



HANEY GRAVEL PIT CLEARING PROJECT ENVIRONMENTAL OVERVIEW ASSESSMENT

Prepared for:

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DISTRIBUTION LIST

The following individuals/firms have received this document:

Name	Firm	Hardcopies	Email	FTP
Tim Li	Ministry of Transportation and Infrastructure		✓	✓
Harihar Bhandari	Ministry of Transportation and Infrastructure		✓	✓

AMENDMENT RECORD

This report has been issued and amended as follows:

Issue	Description	Date	Approved by	
1	First version of Haney Gravel Pit Clearing Project Environmental Overview Assessment	20231219	Garth Taylor Project Director	Joanne Letkeman Project Manager
2	Second version of Haney Gravel Pit Clearing Project Environmental Overview Assessment	20240226	 Garth Taylor Project Director	 Joanne Letkeman Project Manager

1.0 INTRODUCTION

Hatfield Consultants (Hatfield) was retained by the Ministry of Transportation and Infrastructure (MOTI) to complete an Environmental Overview Assessment (EOA) for a proposed storage and laydown area at Haney Gravel Pit (the Project), located in Maple Ridge, British Columbia (BC) (Appendix A1; Figure 1). The Proposed Clearing Area is 3.72 hectares (ha), located east of 256th Street and south of the Justice Institute of British Columbia Maple Ridge Campus.

EBA Engineering Ltd. (EBA) conducted an EOA in 2009 to inventory sensitive environmental features in a 44.85 ha area that included the Proposed Clearing Area (EBA 2009a, Appendix A2). The assessment confirmed the presence of northern red-legged frog (*Rana aurora*) and concluded that the riparian habitats associated with the watercourses provided suitable habitat for Pacific water shrew (*Sorex bendirii*) and western screech owl (*Megascops kennicottii kennicottii*). Based on this assessment, the Ministry of Environment (MOE) recommended that a 100 m setback be applied to all watercourses to protect Pacific water shrew habitat (Appendix A3).

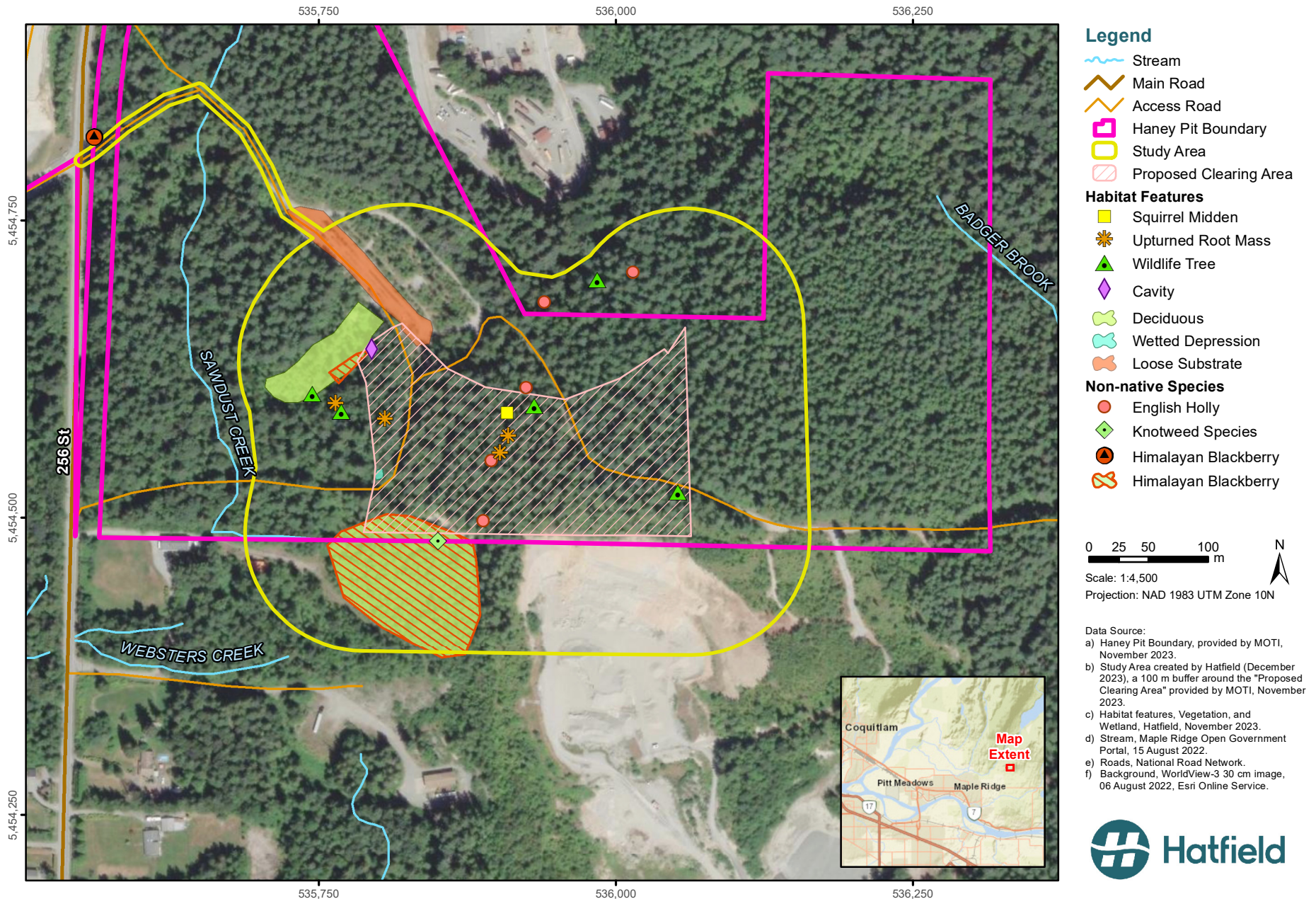
The assessment report prepared by EBA required updating to account for biophysical changes over the last fifteen years, a smaller Project footprint, and changes to applicable regulations. This EOA summarizes key environmental features¹, recommended mitigation, and anticipated environmental regulatory requirements.

1.1 STUDY AREA

The Study Area encompasses the east access road and extends 100 m around the Proposed Clearing Area (Figure 1). It features intact forest, open excavations, access roads, and private rural property. The Study Area accounts for potential buffers around wildlife habitat features (e.g., raptor nests) that may impact Project work.

¹ Key environmental features include terrestrial vertebrates, terrestrial gastropods, vascular vegetation, and wildlife habitat features.

Figure 1 Haney Gravel Pit Clearing Project location and environmental features.



Haney Gravel Pit Clearing Project – Environmental Overview Assessment

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The location of the knotweed species was estimated.

2.0 METHODOLOGY

2.1 DESKTOP ASSESSMENT

A review of online information sources was completed to search for known environmental values, or those with the potential to occur, within 500 m of the proposed clearing footprint. Environmental values include plant species, wildlife and wildlife habitat, and species at risk. Data sources evaluated as part of the desktop review included:

- iMapBC (BC CDC 2023a);
- BC Species and Ecosystem Explorer² (BC CDC 2023b);
- InvasivesBC (MOF 2023);
- Global Biodiversity Information Facility (GBIF 2023);
- Wildlife Tree Stewardship Atlas (WiTS 2018); and
- Sensitive Ecosystem Inventory (SEI) (Metro Vancouver 2023).

The species list obtained by the BC Species and Ecosystem Explorer was filtered to include species of conservation concern (i.e., Red- or Blue-listed species listed by the provincial Conservation Data Centre (CDC) and/or those listed as Threatened or Endangered on Schedule 1 of the *Species at Risk Act*, SC 2002, c 29 [SARA]). Species of conservation concern with potential to occur in the Study Area were evaluated based on site conditions, species life-history, and documented occurrences.

2.2 FIELD DATA COLLECTION

Hatfield conducted a site assessment on November 16, 2023. Vegetation, wildlife, and wildlife habitat were inventoried during the site assessment, and the site's capability to support species at risk was evaluated.

² Search criteria limited to terrestrial vertebrates, terrestrial gastropods, and vascular vegetation within 500 m of the proposed clearing footprint.

3.0 RESULTS

3.1 DESKTOP ASSESSMENT

The Study Area is located in the Coastal Western Hemlock dry maritime (CWHdm) biogeoclimatic subzone (BC CDC 2023a). This subzone occurs at low elevations and is characterized by warm dry summers and moist mild winters (Green and Klinka 1994). Zonal sites are characterized by Douglas-fir (*Pseudotsuga menziesii* var. *menziesii*), western redcedar (*Thuja plicata*), and western hemlock (*Tsuga heterophylla*) in the canopy with salal (*Gaultheria shallon*), red huckleberry (*Vaccinium parvifolium*), and mosses in the understory (Green and Klinka 1994).

The Metro Vancouver SEI database delineates polygons that overlap with 59% of the study area leaving the rest unclassified (Metro Vancouver 2023). The majority of the delineated portion is classified as a combination of mature and young coniferous forest (Table 1).

Two species of conservation concern, killdeer (*Charadrius vociferus*) (GBIF2023) and northern red-legged frog (EBA 2009), were previously observed in the Study Area. The BC CDC has no recorded occurrences of species at risk in the Study Area, nor does federally-identified critical habitat overlap with the Study Area (BC CDC 2023a). There are 13 species of conservation concern with the potential to occur within the Study Area (Table 2).

Table 1 Metro Vancouver SEI classifications for the Haney Gravel Pit Clearing Project Study Area.

Area (%)	SEI Class	Stand Type	Structural Stage	Condition
11.1	Mature forest	Conifer	6	C – Moderate
	Young forest (small)		5	C – Moderate
3.1	Mature forest	Conifer	6	C – Moderate
0.1	Riparian fringe	Mixed	5	C – Moderate
44.5	Mature forest	Conifer	6	B – Good
	Young forest		5	C – Moderate
41.1	Unclassified	NA	NA	NA

Metro Vancouver 2023

Table 2 Species of conservation concern with the potential to occur in the Haney Gravel Pit Clearing Project Study Area.

Scientific Name	Common Name	BC List ¹	SARA
Amphibian			
<i>Rana aurora</i>	Northern red-legged frog	Blue	Special Concern
Gastropod			
<i>Allogona townsendiana</i>	Oregon forestsnail	Red	Endangered
Avian			
<i>Charadrius vociferus</i>	Killdeer	Blue	NA
<i>Megascops kennicottii kennicottii</i>	Western screech-owl, <i>kennicottii</i> subspecies	Blue	Threatened
<i>Patagioenas fasciata</i>	Band-tailed pigeon	Blue	Special Concern

Table 2 (Cont'd.)

Scientific Name	Common Name	BC List ¹	SARA
Mammalian			
<i>Corynorhinus townsendii</i>	Townsend's Big-eared Bat	Blue	NA
<i>Myotis lucifugus</i>	Little brown myotis	Blue	Endangered
<i>Myotis yumanensis</i>	Yuma myotis	Blue	NA
<i>Sorex bendirii</i>	Pacific water shrew	Red	Endangered
Plant			
<i>Berula incisa</i>	Cut-leaved water-parsnip	Blue	NA
<i>Cephalanthera austini</i>	Phantom orchid	Red	Endangered
<i>Claytonia washingtoniana</i>	Washington springbeauty	Blue	NA

¹ BC CDC 2023b: Red = Threatened or Endangered, Blue = Special Concern.

3.2 FIELD ASSESSMENT

3.2.1 Vegetation

Forest structure within the Study Area was predominantly coniferous forest of uniform age with a lack of vertical structural diversity, categorized as structural stage five (young forest) (Photo 1 and Photo 2). Two structural stage four (pole/sapling) deciduous forest patches were present along the southern edge of the Study Area (Photo 3) and in a previously cleared area in the northwest (Figure 1; Photo 4).

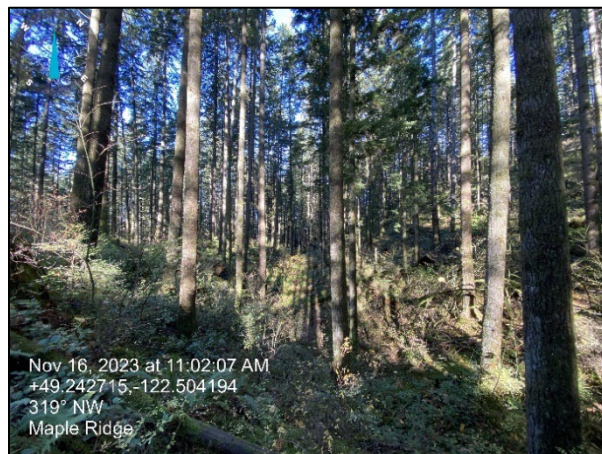


Photo 1 Typical forest structure seen in the Study Area.



Photo 2 Typical forest structure seen in the Study Area.

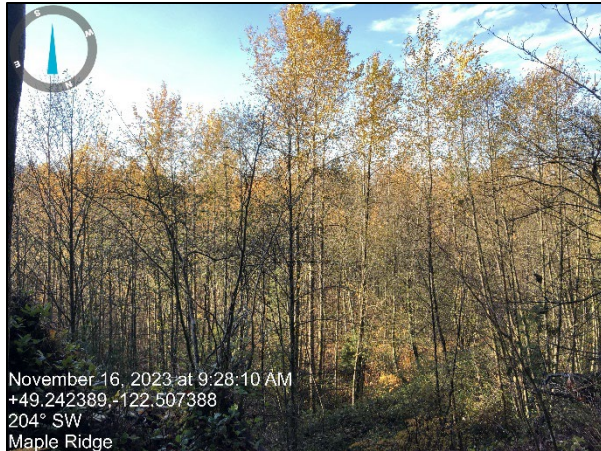


Photo 3 Deciduous forest along the southeast of the Study Area.



Photo 4 Deciduous forest in a previously cleared portion in the northwest of the Study Area.

Douglas fir and western hemlock canopy with a dense understory of salal, red-huckleberry, trailing blackberry (*Rubus ursinus*), and sword fern (*Polystichum munitum*) was the common composition throughout the Study Area. Native vegetation species observed in the Study Area (Table 3) are provincially yellow listed but are not listed under SARA. Slope position and proximity to disturbance influenced species presence creating microsites of habitat heterogeneity. Drier upper- to mid-slope positions had dull Oregon-grape (*Mahonia nervosa*) in the understory (Photo 5) whereas lower wetter slope positions, particularly the western most edge of the Study Area, had vine maple (*Acer circinatum*) and salmonberry (*Rubus spectabilis*) in the understory (Photo 6).



Photo 5 Typical understory dominated by salal and dull Oregon grape in drier microsites.



Photo 6 Typical understory in wetter microsites featuring salmonberry and vine maple.

Edge habitats had denser and smaller trees and more deciduous species compared to interior areas (Photo 7). Wildlife trees were present throughout but were limited in number (Figure 1; Photo 8). Cavities, natural and excavated by woodpeckers, were observed in these wildlife trees but are not abundant. Coarse woody debris (CWD) of varying size and decay class were present throughout.



Photo 7 The south edge adjacent to open excavations where trees are smaller and densely growing.

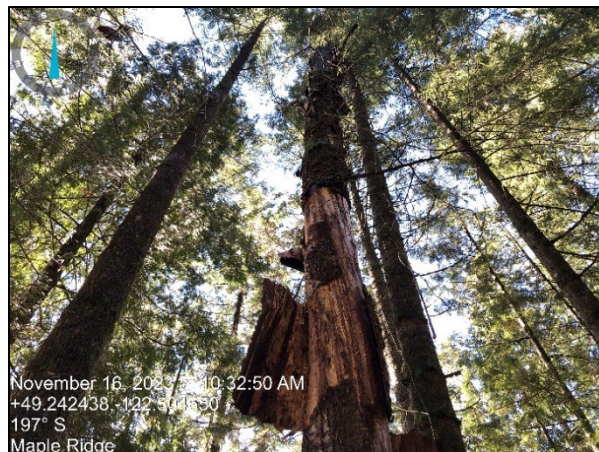


Photo 8 Wildlife tree with peeling bark.

Table 3 Native vegetation species observed in the Haney Gravel Pit Clearing Project Study Area (November 16, 2023).

Scientific Name	Common Name
<i>Acer circinatum</i>	Vine maple
<i>Acer macrophyllum</i>	Bigleaf maple
<i>Alnus rubra</i>	Red alder
<i>Cornus canadensis</i>	Bunchberry
<i>Corylus cornuta</i> ssp. <i>californica</i>	Beaked hazelnut
<i>Gaultheria shallon</i>	Salal
<i>Linnaea borealis</i> ssp. <i>longiflora</i>	Twinflower
<i>Lonicera involucrata</i> var. <i>involucrata</i>	Black twinberry
<i>Lysimachia latifolia</i>	Broad-leaved star flower
<i>Lysichiton americanus</i>	Skunk cabbage
<i>Mahonia nervosa</i>	Dull Oregon grape
<i>Polypodium glycyrrhiza</i>	Licorice fern
<i>Polystichum munitum</i>	Sword fern
<i>Populus trichocarpa</i>	Black cottonwood
<i>Pseudotsuga menziesii</i> var. <i>menziesii</i>	Coast Douglas fir
<i>Pteridium aquilinum</i>	Bracken fern
<i>Rubus leucodermis</i> var. <i>leucodermis</i>	Black raspberry
<i>Rubus spectabilis</i>	Salmonberry
<i>Rubus ursinus</i>	Trailing blackberry
<i>Sambucus racemosa</i> var. <i>arborescens</i>	Red elderberry
<i>Sorbus sitchensis</i>	Sitka mountain ash
<i>Spiraea douglasii</i> var. <i>douglasii</i>	Hardhack
<i>Struthiopteris spicant</i>	Deer fern
<i>Thuja plicata</i>	Western redcedar
<i>Tsuga heterophylla</i>	Western hemlock
<i>Vaccinium parvifolium</i>	Red huckleberry

Margins of the east access road were densely vegetated with salmonberry, sword fern, and trailing blackberry (Photo 9). Trees growing along the road were mostly young western redcedar and red alder with some mature Douglas fir. The road opened to an area with loose gravel/sandy substrate and sparse shrubs and saplings (Photo 10). This area had evidence of heavy anthropogenic disturbance (e.g., dumping, fire, and motorbike use).



Photo 9 Typical vegetation structure along the east access road.



Photo 10 East access road opening with gravel/sandy substrate.

The small wetland north of the east access road along Sawdust Creek mapped by EBA (Appendix A2) was surrounded by a dense hardhack (*Spiraea douglasii* var. *douglasii*) thicket and contained standing water at the time of the assessment. The wetted depression south of the east access road along Sawdust Creek mapped by EBA (Appendix A2) did not contain standing water at the time of the assessment but the ground was saturated and the presence of skunk cabbage (*Lysichiton americanus*) indicated wet soils (Photo 11). Large western redcedar grew around the wetted depression.

Non-native species were uncommon but existed, particularly along roads, trails, and forest edges (Table 4; Figure 1). One provincially noxious weed, a knotweed species (*Polygonaceae* sp.), was observed in the Study Area (Figure 1; Photo 12), but its extent of spread could not be determined due to unsafe access.



Photo 11 Skunk cabbage growing in saturated soils south of the east access road.



Photo 12 Knotweed species observed (through binoculars) outside of the clearing footprint in the southern portion of the Study Area.

Table 4 Non-native vegetation species observed in the Haney Gravel Pit Clearing Project Study Area (November 16, 2023).

Scientific Name	Common Name	BC <i>Weed Control Act</i> Classification ¹
<i>Rubus armeniacus</i>	Himalayan blackberry	NA
<i>Rubus laciniatus</i>	Cutleaf evergreen blackberry	NA
<i>Ilex aquifolium</i>	English holly	NA
<i>Geranium robertianum</i>	Robert's geranium	NA
<i>Digitalis purpurea</i> ssp. <i>purpurea</i>	Common foxglove	NA
<i>Polygonaceae</i> sp.	Knotweed species	Provincially noxious

¹ Noxious species are invasive plants that must be controlled under law by the BC *Weed Control Act* (RSBC 1996, c 487)

3.2.2 Wildlife and Wildlife Habitat

The Study Area provides habitat for wildlife, such as birds, small to large mammals, amphibians, and gastropods. All of these species groups were observed directly or indirectly (e.g., through scat) in the Study Area. Wildlife species or signs observed in the Study Area (Table 5) are provincially yellow-listed but are not listed under SARA.

The Study Area contained a range of wildlife habitat features that support the various species (Figure 1). For avian species, the Study Area had nesting and foraging habitats, including young and mature trees, cavities, berry- and seed-producing plants, and open areas with gravel substrate. No nests with year-round protection³ were observed, but larger trees (i.e., greater than 40 cm in diameter at breast height) could provide potential nesting opportunities for pileated woodpecker (*Dryocopus pileatus*). For small to medium-sized mammals, the habitat features include coarse woody debris (CWD), upturned root masses, berry- and seed-producing plants, and dense ground cover that could provide suitable denning sites and foraging, thermal, and security cover (Photo 13). The context of the Study Area, situated between two creeks and their respective riparian areas, and connectivity to intact forest, provides opportunities for travel for birds, amphibians, small- to medium-mammals, and larger mammals such as coyote (*Canis latrans*), mule deer (*Odocoileus hemionus*), and American black bear (*Ursus americanus*) as shown by the game trails observed.

³ Year-round protection awarded to select species under the Migratory Bird Regulations, 2022, SOR/2022-105 and/or the *Wildlife Act*, RSBC 1996, c 488.



Photo 13 Upturned root mass providing a potential denning site for small to sized medium mammals.

Table 5 Wildlife species or signs observed in the Haney Gravel Pit Clearing Project Study Area (November 16, 2023).

Scientific Name	Common Name
Bird	
<i>Anser caerulescens</i> ¹	Snow goose
<i>Corvus brachyrhynchos</i>	American crow
<i>Corvus corax</i>	Common raven
<i>Cyanocitta stelleri</i>	Steller's jay
<i>Dryocopus pileatus</i>	Pileated woodpecker
<i>Poecile atricapillus</i>	Black-capped chickadee
<i>Poecile rufescens</i>	Chestnut-backed chickadee
<i>Regulus satrapa</i>	Golden-crown kinglet
<i>Sitta pygmaea</i>	Red-breasted nuthatch
<i>Troglodytes pacificus</i>	Pacific wren
Gastropod	
<i>Ariolimax columbianus</i>	Pacific banana slug
Mammal	
<i>Leporidae</i> sp.	Rabbit species
<i>Odocoileus hemionus</i>	Mule deer
<i>Tamiasciurus douglasii</i>	Douglas's squirrel
Amphibian	
<i>Pseudacris regilla</i>	Pacific treefrog

¹ Observed flying over the site.

3.2.3 Species of Conservation Concern

Of the ten wildlife species of conservation concern identified as having potential to occur in the Study Area, suitable habitat was available for killdeer, band-tailed pigeon (*Patagioenas fasciata*), northern red-legged frog, Pacific water shrew, and western screech owl. Open loose substrate, as found along the east access road, could provide nesting opportunities for killdeer (Photo 10). Band-tailed pigeon use low-elevation temperate conifer forests for nesting, often selecting Douglas fir for their nest sites, and forage on berry-producing shrubs (Kippie and Braun 2020). The wetland north of the east access road may support northern red-legged frog breeding. A northern red-legged frog and an unidentified tadpole were observed in this wetland by EBA (2009a). Moist habitats within the Proposed Clearing Area, particularly along the western edge, may provide travel corridors for northern red-legged frog. A small, likely ephemeral, wetted depression was seen on the west side of the Project Footprint (Figure 1) but lacked opportunities for red-legged frog oviposition such as emergent vegetation or fallen branches at the time of observation (Photo 14).

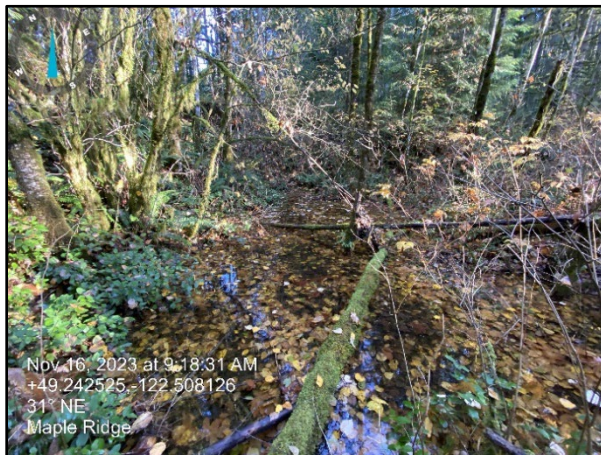


Photo 14 Small wetted depression on the west side of the Study Area.

