



## Technical Memorandum

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**Date:** September 15, 2021  
**To:** Paul Deutsch  
**From:** Mary Ann Olson-Russello, M.Sc., R.P.Bio and Leanne McDonald, B.Sc., P.Ag., B.I.T.  
**File:** 21-3900  
**Subject:** Summary of Environmental Survey and Associated Findings and Recommendations for the Proposed Okanagan Adventure Park Development in RDNO, BC.

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### 1.0 INTRODUCTION

Ecoscape Environmental Consultants Ltd. (Ecoscape) was retained by Paul Deutsch (client) to complete a site inventory / environmental survey for the proposed Okanagan Adventure Park located on the west side of Highway 97 just north of the mine across from Kalamalka Lake in the Regional District of North Okanagan (RDNO; project area). The project area is legally described as Part N ½ Section 36, Township 14, Osoyoos Division of Yale Land District, Except Plan B826 37599 H823 (PID – 013-561-235). The proposed Okanagan Adventure Park design is currently comprised of a gondola, ziplines, mountain bike and hiking trails, a concession area / restaurant, a light show area and associated access road and parking development (**Figure 1; Appendix A**). The purpose of the environmental survey was to update the terrestrial ecosystem mapping (TEM) to reflect current conditions and collect biological/habitat information such as significant ecological features (i.e., overwintering dens, water features, wildlife trees, etc.) to inform the environmental sensitivity analysis (ESA). The project area is currently zoned as Large Holdings (LH) as per the Regional District of North Okanagan (RDNO) Zoning Bylaw (Bylaw No. 1888, 2003) and is partially within the Agricultural Land Reserve (ALR).

This memo has been prepared to inform the client of the existing conditions within the project area, including high value habitats/features to aid the client in making informed decisions regarding the permitting and design of the proposed Okanagan Adventure Park to minimize environmental impacts.

### 2.0 INFORMATION SOURCES

The following databases were queried to find relevant information on the project area and surrounding lands:

- BC Conservation Data Centre (CDC, 2021);
- BC Habitat Wizard (MFLNRORD, 2021);
- Terrestrial Ecosystem Mapping (Iverson and Uunila, 2005); and,
- Species at Risk Act Public Registry.

### 3.0 ENVIRONMENTAL VALUES

Site visits were conducted on August 18, and August 25 – 26, 2021 by Mary Ann Olson-Russello, M.Sc., R.P.Bio and Leanne McDonald, B.Sc., P.Ag., B.I.T.; Natural Resource Biologists with Ecoscape. The proposed Okanagan Adventure Park occurs within primarily open coniferous forest and bunchgrass ecosystems, some of which have been disturbed by logging and livestock grazing. In addition, there are several moisture receiving areas/ephemeral creek corridors and rock outcrops throughout the project area.

The project area occurs within the Okanagan variant Very Dry Hot subzone of the Interior Douglas-fir biogeoclimatic zone (IDF<sub>xh1</sub>). The IDF<sub>xh1</sub> is the driest variant of the Interior Douglas-fir zone and is characterized by a long growing season with warm dry summers, but the region commonly experiences summer moisture deficits. The subzone occupies the lower elevations of the southern Okanagan valley, Similkameen valley, along the Thompson River from northeast of Kamloops west to the Fraser River valley and its tributaries in the Lytton-Lillooet region. Winters are cool with low to moderate snowfall. The IDF<sub>xh1</sub> is dominated by mixed open forests of Douglas-fir and Ponderosa pine with an understory typically comprised of pinegrass, red-stemmed feathermoss, and birch-leaved spirea (Hope et al., 1991).

#### 3.1 Terrestrial Ecosystem Communities

The existing terrestrial ecosystem mapping (TEM) from the Sensitive Ecosystem Inventory (SEI) for Coldstream Vernon (Iverson and Uunila, 2008) was adjusted and classification changes were made to more accurately describe the ecosystem polygons at a finer spatial scale based upon the field inventory and professional judgment. With the existing TEM as a baseline, the polygons covering the project area were ground-truthed to verify the accuracy of the ecological classification and updated to document current site conditions and ecological features. The refined TEM polygons are provided in **Figure 1**. Site photos are provided in **Appendix B**. The project area is overlain by 121 polygons corresponding to 16 ecosystems as described in **Table 1**.

