assessment of available information and project related reports,
- Field reconnaissance to confirm desktop analysis, identify and determine the environmental features within the study area and assess potential project impacts,
- Provide a report summarizing the following:
  - The findings of the desktop and field investigation,
  - The potential impacts related to construction activities as proposed in the design,
  - Recommended measures to avoid or mitigate impacts on sensitive environmental components,
  - Determine residual effects if any, and
  - Recommend a plan for habitat offsetting to address residual effects.

## 3.3 METHODOLOGY

Data was collected through desktop review of web based data sources from regional, provincial and federal websites. Field reconnaissance and observations were conducted early in June 2015.

### 3.3.1 Desktop Reviews

The EA included a web based data search of existing regional, provincial and federal databases. The methodologies used in the desktop study are described in the following sections.

#### Soils and Topography

Surficial geology maps published by the Geological Survey of Canada (Canada 1982) and soil survey reports (Canada 1958, Day *et al.* 1959) for BC were reviewed for identification of soil types and topographic features of the study area.

#### Vegetation Resources

The ecological databases reviewed in the assessment of vegetation resources included the following:

- Biogeoclimatic Ecosystem Classification Subzone/Variant Map for the South Island Forest District Coast Forest Region (MOF 2008),
- A Guide to Site Identification and Interpretations for the Vancouver Forest Region. Land Management Handbook Number 28, British Columbia Ministry of Forests (Green and Klinka 1994),
- BC Conservation Data Centre (CDC 2015a,b) database of provincially listed plant species including information from the federal *Species at Risk Act* (Canada 2002) and the Committee on the Status of Endangered Wildlife in Canada [COSEWIC],
- BC Species and Ecosystems Explorer (CDC 2015a),
- E-Flora BC: Electronic Atlas of the Plants of British Columbia (E-Flora BC 2015),
- Non-native invasive plant species (as listed in the *Weed Control Act* (BC 1996a),
- Field Guide to Noxious and Other Selected Weeds of British Columbia (Cranston *et al.* 2002),
- Provincially-listed ecological communities at risk (as defined in the BC Species and Ecosystem Explorer) (CDC 2015a), and
- Presence of wildlife trees (WITS 2015).

Queries were conducted within the BC Conservation Data Centre (CDC 2015b), iMapBC 2.0 and the BC Species and Ecosystems Explorer (CDC 2015a) databases for known at risk ecological communities, vascular plant and non-vascular plant species associated with the Coastal Douglas fir (CDF) biogeoclimatic zone.

Provincial web databases were consulted to provide information on the general distribution and status of vegetation species and ecological communities in the project area. The BC Ministry of Forests *A Field Guide to Site Identification and Interpretation for the Vancouver Forest Region* (Green and Klinka 1994) was used to assist in identification of typical ecosystem associations based on plant assemblages and soil edaphic conditions such as typical soil moisture condition, which influence plant distribution. E-Flora BC (E-Flora BC 2015) was consulted to identify plant species typically associated

with this CDF biogeoclimatic subzone. Site visits were conducted to confirm species located in the project area.

### *Listed Species / Ecosystem Designations*

The Conservation Data Centre (CDC) compiles and maintains information on wildlife and plant populations in BC. As part of this system, the CDC assigns a provincial rank or listing that ascribes to each species a 'red', 'blue' or 'yellow' designation based on its population status within BC (CDC 2015a,b). The rankings, described below, highlight the wildlife and plant species as well as natural plant communities that are at risk:

- Red – any indigenous species, subspecies or ecological community that is extirpated (X), endangered (E), or threatened (T) in BC.
- Blue – any indigenous species, subspecies or ecological community considered to be Vulnerable or of special concern in BC. Blue-listed elements are at risk, but are not extirpated, endangered or threatened.
- Yellow – any indigenous species, subspecies or ecological communities that are apparently secure and not at risk.

These designations were used in this report to indicate the status of species and ecosystems observed relative to the provincial and federal listings of species at risk presented in the Appendices.

Ecosystems were identified through field reconnaissance and observations of vegetation assemblages throughout the study area.

### Terrestrial Wildlife Resources

The web based databases considered in the assessment of wildlife use of the area and wildlife habitat include the following:

- CDC database of provincially listed wildlife species (CDC 2015a,b), as well as species listed under the federal *Species at Risk Act* (Canada 2002) and COSEWIC.
- BC Species and Ecosystems Explorer (CDC 2015a).
- E-Fauna BC: Electronic Atlas of the Wildlife of British Columbia (E-Fauna BC 2015).
- District of Saanich Cuthbert Holmes Park Environmental Review (Saanich 2011).

The BC Species and Ecosystems Explorer database was accessed to determine vertebrate and invertebrate at risk species in the CRD. Habitat preferences were noted for each listed species within the CRD. The study area was assessed for the presence of critical habitat for federally and provincially listed species at risk. Provincially mapped known locations and reports for listed species at risk in and around the project area were reviewed to identify any critical habitat within the project area (E-Fauna BC 2015, iMapBC 2015).

COSEWIC was established under Section 14 of the federal *Species at Risk Act (SARA)* (Canada 2002). COSEWIC is a committee that assesses and designates which wild species of animal, plant, or other organisms are at risk of loss from the wild in Canada. Below is a listing of the federal status categories used by COSEWIC and SARA to rank or list a species:

- Endangered (E) – a species facing imminent extirpation or extinction.
- Threatened (T) – a species likely to become endangered if limiting factors are not reversed.

- Special Concern (SC) – a species that is particularly sensitive to human activities or natural events, but is not endangered or threatened.
- Data Deficient (DD) – a species for which there is insufficient scientific information to support status designation.
- Not at Risk (NAR) – a species that has been evaluated and found not to be at risk.
- Extirpated (XT) – a species that no longer exists in the wild in Canada, but occurring elsewhere in the world.

Federally listed species and their critical habitats are protected under *SARA*. The above designations used in this report indicate the status of wildlife species observed as per the provincial and federal listings of species at risk provided in the Appendices.

### Watercourses and Aquatic Resources

A review of the Saanich Desktop Map Viewer (Saanich 2015a) and iMapBC 2.0 (iMapBC 2015) was conducted to determine mapped drainage and potential water features in the project area. Nearby watercourses and aquatic resources were confirmed or identified during field reconnaissance.

### 3.3.2 Field Reconnaissance and Data Collection

Following the desktop review, field reconnaissance was conducted to identify and locate sensitive environmental features, including observations of wildlife, wildlife trees, bird nests, and water resources, riparian, aquatic and terrestrial habitat features within the study area on July 22 and 23, 2015. Field mapping of observed features was facilitated by orthophotos and real time Geographic Positioning System (GPS) locating devices. Ecosystem identification was completed through ground observations and orthophoto interpretation.

## 4. Regulatory Context

Provincial and federal legislation that may be applicable to the project was reviewed. Listed wildlife and plant species at risk are subject to federal and provincial protection. Environmental legislation relevant to the project is outlined in *Table 1*. As project construction activities will not occur in or immediately adjacent to water bodies, federal or provincial authorizations or approvals with respect to water are not required for this project.

*Table 1. Environmental Legislation Applicable to the Project*

LEGISLATION	AGENCY	AREA OF REGULATION	ISSUE	MITIGATIONS/PERMITS/AUTHORIZATIONS.
<b>Federal</b>				
<b><i>Species at Risk Act (SARA) (Canada 2002)</i></b>	Environment Canada	Protects wildlife and wildlife habitat listed as threatened or endangered.	Construction Noise/ Disturbance	Avoidance and mitigation strategies may be needed to avoid impacts to listed species such as the Great Blue Heron. No permitting requirements.
<b><i>Migratory Birds Convention Act (MBCA) (Canada 1994)</i></b>	Environment Canada	Prohibits injury, molestation and destruction of migratory birds and their nests.	Construction Noise/ Disturbance	Close proximity of construction to the Victoria Harbour Migratory Bird Sanctuary within Portage Inlet may require noise and disturbance mitigation strategies such as appropriate construction timing. No permitting available.
<b><i>Fisheries Act (Canada 1985)</i></b>	Fisheries and Oceans Canada	Prohibits introduction of deleterious substances to fish-bearing waters.	Construction	Proximity of project to marine and fresh water environments recommends use of best management practices to ensure compliance to Act.
<b>Provincial</b>				
<b><i>Water Sustainability Act (2014), Water Sustainability Regulation (2016)</i></b>	Forests, Lands, and Natural Resource Operations (FLNRO)	Protects fresh water resources	Stormwater conveyance through culverts	Culvert extension or new culvert placement under a roadway will require a notification to the Province.
<b><i>Weed Control Act (1996a)</i></b>	Ministry of Environment (MOE)	Regulates control of designated noxious plants	Noxious weeds observed within project area.	Act imposes a duty on all land owners to control designated noxious plants. Permits will be required if chemical control methods are used.

LEGISLATION	AGENCY	AREA OF REGULATION	ISSUE	MITIGATIONS/PERMITS/AUTHORIZATIONS.
<p><b>Wildlife Act (BC 1996b)</b></p> <p><b>Wildlife Act Designation and Exemption Regulation (BC 2014).</b></p>	(FLNRO)	Regulates works that impact breeding birds.	Construction Noise/ Disturbance	Protects birds and their nests during the bird breeding season as well as the nests, nest trees and eggs of certain species of birds all year. Bird nesting surveys may be needed prior to vegetation clearing. Nuisance birds and their nests are exempt from protection. No permitting anticipated.

The BC MOTI 2012 Standard Specifications for Highway Construction – Section 165 Protection of the Environment (MOTI 2011) contains general and specific provisions for the protection of the environment during construction that will apply to the project.

### **Migratory Bird Sanctuary**

Victoria Harbour Migratory Bird Sanctuary at Portage Inlet has been federally designated for the protection of migratory birds (Environment Canada 2015). Protection from the taking, injury, destruction or molestation of migratory birds, their nests or eggs has been afforded under the Federal *Migratory Birds Convention Act (MBCA)*. The primary purpose of the sanctuary is the protection of migratory birds from being killed, harmed and harassed during critical parts of their life cycle, such as breeding, nesting, molting, or staging and stopover during their migration. *Migratory Birds Sanctuary Regulations* prohibit anyone from carrying on any activity harmful to migratory birds or the eggs, nests or habitat of migratory birds, except under the authority of a permit for those Migratory Bird Sanctuaries on provincial, territorial and federal lands.