Pacific water shrew and western screech owl are riparian-associated species and the portion of the east access road where Sawdust Creek intersects may provide suitable habitat for these species. No such riparian habitat was observed within the Proposed Clearing Area.

Oregon forest snail (*Allogona townsendiana*) is typically found in bigleaf maple (*Acer macrophyllum*) dominated forest with patches of stinging nettle (*Urtica gracilis* ssp. *gracilis*) (EC 2016), which was not observed in the Study Area.

Primary sites used by at-risk bat species for roosting and hibernacula are not present in the Study Area. In summer, little brown myotis (*Myotis lucifugus*) typically roost in anthropogenic structures, such as bridges, and utilize mines and caves for hibernation (Fenger et al. 2006, EC 2016, and Lausen et al. 2022). Yuma myotis (*Myotis yumanensis*) summer roosting is typically in buildings or other anthropogenic structures close to water and they likely use buildings and caves for hibernation (Lausen et al. 2022). Hoary bat (*Lasiurus cinereus*) roosts in tree foliage, likely selecting old conifers in the summer, and migrates in the winter (Fenger et al. 2006, EC 2016, and Lausen et al. 2022). For Townsend's big-eared bat (*Corynorhinus*

townsendii), caves, rock crevices, abandoned mines, and buildings are the primary summer roosts and old mines, tunnels, and caves are used for hibernacula (Lausen et al. 2022).

Cut-leaved water-parsnip (*Berula incisa*) can be found in wetlands and riparian areas (BC CDC 1995) such as those along the water courses and wetlands identified by EBA (Appendix A2). It is unlikely that phantom orchid (*Cephalanthera austiniae*) would be present in the Study Area as it is only occasionally found in older (50 to 60 years) second growth coniferous forest and often grows in areas with sparse ground cover (COSEWIC 2014). Washington spring beauty (*Claytonia washingtoniana*) can be found in dry lowland coniferous forests (Douglas et al. 1999 and BC CDC N.D.). Rare plant surveys were not conducted.

4.0 REGULATORY CONTEXT

The proposed clearing of the Project footprint may be subject to the Migratory Bird Regulations, 2022, SOR/2022-105, the *Wildlife Act*, RSBC 1996, c 488, and the *Weed Control Act*, RSBC. 1996, c. 487.

4.1 WILDLIFE ACT

The *Wildlife Act* provides for the conservation and management of wildlife in BC. Subsection 34 of the *Wildlife Act* protects birds, their eggs, young, and active nests (i.e., containing a bird or eggs) from killing, disturbance, and possession. This subsection also grants year-round protection to six species including bald eagle and great blue heron.

4.2 MIGRATORY BIRDS CONVENTION ACT AND REGULATIONS

The Migratory Bird Regulations provide year-round protection to the nests of the 18 species listed on Schedule 1. Applicable species to the Study Area include pileated woodpecker. If removal of a nest belonging to a Schedule 1 species is required, it must first be registered to the Environment and Climate Change Canada Abandoned Nest Registry and remain abandoned by that species and any other species protected by the *Migratory Birds Convention Act*, 1994, SC 1994, c 22. If the nest remains inactive for the designated waiting period outlined in Schedule 1, it may be removed without a permit. A permit would be required to remove a nest prior to the end of the designating waiting period.

4.3 WEED CONTROL ACT

Noxious weeds are controlled through the BC *Weed Control Act*, RSBC 1996, c 487. This Act regulates the spread of invasive plants through mandates that place the responsibility of noxious species management onto property owners, both private sector and government agencies. Knotweed species are listed as noxious weeds under Schedule A of the BC *Weed Control Act*.

5.0 IMPACT MITIGATION STRATEGIES

To mitigate potentially adverse effects of clearing activities, the following recommendations should be implemented:

- Restrict work to the Proposed Clearing Area and previously disturbed areas (i.e., the road);
- Avoid disturbance to the previously established 100 m Pacific water shrew habitat buffer to protect Pacific water shrew, northern red-legged frog, and western screech owl habitat. The 100 m buffer should be flagged to minimize the chance of encroachment;
- Where possible, retain mature trees along the perimeter of the clearing footprint to preserve future wildlife trees and retain potential nesting habitat for band-tailed pigeon;
- Conduct clearing activities from September 1 to February 28 to avoid the breeding bird window (March 1 to August 31) and the main active season for northern red-legged frog (April through July) that may be migrating through the Proposed Clearing Area or across the east access road;
- Prior to clearing, inspect the clearing footprint including a 100 m buffer to identify nests with year-round protection;
- Prior to clearing, conduct an assessment for rare and endangered plant species; and
- With the permission of the neighbouring landowner, map knotweed occurrences within 20 m of the clearing footprint and subsequently establish a 20 m no ground disturbance buffer from knotweed.

Permits are likely not required for clearing activities associated with the Project. However, if an abandoned nest with year-round protection is identified, a permit pursuant to the Migratory Bird Regulations would be required to remove the nest prior to the end of the designated waiting period.

6.0 CLOSURE

A site assessment was completed on November 16, 2023 to describe environmental conditions in and around the Haney Gravel Pit Clearing Project. No species at risk or significant wildlife habitat features were observed. No permits are anticipated to complete the proposed project works. Recommended mitigation includes: restricting clearing activities to the Proposed Clearing Area and not encroaching into the 100 m Pacific water shrew buffer; retaining mature perimeter trees where possible; conducting clearing activities between September 1 and February 28; conducting a sweep for nests with year-round protection and a rare plant survey prior to clearing; and creating 20 m ground disturbance buffers around knotweed species.

7.0 REFERENCES

- [BC CDC] British Columbia Conservation Data Centre. 2023a. CDC iMap [Internet]. Victoria, BC: Government of British Columbia; [cited 2023 Nov 15]. Available from: <https://maps.gov.bc.ca/ess/hm/cdc/>
- [BC CDC] British Columbia Conservation Data Centre. 2023b. BC Species and Ecosystem Explorer [Internet]. Victoria, BC: Government of British Columbia; [cited 2023 Nov 15]. Available from: <http://a100.gov.bc.ca/pub/eswp/>
- [BC CDC] British Columbia Conservation Data Center. No Date. Species Summary: *Claytonia washingtoniana*. B.C. Ministry of Environment. Victoria, BC: BC Ministry of Environment; [updated cited 2023 Dec 11]. Available from: <https://a100.gov.bc.ca/pub/eswp/speciesSummary.do?id=17892>
- [BC CDC] British Columbia Conservation Data Centre. 1995. Species Summary: *Berula incisa*. Victoria, BC: BC Ministry of Environment; [updated 1995 Aug 2; cited 2023 Dec 11]. Available from: <https://a100.gov.bc.ca/pub/eswp/speciesSummary.do?id=15512>
- [MOE] British Columbia Ministry of Environment. 2016. Chapter 1: Introduction to Bats of British Columbia. In: Best Management Practices for Bats in British Columbia. Victoria, BC: BC Ministry of Environment. p.1-101.
- [MOF] British Columbia Ministry of Forests. 2023. Invasives BC [Internet]. Victoria, BC: Ministry of Forests; [cited 2023 Nov 20]. Available from: <https://invasivesbc.gov.bc.ca/>
- COSEWIC. 2014. COSEWIC Assessment and Status Report on the Phantom Orchid *Rhynchospora macrostachya* in Canada. Ottawa, ON: Committee on the Status of Endangered Wildlife in Canada.
- [EBA] EBA Engineering Consultants Ltd. 2009a. Environmental Overview Assessment Proposed Haney Gravel Quarry, Maple Ridge, BC. EBA Engineering Consultants Ltd.: Vancouver, BC.
- [EBA] EBA Engineering Consultants Ltd. 2009b. Habitat Setback Assessment Proposed Haney Gravel Quarry, Maple Ridge, BC. EBA Engineering Consultants Ltd.: Vancouver, BC.
- [EC] Environment Canada. 2016. Recovery Strategy for the Oregon Forestsnail (*Allogona townsendiana*) in Canada. *Species at Risk Act* Recovery Strategy Series. Ottawa, ON: Environment Canada.
- Fenger, M., T. Cooper, S. Guy, and P. Brandford. 2006. Wildlife & Trees in British Columbia. Edmonton, AB: Lone Pine Publishing.
- [GBIF] Global Diversity Information Facility. 2023. GBIF Occurrence Download [Internet]. Copenhagen, Denmark: Global Diversity Information Facility; [cited 2023 Nov 15]. Available from: <https://doi.org/10.15468/dl.savhb5>
- Green, R. N. and K. Klinka. 1994. Land Management Handbook 28: A Field Guide for Site Identification and Interpretation for the Vancouver Forest Region. Victoria, BC: Research Branch of BC Ministry of Forests.

- Keppie, D. M. and C. E. Braun. 2020. Birds of the World: Band-tailed Pigeon (*Patagioenas fasciata*). Ed 1. Ithica, NY: Cornell Lab of Ornithology; [updated 2000 Jan 1; cited 2023 Nov 24]. Available from: <https://doi.org/10.2173/bow.batpig1.01>
- Lausen, C. L. D. W. Nagorsen, R. M. Brigham, and J. Hobbs. 2022. Bats of British Columbia. Victoria, BC: Royal BC Museum.
- Metro Vancouver. 2023. Sensitive Ecosystem Inventory for Metro Vancouver (2020) [Internet]. Vancouver, BC: Metro Vancouver; [updated 2023 Nov 6; cited 2023 Nov 20]. Available from: <https://open-data-portal-metrovancouver.hub.arcgis.com/explore?query=SEI>
- Nagorsen, D. W. 2005. Snowshoe Hare (*Lepus americanus*). In: Rodents & Lagomorphs of British Columbia. Victoria, BC: Royal BC Museum. p 85-91.
- [WiTS] Wildlife Tree Stewardship. 2018. Wildlife Tree Stewardship Atlas [Internet]. Community Manning Network; [updated 2018 Apr 11; cited 2023 Nov 15]. Available from: https://cmnmaps.ca/WITS_gomap/

APPENDICES

Appendix A1

Proposed Clearing Footprint

Appendix A2

EBA Engineering Consultants Ltd. Environmental Overview Assessment

July 10, 2009

EBA File: N23101455.001

Ministry of Transportation & Infrastructure
South Coast Region
7818 6th St. Burnaby, BC

Via e-mail: Joanne.Cyr@gov.bc.ca

Attention: Joanne M. Cyr, B.Sc.
Assistant Environmental Coordinator

Dear Ms. Cyr:

**Re: Environmental Overview Assessment
Proposed Haney Gravel Quarry, Maple Ridge, BC**

1.0 INTRODUCTION

EBA Engineering Consultants Ltd. (EBA) was retained by the British Columbia Ministry of Transportation & Infrastructure (MOT) to conduct an overview environmental assessment (Assessment) of potential sensitive environmental features at a proposed Haney Gravel Quarry in Maple Ridge B.C. (Figures 1 and 2).

The potential gravel quarry (the “Site”) consists of approximately 44.85 hectares (ha) of mostly forested area as well as the Operating Engineer’s (Local 115) Apprentice Training Facility located on 256th Street north of 130 Avenue. The Site is situated on a relatively gentle gradient that slopes south west, ranging in elevation from approximately 130 m above sea level (ASL) to approximately 240 m ASL.

East of the Site is the Justice Institute of BC facility and west of the Site is the Operating Engineer’s (Local 115) Apprentice Training Facility

According to the Maple Ridge Online GIS map, the majority of the Site is zoned P-6 for Civic Institutional land use. The lower south east portion of the Site is zoned A-2 for Upland Agricultural Use. North of the Site the area is zoned as M-6 for industrial extraction. This area currently houses an operating, privately owned gravel quarry. Current area zoning is illustrated in Appendix A. Contrary to current zoning the Official Community Plan (OCP) designates the Site for industrial and rural resource use. Current OCP designation is illustrated in Appendix B. East of the Site is the Justice Institute of BC facility and west of the Operating Engineer’s (Local 115) Apprentice Training Facility on the Site is the Alouette Women’s Correctional Centre. Further north of Site is the Fraser Regional Correctional Centre and several lumber operations. South of the Site are several single family dwellings situated on large lots. With the exception of the gravel quarry, and aforementioned facilities, the area immediately surrounding the Site is largely undeveloped.

In order to identify potential environmental constraints associated with the proposed quarry development, EBA conducted a baseline bio-inventory of the Site's habitat features. The bio-inventory included a fish habitat assessment and a terrestrial habitat assessment to characterize vegetation and wildlife values, including the presence of habitat for species of management concern (i.e. Pacific Water Shrew). The terrestrial bio-inventory also included a heron and raptor nest survey, and a night-time owl survey using call-playback protocols.

2.0 SCOPE AND METHODOLOGY

The purpose of this environmental overview assessment was to determine the sensitive environmental features that would be potentially affected by the proposed Haney Gravel Quarry project illustrated in Figure 2. EBA focused the assessment on the following:

- Fish and fish habitat (including riparian areas);
- Potential rare plants and rare plant communities (desktop review);
- Habitat for rare wildlife (specifically Pacific Water Shrew, Red-legged Frog and Western Screech-owl);
- Eagle and other raptor nests; and
- Any other significant wildlife habitat features (e.g., dens, wildlife trees etc.).

EBA conducted a review of existing information including:

- Environmental Overview for Haney Pit #1707, MOT 2009;
- Ministry of Environment (MOE) Conservation Data Centre (CDC) Endangered Species and Ecosystem Occurrences on-line mapping database;
- MOE BC Species and Ecosystems Explorer database;
- MOE Fisheries Information Summary System (FISS) database;
- MOE Habitat Wizard mapping database;
- *Species At Risk Act* Public Registry database;
- Watercourse classification, mapping and land delineation information obtained from the District of Maple Ridge;
- Community Mapping Network Sensitive Habitat Information and Mapping (SHIM) database; and,
- Contact with relevant government agencies.

In addition, Ms. Catherine Galbrand (M.E.S., R.P.Bio.) and Mr. Cameron Kulak (B.Sc., B.I.T.) of EBA conducted site visits on June 15 and 16, 2009. EBA traversed the proposed quarry site and immediately adjacent areas on foot, surveying for the above-mentioned environmental features.

2.1 FISH AND FISH HABITAT

The Site is located within the northern drainage basin of the Fraser River. The nearest significant waterbody is the south arm of the Alouette River located approximately 1 km west of the Site. The Alouette River is a 30 km long 5th order stream that flows south west and ultimately discharges into the Fraser River. Alouette River supports numerous fish species including salmonids.

Illustrated within the footprint of the MOT Haney Pit Development Plan (attached as Figure 2) are three (3) distinct watercourses and one (1) roadside ditch. As part of a preliminary Environmental Overview (EO) study of the Site, the MOT confirmed the presence of the watercourses, designating them as Watercourse 1 through 3 in a drawing attached as Figure 3. MOT observed Watercourse 1 to be 1-2 m wide, 5 cm deep with no defined channel or defined high water mark, with dense, well established vegetated banks consisting of both shade trees and mature shrubs. Channel substrates consisted of fines, gravel and cobble. It was unclear to MOT whether the watercourse, which appeared to be at bankfull conditions at the time of observation, was permanent or ephemeral. Information on fish presence or other fish habitat features was reported to be unknown. The MOT EO report did not present any discussion with respect to Watercourse 2.

The MOT's investigation of the Maple Ridge online GIS mapping tool revealed the presence of a watercourse named Sawdust Creek traversing the entire length of the Site flowing north to south. This watercourse was not illustrated in Development Plan, nor could it be located during MOT's field reconnaissance of the Site. Given the location identified on the mapping, MOT deduced that Sawdust Creek was likely Watercourse 3 as illustrated in Figure 3, and recommended that this be confirmed.

In order to ascertain more information on potential watercourses within the project footprint, EBA conducted a review of available ancillary information which included the HabitatWizard database, DFO Lost Streams Map, SHIM database records, the FISS database and CDC mapping database.

HabitatWizard produced no documented watercourses on the Site (Appendix C). The DFO Lost Streams Map and SHIM map, however, illustrated the presence of an unnamed watercourse in the approximate location of Watercourse 3 as shown in the MOT EO drawing presented as Figure 3. This watercourse, which is assigned the watershed code 100-037400-33200, drains south approximately 4 km and discharges into Kanaka Creek, which is documented to support Coho (*Oncorhynchus kisutch*), Chum (*Oncorhynchus keta*) and Pink Salmon (*Oncorhynchus gorbuscha*). The SHIM map also illustrates the presence of a small wetland at the headwater of this watercourse. In addition, a different SHIM map layer illustrates the presence of a watercourse labelled "Indefinite" that appears to mirror the location of Sawdust Creek illustrated in the Maple Ridge online GIS Map. The notes linked to this SHIM layer indicate that the watershed code of this system is also 100-037400-33200

and that this watercourse “Drains to Zinc Brook Drainage System”. The DFO Lost Streams Map and SHIM map are attached as Appendix D and E, respectively.

The DFO FISS database requires either gazetted watercourse names or watershed codes to perform the database query. Information on “Sawdust Creek”, “Zinc Brook”, and watershed code 100-037400-33200 were queried from the database; however, the query produced no records of these watercourses.

The MOE BC Species and Ecosystems Explorer database was also reviewed for potential provincial fish species at risk which exist within the Coastal Western Hemlock zone and Chilliwack Forest District, within which the Site occurs. According to this database, a total of nine (9) fish species at risk have habitat ranges in the general vicinity of the Site. Of the 9 species identified, it was determined that none of these species had the potential to occur at the Site based on their specific habitat requirements, association with larger watershed areas (Fraser and Pitt Rivers) and that impassable barriers are reportedly present within Kanaka Creek downstream of the study area. Any fish species encountered are likely to be local resident populations. The complete BC Species and Ecosystems Explorer database search results are included as Appendix F. The CDC had no records of fish species-at-risk at or in vicinity to the Site (Appendix G).

On June 15 and 16, 2009, EBA Aquatic Biologist Catherine Galbrand traversed the Site in search of permanent and ephemeral watercourses, including the MOT referenced Watercourses 1 through 3, roadside ditches, and “Sawdust Creek”. The purpose of the assessments was to document existing fish habitat features within identified watercourses and to qualify potential setback requirements.

In total, three (3) watercourse channels (1 permanent, 1 ephemeral, and 1 intermittent) and three (3) drainage swales were identified within the Site footprint. Two (2) of the channels were the watercourses identified by the MOT as Watercourse 1 and 3, and one (1) of the swales was the watercourse identified by the MOT as Watercourse 2. The locations of the channels and swales are illustrated in Figure 4.

In addition, three (3) ponded areas, a wet depression and a bog were identified within or adjacent to the Site (Figure 4). Two of the ponded areas appeared to provide a source of water to “Sawdust Creek”.

The watercourses were identified with waypoints using a hand held GPS, which were subsequently plotted onto an aerial of the Site footprint attached as Figure 4. Note that the GPS has up to a 4 m range of accuracy; therefore the locations of the illustrated watercourses are approximate. A legal survey of the Site would be required in order to accurately determine the locations of watercourses within the Site.

The following describes each of the identified drainages in further detail.

A small drainage channel not identified during the MOT EO is located east of 256th Street which flows south to a wetland (see Figure 4 and Photos 1 and 2). This drainage

channel is approximately 1- 2 m wide, shallow (up to 10 cm depth) and meanders around remnant manmade berms to the north of the east Site access road. The drainage channel was flowing at the time of observation. It appeared to be permanent with a defined channel and mostly gravel substrates. The channel gradient was less than 1%. A roadside swale exists on the west side of a large berm which parallels 256th Street. It appears likely that this small drainage pattern is the result of drainage alternations caused with the construction of 256th Street and the east Site access road.

Identified habitat features included good riparian cover and some large and small woody debris. Crown closure was estimated at approximately 50%. Typical riparian vegetation consisted of salmonberry (*Rubus spectabilis*), red huckleberry (*Vaccinium parvifolium*), sword fern (*Polystichum munitum*), deer fern (*Blechnum spicant*), vine maple (*Acer circinatum*), hardhack (*Spiraea douglasii*) willow (*Salix sp.*) and cottonwood (*Populus balsamifera*). Habitat constraints included the lack of water depth, evidence of poor water quality (ie. algal growth and high iron particulate) and anthropogenic influences to watercourse flow and route. Water levels were insufficient to conduct fish sampling; however, given the identified habitat constraints, and identified downstream barriers to fish passage (i.e. culvert 2 discussion to follow in Sawdust Creek description); it was determined unlikely to support fish.

A wetland was located just east of the east Site access gate, directly north of the east Site access road (see Figure 4 and Photos 3 and 4). This ~0.15 hectare feature appeared permanently wetted, and several wildlife trees existed along its fringe and within the water. This wetland contained abundant large woody debris (LWD) and organic soil substrates. It appears that the wetland was created in part by the construction of the Site access road which created a barrier to natural drainage, causing a slow backwater of flow.

Surrounding vegetation included hardhack, salmonberry, twinberry (*Lonicera involucrata*), paper birch (*Betula papyrifera*), some willow and western redcedar (*Thuja plicata*). A blue-listed Red-legged Frog (*Rana aurora*) was observed at this location (Photo 5).

A single baited gee style minnow trap was placed in an open water area of the wetland for a 12 hour period; however, no fish were captured. One unidentified tadpole was captured and released (Photo 6). Given the identified downstream barriers to fish passage (i.e. Culvert 2 discussion to follow in Sawdust Creek description) and the fact that no fish were captured, it is unlikely that the wetland supports fish.

Sawdust Creek was identified by the MOT as Watercourse 2 (See Figure 4 and Photos 7 to 22). Sawdust Creek appears to flow south from a **headwater pond** located northwest of the Justice Institute property (Photos 7 through 11). The pond was approximately 10 m wide and 30-40 m long. At the confluence of the pond and channel existed a significant amount of LWD creating a log jam. The swamp substrates consisted mostly of organics and water depths were nearly a meter in some locations. Abundant skunk cabbage (*Lysichiton americanus*) and sedges (*Carex sp.*) were observed around the perimeter. Riparian cover was dominated by willow, bigleaf maple (*Acer macrophyllum*), hardhack, vine maple, salal

(*Gaultheria shallon*) and western hemlock (*Tsuga heterophylla*), and some Douglas fir (*Pseudotsuga menziesii*). No fish were observed however abundant unidentified tadpoles and a Pacific Tree Frog (*Hyla regilla*) were observed in this location.

The Sawdust Creek channel extended from the southern edge of the pond downstream of the log jam (Photos 12 and 13). The channel from the pond to Culvert 1 beneath the Justice Institute entry road was dry with cobbles and boulders with some fines comprising the channel bed. The channel was approximately 2 m wide and contained moderate amounts of LWD. Evidence was observed that the creek was historically a permanent and significant watercourse. This evidence included a wide, defined channel, abundant gravel and cobble substrate, undercut banks, large woody debris, perched large and small woody debris. However, this area of the creek appeared to have been dry for some time as evidenced by the moss growth on thalweg (deepest channel corridor) substrate. It is likely that Sawdust Creek now mostly conveys freshet (spring run-off) flows, evidenced by perched small woody debris within the channel.

The culvert (Culvert 1) located beneath the Justice Institute entry road was concrete and perched at its downstream end and a likely barrier to upstream migration. Moss was observed around the downstream perimeter of the culvert indicating that water depths of the drop pool are not significant enough to submerge any part of the culvert.

Downstream of the culvert the channel, which extends southwards, remained dry with a variable width of approximately from 80 cm to 2.5 m. Substrates consisted of gravels, cobbles and fines. Again, abundant perched SWD was observed indicating flashy freshet flows; however, the presence of moss on thalweg substrates suggests a lack of flow for prolonged periods.

At approximately 100 downstream of the Justice Institute entry road, substrates were observed to be more organic. Intermittent pools of standing water was observed for an approximate 20 m long reach (Photo 14). A possible but unconfirmed Red-legged Frog was observed in this area (Photo 15). From this location, the channel returned to a dry state with gravel-cobble substrates up to approximately 20 m upstream of the culvert located beneath the east Site access road (Culvert 2). From this location up to Culvert 2, some standing water with some minimal areas of slow flow were observed. Water was flowing through the culvert; however, it appeared this water was sourced from small pond and roadside ditch on the northern side of the east Site access road which extended approximately 20 m to the east (Photo 23). No watercourse was observed upstream of this pond.

