

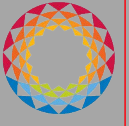


ATTACHMENT

A

This forms part of application

A23-0001



City of
Kelowna
DEVELOPMENT PLANNING

Planner
Initials

CD

Black Mountain Irrigation District

FILL PLACEMENT (WATER TREATMENT SLUDGE)

Dried Sludge Fill Assessment



This report is prepared for the sole use of Black Mountain Irrigation District. No representations are made by Northland Environmental Ltd. or its employees to any party with whom Northland Environmental Ltd. does not have a contract. Copyright 2021.



May 5, 2021

File: 0019.0011.01

Black Mountain Irrigation District
285 Gray Road,
Kelowna, BC V1X 1W8

VIA EMAIL: bvig@bmid.ca

Attention: Bryan Vig, Works Superintendent | Black Mountain Irrigation District

RE: PROPOSED FILL PLACEMENT (WATER TREATMENT SLUDGE)

We are pleased to submit the Environmental/Agricultural Assessment report for the proposed placement of dried sludge fill on the property located at 2458 Joe Riche Road. This assessment report has been prepared to help satisfy applicable provincial and municipal permitting requirements. The assessment is based on the CTQ Consultants Ltd. design drawing, dated December 2nd, 2020. The results of the assessment encompass the evaluation of information gathered from desktop research and a field reconnaissance.

If you have any questions or comments, please do not hesitate to contact me at 778-214-4023.

Sincerely,

NORTHLAND ENVIRONMENTAL LTD.

Graeme Hayward, MNRM, PAg, EP, CESA



ATTACHMENT		A
This forms part of application		
# A23-0001		
Planner Initials	CD	 City of Kelowna <small>DEVELOPMENT PLANNING</small>

1.0 INTRODUCTION	1
1.1 PROJECT BACKGROUND	1
1.2 SCOPE OF ASSESSMENT	1
1.3 METHODOLOGY	3
2.0 THE PROPOSED PROJECT	5
2.1 SITE DESCRIPTION	5
2.2 PROJECT SCOPE	5
2.3 DRIED SLUDGE (SEDIMENT) ANALYSIS	6
2.4 PROJECT PROPONENT AND CONSULTANT CONTACT INFORMATION	6
3.0 REGULATORY FRAMEWORK AND BEST PRACTICES	7
3.1 LOCAL GOVERNANCE	7
3.2 PROVINCIAL LEGISLATION	7
3.3 FEDERAL LEGISLATION	8
3.4 BEST MANAGEMENT PRACTICES	9
4.0 BIOPHYSICAL DESCRIPTION	10
4.1 ENVIRONMENTAL SETTING	10
4.2 AGRICULTURAL CAPABILITY	10
4.3 SURFICIAL GEOLOGY AND SOILS	11
4.4 HYDROGEOLOGY	11
4.5 SURFACE WATER	11
4.6 WILDLIFE	12
4.7 VEGETATION AND ECOLOGICAL COMMUNITIES	17
4.8 CULTURAL RESOURCES AND ARCHAEOLOGY	23
4.9 CONTAMINATED SITES	23
5.0 ENVIRONMENTAL / AGRICULTURAL ASSESSMENT	24
5.1 VALUED ECOSYSTEM AND AGRICULTURAL COMPONENTS	24
5.2 ENVIRONMENTAL AND AGRICULTURAL EFFECTS AND MITIGATION MEASURES	24
5.3 ENVIRONMENTAL EFFECTS DUE TO INCIDENTS AND MALFUNCTIONS	27
5.4 RESIDUAL EFFECTS	27
6.0 MONITORING AND REPORTING	28
6.1 DOCUMENTATION AND RECORDS	28
7.0 OPERATING AND RECLAMMATION PLAN	29
8.0 SUMMARY AND CONCLUSION	30
9.0 REFERENCES	31

TABLES

Table 4.1	Sensitive Species with Potential to Inhabit Ecosystems Characteristic of the Study Area
Table 4.2	SEI Classes and Ecosystem Units Mapped within the Study Area, and their Sensitive Ecosystem Rankings
Table 4.3	Summary of Ecosystems and ESA Ratings within the Study Area
Table 5.1	Environmental / Agricultural Effects and Mitigation Measures

FIGURES

Figure 1.1	Location and Site Plan
Figure 4.1	Site Features and Environmental Sensitivity

APPENDICES

Appendix A	Site Photos
Appendix B	Design Drawings
Appendix C	Aquifer and Groundwater Well Search Results
Appendix D	Field Surveys
Appendix E	Sensitive Species and Ecosystems Search Results
Appendix F	Cultural Resources and Archaeology Search Results
Appendix G	Contaminated Sites Search Results

1.0 INTRODUCTION

Northland Environmental Ltd. (Northland Environmental) was retained by Black Mountain Irrigation District (BMID) to complete an assessment of the environmental and agricultural impacts of the proposed placement of dried sludge fill on their property located at 2458 Joe Riche Road (**Figure 1.1**). The dried sludge is the residual sediment material produced by BMID's water treatment process. This assessment report has been prepared to help satisfy permitting requirements under the BC Environmental Management Act (Waste Management Permit), Agricultural Land Commission Act (Soil or Fill Use Permit), and the Local Government Act (City of Kelowna Development Permit). The purpose of the assessment is to evaluate the environmental and agricultural considerations of the proposed dried sludge fill placement within the BMID subject property. Based on the results of the assessment, recommendations for mitigation are provided to minimize environmental and agricultural impacts.

1.1 Project Background

The project consists of the placement of dried sludge fill on BMID's property at 2458 Joe Riche Road (the project). The sludge fill material consists of the residual sediment removed during the water treatment process at the BMID water treatment plant along Mission Creek. Sampling and analysis indicate that the dried sludge satisfies applicable criteria under the Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health and the BC Hazardous Waste Regulation.

The project area is comprised of a low-lying area with steep side slopes within a rolling hill topography. The area has been disturbed by various land uses including fill placement, trail/road development and rangelands used for grazing livestock. The adjoining lands include several disturbed access corridors and a FortisBC electrical substation and transmission line. There is a mapped stream and wetland habitat located beyond the transmission line to the northwest of project area. The stream and wetland habitats drain to the southwest and are isolated from the project area by higher elevation uplands. There is limited capability and suitability for agriculture within the project area due to the steep slopes and the disturbed nature of the soils from past fill placement. The dried sludge fill material will be hauled from the drying/containment areas located at the BMID water treatment plant site. Prior to the placement of fill, any suitable topsoil will be stripped and stockpiled for site reclamation activities. The fill will be placed in a manner that improves the agricultural capability of the land and avoids disturbance to adjoining vegetation. The finished grade of the fill will complement adjoining landforms and provide for a smooth transition between the land contours and drainage patterns in the area.

1.2 Scope of Assessment

This assessment report is based on the results of desktop research and a field reconnaissance. The review of background information was completed to gain an understanding of the current conditions of the study area to help determine potential effects and site-specific mitigation measures for the project. This assessment considers the physical works and activities within the defined study area. The study area, in which direct environmental and agricultural effects were evaluated, is defined as the area within the project footprint. The regional study area is defined as the spatial area extending beyond the study area in which both direct and indirect effects may occur. The regional study area includes the adjoining grassland ecosystems and agricultural lands within a 200 m radius of the project area.



LEGEND

- Fill Placement Area
- Wetland - Drainage
- FortisBC Substation
- High Voltage Overhead
- Disturbed - Fill Area
- Disturbed - Trail - Road
- Disturbed - Steep Slopes

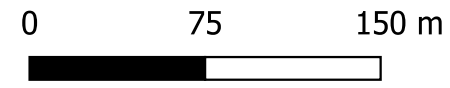


Figure 1.1 - Location and Site Plan

PROJECT - Water Treatment -
Dried Sludge Fill Placement

CLIENT - Black Mountain Irrigation District



Coordinate System
WGS 84 / Pseudo-
Mercator EPSG 3857

Scale 1:5000

Map Prepared by Northland Environmental
Ltd. using QGIS (2021).

QGIS Development Team. 2021. QGIS
Geographic Information System. Open
Source Geospatial Foundation Project.
<http://qgis.osgeo.org>. Projection: ESRI
Satellite.

The assessment objectives include:

- Reviewing background information and reports related to the environmental and agricultural conditions of the study area;
- Conducting a field reconnaissance of the study area to record the agricultural and environmental aspects that may be affected by the fill placement;
- Describing the baseline environmental and agricultural conditions, including soils, agricultural capability, surface water, groundwater, terrestrial and aquatic habitats, wildlife and plants, natural resources and land uses;
- Assessing the potential environmental and agricultural effects of the project and proposing appropriate mitigation measures;
- Predicting whether there will be significant adverse effects, after mitigation is taken into consideration; and,
- Providing follow-up measures to verify the accuracy of the assessment and the effectiveness of the recommended mitigation.