## 5. Description of Existing Environment

### 5.1 GENERAL TOPOGRAPHY AND SOILS

The project area comprises thin soil over bedrock with scattered outcrops with less than 5 m of Victoria clay over the older sand and gravel of the Colwood delta. Soil parent materials were derived primarily from glacial till deposits and glacio-lacustrine sediments of primarily sands and silts (Canada 1958, 1982, Day *et al.* 1959). Much of the highway right-of-way and adjacent areas have been filled in over many years for agricultural use, road building and urban development (Saanich 2011).

### 5.2 LAND USE

The project lies primarily in the Highway 1 right-of-way and approaches at McKenzie Avenue from the north and Admirals Road from the south within the District of Saanich, BC. This urbanized area is currently mixed use, comprised of schools, residential properties, industrial properties, regional trails

(GGT) and municipal parkland (Cuthbert Holmes Park (CHP)). As the roadways cut the project area into quarters or quadrants, each quadrant of the project was described by land use. The northwest quadrant on the north side of the Highway, west of McKenzie Avenue, comprised institutions mostly private schools and a portion of the GGT. The northeast quadrant east of McKenzie Avenue comprised residential homes and the GGT. The southwest quadrant on the south side of Highway 1, west of Admirals Road, was mostly highway right-of-way, with adjacent residential homes and municipal roadways. The southeast quadrant comprised more of the MOTI right-of-way and CHP. Land acquisitions at CHP (managed by District of Saanich) and at some private lots are anticipated for this project.

## 5.3 VEGETATION RESOURCES

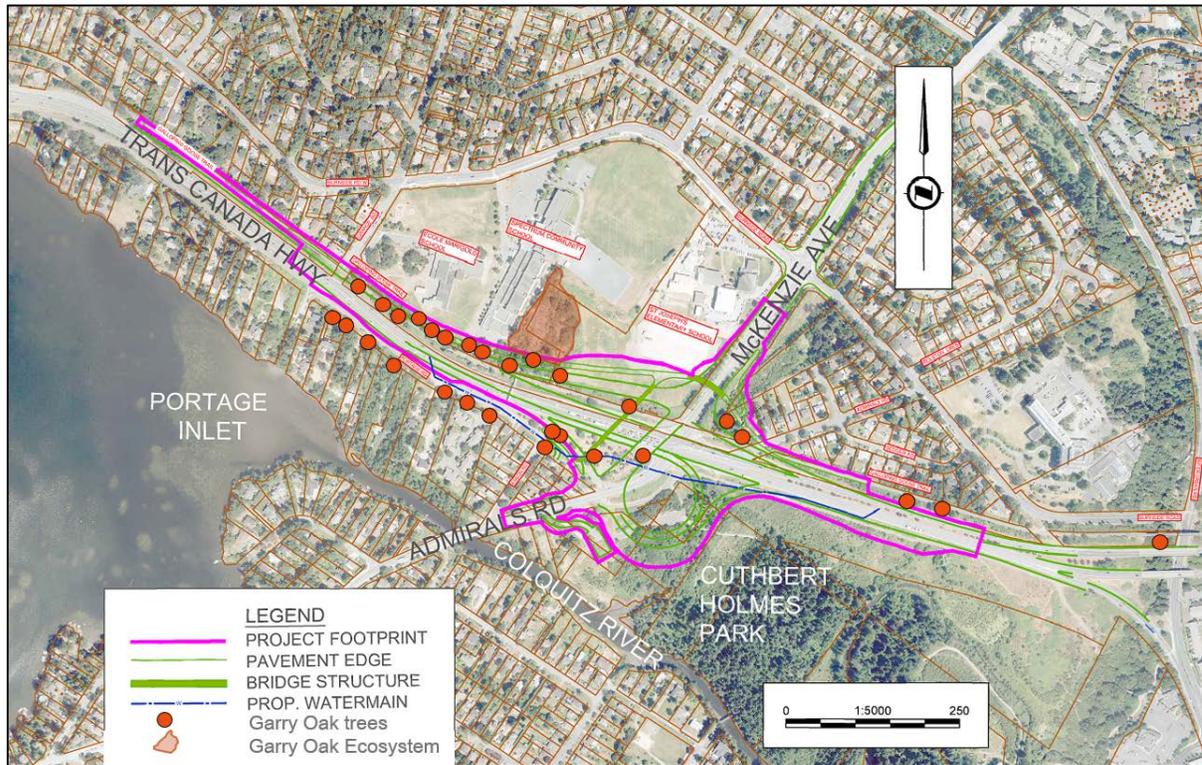
This highway project is located within the Coastal Douglas fir moist maritime (CDFmm) biogeoclimatic (BGC) zone (BC 2008). The ecosystems of the CDFmm BGC zone have been provincially blue and red-listed, which means these ecosystems are considered threatened or endangered. Remnant patches of natural vegetation indicative of the CDFmm BGC zone occur within regional and municipally managed parks located within and adjacent to the project area. These remnant vegetation assemblages reflect the edaphic (soil moisture, soil thickness, rock outcropping) characteristics and disturbance regime of the area.

CHP is located on the south side of the highway, east of Admirals Road. Lesser disturbed areas of CHP comprise mature forests dominated by Douglas fir (*Pseudotsuga menziesii*) with lesser amounts of grand fir (*Abies grandis*) and western redcedar (*Thuja plicata*) (*Photo 1*). Drier sites support Arbutus (*Arbutus menziesii*) and Garry Oak (*Quercus garryana*). Understory vegetation comprise a mix of salal (*Gautheria shallon*), dull Oregon grape (*Mahonia nervosa*), ocean spray (*Holodiscus discolor*), bald hip rose (*Rosa gymnocarpa*), and snowberry (*Symphoricarpos albus*).



*Photo 1. Mature Douglas fir forest in Cuthbert Holmes Park adjacent to Highway 1.*

On the north side of the project alignment is the GGT, portions of which are lined with trees such as Garry Oak (*Figure 3*). Garry Oaks are native trees listed as provincially secure (not threatened) but are locally important (GOERT 2015).



*Figure 3. Location of endangered Garry Oak Ecosystem and mature individuals and groups of Garry Oak trees in and around the project area.*

Rock outcrops in the area provided slightly drier habitat characterized by stands of Garry Oak, Arbutus and Douglas fir (*Photo 2*).

Garry Oak ecosystems often comprised plant species at risk protected under the federal SARA (GOERT 2015). The northwest quadrant of the project contained a rocky knoll supporting a provincially



*Photo 2. Rocky knoll supporting a Garry Oak ecosystem located at the northwest quadrant of the project.*

red listed Garry Oak - Arbutus ecosystem (*Photo 2, Figure 3*). Impacts to this ecosystem by project construction are anticipated. Offset recommendations are presented in Section 7 of this report.

## 5.4 INVASIVE SPECIES

Much of the existing vegetation in the area was comprised of invasive species. Invasive species were located in vegetated corridors lining the GGT (*Photo 3*) and the trails and roadside areas adjacent to CHP.

The disturbed areas of CHP were dominated by invasive shrubs and trees (*Photo 4*). Himalayan blackberry (*Rubus armeniacus*) and common hawthorn (*Crataegus monogyna*) were the most commonly observed invasive species in the area.

Other invasive species included scotch broom (*Cytisus scoparius*), daphne laurel (*Daphne laureola*), English ivy (*Hedera helix*), English holly (*Ilex aquifolium*), and the provincial noxious weeds Canada thistle (*Cirsium arvense*) and tansy ragwort (*Senecio jacobaea*). Control of designated noxious species by landowners is required by the Province (BC 1996a).



*Photo 3. GGT is a multiuse trail vegetated either side with a mix of native and invasive tree, shrub and herb species.*



*Photo 4. Project will impact the invasive blackberry and common hawthorn which occupy disturbed areas of CHP.*

## 5.5 PLANT SPECIES AT RISK

The CDC database was reviewed and utilized to compile a list of at risk plant species and plant communities with potential to occur in and around the project area (CDC 2015). This compilation is presented in *Appendix A* of this report. Site visits assisted in confirming and assessing species habitat in the area. Distribution maps for each species (E-Flora BC 2015) indicated the suitability of habitat for plant species presence.

Plant species at risk historically associated with Garry Oak - Arbutus ecosystems have been reported and mapped by the Province in the local area of the project. These observations included populations of balsamroot (*Balsamorhiza deltoidea*) (reported in 1976 and reported destroyed 1998) and Geyer's onion (*Allium geyeri*) (reported 1959 on a coastal bluff along Portage Inlet) (CDC 2015b). These species have been reported in this locale in recent years but were not observed in the project area during the site reconnaissance.

The location of potential species at risk habitat, adjacent to the project area, mapped by the Province, is presented in *Figure 4*. No provincially or federally listed plant species at risk (*Appendix A*) were known to occur within the immediate project footprint.