**TABLE 1. Ecosystem communities occurring within the project area.**

Ecosystem Code	Polygon	Site Series	Site Series Name	Provincial Status
AS	17, 23	98	Trembling aspen – Snowberry – Kentucky Bluegrass	Red
CL	119	-	Cliff	-
DP	5, 9, 13, 15, 21, 23, 24, 38, 42, 43, 45, 58, 62, 66, 139, 174, 176, 178, 275, 308, 328, 336, 338	01	Interior Douglas-fir / Ponderosa pine – Pinegrass	Blue
DS	5, 9, 13, 15, 42, 43, 66, 81, 84, 139, 174, 176, 183, 294, 322, 335, 337, 338	07	Interior Douglas-fir / Ponderosa pine – Common Snowberry – Spirea	Blue
DW	2, 6, 18, 21, 22, 24, 28, 29, 37, 39, 40, 41, 44, 46, 55, 62, 84, 129, 156, 165, 178, 256, 275, 289, 305, 325, 326, 327, 328, 329, 330, 331	03	Interior Douglas-fir / Ponderosa pine – Bluebunch wheatgrass – Pinegrass	Blue
ES	83, 116	-	Exposed Soil	
FW	1, 4, 10, 11, 14, 21, 22, 25, 34, 39, 40, 41, 47, 59, 62, 135, 156, 165, 256, 289, 305, 325, 329, 338	91	Idaho fescue – Bluebunch wheatgrass	Blue
PB	5, 10, 18, 37, 41, 55, 116, 275, 330, 331	02	Interior Douglas-fir / Ponderosa pine – Bluebunch wheatgrass – Balsamroot	Blue
RZ	83	-	Road Surface	-
SA	4	00	Antelope brush - Selaginella	Red
SB	1, 40	00	Selaginella – Bluebunch wheatgrass rock outcrop	-
SD	9, 13, 81, 183, 293, 294, 335	08	White x Engelmann spruce / Interior-Douglas-fir – Douglas maple - Dogwood	Red
SO	4, 29	00	Saskatoon – Mock orange talus	-
SP	11, 22, 23, 38, 44, 45, 141, 308, 322, 336	04	Interior Douglas-fir / Ponderosa pine – Snowbrush - Pinegrass	Blue
TA	119	-	Talus	-
WB	28, 34, 37, 46, 55, 96, 10, 12, 51, 59, 116, 129, 131, 256, 326, 327, 328, 330, 331	93	Bluebunch wheatgrass – Balsamroot	Blue

**RED:** Ecological communities that are Extirpated, Endangered, or Threatened in British Columbia.

**BLUE:** Ecological communities that are considered to be of Special Concern in British Columbia.

**YELLOW:** Species and ecological communities that are apparently secure and not at risk of extinction.

**NA (NO STATUS):** Ecological communities that have not been ranked.

### 3.2 Species and Ecosystems at Risk

The BC Conservation Data Centre (CDC) was accessed and reviewed for at-risk ecological communities, species-at-risk, wildlife species inventory (WSI) and critical habitat occurrences that occur within a 1.0 km radius of the project area. At-risk ecological communities are provided in **Table 2**, species-at risk occurrences are provided in **Table 3**, and critical habitat occurrences are included in **Table 4**.

**TABLE 2.** CDC listed at-risk ecological community occurrences within 1 km of the project area (CDC, 2021).

Common Name	Scientific Name	BC List <sup>1</sup>	Occurrence ID	Distance
Hard-stemmed Bulrush Deep Marsh	<i>Schoenoplectus acutus</i> Deep Marsh	Blue	12500	Approximately 300 m east of the project area.
Trembling Aspen / Common Snowberry / Kentucky Bluegrass	<i>Populus tremuloides</i> / <i>Symphoricarpos albus</i> / <i>Poa pratensis</i>	Red	11010	Within the project area and within the property to the north.

<sup>1</sup> **Yellow:** Not considered at risk. **Blue:** Of special concern. **Red:** Endangered or threatened. **Variou:** May be one of multiple potential listings, depending upon more detailed taxonomic classification.

**TABLE 3.** CDC listed at-risk species occurrences within 1 km of the project area (CDC, 2021).

Common Name	Scientific Name	BC List <sup>1</sup>	SARA Schedule 1 <sup>2</sup>	Occurrence ID	Distance	Critical Habitat
American Badger, <i>jeffersonii</i> subspecies	<i>Taxidea taxus jeffersonii</i>	Red	Endangered	10214	Record overlays the project area.	Non-forested grassland and shrubland ecosystems, however their range is between 16 to 64 km <sup>2</sup> and can therefore migrate through a range of habitats <sup>3</sup>

<sup>1</sup> **Yellow:** Not considered at risk. **Blue:** Of special concern. **Red:** Endangered or threatened.

<sup>2</sup> **NAR = Not at Risk:** A wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances. **SC = Special Concern:** A wildlife species that may become threatened or endangered because of a combination of biological characteristics and identified threats. **E = Endangered:** A wildlife species facing imminent extirpation or extinction. **T = Threatened:** A wildlife species that is likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction. **DD = Data Deficient:** A category that applies when the available information is insufficient (a) to resolve a wildlife species' eligibility for assessment or (b) to permit an assessment of the wildlife species' risk of extinction.

<sup>3</sup> COSEWIC, 2012.