1.3 Methodology

1.3.1 Surficial Geology and Hydrogeology

Online databases and literature were queried for surficial geology and hydrogeology information for the study area. Information on aquifers and groundwater wells was obtained from the following sources:

- BC Soil Information Finder Tool (BC Ministry of Agriculture and Ministry of Environment & Climate Change, 2018)
- BC Water Resources Atlas, iMap BC mapping application (Government of BC, 2021)
- Soils of the Okanagan and Similkameen Valleys (BC Ministry of Environment, 1986)

1.3.2 Surface Water and Fisheries Resources

The following databases were queried to identify known watercourses and access detailed surface water and fisheries data for watersheds, water quantity and quality monitoring sites, and fish habitat within the study area:

- BC Water Resources Atlas, iMap BC mapping application (FLNRO, 2021)
- Fisheries Inventory Data Queries (FIDQ) (BC Ministry of Environment, 2021)
- iMap BC mapping application (Government of BC, 2021)
- HabitatWizard mapping application (FLNRO, 2021)

1.3.3 Wildlife and Habitat, including Sensitive Species and Ecological Communities

Information regarding vegetation, wildlife and habitats, including species and ecosystems of management concern that have the potential to occupy the study area, was obtained from the following sources:

- BC Species and Ecosystems Explorer (BC MOE, 2021)
- BC Ministry of Environment's Conservation Data Centre mapping application (BC CDC, 2021)
- iMap BC mapping application (Government of BC, 2021)
- eBird online mapping database (eBird, 2021)
- iNaturalist mapping database (iNaturalist, 2021)
- Environment Canada's Species at Risk Public Registry (SARA, 2019)
- Ecosystems of British Columbia, Chapter 10: Interior Douglas-fir Zone (Hope et al., 1991)
- Sensitive Ecosystems Inventory Okanagan Valley: Vernon to Osoyoos 2000 – 2007 (Iverson et al., 2008)
- City of Kelowna Geographic Information System (City of Kelowna, 2021)
- Wildlife Species Inventory (WSI) via iMap mapping application (Government of BC, 2021)

1.3.4 Cultural Resources and Archaeology

A search of the following database was conducted to determine the possible presence of cultural and archaeological records within the study area:

- BC Ministry of Agriculture and Lands Integrated Land and Resource Registry (BC Ministry of Agriculture and Lands, 2021)

1.3.5 Contaminated Sites

The following database was queried to determine the potential presence of contaminated sites within the study area:

- BC Ministry of Agriculture and Lands Integrated Land and Resource Registry (BC Ministry of Agriculture and Lands, 2021)

1.3.6 Field Reconnaissance

On March 22nd, 2021, an overview level field reconnaissance was conducted by Northland Environmental to gain a better understanding of the environmental setting, assess the potential environmental and agricultural effects, and develop appropriate mitigation measures for the project. The survey focused on ground-truthing the desktop research conducted and assessing the conditions of land for agricultural capability. The agricultural considerations included topography, drainage, stoniness, erosion, soil moisture and related agricultural capability aspects. All plant species that could be identified were recorded and all wildlife species and evidence of their presence were documented (i.e., scat, tracks, audio cues). Any essential habitat features that wildlife depend on (i.e., wildlife trees, rock outcrops, nests, wildlife corridors) were recorded to assist with the assessment of impacts. General habitat types were determined utilizing Terrestrial Ecosystem Mapping (TEM) and Sensitive Ecosystem Inventory (SEI) mapping, and the findings of the field reconnaissance.

2.0 THE PROPOSED PROJECT

2.1 Site Description

The subject property at 2458 Joe Riche Road (PID: 001-715-224) is legally described as:

Plan KAP1991, Lot 8, Township 27, Section 18 & 19, Except Plan KAP80286, KAP87038, Parcel 17, Plan KAP237A of East 1/2, Section 19, Township 27, Osoyoos Division of Yale Land District.

The property is within the Agricultural Land Reserve and is zoned Agriculture - A1 within the City of Kelowna (**Figure 1.1**). The A1 - Agriculture zone is designated for rural areas and agricultural uses as well as other complementary uses suitable in an agricultural setting. The project area is comprised of a shallow depression with steep side slopes within a rolling hill topography. The area has been disturbed by various land uses including agricultural uses, fill placement and trail/road development. The adjoining lands include several disturbed access corridors and a FortisBC electrical substation and transmission line. The project area ranges in elevation from approximately 650 m to 660 m Above Sea Level (asl). The project area was selected based on availability of suitable fill placement sites, avoiding environmental and agricultural impacts, complementing adjoining landforms and providing for a smooth transition between the land contours and drainage patterns in the area. Site photos are included in **Appendix A**.

2.2 Project Scope

The project consists of the placement of residual dried sludge (fill material) on BMID's property at 2458 Joe Riche Road. The estimated fill capacity of the project area is 34,680 m³ based on a 660 m asl top-of-fill design elevation. The plan, profile and dimensions are shown on the drawing included in **Appendix B**. The sludge material consists of the residual sediment removed during the water treatment process at the BMID water treatment plant along Mission Creek. This sediment is generally characterized as slightly acidic to mildly alkaline, non-saline, with very low to medium nitrogen levels. Further details of the sludge sediment chemistry are provided in **Section 2.3**.

The fill placement activities are expected to take place from late spring to early fall for a duration of ten years and/or until the design capacity of the fill area is reached. The site preparation activities will include surveying, topsoil stripping, clearing and grubbing, site grading, and upgrading the existing access road to facilitate the safe hauling and placement of the fill material. The fill placement area will be physically marked and the operation of machinery will be restricted to the project area to avoid impacting outlying vegetation. The material will be hauled by tandem dump trucks and spread using a loader or similar equipment. The site access road and fill area will be sprayed with water as necessary to reduce airborne dust. The fill will be placed in lifts in accordance with applicable engineering standards. The fill area will be graded and maintained to prevent impacts to the adjoining lands. During operation of the fill area, all disturbed areas including the fill material will be regularly seeded with a native seed mix suitable for upland habitats within the Okanagan. All weeds and invasive vegetation will be removed regularly to avoid impacts on adjoining agricultural lands and habitats. Some invasive trees were noted within the project area during the field reconnaissance. These trees will be removed by a qualified arborist and disposed at an approved licenced facility off site.

Site restoration will be undertaken in general conformance with best practices as directed by a qualified professional, to improve agricultural capability while ensuring no net loss of productive habitat capacity. Organic materials and topsoil will be stockpiled and redistributed over disturbed areas on site. The final finished grade of the project area will complement adjacent landforms and provide for a smooth transition between the land contours and drainage patterns on adjacent lands and the reclaimed area. The project area, stockpiles and any adjoining disturbed areas will be broadcast seeded and/or hydraulic seeded with a suitable agronomic and/or native seed mix to help prevent the establishment of invasive plant species.

2.3 Dried Sludge (Sediment) Analysis

Northland Environmental conducted sampling and analysis of the sludge produced from the Mission Creek water treatment plant to help inform sludge disposal options. A review of applicable regulations and guidelines was conducted prior to undertaking sampling and analyses of the sludge. The water treatment process uses chemicals to remove the fine sediments from the water that comes from Mission Creek. The sludge produced from this process consists of the sediments removed from the water and any other residuals from the water treatment process. CARO Analytical Services (CARO) was contacted to provide guidance on the analyses required to evaluate whether the sludge is hazardous or if it can be disposed of as non-hazardous waste or used as fill material. CARO suggested a Class 2 Landfill Package that tests for flash point, free liquids, metals by TCLP (toxic characteristic leaching procedure), and pH. The package simulates landfill conditions to determine if harmful metals or volatiles will be released after disposal. CARO also recommended a TCLP extraction to test for any volatile organic compounds (VOC) in the sludge.

A total of three (3) 125 mL sample soil jars were required for the four analyses that were conducted. The sludge had been stock-piled on site at the BMID water treatment plant, and it was anticipated that different depths of the sludge pile may have experienced different temperatures, moisture content, decomposition etc. Therefore, each soil jar was filled with sludge taken from three different depths (bottom, middle and surface). Each soil jar was then mixed thoroughly in the field to ensure the sample was representative of the sludge. The soil jars were transported in a cooler provided by CARO. The sampling methodology was consistent with BC Field Sampling Manual's Soil and Sediment Sampling guide. The sampling was completed on April 24th, 2019 and submitted to CARO for the analyses the same day. CARO provided the results from the analyses on May 2nd, 2019. The results revealed that the analytes detected in the sludge were either very low or non-detectable (i.e., no exceedances of applicable guidelines).

