



Lot 4 Lakeshore Road, Kelowna, BC
**Sensitive Terrestrial Ecosystem and Aquatic Ecosystem
Development Permit Area Environmental Impact
Assessment**

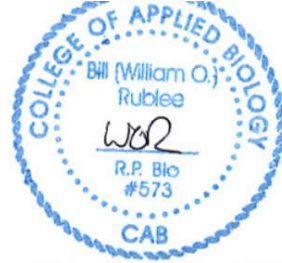
Peter Schroecksnadel



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Notes:

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Disclaimer

This report is rendered solely for the use of Peter Schroecksnadel (the Client) in connection with the proposed development at Lot 4 Lakeshore Road, Kelowna, BC (the Property), and no person may rely on it for any other purpose without Triton Environmental Consultants Ltd.'s (Triton) prior written approval. Should a third party use this report without Triton's approval, they may not rely upon it. Triton accepts no responsibility for loss or damages suffered by any third party as a result of decisions made or actions taken based on this report.

This report is based on facts and opinions contained within the referenced documents, including the results of any data collection programs carried out in relation to this report. We have attempted to identify and consider facts and documents relevant to the scope of work, accurate as of the time during which we conducted this analysis. However, the results, our opinions, or recommendations may change if new information becomes available or if information we have relied on is altered.

The following assumptions were relied on during the preparation of this report:

- The GIS mapping from the Regional District of Central Okanagan (RDCO) is accurate for the needs of this report to identify the Sensitive Terrestrial and Aquatic Development Permit Areas (DPAs) on the Property this report needs to address; and
- Provincial weblink mapping resources and databases are satisfactory with respect to reported data.

We applied accepted professional practices and standards in developing and interpreting data. While we used accepted professional practices in interpreting data provided by Client or third-party sources, we did not verify the accuracy of any such data.

This report must be considered as a whole; selecting only portions of this report may result in a misleading view of the results, our opinions, or recommendations.

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1.0 Introduction

1.1 Background Information

In 2016 Triton Environmental Consultants Ltd. (Triton) was retained by Mr. Peter Schroecksadel (the Owner) to prepare a preliminary Environmental Impact Assessment (EIA) for the property located at Lot 4, KAP 34914, DL2724S, ODYD, located on Lakeshore Road in the Regional District of Central Okanagan (RDCO) (the Property) to guide potential development options. Preparation of the report was triggered by the Sensitive Terrestrial Ecosystem Development Permit Area (DPA) and the Aquatic Ecosystem DPA designated on the Property by the South Slopes Official Community Plan (OCP). No development was proposed at that time and the plan was to sell the Property. The preliminary report was prepared as part of the due diligence of the Owner to identify environmentally sensitive areas and features of the Property and determine setbacks to provide guidance to potential buyers and guide development options. The EIA was considered preliminary and a Development Permit (DP) was not required at that time since there was no development proposed.

1.2 Current Methodology

A DP application is being submitted to the RDCO for the construction of a single-family residential building on the Property and preparation of an updated EIA is required as part of the application. The report has been updated to determine current conditions at the Property and the current development proposal. The current development proposal is provided in the site plan in Appendix 1. The current development proposal includes an access driveway and building footprint on the east side of the Property.

This report was prepared through a review of the existing background information including maps, provincial databases, desktop resources, and reconnaissance field visits to the Property. Desktop review was completed prior to the site visits to identify the biophysical resources of the Property, as well as any potential environmental resources including rare and endangered species or critical habitat that could potentially occur. The sensitive ecosystem inventory (SEI) was reviewed, and SEI classifications were determined and verified during the site visit. Additional resources including the RDCO's OCP, and the RDCO ArcGIS website (as well as additional web resources) were used to determine the location of the Property boundaries, Property description, and biodiversity indexes. Site visits were conducted to review the natural resource values associated with the Property and any potential sensitivities associated with the proposed development area. Photographs taken during the site visits are provided in Appendix 2.

1.3 Project Location

The Property is located at Lot 4, KAP 34914, DL2724S, ODYD, on Lakeshore Road in the RDCO, BC (Figure 1 and 2). The PID for the Property is 002-919-931 and it is 1.76 ha in size. The Property is bounded on the east and west by residential zoned properties, to the north by Okanagan Lake, and to the south by Lakeshore Road and Okanagan Mountain

Provincial Park further to the south. The Property is in an unincorporated area of the RDCO within the Central Okanagan East Electoral Area, bordering Okanagan Lake and the City of Kelowna boundary to the north, called South Slopes. South Slopes includes the two residential neighbourhoods of Lakeshore Road and June Springs Estates. The southern boundary of the South Slopes extends east through unsurveyed Crown Land traversing portions of Okanagan Mountain Provincial Park and Myra-Bellevue Provincial Park (RDCO, 2012).

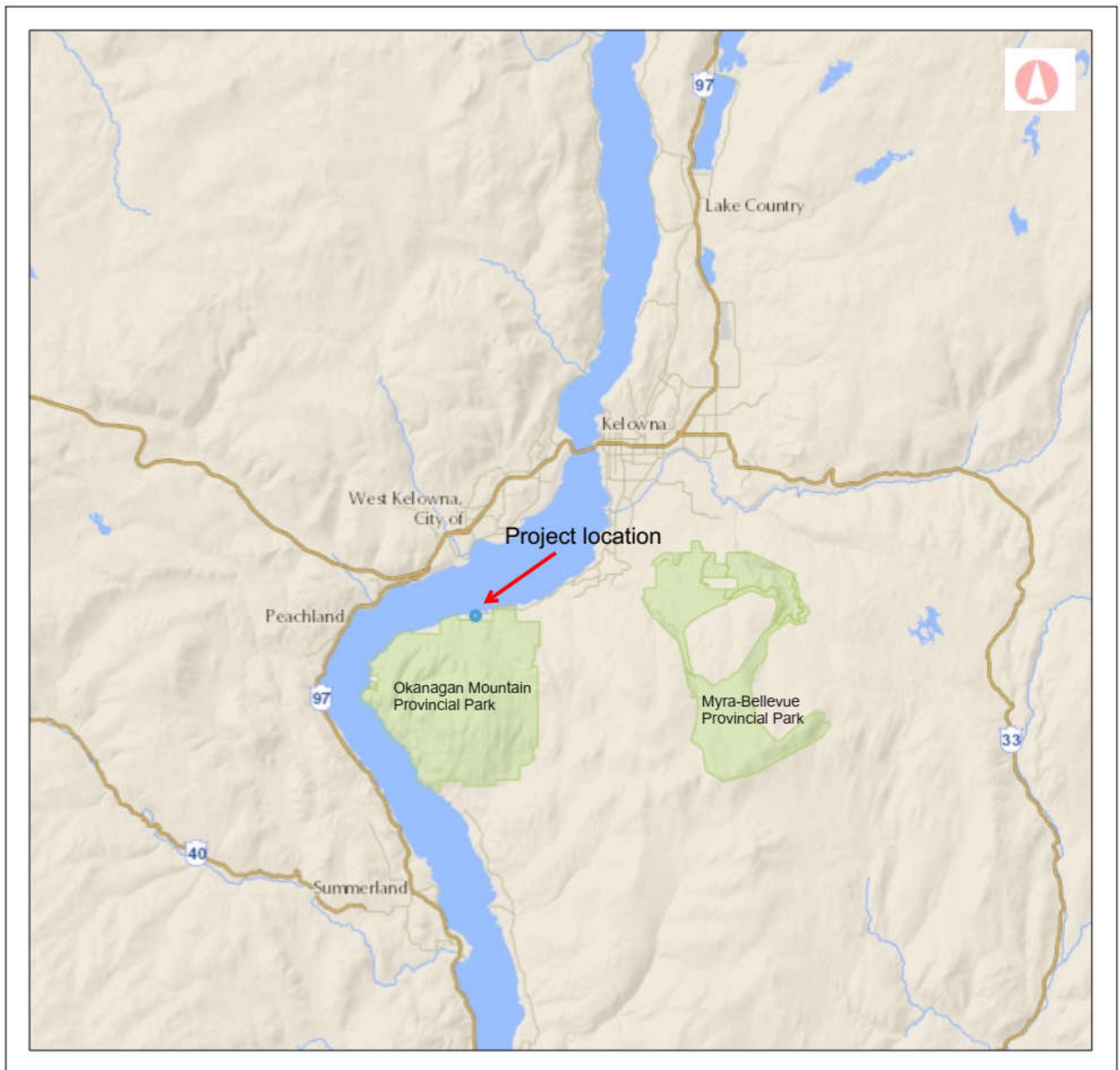


Figure 1. General Project location (source: imapBC)

1.4 Historic, Current, and Proposed Use

The Property is undeveloped and there are no structures or access roads on the Property. The Property is currently zoned RU3 (Rural 3 – to accommodate rural residential on parcels of land that are 1 ha or greater and located outside of the Land Reserve) and when it is developed will be a rural-residential property. The Property Owner is submitting a DP application for a single-family residential building and access driveway proposed to be built on the east side of the Property. A preliminary site plan showing a potential building footprint and a proposed access driveway is provided in Appendix 1. These plans are preliminary and are subject to change prior to or following submission of the DP application and prior to development.

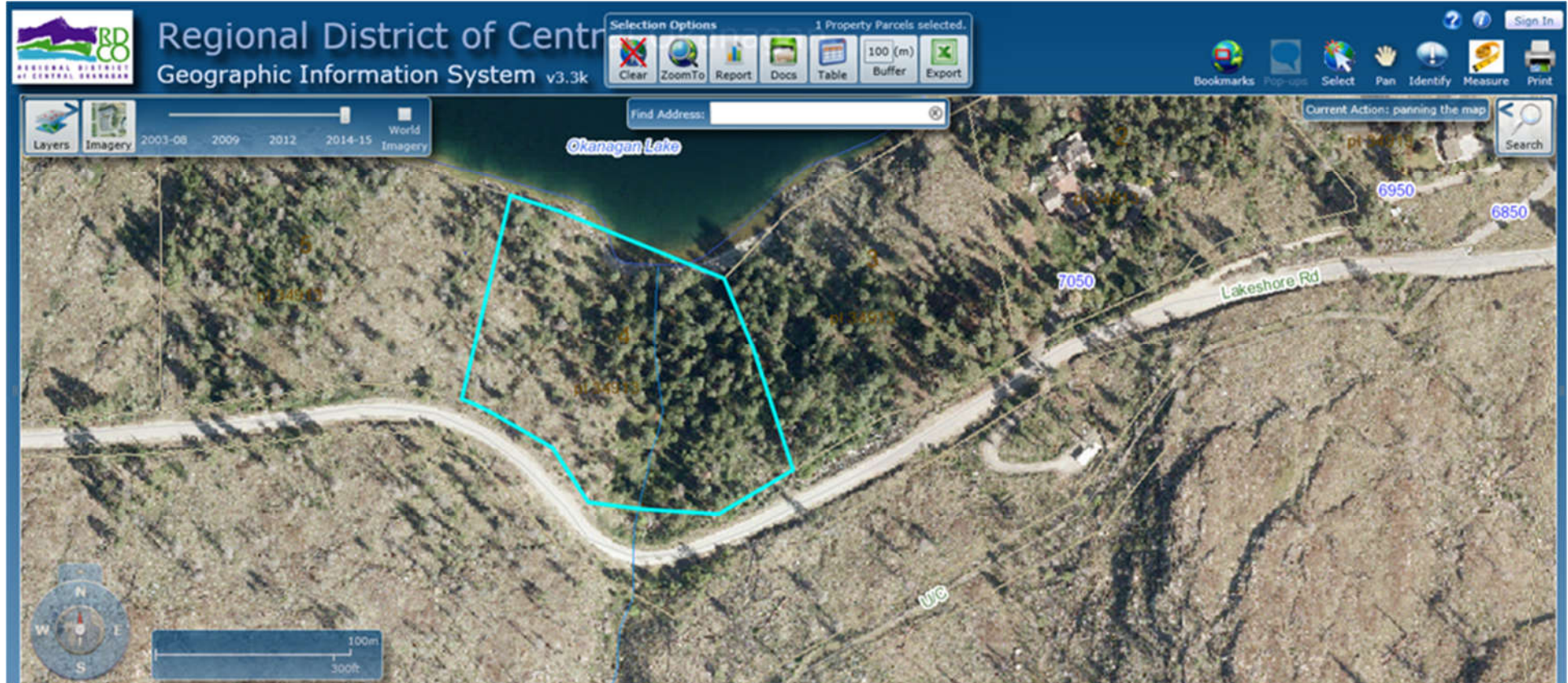


Figure 2. Project location (source: RDCO GIS).

2.0 Background Inventory Review

2.1 Assessment Methodology

2.1.1 Desktop Constraints Analysis

A desktop background review of potential environmental constraints within the Project area was performed for aquatic and terrestrial resources using provincial and federal government databases and mapping tools, as well as relevant literature, previous studies and assessments of the Project area, and other data pertaining to wildlife and environmentally sensitive features that may be present in the Project area. The background review included searches for known occurrences of rare and/or endangered species and ecosystems within the Project area, designated wildlife critical habitats, and a search of ecosystems, plants, and wildlife species at risk that have the potential to occur, as well as available fisheries information. Databases and reports utilized in the background review and constraints analysis included the following:

- DataBC iMapBC mapping tool (Province of BC, 2022a);
- BC Conservation Data Centre's (CDC) BC Species and Ecosystems Explorer and CDC iMap mapping tool (BC CDC, 2022b);
- BC Ministry of Environment (MOE) Habitat Wizard map-based tool (Province of BC, 2022b);
- Sensitive Ecosystem Inventory of the Okanagan Valley: Vernon to Osoyoos (Iverson et al., 2008);
- RDCO Bylaw No. 1304, 2012 South Slopes OCP (RDCO, 2012); and
- RDCO Online Mapping GIS database (RDCO, 2022).