**TABLE 4.** CDC critical habitat occurrences within 1 km of the project area (CDC, 2021).

Common Name	Scientific Name	BC List <sup>1</sup>	SARA Schedule 1 <sup>2</sup>	Critical Habitat ID	Critical Habitat Status	Distance	Critical Habitat
Great Basin Gopher Snake, <i>deserticola</i> subspecies	<i>Pituophis catenifer deserticola</i>	Blue	Threatened	71526	Final	10 km grid square overlapping the project area.	Rock outcrops, talus slopes, shrub-steppe, grassland, riparian, and open Ponderosa pine and Douglas fir forests <sup>3</sup>
Western Rattlesnake	<i>Crotalus oregonus</i>	Blue	Threatened	71767	Final	10 km grid square overlapping the project area.	Rock outcrops, talus slopes, shrub-steppe, grassland, riparian, and open Ponderosa pine and Douglas fir forests <sup>3</sup>

<sup>1</sup> **Yellow:** Not considered at risk. **Blue:** Of special concern. **Red:** Endangered or threatened; <sup>2</sup>**NAR = Not at Risk:** A wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances. **SC = Special Concern:** A wildlife species that may become threatened or endangered because of a combination of biological characteristics and identified threats. **E = Endangered:** A wildlife species facing imminent extirpation or extinction. **T = Threatened:** A wildlife species that is likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction. **DD = Data Deficient:** A category that applies when the available information is insufficient (a) to resolve a wildlife species' eligibility for assessment or (b) to permit an assessment of the wildlife species' risk of extinction.

<sup>3</sup> Environment and Climate Change Canada, 2019;

### 3.3 Important Habitat Features

Important habitat features have been identified within the project area. These features support wildlife and are important to the long-term preservation of local wildlife communities and populations. It is not typically possible to determine whether features are deemed Critical or to determine the specific influence they may have on populations without large scale assessments. As a result, we have identified important features for reference, but because of data limitations, do not provide comment on possible cumulative impacts associated with them.

- Mature and veteran native trees within the project area function as wildlife trees. The trees with blown out tops and cavities, as well as dead snags provide important habitat for a variety of wildlife and bird species and should be retained where possible. The northern portion of Polygon 41 adjacent to the proposed western gondola base was primarily comprised of mature trees and some wildlife trees (**Photo 1 and 2**) and a variety of avian cavity nesters were noted as utilizing this area. In addition, the Black Cottonwoods

associated with the potentially wet ecosystems within Polygon 9 and Polygon 322 displayed in **Figure 1** were also valuable wildlife trees (**Photo 3-5, 27**). A variety of native cavity nesters were observed during the site visits (Northern Flicker, nuthatches, Black-capped Chickadees) and it is likely that they are using wildlife trees for nesting and winter shelter.

- Multiple moisture receiving areas were observed throughout the project area and generally corresponded to mapped streams (“potentially wet ecosystems” displayed in **Figure 1; Photos 3-7, 27**). Ephemeral ecosystems, such as these, provide important corridors for wildlife movement, maintain high biodiversity and provide essential cover, a source of water, and can also provide important drainage during large storm events and/or freshet. The extent and size of these moisture receiving areas was difficult to determine given the timing of the survey and due to the extreme drought conditions, that occurred throughout the Okanagan valley during the summer of 2021.
- Several locations within the project area exhibited rock outcrops and/or shallow soils with pockets of exposed bedrock. These areas were generally mapped as PB (Douglas-fir/Ponderosa pine – Bluebunch wheatgrass - Balsamroot) as seen in **Figure 1**. Rock outcrops such as these provide valuable, obligate habitat for a variety of species, particularly herptiles. The southeast corner of the proposed gondola along the eastern property boundary was occupied by ideal rock outcrop habitat (**Photos 8-12**), and a BC blue-listed Western skink (*Plestiodon skiltonianus*) was observed in this area.

### 3.4 Aquatic Conditions

A search of the BC Habitat Wizard Interactive map revealed that there are three (3) unnamed watercourses mapped throughout the project area (**Figure 1**). The stream mapped from the northeast to the southwest of the project area is described as a 2<sup>nd</sup> order stream that is approximately 1.79 km in total length. The other stream generally runs south from the northeast of the project area and is described as a 1<sup>st</sup> order stream that is approximately 2.29 km in total length. The final stream runs approximately through the center of the project area north to south. No streams were described as supporting any fish species (MFLNRORD, 2021).

The unnamed watercourse alignments generally corresponded to the “potentially wet ecosystems” displayed in **Figure 1**. However, no surface flow or visible high-water mark was observed during the site visits. It should be noted that the site visits were conducted during a period of immense drought and as such, it is not possible to confirm whether these ecosystems would be considered ephemeral streams, wetlands and/or just moisture receiving ecosystems. Additional assessments during a more optimal time of year (i.e., spring) would be needed to fully assess the extent and locations of these alignments and determine whether they would be considered ephemeral streams, wetlands and/or moisture receiving ecosystems.