Culvert 2 beneath the east Site access road was perched at its downstream end (Photo 17). Moss was observed around the downstream perimeter of the culvert indicating that water depths of the drop pool are not sufficient enough to submerge any part of the culvert. Culvert 2 is therefore a likely barrier to upstream migration.

Baited gee style minnow traps were placed in a pool below the culvert and an additional pool further downstream for a 12 hour period. No fish were captured (Photo 18).

Downstream of the culvert, Sawdust Creek was flowing with a defined channel and gravel/cobble substrates (Photo 19). Channel width varied from 1 to 2.5 m with water depths averaging about 10 cm and up to 50 cm in pools. Identified habitat features included good riparian cover, large and small woody debris, pools and undercut banks.

Approximately 150 m downstream of Culvert 2 the Sawdust Creek channel became more incised and the channel bed became consistently more cobbled for approximately 50 m (Photo 20). Then water flows ceased and the creek was dry for a further 75 m up to a concrete culvert (Culvert 3) installed beneath a gravel roadway at the southern boundary of the Site (Photos 21 and 22). No evidence of flow or scour was observed around the culvert and downstream of the culvert the channel bed was also dry. Culvert 3 was perched at its downstream end and is therefore likely barrier to upstream migration.

Beyond the Site boundary the channel discharges to a ditch with organic substrates, which ultimately discharges to a ditch on the east side of 256th Street.

Identified fish habitat features within Sawdust Creek included a riffle-pool morphology, presence of LWD at various locations and undercut banks and well established riparian cover. Riparian cover along the entire length of Sawdust Creek was approximately 50% to 60% crown closure. Typical riparian vegetation consisted of salmonberry, sword fern, deer fern, salal, skunk cabbage, red alder, twinberry, huckleberry, vine maple, western redcedar, Douglas fir and western hemlock.

It is unlikely that Sawdust Creek in its existing condition is fish bearing as evidenced by its intermittent nature, lack of/insufficient water depths, multiple barriers to fish passage, and the lack of fish captured during the trapping program completed during the Assessment.

The fish habitat features observed indicates that the creek was likely historically a permanent and significant watercourse. The hydrology of this watercourse was possibly altered with area development including the construction of 256th Street, property access roads, the introduction of the three culverts, and the removal water input sourced north of the east Site access road.

An ephemeral channel identified by the MOT as Watercourse 3 is located east of Sawdust Creek. The channel headwaters appear to occur from an identified bog in the northeast most corner of the Site through to the proximate terminus of the east Site access road (see Figure 4 and Photos 25 to 33). No flow was observed in any areas of the channel nor was there evidence that flows regularly occur. Although the channel occasionally became more defined where terrain steepened, for the most part, the channel existed as a low wet depression with no defined banks, some standing water, organic substrates, and abundant skunk cabbage, sedges and ferns.

This channel would likely not support fish due to the very poor habitat conditions described above. This watercourse probably only provides drainage from the bog during periods of high water flow such as during freshet or prolonged rainy periods.

Desktop evidence suggested this channel may have connected to Sawdust Creek south of the Justice Institute; however EBA could find no evidence of such a channel during the Site investigation. As with the other watercourses identified on the Site, the hydrology of this watercourse may have been altered with area development including the development of the Justice Institute property, the construction of the east Site access road and trail, and abundant bike trails. However, the lack of a defined channel and coarse substrates is indicative that this watercourse was historically less established than Sawdust Creek.

Three (3) **dry swales** also existed within the Site; one on either side of 256th Street and one within the Operating Engineers Training area, which was referred to in the MOT EO as Watercourse 2 (Figure 4 and Photos 34 and 35). The latter swale was constructed to convey stormwater flows via culvert into a natural depression within the forested area just to the west of the Area A4 where it apparently infiltrates naturally (Photo 36). Should the MOT wish to fill this area, the discharge point may need to be relocated.

In summary, current watercourse habitat values at the Site are limited to poor. These watercourses would provide seasonal (non-permanent) inputs of freshwater supply and nutrients to downstream fish-bearing watercourses. However, it is unlikely that these watercourses support fish presence within the Site boundaries due to the identified habitat constraints, the absence of sufficiently large headwater habitats to act as spawning and rearing grounds, and, the presence of numerous barriers to fish migration both within the Site itself and downstream of the Site.

With respect to possible watercourse setbacks associated with the possible development of the Site, DFO would likely defer to the setback prescriptions under the *Riparian Areas Regulation* (RAR) which has been adopted by the District of Maple Ridge. Based on (RAR) "Simple Assessment" procedures, permanent watercourses with greater than 30 m of existing riparian vegetation are afforded 30 m setbacks regardless of their fish-bearing status. Non-permanent watercourses with greater than 30 m of existing riparian vegetation are afforded 15 m setbacks. DFO could arguably assert that 2 m setbacks be prescribed for the roadside swales as they conceivably connect to fish-bearing waters. Conversely, given that the swale on the Operation Engineers property is an isolated feature with no connection to any watercourse, no setback would likely be required.

The RAR provides a secondary option to determine appropriate stream setback widths, known as a "Detailed Assessment". Detailed Assessments determine the "Zone of Sensitivity" for the Features, Functions and Conditions (FFCs) of the riparian area through a series of assessments. In general, Detailed Assessments typically result in relaxed riparian setbacks. A Detailed Assessment was not within the scope of this assessment; however, given the known features of the watercourses within the project footprint, it is likely that ~10 m setbacks could be applied to all channels. This conclusion would have to be confirmed through a Detailed Assessment conducted by a Qualified Environmental Professional (QEP).

2.2 TERRESTRIAL HABITAT

2.2.1 Vegetation and Ecological Communities

Prior to conducting the site visit, lists of rare plants and rare ecological communities having the potential to occur in the vicinity of the Site were compiled from provincial and federal databases. Rare plant lists were generated using information available from the BC Conservation Data Centre (CDC), the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), and the Species at Risk Act (SARA). Rare ecological community information was compiled from the BC CDC database.

Known occurrence records for both rare plants and rare ecological communities identified in the vicinity of the Site were also obtained from these same information sources. Together, the plant species and ecological community lists helped identify field survey locations with a higher potential to support rare plant species and rare ecological communities. A total of 40 rare plant species had the potential to occur within the study area (Appendix H). Of these, 11 are provincially designated as red-listed, 29 are blue-listed, and 3 are federally designated under SARA. A total of 15 rare ecological communities currently tracked by the BC CDC that could occur in the vicinity of the Site were also identified, six of which are provincially red-listed, and nine of which are blue-listed (Appendix I).

A detailed vegetation classification study and/or rare plant survey were not within EBA's study scope as determined by MOT. A general site assessment was conducted by EBA Biologists Catherine Galbrand and Cameron Kulak over a two-day period, on June 15 and 16, 2009. General forest characteristics and vegetation associations were noted during the Site investigation.

The Site is located within the low elevation Coastal Western Hemlock Dry Maritime (CWHdm) biogeoclimatic subzone which is characterized as having relatively dry, warm summers and mild, moist winters with low snowfall (Green and Klinka 1994). Forests are a mix of younger and mature stands composed of Douglas-fir (*Pseudotsuga menziesii*), western redcedar (*Thuja plicata*), and western hemlock (*Tsuga heterophylla*), as well as broadleaf species such as bigleaf maple (*Acer macrophyllum*), vine maple (*Acer circinatum*), and red alder (*Alnus rubra*). Common understory species include salmonberry (*Rubus spectabilis*) and sword fern (*Polystichum munitum*).

The Site consisted of low lying areas with poor drainage (Photo 24) and areas on mid to low slopes of low and steep grades (Photo 37). A large rocky knoll exists within the eastern portion of the Site and is bordered by a small elevated bog ecosystem (Photo 37, 25 and 26). Forests generally consisted of young to mature conifers in poorly-drained substrates, providing numerous wetted areas, with more well-drained forest occurring on gentle slopes.

Forests characteristic of those observed at the Site are relatively rare in the Lower Mainland, due largely to development pressure. The forests identified are associated with ecological communities that are currently listed by the BC CDC (Appendix I). The extent of each forest type within the study area was not formally mapped. However, an informal assessment of these communities following the guidelines outlined in RISC (2006a) would rank them as at least “fair” to “good” for landscape context, size, and condition. It should be noted that both ecosystems and species listed as either Red or Blue are considered to be a conservation priority; however, there is no legislation providing formal protection.

Many sites appeared to be transitional between the different forest types (site series) described for this subzone (following Green and Klinka [1994]). For example, wetter sites exhibited characteristics consistent with both the western redcedar – foamflower (*Tiarella trifoliata*) unit (site series 07) and the western redcedar, sitka spruce (*Picea sitchensis*) – skunk cabbage (*Lysichiton americanum*) unit (site series 12) indicating very moist to wet and rich to very rich soil conditions.

No rare plants were identified; however, a rare plant survey by a qualified Biologist would be required to conclusively determine their presence or absence on the Site. Some of the more unique and restricted habitats encountered, such as the bog ecosystem in the eastern portion of the area, wetter hollows, and rockier stream channels, could have a higher potential of supporting rare plant species.

2.2.2 Wildlife and Wildlife Habitat

Previous work by the MOT (MOT, April 2009) indicated that 17 wildlife species at risk may occur within the study area and also reported ungulate tracks and Black Bear scat being observed. These identified species were as follows:

- Invertebrates - Oregon Forest Snail;
- Amphibians/Reptiles - Coastal Tailed Frog; Red-legged Frog; Western Painted Turtle;
- Birds - Great Blue Heron; Marbled Murrelet; Horned Lark; Western Screech-owl; Peregrine Falcon; Short-eared Owl; Spotted Owl; Barn Owl; Band-tailed Pigeon; and
- Mammals - Pacific Water Shrew; Mountain Beaver; Grizzly Bear; Wolverine.

Prior to conducting the site visit, a list of wildlife species at risk with potential to be present within the study area was created using the BC Species and Ecosystems Explorer and Environment Canada’s federal Species at Risk database (Appendix F and J respectively). The BC Conservation Data Centre database was also queried for known occurrences of rare wildlife in the area (Appendix G).

According to the Species at Risk database, 10 rare wildlife species were identified as having the potential to occur within or in the vicinity of the Site (Appendix J). Based on potential

habitat suitability, it was determined that 5 of the 10 species identified could be present within the project footprint:

- Western Screech-Owl (*Megascops kennicottii kennicottii*) - B.C. blue-listed, COSEWIC species of Special Concern, SARA Schedule 1;
- Pacific Water Shrew (*Sorex bendirii*) - B.C. red-listed, COSEWIC Endangered species, SARA Schedule 1;
- Western Toad (*Bufo boreas*) – B.C. yellow-listed, COSEWIC species of Special Concern, SARA Schedule 1;
- Red-legged Frog (*Rana aurora*) – B.C. blue-listed, COSEWIC species of Special Concern, SARA Schedule 1;
- Rubber Boa (*Charina bottae*) – B.C. yellow-listed, COSEWIC species of Special Concern, SARA Schedule 1.

Although species listed provincially as red, blue or yellow are considered to be a conservation priority, there is no provincial legislation providing formal protection (with the exception of those species specifically listed under the *BC Wildlife Act* or listed under Schedule 1 of the Species at Risk Act (*SARA*). *SARA* protects all wildlife and plant species listed as Extirpated, Endangered or Threatened and also listed on Schedule 1 of the Act on federal lands. Species listed as Special Concern on Schedule 1 are not protected under *SARA*. Only migratory birds listed in the *Migratory Birds Convention Act* and also listed as Endangered, Threatened or Extirpated in Schedule 1 of *SARA* and aquatic species listed as Endangered, Threatened or Extirpated in Schedule 1 of *SARA* have legal protection on all lands in Canada, including private lands. All five species of the identified species above are Schedule 1 species, and all but Pacific Water Shrew have been designated as Species of Special Concern, and are therefore not legally protected by *SARA*. While the Pacific Water Shrew is a Schedule 1 species and is designated as Endangered on *SARA*; it would only be protected on federal land. Consequently, none of the species identified are afforded *legal* protection at the Site.

The MOE BC Species and Ecosystem Explorer database was also reviewed for provincial species at risk which occur within the Coastal Western Hemlock (CWH) zone and Chilliwack Forest District (Appendix F). According to this database, 58 wildlife species (including fish) have potential habitat ranges in the vicinity of the Site. Notably, the rubber boa and western toad were *not* identified by MOE BC Species and Ecosystem Explorer database as having the potential to occur in the vicinity of the Site. Of the 58 species identified, it was determined that 15 species had the potential to occur in the vicinity of the Site based on the habitat features present at the Site. The species with potential to occur within the Site, in addition to rubber boa and western toad, are presented in Table 1.

TABLE 1. RARE WILDLIFE WITH POTENTIAL TO EXIST AT THE SITE

Scientific Name	English Name	COSEWIC	BC Status	Identified Wildlife	SARA	Comments
<i>Rana aurora</i>	Red-legged Frog	SC (Nov 2004)	Blue	Y (May 2004)	1	Require water for breeding, found in forests adjacent to ponds/wetlands. Observed within the Site.
<i>Rana pretiosa</i>	Oregon Spotted Frog	E (May 2000)	Red		1	Highly aquatic, usually occurs at the grassy margins of streams, lakes, ponds, springs, and marshes. May disperse into forest, grassland, and brushland during wet weather. May occur, habitat exists within the Site; however, none observed.
<i>Bufo boreas</i>	Western Toad	SC (Nov 2002)	Yellow		1	Found in fields, forests or meadows, preferring damp conditions but do roam far from standing water. May occur, habitat exists within the Site; however, none observed.
<i>Charina bottae</i>	Rubber Boa	SC (May 2003)	Yellow		1	Occupies streambanks, thickets, grasslands and montane forests. Requires rocky outcrops and abundant CWD. Utilizes abandoned burrows and rock crevices. May occur, habitat exists within the Site; however, none observed.
<i>Ardea herodias fannini</i>	Great Blue Heron, <i>fannini</i> subspecies	SC (Mar 2008)	Blue	Y (May 2004)	3	Require abundant and accessible prey within 10 km of a breeding location. Inland fields are considered an important foraging habitat for both adults and juveniles in the

TABLE 1. RARE WILDLIFE WITH POTENTIAL TO EXIST AT THE SITE

Scientific Name	English Name	COSEWIC	BC Status	Identified Wildlife	SARA	Comments
						lower Fraser Valley and on southern Vancouver Island. Not likely to exist within the Site boundary.
<i>Butorides virescens</i>	Green Heron		Blue			Two habitat components important, but not critical: slow-moving or shallow water for foraging and nearby dense trees or tall shrubs for nesting. If habitat requirements can be met, the birds are able to tolerate suburban or even urban conditions. May occur, habitat exists within the Site; however, none observed.
<i>Patagioenas fasciata</i>	Band-tailed Pigeon	SC (Nov 2008)	Blue			Generally found in temperate and mountain coniferous and mixed forests and woodlands and locally in southern lowlands; also forage in cultivated areas. May occur, habitat exists within the Site; however, none observed.
<i>Megascops kennicottii kennicottii</i>	Western Screech-Owl, <i>kennicottii</i> subspecies	SC (May 2002)	Blue		1	Primarily wooded environments often in riparian (creek-side) zones. Found in forests dominated by deciduous or mixed (deciduous or coniferous) forests. May occur; however, none observed during owl survey.

TABLE 1. RARE WILDLIFE WITH POTENTIAL TO EXIST AT THE SITE

Scientific Name	English Name	COSEWIC	BC Status	Identified Wildlife	SARA	Comments
<i>Lepus americanus washingtonii</i>	Snowshoe Hare, <i>washingtonii</i> subspecies		Red			Found almost anywhere forest or dense shrub exists. May occur, habitat exists within the Site; however, none observed.
<i>Sorex bendirii</i>	Pacific Water Shrew	E (Apr 2006)	Red	Y (May 2004)	1	Riparian and marshy habitats. Most are caught within 25 m of streams with low percentage of grass and exposed soil, and a moderate amount of ferns, mosses and rocks and a high percentage of fine litter. May occur, habitat exists within the Site; however, none observed.
<i>Sorex trowbridgii</i>	Trowbridge's Shrew		Blue			Wide variety of low elevation coastal forest stands, preferring habitats with dry, loose soil and deep litter. May occur, habitat exists within the Site; however, none observed.
<i>Corynorhinus townsendii</i>	Townsend's Big-eared Bat		Blue			Open wetland areas near coniferous forests. May occur, habitat exists within the Site; however, none observed.
<i>Epitheca canis</i>	Beaverpond Baskettail		Blue			Scattered records from extreme south coast, rare inhabitant of marshy lakeshores, ponds and backwaters of slowly flowing streams. May occur, habitat exists within the Site; however, none observed.

TABLE 1. RARE WILDLIFE WITH POTENTIAL TO EXIST AT THE SITE

Scientific Name	English Name	COSEWIC	BC Status	Identified Wildlife	SARA	Comments
<i>Sympetrum vicinum</i>	Autumn Meadowhawk		Blue			Occurs near ponds, wetlands, and slow streams with dense emergent vegetation. Not likely to occur due to lack of emergent vegetation within watercourses on site.
<i>Euphyes vestris</i>	Dun Skipper	T (Nov 2000)	Blue		1	Site occurs within species range as per South Coast Conservation Program. May occur, habitat exists within the Site; however, none observed.
<i>Allogona townsendiana</i>	Oregon Forestsnail	E (Nov 2002)	Red		1	Most commonly found in broadleaf forests, with abundant leaf litter and woody debris. May occur, habitat exists within the Site; however, none observed.
<i>Monadenia fidelis</i>	Pacific Sideband		Blue			Deciduous, coniferous or mixed forests and open woods and grassy areas west of the Coast Mountains. May occur, habitat exists within the Site; however, none observed.

The CDC Internet Mapping Service database was also reviewed in order to obtain records of species at risk that are known to be present in the vicinity of the Site. According to the CDC, there are no known occurrences of species at risk in the vicinity of the Site. The CDC sensitive and masked occurrence maps are included as Appendix G.

On June 15 and 16, 2009, EBA Biologist Cameron Kulak assessed the wildlife habitat potential of the Site footprint and vicinity. Wildlife and/or evidence of animal use (such as animal scat, dens and burrows, nests and cavities) were recorded when encountered.

The second-growth coniferous and mixed coniferous/deciduous forest was determined to provide habitat for a number of forest-dwelling wildlife species and those typical of forest edges and riparian zones. The Site is unevenly distributed on the east and west sides of 256th Street with the majority of the Site footprint located east of 256th Street. The south-eastern most portion of the Site consists mainly of a forested rocky knoll with abundant coarse woody debris of varying decay class and sparse ground cover. A small bog ecosystem exists on the north-east edge of the knoll. Wetted areas of poor drainage and existing or historic riparian zones exist at several locations within the Site which provide aquatic habitat suitable as a water supply for wildlife (Figure 4). Vegetation species observed within and adjacent to these wetted areas included western red-cedar, sitka spruce (*Picea sitchensis*), skunk cabbage, foam flower, sword fern, deer fern, salal, salmonberry, red huckleberry, bunchberry (*Cornus canadensis*), vine maple and Devil's club (*Oplopanax horridus*) (Photo 29 and 31). Such vegetation assemblages are note-worthy as they indicate moist and rich soil conditions typical of site series 07 and 12 within the CWHdm biogeoclimatic zone and are known high capability habitat associations for Pacific Water Shrew. The western portion of the Site has been largely cleared and excavated for the Operating Engineers training facility. West of the Operating Engineers facility, terrain slopes downward to the southwest and is similarly forested as the east portion. A forested mound exists between the main Operating Engineers access road and 256th Street which consists of predominantly mixed coniferous-deciduous forest. No watercourses or wetted areas were observed within portion of the Site west of 256th Street.

Birds observed during the site visit included Black-capped Chickadee (*Parus atricapillus*), Common Raven (*Corvus corax*), Red-breasted Nuthatch (*Sitta canadensis*), Golden-crowned Kinglet (*Regulus satrapa*), American Robin (*Turdus migratorius*), Swainson's Thrush (*Catharus ustulatus*), Winter Wren (*Troglodytes troglodytes*), Western Wood Peewee (*Contopus sordidulus*), Dark-eyed Junco (*Junco hyemalis*), Spotted Towhee (*Pipilo maculatus*), Common Nighthawk (*Chordeiles minor*) and an unidentified Hummingbird. One small nest was observed along a gravel roadway near the south of the Site. The nest was not identified due to its height within the tree (Photo 38). Numerous dead-standing (wildlife) trees with abundant cavities and loose bark were observed, specifically around the wetted areas or near other anthropogenic impacts such as roadways or excavated areas. In addition, numerous downed trees providing forest floor cover as well as tree stumps from historical logging practices remained within the majority of the Site which is forested (Photo 37). Many species of birds, and occasionally small mammals, often use these resultant cavities as nesting sites and the coarse woody debris as runways. Many species of bats along the B.C. coast will utilize tree cavities for roosting habitat, including the blue-listed Keen's Myotis (*Myotis keenii*), and form nursery colonies under loose bark of wildlife trees; however, no bats were observed.

Additional wildlife observations included two confirmed and one possible observation of provincially blue-listed Red-legged Frog (*Rana aurora*) within the margin of the wetland north of the east Site access road, within a ponded depression east of 256th Street, and within a wetted portion of the Sawdust Creek channel (see Figure 4 and Photos 5 and 15).

Douglas' Squirrel (*Tamiasciurus douglasii*) was observed on a tree adjacent to the wetland. Numerous Pacific Tree Frogs (*Hyla regilla*) were observed at several locations within the Site including the Sawdust Creek headwater pond and the bog ecosystem north of the rocky knoll (Photos 9 and 30). Amphibian egg masses were observed within the headwater swamp of Sawdust Creek (unidentified), within an open wetted area of the bog and in a watercourse channel west of the bog (Photos 11, 27 and 28). The egg masses observed within the bog area appeared to be Northwestern salamander (*Ambystoma gracile*). Several small dark tadpoles (unidentified) and caddis-fly larva were observed within the headwater swamp to Sawdust Creek as well as the wetland (Photos 6 and 10).

Wildlife signs observed included coyote scat at various locations (frequently on the access road), raccoon (*Procyon lotor*) prints within the muddy margins of the wetted areas and a Black Bear (*Ursus americanus*) observed near the access gate.

EBA conducted a detailed habitat assessment to determine the potential for Pacific Water Shrew to occur within the Site. As noted in Section 2.2.1, the wetter sites observed showed vegetation associations typical of site series 07 and 12 within the CWHdm biogeoclimatic subzone (see Figure 4 and Photo 24). As per Craig (2007), 07 Western Red Cedar – Foam Flower and 12 Western Red Cedar Sitka Spruce – Skunk cabbage, are considered to have high capability and suitability for Pacific Water Shrew up to a 100 m radius. Trapping surveys are generally not recommended for areas identified as moderate or high quality habitat because any mortalities associated with the survey may have a significant impact on the population. Areas identified as moderate or high quality Pacific Water Shrew habitat trigger specific guidelines for management (see Recommendations).

EBA Biologists Cameron Kulak and Catherine Galbrand performed an owl survey of the Site on the night of June 16th, 2009 as per the Resource Information Standards Committee's Inventory Methods for Owl Surveys (RISC 2006b). Response rates of Western Screech-owls to conspecifics are greatest during territory establishment/pair bonding and nest-site selection, which occurs from 1 February to 1 June. During the survey, Western Screech-Owl calls were broadcast for two sets of one minute, each followed by four minutes of observation at four broadcast stations (Figure 4). During the observation time, trees were also searched for birds and/or nests. No Western Screech-Owls responded; however, as the survey occurred outside of the greatest response season, this does not preclude the possibility of their presence. Typically Western Screech-owls respond to call-playback of recorded calls from February through May and are unresponsive in June and July. Positive responses of Western Screech-owls during non-breeding periods are possible and can determine owl presence because they remain on territories year-round; however, these responses could be those of dispersing juveniles rather than nesting pair occupancy.