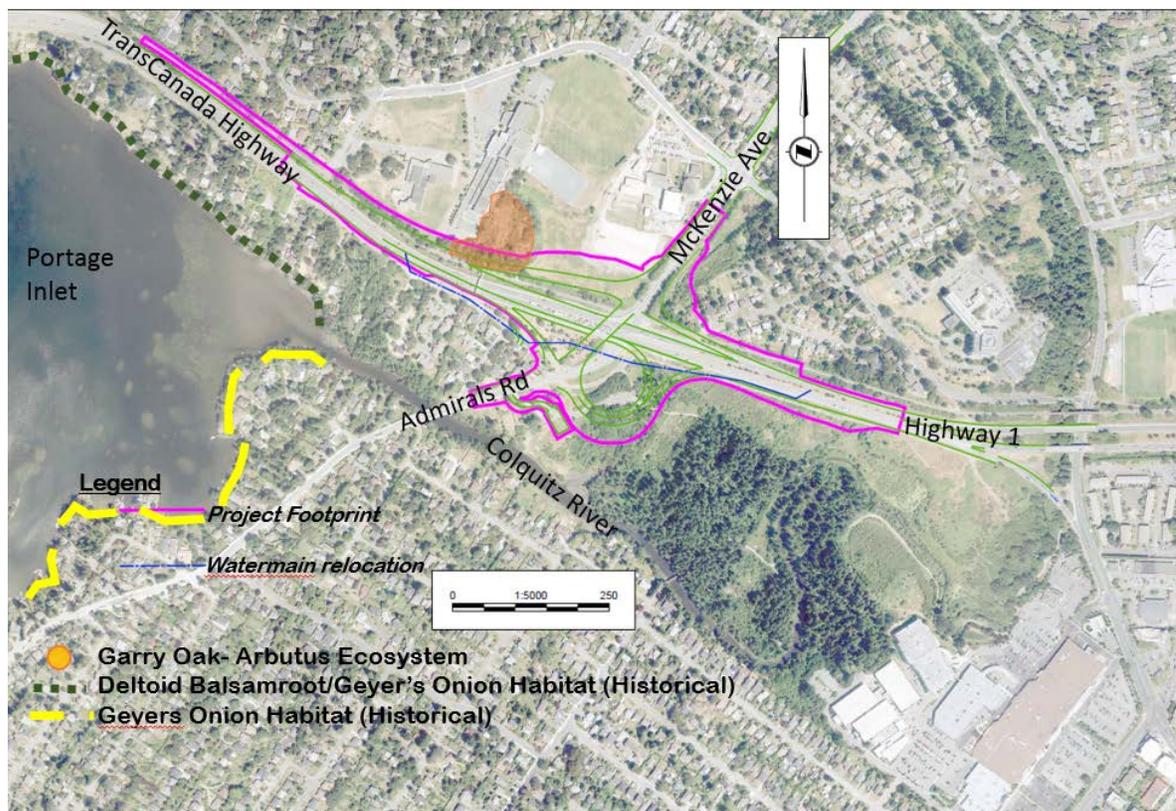


Figure 4. Location of environmental sensitivities in and around the project area including historical plant species at risk and ecosystems at risk.

## 5.6 TERRESTRIAL WILDLIFE SPECIES

CHP provides habitat for urbanized wildlife and birds (Saanich 2011). The Colquitz River and its riparian area within CHP act as a transfer corridor for many fish, birds and other animal species to upstream habitats. A provincial inventory, reporting wildlife and birds in the area, was previously conducted by Campbell (1980). Observations of wildlife during the field review for this project were restricted to observable evidence of habitat use or modification. Wildlife trees were defined as trees that had visible signs of nesting or foraging activity located within or very close to the project area.

The Victoria Harbour Migratory Bird Sanctuary at Portage Inlet (*Figure 5*) is federally designated for the protection of migratory birds. The west side of the project alignment lay a little more than 100 m from the bird sanctuary. Disturbance of breeding birds by construction noise is prohibited under the federal *MBCA* (Canada 1994) and the provincial *Wildlife Act* (BC 1996b).

### Mammals

Black-tailed Deer (*Odocoileus hemionus*), Red Squirrel (*Tamiasciurus hudsonicus*), Raccoon (*Procyon lotor*), Mink (*Neovison vison*), Wandering Shrew (*Sorex vagrans*), River Otter (*Lontra canadensis*), Black Rat (*Rattus rattus*) and Deer Mouse (*Peromyscus maniculatus*) observations were reported by Campbell (1980).

During the site visit, wildlife or wildlife use (often evidenced by the presence of scat or burrows) was investigated. No observations were made of mammals during the field review for this project. Wildlife identification could not be made of the burrows that were observed.

### Birds

Bird activity was observed in the forested habitat of the CHP. Field observations included identification of bird calls, observations of bird nests, presence of bird droppings at tree perches, pecking and foraging activity on trees, and observations of flying and foraging within the study area.

Birds species reported by Campbell (1980) included over 130 species that frequent the area. Of those reported, 36 species were reported as breeding in the area of CHP. The nest colony of the Great Blue Heron was most notable in CHP (*Figure 5*).

Other wildlife trees observed during the field review included an active Northern Flicker nest (*Colaptes auratus*), trees showing signs of woodpecker activity, a Great Blue Heron nest colony (rookery), and trees with potential but unconfirmed owl nesting sites. Raptors reported to breed in the area include Cooper's Hawk (*Accipiter cooperii*), Red-tailed Hawk (*Buteo jamaicensis*), Screech Owl (*Megascops kennicottii*) and Great Horned Owl (*Bubo virginianus*) (Campbell 1980).

Numerous passerines were observed during the field review including the American Robin (*Turdus migratorius*), Chestnut-backed Chickadee (*Poecile rufescens*), and Spotted Towhee (*Pipilo maculatus*).

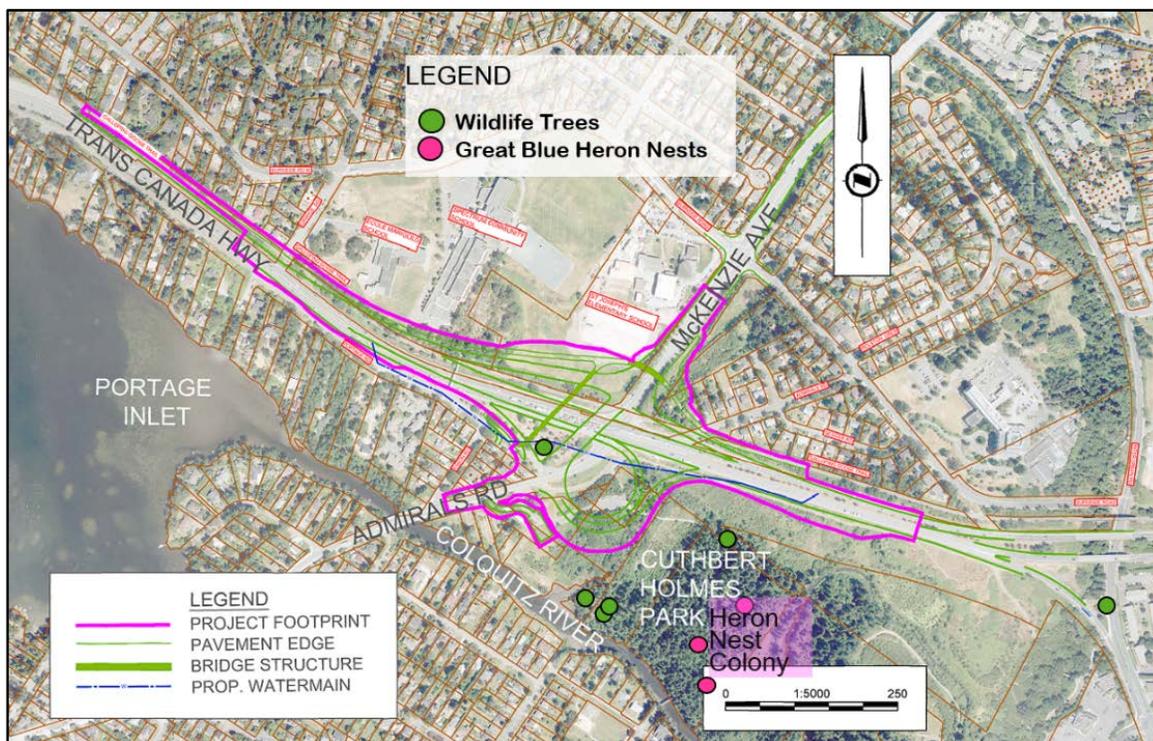


Figure 5. Location of observed wildlife trees and trees containing bird nests. There are several nests at the heron rookery (colony) in various states of deterioration and are grouped here as feature.

### Protected Nests under *Wildlife Act 34b*

Great Blue Heron nesting sites are protected year round under *Wildlife Act 34b* (BC 1996b). The rookery within CHP has been locally and provincially mapped (*Figure 5*). No other nests protected under *Wildlife Act 34b* were observed during the field review or reported for the area. Discussions with a stewardship group for CHP revealed that the heron rookery was abandoned four years ago (2011) due to bald eagle predation. The return of Great Blue Heron to the rookery may occur during any breeding season.

## 5.7 WILDLIFE SPECIES AT RISK

Database queries for the presence of wildlife species at risk known to have habitat within the CDFmm BGC zone were conducted within the CDC and Species Explorer databases (CDC 2015a,b). The data obtained also indicated SARA listed species that may have been locally observed. A list of wildlife species at risk is presented in *Appendix B*. A review of species specific habitat requirements and provincially mapped observations (E-Fauna 2015, iMapBC 2015) informed our site visits to confirm potential species on site. The Great Blue Heron was the only species at risk observed during the field review. This observation was made at the Colquitz River near the CHP heron nest rookery.

## 5.8 WATER RESOURCES

Roadside drainage swales directing water to storm water outlet areas was the only evidence of water within the immediate project area. The Colquitz River and Portage Inlet are two waterbodies in relatively close proximity to the project alignment. These waterbodies, which provide substantial aquatic habitat for aquatic adapted species, fish and waterfowl, will not be directly impacted by the project. Application of best management practices (BMPs) during construction will serve to protect these waterbodies from impact by project activities.

# 6. Assessment of Environmental Impacts

## 6.1 KEY ISSUES

Several environmentally sensitive features within the project area were identified. Mitigation of impacts to these sensitive features from the proposed project construction activities include the application of BMPs, adherence to least risk timing windows, implementation of measures to protect water quality of downslope watercourses, and the potential need for offsetting plans associated with areas of project impact that could not be avoided (discussed in Section 7 of this report).

Site specific environmental impacts identified include:

1. Direct impacts on a provincially red-listed Garry Oak - Arbutus ecosystem.
2. Direct impacts on vegetation and potential wildlife habitat along the GGT, within the Garry Oak – Arbutus ecosystem and within CHP.
3. Potential disturbances to wildlife due to the close proximity of construction activities to Species at Risk critical habitat (Great Blue Heron rookery) and The Victoria Harbour Migratory Bird Sanctuary.