Based on the results of the analyses conducted and the review of sampling/analyses conducted by BMID, the sludge is considered non-hazardous in accordance with applicable criteria under the Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health and the BC Hazardous Waste Regulation (Northland Environmental, 2019).

2.4 Project Proponent and Consultant Contact Information

	Black Mountain Irrigation District	Northland Environmental Ltd.
Contact	Bryan Vig	Graeme Hayward
Address	285 Gray Rd. Kelowna, BC V1X 1W8	201A-347 Leon Ave. Kelowna, BC V1Y 8C7
Telephone	250-870-1119	778-214-4023
Email	bvig@bmid.ca	graeme@northlandenvironmental.ca

3.0 REGULATORY FRAMEWORK AND BEST PRACTICES

As part of the assessment process, the proposed placement of dried sludge fill was reviewed to identify applicable regulatory triggers and permitting processes. The following is a summary of the applicable legislation and regulatory requirements for the project.

3.1 Local Governance

3.1.1 *City of Kelowna Official Community Plan 2030 - Development Permit*

The project area overlaps Natural Environment, Hazardous Conditions, and Farm Protection Development Permit Areas (DPAs). Unless exempt, a Development Permit must be approved prior to any subdivision or land alteration including but not limited to land clearing, preparation for the construction services, roads, blasting or construction, and/or addition to or alternation of a building or structure in a Development Permit Area (DPA). An approved Development Permit sets out site specific development requirements. Conditions in the permit address environmental issues and ensure that the property is developed safely and generally reflects the objectives and guidelines of best management practices produced by the Province of British Columbia.

3.2 Provincial Legislation

3.2.1 *BC Water Sustainability Act*

The *BC Water Sustainability Act* establishes the broad legal framework for managing water in British Columbia. Any activities that result in changes in or about a stream require notification or approval under Section 11 of the *Water Sustainability Act*. Under the *Water Sustainability Act*, “changes in and about a stream” include a modification to the nature of the stream, including any modification of the land, vegetation and natural environment of a stream or the flow of water in a stream, or any activity that has or may have an impact on a stream or stream channel. The project area does not overlap any streams. The fill area will be graded and maintained to prevent impacts to the adjoining lands and drainage patterns.

3.2.2 *BC Wildlife Act*

The *BC Wildlife Act* protects indigenous wildlife, including bird nests, bird eggs and nesting birds, in British Columbia. By conducting land clearing activities outside of the nesting season (mid-March to Mid-August) for birds, a proponent is able to maintain compliance with this Act. In the event that land clearing is to be conducted during the nesting season, a Qualified Environmental Professional (QEP) must first assess the area to ensure that birds and their nests will not be adversely impacted by land clearing activities.

3.2.3 *BC Agricultural Land Commission Act*

The *Agricultural Land Commission Act* and *Agricultural Land Reserve (ALR) Regulations* are the legislative framework for the establishment, administration, and procedures of British Columbia’s agricultural land preservation program. A landowner who wishes to place fill or remove soil in the ALR must submit a Notice of Intent to the CEO of the Commission in accordance with the process set out in Section 5 of Information Bulletin 07 Soil or Fill Uses in the ALR.

3.2.4 BC Environmental Management Act

The *Environmental Management Act* governs the management of waste in British Columbia. The *Act* provides the authority for introducing wastes into the environment, while protecting our health and the environment. Specifically, the *Act* enables the use of permits, regulations and codes of practice to authorize discharges to the environment and enforcement options, such as administrative penalties, orders and fines to encourage compliance. The *Waste Discharge Regulation* defines what industries, activities and operations require authorizations to discharge or release waste to the air, water, and land under the *Environmental Management Act*.

3.2.5 BC Heritage Conservation Act

The purpose of this *Act* is to encourage and facilitate the protection and conservation of heritage property in British Columbia. Although there are no known archaeological or heritage resources within the project area, a chance find procedure will be required for the Contractor to follow in the event of an unanticipated discovery during fill placement activities.

3.3 Federal Legislation

3.3.1 Migratory Birds Convention Act

Most migrating birds found in Canada are protected under the *Migratory Birds Convention Act*. The *Act* is administered by the Wildlife Enforcement Division of Environment Canada in cooperation with provincial governments. By conducting land clearing activities outside of the regional nesting period for migratory birds a proponent is able to maintain compliance under this *Act*. The regional nesting period for migratory birds in the Okanagan is between mid-March and mid-August, and earlier for raptors and herons (approximately early January to end of September). In the event that land clearing is to be conducted during the regional nesting window, a QEP with experience in bird/nest surveys must first assess the area to ensure that any nesting birds, their nest or eggs will not be impacted.

3.3.2 Species at Risk Act

Species at risk in Canada are initially determined at a federal level by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). If approved by the federal Minister of the Environment, species listed under COSEWIC are added to the federal list of wildlife species at risk under the *Species at Risk Act* (SARA) Schedule 1. It is prohibited to kill, harm, harass, capture, take, possess, collect, buy, sell or trade any Schedule 1 species and/or their critical habitat listed as extirpated, endangered or threatened on federal lands (SARA Section 32-36). Within private or provincially owned lands, only critical habitat of aquatic species listed as extirpated, endangered, or threatened in Schedule 1 of SARA and migratory birds listed in the *Migratory Birds Convention Act* (1994) that are also listed as extirpated, endangered or threatened in Schedule 1 of SARA are protected, unless ordered by the Governor in Council.

3.4 Best Management Practices

The BMPs recommended in this report are consistent with the following guidelines:

- A Field Guide to Fuel Handling Transportation & Storage (MWLAP, 2002);
- Best Management Practices for Bats in British Columbia (BC MOE, 2016);
- Criteria for Agricultural Capability Assessments;
- Develop with Care 2014: Environmental Guidelines for Urban and Rural Land Development in British Columbia (BC MOE, 2014);
- Erosion and Sediment Control Best Management Practices (ESCA BC, 2014);
- Guidelines for Amphibian and Reptile Conservation during Urban and Rural Land Development in British Columbia (FLNRO, 2014);
- Guidelines for Farm Practices Involving Fill;
- Guidelines for Raptor Conservation during Urban and Rural Land Development in British Columbia (FLNRO, 2013);
- Information Bulletin 07 Soil or Fill Uses in the ALR;
- Placement of Fill for Soil Bound Agricultural Activities; and,
- Resource Extraction and Fill Placement Proposals, Criteria for Technical Reports Submitted by Consultants.

4.0 BIOPHYSICAL DESCRIPTION

4.1 Environmental Setting

The climate in the southern interior of British Columbia is largely affected by the Coast and Cascade Mountain ranges which act as precipitation barriers to this region of the province. As a result, annual precipitation is relatively low and in many areas the majority of precipitation falls in the form of snow, leaving the summers hot and dry. Winters in this region are generally described as cool. The City of Kelowna has a mean annual temperature of 8.1 °C and receives approximately 360 mm in annual precipitation, with about one third of the precipitation falling as snow (Environment Canada, 2021). The project area is situated within the Okanagan variant of the Very Hot Dry (xh) subzone, of the Interior Douglas-fir (IDF) biogeoclimatic zone. The IDF biogeoclimatic zone occurs at elevations below the Montane Spruce zone and where valleys are deep but above the Ponderosa Pine zone. This zone is characterized by a continental climate with warm, dry summers, a relatively long growing season and cool winters. Significant moisture deficits during the growing season are common. Historically, frequent stand-maintaining fires shaped the ecosystems of this zone.