Other species that are protected by legislation are those listed under the *BC Wildlife Act*. It is prohibited to destroy an egg or a nest (regardless of whether it is occupied) of a bald eagle, osprey, peregrine falcon, gyrfalcon, great-blue heron or burrowing owl. It is unlikely that a peregrine falcon or gyrfalcon nest is present within the Site as both are cliff-nesters

and there were no suitable cliff habitat available. It is unlikely a burrowing owl nest would be present within the Site as they are a grassland species. Bald eagle, osprey, and great-blue heron nest near water and consequently may nest within or near the Site; however, no nests were observed during the assessment. The *Wildlife Act* also prohibits damage to the nest of any bird while it is active. In addition, no raptor or heron nests or nesting activity was observed on or adjacent to the lower portion of the Site, despite the documentation of potentially suitable habitat during MOT's April 2009 reconnaissance (MOT, 2009).

3.0 CONCLUSIONS

Based on the results of the Assessment, EBA makes the following conclusions concerning the development of a potential gravel quarry at the Site:

- Three (3) watercourse channels (1 permanent, 1 ephemeral, and 1 intermittent and three (3) drainage swales were identified within the Site footprint. (Figure 4). None of the watercourses had observed fish presence, with downstream barriers and habitat suitability likely precluding fish presence. However, the three (3) watercourses would be considered fish habitat by definition under the *Fisheries Act*, which includes watercourses that contribute food and nutrients to downstream receiving fish bearing waters.
- Based on the Riparian Areas Regulation (RAR) "Simple Assessment" procedures, permanent watercourses are afforded 30 m setbacks, and ephemeral watercourses are afforded 15 m setbacks. Likewise, non-fish bearing ditches (or swales) which ultimately connect to fish bearing waters are afforded 2 m setbacks. A RAR "Detailed Assessment" was not within the scope of this Assessment. However, based on RAR "Detailed Assessment" procedures, it is likely that, at a minimum, ~10 m riparian setbacks could be applied to each of the three (3) identified watercourses on Site. This conclusion would have to be confirmed through a Detailed Assessment conducted by a Qualified Environmental Professional (QEP).
- The young to mature second growth forest is dominated by Douglas-fir, Western redcedar, and Western hemlock as well as some broadleaf species. Much of the area is undeveloped, particularly east of 256th Street.
- The potential for rare plants to occur is moderate, owing to several unique habitat features with restricted abundance present in the area (e.g., bog ecosystems, exposed rock, wet hollows, and rocky stream channels).
- Of the forest types observed during the field survey, in general there are vegetation associations which indicate the potential for red and blue listed communities within the Site (Appendix G). A formal assessment of the extent of these forests was outside the current project scope, however, a review of imagery for the area shows there is little development. This increases the ecological integrity of the area as well as the conservation value. However, although both ecosystems and individual species listed

provincially as red, blue, or yellow are considered to be a conservation priority, there is no legislation providing formal protection.

- The forest stand provides habitat for a variety of terrestrial and aquatic wildlife species that would be typical of mature second-growth coastal forest stands and riparian areas. The site investigation revealed numerous opportunities for wildlife tree users (cavity nesters). A passerine (perching bird) nest were also observed.
- Of the seventeen (17) federally or provincially listed species at risk with potential to exist, seven (7) of which are listed under Schedule 1 of the *Species at Risk Act*, fifteen (15) may occur based on habitat availability within the Site, and one species (Red-legged Frog) is known to occur. However, none of the species identified are afforded *legal* protection under *SARA*.
- The investigation of the Site identified the presence of Red-legged Frog (provincially blue-listed, *SARA* Schedule 1) and potential high capability habitat for the Pacific Water Shrew (provincially red-listed, *SARA* Schedule 1). Although species listed provincially as red, blue or yellow are considered to be a conservation priority, there is no legislation providing formal protection (with the exception of those species specifically listed under the *BC Wildlife Act* (which neither species is). As Red-legged Frog are designated only as a Species of Special Concern it is; therefore, not legally protected by *SARA*. The Pacific Water Shrew is a Schedule 1 species and is designated as Endangered on *SARA*; however, it would only be protected on federal land. Consequently, neither Red-legged Frog nor Pacific Water Shrew is afforded *legal* protection at the Site. Only migratory birds listed in the *Migratory Birds Convention Act* and also listed as Endangered, Threatened or Extirpated in Schedule 1 of *SARA* and aquatic species listed as Endangered, Threatened or Extirpated in Schedule 1 of *SARA* have legal protection on all lands in Canada, including private lands.
- During the site visit, a Western Screech-Owl survey was conducted and trees were searched for nests. No Western Screech-Owls were observed, although this does not preclude the possibility of their presence.

As discussed, the purpose of this report is to identify potential environmental constraints associated with the quarry development. Potential requirements with respect to riparian setbacks and species-at-risk are discussed below along with mitigation options to reduce or avoid impacts to sensitive or critical wildlife resource values.

4.0 RECOMMENDATIONS

Based on the findings of the Assessment, EBA makes the following recommendations concerning the development of a gravel quarry at the Site:

- In order to accurately determine and illustrate the locations of existing watercourses within Site boundaries, and determine subsequent setback extents and areas, a legal survey of these watercourses should be conducted.
- Detailed and specific rare plant and wildlife surveys may be required by Regulators prior to any site clearing; particularly with respect to Western Screech-Owl due to the timing of the survey during this Environmental Assessment. A survey for Western Screech-Owl may be required to be conducted between 1 February and 1 June.
- Active nests are protected by the BC *Wildlife Act*. Should future site clearing need to occur within the breeding bird season, a nest survey would need to be conducted to identify and avoid all active nests.

With respect to fish habitat, Pacific Water Shrew and Red-legged Frog, there are three (3) possible scenarios to consider with respect to the development of the gravel quarry at the Site:

1. Proponent is willing to stay clear (30 m for permanent, 15 m for ephemeral) of all the identified watercourses on the Site (see Figure 4).

ACTION: Setbacks may be sufficient to protect fish habitat and Red-legged Frog and Pacific Water Shrew habitat. It should be noted that setbacks associated for PWS are recommended to be 100 m from wetted areas.

2. Proponent wants to excavate as closely to the watercourses as possible.

ACTION: Conduct a detailed RAR setback assessment to determine relaxed riparian setbacks and conduct PWS study including trapping at the low habitat suitability sites. Trapping would not likely be permitted in the high probability site (Figure 4). Regulators would likely assert that PWS presence at the high probability sites be assumed and 30-100 m setbacks prescribed.

3. Proponent wants to remove/relocate all/some of the watercourses in order to maximize extraction footprint.

ACTION: Could be considered a Section 35 *Fisheries Act* violation (harmful alternation disruption or destruction of fish habitat, otherwise known as a 'HADD') requiring DFO Authorization. Conduct detailed habitat study of all affected watercourses (to quantify impacts), conduct a detailed RAR setback assessment to determine riparian footprint requiring compensation, and conduct PWS and Red-legged Frog study including trapping and (potential relocation) for all sites identified as low capability habitat. As per Scenario 2, trapping would not likely be permitted in the high probability areas (Figure 4). Regulators would likely assert that PWS presence at the high probability site be assumed and recommend 30-100 m setbacks.

Should the project advance, further detailed studies (i.e. legal site survey, detailed RAR assessment, detailed rare plant survey, habitat impact assessment and habitat compensation) may be required in order to meet certain regulatory requirements. These studies are beyond the scope of this assignment; however, EBA has extensive experience in these areas and would be pleased to provide any of these services under separate cover if required.

5.0 CLOSURE

EBA trusts that this report prepared for the BC Ministry of Transportation meets with your expectations and needs. The information contained in this report has been compiled from existing information sources, from field observations and from information provided by the BC Ministry of Transportation.

This report has been prepared in accordance with EBA practices and generally accepted scientific methods. No other warranty is made, expressed or implied. Professional judgment has been applied in developing the recommendations in this report. Reference should be made to the 'Environmental Report – General Conditions' attached as Appendix K.

Please contact the undersigned should you require clarification on any of the information contained herein.

Sincerely,
EBA Engineering Consultants Ltd.

Prepared by:



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Aquatic Biologist



Cameron Kulak, B.Sc. B.I.T.
Terrestrial Biologist

Reviewed by:



Nigel Cavanagh, M.Sc., R.P.Bio.
Project Director, Environmental Practice,
Vancouver Island Operations

ATTACHMENTS

References

- Figure 1: Site Location Plan
- Figure 2: Quarry Pit Development Plan (provided by MOT, 2009)
- Figure 3: MOT EO Assessment Results (MOT, 2009)
- Figure 4: EBA Bio-assessment Results

Photographs 1 through 38

- Appendix A: Maple Ridge Zoning Map
- Appendix B: Maple Ridge OCP Designation
- Appendix C: MOE HabitatWizard Results
- Appendix D: DFO Lost Steams Map
- Appendix E: SHIM Mapping Database Results
- Appendix F: MOE Species and Ecosystems Explorer Database Results
- Appendix G: BC CDC Database Results
- Appendix H: Rare and Protected Plant Species with Potential to Occur within Study Area
- Appendix I: Potential CWHdm Vegetation Associations
- Appendix J: Environment Canada's Species at Risk Database Results
- Appendix K: Environmental Report – General Conditions

REFERENCES

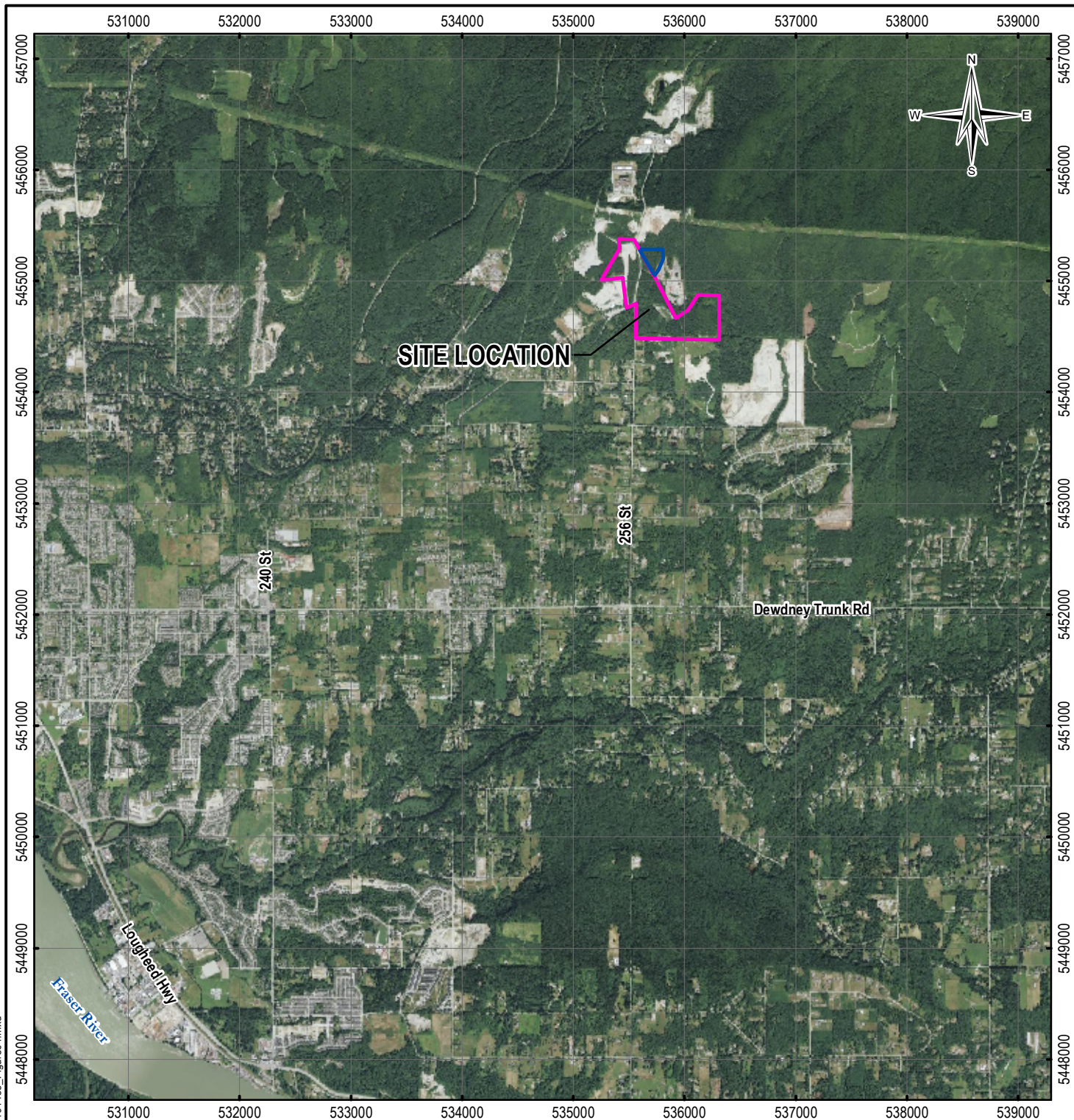
- BC Conservation Data Centre: Conservation Data Centre Mapping Service [web application]. 2008. Victoria, British Columbia, Canada. Available: http://webmaps.gov.bc.ca/imfx/imf.jsp?site=imapbc&savessn=Ministry%20of%20Environment/Conservation_Data_Centre.ssn (Date Accessed: June, 2009).
- BC Conservation Data Centre: BC Species and Ecosystems Explorer [web application]. 2008. Victoria, British Columbia, Canada. Available: <http://a100.gov.bc.ca/pub/eswp/results.do> (Date Accessed: June, 2009).
- Cannings, S.G., and J. Ptolemy. 1998. Rare Freshwater Fish of British Columbia. B.C. Minist. Environ., Lands and Parks, Victoria, BC. 214pp.
- Community Mapping Network: Sensitive Habitat Inventory and Mapping [web application]. 2009. Available: <http://204.244.79.12/mapguide2009/SHIM/Shim.php> (Date Accessed: June, 2009).
- Craig, V., and R. Vennesland. 2008. Best Management Practices guidelines for Pacific water shrew in urban and Rural areas. Working draft, September 2008. Surrey, British Columbia Ministry of Environment. 39 p.
- District of Maple Ridge: Maple Ridge Official Community Plan Bylaw No. 6425-2006 [web application]. 2009. Maple Ridge, BC, Canada. Available: <http://www.mapleridge.ca/EN/main/business/4389/ocp.html> (Date Accessed: June, 2009).
- District of Maple Ridge: Maple Ridge Zoning Bylaw No. 3510-1985 [web application]. 2009. Maple Ridge, BC, Canada. Available: <http://www.mapleridge.ca/EN/main/municipal/6103.html#z> (Date Accessed: June, 2009).
- District of Maple Ridge: RidgeView Internet Mapping System [web application]. 2009. Maple Ridge, BC, Canada. Available: <http://www1.mapleridge.ca/RidgeView/app/default.asp> (Date Accessed: June, 2009).
- Green, R.N. and K. Klinka. 1994. A Field Guide to Site Identification and Interpretation for the Vancouver Forest Region. Land Management Handbook Number 28. Victoria, BC. 293 pp.
- Land Development Guidelines for the Protection of Aquatic Habitat. 1992. Prepared by Department of Fisheries and Oceans Canada and Ministry of Environment, Lands and Parks.

-
- Ministry of Environment: Fisheries Information Summary System [web application]. 2008. Available: <http://a100.gov.bc.ca/pub/fidq/fissSpeciesSelect.do> (Date Accessed: June, 2009).
- Ministry of Environment: Habitat Wizard [web application]. 2008. Available: <http://www.env.gov.bc.ca/habwiz/> (Date Accessed: June, 2009).
- Ministry of Transportation and Infrastructure. 2009. Environmental Overview for Haney Pit #1707.
- Resources Information Standards Committee (RISC). 2006a. Standards for Mapping Ecosystems at Risk in British Columbia: An Approach to Mapping Ecosystems at Risk and Other Sensitive Ecosystems. Version 1.0. Report prepared by Ministry of Environment Ecosystems Branch for RISC. Victoria, BC. 98pp.
- Resources Information Standards Committee (RISC). 2006b. Inventory Methods for Owl Surveys. Standards for Components of British Columbia's Biodiversity No. 42. Version 1.0. Report prepared by Seepanee Ecological Consulting for RISC. Victoria, BC. 58pp.
- South Coast Conservation Program: SCCP Atlas [web application] 2008. Available: <http://www.shim.bc.ca/atlas/sar/main.cfm> (Date Accessed: June, 2009).



FIGURES

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LEGEND

- Study Area (42 ha)
- Additional Study Area (3ha)

NOTES

Base data source:
Image from Google Earth Pro (August 5, 2008)

ISSUED FOR USE

PROPOSED HANEY GRAVEL PIT ENVIRONMENTAL OVERVIEW ASSESSMENT MAPLE RIDGE, BC

Site Location Plan

PROJECTION
UTM Zone 10

DATUM
NAD83

Scale: 1:50,000
800 400 0 800
Meters

FILE NO.
N23101455_Figure01.mxd

PROJECT NO.
N23101455.001

OFFICE
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DATE
July 9, 2009

 **BRITISH COLUMBIA**
Ministry of Transportation

 **EBA Engineering Consultants Ltd.**

Figure 1

LEGEND

- 

HYPSOGRAPHIC CONTOURS
WITH ELEVATION INDEX
- 

TP93-02 TH93-02
TEST PIT, TEST HOLE
(YEAR 1993, No. 02)
- 

TREE, SPOT ELEVATION
- 

MONUMENT, WOODEN POST,
STANDARD IRON PIN
- 

DITCH/CREEK CENTRE
- 

ROAD
- 

DISTRICT LOT BOUNDARY
- 

PARCEL BOUNDARY
- 

RESERVE BOUNDARY
- 

GRANULAR BOUNDARY
- 

SURVEY BOUNDARY
- 

GARDEN, LAWNS, VEGETATION
- 

FENCE
- 

TREE LINE
- 

CSA

CRUSHER SETUP AREA
- 

DEVELOPMENT DIRECTION
- 

ADDITIONAL POTENTIAL
- 

BUFFER AREA
- 

STOCKPILE AREA:
SA-A = AGGREGATE
SA-OB = OVERBURDEN
SA-TS = TOPSOIL
SA-RJ = REJECT
SA-DEB = DEBRIS
- 

EXISTING STOCKPILE:
STPL-A (Type) = AGGREGATE
STPL-OB = OVERBURDEN
STPL-TS = TOPSOIL
STPL-RJ (Type) = REJECT
STPL-DEB = DEBRIS

GENERAL NOTES

- Coordinates are UTM Zone 10 NAD 83.
- Lot boundaries are approximate.
- Survey date: August 2003.

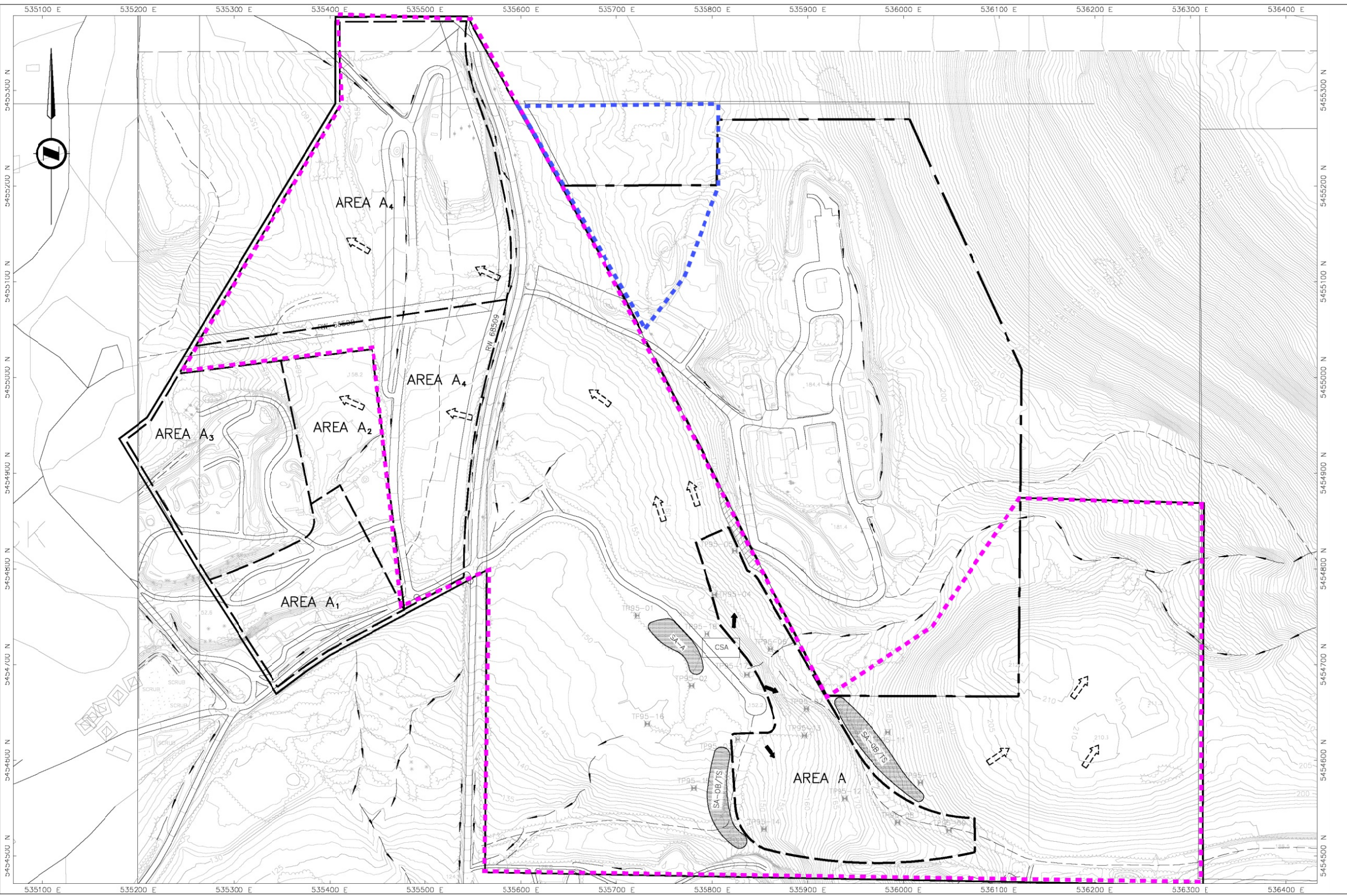
MINING NOTES

General:

- Development areas are based on sampling completed to a 5 metre depth. Once these thicknesses have been extracted re-evaluation of material quality will be required.
- A minimum 2 metre cleared, grubbed and stripped zone is to be maintained above all active pit faces.
- All pit development slopes will be 1.5 H to 1.0 V.
- All final reclamation slopes will be 2.0 H to 1.0 V.
- The pit is to be developed in accordance with: Health, Safety and Reclamation Code for Mines in B.C., Reclamation and Environmental Protection Handbook for Sand, Gravel and Quarry Operations in B.C., Aggregate Operators Best Management Practices Handbook for B.C.
- For material extractions in excess of 1000 m³ a Notice of Pit/Quarry Mining must be filed with the Ministry of Energy and Mines minimum 14 days prior to commencement of operations.
- The dumping of off-site soils, overburden or road building debris is not permitted.

Development Area "A":

- Selective mining and the use of a primary crusher is required.
- Sand rejection may be required to meet base coarse gradations.



NOTES

Original drawing (PDP1707.PDF, 2009-02-23) provided to EBA by BC Ministry of Transportation and prepared by Wranglers Technical Services Inc.

CLIENT



PROPOSED HANEY GRAVEL PIT
ENVIRONMENTAL OVERVIEW ASSESSMENT
MAPLE RIDGE, BC

Quarry Pit Development Plan

ISSUED FOR USE

EBA Engineering
Consultants Ltd.



PROJECT NO. N23101455.001	DWN MEZ	CKD CG	REV 0
OFFICE EBA-VANC	DATE July 9, 2009		

Figure 2

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NOTES

Original drawing (PDP1707.PDF, 2009-04-17) provided to EBA by BC Ministry of Transportation and prepared by Wranglers Technical Services Inc.