The ecosystems mapped as SD (Hybrid white spruce/Douglas-fir – Douglas maples – Dogwood ecosystem) were the wettest ecosystems observed within the project area as these ecosystems are defined as experiencing intermittent or permanent streams or subsurface water flow. The SD ecosystems observed within the project area were generally more characteristic of a wetland feature compared to that of a stream. Whereas ecosystems mapped as DS (Interior Douglas-fir/ Ponderosa pine – Snowberry – Spirea) were considered ecosystems that receive some moisture, but were not as wet as an SD ecosystem. The stream mapped as running south through the center of the project area was the most modified by logging and/or livestock grazing and was only found to be a moisture receiving ecosystem partially on the downstream side of the existing road through the project area (Polygon 322). None of the mapped watercourses on the property appeared to connect to Kalamalka Lake as there are permanent obstructions to flow at the access road to the mine along the southern property boundary (**Photos 13 and 14**).

#### 4.0 RELEVANT LEGISLATION AND BEST MANAGEMENT PRACTICES

The following lists the range of regulatory authorities and relevant legislation that may pertain to the proposed development:

Federal:

- *Migratory Birds Convention Act*; and,
- *Species at Risk Act*.

Provincial:

- *Water Sustainability Act*;
- *Weed Control Act*;
- *Heritage Conservation Act*;
- *Riparian Areas Protection Regulation*;
- *Wildlife Act*; and,
- *Engineers and Geoscientists Act*.

Regional and Municipal:

- Local Government Act; and,
- Official Community Plans and associated Development Permit Areas' Requirements.

Best Management Practices (BMPs) must be adhered to throughout construction to mitigate the risk associated with the proposed project. The most relevant BMPs that should be adhered to during the development include:

- [Develop with Care Environmental Guidelines for Urban and Rural Land Development](#)
- [Best Management Practices for Amphibian and Reptile Salvages in British Columbia](#)
- [Guidelines for Amphibian and Reptile Conservation during Urban and Rural Land Development in British Columbia](#)
- [Guidelines for Raptor Conservation during Urban and Rural Land Development in British Columbia](#)
- [Standards and Best Management Practices for Instream Works](#)

According to the legislation and best management practices listed above, the following describes the most applicable legislation to the proposed development and any associated permitting requirements.

#### ***Migratory Birds Convention Act and the Wildlife Act***

- Section 6 of the Federal Migratory Birds Convention Regulation protects both the nests and eggs of migratory birds. Section 34 of the Provincial *Wildlife Act* protects all birds and their eggs, and Section 34(c) protects their nests while they are occupied by a bird or egg. The project area falls within the Northern Okanagan Basin ecodistrict. The avian nesting period for all birds within this ecodistrict is **February 18th to September 12th** (Birds Canada, 2020);
- If vegetation clearing activities are required during the identified avian nesting period, pre-clearing nesting surveys may be required by an Environmental Monitor (EM) to identify active nests;
- If active nests are found within the clearing limits, a buffer will be established around the nest until such time that the EM can determine that nest has become inactive. The size of the buffer will depend on the species and nature of the surrounding habitat. Buffer sizes will generally follow provincial BMP guidelines or other accepted protocol (e.g., Environment Canada). In general, a minimum 20 m buffer will be established around songbird nests or other non-sensitive (i.e., not at risk) species;
- Clearing and other construction activities must be conducted within 72 hours following the completion of the pre-clearing nesting surveys. If works are not conducted in that time, the nesting surveys are considered to have expired and a follow-up survey will be completed to ensure that no new nests have been constructed; and,
- The nests of Bald Eagle, Golden Eagle, Peregrine falcon, Gyrfalcon, Osprey and Burrowing Owl are protected year-round whether they are active or not as per Section 34(b) of the *Wildlife Act*. Best management practices relating to raptors and their nests can be found in *Guidelines for Raptor Conservation during Urban and Rural Land Development in BC (2013)*.



### **Water Sustainability Act**

The potentially wet ephemeral ecosystems may be considered a “stream” under the *Water Sustainability Act* (WSA). As per the WSA: “stream” means

- (a) a natural watercourse, including a natural glacier course, or a natural body of water, whether or not the stream channel of the stream has been modified, or
- (b) a natural source of water supply, including, without limitation, a lake, pond, river, creek, spring, ravine, gulch, wetland or glacier, whether or not usually containing water, including ice, but does not include an aquifer.

Confirmation of the applicability of WSA would require dialogue with the Province, as they have jurisdictional authority over applicability. If the Province considers these ecosystems *streams*, a *Water Sustainability Act* Section 11 applications for a Change Approval will be required for any culvert installations/replacements, bridges, boardwalks and/or trail crossings over the mapped streams/potentially wet ecosystems. Dialogue with the Ministry of Forest’s, Lands, and Natural Resource Operations and Rural Development (MFLNRORD) will occur to confirm exact requirements for the works and whether a Section 11 will be required for work over these ecosystems. A change approval is written authorization to make complex changes in and about a stream. A notification is used for specified low risk changes in and about a stream that have minimal impact on the environment or third parties; it is suspected that if these areas are considered “streams” under the Act, a Notification would be required. Detailed conceptual designs prepared by a qualified Engineering Contractor (Professional Engineer (P.Eng.) registered with Engineers and Geoscientist of BC ) will likely be required, and an Environmental Management Plan with an Environmental Impact Statement prepared by a Qualified Environmental Professional must accompany the Section 11 applications.