Table 2 below summarizes the general impacts of various project related construction activities on environmentally sensitive features that require protection or compliance with legislation.

Table 2. Environmental Impact Matrix

Environmental Features:	Natural Systems					Soils			Water		Air Quality/ Noise		
	Vegetation	Wildlife / Wildlife	Water Resources	Species at Risk	Invasive Species	Soil Quality/Compaction	Sedimentation	Erosion	Surface Water Quality	Surface Water Quantity	Air Quality (dust)	Noise	Vibration
<b>PROJECT PHASES / COMPONENTS</b>													
<b>Site Preparation:</b>													
Blasting	X	X		X		X	X	X	X	X	X	X	X
Clearing and Grubbing	X	X	X	X	X	X	X	X	X	X	X	X	
Stripping		X			X	X	X	X	X	X	X	X	
Demolition of Existing Structures	X			X							X	X	
<b>Construction:</b>													
Excavation		X	X	X	X	X	X	X	X		X	X	
Grading		X	X	X		X	X	X	X		X	X	
Cuts and fills		X	X	X	X	X	X	X	X		X	X	
Pile Driving		X	X	X		X	X	X	X	X		X	X
Overpass / Culvert Removal & Installation			X			X					X		
Road base installation						X			X		X		
Paving	X						X			X			
Landscaping	X				X	X		X			X		

## 6.1.1 Natural Systems

Direct project impacts on natural systems within or immediately adjacent to the project area will primarily occur during site preparation activities such as clearing and grubbing, blasting, and stripping and construction activities such as excavation and pile driving.

Construction activities have the potential to cause the following impacts:

### On Vegetation

- Removal of individual trees, shrubs and other vegetation located along the linear corridor of the GGT.
- Disturbance of park ecosystems adjacent to or within the project footprint from construction activities.
- Permanent loss of portions of a provincially red-listed plant community/ecosystem.

## On Wildlife

- Permanent loss of wildlife habitat through the creation of new hard surfaces covering soil surfaces and the removal of vegetation.
- Disturbance of bird species protected under *Wildlife Act* 34 and the *MBCA*.

## On Adjacent Watercourses

- Blasting, excavation, levelling, and in-filling activities have the potential to disturb soils and create erodible soil surfaces.
- Increased sedimentation of watercourses from the erosion of disturbed soil surfaces. Sedimentation can reduce biological productivity and stress wildlife by altering forage and wildlife and fish habitat availability.

## On Species and Ecosystems at Risk

- Activities such as blasting and excavation create noise that may impact breeding and foraging activities of species at risk such as the Great Blue Heron.
- Removal of vegetation and wildlife trees reduces breeding and foraging habitat.
- Blasting/grading/infill of habitat.

## By Invasive Species

- Noxious weeds controlled under the *Weed Control Act* are found throughout the project area and will need mitigation measures in place for controlling spread.
- Invasive weeds tend to establish quickly, spread rapidly and overtake native species habitat, preventing the natural regeneration of natural ecosystems. As a result they are a threat to natural ecosystem establishment or restoration.

## 6.1.2 Soils

Cut and fill practices will be employed during the construction phase of the project. Crushed rock and overburden materials (including topsoil) may be reused within the project footprint.

Site preparation and construction activities will result in impacts to soils in the study area through:

- A reduction in soil quality due to the erosion and compaction of soils or contamination from the accidental spill of deleterious substances such as fuel, oil or spills from equipment;
- Grade changes and alteration of local drainage patterns and potential erosion of soil surfaces; and
- Generation of sediment/dust laden runoff and potential release into the environment.

## 6.1.3 Water

Surface water quality has the potential to be impacted by construction activities. The federal *Fisheries Act* (Canada 1985) legislates that no deleterious substances may be released into fish-bearing waters. A substance is deleterious if it is harmful to fish or wildlife, if it limits the use of fish by humans, or if, by going through some process of degradation, it harms the soil or water quality (for example, oxygen-depleting wastes) (MOE 2014a). A substance is also deleterious if it exceeds a level prescribed by regulation.

### Water Quality

Construction activities that have the potential to result in the temporary reduction in water quality include:

- Accidental spill of deleterious substances such as fuel, oil or spills from construction equipment or vehicles can potentially impact surface and groundwater quality depending on the proximity to a watercourse or the permeability of the soil;
- Runoff from construction activities and impermeable surfaces has the potential to enter nearby watercourses potentially discharging sediment and other 'deleterious' substances into the environment. Potential contaminants from runoff include:
  - Dust particles from rock blasting, from dry soil disturbance, or from construction waste or other products.
  - Sediment from turbid runoff causing the release of silt-laden water into the environment.

### Water Quantity

Runoff from newly constructed hard surfaces in areas where surfaces had been previously permeable to rainfall reduces ground water recharge and can increase volume of surface water runoff and erosion potential. Stormwater treatment facilities are being designed for this project.

## 6.1.4 Air Quality / Noise and Vibration

Air quality, noise and vibration from construction activities can create negative impacts on environmental resources including wildlife. Rock blasting, if not done in a controlled manner, can have short-term but negative impacts related to noise pollution as well as dust and debris generated during these types of activities.

### Air Quality

Construction related activities that have the potential to impact air quality include the following:

- Exhaust emission from diesel and gasoline powered construction equipment and vehicles; and
- Construction activities with potential to generate dust including:
  - Ground disturbance, vegetation and debris clearing;
  - The blasting of rock hillsides;
  - The removal of asphalt and concrete from road surfaces;

- Removal of existing structures and obstacles;
- Removal of construction debris;
- Filling activities and trucks transporting overburden and fill materials;
- Vehicular traffic on temporary unpaved roads; and
- Wind erosion from stockpiles.

## Noise and Vibration

Construction activities have the potential to generate noise levels that can create negative impacts on environmental receptors such as birds. The size of the impact area depends on factors such as noise level, the duration of the activity, and its timing. Rock blasting, if not done in a controlled manner, can have short-term but negative impacts related to noise pollution as well as dust and debris generated during these types of activities. The following impacts can be attributed to excessive noise and vibration:

- Noise and vibration from heavy equipment operation, blasting, crushing rock, pile driving, may disturb breeding birds and their young during the bird breeding season;
- Wildlife may be impacted by noise from construction activities, especially if the timing or magnitude of noise and/or vibration is in proximity to sensitive species and/or habitats in which they are active (e.g. disturbance during breeding); and
- Construction noise may also impact the surrounding residential communities.

Potential noise impacts on the local residents and schools are being assessed by a qualified professional, specifically, pre – and post - construction noise and noise produced during construction.

# 7. Mitigation Strategies

A Construction Environmental Management Plan (CEMP) must be prepared for the project as per the guidelines set out in Section 165 of the *2012 Standard Specifications for Highway Construction* (MOTI 2011). The CEMP is required to outline mitigation measures for environmental impacts associated with the project and assist in achieving compliance with provincial and federal regulations. The CEMP and works undertaken for this project will follow the environmental protection provisions presented in Section 165 of the *2012 Standard Specifications for Highway Construction* (MOTI 2011).

Environmental components potentially impacted by the project and recommended mitigation measures or BMPs to mitigate these potential impacts are summarized in the following sections.

## 7.1 SOILS

The various site preparation and construction activities will result in the disturbance of soils in the study area. Erosion and Sediment Control (ESC) strategies should be designed, planned and implemented for each construction activity to prevent erosion and sedimentation. Contamination of soils and remediation is regulated under the *Environmental Management Act* (BC 2003). The project CEMP

should include mitigation measures for erosion and sedimentation and for accidental spills of deleterious substances to minimize potential soil contamination.

## 7.2 WORKS IN AND ABOUT STREAMS

There are no instream works planned. The Project is located uphill from sensitive freshwater and marine habitat. Project compliance with the provincial *Water Sustainability Regulations* (BC 2016) and the implementation of standards and BMPs outlined in 'Standards and Best Practices for Instream Works' (MWLAP 2004) is required to protect fish habitat and water quality. BMP guidelines listed in the 'Land Development Guidelines for the Protection of Aquatic Habitat' (DFO 1993) should be incorporated into the project construction plan and implemented to fulfill the compliance requirements of the Part 3 of the *Water Sustainability Regulation* (BC 2016) and the federal *Fisheries Act* (Canada 1985).

## 7.3 WILDLIFE, BIRDS, AND BIRD HABITAT

Construction of the project will require the implementation of provincial guidelines and BMPs to comply with federal and provincial environmental protection legislation. Following the finalization of the design of the highway, structures, and frontage roads, the regulatory requirements and mitigation strategies recommended here may need to be updated or reassessed.

### 7.3.1 Least Risk Timing Windows for Birds

As vegetation provides nesting and foraging habitat for birds and other animals, there is the potential to contravene the *Wildlife Act* and *MBCA* with the cutting of trees and shrubs for project construction. Noisy activities such as blasting surface rock or pile driving for highway and ramp construction have the potential to impact breeding birds utilizing the adjacent migratory bird sanctuary and vegetated areas of the CHP.

Construction timing windows for birds are the most suitable periods for performing works that would otherwise impact sensitive life stages. Birds and their active nests are protected in Canada by the federal *MBCA* and in BC most birds are protected while nesting under Section 34 of the BC *Wildlife Act*. The BMPs outlined in 'Develop with Care' (MOE 2014a) recommend tree and vegetation clearing outside the bird breeding period. While the breeding season for bird species varies by species, the general bird breeding period is considered to be March 1 to August 30 (MOE 2014a). The least risk windows for activities with the potential to impact breeding birds within the project area are listed in *Table 3*.

If vegetation clearing or other disruptive activities must be conducted during the breeding period, an Appropriately Qualified Professional (AQP) should be engaged to survey the site for active nests and flag no-go buffer zones around active nests. AQP monitoring of active nests for disturbance within 200 m of construction noise is recommended (MOE 2014a). Nests should be monitored for signs of disturbance behavior until each nest has fledged. Clearing vegetation outside the bird breeding season does not require a pre-clearing survey. Subsection 34(b) of the *Wildlife Act* provides year-round protection to Bald Eagle, Osprey, and Great Blue Heron nests (among others), no matter the nest

condition or activity (MOE 2014b,c). If project activity occurs near a protected nest, a protective buffer is required so that damage or disturbance to the nest and nest tree does not occur (MOE 2013b).