2.1.1 Field Assessment

Preliminary site visits to the Project area were conducted by Triton biologists in 2016. Additional site visits were conducted on October 11 and October 15, 2022. The field visits were focused on capturing a general overview of the Project area noting presence of wildlife or wildlife habitat features (mammals, birds, amphibians) and vegetation species. The mapped watercourse which occurs within the Project area was assessed.

2.2 Project Area

Table 1 outlines the Project area administrative and physiographic setting.

Table 1. Site description and classifications

Classification	Description
Administrative Boundary	
Forest Region	Thompson Okanagan Region
Forest District	Okanagan Shuswap Forest District
Natural Resource District	Okanagan Shuswap Natural Resource District
Watershed Group	Okanagan River

Classification	Description
Administrative Boundary	
Regional District	Central Okanagan
Municipality	Kelowna
UTM	11U 311582 E 5517225 N
Ecosystem Classification	
Ecodomain	Dry
Ecodivision	Semi-Arid Steppe Highlands
Ecoprovince	Southern Interior
Ecoregion	Thompson Okanagan Plateau
Ecosection	Northern Okanagan Basin
Biogeoclimatic Zone	Ponderosa Pine (PP)
Subzone	Very Dry Hot (xh)
Variant	Okanagan (1) variant
Elevation Range (m)	~ 340 – 390 m ASL

Sources: Meidinger and Pojar (1991); MoF (1990)

2.3 Topography, Soils, and Geology

The topography of the Property slopes steeply down to Okanagan Lake from Lakeshore Road. The area contains rock outcrops interspersed throughout. There is a defined gully that bisects the Property which originates from the south in Okanagan Mountain Provincial Park and slopes down toward Okanagan Lake. The gully and eastern portion of the Property are steeper compared to the western portion (Figure 3).

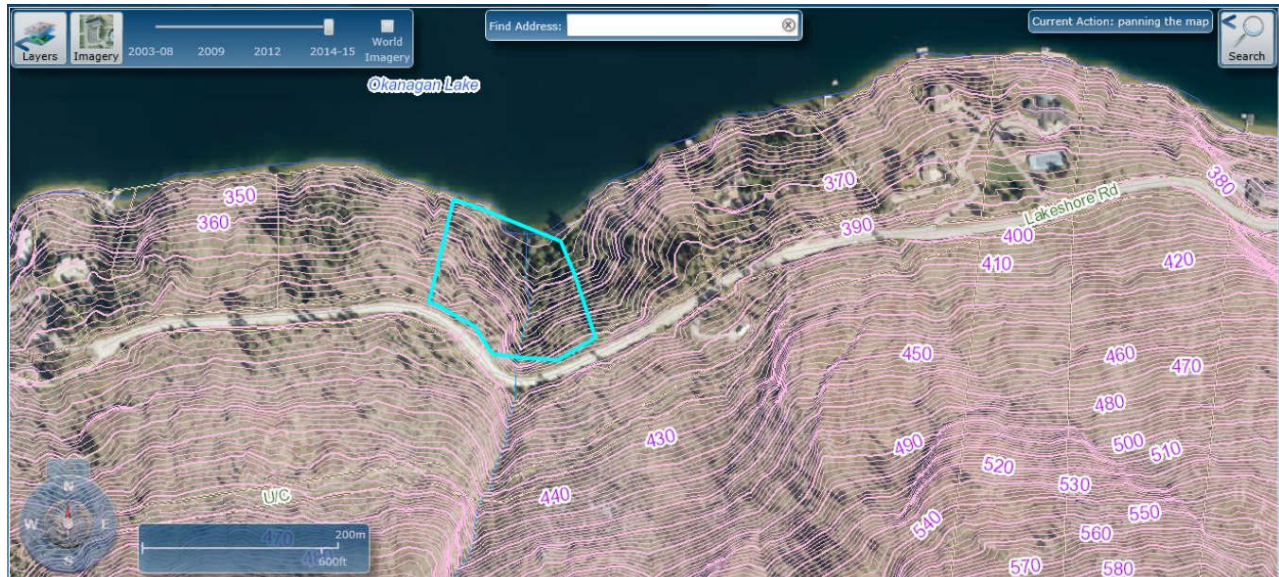


Figure 3. Slope contours for the Property (source: RDCO GIS).

2.4 Terrestrial Resources

2.4.1 Biogeoclimatic Ecosystem Classification

According to the Biogeoclimatic Ecosystem Classification (BEC), the Property exists in the Ponderosa Pine (PP) biogeoclimatic zone within the Very Dry Hot subzone Okanagan variant (xh1) (DataBC, 2022). The climate of the Okanagan region is generally very dry as it is in the rain shadow of the Coast and Cascade mountain ranges. Warmest temperatures occur during June, July and August. The coldest month is January (minimum temperature -8.4°C). Precipitation is mainly in the form of rain with highest rainfalls occurring in the summer months from May to September. The average amount of precipitation for the Okanagan Valley is approximately 350 mm per year (Meidinger,D., J.Pojar, 1991).

The forests within the PP zone are found in a narrow band in the driest and warmest valleys of the Southern Interior (Okanagan/Similkameen) region. The forests are dominated by ponderosa pine (*Pinus ponderosa*) with Douglas fir (*Pseudotsuga menziesii*) common on cool and moist sites. The understory is dominated by bluebunch wheatgrass (*Pseudoregneria spicata*) and rough fescues (*Festuca* spp.). Frequent ground fires create and maintain stand structure. Overall, the PPxh1 subzone contains a range of features from bedrock cliffs and talus slopes (found in dry site associations) to riparian areas (in wet site associations) (Meidinger,D., J.Pojar, 1991) .

2.4.2 Rare and Endangered Wildlife

Species at risk information is available from provincial and federal sources (Table 2). Provincially, BC Ministry of Environment (BC MOE) maintains information on the BC Species and Ecosystems Explorer for species in the province (CDC, 2022). Data on known species at risk occurrences are available through the BC Conservation Data Centre (BC CDC) (CDC, 2022). Federally, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) was established under Section 14 of the *Species at Risk Act* (SARA) and ranks species. Schedule 1 of SARA provides the list of species at risk. SARA typically only applies to federal land and only aquatic species as defined by the federal *Fisheries Act* and migratory birds listed under the federal *Migratory Bird Act* are protected under SARA on private or provincially owned lands.

Table 2. Definitions of conservation status classifications

Regulation	Status	Definition
COSEWIC (federal)	Endangered (E)	A species facing imminent extirpation or extinction.
	Threatened (T)	A species that is likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction.
	Special Concern (SC)	A species that may become threatened or endangered because of a combination of biological characteristics and identified threats.
BC CDC (provincial)	Red-listed	Species, subspecies, or ecological communities considered to be Extirpated, Endangered, or Threatened.
	Blue-listed	Species, subspecies, or ecological communities considered to be of Special Concern (formerly Vulnerable).
	Yellow	Species or subspecies that is apparently secure and not at risk of extinction.

2.4.3 Wildlife Species at Risk

The Project area has the potential to provide important foraging, breeding, nesting, and travel corridor habitat for rare and endangered wildlife. The CDC database was used to prepare a list of Red- and Blue-listed wildlife species which could potentially occur within the Project area. The list was compiled by filtering the tool's database to search for species based on the area of interest which was further refined by PP BEC zone and habitat subtypes found in the Project area including dry conifer forest, grassland, riparian forests, riparian shrub, and sparsely vegetated rock. Based on the results of the query, 55 provincially rare or at-risk wildlife species potentially could occur within or in proximity to the Project area (CDC, 2022). The full results of the query are provided in Appendix 3 (Table 1).

2.4.3.1 Known Occurrences of Wildlife Species at Risk

The CDC database and mapping tool was accessed to identify known occurrences of wildlife species at risk (an area of land and/or water where a species or ecosystem is known to occur) within and in proximity to the Project area (within 5 km). No known occurrences were identified within the Project area (CDC, 2022). Lack of occurrences in this database do not necessarily mean there are no species or ecosystems at risk present; only that none have been recorded in the database. Two occurrences were identified within 5 km of the Project area (CDC, 2022).

Western Screech Owl Occurrence #6115; Shape ID 19513

The Western Screech Owl (*Megascops kennicottii macfarlanei*) is provincially Blue-listed and listed as a Threatened species under COSEWIC and Sara (Schedule 1-Threatened). This Western Screech Owl occurrence is composed of several Western Screech Owls sightings in the area (east of Okanagan Lake, along Mission Creek and KLO Creek) between 1990 - 2016. The closest occurrence was recorded 3.2 km east of the Project area adjacent to Varty Creek. Suitable habitat includes deciduous woodlands along lakeshores, streams, and rivers. Nest trees are generally dead deciduous or coniferous trees including black cottonwood (*Populus trichocarpa*), water birch (*Betula occidentalis*), and paper birch (*Betula papyrifera*) with understory of shrubs and willows (CDC, 2022).

American Badger #10214; Shape ID 74373

The American Badger (*Taxidea taxus*) is provincially Red-listed and listed as an Endangered species under COSEWIC and SARA (Schedule 1-Endangered). The Property is 3.2 km east of a large mapped American Badger range polygon extending from the U.S. border to the north end of Okanagan Lake (ID #74373). The occurrence polygon is inclusive of 498 reported sightings of badgers (most between 1995 and 2012), occurring throughout the polygon, but are concentrated within grassland/agricultural interface zones in the Vernon, Lumby, Mission Creek, Osoyoos, Anarchist Mountain/Rock Creek, and Grand Forks areas (DataBC, 2022).

2.4.4 Critical Habitat

The CDC database and mapping tool was accessed to identify designated critical habitat of wildlife species at risk and in proximity (within 5 km) to the Project area. The Project area overlaps with one critical habitat area and additional critical habitat areas occur within 5 km of the Project area were identified within the Project area (CDC, 2022).

2.4.4.1 **Lewis's Woodpecker (Critical Habitat ID No. 29620)**

The portion of the Property west of the unnamed gully overlaps with a polygon of critical habitat for Lewis's Woodpecker (*Melanerpes lewis*). Several additional critical habitat polygons occur within 5 km of the Project area (CDC, 2022). The polygons are based on observations, habitat features, and modelling. Important habitat features include an open tree canopy, a brushy understory with ground cover, and dead trees for cavities in open ponderosa pine forests or open riparian woodlands dominated by cottonwood. Also use burned pine forests for nesting (CDD, 2022).

2.4.4.2 **Great Basin Gophersnake (Critical Habitat ID No. 30224)**

The Great Basin Gophersnake (*Pituophis catenifer deserticola*) is a provincially Blue-listed species and is listed as a Threatened species under COSEWIC and SARA (Schedule 1- Threatened). Critical habitat for Great Basin Gophersnake occurs within a 10 km grid where the critical habitat criteria described in the Recovery Strategy for the Great Basin Gophersnake are met. Gophersnakes forage in open grasslands but riparian areas within grasslands may also be important. Most known den sites are located within rock outcrops or talus slopes located on south-facing slopes in the Ponderosa Pine or Bunchgrass BEC zones (CDC, 2022). Polygon occurs approximately 1.5 km west of the Property (CDC, 2022).

2.4.5 Vegetation species at risk

The CDC database was used to prepare a list of Blue- and Red-listed vascular plant species which could potentially occur within the Project area. The list was compiled by filtering the tool's database to search for species based on the area of interest which was further refined by PP BEC zone and habitat subtypes found in the Project area including dry conifer forest, grassland, riparian forests, riparian shrub, and sparsely vegetated rock. Based on the results of the query, seven provincially rare or at-risk plant species were identified (CDC, 2022). The results of the query are provided in Table 3.

Table 3. Vegetation Species at Risk with potential to occur in and around the Project area*

Common Name	Scientific Name	BC Status	SARA Status	COSEWIC Status
cut-leaved water-parsnip	<i>Berula incisa</i>	Blue	-	-
Englemann's spike-rush	<i>Eleocharis engelmannii</i>	Blue	-	-
haristern groundsmoke	<i>Gayophytum ramosissimum</i>	Blue	-	-
Idaho blue-eyed grass	<i>Sisyrinchium idahoense</i> var. <i>occidentale</i>	Red	-	-

Common Name	Scientific Name	BC Status	SARA Status	COSEWIC Status
showy phlox	<i>Phlox speciosa</i> ssp. <i>occidentalis</i>	Red	1-T (2006)	T
slender hawksbeard	<i>Crepis atribarba</i>	Blue	-	-
sulphur lupine	<i>Lupinus sulphureus</i>	Blue	-	-

*Search criteria:

AND BC Conservation Status: Red (Extirpated, Endangered, Threatened) OR Blue (Special Concern)

AND User Defined Polygon Area of Interest (Property)

AND Habitat Subtypes: Conifer Forest – Dry, Grassland, Riparian Forest, Riparian Shrub, Rock/Sparsely Vegetated Rock

AND BCG Zone, PP

2.4.5.1 Known Occurrences of Vegetation Species at Risk

The CDC database and mapping tool was accessed to identify known occurrences of vegetation species at risk within and in proximity (within 5 km) to the Project area. There are no known occurrences of terrestrial vegetation species at risk occurrences identified in the search radius of the Project area (CDC, 2022).