### **Riparian Areas Protection Regulation**

As per the Riparian Areas Protection Regulation (RAPR):

#### ***Application to developments***

*3 (1) Subject to this section, this regulation applies in relation to a development if*

- (a) the development is a residential, commercial or industrial development,*
- (b) the development is proposed to occur in a riparian assessment area of a stream that provides fish habitat to protected fish, and*
- (c) a local government has the power under Part 14 [Planning and Land Use Management] of the Local Government Act to regulate, prohibit or impose requirements in relation to the development.*

***“stream” means***

- (a) a watercourse or body of water, whether or not usually containing water, and
- (b) any of the following that is connected by surface flow to a watercourse or body of water referred to in paragraph (a):
  - (i) a ditch, whether or not usually containing water;
  - (ii) a spring, whether or not usually containing water; and,
  - (iii) a wetland.

The mapped streams throughout the project area did not exhibit surface flow at the time of the site assessment and largely did not have a defined channel or visible High-Water Mark (HWM). Ecosystems mapped as SD were observed to be minimally wetted; however, considering no surface flow was observed these areas are likely a low-lying area that experiences groundwater seepage and/or seasonal surface flow. The lack of a visible HWM indicates that water does not flow through the mapped streams regularly (i.e., a 1:5-year return period). For this reason, the mapped streams do not fall under the definition of a watercourse or body of water. Additionally, all of the mapped streams were permanently obstructed downstream at the access road to the mine and consequently were not connected by surface flow to a feature considered a watercourse or waterbody such as Okanagan Lake (**Photos 13 and 14**). Therefore, these potentially wet ecosystems likely could not provide habitat to protected fish. For these reasons, it is likely that the RAPR does not apply to the mapped streams and that no riparian setbacks associated with them are required under this regulation.

### **Weed Control Act**

Multiple plant species within the project area are designated as regionally noxious weeds. There is a duty to control noxious weeds under the BC *Weed Control Act*. As per Section 2 of the Act, “*In accordance with the regulations, an occupier must control noxious weeds growing or located on land and premises, and on any other property located on land and premises, occupied by that person.*” Consequently, these species should be given highest priority for management. A comprehensive list of plants designated as noxious weeds, both regionally and throughout BC, can be seen in Schedule A of the BC *Weed Control Regulation*.

## **5.0 DESIGN AND CONSTRUCTION RECOMMENDATIONS**

There are a variety of environmental constraints to the proposed development due to high value habitats and features throughout the project area that should be retained and protected. As described in Section 3.0, mature vegetation (i.e., large diameter at breast-height trees), rock outcrops, and moisture receiving/ephemeral stream/wetland ecosystems should all be retained and protected where possible. This is particularly true in areas where gondola bases and high levels of activity are proposed. The current proposed location of the western most gondola base is

partially overlain by valuable rock outcrops and mature forest (**Photos 1, 2 and 8-12**). The location of the southwest mid-slope gondola base is primarily situated within a young to sapling aged coniferous stand (**Photos 17-20**) and the location of the southeast gondola base is primarily a young coniferous stand (**Photos 21 and 22**). Similarly, the zipline base located within Polygon 322 was primarily comprised of disturbed grassland and young coniferous forest (**Photos 23-25**). General design and construction recommendations are as follows:

- The concept design shows access infrastructure (i.e., a new roadway) that would connect the lower access road with the dirt road that extends across the project area. As currently drawn, the new road parallels an unknown stream (Polygon 9). This road alignment and location should be redesigned to largely avoid the potentially wet ecosystem (**Figure 1**). Impacts of a road in the current location include the loss and thinning of wildlife trees, the loss of riparian habitat and the need for substantial fill placement to achieve a road design that would not experience periodic flooding. It is possible that the substantial fill placement would trigger a Change Approval versus a Notification Application under the *Water Sustainability Act*;
- Hiking and mountain bike trails that are proposed within potentially wet ecosystems should be constructed using elevated boardwalks, bridges or other infrastructure to prevent destruction of the habitat, especially when wet. Ideally, trails are designed as narrow alignments (< 1 m width) with perpendicular crossings of creeks and/or riparian corridors to minimize environmental impacts;
  - Trail grades should also be carefully considered to ensure that constructed trails do not promote erosion or downcutting during wet conditions. Steeper trail alignments should also not occur upslope of watercourses.
- The Trembling Aspen / Common Snowberry / Kentucky Bluegrass ecosystem mapped as 20% of Polygon 23 in **Figure 1** is a BC red-listed ecosystem (**Photo 26**), meaning it is either extirpated, endangered or threatened in the province. The proposed parking lot should avoid this ecosystem and should be constructed as close to the existing road as possible to minimize disturbance to this rare and at-risk ecosystem. It is recommended that an additional site assessment be completed to assess the best location for the parking lot to minimize environmental impacts to the project area and preserve rare and at-risk ecosystems and habitat features;
- Clearing and grubbing limits must be clearly marked in the field prior to construction and minimized wherever possible. Unnecessary impacts to native vegetation and soils must be avoided at all times. Important wildlife habitat, including veteran trees, snags, and other features should be identified and avoided. The draft trail alignments, once complete, should be walked, and re-aligned where necessary, to retain important environmental features;