Table 3. Bird Breeding Season and Least Risk Timing Windows for Compliance with Wildlife Act 34.<sup>1</sup>

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Bald Eagle												
Other birds												
Great Blue Heron												
Migratory Birds												

<sup>1</sup>(MOE 2014 a,b,c)

Breeding Window	Least Risk Window
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## 7.4 WATER QUALITY

Mitigation measures and BMPs to protect surface water quality during construction include:

- Effective management of site water and ESC measures to protect water quality.
- Control of waste and potential contaminants from construction equipment.

## 7.5 INVASIVE SPECIES

Control of designated noxious and invasive species is required by the Province under the *Weed Control Act* (BC 1996a). Due care should be taken to protect the site and surrounding area from the introduction of invasive plants during construction. Mitigation measures include:

- Keeping equipment and vehicles clean to prevent tracking of soil on or off site.
- Providing fill and topsoil clean of seeds of invasive species.
- Treatment of nearby infestations.

## 7.6 Air Quality / Noise and Vibration

Air quality management should be addressed in the project CEMP and monitored by a qualified environmental monitor. Mitigation measures to be considered include:

- Controlling dust generated during construction with the application of water.
- Road sweeping during construction and operations;
- Implementing anti-idling procedures for vehicles and equipment;
- Providing speed limits within the construction area; and
- Securing excavated bays on haul trucks.

Preparation and implementation of a noise and vibration management plan should cover scheduling activities like blasting, pile driving or any loud noises outside the bird breeding season. Noise effects and mitigation is being studied by another consultant on this project.

## 7.7 SUMMARY OF ENVIRONMENTAL COMPONENTS, IMPACTS AND RECOMMENDED MITIGATION STRATEGIES

The following table summarizes potential project impacts to environmental components and recommended mitigation strategies (*Table 4*). Final design plans will determine the extent of actual impacts to be mitigated and the selection and refinement of mitigation strategies to be developed within the project CEMP. All resulting mitigation measures will need to conform to the BC MOTI 2012 *Standard Specifications for Highway Construction - Section 165 Protection of the Environment* (MOTI 2011).

Table 4. Summary of Environmental Components, Impacts and Recommended Mitigation Strategies

ENVIRONMENTAL COMPONENT	PROJECT ACTIVITIES THAT MAY IMPACT ENVIRONMENTAL RESOURCES	DESCRIPTION OF POTENTIAL ENVIRONMENTAL IMPACTS	RECOMMENDED MITIGATION/ OR BMPS
<b>Vegetation</b>	<ul style="list-style-type: none"> <li>• Vegetation clearing</li> <li>• Grubbing</li> </ul>	<ul style="list-style-type: none"> <li>• Potential loss of wildlife habitat and wildlife trees</li> </ul>	<ul style="list-style-type: none"> <li>• Retain or provide for the reuse of wildlife trees. Leave cut trees on the remaining forest floor to provide habitat and foraging opportunities.</li> </ul>
		<ul style="list-style-type: none"> <li>• Impacts to retained trees by compaction of tree root zone</li> </ul>	<ul style="list-style-type: none"> <li>• Root protection zone is the extent of the tree crown of each tree.</li> <li>• Protection fencing is recommended around retained trees.</li> </ul>
		<ul style="list-style-type: none"> <li>• Removal of provincially listed ecosystems</li> </ul>	<ul style="list-style-type: none"> <li>• Impacts to provincially listed vulnerable forest ecosystems should be avoided or impact minimized as much as possible.</li> </ul>
		<ul style="list-style-type: none"> <li>• Establishment of invasive plant species</li> </ul>	<ul style="list-style-type: none"> <li>• Due care should be taken to protect the site and surrounding area from the introduction or spread of invasive plants during construction</li> <li>• Monitor areas with disturbed soils and remove regulated weeds as per the <i>Weed Control Act</i>.</li> <li>• Revegetate exposed soils with native species as soon as possible and where practical.</li> </ul>
<b>Wildlife / Wildlife Habitat</b>	<ul style="list-style-type: none"> <li>• Vegetation clearing</li> <li>• Blasting and noise</li> <li>• Clearing and grubbing</li> <li>• Stripping</li> <li>• Excavation</li> <li>• Grading and infill</li> </ul>	<ul style="list-style-type: none"> <li>• Loss of wildlife habitat</li> </ul>	<ul style="list-style-type: none"> <li>• Minimize forest clearing and cutting through reduced footprint. Replant non-hard surfaces with native vegetation.</li> </ul>
		<ul style="list-style-type: none"> <li>• Wildlife disturbance from construction noise-related impacts: bird nest abandonment</li> </ul>	<ul style="list-style-type: none"> <li>• Timing constraints: Follow least risk timing windows for clearing vegetation and schedule construction activities that generate noise that could disturb breeding birds within the least risk window.</li> <li>• Provide an AQP to monitor active bird nests within the project area during construction outside the least risk window. AQP monitoring of active nests for disturbance within 200 m of construction noise is recommended (MOE 2014a).</li> </ul>

ENVIRONMENTAL COMPONENT	PROJECT ACTIVITIES THAT MAY IMPACT ENVIRONMENTAL RESOURCES	DESCRIPTION OF POTENTIAL ENVIRONMENTAL IMPACTS	RECOMMENDED MITIGATION/ OR BMPS
			<ul style="list-style-type: none"> <li>• Buffer zones to be placed around active nests. Monitoring of active nests for disturbance during construction. AQP to determine impacts.</li> </ul>
		<ul style="list-style-type: none"> <li>• Direct wildlife mortality</li> </ul>	<ul style="list-style-type: none"> <li>• Salvage of organisms from wildlife habitat to be impacted by construction of the project.</li> <li>• AQP onsite monitoring.</li> <li>• Permits for salvage, if the need arises, may be required from MOE.</li> </ul>
		<ul style="list-style-type: none"> <li>• Wildlife encounters</li> </ul>	<ul style="list-style-type: none"> <li>• AQP on site during site clearing and grading to salvage and relocate wildlife.</li> <li>• Develop a plan to reduce attracting birds and other wildlife to construction site during construction by proper waste control.</li> </ul>
<b>Water Resources</b>	<ul style="list-style-type: none"> <li>• General construction works and grading and infill</li> <li>• Culvert installation</li> </ul>	<ul style="list-style-type: none"> <li>• Increase in water turbidity of watercourses downslope of work area</li> <li>• Potential reduction in quality of adjacent fish habitat</li> </ul>	<ul style="list-style-type: none"> <li>• Limit impacts to onsite vegetated and adjacent riparian areas.</li> <li>• Apply ESC measures and BMPs to control erosion and sedimentation.</li> </ul>
<b>Species at Risk - Birds</b>	<ul style="list-style-type: none"> <li>• Vegetation clearing</li> <li>• Rockface blasting</li> </ul>	<ul style="list-style-type: none"> <li>• Non-compliance with the <i>Wildlife Act</i> through disturbance of breeding birds</li> </ul>	<ul style="list-style-type: none"> <li>• Buffer zones to be placed around active nests. Monitoring of active nests for disturbance during construction. AQP to determine impacts.</li> <li>• Removal of protected nests under <i>Wildlife Act</i> 34b is not permitted.</li> </ul>
<b>Invasive Species</b>	<ul style="list-style-type: none"> <li>• Clearing and grubbing</li> <li>• All ground disturbances</li> </ul>	<ul style="list-style-type: none"> <li>• Invasive species may spread through construction activities</li> </ul>	<ul style="list-style-type: none"> <li>• Proper removal and handling of noxious weeds.</li> <li>• Methods to prevent spread of propagules on tires of vehicles.</li> </ul>

ENVIRONMENTAL COMPONENT	PROJECT ACTIVITIES THAT MAY IMPACT ENVIRONMENTAL RESOURCES	DESCRIPTION OF POTENTIAL ENVIRONMENTAL IMPACTS	RECOMMENDED MITIGATION/ OR BMPS
			<ul style="list-style-type: none"> <li>• Provide protective cover of disturbed soils through native species revegetation</li> </ul>
<b>Soils</b>	<ul style="list-style-type: none"> <li>• New road surfaces, equipment or vehicle use on off road.</li> <li>• Accidental spills of deleterious substances</li> </ul>	<ul style="list-style-type: none"> <li>• Compaction reducing permeability</li> <li>• Contamination of soil</li> </ul>	<ul style="list-style-type: none"> <li>• Restrict vehicles and equipment from accessing natural soil surfaces to be retained. Where possible provide exclusion fencing for no-go zones.</li> <li>• Spill contingency plan.</li> <li>• Spill kits on heavy equipment &amp; throughout project site.</li> </ul>
	<ul style="list-style-type: none"> <li>• Erosion and sedimentation</li> </ul>	<ul style="list-style-type: none"> <li>• Sediment release to nearby watercourses</li> </ul>	<ul style="list-style-type: none"> <li>• Design and implementation of ESC protections.</li> </ul>
<b>Water Quality / Quantity</b>	<ul style="list-style-type: none"> <li>• Clearing</li> <li>• Blasting</li> <li>• Excavation</li> <li>• Overburden stripping</li> </ul>	<ul style="list-style-type: none"> <li>• Erosion and sedimentation causing increased turbidity in the water</li> </ul>	<ul style="list-style-type: none"> <li>• BMPs recommend that equipment used for site preparation, construction, maintenance, or removal of the culvert operate within a dry stream channel or from the top of the bank.</li> <li>• Manage through standard erosion and sediment control plans (e.g., sediment fences for foreshore activities, use of temporary diversion berms and sandbags)</li> <li>• Water quality parameters such as TSS and turbidity will be monitored by an AQP during construction activities that have the potential to release turbid water to the aquatic environment.</li> <li>• Environmental monitor on site to monitor effectiveness of ESC measures.</li> </ul>
	<ul style="list-style-type: none"> <li>• Accidental spills of deleterious substances</li> <li>• Runoff from construction activities and impermeable surfaces</li> </ul>	<ul style="list-style-type: none"> <li>• Transport of substances to watercourses reducing water quality</li> </ul>	<ul style="list-style-type: none"> <li>• Water quality parameters such as TSS and turbidity will be monitored during construction activities near a watercourse.</li> <li>• Spill contingency plan. Spill kits on heavy equipment &amp; throughout project site.</li> </ul>