2.4.6 Ecological Communities at risk

Ecological communities at risk are of concern because of their limited distribution on the landscape and sensitivity to disturbance. The CDC database was used to prepare a list of blue- and red-listed ecological communities which could potentially occur within the Project area. The list was compiled by filtering the tool's database to search for species based on the area of interest which was further refined by PP BEC zone and habitat subtypes found in the Project area. (CDC, 2022). Based on the results of the query, thirteen provincially ecological communities of concern were identified. The results of the query are provided in Appendix 3, Table 2.

2.4.6.1 Known Occurrences of Ecological Communities at Risk

The CDC database and mapping tool was accessed to identify known occurrences of Red- and Blue-listed ecological communities at risk within and in proximity to the Project area (within 5 km). No known occurrences were identified within the Project area (CDC, 2022). Lack of occurrences in this database do not necessarily mean there are no ecosystems at risk present; only that none have been recorded in the database. Seven occurrences were identified within 5 km of the Project area (CDD, 2022) (Table 4).

Table 4. Known occurrences of Ecological Communities at Risk

Occurrence ID/Shape ID	Ecological Community	Scientific Name	BC Status	Comments
10351/77079	black cottonwood – Douglas fir/Douglas fir–common snowberry	<i>Populus trichocarpa</i> – <i>Pseudotsuga menziesii</i> /Acer <i>glabrum</i> – <i>Shymphoricarpos albus</i>	Red	Occurs along 1.1 km of Deeper Creek to the edge of Okanagan Lake approximately 1.3 km east of the Property.

Occurrence ID/Shape ID	Ecological Community	Scientific Name	BC Status	Comments
10350/77077	black cottonwood – Douglas fir/Douglas fir–common snowberry	<i>Populus trichocarpa</i> – <i>Pseudotsuga menziesii</i> /Acer <i>glabrum</i> – <i>Shymphoricarpos albus</i>	Red	Deciduous riparian occurrence on a small peninsula at the shore of Okanagan Lake surrounded by coniferous woodlands. Approximately 4.5 km west of Property.
10352/77082	black cottonwood – Douglas fir/Douglas fir–common snowberry	<i>Populus trichocarpa</i> – <i>Pseudotsuga menziesii</i> /Acer <i>glabrum</i> – <i>Shymphoricarpos albus</i>	Red	Occurs along Bertram Creek to the edge of Okanagan Lake. Surrounded by agriculture, coniferous woodlands, grasslands, lake, and road. Approximately 4.5 km east of Property.
13014/103757	common cattail marsh	<i>Typha latifolia</i> marsh	Blue	Occurrence in two depressions on the middle slopes of Okanagan Mountain Provincial Park. Surrounded by burned coniferous woodlands and sparsely vegetated ecosystems. Approximately 1.7 km southwest of Property.
13019/103762	common cattail marsh	<i>Typha latifolia</i> marsh	Blue	Occurrence in two depressions on the middle slopes of Okanagan Mountain Provincial Park. Surrounded by burned coniferous woodlands and sparsely vegetated ecosystems. Approximately 1.7 km southwest of Property.
13018/103761	common cattail marsh	<i>Typha latifolia</i> marsh	Blue	Occurrence is in two depressions on the middle slopes of Okanagan Mountain Provincial Park. Surrounded by riparian forest and burned forest. Approximately 2 km southwest of Property.
12530/102048	hard-stemmed bulrush deep marsh	<i>Schoenoplectus acutus</i> deep marsh	Blue	Occurrence in a depression on the middle slopes of Okanagan Mountain Provincial Park. Surrounded

Occurrence ID/Shape ID	Ecological Community	Scientific Name	BC Status	Comments
				by burned forest, grassland, and sparsely vegetated ecosystems. Associated with shallow open water. Approximately 3 km southwest of Property.

*Search criteria:

AND Ecosystem Realm-Groups: Peatland Group OR Beach Group (B) OR Ecosystem Classes: Broadleaf – dry OR Grassland Class (Gg) OR Grassland Brushland Class (Gb) OR Shrub Steppe Class (Gs) OR Rock Outcrop Class (Ro) OR Talus Class (Rt) OR Marsh Wetland Class (Wm) OR Shallow Water (Aquatic) Wetland Class (Ww) OR Swamp Wetland Class (Ws)

AND BC Conservation Status: Red (Extirpated, Endangered, Threatened) OR Blue (Special Concern)

AND User Defined Polygon Area of Interest (Property)

AND Habitat Subtypes: Conifer Forest – Dry, Grassland, Riparian Forest, Riparian Shrub, Rock/Sparsely Vegetated Rock

AND BCG Zone, Subzone, Variant, Phase: PPxh1

2.5 Aquatic Resources

2.5.1 Okanagan Lake

The Property is bounded by Okanagan Lake to the north. The shoreline is approximately 125 m in length. Okanagan Lake supports 22 species of resident fish (Table 5). Species valued by the sport fishery include Kokanee Salmon (*Oncorhynchus nerka*) and Rainbow Trout (*Oncorhynchus mykiss*).

Table 5. Fish species recorded in Okanagan Lake

Common Name	Scientific Name
Brook Trout	<i>Salvelinus fontinalis</i>
Burbot	<i>Lota lota</i>
Carp	<i>Cyprinus carpio</i>
Chiselmouth	<i>Acrocheilus alutaceus</i>
Cutthroat Trout	<i>Oncorhynchus clarki</i>
Kokanee	<i>O. nerka</i>
Lake Trout	<i>S. namaycush</i>
Lake Whitefish	<i>Coregonus clupeaformis</i>
Largescale Sucker	<i>Catostomus macrocheilus</i>
Leopard Dace	<i>Rhinichthys falcatus</i>
Longnose Dace	<i>R. cataractae</i>
Longnose Sucker	<i>R. catostomus</i>
Mountain Whitefish	<i>Prosopium williamsoni</i>
Northern Pikeminnow	<i>Ptychocheilus oregonensis</i>
Peamouth Chub	<i>Mylocheilus caurinus</i>
Prickly Sculpin	<i>Cottus asper</i>
Pumpkinseed	<i>Lepomis gibbosus</i>
Pygmy Whitefish	<i>P. coulteri</i>
Rainbow Trout	<i>O. mykiss</i>
Redside Shiner	<i>Richardsonius batleatus</i>
Slimy Sculpin	<i>C. confusus</i>
Yellow Perch	<i>Perca flavescens</i>

Source: MOE, 2022.

MFLNRORD's "Okanagan Large Lakes Foreshore Protocol" (the Protocol) provides direction to proponents and Qualified Professionals regarding requirements for applications for works along the foreshore based on the sensitivities of a site and the potential risk of the foreshore development activity.

2.5.1.1 Kokanee

The foreshore at the Property is a combination of a Red zone and a Black zone for Kokanee shore spawners. The portion of the foreshore at the Property west of the unnamed gully is designated as a black zone and the portion of the Property is designated as a red zone according to the Okanagan Region Large Lakes Foreshore Protocol (Figure 4). Black zones are considered critical for Okanagan Lake shore spawning Kokanee and occur in areas which identify aggregates of 1,000 or greater spawning fish observed. Red zones are considered high value habitat (MFLNRORD, 2018). No development is proposed within 30 m of Okanagan Lake and no impacts to Kokanee or Kokanee habitat are anticipated.



Figure 4. Kokanee shore spawning zones at the Property (approximate Property boundary shown in white)

2.5.1.2 Freshwater Mussels

According to the Protocol, the Property is in a No Colour zone for freshwater mussels. A No Colour zone does not confirm absence of mussels in an area but indicates the lack of information about mussels in the area (MFLNRORD, 2018). No development is proposed within 30 m of Okanagan Lake and no impacts to mussels are anticipated.

2.5.2 Mapped Watercourse

A mapped watercourse bisects the Property (watershed code: 300-432687-764850). It is a 1st order stream, magnitude 1. It is approximately 1 km in length and originates south of the Property in Okanagan Mountain Provincial Park and enters the Property from an existing culvert under Lakeshore Road. No obvious headwater was observed from aerial imagery.

3.0 Development Permit Areas and Sensitive Ecosystem Inventory

3.1 Guidelines

The RDCO South Slopes OCP and DP guidelines identify environmentally sensitive development permit areas (DPAs). The OCP and associated DPAs were designed to lessen the potential negative effects that development can have on the natural environment and sensitive environmental features and preserve the rural characteristics of the South Slopes area (RDCO, 2012). The Property falls under the Sensitive Terrestrial Ecosystem DPA and the Aquatic Ecosystem DPA. These are discussed further in the following sections.

3.2 Sensitive Terrestrial Ecosystem DPA

Sensitive Terrestrial Ecosystem DPAs have been designated for the protection of the natural environment, its ecosystems, and biological diversity from development. A "sensitive" ecosystem is one that is ecologically fragile or is recognized as rare (RDCO, 2012). Terrestrial DPAs are based on a report and series of corresponding maps called the *Sensitive Ecosystem Inventory of the Okanagan Valley: Vernon to Osoyoos* (Iverson, 2008). The Sensitive Ecosystem Inventory (SEI) was developed to provide information on sensitive ecosystems in the Okanagan Valley and provide guidance regarding conservation and management. It provides information to landowners, developers, local and provincial government officials on how to minimize and avoid degradation of sensitive ecosystems (Iverson, 2008).

The objectives of the Sensitive Terrestrial Ecosystem DPA are to ensure sensitive environments are identified and protected; to conserve these areas in a relatively natural state while supporting rural land uses; to plan new development carefully in a manner that protects these areas; to protect Sensitive Terrestrial Ecosystems through the use of buffers; and to identify feasible habitat corridors connecting core conservation and significant habitat areas (RDCO, 2012).

3.3 Aquatic Ecosystem DPA

The Aquatic Ecosystem DPA includes riparian areas and landform characteristics such as ravines, steep slopes, and proximity to fluctuating water levels. The RDCO have mapped aquatic ecosystems using the Sensitive Habitat Inventory Mapping (SHIM) program. Protection of watercourses and their associated riparian areas is a legislated requirement of the Province of BC. The Aquatic Ecosystem DPA was established to meet objectives including protection of ecological attributes of aquatic ecosystems; to protect, restore, and enhance aquatic ecosystems through the use of buffers; to protect water quality and quantity; and to protect fish populations, fish habitat, and wildlife functions such as travel corridors, water source, and place of refuge (RDCO, 2012).

3.4 SEI Classification of the Property

The SEI classification divided the Property into two polygons (Figure 5 and 6). The area east of the gully has one SEI classification and one Other Important Ecosystem (OIE) classification (Table 6) and the area west of the gully has three SEI classifications (Table 7). Characteristics of the classifications are discussed further in the following sections.

3.4.1 Ecosystem Classification East of the Unnamed Gully

Table 6. Ecosystem classification of polygon east of unnamed gully*

Class	Subclass	Structural Stage	Description
Coniferous woodland (WD)	Coniferous (co)	3	WD stage 3: shrub/herb shrub cover 20% or greater, tree cover less than 10%
Mature Forest (MF)	Coniferous (co)	6	MF Stage 6: Trees are >10m tall and have 10% or greater cover, dominated by mature trees 80 – 250 years old

*source: Iverson, 2008

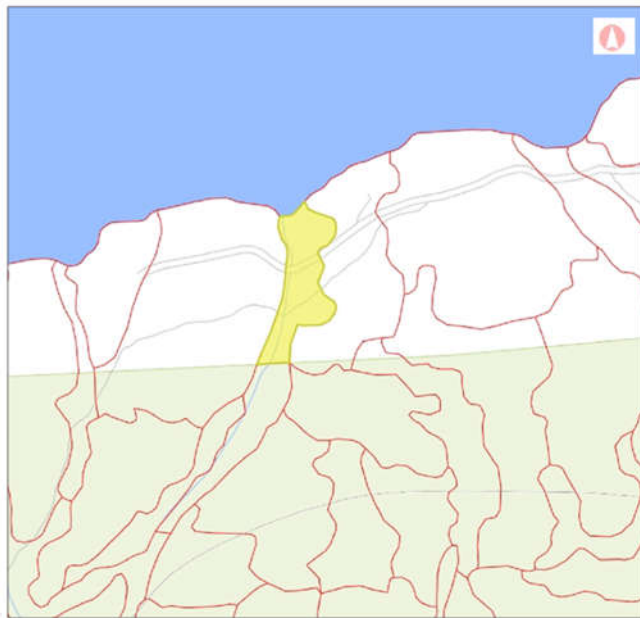


Figure 5. SEI polygon east of the unnamed gully (Source: iMapBC, 2022).

3.4.2 Coniferous Woodlands and Mature Forest

Coniferous Woodlands (WD) are characterized by open stands of Douglas fir or ponderosa pine. These communities occur in drier climates on rocky knolls and steep south-facing slopes where limited moisture or shallow soils limit tree growth. These areas are classified into five structural stages. Structural stages are important to identify habitat values and the quality of the site with older structural stages having higher conservation priority than younger structural stages. Younger stages (lower stage number) still play an important role for buffers and provide recruitment for older structures (Iverson, 2008).