CLIENT



**PROPOSED HANEY GRAVEL PIT
ENVIRONMENTAL OVERVIEW ASSESSMENT
MAPLE RIDGE, BC**

MoT EO Assessment Results

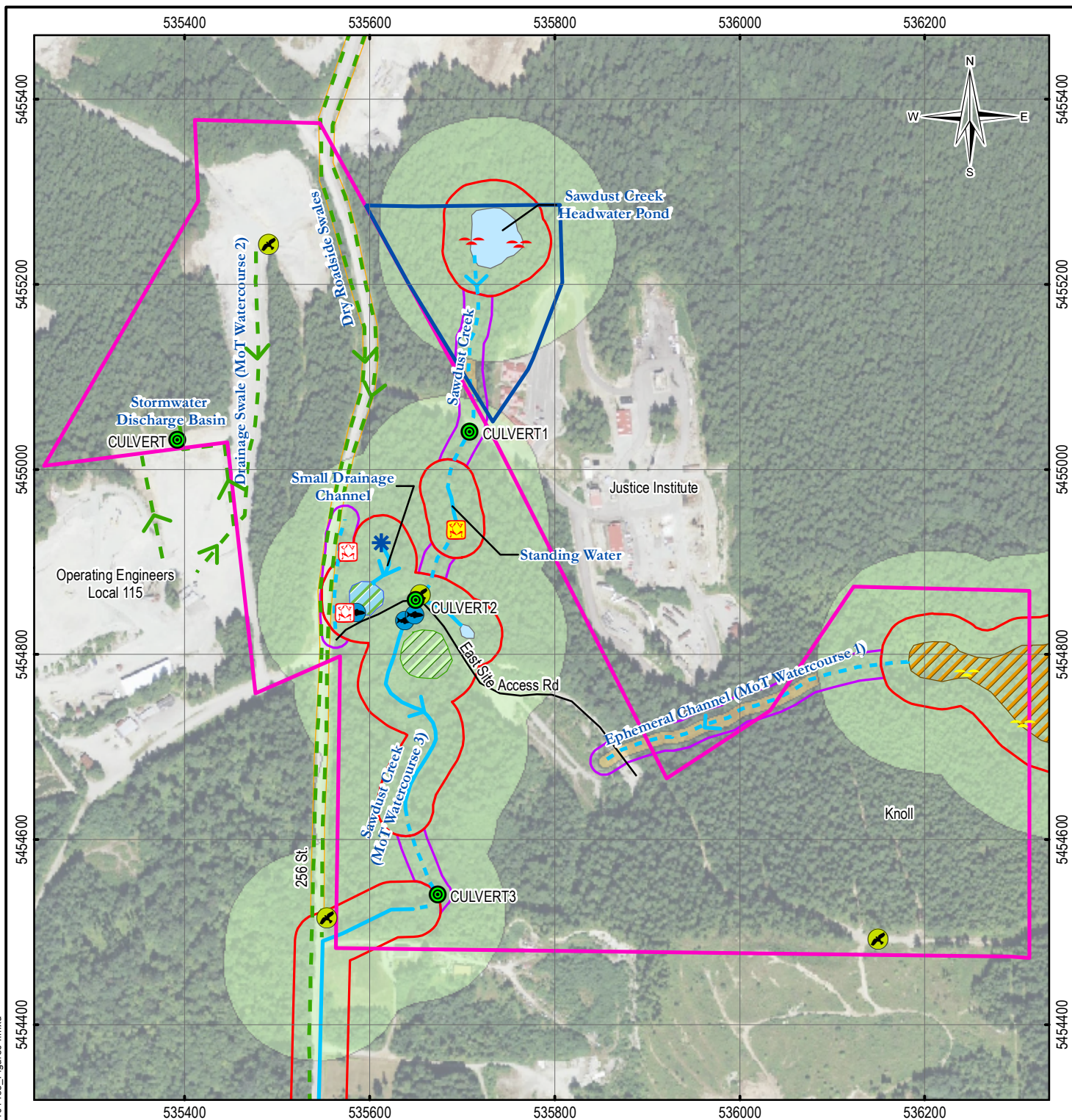
EBA Engineering
Consultants Ltd.



PROJECT NO. N23101455.001	DWN MEZ	CKD CG	REV 0
OFFICE EBA-VANC	DATE July 9, 2009		

Figure 3

ISSUED FOR USE



LEGEND

- Study Area
- Additional Study Area
- Culvert
- Amphibian Egg Mass
- Salamander Egg Mass
- Fish Trap
- * Headwater
- Owl Broadcast Station
- Red-legged Frog Observation
- Possible Red-legged Frog Observation
- Flowing Stream
- - Ephemeral Stream
- - Drainage Swale
- 2m Setback
- 30m Setback
- 15m Setback
- Bog
- Pond
- Wet Depression
- Wetland
- Pacific Water Shrew - High Habitat Capability
- Pacific Water Shrew - Low Habitat Capability

NOTES

Base data source:
Image from Google Earth Pro
(August 5, 2008)

PROPOSED HANEY GRAVEL PIT ENVIRONMENTAL OVERVIEW ASSESSMENT MAPLE RIDGE, BC

EBA Bio-Assessment Results

PROJECTION UTM Zone 10	DATUM NAD83
Scale: 1:6,000	
110 55 0 110	
Meters	

FILE NO.
N23101455_Figure04.mxd

PROJECT NO.
N23101455.001

OFFICE
EBA-VANC

DWN
MEZ

DATE
July 9, 2009

CKD
CK

REV
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EBA Engineering
Consultants Ltd.



Figure 4



PHOTOGRAPHS





Photo 1

Small drainage channel flowing north and discharging into wetland north of east Site access road (June 15, 2009).



Photo 2

Algal bloom in small drainage channel flowing north and discharging into wetland north of east Site access road (June 15, 2009).



Photo 3

Wetland just north of east Site access road (June 15, 2009).



Photo 4

Wetland north of Site access road and location of fish trap 1 (June 15, 2009).



Photo 5

Red-legged frog observed within wetland north of Site access road (June 15, 2009).



Photo 6

Unidentified tadpole captured baited minnow trap set in wetland north of Site access road (June 16, 2009)



Photo 7

Pond headwaters of Sawdust Creek (June 16, 2009).



Photo 8

Pond headwaters of Sawdust Creek (June 16, 2009).



Photo 9

Pacific Tree Frog observed within Sawdust Creek headwater swamp, (June 15, 2009).



Photo 10

Abundant unidentified tadpoles in headwater pond of Sawdust Creek (June 16, 2009).



Photo 11

Amphibian egg mass in Sawdust Creek headwater pond (June 16, 2009).



Photo 12

Dry Sawdust Creek channel immediately south of headwater pond (June 16, 2009).



Photo 13

Dry Sawdust Creek channel northwest of Justice Institute (June 16, 2009).



Photo 14

Sawdust Creek further downstream. Some standing water observed (June 16, 2009).

**Photo 15**

Possible red-legged frog observed in standing water of Sawdust Creek (June 16, 2009).

**Photo 16**

Sawdust Creek further downstream near Site access road. Channel dry (June 16, 2009).



Photo 17

Culvert 2 beneath east Site access road. Note culvert is perched and likely barrier to fish passage (June 15, 2009).



Photo 18

Minnow trap in Sawdust Creek downstream of Culvert 2. Styrofoam shrew floatation device installed (June 15, 2009).



Photo 19

Sawdust Creek downstream of Culvert 2 south of east Site access road (June 15, 2009).



Photo 20

Sawdust Creek further downstream (June 15, 2009).

**Photo 21**

Sawdust Creek becomes dry further downstream with intermittent ponded water. Channel observed to be dry up to Culvert 3 (June 15, 2009).

**Photo 22**

Sawdust Creek dry at Culvert 3 (June 15, 2009).



Photo 23

Wet pond providing flow input to Culvert 2 and Sawdust Creek (June 15, 2009).



Photo 24

Large wetted area east of downstream end of Sawdust Creek (June 15, 2009).



Photo 25

Bog at headwater location of ephemeral channel (MOT Watercourse 1) (June 15, 2009).



Photo 26

Bog vegetation observed (June 15, 2009).



Photo 27

Salamander egg mass observed in bog (June 15, 2009).



Photo 28

Additional salamander egg mass observed in bog (June 15, 2009).



Photo 29

Ephemeral channel (MOT Watercourse 1) consisted mostly of wet depression with no defined channel (June 15, 2009).



Photo 30

Pacific Tree Frog observed near ephemeral watercourse (June 15, 2009).

**Photo 31**

Ephemeral channel (MOT Watercourse 1) channel occasionally becomes more defined where terrain steepens, with areas of standing water. No flow observed (June 15, 2009).

**Photo 32**

Ephemeral channel (MOT Watercourse 1) near confluence with access road. Dry with evidence of little flow conveyance (June 15, 2009).



Photo 33

Terminus of east Site access road. Becomes trail above barrier. No swale exists along road at this location (June 15, 2009).



Photo 34

Dry roadside swales border each side of 256th Street (June 15, 2009).

**Photo 35**

Dry swale on Operational Engineer site (MOT Watercourse 2) (June 16, 2009).

**Photo 36**

Dry swale on Operational Engineer site (MOT Watercourse 2) ultimately discharges via culvert to natural gully where water reportedly infiltrates. No standing water or evidence of standing water was observed (June 16, 2009).



Photo 37

General forest characteristics of rocky knoll in southeast corner of Site (June 15, 2009).

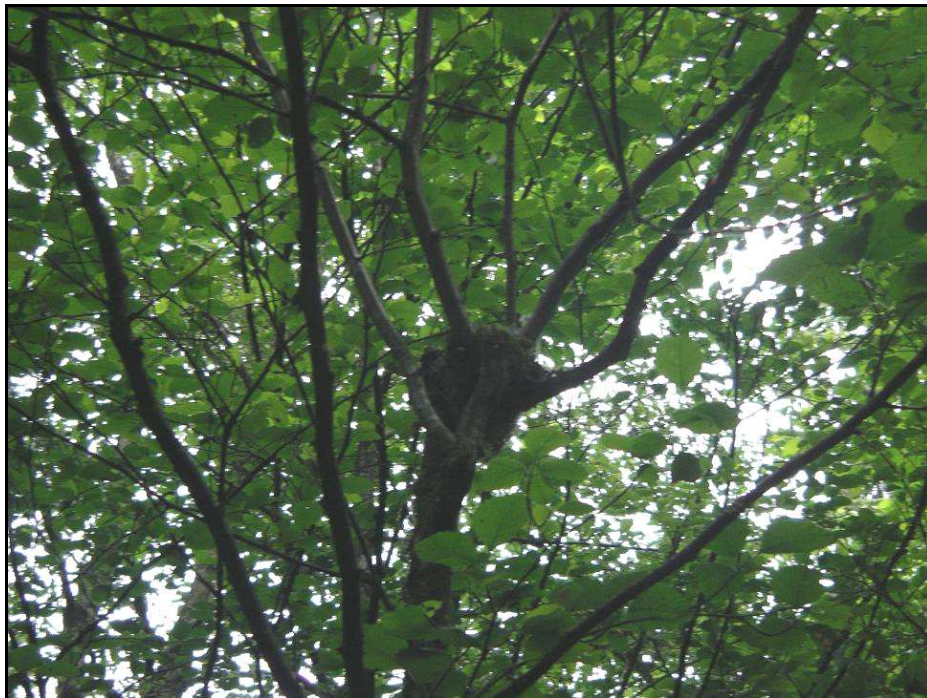


Photo 38

Unidentified nest observed; active/non-active was not confirmed (June 15, 2009).

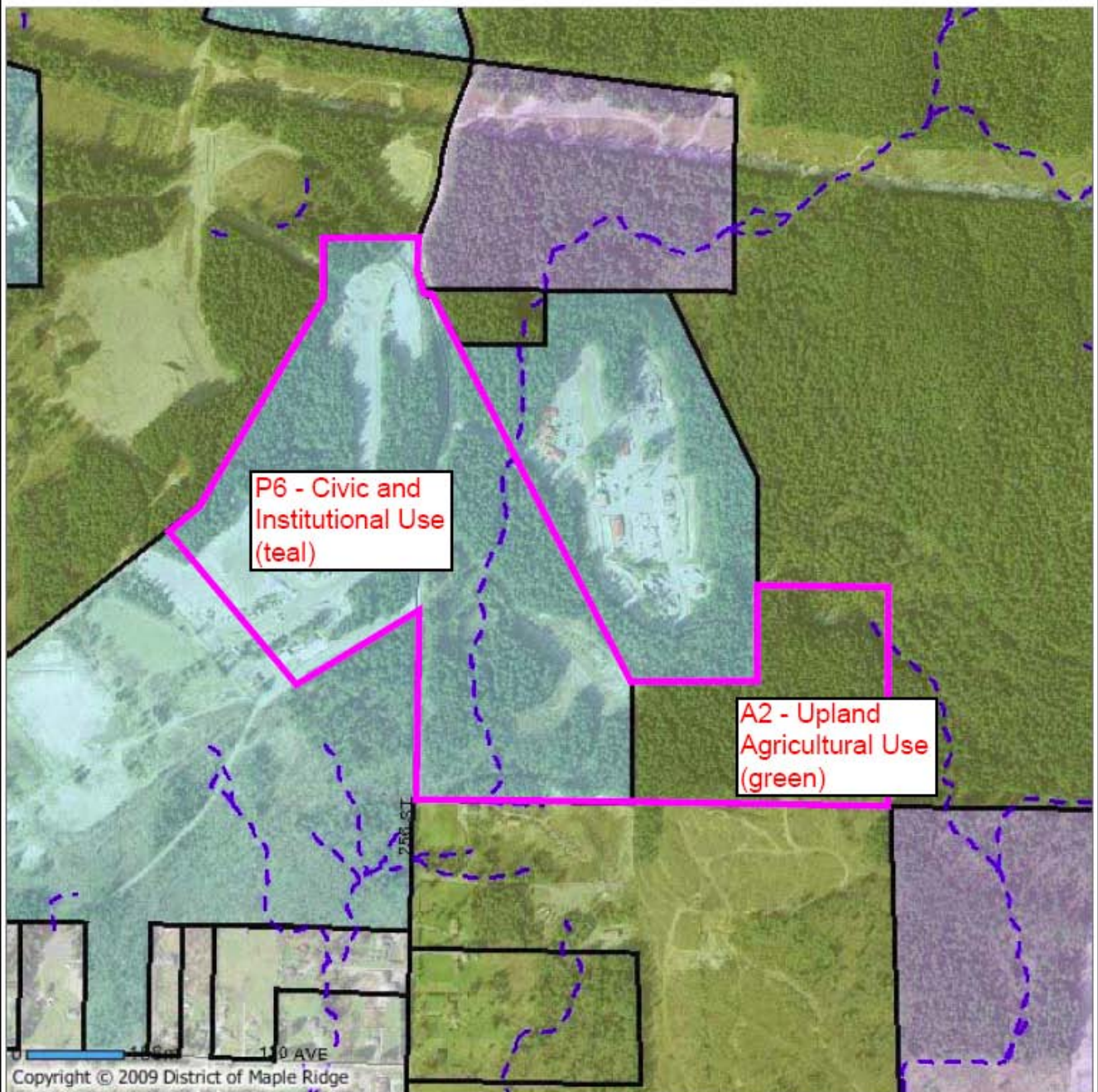


APPENDIX A

APPENDIX A: DISTRICT OF MAPLE RIDGE ZONING MAP



Maple Ridge Creeks



- Municipal Boundary
- Major Rivers and Lakes
- Creeks
- Zoning
- Agricultural
- Commercial
- Industrial
- Institutional
- Multi-Family Residential

- Streets
- Arterial
- Collector
- Highway
- Lane
- Local
- Private
- Railway

Aerial Photo (2007)

Scale
1:10000

Current Land Use Zoning in
Maple Ridge

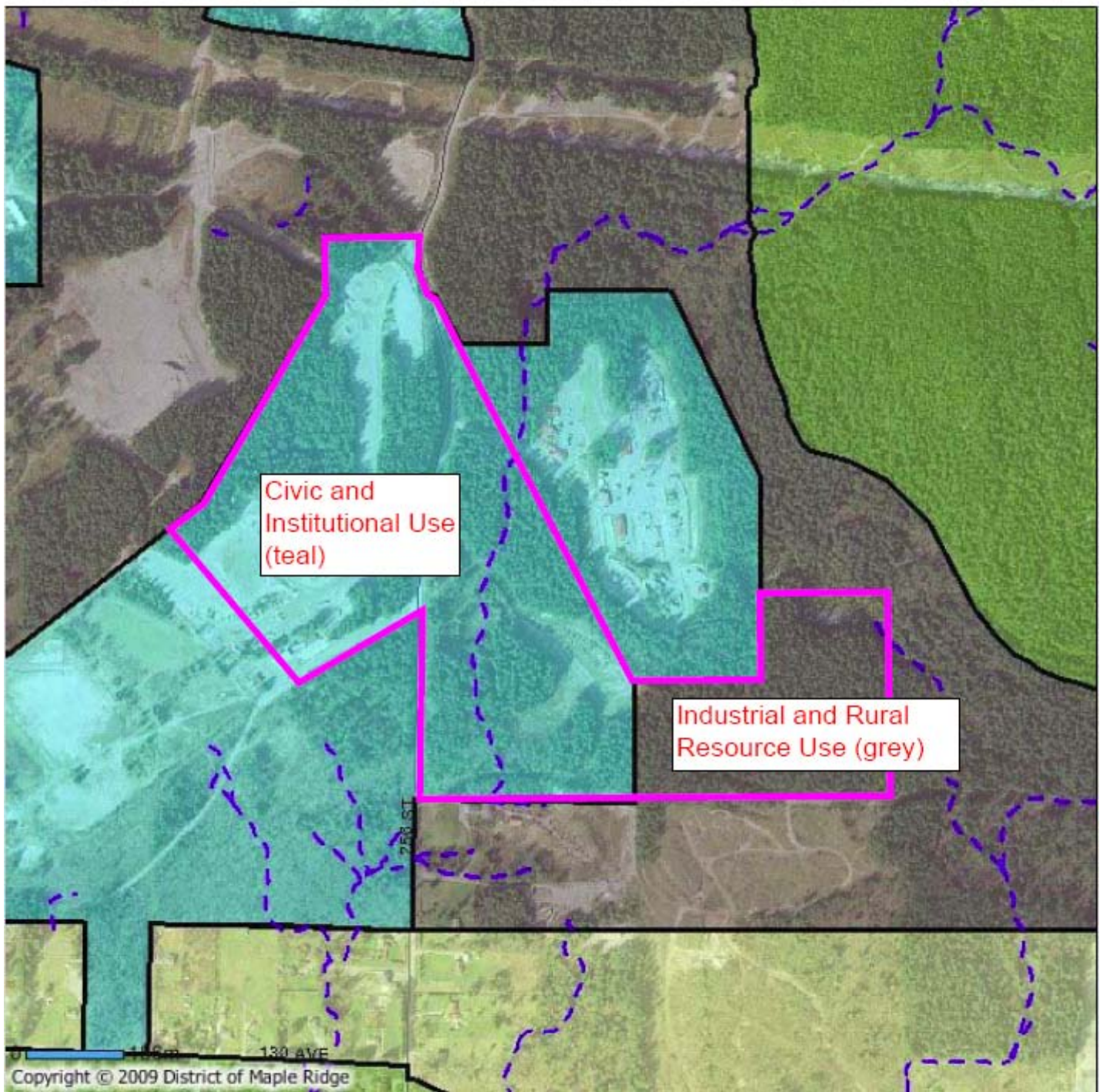


APPENDIX B

APPENDIX B: DISTRICT OF MAPLE RIDGE OCP DESIGNATION



Maple Ridge - OCP



Scale
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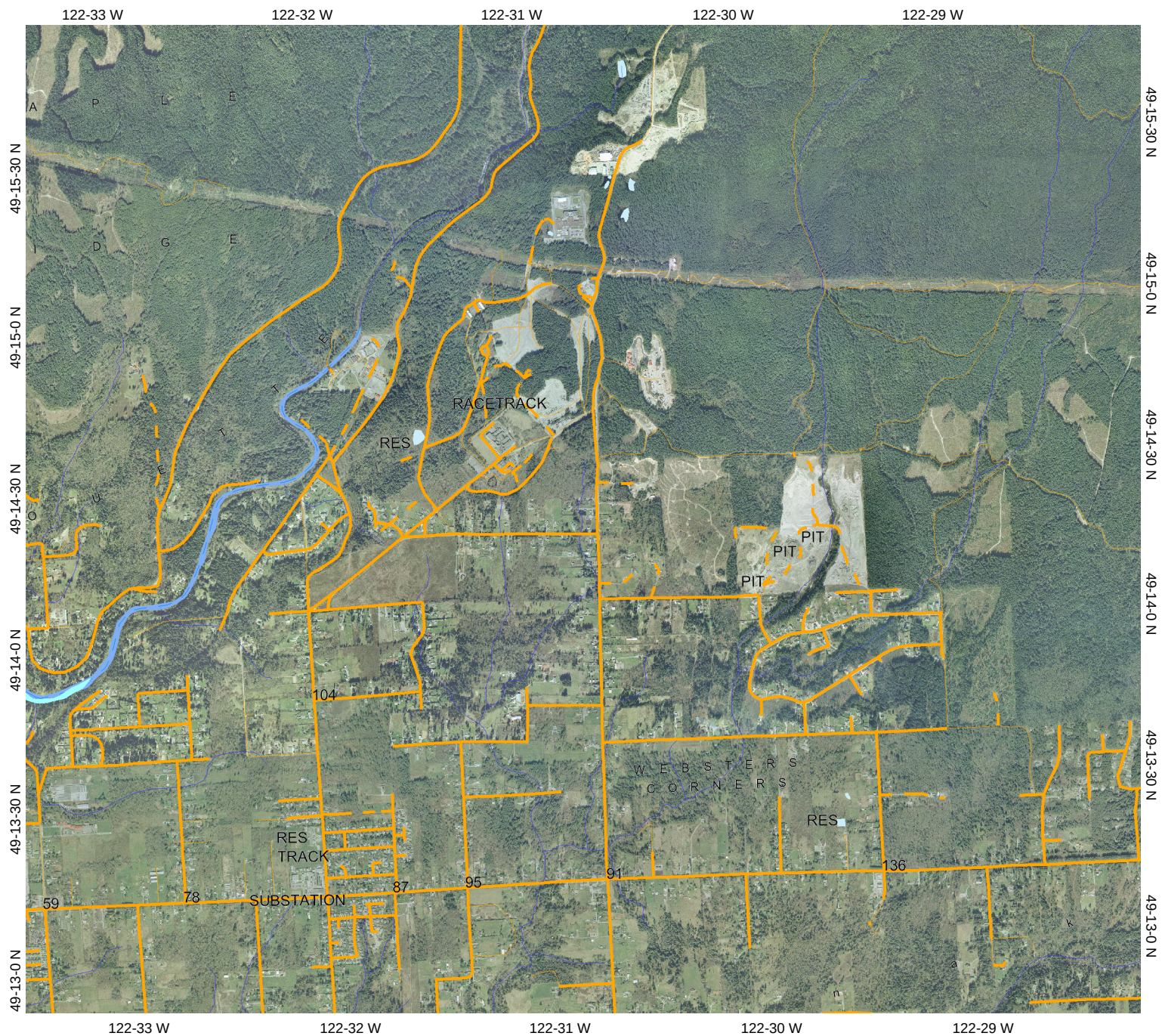
Land uses recommended for future developments. These designations were determined with extensive public consultation, and can be found in Maple Ridge's Official Community Plan at the following link: <http://www.mapleridge.ca/EN/main/business/4389/ocp.html>



APPENDIX C

APPENDIX C: MOE HABITAT WIZARD RESULTS





Haney Pit - Habitat Wizard

Legend

- Regional Boundaries - Ministry of Environment
- Water - River, Canal, etc. - Colour Themed (1:20,000)
- Canal
- River or Stream - Definite
- Water - Ocean - Colour Filled (1:20,000)
- Water - Dams, Falls, etc. - Colour Themed (1:20,000)
- Dam
- Falls
- Rapids
- Spillway - Penstock
- Sand Gravel Bar
- Sinkhole
- Transportation - Airfield - Colour Themed (1:20,000)
- Air Facility
- Airport
- Airstrip
- Abandoned Airfield
- Helipad
- Water - Coastal Islands - Colour Filled (1:250,000)
- Coastal Island - Definite
- Lakes, Major Rivers, Man-Made Waterbodies and Wetlands - Colour Themed (50K)