ENVIRONMENTAL COMPONENT	PROJECT ACTIVITIES THAT MAY IMPACT ENVIRONMENTAL RESOURCES	DESCRIPTION OF POTENTIAL ENVIRONMENTAL IMPACTS	RECOMMENDED MITIGATION/ OR BMPS
	<ul style="list-style-type: none"> <li>• Hard surface creation - Asphalt primer and paving</li> </ul>		<ul style="list-style-type: none"> <li>• Use of biodegradable fuels when working over or adjacent to a watercourse.</li> <li>• Cleaning and sweeping public road surfaces used by heavy equipment daily or as needed</li> <li>• Contain and collect all effluent and debris from construction activities and disposed of in accordance with BC <i>Environmental Management Act</i></li> </ul>
<b>Air Quality-Dust / Noise/ Vibration</b>	<ul style="list-style-type: none"> <li>• Blasting</li> <li>• Clearing and grubbing</li> <li>• Stripping</li> <li>• Demolition of structures</li> <li>• Pile driving</li> <li>• Excavation</li> <li>• Grading, cut and fill</li> <li>• Paving</li> <li>• Landscaping</li> </ul>	<ul style="list-style-type: none"> <li>• Dust generation</li> <li>• Noise generation</li> <li>• Sediment transfer to watercourses</li> <li>• Noise and vibration through the air and ground disrupting wildlife</li> </ul>	<ul style="list-style-type: none"> <li>• Provide protective covers to reduce blast noise and dust generation.</li> <li>• Noise and vibration from blasting and pile driving activities planned during the least risk window for disturbance of wildlife (birds).</li> <li>• Noise impacts and mitigations regarding nearby residents are being investigated by another consultant.</li> </ul>

## 8. Residual Impacts

Residual impacts cannot be fully determined at this time as the design footprint and construction requirements are still being developed. At the time of this assessment, expected residual impacts include:

- permanent loss of a portion of a Garry Oak ecosystem.
- loss of wildlife habitat through reduction in wildlife vegetation at CHP and along the highway and GGT corridor.

These impacts will be quantifiable based on the final detailed design. Detailed design for this highway widening project is not complete and the full extent of residual impacts cannot be determined at this time.

## 9. Offsetting / Restoration

A native Garry Oak - Arbutus ecosystem and the existing vegetation lining the GGT and highway corridor will be impacted by highway widening and on and off ramp development. A plan to offset these impacts will be developed at a future stage, as the project advances.

CHP will be impacted by the construction of the eastbound on-ramp to Highway 1 from Admirals Road. These residual impacts will be offset through land transfers to the park. All lands within CHP that are removed from park use for this project will be offset with the addition of land area from properties adjacent to the park to ensure there is not net loss of park area. Amenities within the park such as parking lots, trails and trailheads, if impacted by the project footprint, will be reinstated to ensure continued connectivity of park access and trail use throughout the park.

CHP is an urban park comprised of shrub and forest vegetation that has been degraded due to disturbance associated with agriculture, human activities and soil compaction, and the introduction of invasive plants. The District of Saanich has several ongoing efforts to remove invasive plants and restore native vegetation in this park. Potential offsetting of impacts through improvements to trails, park amenities, and rehabilitation of vegetated wildlife habitat within CHP could provide an opportunity to create a positive benefit to the park, the local neighbourhood and for wildlife.

The District of Saanich has prioritized habitat rehabilitation projects within CHP with goals to reduce invasive species, restore native species and improve park amenities. The Cuthbert Holmes/Tillicum Park Draft Management Plan (Saanich 2015b) outlines the District of Saanich's goals and objectives for the park. Priority management areas for restoration and rehabilitation efforts within the park by the District of Saanich are presented in *Figure 6*. Specific plans for offsets and restoration efforts within CHP may be developed through engagement with the District of Saanich. The District of Saanich has indicated that management areas marked 3 and 4 on *Figure 6* are high priority areas for consideration for offsetting project impacts to other areas of the park.

Restoration efforts within the project right of way include plans to re-establish a parking lot (if/as appropriate, based on discussions with the District of Saanich) and trail access through the park if

these amenities are impacted by the project. Bare soil surfaces are to be planted with native vegetation. Restoration of disturbed areas within the project footprint can include stabilizing through planting of native vegetation.

BMPs recommend that areas disturbed by construction activities should be immediately stabilized or revegetated with native plant species adapted to local climate conditions (MOE 2014). AQPs can

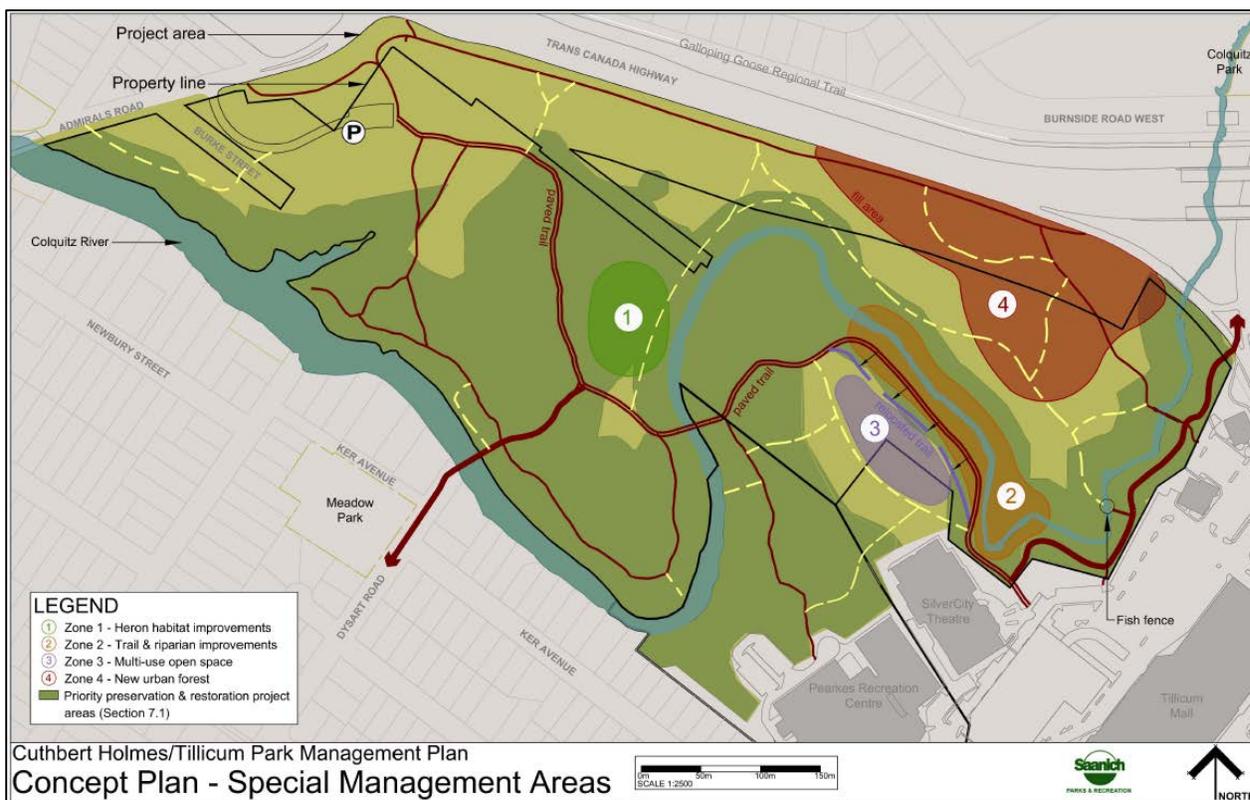


Figure 6. Management areas of CHP showing areas of priority for Park habitat and amenity improvements and rehabilitation efforts by the District of Saanich (Saanich 2011).

provide advice on which suitable locally adapted native species to use in restoration efforts and provide planting patterns that are appropriate to the local ecosystem. As the local CDFmm ecosystems are provincially designated ‘at risk’, efforts to restore CDF ecosystems, particular Garry Oak woodlands and meadows, are locally important. Restoring forest communities in CHP will provide wildlife habitat within this urban setting, adding habitat adjacent to the migratory bird sanctuary.

## 10. Regulatory Compliance

The project will conduct its activities in compliance with legislated acts associated with environmental protection. If constructed as proposed in the reviewed design there are no anticipated needs for environmental permits, approvals or authorizations to complete the project. However, culvert installation or replacement will require a notification to the Province under Part 3 of the *Water Sustainability Regulation*.

# 11. Conclusions

This EA was completed with information obtained from desktop studies, a field site visit and engineering design drawings prepared for the conceptual designs, which outlined the potential project footprint. Environmentally sensitive features within the study area were identified and located. Potential impacts to be mitigated during the design and construction of the project were identified and recommendations for mitigation provided. Environmental legislation was reviewed to determine the regulatory compliance requirements for the successful construction of the project.

This report focused on the potential environmental impacts of the largest (in area) proposed design footprint. The design footprint is at the conceptual design phase and under continual development and revision. The precise magnitude of environment impacts are undetermined at this time and may require revisiting once a final detailed design has been completed.

Potential environmental impacts determined at this design phase include: loss of wildlife habitat with highway widening and underpass and on/off ramp development, loss of rare ecosystem features, and potential disturbance of sensitive life stages (breeding) of wildlife and birds by construction activities.