Stage 6 forests are considered Mature Forests and occur in areas with mature trees and a few large old trees. These remaining older trees play an important role for wildlife. Mature Forests provide buffers and connectivity between other ecosystems (Iverson, 2008).

3.4.3 SEI Classification West of the Unnamed Gully

Table 7. SEI classification of polygon west of unnamed gully*

Class	Subclass	Structural Stage	Description
Coniferous woodland (WD)	Coniferous (co)	3	WD stage 3: shrub/herb shrub cover 20% or greater, tree cover less than 10%
Grasslands/Disturbed grasslands (GR)	Steep shallow soil grasslands (ss)	3	Sloping ecosystems dominated by bunchgrasses and steep shallow soils
Sparsely Vegetated (SV)	Shrubby rocky outcrops (sh)	3	Amount of rock and talus prevent vegetation development

*source: Iverson, 2008

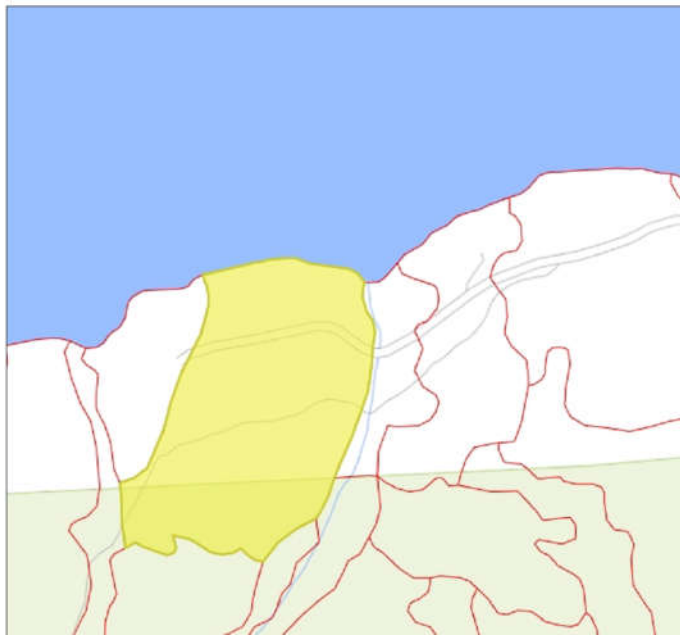


Figure 6. SEI polygon west of the unnamed gully (source: iMapBC).

3.4.4 Grasslands

Grassland ecosystems in the area are dominated by bunchgrasses and scattered forbs and scrublands dominated by snowberry and rose. Grasslands occur on medium and finer textured soils while shrublands occur on slightly moister and richer patches within a grassland ecosystem. Steep shallow soil grasslands occur on slopes greater than 25% and have soils that are 20 cm to 1 m deep. These areas have fewer alien species because they have not been disturbed by development. Grasslands support a unique

assemblage of wildlife species including at-risk species. They are susceptible to human disturbance (Iverson, 2008).

3.4.5 Sparsely Vegetated

Sparsely vegetated ecosystems are defined as sites where rock or talus limits vegetation establishment and vegetation cover is interspersed by bedrock or blocks of rock. Sparsely vegetated shrub (sh) ecosystems occur on small rock outcrops which occur within a grassland matrix. They are often steep with soils restricted to small pockets with scattered shrubs (Iverson, 2008). Rock features found in sparsely vegetated ecosystems provide for a variety of wildlife species including hibernacula for over-wintering snakes (including at-risk species), roosting and breeding areas for bats, and nesting habitat for a variety of birds. These areas are sensitive to disturbance and can take a long time to recover (Iverson, 2008).

4.0 Field Visit and Environmentally Sensitive Areas

4.1 Field Visit

The preliminary field visit was conducted by Ms. Kellen Smith (Triton) on August 30, 2016 to confirm findings of the desktop review and identify additional information and parameters. A second field visit was conducted on November 29, 2016 to gather additional information and to determine a potential access route onto the Property. Additional field visits were conducted on October 11, 2022 and October 15, 2022.

4.2 Terrestrial Resources

4.2.1 Vegetation Resources

The Property can be divided into three distinct areas based on vegetation type and SEI classification: area west of the gully, the gully, and the area east of the gully.

4.2.1.1 West of gully

The portion of the Property west of the gully was dominated by dry upland species with rocky outcrops interspersed throughout. The SEI classifications in this polygon include Coniferous Woodlands, Sparsely Vegetated, and Grasslands. Dominant vegetation species are provided in Table 8. The slope in the upper portion of the western area is less severe (relative to the remainder of the Property) and gradually slopes toward Okanagan Lake on the upper portion and drops abruptly to the foreshore. The foreshore in this area is composed of large sections of bedrock.

Table 8. Dominant vegetation species observed west of the gully

Common Name	Latin Name	Comments (location)
Trees		
ponderosa pine	<i>Pinus ponderosa</i>	Scattered throughout.
Douglas fir	<i>Pseudotsuga menziesii</i> var. <i>glauca</i>	Scattered throughout.
Shrubs		
common snowberry	<i>Symphoricarpos albus</i>	Native shrubs in understory.
rose	<i>Rosa</i> spp.	Native shrubs in understory.
Saskatoon	<i>Amelanchier alnifoli</i>	Native shrubs in understory.
smooth sumac	<i>Rhus glabra</i>	Native shrubs in understory.
mock orange	<i>Philadelphus lewisii</i>	Native shrubs in understory.
Forbs		
arrowleaf balsamroot	<i>Balsamorhiza sagittate</i>	Native forbs in understory.
silky lupine	<i>Lupinus sericeus</i>	Native forbs in understory.
yarrow	<i>Achillea millefolium</i>	Native forbs in understory.
mosses - various		Associated with rock outcrop – more dominant on lower slope closer to Okanagan Lake foreshore.
pasture sage	<i>Artemisia frigida</i>	Native forbs in understory.
Grasses		
bluebunch wheatgrass	<i>Pseudoroegneria spicata</i>	Native grass species in understory.
rough fescue	<i>Festuca</i> sp.	Native grass species in understory.

4.2.1.2 Unnamed gully

The unnamed mapped watercourse originates south of the Property in Okanagan Mountain Park from a deep gully where it enters a culvert across Lakeshore Road. Two culvert outlets on the Property on the north side of Lakeshore Road were observed during the field visits which drops sharply down a steep gradient onto the Property. Riprap occurs on the upper slope of the gully adjacent to Lakeshore Road and around the culvert outlet. The upper portion of the gully drops down a steep gradient which is densely vegetated with a mixture of deciduous and coniferous trees and larger shrubs. Dominant vegetation species observed during the site visit are provided in Table 9. The western side of the gully is rocky and steep. The eastern side is less steep and gradually slopes into dense vegetation which continues to the eastern portion of the Property.

It is considered a riparian gully. There was no flow observed and the gully was dry during both field visits. There was no indication of a defined channel or bed in the southern portion. Further downstream there were a few interspersed indications of bed material, but the sections were not contiguous for any significant length (greater than 20 m). Approximately 35 m upstream of Okanagan Lake there is no indication of a channel and water spread and fanned out toward the lake as the gradient flattened. The gully is an obvious depression and swale with interspersed sections of bed material but is not characteristic of a stream.

Table 9. Dominant vegetation species observed at the gully

Common Name	Latin Name	Comments (location)
Trees		
Douglas fir	<i>Pseudotsuga menziesii</i> var. <i>glauca</i>	-
ponderosa pine	<i>Pinus ponderosa</i>	-
water birch	<i>Betula occidentalis</i>	In gully and at the foreshore of Okanagan Lake.
willow	<i>Salix</i> sp.	At the foreshore of Okanagan Lake.
Shrubs		
black hawthorn	<i>Crataegus douglasii</i>	Thick native shrub cover in understory.
choke cherry	<i>Prunus virginiana</i>	Thick native shrub cover in understory.
common snowberry	<i>Symphoricarpos albus</i>	Thick native shrub cover in understory.
mountain alder	<i>Alnus incana</i>	Thick native shrub cover in understory.
Oregon grape	<i>Mahonia aquifolium</i>	Thick native shrub cover in understory.
red-osier dogwood	<i>Cornus stolonifera</i>	Thick native shrub cover in understory.
rose	<i>Rosa</i> spp.	Thick native shrub cover in understory.
Saskatoon	<i>Amelanchier alnifoli</i>	Thick native shrub cover in understory.
smooth sumac	<i>Rhus glabra</i>	Thick native shrub cover in understory.

4.2.1.3 East of the gully

The portion of the Property east of the unnamed gully is densely vegetated with thick canopy cover. The classifications in this polygon include SEI Coniferous Woodlands and OEI Mature Forest. Douglas fir is the dominant tree species with Ponderosa pine interspersed. The shrub layer is denser compared to the western portion. Dominant vegetation species are provided in Table 10. The slope drops abruptly from Lakeshore

Road and becomes more gradual near the lakeshore. The slope from Lakeshore Road on the east side of the gully is steeper in this area compared to the west side.

Table 10. Dominant vegetation species observed east of the gully

Common Name	Latin Name	Comments (location)
Trees		
Douglas fir	<i>Pseudotsuga menziesii</i> var. <i>glauca</i>	Mature trees more dominant on east side of the Property.
ponderosa pine	<i>Pinus ponderosa</i>	Mature trees more dominant on east side of the Property.
water birch	<i>Betula occidentalis</i>	At the foreshore of Okanagan Lake.
Shrubs		
black hawthorn	<i>Crataegus douglasii</i>	Native shrubs in understory.
choke cherry	<i>Prunus virginiana</i>	Native shrubs in understory.
common snowberry	<i>Symphoricarpos albus</i>	Native shrubs in understory.
Oregon grape	<i>Mahonia aquifolium</i>	Native shrubs in understory.
red-osier dogwood	<i>Cornus stolonifera</i>	Native shrubs in understory.
rose	<i>Rosa</i> spp.	Native shrubs in understory.
Saskatoon	<i>Amelanchier alnifolia</i>	Native shrubs in understory.
smooth sumac	<i>Rhus glabra</i>	Native shrubs in understory.
Forbs		
Arrowleaf balsamroot	<i>Balsamorhiza sagittate</i>	Native forbs in understory.
silky lupine	<i>Lupinus sericeus</i>	Native forbs in understory.
yarrow	<i>Achillea millefolium</i>	Native forbs in understory.
Grasses		
bluebunch wheatgrass	<i>Pseudoroegneria spicata</i>	Native grasses in understory.
rough fescue	<i>Festuca</i> sp.	Native grasses in understory.
pinegrass	<i>Calamagrostis rubescens</i>	Native grasses in understory.

4.2.2 Wildlife Resources

There was evidence of wildlife use on the Property. Game trails were evident throughout the Property. Scat and ungulate prints were seen in several areas. A white-tailed deer (*Odocoileus virginianus*) was observed passing through the eastern portion of the Property during the second field visit in the flat area near the foreshore of Okanagan Lake. Several rocky outcrops are interspersed throughout the western area. Rocky outcrops provide potential overwintering habitat for reptiles. A more detailed survey of the Property is recommended to determine if any of these outcrops support potential reptile habitat or hibernacula.

4.2.3 Wildlife Resources

4.2.3.1 **Birds**

Several mature Douglas fir and ponderosa pine trees were noted on the lower portion of the Property including one dead Douglas fir tree. No significant wildlife trees, cavities or nests were observed. Construction timing will need to account for the migratory bird nesting period for the region (April 1 – August 30) (MOE, 2021). No active nests or significant cavity trees were noted at the time of survey, but this area could contain both ground and cavity nesting species at appropriate times of the year, including for several avian species-at-risk noted in Appendix 3.

4.2.3.2 Reptiles

In general, reptiles prefer warm, drier areas and could potentially be negatively impacted by urban developments (BC CDC, 2021). Reptiles could potentially use the open grasslands and open canopy habitat on the lower portion of the Property for foraging, basking, and moving through the site. Rock outcrops and talus slopes could provide overwintering or sheltering habitat. Small mammals which could potentially occur on the Property including voles, shrews, moles, mice, and ground squirrels are potential food sources. Masked occurrences may move through the Property and there are talus and rock outcrops present. No reptiles were observed during the site visit.

4.2.3.3 Mammals

Vegetated areas can provide thermal protection, cover, foraging habitat, and migratory routes for a variety of mammals including ungulates (Iverson, 2003). White-tailed deer forage on shrubs, forbs, and grasses in the undisturbed portion of the Property and several deer trails were observed on the lower slope. Open forests provide foraging, nesting, and burrowing opportunities for various small rodents including voles, marmots, ground squirrels, and mice. Small mammals provide a food source for other species including birds, snakes, and coyotes. High insect density and mature trees provide forage and nesting habitat for bats (Iverson, 2006). Leaving this area undisturbed will allow for the corridor habitat to stay intact and will continue to provide access to the vegetated gully in the central portion of the Property.