4.2 Agricultural Capability

Agricultural capability ratings and limitations are assessed using a classification system known as the "Land Capability Classification for Agriculture in BC". The classification system describes seven land capability classes for agriculture (Classes 1 to 7). The land capability classification for agriculture has two main components - the capability class and the capability subclass. The class identifies potential for agriculture. The best agricultural lands are rated Class 1 because they have the ideal climate and soil to allow a farmer to grow the widest range of crops. Class 7 is considered non-arable, with no potential for soil bound agriculture. As the class numbers increase from Class 1 to Class 7, the range of crops decreases. Associated with each class is a subclass that identifies limitations or special management practices needed to improve the soil, such as topography, stoniness, soil moisture deficiency, low fertility, etc. The land capability classification system was utilized to determine the potential for agriculture within the fill placement project area. A search of the British Columbia Soil Information Finder Tool revealed that the majority of the fill placement lands are classified 5A for agricultural capability. Class 5 land has limitations that restrict its capability to producing perennial forage crops or other specially adapted crops. The Subclass 5A (Soil Moisture Deficiency) represents soil moisture deficiency where crops are adversely affected by insufficient precipitation or low water holding capacity. The Improved Capability Class for these lands is 3AP. Class 3 land has limitations that require moderately intensive management practices or moderately restrict the range of crops, or both. The subclasses (A and P) represent Soil Moisture Deficiency and Stoniness. The improved Subclass 3A soil moisture deficiency rating takes irrigation into account. The Subclass 3P rating represents total coarse fragment content (2.5 cm diameter or larger) that causes significant interference with cultivation. Total coarse fragment content is 11% to 20% or cobbles and stones occupy 2% to 5% of the sieved soil. The remaining lands within the fill placement project area are classified 6TA for agricultural capability. The subclass "6T" (Topography) represents slopes, either simple or complex, varying from 31% to 60% and the land in its present condition providing sustained natural grazing for livestock. The subclass "6A" refers to a soil moisture deficit from 341 mm to 425 mm and the land in its present condition providing sustained natural grazing for domestic livestock.

4.3 Surficial Geology and Soils

The Okanagan Valley is a major valley in the Southern Interior Plateau region of British Columbia. The valley trends generally north-south from Shuswap Lake to the Columbia River between the Cascade Mountains to the west and the Monashee Mountains to the east. The materials that line the valley are a heterogeneous mixture derived from many different bedrock sources. Glacial deposits are variable in texture and thickness and are largely lacustrine and glaciofluvial in origin. Most of the valley floor and lower slopes are underlain by silt, sand, gravel and diatomaceous earth.

The project area encompasses a shallow depression with strong to extreme slopes comprised of Rutland (R) and Kelowna (KE) soils. Rutland and Kelowna soils are classified as Orthic Dark Brown. Rutland soils are rapidly drained, rapidly pervious, have slow surface runoff and low water holding capacity. The main agricultural limitations of Rutland soils are gravelly and stony textures, rapid permeability and low water holding capacity. Kelowna soils are well drained, moderately pervious and have a moderate water holding capacity. Kelowna soils are well suited for most agricultural crops although adverse topography and stoniness may be limiting in some areas (Ministry of Environment, 1986).

The soils and contours of the project area appear to be, in part, attributed to past disturbances, including historic fill placement and trail/access development. In undisturbed areas, the soils include well to rapidly draining sandy loam overlying parent materials of glaciolacustrine and glaciofluvial origin. Glaciolacustrine sediments were deposited in glacial lakes during or shortly after deglaciation. These sediments are usually stratified and consist of stone and gravel free, moderately and well sorted sands, silts and clays. Glaciofluvial sediments were deposited by glacial meltwater either in contact with glacier ice or beyond the ice margin as outwash. The deposits usually consist of stratified gravels and sands with a high proportion of stones and sometimes boulders (Ministry of Environment, 1986).

The fill placement project area is situated in a north-south oriented depression. Considering the strong to extreme slopes and disturbed (anthropogenic) nature of the project area, agricultural capability is anticipated to be low for most crops without significant site improvements.

4.4 Hydrogeology

A search of the Ministry of Environment's Water Resource Atlas revealed no mapped aquifers or groundwater well records within the fill placement project area. The closest mapped groundwater wells are located along Highway 33 approximately 700 m and 1,300 m to the south and southeast of the project area.

Groundwater Well Tag # 24117 had a recorded static water level of approximately 6 m (20 ft.) and a finished well depth of 15 m (50 ft.). The recorded lithology consists of a layer of cobbles and boulders (0 m to 6 m), over a layer of stony clay (6 m to 12 m), over a layer of stones and fine sand (12 m to 14 m), over a layer of till. Groundwater Well Tag # 76783 was recorded as a dry well with a finished well depth of 183 m (600 ft.). The recorded lithology consists of a layer of sand and gravel (0 m to 2.5 m) over bedrock. A copy of the aquifer and groundwater well search results is included in **Appendix C**.

4.5 Surface Water

The fill placement project area is located within the Mill Creek watershed, which drains into Okanagan Lake. The Mill Creek watershed encompasses an area of approximately 224 km².

The project area generally drains internally before daylighting toward the access road to the northwest. There was no evidence of historic surface flow observed during the field reconnaissance. The soil permeability within the project area is anticipated to be high due to the sandy and gravelly nature of the soils. Any subsurface flow through the project area is expected to trend to the southwest, consistent with local drainage patterns. There is a mapped stream and wetland habitat located beyond the high voltage overhead power line to the northwest of the project area. The stream and wetland habitat drain to the southwest and are isolated from the project area by higher elevation uplands. The final finished grade of the fill placement area will complement adjacent landforms and provide for a smooth transition between the land contours and drainage patterns on adjacent lands and the reclaimed area.

4.6 Wildlife

A meandering wildlife survey was conducted within the study area on March 22nd, 2021. The survey recorded incidental wildlife observed and evidence of wildlife use (i.e., nests, burrows, shed skins, feathers, scat, tracks and individuals). A list of all the wildlife observations is included in **Appendix D**.

4.6.1 Mammals

The IDFxh subzone contains a vast diversity and abundance of wildlife and wildlife habitat. The disturbed grasslands and adjoining coniferous woodlands of the study area support mammalian species such as yellow-bellied marmot, golden mantled ground squirrel, Rocky Mountain elk, black-tailed deer, mule deer, white-tailed deer, cougar, bobcat, coyote, black bear, Columbian ground squirrel, Northern pocket gopher and sensitive species such as American badger, California and Rocky Mountain bighorn sheep and Great Basin pocket mouse. Deer tracks and scat were observed within the study area and a trail running through the study area is expected to be used by deer and other wildlife.

4.6.2 Birds

The disturbed grasslands and adjoining coniferous woodlands of the study area support species such as Northern flicker, Northern pygmy owl, blue grouse, pileated woodpecker, Clark's nutcracker, red-naped sapsucker, red-breasted nuthatch, red cross-bill, American kestrel, Canada goose, ruffed grouse, Golden eagle, red-tailed hawk, turkey vulture, short-eared owl, sharp-tailed grouse, long-billed curlew, sandhill crane, black-billed magpie, mountain bluebird, and sensitive species such as burrowing owl, prairie falcon, flammulated owl, common poorwill, Lewis' woodpecker, and Williamson's sapsucker.

4.6.3 Herptiles

The study area has the potential to support herptile species including but not limited to Northern rubber boa and Western yellow-bellied racer, and sensitive species such as the Great Basin spadefoot, Western rattlesnake, and Great Basin gopher snake. The field reconnaissance revealed no evidence of reptiles or amphibians, although suitable habitat for snakes, spadefoots and skinks was observed within the study area (i.e., grassland habitats).

4.6.4 Invertebrates

Invertebrates make up the greatest part of British Columbia's biodiversity, however very little is known about the invertebrates in British Columbia. The field reconnaissance revealed suitable habitat for various invertebrate species.

4.6.5 *Species at Risk*

A rare occurrence search of the BC Ministry of Environment's Conservation Data Centre (CDC) revealed one (1) sensitive species occurrence record and no sensitive ecological community records within the study area. The sensitive species occurrence record revealed is for American badger (BC Red-listed; SARA Schedule 1 - Endangered), which overlaps the study area. The badger polygon spans from the U.S. border to the north end of Okanagan Lake. The record indicated that the most recent sighting was in 2012, however badgers have very large home ranges (15-50 km²) and could traverse through the study area. There are three sensitive ecological community occurrence records within a 500 m radius of the project area. These records are for black cottonwood - Douglas fir / Douglas maple - common snowberry (BC Red-listed), trembling aspen / common snowberry / Kentucky bluegrass (BC Red-listed), and Baltic rush - common silverweed (BC Red-listed). The search also revealed one (1) masked sensitive species occurrence record that overlaps the northwest limit of the study area.

A search for federally listed critical habitat polygons revealed a "final" critical habitat "grid square" for the Great Basin gopher snake (BC Blue-listed; SARA Schedule 1 - Threatened) that overlaps the study area. Critical habitat occurs within the standardized UTM grids where the criteria described in the Recovery Strategy are met. Gopher Snakes inhabit grasslands, shrub-steppe, deciduous and coniferous woodlands, and other open habitats below 1,700 m elevation. Rock outcroppings, talus slopes, and rodent burrows provide important habitat for overwintering sites (hibernacula). Shrub-steppe and riparian areas are used for foraging. Sandy, south-facing slopes are important for egg laying. Each of these habitat components must be available in close proximity to support the species.