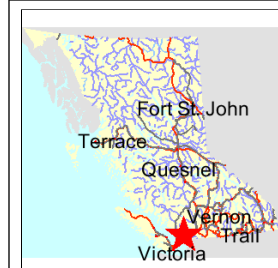
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Key Map of British Columbia

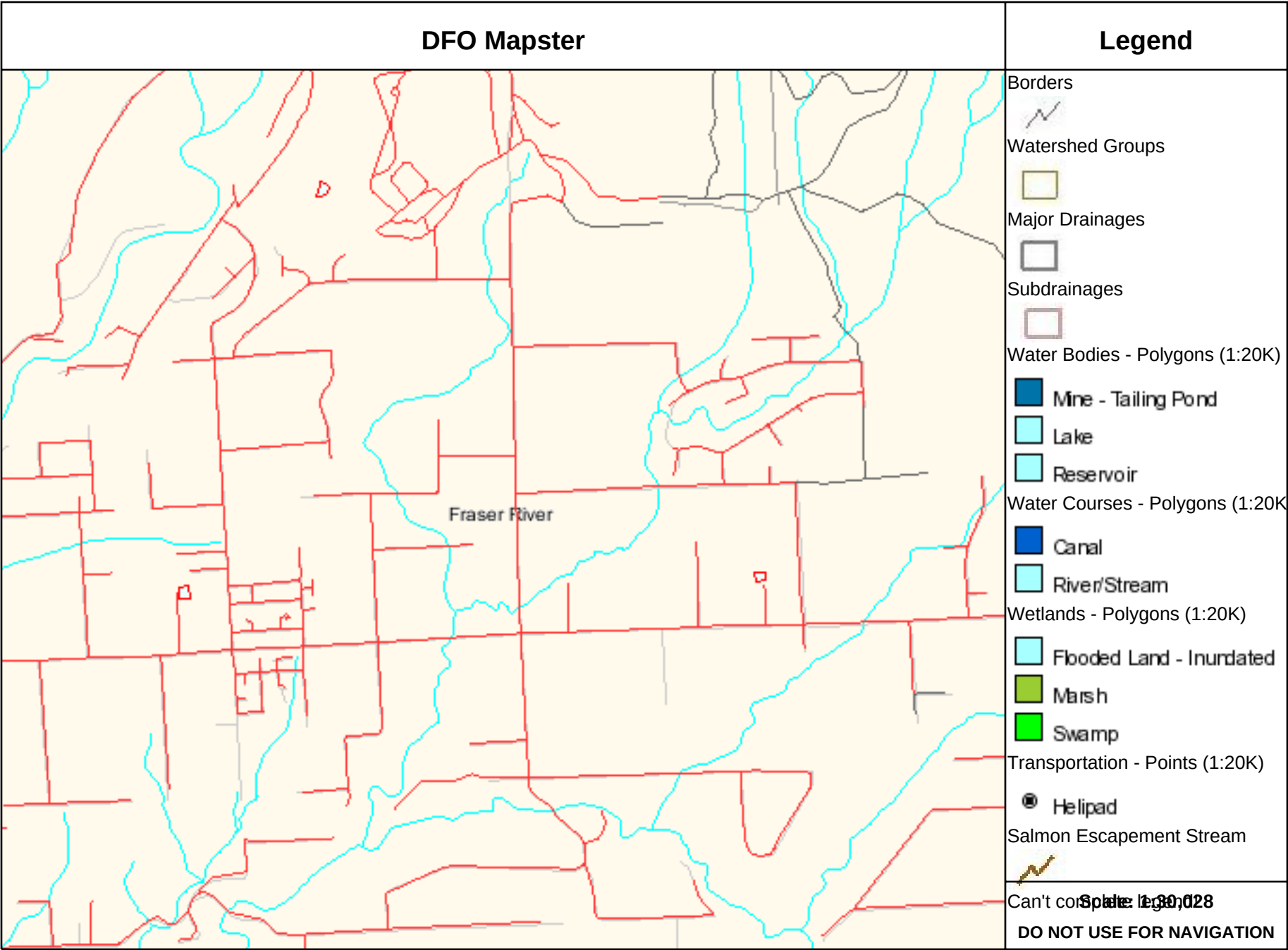




APPENDIX D

APPENDIX D: DFO LOST STREAMS MAP





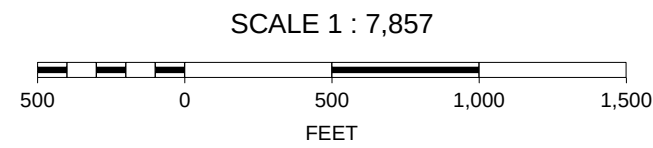
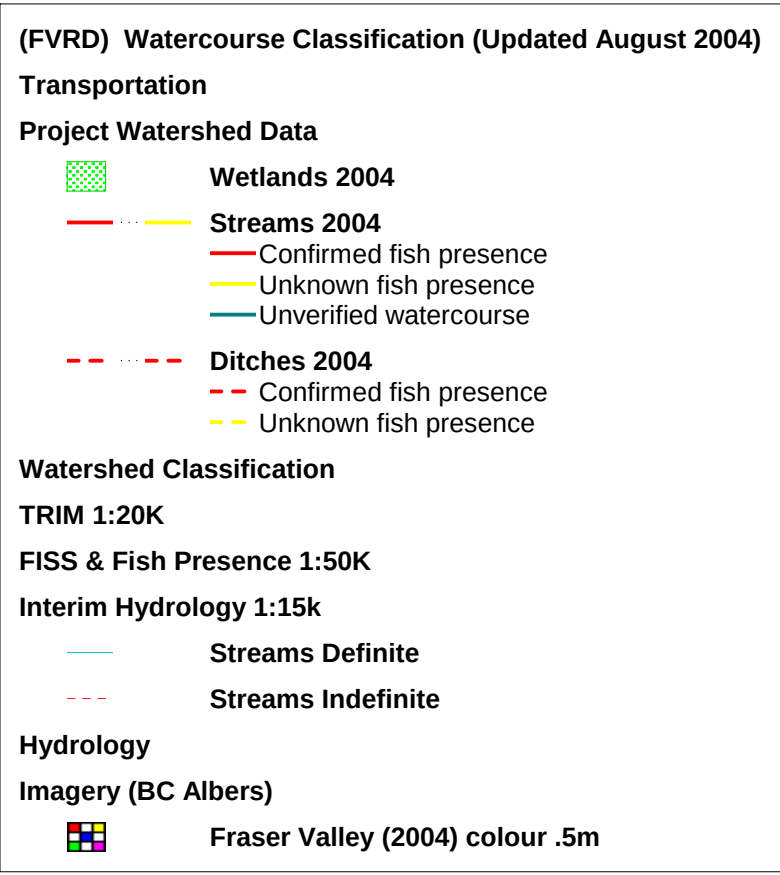


APPENDIX E

APPENDIX E: SHIM MAPPING DATABASE RESULTS



Sensitive Habitat Inventory and Mapping





APPENDIX F

APPENDIX F: MOE BC SPECIES AND ECOSYSTEMS EXPLORER DATABASE SEARCH RESULTS



Appendix F. Rare Wildlife Species with Potential Habitat Ranges Near Site.						
Scientific Name	English Name	COSEWIC	BC Status	Identified Wildlife	SARA	Comments
<i>Acipenser medirostris</i>	Green Sturgeon	SC (May 1987)	Red		1	Typically in estuarine or marine waters rarely in freshwater.
<i>Acipenser transmontanus</i> pop. 4	White Sturgeon (Lower Fraser River population)	E (Nov 2003)	Red		3	Habitat varies with life history stage. Deep low velocity adjacent to faster water important. Majority of range within mainstem Fraser River.
<i>Rhinichthys</i> sp. 4	Nooksack Dace	E (Apr 2007)	Red		1	Found only in Bertrand, Cave, Fishtrap, and Pepin creeks, all tributaries of the Nooksack River of Washington State
<i>Catostomus</i> sp. 4	Salish Sucker	E (Nov 2002)	Red		1	Most often captured in slow currents over sand or silt substrate in areas with in-stream vegetation and overstream cover.
<i>Spirinchus</i> sp. 1	Pygmy Longfin Smelt	DD (Nov 2004)	Red			Found only in Harrison and Pitt lakes, both on the north side of the Fraser River valley.
<i>Thaleichthys pacificus</i>	Eulachon		Blue			Requiere cold water, typically estuarine systems like the Fraser, Skeena, Nass Rivers.
<i>Oncorhynchus clarkii clarkii</i>	Cutthroat Trout, <i>clarkii</i> subspecies		Blue			Small coastal streams, Requires small, low gradient coastal streams and estuarine habitats; well-shaded streams with water temperatures below 18 C are optimal . Spawns in streams on clean, small gravel substrates.
<i>Salvelinus confluentus</i>	Bull Trout		Blue	Y (Jun 2006)		Interior species but found within Fraser and Harrison watersheds.
<i>Salvelinus malma</i>	Dolly Varden		Blue			Found in Fraser river watershed, residents remain in streams or lakes.
<i>Ascaphus truei</i>	Coastal Tailed Frog	SC (May 2000)	Blue	Y (May 2004)	1	Live in cool, permanent mountain streams with stable substrates, such as boulders and cobbles.
<i>Rana aurora</i>	Red-legged Frog	SC (Nov 2004)	Blue	Y (May 2004)	1	Require water for breeding, found in forests adjacent to ponds/wetlands.
<i>Rana pretiosa</i>	Oregon Spotted Frog	E (May 2000)	Red		1	Highly aquatic, avoids dry uplands; rarely found far from permanent quiet water; usually occurs at the grassy margins of streams, lakes, ponds, springs, and marshes; May disperse into forest, grassland, and brushland during wet weather.
<i>Chrysemys picta</i> pop. 1	Western Painted Turtle - Pacific Coast Population	E (Apr 2006)	Red		1	Painted Turtles prefer the margins and shallows of lakes and ponds, ditches and sluggish streams with muddy bottoms and lots of aquatic plants and also require nearby upland nesting areas without vegetation
<i>Phalacrocorax auritus</i>	Double-crested Cormorant	NAR (May 1978)	Blue			Most colonies in British Columbia are located on relatively flat ground, either on the tops of low islands or on cliff tops on more steep-faced islands.
<i>Ardea herodias fannini</i>	Great Blue Heron, <i>fannini</i> subspecies	SC (Mar 2008)	Blue	Y (May 2004)	3	Large colonies in deciduous trees or small and dispersed colonies can encompass several hectares; require abundant and accessible prey within 10 km of a breeding location. Inland fields are considered an important foraging habitat for both adults and juveniles in the lower Fraser Valley and on southern Vancouver Island.
<i>Botaurus lentiginosus</i>	American Bittern		Blue			Breeding occurs in lowland marshes in lakes, ponds, and rivers in south and central interior British Columbia. and in the lower Fraser Valley.

<i>Butorides virescens</i>	Green Heron		Blue			Two habitat components seem important, but not critical: slow-moving or shallow water for foraging and nearby dense trees or tall shrubs for nesting. If these habitat requirements can be met, then the birds seem to be able to tolerate suburban, or even urban conditions.
<i>Falco peregrinus anatum</i>	Peregrine Falcon, <i>anatum</i> subspecies	SC (Apr 2007)	Red		1	Traditionally nest on cliffs, but also variety of buildings, churches, and bridges in metropolitan centers, usually aided by artificial nest box.
<i>Grus canadensis</i>	Sandhill Crane	NAR (May 1979)	Yellow	Y (Jun 2006)		Known breeding areas include Pitt Meadows and Burns Bog in the Lower Mainland. Typical breeding habitats include isolated bogs, marshes, swamps and meadows, and other secluded shallow freshwater wetlands generally >1 ha in size surrounded by forest cover.
<i>Recurvirostra americana</i>	American Avocet		Red			Known to select sparsley vegetated habitats. Only known from one location in Lower Mainland - Serpentine Fen.
<i>Hydroprogne caspia</i>	Caspian Tern	NAR (May 1999)	Blue			Breeds in coastal estuarine, salt marsh, and barrier islands along Pacific. On Pacific Coast, frequents freshwater lakes and estuaries.
<i>Brachyramphus marmoratus</i>	Marbled Murrelet	T (Nov 2000)	Red	Y (May 2004)	1	Requires specialized nesting requirements specific to old forest (age class 8 to 9) second growth forest.
<i>Patagioenas fasciata</i>	Band-tailed Pigeon	SC (Nov 2008)	Blue			Generally found in temperate and mountain coniferous and mixed forests and woodlands and locally in southern lowlands; also forage in cultivated areas.
<i>Coccyzus americanus</i>	Yellow-billed cuckoo		Red			Formerly known from the lower Fraser Valley. Nest in dense tangles and thickets of deciduous riparian vegetation.
<i>Tyto alba</i>	Barn Owl	SC (Nov 2001)	Blue		1	Prefer low-elevation, open country, where their small rodent prey are more abundant. They are often associated with agricultural lands, especially pasture. Nests are located in buildings, hollow trees, and cavities in cliffs.
<i>Asio flammeus</i>	Short-eared Owl	SC (Mar 2008)	Blue	Y (May 2004)	3	Breed locally on the south mainland coast, through the Fraser River delta east to Fort Langley. An uncommon migrant throughout the province. The Fraser River delta is the main wintering area in the province. Old-growth fields required for breeding and foraging habitat.
<i>Athene cunicularia</i>	Burrowing Owl	E (Apr 2006)	Red	Y (May 2004)	1	At present, the Burrowing Owl is confined to areas within the Thompson-Okanagan Plateau.
<i>Megascops kennicottii kennicottii</i>	Western Screech-Owl, <i>kennicottii</i> subspecies	SC (May 2002)	Blue		1	Primarily wooded environments often in riparian (creek-side) zones. Along the coast mostly found in forests dominated by deciduous trees or mixed (deciduous or coniferous) forests.
<i>Strix occidentalis</i>	Spotted Owl	E (Mar 2008)	Red	Y (May 2004)	1	Considered an old-growth forest dweller.
<i>Melanerpes lewis</i> pop. 1	Lewis's Woodpecker (Georgia Depression population)		Red	Y (May 2004)		Breeding last confirmed in the Lower Mainland in 1963. Interior species.
<i>Eremophila alpestris strigata</i>	Horned Lark, <i>strigata</i> subspecies	E (Nov 2003)	Red		1	The last confirmed breeding record was 1978. A few birds may persist in the lower Fraser Valley at Vancouver International Airport, near Abbotsford, and near Chilliwack.

<i>Hirundo rustica</i>	Barn Swallow		Blue			Breeding habitat usually contains open areas (fields, meadows) for foraging, nest site that includes a vertical or horizontal substrate (often enclosed) underneath some type of roof or ceiling, and a body of water that provides mud for nest-building.
<i>Progne subis</i>	Purple Martin		Blue			It is found in estuaries and harbours, usually near abandoned pilings. Deciduous second growth near ponds, lakes.
<i>Sialia mexicana</i> pop. 1	Western Bluebird (Georgia Depression population)		Red			Mostly migrants, some residents interior.
<i>Sturnella neglecta</i> pop. 1	Western Meadowlark (Georgia Depression population)		Red			Can occur near tidal flats; however, mainly an interior grassland, pasture species.
<i>Aplodontia rufa rufa</i>	Mountain Beaver, <i>rufa</i> subspecies	SC (May 1999)	Blue		1	South of the Fraser River, approximately from Hope west to Langley, generally at higher elevations. Habitat must include deep, firm and well-developed soils, a cool and moist microclimate and suitable succulent forage within 50 m of burrows.
<i>Myodes gapperi occidentalis</i>	Southern Red-backed Vole, <i>occidentalis</i> subspecies		Red			Local occurrence only in Burns Bog.
<i>Lepus americanus washingtonii</i>	Snowshoe Hare, <i>washingtonii</i> subspecies		Red			Found almost anywhere forest or dense shrub exists.
<i>Sorex bendirii</i>	Pacific Water Shrew	E (Apr 2006)	Red	Y (May 2004)	1	Riparian and marshy habitats. Most are caught within 25 m of streams with low percentage of grass and exposed soil, and a moderate amount of ferns, mosses and rocks and a high percentage of fine litter.
<i>Sorex trowbridgii</i>	Trowbridge's Shrew		Blue			Wide variety of low elevation coastal forest stands, preferring habitats with dry, loose soil and deep litter.
<i>Corynorhinus townsendii</i>	Townsend's Big-eared Bat		Blue			Open wetland areas near coniferous forests.
<i>Myotis keenii</i>	Keen's Myotis	DD (Nov 2003)	Red	Y (May 2004)	3	Appear to be associated with cool wet coastal montane forests and karst features. Caves >100 m in length and above 500 m elevation are important winter hibernation sites. In summer, rock faces and knolls with crevices that are solar or geothermally heated are important maternity roosts. Low elevation coastal forest and riparian areas are important foraging areas.
<i>Gulo gulo luscus</i>	Wolverine, <i>luscus</i> subspecies	SC (May 2003)	Blue	Y (May 2004)		Most abundant where large ungulates are common, and where carrion is abundant in winter from hunter kills, predation and natural mortality.
<i>Ursus arctos</i>	Grizzly Bear	SC (May 2002)	Blue	Y (May 2004)		Habitat associations are strongly seasonal, and are habitat generalists.
<i>Argia emma</i>	Emma's Dancer		Blue			Occurs in flowing streams and creeks as well as along the shores of some lakes in southwestern British Columbia.
<i>Tanypteryx hageni</i>	Black Petaltail		Blue			Found in seepage areas and bogs, flat or on hillsides, often associated with streams and usually not under forest canopy in wet mountain ranges.
<i>Octogomphus specularis</i>	Grappletail		Red			Lives only along streams flowing swiftly out of warm lakes in the hills bordering the lower Fraser Valley.
<i>Epitheca canis</i>	Beaverpond Baskettail		Blue			Scattered records from the extreme south coast, rare inhabitant of marshy lakeshores, ponds and backwaters of slowly flowing streams.
<i>Pachydiplax longipennis</i>	Blue Dasher		Blue			Riverine, shallow water.

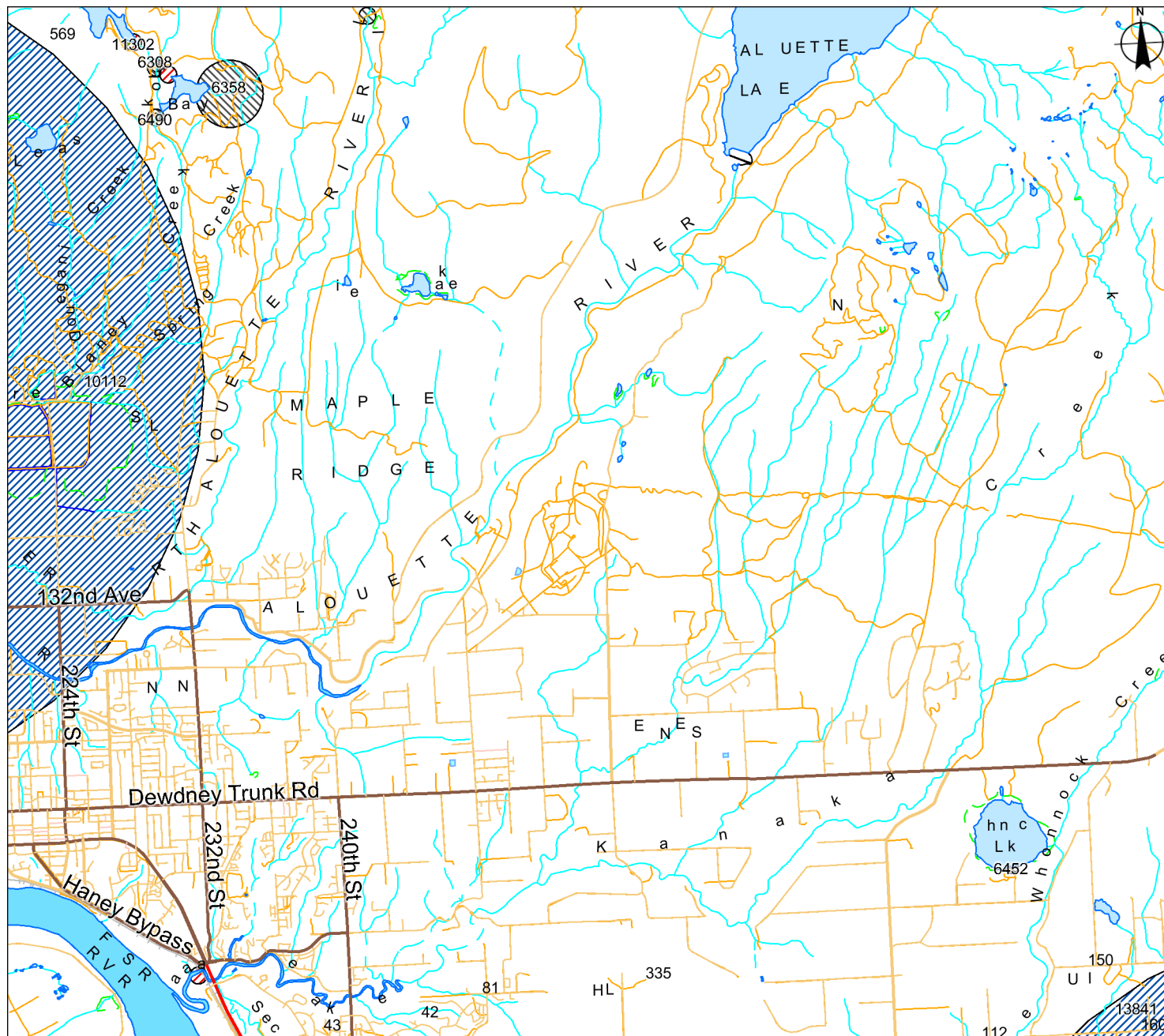
<i>Sympetrum vicinum</i>	Autumn Meadowhawk		Blue			Occurs near ponds, wetlands, and slow streams with dense emergent vegetation.
<i>Euphyes vestris</i>	Dun Skipper	T (Nov 2000)	Blue		1	Fraser River Canyon populations of the butterfly are in xeric conditions where permanent springs or spring floods.
<i>Sphaerium patella</i>	Rocky Mountain Fingernailclam		Red			Occurs in lakes, rivers, sloughs and streams.
<i>Carychium occidentale</i>	Western Thorn		Blue			Undisturbed leaf litter in low-elevation forests dominated by big-leaf maple and which do not flood.
<i>Prophyaon vanatta</i>	Scarletback Taildropper		Blue			This species is only known from Vancouver Island and the Chilliwack Valley in coastal mixed-wood forests.
<i>Zonitoides nitidus</i>	Black Gloss		Blue			Terrestrial snail with greatest richness of species among carbonate cliff habitats.
<i>Allogona townsendiana</i>	Oregon Forestsnail	E (Nov 2002)	Red		1	Most commonly found in broadleaf forests, with abundant leaf litter and woody debris.
<i>Cryptomastix devia</i>	Puget Oregonian	XT (Nov 2002)	Red		1	Historically found in the Sumas Prairie and Vancouver Island. No recent occurrences north of Seattle.
<i>Monadenia fidelis</i>	Pacific Sideband		Blue			Deciduous, coniferous or mixed forests and open woods and grassy areas west of the Coast. Sixteen occurrences are known from the following locations: Vancouver Island, the Gulf Islands, Surrey and Burnaby.



APPENDIX G

APPENDIX G: BC CDC DATABASE RESULTS





CDC Occurrences

Legend

(DRA) Digital Road Atlas - Partially Attributed

- Alleyway
- Arterial
- Collector
- Ferry
- Freeway
- Highway
- Lane
- Local
- Ramp
- Recreation
- Resource
- Restricted
- Service
- Strata
- Trail
- Unknown
- (1:20,000) Water - Ocean - Colour Filled

(1:20,000) Water - Lake, Reservoir, etc. - Colour Themed

- Mine - Tailing Pond
- Reservoir - Definite
- Lake - Definite
- (1:20,000) Water - River, Canal,

0 1000 2000 m.