- Every effort to maintain and protect mature vegetation should be made, especially trees with cavities, dead snags and blown-out tops (i.e., Black Cottonwood, Interior Douglas-fir).
- Following the completion and determination of a final concept design, a habitat restoration plan should be prepared to offset any disturbances to natural areas and enhance the environmental values within the project area. At a minimum, hydroseeding and/or broadcast seeding of cut and fill slopes must be conducted to prevent erosion and invasive species establishment;
- For any road or trail realignments/improvements, herptile crossing requirements should be incorporated into the associated culvert design. Further details on species specific crossing and fencing requirements are provided in the Guidelines for Amphibian and Reptile Conservation During Road Building and Management Activities in British Columbia (BC Ministry of Environment and Climate Change Strategy, 2020); and,
- The proposed light show should avoid being constructed in an area with mature forest. Species such as owls and bats rely on darkness to hunt at night and this could significantly interfere with their ability to forage. By constructing this park feature in an area with minimal vegetation that is comprised of primarily young to sapling aged trees, this impact can largely be mitigated. Ecoscape understands the light show is primarily planned within Polygon 37 which is coded as young coniferous forest.

## 6.0 OPERATIONAL RECOMMENDATIONS

Upon completion of proposed Okanagan Adventure Park, the following operational measures are recommended to protect and enhance the high value habitats and features within the project area for the variety of species, including species at-risk that occupy the project area:

- Continual hiking and biking trails maintenance and delineation should be conducted to ensure that disturbance is limited to these areas and to prevent park visitors from creating auxiliary trails;
- Invasive species management will be necessary to prevent the spread of invasive species throughout the project area, particularly to relatively undisturbed areas. Identification of existing weed populations and prevention of spread is the most efficient form of weed management. Ecosystems coded with kc and/or wk in **Figure 1** were found to have weedy seral associations.

Some invasive plant species are annuals – meaning they only live for one year and die off over the winter. The seeds they drop are required to maintain the population into the next year. In a population of annual species, mowing, string-trimming, and other mechanical means may be used to cut the plants above the roots. Alternatively, some invasive plant species are biennials – meaning they live for two years and die off before their third. Their

first year is often focused on growth and does not produce seeds. During this time, it can often be recognized as a flat, radial growth of leaves called a “rosette”. Because of this low growth habit, rosettes must be removed by hand and cannot be mowed or string-trimmed. In their second year they typically grow a tall stock which produces flowers and then seeds. In this second year, the plant can be removed mechanically as normal, or, in some species, only the seed stalk can be cut, leaving the rest of the plant in the ground. Finally, some invasive plant species are perennials – meaning they live for multiple years. In this case, the entire plant must be removed or it will continue to produce and drop seeds and continue to increase the size of the population. Therefore, mowing and string-trimming will be ineffective at removing the population. Regardless of whether an invasive plant is an annual, biennial or perennial, some species, such as Canada thistle (*Cirsium arvense*) or Curled dock (*Rumex crispus*), have specific management requirements, which can be communicated by the environmental monitor once these species have been identified.

Weed infestations were most predominant along the existing roadsides and as such, a detailed invasive species management plan should be developed for the park to prevent any further establishment or spread.

## 7.0 CONCLUSION

This report has been prepared for the exclusive use of Paul Deutsch. The purpose of the memo was to provide a summary of the existing conditions at the project area, including high value habitats/features to aid the client in making informed decisions regarding the permitting and design of the proposed Okanagan Adventure Park. Ecoscape has prepared this memo with the understanding that all available information on the present and proposed condition of the site has been disclosed. The client has acknowledged that in order for Ecoscape to properly provide its professional service, Ecoscape is relying upon full disclosure and accuracy of this information.

## 8.0 CLOSURE

If you have any questions or comments, please contact the undersigned at your convenience.