A search of the BC Species and Ecosystems Explorer: Species and Ecosystems Search website was conducted for sensitive species that have potential to inhabit grassland ecosystems that are characteristic of the study area. The search results revealed a total of fifty-nine (59) BC Red-listed, BC Blue-listed and/or species listed on SARA Schedule 1. Of the species identified, thirty-one (31) sensitive species are listed as Schedule 1 Species under the Species at Risk Act. **Table 4.1** lists only the species that have been confirmed within the study area or have potential to be present within the study area based on the desktop research and field reconnaissance performed. These species, their rankings and preferred habitat types are provided in the table. The complete results from BC Species and Ecosystems Explorer and CDC searches are included in **Appendix E**.

Table 4.1: Sensitive Species with Potential to Inhabit Ecosystems Characteristic of the Study Area

Common Name	Scientific Name	BC List	SARA Schedule 1	Class	Range and Habitat Preferences	Likelihood of Presence in Study Area	Rationale on Likelihood Determination
American Badger	<i>Taxidea taxus jeffersonii</i>	Red	Endangered	Mammals	Badgers inhabit the dry southern interior region of British Columbia. They prefer open areas in grasslands/fields or open-canopied forests and utilized underground burrows when inactive and as maternal dens. They require friable soil for burrowing and adequate amounts of prey.	Low	The study area may contain suitable habitat for denning (friable soils) and may act as a wildlife corridor.
Barn Swallow	<i>Hirundo rustica</i>	Blue	Threatened	Birds	Barn swallows prefer open habitats to partly open habitats for foraging such as grassy fields, pastures, agricultural crops, and frequently near water to access mud for nest building. They nest in anthropogenic structures such as outbuildings, bridges, rafters, road culverts and rooves or in natural structures like caves or cliff crevices. They frequently reuse old nests returning to the same nesting areas in successive years with their young often returning within 30 km or closer to their natal site.	Moderate	There are recent records for sightings in the vicinity of the study area and sightings recorded over several years in Kelowna recorded on eBird. The study area habitat may be suitable for nesting and foraging.
California Bighorn Sheep	<i>Ovis canadensis</i>	Blue	N/A	Mammals	The bighorn sheep range between mountains and river breaks from southwestern Canada (southern British Columbia and southwestern Alberta) south through the Rocky Mountains, Sierra Nevada, and desert mountains of the southwestern United States to Baja California and the northwestern mainland of Mexico. Distribution is naturally fragmented in many areas due to discontinuity of habitat. Bighorn sheep occur in mesic to xeric, alpine to desert grasslands or shrub-steppe in mountains, foothills, or river canyons, in primarily fire-maintained ecosystems. In addition, suitable escape terrain (cliffs, talus slopes, etc.) is an important feature of their habitat.	Low	A bighorn sheep herd is known to occupy the Highway 33 area. The study area may provide a wildlife corridor and suitable foraging habitat.
Common Nighthawk	<i>Chordeiles minor</i>	Yellow	Threatened	Birds	The common nighthawk's nesting range covers the majority of North America occupying a variety of wide range-open vegetation-free habitats such as dunes, beaches, recently harvested forests, burnt areas, rocky outcrops, rocky barrens, grasslands, pastures, peat bogs, marshes, lakeshores, and riverbanks as well as mixed and coniferous forests. They will also occupy more urban areas and have been known to nest on flat gravel rooves. They prefer sandy soil for ground nesting.	Low	There are records for recent sightings and sightings over several years in Kelowna on eBird, including a record in the vicinity of the study area in 2013. The study area may be suitable for foraging.
Great Basin Gopher Snake	<i>Pituophis catenifer deserticola</i>	Blue	Threatened	Herptiles	The Great Basin gopher snake ranges from southern British Columbia through Washington, Oregon, California, Arizona, Colorado, Nevada, Idaho, Utah to Wyoming. They forage in open habitats such as grasslands, dry open forests, edges of cultivated fields, shrubby areas, talus, wetlands, and riparian areas. They will shelter in burrows, base of shrubs, under various cover objects and the females will lay their eggs in burrows on warm grassy slopes or in fine talus. They hibernate in dens in bedrock crevices, in deep burrows, or in interstitial spaces between rocks in talus slopes.	Moderate	There is suitable habitat for foraging, sunning and cover within the study area.
Great Basin Spadefoot	<i>Spea intermontana</i>	Blue	Threatened	Herptiles	The Great Basin spadefoot is restricted to the arid and semi-arid zones of south-central British Columbia. Spadefoots occupy open woodland and grassland habitats when foraging, hibernating and aestivation and additionally requires aquatic habitats (i.e., temporary or permanent water including rain pools, pools in intermittent streams, and flooded areas along streams) for breeding. The terrestrial and aquatic habitats must be suitably connected to allow for seasonal movements.	Moderate	They have been recorded near Highway 97 in 2020 on iNaturalist. The grassland habitat may be suitable for foraging.
Horned Lark	<i>Eremophila alpestris merrilli</i>	Blue	N/A	Birds	The horned lark <i>merrilli</i> subspecies is found in the southern interior plateaus of British Columbia. Their habitat preference is for open grassy areas, such as cultivated fields, hedgerow, pasture/old field, grassland, meadows, and in urban/suburban areas.	Moderate	There are records from 2018 at Black Mountain – Pyman Road near the study area and a record from this year in the City of Kelowna on eBird. The study area contains suitable foraging and nesting habitat.

Common Name	Scientific Name	BC List	SARA Schedule 1	Class	Range and Habitat Preferences	Likelihood of Presence in Study Area	Rationale on Likelihood Determination
Lark Sparrow	<i>Chondestes grammacus</i>	Blue	N/A	Birds	The lark sparrow's breeding population is throughout extreme southern British Columbia. Their habitat preference during breeding is for open areas with scattered shrubs and trees which includes mixed-grass with shrubs, parkland, sandhills, barrens, old fields, cultivated fields, shrub thickets, shrub-steppe, woodland edges, shelter beds, orchards, parks, riparian areas, brushy pastures, overgrazed pastures and savanna habitats.	Moderate	There are many records over many years in the City of Kelowna and a record from 2003 on McCulloch Road near the study area. The study area contains suitable foraging and nesting habitat.
Lewis's Woodpecker	<i>Melanerpes lewis</i>	Blue	Threatened	Birds	Lewis's woodpeckers only occur in Western North America and in British Columbia. Their range is only within the valleys of the southern interior. The Recovery Strategy (Environment and Climate Change Canada, 2017) for the Lewis's woodpecker describes their critical habitat as three (3) main forest types: dry open ponderosa pine or Douglas-fir forests, and open grasslands, with fire-maintained features, low stem densities, veteran ponderosa pines or Douglas-firs, abundant wildlife trees, and rich herb and shrub layers; mature to old riparian cottonwood stands typically adjacent to grassland, agricultural field, shrub-steppe, or open woodland habitats; or, recently burned (<30 years) ponderosa pine and Douglas-fir dominated forests withstanding snags resulting from stand-destroying fires. The presence of large trees in a state of partial to advanced decay for nesting and relatively open areas for foraging appears to be essential for Lewis's woodpecker. Lewis's woodpecker uses existing nest holes or natural cavities but will excavate its own cavities in highly decayed wood.	Low	The BC CDC revealed an occurrence record and a "final" critical habitat polygon approximately 1 km west of the study area. Additionally, there are recent sightings and sightings over several years in the vicinity of the study area on eBird. The study area contains suitable habitat for foraging.
Northern Rubber Boa	<i>Charina bottae</i>	Yellow	Special Concern	Herptiles	The Northern rubber boa ranges from southern British Columbia south towards west-central California, central Nevada, and southern Utah from the Pacific coast east to north-central Wyoming and western Montana. Their habitat preference is for woodlands, forest clearings, patchy chaparral, rock outcrops, meadows and shrubby treeless areas in dry lowlands. They generally stay close to water so are also found in riparian areas in arid canyons. They will utilize rotting logs and stumps, underneath rocks and rock crevices, and under the bark of dead trees.	Low	There are numerous records over several years in Kelowna on iNaturalist. There is suitable foraging and sunning habitat within the study area.
Preble's Shrew	<i>Sorex preblei</i>	Red	N/A	Mammals	The Preble's shrew range is within western North America, from the Columbia Plateau to the Northern Great Plains and southward to at least New Mexico. Their habitat preference is for arid and semi-arid shrub-grass habitats in montane coniferous forests dominated by sagebrush, willow-fringed creeks, marshes, bunchgrass, sagebrush-aspen, sagebrush-grass and alkaline shrubland habitats.	Low	There is suitable burrowing, breeding, foraging and hibernating habitat within the study area.
Short-eared Owl	<i>Asio flammeus</i>	Blue	Special Concern	Birds	Short-eared owls breed on multiple continents and islands, but in North America they are found breeding sporadically in arctic areas, coastal marshes and interior grasslands where small rodents are abundant. Their habitat preferences are based off of open spaces and abundance of food in both the summer and winter. They are found in agricultural fields, arctic tundra, grasslands, peat bogs, marshes, sand-sage concentration and old pastures. Their preferred nesting sites are in dense grasslands or arctic tundra with small willows.	Moderate	There are sightings over many years with the most recent being in 2018 at Black Mountain-Pyman Road on eBird, near the study area. There is suitable foraging, roosting and nesting habitat in the study area.
Swainson's Hawk	<i>Buteo swainsoni</i>	Red	N/A	Birds	The swainson's hawk breeding range is from east-central Alaska through central Alberta and Saskatchewan and southern Manitoba and south through the western states to California. Their habitat preference is for savanna, open pine-oak woodlands and cultivated lands. They nest in solitary trees, shrub or small grove. They have been found nesting in abandoned black-billed magpie nests, rock ledges, and in shelterbelts or other similarly human created habitat.	Moderate	There are multiple sightings from 2020 just west of the study area on Highway 33 in 2020 on eBird. There is suitable foraging and nesting habitat within the study area.