The close proximity of the project to the Victoria Harbour Migratory Bird Sanctuary at Portage Inlet, to the heron nest rookery within CHP, and to the Colquitz River, may require construction management scheduling to avoid impacts to the species that frequent these sensitive habitats. Disruption of breeding birds is prohibited under the *Wildlife Act* and the *MBCA*. Blasting of rock and pile driving is not expected to impact the habitat of species at risk but could disrupt breeding birds. AQP monitoring of active nests for disturbance within 200 m of construction noise is recommended (MOE 2014a). Construction planning to schedule particularly noisy construction activities outside the bird breeding season is recommended to ensure compliance with the *Wildlife Act* and the *MBCA*. Construction mitigation strategies, including noise dampening techniques, are to be addressed at a later date in a project specific CEMP.

Project reviews or authorizations from DFO are not required by this project as this project does not directly impact fish habitat. Culvert installation and culvert extensions directing stormwater under the widened highway and roads requires a notification to the Province under the *Water Sustainability Regulation* of the *Water Sustainability Act*. Implementation of standard BMPs during construction is required to protect nearby water resources, fish and fish habitat. No other environmentally related permitting is expected to be needed to construct this project.

Habitat offsetting will be accomplished through a 1:1 land area transfer to ensure there is no net loss of habitat area and amenities within Cuthbert Holmes Park.

## 12. Closing

The information presented in this report is for use by the MOTI as part of their requirement for a review of potential environmental impacts associate with the Highway 1 Admirals-McKenzie Interchange Project. This EA was prepared based on the preferred design option information and will need to be revised at the final detailed design stage to include a final determination of project impacts requiring mitigation. We trust the information provided is sufficient to meet your needs at this time.

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Appendix A: Plant Species at Risk for the CDFmm Biogeoclimatic Zone of the Capital Regional District

English Name	Scientific Name	BC List	SARA	Suitability of Habitat in and around the project area.
<b>Vascular Plants (conifers, deciduous trees and shrubs)</b>				
seaside juniper	<i>Juniperus maritima</i>	Blue		No suitable habitat
yellow sand-verbena	<i>Abronia latifolia</i>	Red		No suitable habitat
Spanish-clover	<i>Acmispon americanus</i> var. <i>americanus</i>	Blue		No suitable habitat
chaffweed	<i>Anagallis minima</i>	Blue		No suitable habitat
deltoid balsamroot	<i>Balsamorhiza deltoidea</i>	Red	1-E	Suitable habitat locally
Vancouver Island beggarticks	<i>Bidens amplissima</i>	Blue	1-SC	No suitable habitat
two-edged water-starwort	<i>Callitriche heterophylla</i> var. <i>heterophylla</i>	Blue		No suitable habitat
winged water-starwort	<i>Callitriche marginata</i>	Blue		No suitable habitat
contorted-pod evening-primrose	<i>Camissonia contorta</i>	Red	1-E	No suitable habitat
golden paintbrush	<i>Castilleja levisecta</i>	Red	1-E	No suitable habitat
Victoria's owl-clover	<i>Castilleja victoriae</i>	Red	1-E	No suitable habitat
erect pygmyweed	<i>Crassula connata</i> var. <i>connata</i>	Red		Suitable habitat locally
dense spike-primrose	<i>Epilobium densiflorum</i>	Red	1-E	Suitable habitat locally
brook spike-primrose	<i>Epilobium torreyi</i>	Red	1-E	Suitable habitat locally
rough-leaved aster	<i>Eurybia radulina</i>	Red		Suitable habitat locally
Oregon ash	<i>Fraxinus latifolia</i>	Red		No suitable habitat
common bluecup	<i>Githopsis specularioides</i>	Red		No suitable habitat
mountain sneezeweed	<i>Helenium autumnale</i> var. <i>grandiflorum</i>	Blue		No suitable habitat
heterocodon	<i>Heterocodon rariflorum</i>	Blue		Suitable habitat locally
ovalpurse	<i>Hornungia procumbens</i>	Blue		No suitable habitat

English Name	Scientific Name	BC List	SARA	Suitability of Habitat in and around the project area.
seaside bird's foot lotus	<i>Hosackia gracilis</i>	Red	1-E	No suitable habitat
Pacific waterleaf	<i>Hydrophyllum tenuipes</i>	Red		No suitable habitat
scalegpod	<i>Idahoia scapigera</i>	Blue		No suitable habitat
fleshy jaumea	<i>Jaumea carnosa</i>	Blue		No suitable habitat
silky beach pea	<i>Lathyrus littoralis</i>	Red		No suitable habitat
Macoun's meadow-foam	<i>Limnanthes macounii</i>	Red	1-T	Suitable habitat locally
fern-leaved desert-parsley	<i>Lomatium dissectum</i> var. <i>dissectum</i>	Red		Suitable habitat locally
Gray's desert-parsley	<i>Lomatium grayi</i>	Red	1-T	Suitable habitat locally
dense-flowered lupine	<i>Lupinus densiflorus</i> var. <i>densiflorus</i>	Red	1-E	No suitable habitat
prairie lupine	<i>Lupinus lepidus</i>	Red	1-E	Suitable habitat locally
Kincaid's lupine	<i>Lupinus oreganus</i> var. <i>kincaidii</i>	Red	1-XX	No suitable habitat
streambank lupine	<i>Lupinus rivularis</i>	Red	1-E	No suitable habitat
coast manroot	<i>Marah oregana</i>	Red		Suitable habitat locally
white meconella	<i>Meconella oregana</i>	Red	1-E	Suitable habitat locally
coast microseris	<i>Microseris bigelovii</i>	Red	1-E	No suitable habitat
dwarf sandwort	<i>Minuartia pusilla</i>	Red	1-E	No suitable habitat
needle-leaved navarretia	<i>Navarretia intertexta</i>	Red		No suitable habitat
Texas toadflax	<i>Nuttallanthus texanus</i>	Blue		No suitable habitat
rosy owl-clover	<i>Orthocarpus bracteosus</i>	Red	1-E	Suitable habitat locally
Macoun's groundsel	<i>Packera macounii</i>	Blue		Suitable habitat locally
slender popcornflower	<i>Plagiobothrys tenellus</i>	Red	1-T	Suitable habitat locally
graceful cinquefoil	<i>Potentilla gracilis</i> var. <i>gracilis</i>	Blue		Suitable habitat locally
tall woolly-heads	<i>Psilocarphus elatior</i>	Red	1-E	Suitable habitat locally

English Name	Scientific Name	BC List	SARA	Suitability of Habitat in and around the project area.
water-plantain buttercup	<i>Ranunculus alismifolius</i> var. <i>alismifolius</i>	Red	1-E	Suitable habitat locally
California buttercup	<i>Ranunculus californicus</i>	Red	1-E	Suitable habitat locally
Lobb's water-buttercup	<i>Ranunculus lobbii</i>	Red		No suitable habitat
California-tea	<i>Rupertia physodes</i>	Blue		Suitable habitat locally
bear's-foot sanicle	<i>Sanicula arctopoides</i>	Red	1-E	Suitable habitat locally
purple sanicle	<i>Sanicula bipinnatifida</i>	Red	1-T	Suitable habitat locally
white-top aster	<i>Sericocarpus rigidus</i>	Red	1-SC	Suitable habitat locally
Henderson's checker-mallow	<i>Sidalcea hendersonii</i>	Blue		No suitable habitat
coastal Scouler's catchfly	<i>Silene scouleri</i> ssp. <i>scouleri</i>	Red	1-E	No suitable habitat
sand lacepod	<i>Thysanocarpus curvipes</i>	Blue		Suitable habitat locally
small-flowered tonella	<i>Tonella tenella</i>	Red	1-E	Suitable habitat locally
poison oak	<i>Toxicodendron diversilobum</i>	Blue		Suitable habitat locally
cup clover	<i>Trifolium cyathiferum</i>	Red		Suitable habitat locally
poverty clover	<i>Trifolium depauperatum</i> var. <i>depauperatum</i>	Blue		Suitable habitat locally
Macrae's clover	<i>Trifolium dichotomum</i>	Blue		Suitable habitat locally
bearded owl-clover	<i>Triphysaria versicolor</i> ssp. <i>versicolor</i>	Red	1-E	Suitable habitat locally
Lindley's microseris	<i>Uropappus lindleyi</i>	Red	1-E	Suitable habitat locally
Howell's violet	<i>Viola howellii</i>	Red		Suitable habitat locally
yellow montane violet	<i>Viola praemorsa</i> ssp. <i>praemorsa</i>	Red	1-E	Suitable habitat locally
Muhlenberg's centaury	<i>Zeltnera muehlenbergii</i>	Red	1-E	Suitable habitat locally
giant chain fern	<i>Woodwardia fimbriata</i>	Blue		No suitable habitat
slimleaf onion	<i>Allium amplexans</i>	Blue		Suitable habitat locally
Olympic onion	<i>Allium crenulatum</i>	Blue		Suitable habitat locally

English Name	Scientific Name	BC List	SARA	Suitability of Habitat in and around the project area.
Geyer's onion	<i>Allium geyeri</i> var. <i>tenerum</i>	Blue		Suitable habitat locally
Carolina meadow-foxtail	<i>Alopecurus carolinianus</i>	Red		No suitable habitat
green-sheathed sedge	<i>Carex feta</i>	Blue		No suitable habitat
foothill sedge	<i>Carex tumulicola</i>	Red	1-E	No suitable habitat
phantom orchid	<i>Cephalanthera austiniiae</i>	Red	1-T	No suitable habitat
small spike-rush	<i>Eleocharis parvula</i>	Blue		No suitable habitat
dwarf red fescue	<i>Festuca rubra</i> ssp. <i>mediana</i>	Blue		No suitable habitat
slender-spiked mannagrass	<i>Glyceria leptostachya</i>	Blue		No suitable habitat
Kellogg's rush	<i>Juncus kelloggii</i>	Red	1-E	No suitable habitat
white-lip rein orchid	<i>Piperia candida</i>	Red		No suitable habitat
Oakes' pondweed	<i>Potamogeton oakesianus</i>	Blue		No suitable habitat
graceful arrow-grass	<i>Triglochin concinna</i>	Blue		No suitable habitat
Howell's triteleia	<i>Triteleia howellii</i>	Red	1-E	Suitable habitat locally
Columbian water-meal	<i>Wolffia columbiana</i>	Red		No suitable habitat
Nuttall's quillwort	<i>Isoetes nuttallii</i>	Blue		No suitable habitat
northern adder's-tongue	<i>Ophioglossum pusillum</i>	Blue		Suitable habitat locally
<b>Non-vascular plants (Mosses, quillworts)</b>				
Alsia	<i>Alsia californica</i>	Blue		
rigid apple moss	<i>Bartramia stricta</i>	Red	1-E	
least moonwort	<i>Botrychium simplex</i> var. <i>compositum</i>	Blue		
moss	<i>Brachythecium holzingeri</i>	Blue		
moss	<i>Bryum violaceum</i>	Red		
moss	<i>Crumia latifolia</i>	Blue		