Scale: 1:70,877

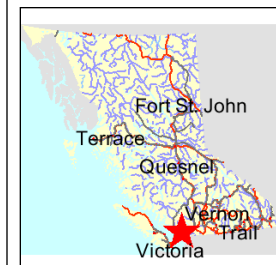
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Key Map of British Columbia





APPENDIX H

APPENDIX H: RARE AND PROTECTED PLANT SPECIES WITH POTENTIAL TO OCCUR WITHIN THE STUDY AREA



Appendix # - List of Rare Plant Species with Potential to Exist within Study Area

Family	Scientific Name	English Name	COSEWIC	BC Status	Habitat Type
Asteraceae	<i>Bidens amplissima</i>	Vancouver Island beggarticks	SC (Nov 2001)	Blue	PALUSTRINE
Callitrichaceae	<i>Callitriche heterophylla</i> ssp. <i>heterophylla</i>	two-edged water-starwort		Blue	ESTUARINE;LACUSTRINE;PALUSTRINE
Ranunculaceae	<i>Caltha palustris</i> var. <i>palustris</i>	yellow marsh-marigold		Blue	ESTUARINE;PALUSTRINE
Brassicaceae	<i>Cardamine parviflora</i> var. <i>arenicola</i>	small-flowered bitter-cress		Red	TERRESTRIAL
Cyperaceae	<i>Carex amplifolia</i>	bigleaf sedge		Blue	PALUSTRINE;RIVERINE;TERRESTRIAL
Cyperaceae	<i>Carex interrupta</i>	green-fruited sedge		Red	LACUSTRINE;PALUSTRINE;TERRESTRIAL
Cyperaceae	<i>Carex scoparia</i>	pointed broom sedge		Blue	LACUSTRINE;PALUSTRINE;TERRESTRIAL
Cyperaceae	<i>Carex vulpinoidea</i>	fox sedge		Blue	LACUSTRINE;PALUSTRINE;TERRESTRIAL
Portulacaceae	<i>Claytonia washingtoniana</i>	Washington springbeauty		Red	RIVERINE;TERRESTRIAL
Crassulaceae	<i>Crassula aquatica</i>	pigmyweed		Blue	ESTUARINE;LACUSTRINE;PALUSTRINE
Cuscutaceae	<i>Cuscuta campestris</i>	field dodder		Blue	
Elatinaceae	<i>Elatine rubella</i>	three-flowered waterwort		Blue	ESTUARINE;LACUSTRINE;PALUSTRINE
Cyperaceae	<i>Eleocharis parvula</i>	small spike-rush		Blue	ESTUARINE;LACUSTRINE;PALUSTRINE
Cyperaceae	<i>Eleocharis rostellata</i>	beaked spike-rush		Blue	ESTUARINE;LACUSTRINE;PALUSTRINE;RIVERINE;TERRESTRIAL
Hydrocharitaceae	<i>Elodea nuttallii</i>	Nuttall's waterweed		Blue	ESTUARINE;LACUSTRINE;PALUSTRINE
Onagraceae	<i>Epilobium ciliatum</i> ssp. <i>watsonii</i>	purple-leaved willowherb		Blue	ESTUARINE;PALUSTRINE;TERRESTRIAL
Onagraceae	<i>Epilobium leptocarpum</i>	small-fruited willowherb		Blue	PALUSTRINE;RIVERINE;TERRESTRIAL
Fissidentaceae	<i>Fissidens pauperculus</i>	poor pocket moss	E (Nov 2001)	Red	RIVERINE;TERRESTRIAL
Poaceae	<i>Glyceria leptostachya</i>	slender-spiked mannagrass		Blue	ESTUARINE;LACUSTRINE;PALUSTRINE;TERRESTRIAL
Asteraceae	<i>Helenium autumnale</i> var. <i>grandiflorum</i>	mountain sneezeweed		Blue	ESTUARINE;LACUSTRINE;PALUSTRINE;TERRESTRIAL
Asteraceae	<i>Helianthus nuttallii</i> var. <i>nuttallii</i>	Nuttall's sunflower		Red	PALUSTRINE;TERRESTRIAL
Clusiaceae	<i>Hypericum scouleri</i> ssp. <i>nortoniae</i>	western St. John's-wort		Blue	LACUSTRINE;PALUSTRINE;TERRESTRIAL
Isoetaceae	<i>Isoetes nuttallii</i>	Nuttall's quillwort		Blue	PALUSTRINE;RIVERINE;TERRESTRIAL
Juncaceae	<i>Juncus oxymeris</i>	pointed rush		Blue	ESTUARINE;PALUSTRINE;TERRESTRIAL
Juncaginaceae	<i>Lilaea scilloides</i>	flowering quillwort		Blue	ESTUARINE;PALUSTRINE
Scrophulariaceae	<i>Lindernia dubia</i> var. <i>anagallidea</i>	false-pimpernel		Blue	ESTUARINE;LACUSTRINE;PALUSTRINE;TERRESTRIAL
Fabaceae	<i>Lupinus rivularis</i>	streambank lupine	E (Nov 2002)	Red	
Haloragaceae	<i>Myriophyllum hippuroides</i>	western water-milfoil		Blue	LACUSTRINE;RIVERINE
Haloragaceae	<i>Myriophyllum pinnatum</i>	green parrot's-feather		Red	LACUSTRINE;RIVERINE
Haloragaceae	<i>Myriophyllum ussuriense</i>	Ussurian water-milfoil		Blue	ESTUARINE;LACUSTRINE;PALUSTRINE;RIVERINE
Polemoniaceae	<i>Navarretia intertexta</i>	needle-leaved navarretia		Red	PALUSTRINE;RIVERINE;TERRESTRIAL
Poaceae	<i>Pleuropogon refractus</i>	nodding semaphoregrass		Blue	PALUSTRINE;TERRESTRIAL
Polygonaceae	<i>Polygonum hydropiperoides</i>	water-pepper		Blue	LACUSTRINE;PALUSTRINE
Polygonaceae	<i>Polygonum punctatum</i>	dotted smartweed		Blue	PALUSTRINE
Rosaceae	<i>Rubus nivalis</i>	snow bramble		Red	TERRESTRIAL
Fabaceae	<i>Rupertia physodes</i>	California-tea		Blue	TERRESTRIAL
Salicaceae	<i>Salix sessilifolia</i>	soft-leaved willow		Blue	ESTUARINE;LACUSTRINE;PALUSTRINE;TERRESTRIAL
Malvaceae	<i>Sidalcea hendersonii</i>	Henderson's checker-mallow		Blue	ESTUARINE;PALUSTRINE
Verbenaceae	<i>Verbena hastata</i> var. <i>scabra</i>	blue vervain		Red	PALUSTRINE;TERRESTRIAL
Lemnaceae	<i>Wolffia borealis</i>	northern water-meal		Red	LACUSTRINE;PALUSTRINE;RIVERINE

APPENDIX I

APPENDIX I: POTENTIAL CWHDM VEGETATION ASSOCIATIONS

Appendix # - Rare Ecological Communities with Potential to Exist Within Study Area									
Scientific Name	English Name	Global Rank	Prov Rank	BC Status	CDC Track	BEC Unit	Ecosystem Group	Endemic	
<i>Picea sitchensis</i> / <i>Rubus spectabilis</i> Dry	Sitka spruce / salmonberry Dry	G1G2	S1S2	Red	Y	CWHdm08	Riparian, Forest	Y	
<i>Populus balsamifera</i> ssp. <i>trichocarpa</i> - <i>Alnus rubra</i> / <i>Rubus spectabilis</i>	black cottonwood - red alder / salmonberry	GNR	S3	Blue	Y	CWHdm09	Riparian, Forest		
<i>Populus balsamifera</i> ssp. <i>trichocarpa</i> / <i>Salix sitchensis</i>	black cottonwood / Sitka willow	GNR	S2S3	Blue	Y	CWHdm10	Riparian, Forest		
<i>Pseudotsuga menziesii</i> - <i>Pinus contorta</i> / <i>Holodiscus discolor</i> / <i>Cladina</i> spp.	Douglas-fir - lodgepole pine / oceanspray / reindeer lichens	G2G3	S2	Red	Y	CWHdm02	Woodland, Forest	Y	
<i>Pseudotsuga menziesii</i> / <i>Polystichum munitum</i>	Douglas-fir / sword fern	G2G4	S2	Red	Y	CWHdm04	Forest		
<i>Pseudotsuga menziesii</i> - <i>Tsuga heterophylla</i> / <i>Gaultheria shallon</i> Dry Maritime	Douglas-fir - western hemlock / salal Dry Maritime	G3G4	S2S3	Blue	Y	CWHdm03	Forest		
<i>Thuja plicata</i> / <i>Carex obnupta</i>	western redcedar / slough sedge	GNR	S2S3	Blue	Y	CWHdm15	Wetland, Forest		
<i>Thuja plicata</i> / <i>Lonicera involucrata</i>	western redcedar / black twinberry	GNR	S2	Red	Y	CWHdm14	Forest		
<i>Thuja plicata</i> - <i>Picea sitchensis</i> / <i>Lysichiton americanus</i>	western redcedar - Sitka spruce / skunk cabbage	G3?	S3?	Blue	Y	CWHdm12	Wetland, Forest		
<i>Thuja plicata</i> / <i>Polystichum munitum</i> Dry Maritime	western redcedar / sword fern Dry Maritime	G2G3	S2S3	Blue	Y	CWHdm05	Forest		
<i>Thuja plicata</i> / <i>Rubus spectabilis</i>	western redcedar / salmonberry	GNR	S1S2	Red	Y	CWHdm13	Forest, Riparian		
<i>Thuja plicata</i> / <i>Tiarella trifoliata</i> Dry Maritime	western redcedar / three-leaved foamflower Dry Maritime	G3	S2S3	Blue	Y	CWHdm07	Forest		
<i>Tsuga heterophylla</i> / <i>Plagiothecium undulatum</i>	western hemlock / flat-moss	G3G4	S2S3	Blue	Y	CWHdm01	Forest		
<i>Tsuga heterophylla</i> - <i>Thuja plicata</i> / <i>Blechnum spicant</i>	western hemlock - western redcedar / deer fern	G2G3	S2	Red	Y	CWHdm06	Forest		
<i>Typha latifolia</i> Marsh	common cattail Marsh	G5	S3	Blue	Y	CWHdm/Wm05	Wetland, Herbaceous		



APPENDIX J

APPENDIX J: ENVIRONMENT CANADA'S SPECIES AT RISK DATABASE RESULTS



NOTE: Before beginning a search and using the results of your search, you must read and understand the [Data Description and Limitations](#) and [Disclaimer](#). This web mapping application is limited to species belonging to [Schedule 1 of the Species at Risk Act](#), as of September 2006, and some species do not have a distribution map [[see the species list below](#)].

All Endangered, Threatened, and Special Concern Species with a Map

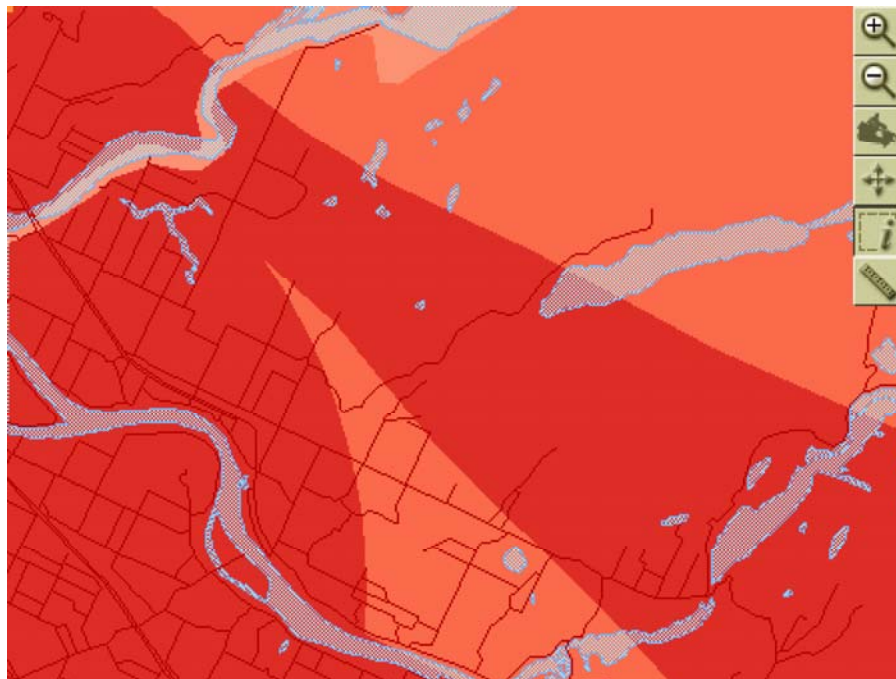


Number of Species

- 1
- 2 - 3
- 4 - 6
- 7 - 10
- 11 - 15
- > 15

Map Layers

- ☐ Cities & Towns
- ☒ Roads
- ☐ Railways
- ☐ Rivers
- ☒ Water
- ☐ Forest
- ☐ Wetland
- ☐ Urban Areas



Redraw Map

0 2 4 6 km

Notes:

- » Click a taxonomic group to view the list of species at risk for that group.
- » Click a numeric value to display only the distribution maps for the species that belong to the selected taxonomic group and risk category.
-  Click for more information about a species.
-  Click to view the species distribution map.

Pale highlighting

Species that belong to the selected taxonomic group and risk category (by default, all taxonomic groups and risk categories have been selected).

Bright highlighting

Species that were found in the query area.

[Mammals](#) [Birds](#) [Reptiles...](#) [Fishes](#) [Lepidopterans](#) [Molluscs](#) [Plants...](#) [All](#)

All Taxa

All **363** Endangered **169** Threatened **110** Special Concern **84**

Mammals

All **40** Endangered **16** Threatened **12** Special Concern **12**

-   American Badger jacksoni subspecies
-   American Badger jeffersonii subspecies
-   Beluga Whale (St. Lawrence Estuary population)
-   Black-tailed Prairie Dog
-   Blue Whale (Atlantic population)
-   Blue Whale (Pacific population)
-   Eastern Mole
-   Eastern Wolf
-   Frmine haidarum subspecies

-   Fin Whale (Atlantic population)
-   Fin Whale (Pacific population)
-   Grey Fox
-   Grey Whale (Eastern North Pacific population)
-   Harbour Porpoise (Pacific Ocean population)
-   Humpback Whale (North Pacific population)
-   Killer Whale (Northeast Pacific northern resident population)
-   Killer Whale (Northeast Pacific offshore population)
-   Killer Whale (Northeast Pacific southern resident population)
-   Killer Whale (Northeast Pacific transient population)
-   Mountain Beaver
-   Newfoundland Marten
-   North Atlantic Right Whale
-   North Pacific Right Whale
-   Northern Bottlenose Whale (Scotian Shelf population)
-   **Pacific Water Shrew**
-   Pallid Bat
-   Sea Otter
-   Sei Whale (Pacific population)
-   Spotted Bat
-   Steller Sea Lion
-   Swift Fox
-   Townsend's Mole
-   Vancouver Island Marmot
-   Wolverine (Eastern population)
-   Wood Bison
-   Woodland Caribou (Atlantic–Gaspésie population)
-   Woodland Caribou (Boreal population)
-   Woodland Caribou (Northern Mountain population)
-   Woodland Caribou (Southern Mountain population)
-   Woodland Vole

Birds

All **48**

Endangered **25**

Threatened **10**

Special Concern **13**

-   Acadian Flycatcher
-   Ancient Murrelet
-   Barn Owl (Eastern population)
-   **Barn Owl (Western population)**
-   Barrow's Goldeneye (Eastern population)
-   Burrowing Owl
-   Cerulean Warbler
-   Eskimo Curlew
-   Flammulated Owl
-   Greater Sage-Grouse urophasianus subspecies
-   Harlequin Duck (Eastern population)
-   Henslow's Sparrow
-   Hooded Warbler
-   Horned Lark strigata subspecies
-   Ivory Gull
-   King Rail
-   Kirtland's Warbler
-   Least Bittern

-   **Least Bittern**
-   Lewis's Woodpecker
-   Loggerhead Shrike excubitorides subspecies
-   Loggerhead Shrike migrans subspecies
-   Long-billed Curlew
-   **Marbled Murrelet**
-   Mountain Plover
-   Northern Bobwhite
-   Northern Goshawk laingi subspecies
-   **Peregrine Falcon anatum subspecies**
-   Peregrine Falcon pealei subspecies
-   Pink-footed Shearwater
-   Piping Plover circumcinctus subspecies
-   Piping Plover melodus subspecies
-   Prothonotary Warbler
-   Red Crossbill percna subspecies
-   Roseate Tern
-   Ross's Gull
-   Sage Thrasher
-   Savannah Sparrow princeps subspecies
-   Short-tailed Albatross
-   **Spotted Owl caurina subspecies**
-   Sprague's Pipit
-   **Western Screech-Owl kennicottii subspecies**
-   Western Screech-Owl macfarlanei subspecies
-   White-headed Woodpecker
-   Whooping Crane
-   Williamson's Sapsucker
-   Yellow Rail
-   Yellow-breasted Chat auricollis subspecies (British Columbia population)
-   Yellow-breasted Chat virens subspecies

Reptiles and Amphibians

All 44 Endangered 13 Threatened 18 Special Concern 13

-   Allegheny Mountain Dusky Salamander
-   Blanding's Turtle (Great Lakes / St. Lawrence population)
-   Blanding's Turtle (Nova Scotia population)
-   Blue Racer
-   Butler's Gartersnake
-   **Coast Tailed Frog**
-   Coastal Giant Salamander
-   Coeur d'Alene Salamander
-   Eastern Foxsnake
-   Eastern Hog-nosed Snake
-   Eastern Ratsnake
-   Eastern Ribbonsnake (Atlantic population)
-   Eastern Ribbonsnake (Great Lakes population)
-   Eastern Yellow-bellied Racer
-   Fowler's Toad
-   Great Basin Gophersnake
-   Great Basin Spadefoot
-   Great Plains Toad

-   Jefferson Salamander
-   Leatherback Seaturtle
-   Massasauga
-   Milksnake
-   Nightsnake
-   Northern Cricket Frog
-   Northern Leopard Frog (Southern Mountain population)
-   Northern Leopard Frog (Western Boreal/Prairie populations)
-   Northern Map Turtle
-   Oregon Spotted Frog
-   Prairie Skink
-   Queen Snake
-   **Red-legged Frog**
-   Rocky Mountain Tailed Frog
-   **Rubber Boa**
-   Sharp-tailed Snake
-   Small-mouthed Salamander
-   Spiny Softshell
-   Spotted Turtle
-   Spring Salamander
-   Stinkpot
-   Tiger Salamander (Southern Mountain population)
-   Western Rattlesnake
-   Western Skink
-   **Western Toad**
-   Western Yellow-bellied Racer

Fishes

All **39** Endangered **15** Threatened **13** Special Concern **11**

-   "Eastslope" Sculpin (St. Mary and Milk River populations)
-   Atlantic Salmon (Inner Bay of Fundy populations)
-   Atlantic Whitefish
-   Atlantic Wolffish
-   Aurora Trout
-   Banded Killifish (Newfoundland population)
-   Benthic Enos Lake Stickleback
-   Benthic Paxton Lake Stickleback
-   Benthic Vananda Creek Stickleback
-   Blackstripe Topminnow
-   Bridle Shiner
-   Carmine Shiner
-   Channel Darter
-   Columbia Mottled Sculpin
-   Cultus Pygmy Sculpin
-   Eastern Sand Darter
-   Grass Pickerel
-   Green Sturgeon
-   Lake Chubsucker
-   Lake Utopia Dwarf Smelt
-   Limnetic Enos Lake Stickleback
-   Limnetic Paxton Lake Stickleback

-   Limnetic Vananda Creek Stickleback
-   Morrison Creek Lamprey
-   Nooksack Dace
-   Northern Madtom
-   Northern Wolffish
-   Pugnose Minnow
-   Pugnose Shiner
-   Salish Sucker
-   Shorthead Sculpin
-   Silver Chub
-   Spotted Gar
-   Spotted Sucker
-   Spotted Wolffish
-   Vancouver Lamprey
-   Warmouth
-   Western Silvery Minnow
-   White Sturgeon

Molluscs

All 17 Endangered 11 Threatened 2 Special Concern 4

-   Banff Springs Snail
-   Dromedary Jumping–slug
-   Hotwater Physa
-   Kidneyshell
-   Mudpuppy Mussel
-   Northern Abalone
-   Northern Riffleshell
-   Olympia Oyster
-   Oregon Forestsnail
-   Rayed Bean
-   Rocky Mountain Ridged Mussel
-   Round Hickorynut
-   Round Pigtoe
-   Snuffbox
-   Warty Jumping–slug
-   Wavy–rayed Lampmussel
-   Yellow Lampmussel

Lepidopterans

All 15 Endangered 8 Threatened 5 Special Concern 2

-   Behr's (Columbia) Hairstreak
-   Dakota Skipper
-   Dun Skipper (Western population)
-   Island Blue
-   Maritime Ringlet
-   **Monarch**
-   Mormon Metalmark (Prairie population)
-   Mormon Metalmark (Southern Mountain population)
-   Ottoe Skipper
-   Poweshiek Skipperling
-   Sand–verbena Moth

-   Taylor's Checkerspot
-   Weidemeyer's Admiral
-   White Flower Moth
-   Yucca Moth

Plants, Lichens, and Mosses

All 160

Endangered 81

Threatened 50

Special Concern 29

-   Alkaline Wing-nerved Moss
-   American Chestnut
-   American Ginseng
-   American Hart's-tongue Fern
-   American Water-willow
-   Anticosti Aster
-   Athabasca Thrift
-   Baikal Sedge
-   Banded Cord-moss
-   Barrens Willow
-   Bashful Bulrush
-   Bearded Owl-clover
-   Bear's-foot Sanicle
-   Bird's-foot Violet
-   Blue Ash
-   Bluehearts
-   Blunt-lobed Woodsia
-   Bog Bird's-foot Trefoil
-   Boreal Felt Lichen (Atlantic population)
-   Boreal Felt Lichen (Boreal population)
-   Branched Bartonia
-   Branched Phacelia
-   Buffalograss
-   Butternut
-   Cliff Paintbrush
-   Climbing Prairie Rose
-   Coastal Scouler's Catchfly
-   Coastal Wood Fern
-   Colicroot
-   Columbian Carpet Moss
-   Common Hoptree
-   Crooked-stem Aster
-   Cucumber Tree
-   Deerberry
-   Deltoid Balsamroot
-   Dense Blazing Star
-   Dense Spike-primrose
-   Dense-flowered Lupine
-   Drooping Trillium
-   Dwarf Hackberry
-   Dwarf Lake Iris
-   Dwarf Sandwort
-   Eastern Lilaeopsis
-   Eastern Mountain Avens
-   Eastern Prairie Fringed-orchid
-   Eastern Prickly Pear Cactus
-   Engelmann's Quillwort
-   False Hemlock

  False Hop Seuge
  False Rue–anemone
  Felt–leaf Willow
  Fernald's Braya
  Fernald's Milk–vetch
  Floccose Tansy
  Flooded Jellyskin
  Forked Three–awned Grass
  Frosted Glass–whiskers (Nova Scotia population)
  Furbish's Lousewort
  Gattinger's Agalinis
  Golden Crest
  Golden Paintbrush
  Goldenseal
  Grand Coulee Owl–clover
  Gulf of St. Lawrence Aster
  Hairy Prairie–clover
  Haller's Apple Moss
  Heart–leaved Plantain
  Hill's Pondweed
  Hill's Thistle
  Hoary Mountain–mint
  Horsetail Spike–rush
  Houghton's Goldenrod
  Howell's Tritelia
  Juniper Sedge
  Kellogg's Rush
  Kentucky Coffee–tree
  Lakeside Daisy
  Large Whorled Pogonia
  Large–headed Woolly Yarrow
  Lemmon's Holly Fern
  Long's Braya
  Lyall's Mariposa Lily
  Mackenzie Hairgrass
  Macoun's Meadowfoam
  Margined Streamside Moss
  Mexican Mosquito–fern
  Mountain Holly Fern
  New Jersey Rush
  Nodding Pogonia
  Phantom Orchid
  Pink Coreopsis
  Pink Milkwort
  Pink Sand–verbena
  Pitcher's Thistle
  Plymouth Gentian
  Poor Pocket Moss
  Prairie Lupine
  Prototype Quillwort
  Purple Sanicle
  Purple Twayblade
  Pygmy Pocket Moss
  Red Mulberry
  Redroot
  Riddell's Goldenrod

  Rigid Apple Moss
  Rosy Owl-clover
  Round-leaved Greenbrier (Great Lakes Plains population)
  Rusty Cord-moss
  Sand-dune Short-capsuled Willow
  Scarlet Ammannia
  Seaside Birds-foot Lotus
  Seaside Centipede Lichen
  Showy Goldenrod
  Showy Phlox
  Silver Hair Moss
  Skinner's Agalinis
  Slender Bush-clover
  Slender Collomia
  Slender Mouse-ear-cress
  Small White Lady's-slipper
  Small Whorled Pogonia
  Small-flowered Lipocarpha
  Small-flowered Sand-verbena
  Small-flowered Tonella
  Soapweed
  Southern Maidenhair Fern
  Spalding's Campion
  Spoon-leaved Moss
  Spotted Wintergreen
  Stoloniferous Pussytoes
  Streambank Lupine
  Swamp Rose-mallow
  Sweet Pepperbush
  Tall Bugbane
  Tall Woolly-heads
  Thread-leaved Sundew
  Tiny Cryptanthe
  Toothcup
  Tubercled Spike-rush
  Tuberos Indian-plantain
  Turnor's Willow
  Twisted Oak Moss
  Van Brunt's Jacob's-ladder
  Vancouver Island Beggarticks
  Victorin's Gentian
  Victorin's Water-hemlock
  Virginia Goat's-rue
  Water-pennywort
  Water-plantain Buttercup
  Western Blue Flag
  Western Prairie Fringed-orchid
  Western Silvery Aster
  Western Spiderwort
  White Meconella
  White Prairie Gentian
  White Wood Aster
  White-top Aster
  Wild Hyacinth
  Willowleaf Aster

-   Wood-poppy
-   Yellow Montane Violet

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[Important Notices](#)

Last update: 2007-04-02



URL of this page:

http://www.sis.ec.gc.ca/ec_species/ec_species_e.phtml

APPENDIX K

APPENDIX K: ENVIRONMENTAL REPORT – GENERAL CONDITIONS

GEO-ENVIRONMENTAL REPORT – GENERAL CONDITIONS

This report incorporates and is subject to these “General Conditions”.