4.2.4 Aquatic Resources

4.2.4.1 Okanagan Lake

The Property slopes from Lakeshore Road down to the foreshore of Okanagan Lake. The western portion of the Property (west of the unnamed gully) drops steeply toward Okanagan Lake. This area is dry grasslands and drops off to bedrock at the foreshore. Large rocky outcrops of bedrock drop to Okanagan Lake. The eastern portion of the Property drops steeply from Lakeshore Road to a gradual slope and flattens toward the foreshore. The shoreline at the Property is 125 m in length. On the eastern portion of the Property there is a protected bay and the foreshore is composed of a gravel beach. The unnamed gully slopes toward this area and there is no definite channel or connection with Okanagan Lake at the foreshore. The slope on the eastern edge decreases and becomes more gradual at the foreshore with denser trees and understory.

Dominant tree species include Douglas fir and ponderosa pine. Shrub species include Oregon grape and red-osier dogwood. Species indicative of wet conditions occur at the foreshore including horsetail (*Equisetum*) and water birch (*Betula occidentalis*). Substrate at the foreshore is composed of large gravel in exposed areas and small to large cobble with some small boulders further out into the lake.

4.3 Environmentally Sensitive Areas

The RDCO Terms of Reference for Professional Reports identifies the requirement for stratification of communities within the Property based on their environmental sensitivity (RDCO, 2014). This allows for the identification of constraints and areas of high environmental habitat to avoid during development on the Property. It also allows for the identification of areas on the Property for development opportunities. During the inventory phase, communities are stratified into a four-class rating system of Environmentally Sensitive Areas (ESAs).

For the purposes of the preliminary EIA report (Triton, 2017), the ESA ratings were done in a preliminary fashion and were based on the SEI inventory and observations made during the field visit. At the time it was recognized the ESAs would need to be revisited in more detail at the time of proposed development. The Property contains several SEI classifications and large, contiguous areas of undisturbed habitat. The following sections provide an updated designation of ESAs on the Property to reflect current conditions of the Property, further detailed analysis in accordance with the RDCO's Terms of Reference, and the current proposed development. The preliminary EIA report recommended building on the west portion of the Property. Since the original EIA report was prepared, it was determined development on the east side of the unnamed gully would be significantly more feasible from a construction standpoint than the west side. There are large portions of bedrock on the west side which would likely require blasting and other significant efforts to allow for development. The building envelope was moved to the east side of the unnamed gully.

4.3.1 ESA-1

Areas identified as ESA-1 contain significant vegetation and wildlife characteristics representing a diverse range of sensitive habitat (RDCO, 2014). For the purposes of the Riparian Area Protection Regulation (RAPR) assessment, the Riparian Assessment Area (RAA) and Streamside Protection and Enhancement Area (SPEA) for Okanagan Lake is 30 m. No development is proposed within the RAA of Okanagan Lake and a RAPR assessment is not required. Since the unnamed gully does not have channel characteristics for any significant length (greater than 20 m in this case) and there is no defined downstream connectivity to Okanagan Lake, it does not qualify as a stream under RAPR. However, the OCP guidelines defaults the setback to 15 m from the gully. The identified setbacks from Okanagan Lake (30 m) and the unnamed gully (15 m) are considered ESA-1 areas. In addition to protecting the riparian functions of Okanagan Lake, the RAA provides important wildlife habitat and an east/west travel corridor along the foreshore and lower portion of the Property to allow for wildlife movement. The unnamed gully provides a corridor for north/south movement (Figure 7). These areas would be considered by the RDCO as no-build/no-disturb covenant to ensure long-term protection. A single access to be built by the Property owner would be allowed under the covenant.

The lower portion of the Property west of the unnamed gully has been designated as ESA-1. This portion provides connectivity and corridor habitat to the unnamed gully and the

foreshore of Okanagan Lake. These areas would be considered by the RDCO as no-build/no-disturb covenant to ensure long-term protection (Figure 7).

4.3.2 ESA-2

Areas identified as ESA-2 are of moderate significance and contribute toward the overall diversity and contiguous nature of the surrounding natural features. These include SEI and areas used to buffer ESA-1 areas. Some degree of development may be considered in ESA-2 areas as long as those areas identified as Very High Priority (ESA-1) are not impacted. Portions of habitat should be retained and integrated to maintain contiguous nature of landscape (RDCO, 2014). The habitat west of the unnamed gully showed continuity to the gully and ESA-1 areas including the unnamed gully and the foreshore of Okanagan Lake. Similar habitat and vegetation are found in this area to the Property line. Wildlife could use this area as a corridor to access the lake and other areas of the Property. The portion of the Property east of the unnamed gully is densely vegetated and older trees present provide high quality habitat. This area is considered ESA-2 and development could be possible through careful planning to maintain integrity of adjacent ESA-1 areas (Figure 7). Lack of development in the ESA-1 areas and lack of development on the Property west of the unnamed gully would protect a large portion of the habitat and values of the Property while supporting the most feasible location for a building footprint east of the unnamed gully.

4.3.3 ESA-3

Areas identified as ESA-3 contain important features or remnant stands/sites with ecological values that are not identified in the SEI (RDCO, 2014). For the purposes of this EIA report and recognizing the presence of SEI classifications on the Property, no areas were considered ESA-3 for the purposes of the EIA report.

4.3.4 ESA-4

Areas identified as ESA-4 are considered to contribute little or no value to the overall diversity or vegetation, soils, terrain, and wildlife characteristics of the area (RDCO, 2012). Due to the size and undeveloped state of the Property and surrounding areas, no areas were considered ESA-4.

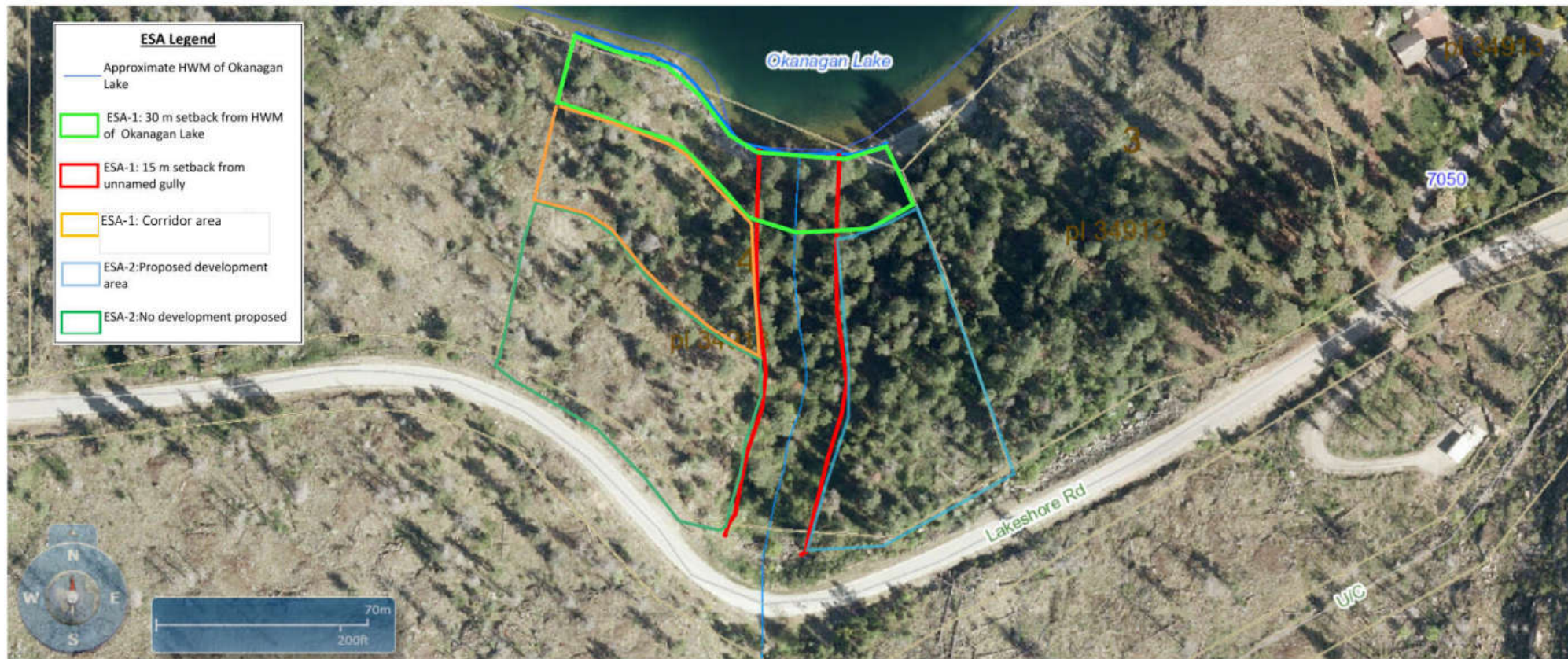


Figure 7. Proposed ESA designations for the Property

5.0 Potential Disturbance and Environmental Effects Assessment

5.1 Proposed Development

Proposed development involves clearing and grading a portion of the Property east of the unnamed gully to construct an access driveway and single-family residential structure. A septic covenant exists east of the unnamed gully in proximity to the 30 m RAA of Okanagan Lake. To allow for a building footprint in this area (outside of the 30 m setback), the septic covenant is being moved to the upper portion of the Property closer to Lakeshore Road and outside of the 15 m setback of the unnamed gully (see Site Plan, Appendix 1). Table 11 provides ESA designations and quantity of proposed disturbance.

Table 11. ESA Designation and Proposed Disturbance

<i>ESA Designation</i>	<i>Total (m²)</i>	<i>Proposed Disturbance (m²)</i>	<i>% to be Retained</i>
ESA-1	8,500	0	100
ESA-2	8,700	1,576	82

The RDCO is in support of a no-build/no-disturb environmental covenant on the ESA-1 areas and the remainder of the ESA-2 area (Figure 7) to avoid impacts to environmental values of that area and ensure connection to the unnamed gully and Okanagan Lake. No development is proposed within the setbacks identified around Okanagan Lake (30 m) and the unnamed gully (15 m). These areas have been identified as ESA-1 areas. It is also recommended that development does not occur in the portion of the Property west of the unnamed gully. Restricting development to the area east of the unnamed gully will leave most of the Property undeveloped and maintain connectivity between undeveloped areas in the vicinity of the Property, including Okanagan Mountain Provincial Park, and Okanagan Lake. An east/west travel corridor will be maintained along the lower portion of the Property at the foreshore of Okanagan Lake within the 30 m setback.

5.2 Potential Access Options

All development including access from Lakeshore Road onto the Property is recommended from the portion of the Property east of the unnamed gully labeled as ESA-2. Access to the Property from Lakeshore Road will begin on the edge and outside of the ESA-1 area and the 15 m setback of the unnamed gully.

5.3 Potential Disturbance from Development

Development will involve the following activities:

- Site preparation;
- Equipment access and movement;
- Clearing and grubbing to construct the driveway access and building footprint;
- Habitat alteration or degradation;

- Potential risk of fuel spills from equipment or improper waste management;
- Elevated risk of erosion and sediment mobilization; and
- Potential for the introduction and spread of invasive weed species.

According to the

5.3.1 Potential Disturbance to Vegetation Resources

No development is proposed for the ESA-1 areas and portions of the Property west of the unnamed gully and potential disturbance to vegetation resources in these areas will be avoided. Potential impacts on vegetation and riparian habitat east of the unnamed gully during clearing and grading operations and development include:

- Change or loss of plant diversity and density, including listed plant communities;
- Introduction and/or spread of noxious weeds; and
- Change or loss of habitat quality/quantity for wildlife.

Vegetation clearing for temporary and permanent workspaces has the potential to reduce plant diversity with associated loss of habitat quality and quantity for wildlife using the Property. Once soils are exposed, it increases the potential for the colonization of noxious weeds, including the introduction from machinery and vehicles entering and leaving the Property. The implementation of mitigation measures cannot completely avoid the impacts on vegetation communities from Project-related activities, however, the effects can be reduced. Mitigation measures for clearing and grubbing have been identified in the EMP (Section 6), as well as a Noxious Weed Management Plan which will help reduce the potential spread and colonization of invasive weeds. The following general mitigation is recommended to reduce Project-related effects:

- Minimize vegetation clearing and removal wherever practical;
- Restrict vegetation clearing to Project footprints only;
- Observe sensitive timing windows for wildlife;
- Minimize the number of access roads;
- Restrict vehicle and machinery movement to approved access roads only;
- Ensure the removal of any noxious weeds on all vehicles and machinery prior to entering the Property; and
- Restrict access to areas of the Property that are not within the Project plans for development.

5.3.2 Wildlife and Wildlife Habitat

No development is proposed for the ESA-1 areas and portions of the Property west of the unnamed gully and long-term impacts to wildlife and wildlife habitat in these areas will be avoided. Potential effects on wildlife and wildlife habitat east of the unnamed gully during clearing and grading operations include:

- Sensory disturbance leading to habitat avoidance or abandonment;
- Habitat loss as a result of vegetation clearing, leveling, and grading;
- Direct or indirect mortalities as a result of earthworks; and
- Disturbance or destruction to habitat features (i.e., nests, cover, or burrows).

Noise, dust, equipment vibration, and increased human interaction may cause changes to wildlife movement patterns, behavior, and habitat avoidance or abandonment by the species identified or that could potentially occur in the Project area. Vegetation removal and re-contouring of land could lead to the permanent or temporary loss of usable habitat for bird species, small mammals, ungulates, reptiles, and amphibian species. Construction activities and equipment have the potential to disturb or destroy bird nests, migratory bird habitat, small mammal burrows, amphibian breeding ponds, and suitable foraging or basking habitat for reptiles. Potential effects to species at risk will be similar to those for wildlife in general. Specific mitigation measures for wildlife have been developed to reduce the potential effects during construction and are provided in the Project-specific EMP (Section 6).