Common Name	Scientific Name	BC List	SARA Schedule 1	Class	Range and Habitat Preferences	Likelihood of Presence in Study Area	Rationale on Likelihood Determination
Townsend's Big-eared Bat	<i>Corynorhinus townsendii</i>	Blue	N/A	Mammals	The Townsend's big-eared bat range in western North America is from southern British Columbia to Mexico, west to the Pacific coast and eastward to South Dakota and Texas. They occupy a variety of habitats including dry grasslands and coniferous and deciduous forests. They forage for insects in riparian areas, wetlands, forest edges and open woodland. They will roost (maternity and night roosts) in caves, old mines, and buildings.	Low	There is suitable foraging habitat within the study area.
Western Harvest Mouse	<i>Reithrodontomys megalotis</i>	Blue	Special Concern	Mammals	The Western harvest mouse ranges from the Okanagan and Similkameen valleys and southern Alberta south to Mexico. Their habitat preference is for thick herbaceous cover of tall grasses or shrubs. In British Columbia, they are restricted to very hot dry valley bottoms including dry gullies with dense shrub cover bordering grasslands, old fields, apple orchards, ponderosa pine forests, grassy areas bordering cultivated fields, and cultivated fields with sufficient brush cover.	Moderate	There is suitable foraging and burrowing habitat within the study area.
Western Rattlesnake	<i>Crotalus oreganus</i>	Blue	Threatened	Herptiles	The Western rattlesnake ranges from south-central British Columbia south to California and east to Idaho, eastern Utah and Arizona. The snakes overwinter in communal dens including steep slopes on rock outcrops, along talus slopes, or in earth-covered outcrops. In the summer months they occupy grasslands with suitable areas for sun-basking, retreat sites and prey abundance. They utilize riparian areas to escape the heat, as well as under rocks and fallen trees, under boards, concrete structures and other anthropogenic structures.	Moderate	There is suitable foraging, sunning and shelter habitat within the study area.
Western Skink	<i>Plestiodon skiltonianus</i>	Blue	Special Concern	Herptiles	The Western skink ranges from extreme southern BC through the western US as far south as Baja California in Mexico. They have a wide variety of habitats they occupy including woodlands, grasslands, forested areas, dry hillsides including roadsides, and riverbanks. They prefer habitats with numerous places to hide such as rocks, decaying logs, leaf litter, and vegetation. They hibernate in burrows below the frost line in the same area as their summer range.	Moderate	They have been documented in the North Mission area in 2020 and there is suitable burrowing and foraging habitat in the study area.
Western Yellow-bellied Racer	<i>Coluber constrictor mormon</i>	Blue	Special Concern	Herptiles	The Western yellow-bellied racer ranges from southern British Columbia, Saskatchewan, and Ontario through the US as far south as Belize. They prefer desert, prairie, sandhill, shrubland, woodland, forest, canyon, streamside and semi-agricultural habitats. They are known to climb shrubs and small trees and when inactive will hide underground in crevices or under surface cover. The females will lay eggs in underground tunnels or burrows, rotting stumps, sawdust piles or under rocks. They overwinter in communal rock dens or individually in rodent burrows or other similar refuges.	Moderate	There are several records over several years just north of Highway 33 and the study area on iNaturalist, with the most recent record in 2020. There is suitable foraging, sunning and shelter habitat within the study area.

Habitat Information was compiled from multiple sources: BC CDC Species Summaries retrieved from BC CDC Ecosystems Explorer (BC CDC, 2020); SARA Public Registry Species Profiles; SARA Species Recovery Strategies; COSEWIC assessment and status reports; Habitat Atlas for Wildlife at Risk.

4.7 Vegetation and Ecological Communities

The study area is situated within the Okanagan variant of the Very Hot Dry (xh) subzone, of the Interior Douglas-fir (IDF) biogeoclimatic zone. Climax vegetation of very dry sites in the IDFxh subzone consists of open-canopy Interior Douglas-fir and ponderosa pine forests. The project area is mainly comprised of disturbed grassland, bordering cultivated fields and coniferous woodlands comprised of young to mature stands of ponderosa pine with some Douglas-fir. General habitat types were determined utilizing Terrestrial Ecosystem Mapping (TEM) and Sensitive Ecosystem Inventory (SEI) mapping. There are several versions and updates that have been made to the ecosystem mapping for the Central and South Okanagan. There are seven SEI classes that are considered “sensitive ecosystems” and three “other important ecosystems”. **Table 4.2** lists the ecosystems and SEI classes mapped within the project area. A list of vegetation species identified during the field reconnaissance is included in **Appendix C**.

4.7.1 Grassland

Although the grassland habitat is disturbed within the study area, grasslands are recognized as one of the province’s most threatened ecosystems. Grasslands support a unique assemblage of species, including a high proportion of rare and at-risk species such as the Great Basin spadefoot, gopher snake, Western rattlesnake, Lewis’s woodpecker, American badger and many more. Grasslands are very sensitive to disturbance and recovery can take decades (Iverson et al., 2008). The study area lies within the following grassland ecosystem units:

- **Kentucky bluegrass – Stiff needlegrass** - This ecosystem commonly occurs in moisture-collecting swales and depressions in grasslands and grassland openings. These sites are generally quite small and are dominated by grasses with scattered forbs. Disturbed sites are dominated by Kentucky bluegrass.
- **Idaho fescue – Bluebunch wheatgrass - Knapweed - Cheatgrass seral association** – The Idaho fescue – Bluebunch wheatgrass ecosystem occurs on gentle warm aspects, levels sites, and cool aspects. There is little or no bluebunch wheatgrass remaining within sites of the Knapweed - Cheatgrass seral association. Non-native plants including knapweed, cheatgrass and sulphur cinquefoil dominate these sites.
- **Bluebunch wheatgrass – Balsamroot** - This grassland ecosystem commonly occurs on moderately steep to steep warm slopes. Bluebunch wheatgrass and balsamroot dominate these sites. Bunchgrasses are more widely spaced than on gentler slopes. Many of these sites have been disturbed by grazing and have been invaded by noxious weeds.

The study area is mainly comprised of invasive herbaceous plant species that are not representative of the native grassland ecosystems within the Okanagan variant of the IDFxh subzone. Invasive herb and grass species identified during the field reconnaissance include crested wheatgrass, Kentucky bluegrass, knapweed, cheatgrass, and mullein.

4.7.2 Coniferous Woodland

The Douglas-fir / Ponderosa pine – Bluebunch wheatgrass - Pinegrass ecosystem unit overlaps a small portion of the study area. Coniferous forests provide habitat to both forest and grassland species. The coniferous forest ecosystems of British Columbia have been impacted as a result of fragmentation from logging, forest ingrowth and weed invasion (Iverson et al., 2008). Two mature ponderosa pine trees and several young invasive Siberian elm trees were recorded within the study area. The coniferous woodlands outside of the east boundary of the study area are comprised of young to mature stands of ponderosa pine with some Douglas-fir.