1.0 USE OF REPORT AND OWNERSHIP

This report pertains to a specific site, a specific development, and a specific scope of work. It is not applicable to any other sites, nor should it be relied upon for types of development other than those to which it refers. Any variation from the site or proposed development would necessitate a supplementary investigation and assessment.

This report and the assessments and recommendations contained in it are intended for the sole use of EBA’s client. EBA does not accept any responsibility for the accuracy of any of the data, the analysis or the recommendations contained or referenced in the report when the report is used or relied upon by any party other than EBA’s Client unless otherwise authorized in writing by EBA. Any unauthorized use of the report is at the sole risk of the user.

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2.0 ALTERNATE REPORT FORMAT

Where EBA submits both electronic file and hard copy versions of reports, drawings and other project-related documents and deliverables (collectively termed EBA’s instruments of professional service), only the signed and/or sealed versions shall be considered final and legally binding. The original signed and/or sealed version archived by EBA shall be deemed to be the original for the Project.

Both electronic file and hard copy versions of EBA’s instruments of professional service shall not, under any circumstances, no matter who owns or uses them, be altered by any party except EBA. The Client warrants that EBA’s instruments of professional service will be used only and exactly as submitted by EBA.

Electronic files submitted by EBA have been prepared and submitted using specific software and hardware systems. EBA makes no representation about the compatibility of these files with the Client’s current or future software and hardware systems.

3.0 NOTIFICATION OF AUTHORITIES

In certain instances, the discovery of hazardous substances or conditions and materials may require that regulatory agencies and other persons be informed and the client agrees that notification to such bodies or persons as required may be done by EBA in its reasonably exercised discretion.

Appendix A3

**EBA Engineering Consultants Ltd.
Habitat Setback Assessment**

November 25, 2009

EBA File: N23101455.007

Ministry of Transportation & Infrastructure
South Coast Region
7818 6th St. Burnaby, BC

Via e-mail: Joanne.Cyr@gov.bc.ca
Neetu.Bhatti@gov.bc.ca
Ken.Lukawesky@gov.bc.ca

Attention: Joanne M. Cyr, B.Sc.
Assistant Environmental Coordinator

Dear Ms. Cyr:

**Re: Habitat Setback Assessment
Proposed Haney Gravel Quarry, Maple Ridge, BC**

1.0 INTRODUCTION

EBA Engineering Consultants Ltd. (EBA) was retained by the British Columbia Ministry of Transportation & Infrastructure (MOT) to conduct a Habitat Setback Assessment of potential sensitive environmental features at the proposed Haney Gravel Quarry in Maple Ridge B.C. The proposed gravel quarry (the “Site”) encompasses approximately 44.85 hectares (ha) of mostly forested area as well as the Operating Engineer’s (Local 115) Apprentice Training Facility located on 256th Street north of 130 Avenue.

The Habitat Setback Assessment was recommended in EBA’s Overview Environmental Assessment conducted for the Site in June of 2009.

1.1 BACKGROUND

On June 15th and 16th, 2009, EBA Biologists Catherine Galbrand and Cameron Kulak traversed the Site to identify permanent and ephemeral watercourses, including the MOT referenced Watercourses 1 through 3, roadside ditches, and “Sawdust Creek”. The purpose of the assessment was to document existing sensitive fish and wildlife habitat features within the Site and to qualify potential habitat setback requirements and other possible protective restrictions required per applicable legislation. Similar to fish habitat, sensitive wildlife habitat is often associated with watercourses and/or wetlands and were thus the focus of the assessment.

In total, three (3) watercourse channels and three (3) drainage swales were identified within the Site footprint during the June site visit. Two (2) of the channels were the watercourses identified by the MOT as Watercourse 1 (an ephemeral drainage within a gully) and Watercourse 3 (also known as Sawdust Creek). One (1) of the drainage swales within the

Operating Engineer's site was confirmed to be the watercourse identified by the MOT as Watercourse 2. In addition, wetland/ponded areas were also identified within or adjacent to the Site. The locations of the aforementioned watercourse features are illustrated in Figure 1.

At the time of the June assessment, the watercourse locations were confirmed using a hand held GPS. However, given that the GPS unit had an accuracy of plus or minus 4 m, the locations of the watercourses were approximate.

EBA concluded that it was unlikely that any of the aquatic features within the Site were fish bearing as evidenced by the ephemeral nature of most watercourses, a general lack of adequate water depths during high flow events based on inferred bank-full widths, presence of multiple downstream barriers to fish passage (i.e. perched culverts, subsurface flows), and the lack of fish captured during the trapping program completed during the June Assessment. Based on local bylaws adopted by the District of Maple Ridge, the watercourses would be afforded 15 or 30 m setbacks based on their flow permanency. It was anticipated that the Department of Fisheries and Oceans Canada (DFO) may accept relaxed setbacks along the subject watercourses (minimum of 10 m) based on the principles of the Riparian Areas Regulation (RAR) enacted under Section 12 of the provincial *Fish Protection Act* (July 2004), however, this would require a RAR Detailed Assessment conducted by a Qualified Environmental Professional (QEP).

Wildlife observations included two confirmed and one possible observation of provincially blue-listed Red-legged Frog (*Rana aurora*) (Figure 1). The site has suitable habitat for the Blue-listed Western Screech-Owl (*Otus kennicottii kennicottii*). EBA Biologists performed an owl survey of the Site on the night of June 16th, 2009 as per the Resource Information Standards Committee's Inventory Methods for Owl Surveys (RISC 2006b). No Western Screech-Owls responded to broadcasts. The broadcast station locations are included in Figure 1.

EBA also assessed the potential for the SARA Endangered-Schedule 1 and Provincial red-listed Pacific Water Shrew to occur within the Site. The wetter areas of the Site exhibited vegetation associations typical of site series 07 and 12 within the CWHdm biogeoclimatic subzone. As per Craig (2007), wet areas supporting 07 Western Red Cedar – Foam Flower and 12 Western Red Cedar Sitka Spruce – Skunk cabbage, are considered to have high capability and suitability to support Pacific Water Shrew. Trapping surveys are generally not recommended for areas identified as moderate or high quality habitat because any mortalities associated with the survey may have a significant impact on the population. Therefore, no trapping programs were conducted or recommended.

In order to accurately determine and illustrate the locations of existing watercourses (including wet areas) within Site boundaries, and determine subsequent potential setback extents and areas, a legal survey of the watercourses within the Site was recommended.

2.0 HABITAT SETBACK ASSESSMENT

The purpose of the Habitat Setback Assessment was to accurately determine the locations of watercourses within the Site and to further refine possible watercourse setbacks within the Site footprint.

On October 28th and 29th 2009, EBA QEPs Catherine Galbrand and Cameron Kulak identified and staked the high water mark (natural boundary) and Top-of-Ravine Bank (where applicable) of the previously identified waterbodies within the Site as per the Detailed Riparian Area Regulation (RAR) methodology; as well as Land Development Guideline methodology. Concurrent and subsequent to the field visit, EBA arranged for Mason Surveyors Inc. to conduct a legal survey of our stakes.

As part of the regulatory overview conducted during the Habitat Setback Assessment, it was established that the ephemeral watercourse (MOT Watercourse 1), western red cedar-skunk cabbage swamp, and headwater sphagnum bog in the eastern portion of the Site footprint arguably do not meet the definition of ‘fish habitat’ under the federal *Fisheries Act* or the BC *Fish Protection Act*, as they do not connect to fish-bearing waters. This lack of connectivity was confirmed by both the EBA field crew and survey team during the October site visit, when it was observed that the terminus of the flowing system became subsurface with no evidence of a continued channel. Consequently, setback requirements for the purpose of protecting fish habitat as detailed in applicable federal and provincial legislation would not likely apply to these waterbodies. Conversely, Sawdust Creek and its tributaries do meet the definition of ‘fish habitat’ under both Acts as they connect to eventual fish bearing watercourses downstream.

Consequently, the RAR Detailed Assessment was focused on Sawdust Creek and its connecting tributaries, wetlands and ponds.

2.1 RAR DETAILED ASSESSMENT

The detailed RAR methodology requires that three fish habitat-related Zones of Sensitivity (ZOS) are assessed:

- 1) Large woody debris (LWD) and bank stability;
- 2) Leaf litter and insect drop; and,
- 3) Shading.

Following the RAR methodology, specific setbacks (called the Streamside Protection and Enhancement Area or “SPEA”) for each component are established, based on minimum setback criteria for ponds and wetlands, and based on the observed average channel width for channels. The average channel width is determined after eliminating the low and high measurements from eleven bankfull measurements in each watercourse reach.

As per the detailed RAR methodology, based on the gradient, average channel width and observations obtained, the channel type of Sawdust Creek was determined to be 'riffle-pool', and the potential vegetation type was determined to be 'Tree'. As for ponds and wetlands connected to Sawdust Creek, the potential vegetation type was also determined to be 'Tree'.

Based on the largest of the assessed ZOS values, the SPEA for Sawdust Creek was determined to be 10 m for Reaches 1, 2 and 3, and 10.3 m for Reach 4. Likewise the SPEA for the ponds and wetlands connected to Sawdust Creek was determined to be 15 m to 30 m depending on Shading orientation.

Based on the RAR Detailed Assessment results, the total area of the SPEA for Sawdust Creek system was determined to be 30,353 m². It is this total area that DFO will likely assert would need to be maintained at a minimum to avoid Harmful Alteration, Disruption or Destruction (HADD) of fish habitat under Section 35 (2) of the *Fisheries Act*. Any HADD resulting from the Project would require DFO Authorization, which could trigger the need for a Canadian Environmental Assessment Act (CEAA) review. Should the District of Maple Ridge assert a 15 m setback for the Sawdust Creek system, the area would increase to 38,873 m². Likewise, should the District of Maple Ridge assert a 30 m setback for the Sawdust Creek system, the area would increase to 55,176 m².

Where the proposed development of the Site will result in unavoidable encroachments into the SPEA and, according to the judgment of the QEP, will not result in any impact to fish habitat, regulators have some discretionary powers to modify setbacks. This can include "bending" the SPEA boundary such that the overall riparian area (i.e. 30,353 m²; 38,873 m²; or 55,176 m²) remains the same. This enables a shifting of the SPEA boundary, but not an overall reduction in the amount of area providing riparian function. New areas added to the riparian area to make up for those shifted out must be contiguous with the original SPEA area (i.e., there cannot be any disconnected patches) and located as close to the watercourse as possible (i.e., there should not be a panhandle extending >50 m from the watercourse). If the established total SPEA areas cannot be maintained as a result of the Project, DFO Authorization and subsequent habitat compensation will most likely be required for the Project, thereby triggering CEAA.

The results of the RAR Detailed Assessment as well as the 15 and 30 m setback options are illustrated in Figure 1.

2.2 PACIFIC WATER SHREW HABITAT ASSESSMENT

In October of 2009, the Ministry of Environment (MOE) Environmental Stewardship Division's (ESD) provided a review of EBA's Overview Environmental Assessment conducted in June of 2009. The purpose of the review was to "advise the appropriate statutory decision makers of the ESD concerns and recommendation with respect to the subject gravel quarry".

Given that the ecological integrity and various components including habitat for fish and wildlife were considered good at the Site; including known habitat for the blue-listed red-legged frog and potential habitat for the red-listed Pacific Water Shrew (PWS), the MOE concluded that “a gravel quarry represents a potentially devastating impact to these values”. Subsequently, the MOE recommend that 100 m setbacks be applied along all watercourses in order to protect PWS habitat. The 100 m setback recommendation asserted by MOE to protect PWS habitat have also been included in Figure 1. Setbacks specific to the protection of red-legged frog were not mentioned.

While on site, EBA further assessed and confirmed habitat suitability for Pacific Water Shrew within the Site boundaries.

Wetted areas supporting the vegetation associations similar to 07 Western Red Cedar – Foam Flower and 12 Western Red Cedar Sitka Spruce – Skunk cabbage, which are considered to have high capability and suitability for Pacific Water Shrew, were observed on the Site. However, with the exception of the Sawdust Creek headwater pond, Sawdust Creek Reach 2, and the bog ecosystem in the east corner of the Site, all watercourses were confirmed to be ephemeral in nature. As such, habitat suitability in these areas could arguably be considered to provide low to moderate habitat value for PWS.

3.0 CONCLUSIONS/RECOMMENDATIONS

Any permanent removal of Sawdust Creek or its tributaries/connecting wet areas, and/or any permanent removal the riparian areas associated with these systems that cannot be accommodated through mitigation or “SPEA bending” would likely be considered a HADD of fish habitat under Section 35(2) of the *Fisheries Act*. A HADD could require DFO Authorization, habitat compensation, and would trigger the need for a CEAA.

The MOE did not comment on the fact that red legged frog were identified on the site. Potential construction and operational impacts associated with the Project could reasonably be addressed through mitigation (i.e. protected within prescribed setbacks for fish/PWS, salvage/relocation if encountered).

The MOE has recommended that 100 m setbacks be applied along all watercourses in order to protect PWS habitat. Although individuals are protected under both SARA and the BC *Wildlife Act*, critical habitat has not been identified for this species and given that their presence is unknown, potential construction and operational impacts associated with the Project could reasonably be addressed through relaxed setbacks combined with mitigation, such as trapping (salvage) and relocation of individuals, particularly in areas supporting potential low to moderate capability habitat.

4.0 NEXT STEPS

All setback options discussed are illustrate in Figure 1. In order to move the Project forward, this figure should be used to facilitate negotiation and discussion with the MOE, District of Maple Ridge, and DFO with regards to potential setback relaxations.

5.0 LIMITATIONS OF REPORT

This report and its contents are intended for the sole use of Ministry of Transportation & Infrastructure and their agents. EBA does not accept any responsibility for the accuracy of any of the data, the analysis or the recommendations contained or referenced in the report when the report is used or relied upon by any Party other than the BC Ministry of Transportation, or for any Project other than the proposed development at the subject site. Any such unauthorized use of this report is at the sole risk of the user. Use of this report is subject to the terms and conditions stated in the General Conditions provided in Appendix A of this report.

6.0 CLOSURE

EBA trusts that this report prepared for the BC Ministry of Transportation meets with your expectations and needs. The information contained in this report has been compiled from existing information sources, from field observations and from information provided by the BC Ministry of Transportation.

This report has been prepared in accordance with EBA practices and generally accepted scientific methods. No other warranty is made, expressed or implied. Professional judgment has been applied in developing the recommendations in this report. Reference should be made to the 'Environmental Report – General Conditions' attached as Appendix A.

Please contact the undersigned should you require clarification on any of the information contained herein.

Sincerely,
EBA Engineering Consultants Ltd.

Prepared by:



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Aquatic Biologist



Cameron Kulak, B.Sc. B.I.T.
Terrestrial Biologist

Reviewed by:

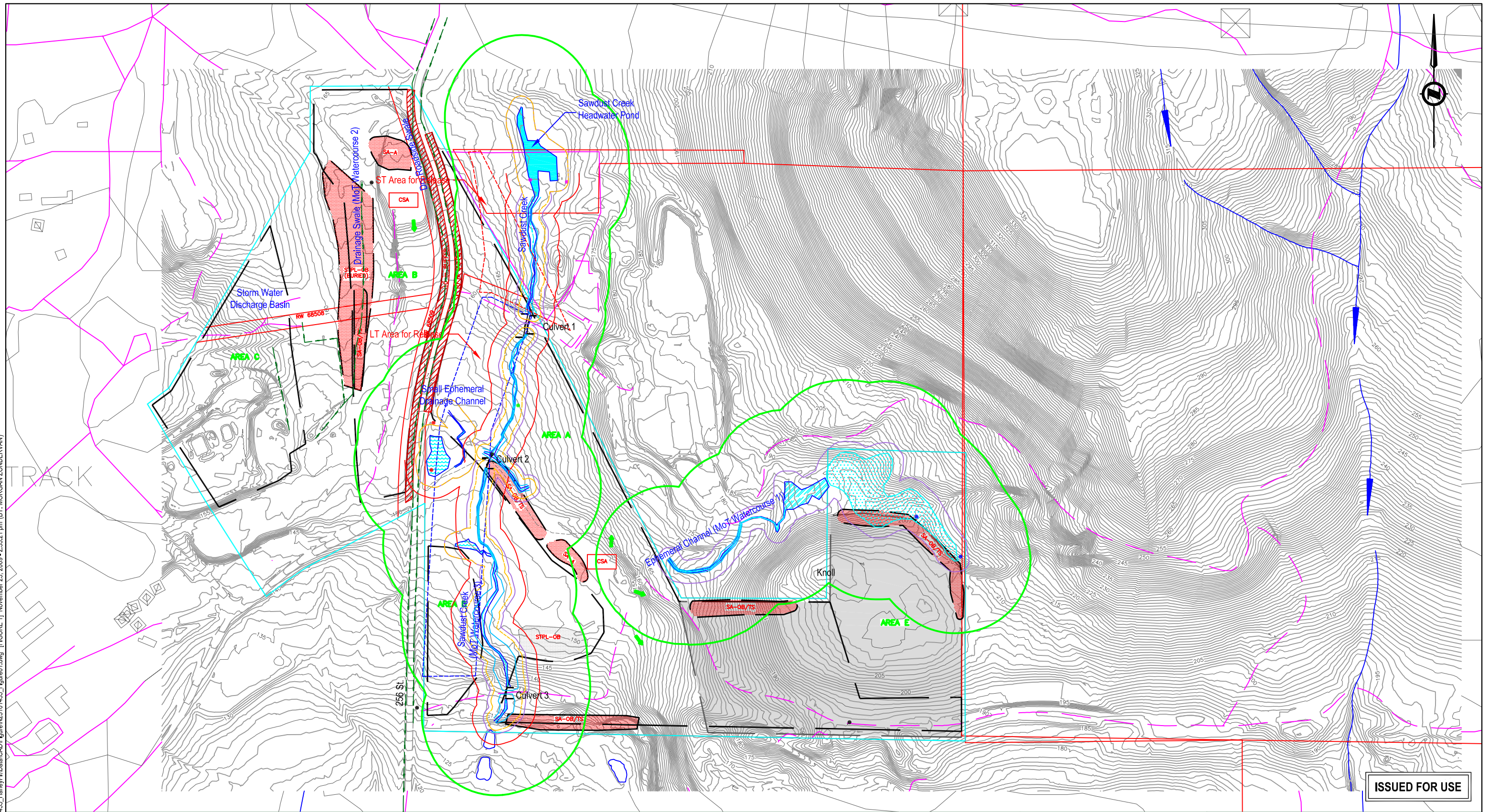


Nigel Cavanagh, M.Sc., R.P.Bio.
Project Director, Environmental Practice,
Vancouver Island Operations

ATTACHMENTS

Figure 1: Habitat Setback Assessment Results

Q:\Vancouver\GIS\ENVIRONMENTAL\N23101455_Henry\PHData\CAD\Figure\N23101455_Figure01.dwg [FIGURE 1] November 25, 2009 - 2:53:21 pm (BY: MORGAN ZONDERVAN)



ISSUED FOR USE

LEGEND

- | | | | | | |
|-----------------------|--------------------------------------|---------------------------|--|---|--------------------------------------|
| Hypsographic Contours | Granular Boundary | Development Direction | Existing Stockpile:
STPL-A (Type) = Aggregate | Bog | Amphibian Egg Mass |
| Survey Boundary | Additional Potential | Buffer Area | STPL-OB = Overburden | 15m Setback (Maple Ridge - Ephemeral Streams) | Salamander Egg Mass |
| Road | Stock Pile Area:
SA-A = Aggregate | Garden, Lawns, Vegetation | STPL-TS = Topsoil | 30m Setback (Maple Ridge - Permanent Streams) | Owl Broadcast Station |
| District Lot Boundary | SA-OB = Overburden | Fence | STPL-RJ (Type) = Reject | RAR Setback (Detailed Assessment) | Red-legged Frog Observation |
| Parcel Boundary | SA-TS = Topsoil | Tree Line | STPL-DEB = Debris | Pacific Watershrew (100m Setback) | Possible Red-legged Frog Observation |
| Reserve Boundary | SA-RJ = Reject | Crusher Setup Area | Open Water Pond | Flowing Section | ST Area for Release |
| | SA-DEB = Debris | | Skunk Cabbage Swamp | Drainage Swale | LT Area for Release |
| | | | Ephemeral Wet Depression (Flood Disturbance) | Culvert | Top of Ravine Bank |
| | | | | High Water Mark | |

SCALE 1:5000
0 50 100 200m

NOTES
Modified from original CAD file (PDP1707-SEP09.DWG) by Data Wranglers

CLIENT



EBA Engineering
Consultants Ltd.



PROPOSED ANEY GRAVEL PIT MAPLE RIDGE, BC

Possible Watercourse Setbacks

PROJECT NO. N23101455.007	DWN MEZ	CKD CG	REV 0
OFFICE VANC	DATE November 25, 2009		

Figure 1

APPENDIX

APPENDIX A: ENVIRONMENTAL REPORT – GENERAL CONDITIONS

GEO-ENVIRONMENTAL REPORT – GENERAL CONDITIONS

This report incorporates and is subject to these “General Conditions”.

1.0 USE OF REPORT AND OWNERSHIP

This report pertains to a specific site, a specific development, and a specific scope of work. It is not applicable to any other sites, nor should it be relied upon for types of development other than those to which it refers. Any variation from the site or proposed development would necessitate a supplementary investigation and assessment.

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2.0 ALTERNATE REPORT FORMAT

Where EBA submits both electronic file and hard copy versions of reports, drawings and other project-related documents and deliverables (collectively termed EBA’s instruments of professional service), only the signed and/or sealed versions shall be considered final and legally binding. The original signed and/or sealed version archived by EBA shall be deemed to be the original for the Project.

Both electronic file and hard copy versions of EBA’s instruments of professional service shall not, under any circumstances, no matter who owns or uses them, be altered by any party except EBA. The Client warrants that EBA’s instruments of professional service will be used only and exactly as submitted by EBA.

Electronic files submitted by EBA have been prepared and submitted using specific software and hardware systems. EBA makes no representation about the compatibility of these files with the Client’s current or future software and hardware systems.

3.0 NOTIFICATION OF AUTHORITIES

In certain instances, the discovery of hazardous substances or conditions and materials may require that regulatory agencies and other persons be informed and the client agrees that notification to such bodies or persons as required may be done by EBA in its reasonably exercised discretion.