6.0 Mitigation Measures and Environmental Management Plan

6.1 Mitigation Measures

Standard best management practices (BMPs) will be effective in mitigating the majority of potential adverse environmental effects. Specific BMPs are outlined in the following sections. Key Project BMP references include:

- Requirements and Best Practices for Making Changes In and About a Stream in British Columbia (Government of British Columbia, 2022);
- A Users Guide to Working in and Around Water (MOE, 2005); and
- Land Development Guidelines for the Protection of Aquatic Habitat (DFO, 1993).

Appropriate mitigation measures will be implemented onsite to reduce the risk and minimize potential adverse environmental effects during construction. Sediment and erosion control will be implemented as needed and reclamation will occur immediately following the works.

6.2 General Recommendations

To prevent or minimize the negative impacts due to the development, some Best Management Practices when considering developing the lot to follow include:

- Protect large old trees and snags which provide important wildlife habitat;
- Retain as much existing vegetation as possible;
- Control invasive species by managing human and vehicular access;
- Carefully plan new trails and access to prevent erosion problems, disturbance to fragile vegetation, and the spread of invasive weed species;
- Avoid disturbance of areas with at-risk plants, wildlife, and ecological communities;
- Restore native vegetation;
- Maintain habitat structures such as crevices in rocks, trees with cavities, large old trees and snags, large, downed trees, and understory vegetation which provide cover habitat for wildlife; and
- Protect nesting and denning sites and conduct breeding bird field surveys will be necessary prior to commencement of clearing and grubbing activities within the bird nesting period (April 1 to August 30).

6.3 Environmental Monitoring Plan

It is recommended a qualified environmental professional (QEP) conduct environmental monitoring for the proposed works to ensure mitigation measures are implemented as required. The Environmental Monitor (EM) will be present for all work activities that have the potential to impact the environment. The primary responsibilities of the EM are to ensure that that mitigation measures function as intended, and to interpret and advise

the Client on the requirements of environmental regulatory permits. Specific duties of the EM will also include the following:

- Ensure all environmental permits, licenses, and/or authorizations have been obtained prior to commencement of construction activities and copies are kept onsite;
- Work cooperatively with Project personnel to address environmental issues and ensure conformance with the EMP and other regulatory environmental requirements;
- Participate in pre-construction and key onsite meetings, so the Client and onsite workers are aware of the potential environmental risks of the Project;
- Provide appropriate and timely communications to onsite personnel and to the Client on EMP performance and any non-conformance with this EMP or applicable environmental regulatory requirements;
- Take immediate action to address works that are perceived to be in non-conformance with this EMP or environmental regulatory requirements;
- Prepare and submit a monitoring report, if requested, to the Client. Report will include:
 - Identification of potential environmental concerns or potential hazards from construction activities;
 - Reportable incidents and work stoppages; and
 - Assessment of the effectiveness of mitigation measures.
- Immediately notify the Site Supervisor when a halt work order is necessary to stop, avoid, or prevent detrimental environmental effects due to construction activities, or when a reportable incident (e.g., spill) has occurred;
- Provide appropriate communications, as required, throughout the construction period, with regulatory agencies and other stakeholders on environmental issues; and
- Facilitating onsite environmental inspection by regulatory agencies, if required.

6.4 Vegetation Removal and Clearing Plan

Vegetation clearing activities conducted within the Project area will involve the removal of trees, shrubs, and vegetation from the areas to facilitate construction of the driveway access and building. Smaller diameter trees and shrubs will either be cut as required, leaving the stumps in place, or they will be fully removed. Stumps and other waste material will be disposed of, off site. General vegetation clearing BMPs include, but are not limited to, the following:

- Prior to the commencement of clearing or grubbing activities the Contractor's EM will familiarize construction personnel with the environmental requirements and acceptable construction practices associated with the Project;

- Timing of development should consider and avoid times of year when critical wildlife activities occur (e.g., bird breeding and nesting) to protect bird nesting habitat as per the *Migratory Bird Convention Act*, the *Migratory Birds Regulations*, and the *BC Wildlife Act*. If this cannot be avoided, a breeding bird nest field survey will be necessary prior to commencement of tree removal activities proposed to occur within the migratory bird breeding and nesting period for the region (April 1 to August 30) (MOE, 2022).
- If any active nests are identified, whether they are identified inside, or outside of the general breeding window, the EM will develop and implement a site-specific nest management plan including appropriate mitigation measures for the duration of nest occupancy;
- In accordance with the *BC Wildlife Act*, Section 34, nests of Osprey, eagles, Peregrine Falcon, Gyrfalcon, heron, and Burrowing Owl are protected year-round, whether the nest is occupied or not;
- If a nest is discovered by the Contractor, works will be suspended in the area, and the EM will be notified immediately, at which time they will determine whether the nest is active or inactive;
- Vegetation clearing will only extend to designated limits (which will be marked in the field) as indicated by the Project drawings and will not impact ESA-1 areas;
- Vegetation clearing will be conducted to protect vegetation outside of the Project footprint except for danger trees, which, if discovered, will be assessed by a Qualified Professional and removed with minimal disturbance to surrounding vegetation;
- In areas determined by the EM to have high erosion or siltation potential, vegetation clearing activities will be conducted to limit the amount of exposed surface area and construction will promptly proceed with earthwork and stabilization;
- An appropriate seed mix for the area may be used as needed for temporary erosion control on soil disturbances. Mulch or straw may be used in conjunction with seed mix to enhance re-vegetation process; and
- Cleared ground that is sensitive to inclement weather will be protected to withstand that weather in areas where earthworks and stabilization do not proceed promptly after clearing.

6.5 Erosion and Sediment Control Plan

Effective erosion and sediment control is essential due to the works taking place within a stream. Erosion and sediment control (ESC) will employ BMPs in accordance with the "A Users' Guide to Working In and Around Water" (MOE, 2005) and "Requirements and Best Practices for Making Changes In and About a Stream in British Columbia" (Government of BC, 2021). General ESC BMPs to be implemented during construction include, but are not limited to, in the following:

- All work is to be undertaken and completed in such a manner as to prevent the release of silt, sediment or sediment-laden water, or any other deleterious substances into any ditch, watercourse, or drainage;
- An EM is to be present on an as needed basis for aspects of the work where there are potential risks;
- The limits of construction will be identified and flagged as required in the field. Equipment and machinery are not to be operated outside the identified area (i.e., clearing and grubbing limits, no impacts to ESA-1 areas);
- Riparian zones and limits of road toe-of-slope will be isolated with silt fence to prevent surface flow of sediment laden water;
- In areas where there is potential for siltation, where practical, the duration of exposure will be minimized; otherwise, polyethylene sheeting or other suitable tarp material will be used to cover temporarily exposed steep surfaces or stockpiles of erodible materials, such as gravel or other road-based fills;
- Sheeting or tarp materials will be examined and maintained, and the sheeting or tarp materials will be sufficiently anchored to prevent displacement by winds;
- The Contractor will be responsible for temporary ESC measures;
- Control measures will be capable of continuous operation during working and non-working hours;
- Drainage structures will be incorporated into and maintained for the duration of the Project as to minimize erosion and maintain drainage patterns such that no surface erosion is introduced into fish habitat;
- The Contractor will be responsible for ensuring that sediment and erosion control features are in place, are functional and are maintained;
- The required erosion/sediment control materials including filter cloth, straw bales, rock, drain rock, culverts, staking, matting, polyethylene, etc. are to be stockpiled at the site;
- Should any mitigative strategies (e.g., silt fencing) be proven inadequate to control the severity of a sediment movement or erosion issue, the EM will be notified immediately; at which time he/she will implement new mitigative strategies.
- All disturbed areas will be re-contoured and stabilized upon completion of work. Furthermore, these areas will be revegetated to prevent surface erosion and subsequent siltation into the watercourse;
- Avoid conducting excavation works during periods of inclement weather; and
- Work will be pursued to completion as quickly as possible once started.

6.6 Noxious Weed Management Plan

In accordance with the BC *Weed Control Act* all land occupiers are required to control noxious and invasive weeds. Control of these plants is important to protecting the native flora. To ensure that weeds are not transferred to the Project site, it is recommended the Client adhere to the following:

- Stripped topsoil will be stored onsite and reused during reclamation as opposed to bringing new soil from offsite as feasible;
- Disturbed soils will be revegetated where required as quickly as possible as directed by the EM;
- Pressure-wash or steam clean all vehicles and equipment prior to their arrival at the work site; and
- Keep all vehicles and equipment on established roads on the work site regardless of whether they are travelling in infested areas unless the vehicle or piece of equipment must perform work off-road.

6.7 Working in and Around Water

BMPs outlined in "Requirements and Best Practices for Making Changes In and About a Stream in British Columbia" (Government of BC, 2021) will be followed during works in proximity to the ESA-1 areas (30 m setback of Okanagan Lake and the 15 m setback of the unnamed gully). No instreams work is proposed. However, adverse effects to aquatic habitats will be avoided or minimized by implementing the following:

- Works must not cause stream channel instability or increase the risk of sedimentation into the stream;
- Disturbance of stream bank vegetation must be minimized as much as possible;
- Work must be conducted on, and equipment located and operated from, dry land (where no water present);
- Any disturbance of the right-of-way approach to any watercourse related to the Project and associated activities must be kept to a minimum and immediately stabilized and reclaimed to preconstruction conditions;
- Appropriate ESC measures must be installed and maintained to prevent sediment from disturbed areas being transported to the stream; and
- Where banks are disturbed by construction activities, salvaged soil and vegetation must be applied to rebuilt banks.

6.8 Wildlife and Wildlife Habitat Management Plan

The Project will require removal of vegetation and possible disturbance to wildlife habitat. Adverse impacts to vegetation and wildlife habitat will be avoided or minimized as required through implementation of the following mitigation measures:

- It is recommended a wildlife sweep be completed prior to construction activities to mark any sensitive habitat features within the Project footprint including bird nests, American Badger dens, or important reptile habitat features;
- Food must be stored in a location where it is inaccessible to wildlife (e.g., inside a vehicle, equipment, or building);
- Food waste and attractants will be removed from site regularly to minimize encounters with wildlife;
- Feeding or harassment of wildlife is strictly forbidden;
- Waste containers must be sealed to prevent entry by wildlife;
- Works will occur during periods of least risk (where possible) to minimize adverse impact to wildlife, erosion, and to maintain water quality;
- A breeding bird survey will be conducted prior to vegetation removal activities if construction works are scheduled to occur within the breeding window; and
- Where feasible, avoid disturbing soils where wildlife burrows are present.

6.9 Waste Management Plan

Garbage can attract a variety of wildlife species, which may result in an increased risk of mortality due to negative wildlife-human interactions. Effective garbage management will involve, but not be limited to:

- Daily removal of trash;
- Maintenance of clean work areas;
- Enforcement of litter prevention;
- Keeping food in vehicles or other designated areas that are inaccessible to wildlife; and
- Use of wildlife-proof trash containers.

The following general practices will be followed during construction activities:

- Collection and removal of all waste materials will follow federal (e.g., *Transportation of Dangerous Goods Act*) and provincial (e.g., *Environmental Management Act*) waste management legislation, including requirements regarding containment, handling, manifesting, and disposal.
- Hazardous waste will be separated from non-hazardous waste, stored in appropriately labeled containers, and disposed of in an appropriate manner.
- Hazardous materials will be stored and labeled in accordance with WHMIS requirements, as set out in BC's *Occupational Health and Safety Regulation* of the *Workers Compensation Act*.
- Reusable and recyclable materials will be segregated from other materials where applicable.

6.10 Fuel and Hazardous Material Storage and Handling Plan

The purpose of the Hazardous Materials Management and Spill Response Plan is to ensure that spills of hazardous materials are prevented and are dealt with and reported upon appropriately if they occur. The Contractor will provide, in accordance with applicable Federal, Provincial or local requirements, suitable equipment and facilities and will take all precautions necessary to prevent the discharge of contaminants and the conduct of actions which may pollute or degrade the atmosphere, bodies of water, or land areas, or which may harm fish, wildlife and their habitats.

The Contractor will have the necessary spill abatement and clean-up equipment stored on-site at a convenient, readily accessible location. The Contractor will promptly replace any used spill abatement and clean-up materials and maintain a sufficient inventory of materials throughout construction operations.

The Contractor will immediately report any spill of any toxic or hazardous material verbally to the EM, the Ministry Representative, and if externally reportable, to the Provincial Environmental Emergencies Program (EEP) 24-hour telephone line: 1-800-663-3456. Written notification of the spill must follow within two weeks of this verbal report.

The EM and/or the Contractor will document any spills observed in the vicinity of the works that are not the result of Project-related activities and notify relevant Environmental Agencies of such incidents.

6.10.1 Regulatory Framework

A combination of Provincial and Federal Acts, regulations, and best practices guide the storage, transportation, and disposal of hazardous materials (Table 12).