4.7.3 Cultivated Field

The southern most portion of the study area overlies a cultivated field ecosystem unit. This unit is described as containing agricultural fields with tilled soils and planted crops or ground cover. Ground-truthing during the field reconnaissance did not identify evidence of any recent cultivation within the study area. Considering the strong to extreme slopes, gravelly and sandy soil texture, presence of cobbles and boulders, and disturbed (anthropogenic) nature of the project area, agricultural capability is anticipated to be low (unsuitable) for most agricultural crops without significant site improvements.

Table 4.2: SEI Classes and Ecosystem Units Mapped within the Study Area, and their Sensitive Ecosystem Rankings

TEM Polygon No. (Project 082E084)	% of Polygon	SEI Class	Ecosystems	Structural Stage	Sensitive Ecosystem Ranking	Area within Study Area (m ²)	% of Study Area
85	70	Grassland, disturbed (GR:dg)	Kentucky bluegrass – Stiff needlegrass (BN)	2 (Herb)	Medium	3,047	53.7
	30	Grassland, disturbed (GR:dg)	Idaho fescue – Bluebunch wheatgrass - Knapweed - Cheatgrass seral association (FW:kc)	2 (Herb)			
49	70	Grassland (GR)	Bluebunch wheatgrass – Balsamroot (WB)	2 (Herb)	High	1,695	29.9
	30	Woodland, coniferous (WD:co)	Douglas-fir / Ponderosa pine – Bluebunch wheatgrass (DW)	5 (Young Forest)			
51	100	Cultivated Field (CF)	Cultivated Field – Agricultural fields with tilled soils and planted crops or ground cover (CF)	2 (Herb)	Medium	928	16.4
TOTAL						5,670	100

Ecological communities listed in blue are Blue-listed ecosystems.

4.7.4 *Environmentally Sensitive Areas Evaluation*

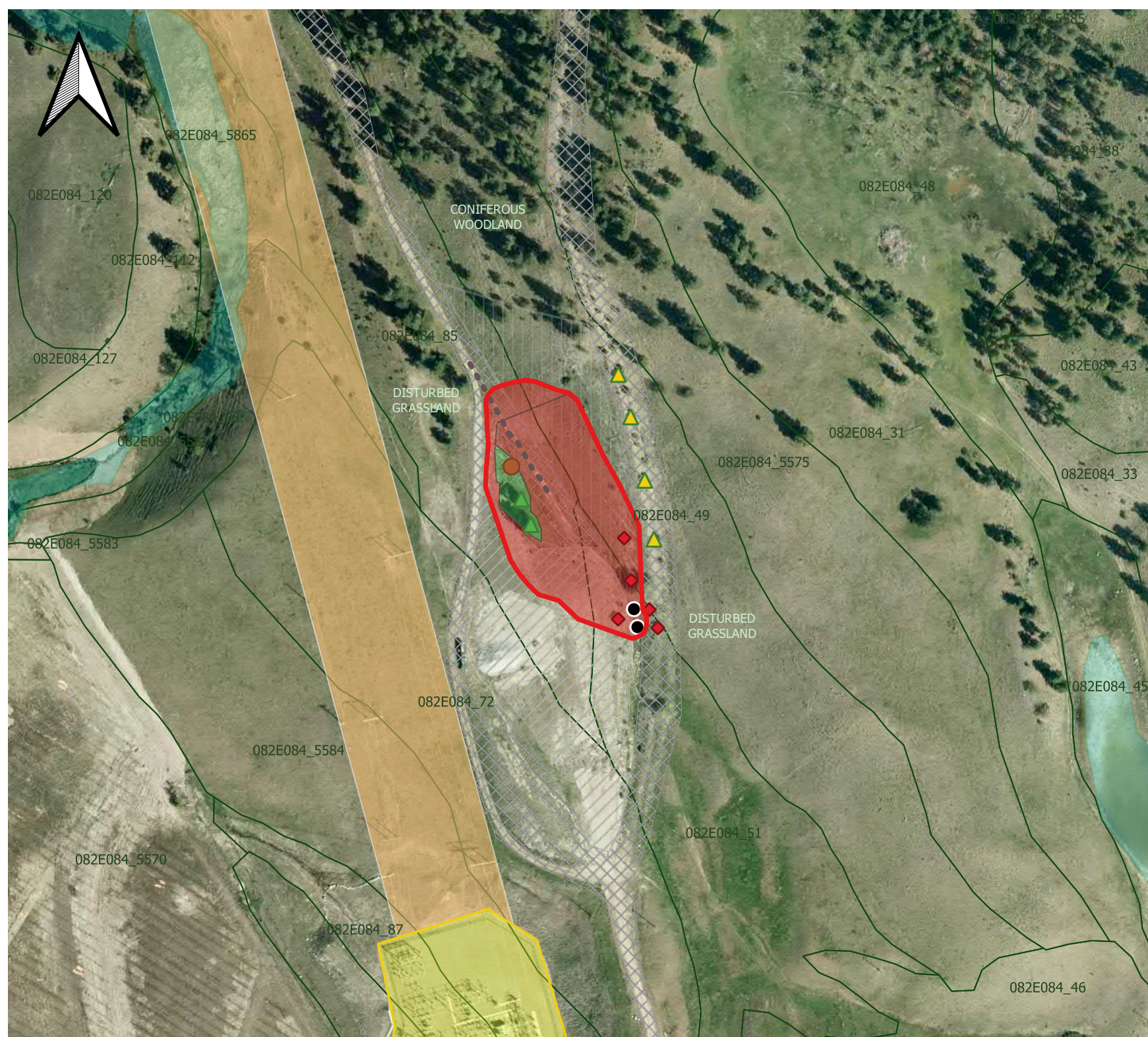
The four-class rating system adopted by the Regional District of Central Okanagan was applied to evaluate the Environmentally Sensitive Areas (ESAs) within the study area. ESAs are essential to the maintenance of productive and diverse ecological communities. This rating system was used to categorize the study area on a multitude of factors including ecosystem rarity and sensitivity, wildlife habitat suitability, the potential for sensitive species and ecosystems to occur, functional condition (i.e., ecological connectivity, level of disturbance, seral stage, structural stage etc.) and fragility. Categorizing the study area into respective ESA ratings was undertaken by analysing the data collected from the desktop research and field reconnaissance, and professional opinion of the functional environmental requisites of the respective wildlife and ecosystems that occupy the study area (RDCO, 2019). The four-class rating system defined by the RDCO (2019) is as follows:

1. **ESA-1 – Very Significant:** Areas with significant flora and fauna populations that represent a diverse range of sensitive habitats and species and significantly contribute to the overall connectivity of the habitat and ecosystems. Avoidance and conservation are the primary mitigation measures for ESA-1. Development can only occur in these areas if it is proved impossible or impractical to maintain the same level of ecosystem function. If this is proved, compensation will still be required to ensure no net loss to the habitat has occurred.
2. **ESA-2 – Moderate Significance:** Areas that contribute towards the overall diversity and contiguous nature of the surrounding natural features. If development is pursued, portions of the habitat should be retained and integrated to maintain the contiguous nature of the landscape. Some loss in these ESAs can be offset by habitat enhancements to the remaining natural areas found on the property.
3. **ESA-3 – Low Significance:** Areas that contribute to the overall diversity of the landscape, however due to the condition and adjacency of each habitat, the significant function within the landscape is limited. If development is pursued in these areas the impacts should be offset by habitat enhancements in other more sensitive natural areas found on the property.
4. **ESA-4 – Little or No Significance:** Areas that contribute little or no value to the overall diversity, flora or fauna, soils, terrain, and wildlife characteristics of the area. Development in these areas is encouraged before considering development in higher rated ESAs. These areas should not be considered for restoration, enhancements or as recruitment as a higher value ESA in offsetting development in other areas.

The ESAs within the study area are summarized in **Table 4.3** and shown on **Figure 4.1**.