Respectfully Submitted,

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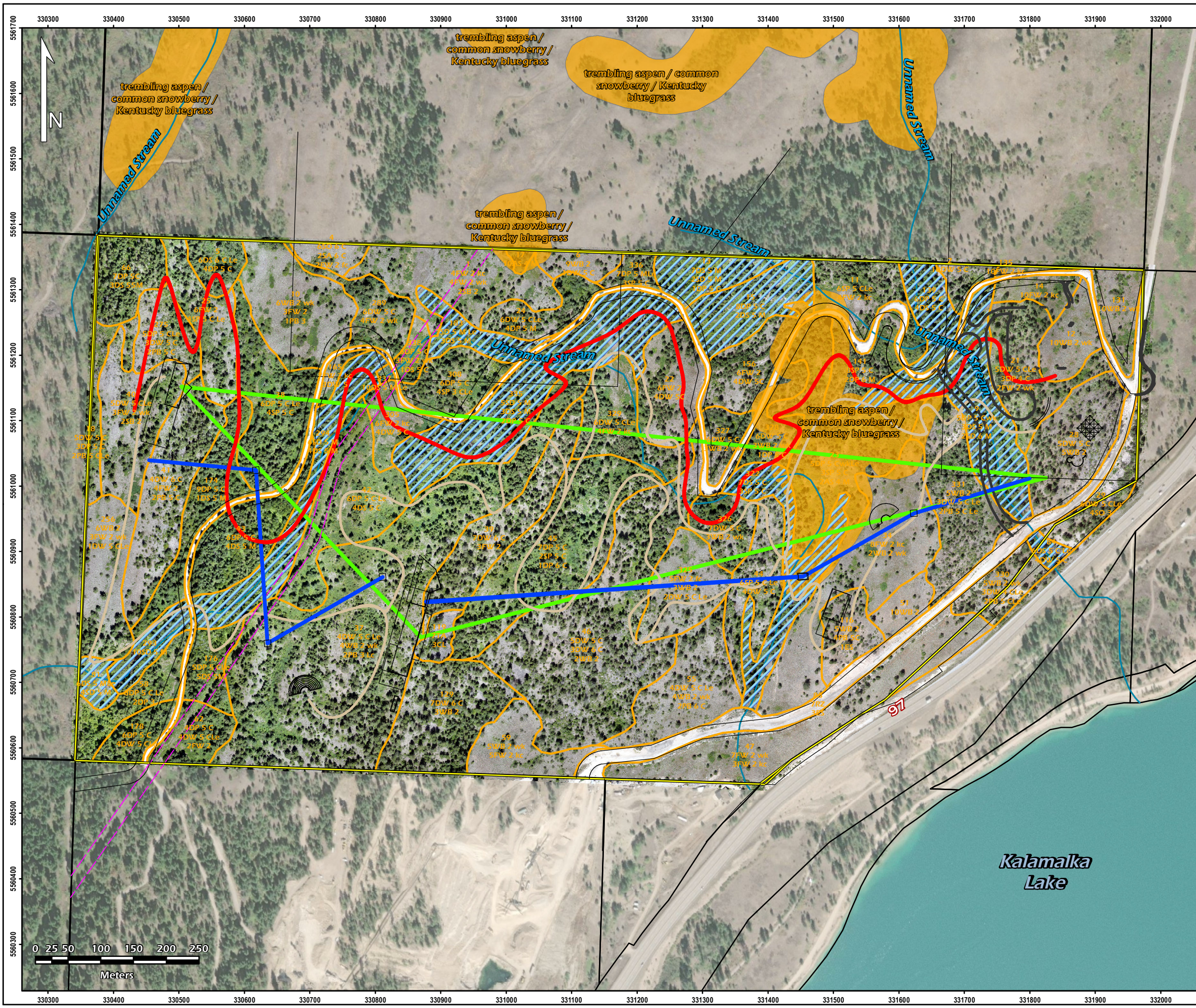
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## 9.0 REFERENCES

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# FIGURES



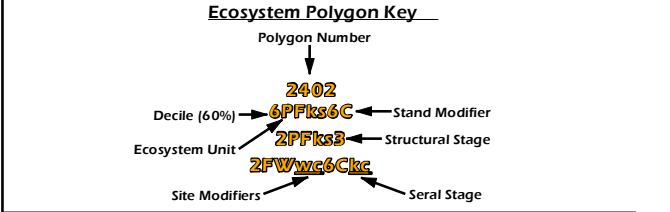


**FIGURE 1**  
**Ecosystem Overview**

Project: Environmental Assessment  
 Location: City of Vernon/RDNO  
 Project No.: 21-3900  
 Prepared for: Paul Deutsch  
 Prepared by: Dan Austin, GIS Specialist  
 Ecoscape Environmental Consultants Ltd.

Coordinate System: NAD83-UTM Zone 11  
 Imagery: ESRI World Imagery  
 Field Visit: August 25 & 26, 2021  
 Map Date: September 2, 2021

- LEGEND**
- Streams
  - Proposed Gondola
  - Proposed Paths
  - Proposed Zipline
  - Proposed Acces Infrastructure
  - Proposed Mountain Bike
  - Design Detail
  - Property Boundary
  - Easement
  - Ecosystem Polygons
  - Potentially Wet Ecosystems
  - Okanagan Critical Habitat
  - BC Conservation Data Center (CDC) Polygons\*
  - Subject Property
  - Cadastre