Table 12. Regulatory framework guiding hazardous materials management in BC

Federal and Provincial Acts	Relevant Regulations and Sections
<i>Environmental Management Act</i> (BC)	Contaminated Sites Regulation - Part 7 Liability Part 8 Contaminated soil relocation Hazardous Waste Regulation - Part 8 storage and transportation Spill Reporting Regulation (reportable spills)
<i>Fire Services Act</i> : British Columbia Fire Code Regulations	Fuel dispensing and storage requirements
<i>Transportation of Dangerous Goods Act</i> (BC)	Parts (2, 4) Requirements for appropriate product labelling, duty to report discharge, requirement for Hazardous Waste Transport License, Dangerous Goods Shipping Documentation (all marine pollutants and flash points of Class 3 flammable products must be identified in the documents)
<i>Transportation of Dangerous Goods Act</i> (Canada)	Section (5) Safety Requirements, Standards and Marks, Section (7) Emergency Response Assistance Plan requirements, Section (8) Means of containment, (Section 14) Financial Responsibility, Section (18) Duty to Respond (report), Section (23) Disclosure of information

Federal and Provincial Acts	Relevant Regulations and Sections
Public Health Act (BC)	Part 4, Section 15: reporting of toxic spills
Guidelines, BMPs and Guidance documents	Relevant regulations and sections
A Field Guide to Fuel Handling, Transportation and Storage	Design, Operations, Transportation, Documentation and Training: Small containers, small TDG tanks, Large TDG tanks, above and below ground storage tanks, Marine Facilities, Spill Response
2020 Standard Specifications for Highway Construction Volume 1 (MOTI)	Section 165.14: Waste Disposal and Toxic/Hazardous Materials

6.10.2 Hazardous Materials Management Strategies

Effective hazardous materials management strategies include:

- Preparing inventories of chemicals that will be used or have the potential to be used on-site. Inventories will include anticipated volumes and types of materials and Safety Data Sheets (SDS);
- Providing appropriate storage and guidelines for use of hazardous materials;
- Developing and posting spill prevention plans. Such plans will include guidelines for daily use and overnight fuel storage, as well as designated waste storage areas for oils, solvents, concrete, and other potentially hazardous products. These plans also include guidelines for managing suspect or known contaminated materials; and
- Developing and posting spill preparedness and response plans for chemicals in use on-site. These plans will include, at a minimum, information on appropriate spill response equipment, communications, and response plans.

6.10.3 Storage and Use of Hazardous Materials

Where feasible and applicable, the Contractor will follow these general guidelines for storage and use of hazardous materials in construction areas:

- Outdoor storage will be secured when unmanned, and storage of hazardous or potentially hazardous materials will ideally be arranged so that stored products are away from vegetated areas and there is ≥ 6 m between stored products, uncontrolled grasses or weeds, and fuel dispensers;
- Storage areas and containers will be regularly inspected for leaks, poor condition, inadequate seals, and other problems that may result in the spill or release of a hazardous substance;
- Personnel will read and follow the directions for all products, and have easy access to SDS for all hazardous material on-site;
- Products will be stored in their original containers and their labels maintained in good condition; labels will be protected with transparent tape as necessary;

- As needed and where safe to do so, a correctly sized funnel will be used to transfer hazardous materials from one container to another;
- Personnel will avoid mixing chemicals unless specified by the manufacturer, and will use chemicals as specified on labels, in well-ventilated areas;
- Corrosives will be stored away from flammables; and
- Re-useable or recycled degreasers will be used where possible or appropriate to machinery and equipment.

6.10.4 General Spill Response and Abatement

- Work will be undertaken and completed in such a manner as to prevent the release of any deleterious substances into the environment;
- No equipment refueling, or servicing will be undertaken within thirty 30 m of any watercourse, drainage, and if possible, ditches;
- All leaks or spills will be isolated, contained and cleaned up to the satisfaction of the Ministry Representative, the EM, and Regulatory Agencies. Spills will be reported immediately;
- Waste oil and/or other special wastes will be removed from the Project area at the end of each day and will be disposed of at an approved disposal facility and in a manner consistent with *Waste Management Act* (BC), *Special Waste Regulations*, and the *Health Act* (BC), or will be stored onsite within containment, in a secure location until disposal at an approved facility;
- Fuel dispensing will comply with the *Fire Service Act* (BC), and the British Columbia Fire Code Regulation. The Contractor will be responsible for ensuring complete containment of all fuel losses, regardless of how small, experienced during fuelling or servicing of excavation and related equipment. It is highly recommended that fueling procedures be developed and posted and the use of spill trays and absorbent pads be mandatory when filling;
- If an accident occurs and fuels, oils, chemicals, or other hazardous materials are spilled or dumped on the ground, the affected soil will be removed, placed in drums and disposed of in compliance with the *Waste Management Act* (BC), and *Special Waste Regulations*. Removed soil will be replaced to the satisfaction of the Ministry Representative. Materials spilled will be contained, placed in sealed drums or barrels, and stored at a hazardous waste facility. The affected area(s) will be restored to as close as possible to their original condition; and
- A spill containment kit will be readily accessible on-site, and present in all mobile equipment in the event of a release of a deleterious substance to the environment.

6.10.5 Waste Management Act – Spill Reporting Regulation

6.10.5.1 Report

For spills to land at or above reportable levels (Table 13) or a spill of any volume to water, the person who had possession, charge or control of a substance immediately before its spill shall immediately report the spill to EEP by telephoning 1-800-663-3456 or, where it is not practical to report to EEP within a reasonable time, to the local police or nearest detachment of the Royal Canadian Mounted Police.

Where it appears to a person observing a spill that a report under subsection (1) has not been made, he or she shall make the report referred to in this section. A report under this section shall include, to the extent practical:

- The reporting person's name and telephone number;
- The name and telephone number of the person who caused the spill;
- The location and time of the spill;
- The type and quantity of the substance spilled;
- The cause and effect of the spill;
- Details of action taken or proposed to comply with section 3;
- A description of the spill location and of the area surrounding the spill;
- The details of further action contemplated or required;
- The names of agencies on the scene; and
- The names of other persons or agencies advised concerning the spill.

Table 13. Reportable levels of spilled substances on land

Substance	Quantity
Explosives	Any
Diesel Fuel	100 L
Gasoline	100 L
Grease	100 L
Hydraulic Oil	100 L
Lubricating Oils	100 L
Solvents	100 L
Toxic Substances as defined in section 2.27 (a) of the Federal Regulations (i.e., ethylene glycol)	5 kg or 5 L
Flammable gases, other than natural gas as defined in section 3.11 (a) of the Federal Regulations	10 kg, if the spill results from equipment failure, error or deliberate action or inaction
Non-flammable gases of Division 2 of Class 2 as defined in section 3.11 (d) of the Federal Regulations	10 kg, where spill results from equipment failure, error or deliberate action or inaction
Flammable liquids of Class 3 as defined in section 3.12 of the Federal Regulations	100 L

Substance	Quantity
Waste oil as defined in section 1 of the Special Waste Regulation	100 L
Natural Gas	10 kg, if there is a breakage in a pipeline or fitting operated above 100 psi that results in a sudden and uncontrolled release of natural gas
A substance not covered by the above listed items that can cause pollution (i.e., concrete)	200 kg

6.10.5.2 Spill Incident Reporting Form

An example spill reporting form is shown on the following page.

Spill Incident Reporting Form

All non-authorized releases or discharges of contaminants to the environment in excess of the reportable levels identified in the *Waste Management Act* must be reported immediately to the Provincial Environmental Emergency Program: 1-800-663-3456.

Reporting Person's Name: _____

Reporting Person's Contact Number: _____

Name of Company or Person Causing Spill: _____

Contact Number for Person or Company Causing Spill: _____

Location of Spill: _____

Date / Time of Spill: _____

Substance Spilled: _____

Quantity: _____

Cause and Effect of Spill: _____

Actions Taken to Stop / Contain / Minimize / Maintain Spill:

Description of Spill Location and Surrounding Area:

Further Action Required: _____

Name of Agencies and Environmental Representatives on Site:

Report Completed By: _____ Date: _____

6.10.5.3 Further Action

Where a spill occurs, the person who immediately before the spill had possession, charge or control of the spilled substance shall take all reasonable and practical action, having due regard for the safety of the public and of himself or herself, to stop, contain, and minimize the effects of the spill.

6.10.6 Spill Response Equipment Location and Contents

Written spill response procedures and communications protocols will be posted at conspicuous locations on-site. Personnel should know the locations of the spill kits in each working area and be trained in their use prior to construction. Spill kits will be appropriate to the types of hazardous materials and anticipated spills on-site (e.g., hydrocarbon spills such as hydraulic fluid and diesel). The Contractor will be expected to develop and post a list of contacts and emergency numbers for managing and responding to spills. All Project personnel must be familiar with the spill prevention, containment, and clean-up plan.

Each piece of heavy machinery on the Project site will be equipped with an onboard spill kit. At least one large spill kit will also be available on site; the total number of large spill kits required will depend on the potential spill volumes on site at any one time, as each spill kit is rated for a specific volume of spilled material. An example of large spill kit contents includes the following:

- 100 absorbent pads (oil, gas, & diesel)
- 50 universal absorbent pads (antifreeze & non-haz)
- 6 absorbent socks (3"x 4')
- 4 absorbent socks (3"x 8')
- 1 neoprene drain cover (36"x 36")
- 1 jar of plug n dike (1 lb)
- 8 heavy duty hazmat disposal bags
- Personal protective equipment
- 2 content/instruction sheet

If any items are used throughout the duration of the Project, items will be immediately replaced.

6.10.7 Disposal of Contaminated Material

The Contractor will immediately take the necessary steps to abate the discharge of a spill; provide the necessary labor, equipment, materials and absorbents to contain and remove the spill; clean up the affected area; dispose of waste materials at an approved disposal site; and restore the area to the satisfaction of the Ministry Representative and Environmental Agencies. Any soil contaminated by spills will be removed and replaced by comparable substitutes. All contaminated soil and vegetation that is removed from the site will be disposed of in an approved waste disposal site.

6.10.8 General Guidelines for Fuel Management and Equipment Fuelling

The Contractor will follow these general guidelines for fuel management and the fuelling of trucks and other machinery (MWLAP 2002):

6.10.8.1 Fuel Management

- Fuel containers will be labelled as per the Workplace Hazardous Materials Information System (WHMIS) and consistent with the Fire Code (FC Section 4.2.3.2.) as necessary.
- Small containers (≤ 230 L as per MWLAP, 2002) that are used to store flammable or combustible liquids will meet design specifications of the Fire Code (FC Section 4.2.3.1.).
- Tertiary containment will be required for truck-box fuel tanks that are > 230 L and removed from the truck or other vehicle and operated in a fixed location for any length of time. Important note: secondary and tertiary containment must have a capacity of $\geq 110\%$ of the holding tank.
- Containers will be maintained in good condition, with no evidence of rust, damage, or leaks. Containers will also be adequately sealed with proper fitting lids, caps, bungs, or valves to prevent spills and leaks.
- Hoses and nozzles used for dispensing fuel will be maintained in good repair. Maintenance and operating procedures will be established and posted to prevent spills (FC 4.1.6.3.)

6.10.8.2 Fuelling and Servicing Procedures

- Construction personnel will monitor all fuel dispensing.
- Engines will be shut off and smoking will be prohibited during fuelling.
- Fuel transfers will be stopped prior to overflowing to leave room for expansion. Small TDG tanks must not be filled beyond a level corresponding to 90% capacity.
- Equipment will be serviced ≥ 30 m away from ditches and drainages, or otherwise sensitive habitats wherever possible. Drip pans and/or other protective devices should be used to prevent spills of petroleum products and other potentially hazardous liquids (e.g., antifreeze) during servicing.
- The Contractor will contain fuel losses during fuelling or servicing of equipment and will regularly inspect fuel-dispensing equipment for leaks.

7.0 Habitat Restoration and Enhancement Plan

7.1 Background

Proposed development involves the clearing and grading of a portion of the Property east of the unnamed gully to construct an access driveway and single-family residential structure. No development is proposed in the ESA-1 corridor area west of the gully, as well as, within the Okanagan Lake 30m setback and the Unnamed gully 15m setback and impacts to these areas will be avoided. Restricting development to the area east of the unnamed gully will leave most of the Property undeveloped and maintain connectivity between undeveloped areas in the vicinity of the Property, including Okanagan Mountain Provincial Park, and Okanagan Lake. An east/west travel corridor will be maintained along the lower portion of the Property at the foreshore of Okanagan Lake within the 30 m setback.

7.2 Potential Disturbance

It is proposed to place a no-build/no-disturbance covenant on the ESA-1 areas on the Property and the ESA-2 areas west of the unnamed gully to avoid impacts to environmental values of these areas and ensure connection to the unnamed gully and Okanagan Lake. No development is proposed within the setbacks identified around Okanagan Lake (30 m) and the unnamed gully (15 m).

The proposed clearing and grading of the Property east of the gully, within the EAS-2 area will result in approximately 1,576 m² of land disturbance (Table 14). This disturbance will consist of clearing and grubbing of trees, shrubs, and grasses and the grading of substrates within the Project area. Due to the natural, undisturbed nature of the remainder of the Property, areas for habitat restoration and enhancement will be associated with and adjacent to the building footprint and driveway. A detailed restoration plan will be prepared prior to development.