English Name	Scientific Name	BC List	SARA	Suitability of Habitat in and around the project area.
<b>banded cord-moss</b>	<i>Entosthodon fascicularis</i>	Blue	1-SC	
<b>moss</b>	<i>Fissidens ventricosus</i>	Blue		
<b>moss</b>	<i>Funaria muhlenbergii</i>	Blue		
<b>moss</b>	<i>Physcomitrium pyriforme</i>	Blue		
<b>moss</b>	<i>Platyhypnidium riparioides</i>	Blue		
<b>moss</b>	<i>Racomitrium pacificum</i>	Blue		
<b>moss</b>	<i>Rosulabryum erythroloma</i>	Blue		
<b>twisted oak moss</b>	<i>Syntrichia laevipila</i>	Blue	1-SC	
<b>moss</b>	<i>Desmatodon obtusifolia</i>	Blue		

Appendix B: Animals Species at Risk in the CDFmm Biogeoclimatic Zone of the Capital Regional District

English Name	Scientific Name	BC List	SARA
<b>Amphibians</b>			
Northern Red-legged Frog	<i>Rana aurora</i>	Blue	1-SC
Wandering Salamander	<i>Aneides vagrans</i>	Blue	
Western Toad	<i>Anaxyrus boreas</i>	Blue	1-SC
<b>Birds</b>			
American Bittern	<i>Botaurus lentiginosus</i>	Blue	
Band-tailed Pigeon	<i>Patagioenas fasciata</i>	Blue	1-SC
Barn Owl	<i>Tyto alba</i>	Red	1-SC
Barn Swallow	<i>Hirundo rustica</i>	Blue	
Black Swift	<i>Cypseloides niger</i>	Blue	
Brandt's Cormorant	<i>Phalacrocorax penicillatus</i>	Red	
Caspian Tern	<i>Hydroprogne caspia</i>	Blue	
Common Murre	<i>Uria aalge</i>	Red	
Common Nighthawk	<i>Chordeiles minor</i>	Yellow	1-T
Double-crested Cormorant	<i>Phalacrocorax auritus</i>	Blue	
Great Blue Heron, <i>fannini</i> subspecies	<i>Ardea herodias fannini</i>	Blue	1-SC
Great Blue Heron, <i>herodias</i> subspecies	<i>Ardea herodias herodias</i>	Blue	
Green Heron	<i>Butorides virescens</i>	Blue	

English Name	Scientific Name	BC List	SARA
Hairy Woodpecker, <i>picoideus</i> subspecies	<i>Picooides villosus picoideus</i>	Blue	
Horned Lark, <i>strigata</i> subspecies	<i>Eremophila alpestris strigata</i>	Red	1-E
Marbled Murrelet	<i>Brachyramphus marmoratus</i>	Blue	1-T
Northern Pygmy-Owl, <i>swarthi</i> subspecies	<i>Glaucidium gnoma swarthi</i>	Blue	
Olive-sided Flycatcher	<i>Contopus cooperi</i>	Blue	1-T
Pelagic Cormorant, <i>pelagicus</i> subspecies	<i>Phalacrocorax pelagicus</i>	Red	
Peregrine Falcon	<i>Falco peregrinus</i>	-	
Peregrine Falcon, <i>anatum</i> subspecies	<i>Falco peregrinus anatum</i>	Red	1-SC
Purple Martin	<i>Progne subis</i>	Blue	
Short-eared Owl	<i>Asio flammeus</i>	Blue	1-SC
Tufted Puffin	<i>Fratercula cirrhata</i>	Blue	
Vesper Sparrow, <i>affinis</i> subspecies	<i>Poocetes gramineus affinis</i>	Red	1-E
Western Bluebird (Georgia Depression)	<i>Sialia mexicana</i> pop. 1	Red	
Western Screech-Owl, <i>kennicottii</i> subspecies	<i>Megascops kennicottii kennicottii</i>	Blue	1-SC
White-tailed Ptarmigan, <i>saxatilis</i> subspecies	<i>Lagopus leucura saxatilis</i>	Blue	
Swamp Fingernailclam	<i>Musculium partumeium</i>	Blue	
<b>Gastropods</b>			
Black Gloss	<i>Zonitoides nitidus</i>	Blue	
Blue-grey Taildropper	<i>Prophysaon coeruleum</i>	Red	1-E
Broadwhorl Tightcoil	<i>Pristiloma johnsoni</i>	Blue	

English Name	Scientific Name	BC List	SARA
Dromedary Jumping-slug	<i>Hemphillia dromedarius</i>	Red	1-T
Meadow Rams-horn	<i>Planorbula campestris</i>	Blue	
Northern Abalone	<i>Haliotis kamtschatkana</i>	Red	1-T
Pacific Sideband	<i>Monadenia fidelis</i>	Blue	
Pacific Vertigo	<i>Vertigo andrusiana</i>	Red	
Prairie Fossaria	<i>Galba bulimoides</i>	Blue	
Puget Oregonian	<i>Cryptomastix devia</i>	Red	1-XX
Rocky Mountain Physa	<i>Physella propinqua</i>	Blue	
Scarletback Taildropper	<i>Prophysaon vanattaie</i>	Blue	
Sunset Physa	<i>Physella virginea</i>	Blue	
Threaded Vertigo	<i>Nearctula</i> sp. 1	Red	1-SC
Umbilicate Sprite	<i>Promenetus umbilicatellus</i>	Blue	
Warty Jumping-slug	<i>Hemphillia glandulosa</i>	Blue	1-SC
Western Thorn	<i>Carychium occidentale</i>	Blue	
Galba	<i>Galba vancouverensis</i>	Red	
<b>Insects</b>			
Audouin's Night-stalking Tiger Beetle	<i>Omus audouini</i>	Red	
Autumn Meadowhawk	<i>Sympetrum vicinum</i>	Blue	
Black Saddlebags	<i>Tramea lacerata</i>	Red	
Boisduval's Blue, <i>blackmorei</i> subspecies	<i>Plebejus icarioides blackmorei</i>	Blue	

English Name	Scientific Name	BC List	SARA
Clodius Parnassian, <i>claudianus</i> subspecies	<i>Parnassius clodius claudianus</i>	Blue	
Common Ringlet, <i>insulana</i> subspecies	<i>Coenonympha tullia insulana</i>	Red	
Common Wood-nymph, <i>incana</i> subspecies	<i>Cercyonis pegala incana</i>	Red	
Dun Skipper	<i>Euphyes vestris</i>	Red	1-T
Edith's Checkerspot, <i>taylori</i> subspecies	<i>Euphydryas editha taylori</i>	Red	1-E
Edwards' Beach Moth	<i>Anarta edwardsii</i>	Red	1-E
Greenish Blue, <i>insulanus</i> subspecies	<i>Plebejus saepiolus insulanus</i>	Red	1-E
Johnson's Hairstreak	<i>Callophrys johnsoni</i>	Red	
Large Marble, <i>insulanus</i> subspecies	<i>Euchloe ausonides insulanus</i>	Red	1-XX
Monarch	<i>Danaus plexippus</i>	Blue	1-SC
Moss' Elfin, <i>mossii</i> subspecies	<i>Callophrys mossii mossii</i>	Blue	
Propertius Duskywing	<i>Erynnis propertius</i>	Red	
Sand-verbena Moth	<i>Copablepharon fuscum</i>	Red	1-E
Silver-spotted Skipper	<i>Epargyreus clarus</i>	Blue	
Silver-spotted Skipper, <i>californicus</i> subspecies	<i>Epargyreus clarus californicus</i>	Red	
Sinuous Snaketail	<i>Ophiogomphus occidentis</i>	Blue	
Western Branded Skipper, <i>oregonia</i> subspecies	<i>Hesperia colorado oregonia</i>	Red	
Western Pine Elfin, <i>sheltonensis</i> subspecies	<i>Callophrys eryphon sheltonensis</i>	Blue	
Western Pondhawk	<i>Erythemis collocata</i>	Blue	
Zerene Fritillary, <i>bremnerii</i> subspecies	<i>Speyeria zerene bremnerii</i>	Red	

English Name	Scientific Name	BC List	SARA
<b>Mammals</b>			
American Water Shrew, <i>brooksi</i> subspecies	<i>Sorex palustris brooksi</i>	Red	
Ermine, <i>anguinae</i> subspecies	<i>Mustela erminea anguinae</i>	Blue	
Keen's Myotis	<i>Myotis keenii</i>	Blue	3
Little Brown Myotis	<i>Myotis lucifugus</i>	Yellow	1-E
Northern Elephant Seal	<i>Mirounga angustirostris</i>	Red	
Steller Sea Lion	<i>Eumetopias jubatus</i>	Blue	1-SC
Townsend's Big-eared Bat	<i>Corynorhinus townsendii</i>	Blue	
<b>Fish</b>			
Coho Salmon	<i>Oncorhynchus kisutch</i>	Yellow	
Cutthroat Trout, <i>clarkii</i> subspecies	<i>Oncorhynchus clarkii clarkii</i>	Blue	
<b>Reptiles</b>			
Gopher Snake	<i>Pituophis catenifer</i>	No	1
Gopher Snake, <i>catenifer</i> subspecies	<i>Pituophis catenifer catenifer</i>	Red	1-XX
Sharp-tailed Snake	<i>Contia tenuis</i>	Red	1-E
<b>Turtles</b>			
Painted Turtle	<i>Chrysemys picta</i>	No	1
Painted Turtle - Pacific Coast Population	<i>Chrysemys picta</i> pop. 1	Red	1-E