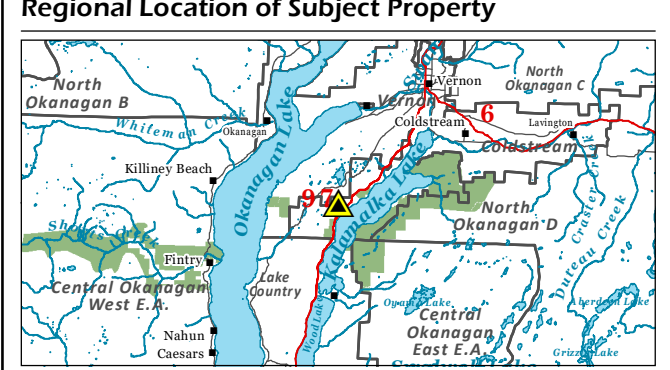


\*A large Okanagan Critical Habitat polygon covers the entire map and subject property area representing the following wildlife species but is not shown on this figure:

- Western Rattlesnake (*Crotalus oregonus*)
- Desert Nightsnake (*Hypsiglena chlorophaea*)
- Great Basin Gophersnake (*Pituophis catenifer desertyicola*)

Large Conservation Data Centre (CDC) polygons include:

- American Badger (*Taxidea taxus*)



**DISCLAIMER**  
 The data displayed is for conceptual purposes only and should not be interpreted as a legal survey or for legal purposes. If discrepancies are found between the data portrayed in this report and that of a legal survey, the legal survey will supersede any data presented herein.

# **APPENDIX A – Okanagan Adventure Park Preliminary Concepts**

## APPENDIX B – Site Photos



**Photo 1.** View of wildlife tree (blown out top Douglas-fir) at the proposed western gondola base location (Photo taken August 25, 2021).



**Photo 2.** View of mature vegetation at the proposed western gondola base location (Photo taken August 25, 2021).



**Photo 3.** View of wildlife trees (Black Cottonwood) located within Polygon 9 along the proposed road realignment (Photo taken August 25, 2021).



**Photo 4.** View of wildlife trees (Black Cottonwoods) located within Polygon 9 along the proposed road realignment (Photo taken August 26, 2021).



**Photo 5.** View of wildlife trees (Black Cottonwoods) located within Polygon 293 (Photo taken August 25, 2021).



**Photo 6.** View looking at SD ecosystem within Polygon 293 (Photo taken August 25, 2021).



**Photo 7.** View looking at DS ecosystems within Polygon 43 (Photo taken August 25, 2021).



**Photo 8.** View of rock outcrops situated within Polygon 41 where the proposed gondola base would be situated along the western property boundary (Photo taken August 25, 2021).



**Photo 9.** View of rock outcrops situated within Polygon 41 where the proposed gondola base would be situated along the western property boundary (Photo taken August 25, 2021).



**Photo 10.** View of rock outcrops situated within Polygon 41 where the proposed gondola base would be situated along the western property boundary (Photo taken August 25, 2021).





**Photo 11.** View of rock outcrops situated within Polygon 41 where the proposed gondola base would be situated along the western property boundary and approximately where the Western skink was observed (Photo taken August 25, 2021).



**Photo 12.** View of rock outcrops situated within Polygon 41 where the proposed gondola base would be situated along the western property boundary (Photo taken August 25, 2021).



**Photo 13.** View of permanent obstruction on the downstream side of Polygon 322 (Photo taken August 26, 2021).



**Photo 14.** View of permanent obstruction on the downstream side of Polygon 9, photo taken within Polygon 84 (Photo taken August 26, 2021).



**Photo 15.** View of invasive plant populations along the road side within Polygon 47 (Photo taken August 26, 2021).



**Photo 16.** View of invasive plant populations along the road side within Polygon 11 (Photo taken August 26, 2021).



**Photo 17.** View of southern portion of the proposed southwest gondola location within Polygon 37 (Photo taken August 25, 2021).



**Photo 18.** View of southern portion of the proposed southwest gondola location within Polygon 37 (Photo taken August 25, 2021).



**Photo 19.** View of southern portion of the proposed southwest gondola location within Polygon 37 (Photo taken August 25, 2021).



**Photo 20.** View of southern portion of the proposed southwest gondola location within Polygon 37 (Photo taken August 25, 2021).



**Photo 21.** View of the proposed southeast gondola location within Polygon 116 (Photo taken August 26, 2021).



**Photo 22.** View of the proposed southeast gondola location within Polygon 116 (Photo taken August 26, 2021).



**Photo 23.** View of the proposed zip line location within Polygon 322 (Photo taken August 26, 2021).



**Photo 24.** View of the proposed zip line location within Polygon 322 (Photo taken August 26, 2021).



**Photo 25.** View of the proposed zip line location within Polygon 322 (Photo taken August 26, 2021).



**Photo 26.** View of the red-listed Trembling Aspen / Common Snowberry / Kentucky Bluegrass sapling aged ecosystem within Polygon 23 (Photo taken August 26, 2021).





**Photo 27.** View of wildlife tree (Black Cottonwood) located within Polygon 322 adjacent to the proposed zipline base (Photo taken August 26, 2021).