Table 14. ESA Designation and Proposed Disturbance

ESA Designation	Total (m²)	Proposed Disturbance (m²)	Rationale for Disturbance	% to be Retained	Area of Restoration (m²)
ESA-1	8,500	0	N/A	100	N/A
ESA-2	8,700	1,576	Building footprint, driveway, and septic field	82	Approx. 2,000

7.3 Existing Vegetation

The portion of the Property east of the unnamed gully is densely vegetated with thick canopy cover. The classifications in this polygon include SEI Coniferous Woodlands and OEI Mature Forest. Douglas fir is the dominant tree species with Ponderosa pine

interspersed. The shrub layer is denser compared to the western portion. Dominant vegetation species are provided in Table 15.

Table 15. Dominant vegetation species observed east of the gully

Common Name	Latin Name	Comments (location)
Trees		
Douglas fir	<i>Pseudotsuga menziesii</i> var. <i>glauca</i>	Mature trees more dominant on east side of the Property.
ponderosa pine	<i>Pinus ponderosa</i>	Mature trees more dominant on east side of the Property.
water birch	<i>Betula occidentalis</i>	At the foreshore of Okanagan Lake.
Shrubs		
black hawthorn	<i>Crataegus douglasii</i>	Native shrubs in understory.
choke cherry	<i>Prunus virginiana</i>	Native shrubs in understory.
common snowberry	<i>Symphoricarpos albus</i>	Native shrubs in understory.
Oregon grape	<i>Mahonia aquifolium</i>	Native shrubs in understory.
red-osier dogwood	<i>Cornus stolonifera</i>	Native shrubs in understory.
rose	<i>Rosa</i> spp.	Native shrubs in understory.
Saskatoon	<i>Amelanchier alnifoli</i>	Native shrubs in understory.
smooth sumac	<i>Rhus glabra</i>	Native shrubs in understory.
Forbs		
Arrowleaf balsamroot	<i>Balsamorhiza sagittate</i>	Native forbs in understory.
silky lupine	<i>Lupinus sericeus</i>	Native forbs in understory.
yarrow	<i>Achillea millefolium</i>	Native forbs in understory.
Grasses		
bluebunch wheatgrass	<i>Pseudoroegneria spicata</i>	Native grasses in understory.
rough fescue	<i>Festuca</i> sp.	Native grasses in understory.
pinegrass	<i>Calamagrostis rubescens</i>	Native grasses in understory.

8.0 Restoration Plan

8.1 General Location

The proposed clearing and grading of the Property east of the gully, within the EAS-2 will result in approximately 1,576m² of land disturbance.

8.2 Specific Disturbance Areas

The specific areas of disturbance include the areas of the proposed building envelope, the proposed driveway, and the proposed septic covenant (Table 16).

Table 16. Specific areas of disturbance

Specific area	Estimated disturbance (m ²)	Location	ESA
Proposed building envelope - residence	519.6	Upslope of 30m SPEA East of unnamed gully	ESA-2
Proposed driveway	541.6	Upslope – from back of residence to Lakeshore Rd. East of unnamed gully	ESA-2
Proposed septic covenant	515.1	Upslope of residence Along Lakeshore Rd. East of unnamed gully	ESA-2
Total area of disturbance	1576.3		

8.3 Compensation

Once development is further refined, a landscaping plan must be developed and will incorporate replacement vegetation. The use of native species that are suited to the Property's soil, light, and groundwater conditions that will create habitat will be used to replace the native vegetation lost. A list of recommended native shrubs and trees for replanting efforts are provided in Table 17. Native grasses including bluebunch wheatgrass and fescues will be planted in disturbed areas. Trees and additional landscaping will be established throughout the development.

The Property is currently in an undisturbed, natural state and restoration planting will be associated with incorporating enhancement as part of the landscaping around the proposed areas for disturbance including the building footprint and driveway areas. At this time the site plan is preliminary to inform a location for a building footprint and a landscaping plan must be developed as part of the overall development and will incorporate replacement vegetation.

Table 17. Suggested native plant list

Tree Species	
Common Name	Latin Name
ponderosa pine	<i>Pinus ponderosa</i>
Douglas fir	<i>Pseudotsuga menziesii</i>
trembling aspen	<i>Populus tremuloides</i>

Tree Species	
Common Name	Latin Name
maple spp.	<i>Acer spp.</i>
mountain alder	<i>Alnus tenuifolia</i>
chokecherry	<i>Prunus virginiana</i>
Shrub Species	
Common Name	Latin Name
Saskatoon	<i>Amelanchier alnifolia</i>
common snowberry	<i>Symphoricarpos albus</i>
prickly rose	<i>Rosa acicularis</i>
Oregon Grape	<i>Mahonia aquifolium</i>
birch leaved spirea	<i>Spirea betulifolia</i>
common juniper	<i>Juniperus communis</i>
red osier dogwood	<i>Cornus stolonifera</i>
mock orange	<i>Philadelphus lewisii</i>
Smooth sumac	<i>Rhus glabra</i>

8.4 Restoration Monitoring

Plants should be selected and spaced appropriately to provide adequate cover. A mix of grasses, shrubs, and trees will be planted. Additionally, further site preparation may be required prior to planting (e.g., addition of topsoil, removal of invasive species).

Maintenance and monitoring of the plants will be important. Human disturbance must be reduced within the planted areas. The planted area must be monitored for weed control and weeding may be required during the spring, summer and fall seasons until the shrubs and native grasses have established. Yearly survival counts will be performed by the landowner and dead or dying plants must be removed and replanted during an appropriate planting season.

8.5 Restoration Specifications

There are specifications required for the Property's restoration to ensure the disturbed land is re-established to its fully potential.

8.5.1 Topsoil and landscape grading

- Topsoil shall not be prepared or handled in an excessively wet or frozen condition, or in any way structure is adversely affected.
- Imported Topsoil – Imported topsoil shall be of a sandy loam or loamy sand texture (no less than 50% sand by weight) containing between 4% and 15% organic matter (dry weight basis).
- Imported topsoil shall be free of propagules of plant species designated as noxious under the Weed Control Act & Regulation, and other invasive or undesirable plant species.
- Existing topsoil material, shall be stripped and removed to stockpile(s) within the project area at least 30 m from water, kept properly drained, and maintained in a presentable condition free of spoil, propagules of invasive plants and other weedy species.

- Sites chosen for storage of topsoil shall be free of noxious weeds and invasive plants. If invasive plants or noxious weeds are present at a storage site, propagules shall be removed prior to stockpiling topsoil at the site.
- If topsoil is planned to be or actually is stockpiled for more than one month, those stockpiles must be covered or seeded to prevent erosion and invasive plant or noxious weed establishment.
- Stockpiled topsoil shall be inspected for the presence of invasive plants or noxious weeds prior to spreading, and any topsoil containing noxious weeds shall either be treated prior to use to remove all propagules or disposed of appropriately.
- Topsoil containing knotweed plant material shall not be used as fill.

8.6 Preparation of Landscape Area

- Debris, roots, branches, stones, building material, contaminated subsoil, visible invasive plants or weeds and anything else that may interfere with the proper growth and development of the planned finished landscaping shall be removed.
- Fill materials shall be placed to achieve stability.
- Fine Grading – Areas requiring topsoil shall be fine graded by raking out spoil material and debris such as rocks over 50 mm in diameter.
- Naturalized areas not requiring topsoil shall be similarly cleaned, raked and manicured.
- Scarifying – All landscape area subgrade shall be scarified to a minimum depth of 150 mm perpendicular to the slope immediately before placing topsoil.
- Cleanup – All unsuitable material and inorganic debris shall be removed from the project area.
- All surplus or unsuitable organic waste and debris shall be removed from the Site and disposed in a suitable location.
- Placing Topsoil –The topsoil shall be placed over the prepared landscape area subgrade and shall be allowed to settle or be compacted by light rolling such that it is firm against deep footprints and shall not be compacted more than necessary to meet this requirement; moist (25% to 75% of field capacity) but not wet when placed, and shall not be handled if frozen or wet such that its structure will be altered; manually spread around trees, shrubs and obstacles.

8.7 Planting

- Origin and Requirements – All plant material shall be nursery grown stock or approved collected native plants unless specified otherwise.
- Plants shall be true to name, type and form and shall be representative of their species and variety.
- All plants shall be sturdy stock, with tree and shrub heights proportional to trunk caliper, overall plant width and size of root ball.

- Plants shall be vigorous and healthy with normal, well developed branches and good fibrous root systems and be free from decay, physical injury, disease and insect damage and infestation.
- Conifers shall have a healthy, single leader with well shaped whorls of vigorous, newly growing branches and shall exhibit natural growth habit characteristic of the species and variety.
- The root balls of dug material and the soil of containerized plants shall be free from pernicious perennial weeds. All balled and burlapped plant stock shall be supplied in biodegradable root ball sacking.
- Planting Holes –The bottom of planting holes shall be scarified and loosened to a depth of 100 mm prior to placement of plants and backfill soil. Subsoil, rocks, roots and extraneous material shall be removed from excavated material that will be used as planting backfill soil.
- Time of Planting – All planting operations shall be performed during the normal planting season for each type of material. Late spring or early fall planting is recommended unless supplemental watering is available. Planting shall occur when risk of frost or snowfall is minimal. Planting into frozen ground is not acceptable.
- Trees and Shrubs– Plants shall be installed so that after settlement they will be at the same planting depth they were at in the field or in containers. The soil mark on the stem is an indication of this, and it shall be flush with the finished level allowing for settling of the topsoil after planting and settlement.
- The entire root ball shall be covered with growing medium.
- The growing medium shall be placed in layers around the roots or ball, preferably by hand. Each layer shall be firmed to eliminate air void and ensure good soil contact with the roots.
- Trees requiring staking shall have support stakes placed carefully between the roots before backfilling.
- A final backfill layer shall be applied to form a saucer-like berm around the circumference of the planting hole in order to catch and hold rainwater
- Once planting and mulching is complete, the Site shall be cleaned of all excess soil, rock and debris.

8.8 Planting Procedures

General procedures for planting:

- Grass seed will be placed after the movement of fill. Additional seeding may be required in the following years to reduce noxious weeds.
- Each plant hole will be approximately twice the size of the plant's root-ball and deep enough to make a depression or "well" at the base of each plant (Figure 8).

- The holes will be deep enough to allow all root material to be covered but not too deep as to cause branches to be buried.
- Container sizes will range from 4.5 inches to 1 gallon.
- It is best to perform planting in the early spring or late fall.

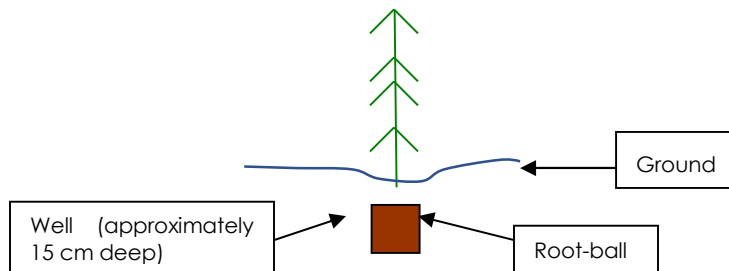


Figure 8. Picture of planted tree with well to catch moisture.

8.9 Additional Environmental Considerations

- Protect large old trees and snags which provide important wildlife habitat.
- Control invasive species by managing human and vehicular access. Invasives should be removed from the Property and properly disposed of to prevent spread to other areas of the Property.
- Revegetate exposed soils following land alteration to prevent erosion and noxious weed infestation including the replacement of native bunchgrass and wildflowers.
- Timing of development should consider and avoid times of year when critical wildlife activities occur (e.g., bird breeding and nesting) to protect bird nesting habitat as per the *Migratory Bird Convention Act*, the *Migratory Birds Regulations*, and the *BC Wildlife Act*. If this cannot be avoided, a breeding bird nest field survey will be necessary prior to commencement of tree removal activities proposed to occur within the bird breeding and nesting period for the region (April 1 to August 15) (ECCC, 2021).
- If land disturbance is planned during the active period for reptiles (April to September), a reptile sweep is recommended prior to disturbance.
- Retain as much existing vegetation as possible by implementing the following measures during construction:
 - Minimize clearing of vegetation for equipment access and storage wherever possible;
 - Minimize the quantities and duration of on-site material (e.g., soil and aggregate stockpiling) and limit to previously disturbed areas;
 - Physically mark the boundaries of construction to ensure vegetated areas are not unnecessarily cleared; and

- Washing or disposal of sediment including from equipment into local drainages, ditches, catch basins, storm sewers, etc. will not be permitted.

9.0 Conclusion

The Property at Lot 4, Lakeshore Road in Kelowna, BC is classified as a variety of SEIs including Coniferous Woodland, Sparsely Vegetated, and Grassland and OEI of Mature Forest. Based on the review of background information and the preliminary site visit the SEI classifications correctly identify the ecosystems present at the site. Large, intact areas of the lot should remain undisturbed and in the natural condition. The entire lot is approximately 17,507 m² in size. The ESA-2 area proposed for development east of the gully is approximately 4,500 m². There is approximately 4,200 m² of land associated with the ESA-2 portion of the Property west of the gully which will remain undeveloped. The remaining ESA-1s (approximately 8,500 m² including the setbacks of Okanagan Lake and the unnamed gully and the corridor habitat west of the unnamed gully). If the low-impact development procedures are followed and the previously discussed mitigation measures are implemented and the ESA-1 areas are protected from development, the impacts of any proposed development at the site can be expected to be minimized and mitigated.