Table 4.3: Summary of Ecosystems and ESA Ratings within the Study Area

Habitat Type	SEI Class	Ecosystems and Distribution within the Study Area	Other Considerations	ESA Rating	Study Area (m ²)	Study Area %
Grassland (Disturbed)	Grasslands disturbed (GR:dg)	Within the study area, there are two TEM polygons that Iverson et al. (2008) identified as containing Kentucky bluegrass – stiff needlegrass, Idaho fescue – bluebunch wheatgrass, and bluebunch wheatgrass – balsamroot ecosystems. Based on the results of the field reconnaissance, the study area is mainly comprised of invasive herbaceous plant species that are not representative of the native grassland ecosystems within the Okanagan variant of the IDFxh subzone.	Although the grassland habitat was disturbed within the study area, grasslands are recognized as one of the Province’s most threatened ecosystems. Grasslands support a unique assemblage of species, including a high proportion of rare and at-risk species. Grasslands are very sensitive to disturbance and recovery can take decades (Iverson et al., 2008).	ESA-3	5,250	92.6
Coniferous Woodland (Disturbed)	Woodland, coniferous (WD:co)	Within the study area, there is one TEM polygon that Iverson et al. (2008) identified as partially containing Douglas-fir / ponderosa pine – bluebunch wheatgrass (DW) ecosystems. The field reconnaissance confirmed that the study area lacks woodland ecosystems due to past disturbances. There were two mature ponderosa pine observed within the west boundary of the study area. Young ponderosa pine were also observed along the trail located to the east of the study area.	Most coniferous woodlands in the Okanagan consist of open canopies. Coniferous forests provide habitat to both forest and grassland species. Some species rely on the unique transition between forest and grassland ecosystems. Forests with a greater structural stage are of a higher conservation value than younger structural stage forests on average. The study area contains two mature conifers and a small amount of large woody debris. These features were given an ESA rating of 2 as they contribute towards the overall diversity and contiguous nature of the surrounding natural features.	ESA-2	420	7.4
TOTAL					5,670	100



LEGEND


- Fill Placement Area
- Large Woody Debris
- Ponderosa Pine (Pole/Sapling)
- Ponderosa Pine (Mature)
- Tree - Invasive
- Boulder Pile
- Trail - Access Road
- ESA 3 - Low Significance
- ESA 2 - Moderate Significance
- Wetland - Drainage
- FortisBC Substation
- High Voltage Overhead Power Line
- Disturbed - Fill Area
- Disturbed - Trail - Road
- Disturbed - Steep Slopes
- SEI Polygon

0 50 100 m

Figure 4.1 - Site Features and Environmental Sensitivity

PROJECT - Water Treatment - Dried Sludge Fill Placement

CLIENT - Black Mountain Irrigation District

 <p>NORTHLAND ENVIRONMENTAL</p>	<p>Coordinate System WGS 84 / Pseudo-Mercator EPSG 3857 Scale 1:3500 2021-04-30</p>
---	---

Map Prepared by Northland Environmental Ltd. using QGIS (2021).

QGIS Development Team. 2021. QGIS Geographic Information System. Open Source Geospatial Foundation Project. <http://qgis.osgeo.org>. Projection: ESRI Satellite.

4.8 Cultural Resources and Archaeology

A search of the BC Ministry of Agriculture and Lands Integrated Land and Resource Registry was conducted on May 3rd, 2021. The results of the ILRR search revealed no sensitive archaeological records within the study area. The following criteria may indicate the presence of an archaeological site:

- Artifacts (stone tools, worked shell, bone, antler);
- Buried hearths, commonly expressed as dark lenses in the soil;
- Concentrations of animal bones (possibly burned);
- Remains of structural features; and/or
- Human bone.

Heritage resources are protected under the BC Heritage Conservation Act. If archaeological materials are encountered during construction, activities must be halted, and the Archaeology Branch contacted at 250-953-3334 for direction. A copy of the cultural resources and archaeology search results is contained in **Appendix F**.

4.9 Contaminated Sites

A search of the BC Ministry of Agriculture and Lands Integrated Land and Resource Registry was conducted for contaminated sites on May 3rd, 2021. The results of the search revealed no contaminated sites records within the study area. A copy of the contaminated sites search results is contained in **Appendix G**.

5.0 ENVIRONMENTAL / AGRICULTURAL ASSESSMENT

5.1 Valued Ecosystem and Agricultural Components

Based on the review of the background information and baseline site conditions, the following valued ecosystem and agricultural components have the potential to be impacted by the proposed placement of sludge fill on the BMID's property at 2458 Joe Riche Road:

- Terrain and soils;
- Surface water;
- Groundwater;
- Vegetation; and,
- Wildlife and Wildlife Habitat

In addition, based on the project scope, the following social components have the potential to be impacted by the project:

- Cultural resources and archaeology;
- Air quality; and,
- Health and safety.

5.2 Environmental and Agricultural Effects and Mitigation Measures

This section describes the potential environmental and agricultural effects of the project on the valued components. The majority of the study area (approximately 92.6%) is classified as ESA-3 (low environmental sensitivity) and the agricultural capability of the fill placement area is low for most crops without significant site improvements. The potential environmental and agricultural effects of the project and recommended mitigation measures are provided in **Table 5.1**. The project impacts can be avoided or reduced through the implementation of the specified mitigation measures and best management practices.

Table 5.1: Environmental / Agricultural Effects and Mitigation Measures

Valued Ecosystem and Agricultural Components	Project Activities	Environmental and Agricultural Effects	Potential for Impact (low, medium, high)	Mitigation Measures
Terrain and Soils (Lands, Geology)	Excavation, land clearing, grubbing, topsoil stripping, site grading, hauling, and fill placement.	Soil compaction from heavy machinery.	High	<ul style="list-style-type: none"> Survey and mark the fill placement limits to avoid disturbance outside of the project area. Restrict the operation of heavy equipment to the project footprint to minimize the impact on surrounding land.
		Impacts to Class 5 and Class 6 agricultural lands.	Low	<ul style="list-style-type: none"> Strip and stockpile topsoil and organics for redistribution and reclamation of disturbed areas during and after fill placement. Implement a phased approach to fill placement to limit duration and extent of disturbance at all times. Utilize the existing access road to avoid disturbance to adjoining agricultural lands. Conduct sampling and analysis of the fill annually to ensure compliance with the Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health and the BC Hazardous Waste Regulation. Implement a weed management plan. Manage weeds and invasive vegetation in compliance with Invasive Species Management in B.C. Seed all disturbed areas, including the active fill placement area, with a native seed and/or suitable agronomic seed mix during the spring (April-May) and fall (September-October). Limit access to the site using a secured gate and ensure there is no indiscriminate dumping of fill or other materials on site.
		Soil contamination from leaking machinery and/or fuel spills.	Medium	<ul style="list-style-type: none"> Ensure all equipment is clean, leak free and in good operating condition prior to mobilization to the site. Have a spill response and contingency plan and materials in place prior to project initiation. Store all necessary spill abatement and clean-up equipment on-site at a convenient location. Promptly replace any used spill abatement and clean-up materials and maintain a sufficient inventory of materials. Report any spill of a toxic or hazardous material verbally to the Environmental Monitor, and (as required) to the Provincial Environmental Emergencies Program 24-hour telephone line: 1-800-663-3456. Avoid storing fuel on site at all times. Store contaminated absorbents in properly marked, sealed containers and dispose of all contaminated materials through an approved agent or facility.
		Erosion and sediment transport from soil disturbance.	Medium	<ul style="list-style-type: none"> Avoid altering natural drainage patterns and remediate any erosion-prone areas as required. Direct runoff away from disturbed, erosion-susceptible areas. Delay soil disturbance during high precipitation events. Avoid rutting by keeping machinery away from soft or wet ground and using brush matting where required. Implement erosion controls such as silt fence, straw logs and covering materials and ensure that controls are maintained throughout the fill placement project and afterwards until vegetation re-establishes. Inspect erosion and sediment control measures regularly; undertake necessary repairs immediately after damage has been discovered. Stabilize all disturbed areas with native plant materials as soon as the weather permits following completion of the works.
Surface Water	Excavation, land clearing, grubbing, topsoil stripping, site grading, hauling, and fill placement.	Impacts on natural drainage patterns	Low	<ul style="list-style-type: none"> The finished grade of the fill must complement adjoining landforms and provide for a smooth transition between the land contours and drainage patterns in the area. Place fill in a manner that improves the agricultural capability of the land and avoids disturbance to adjoining agricultural areas.
		Contamination resulting from spills, leaks or releases by heavy machinery and construction equipment.		<ul style="list-style-type: none"> Restrict the operation of heavy machinery to designated areas away from surface water. Have a spill response and contingency plan in place prior to project initiation. Keep project area clean and orderly at all times; ensure no indiscriminate dumping of waste and litter. Dispose of waste only at approved offsite facilities. Direct runoff away from disturbed, erosion-susceptible areas (Refer to measures specified above for further details). Delay stripping, hauling and placing activities during high precipitation events.
Ground Water	Excavation, land clearing, grubbing, topsoil stripping, site grading, hauling, and fill placement.	Groundwater contamination from leaking equipment, fuel/oil spill.	Medium	<ul style="list-style-type: none"> Designate an area for fueling and ensure all equipment is clean, leak free and in good operating condition prior to mobilizing to the site. Have a spill response and contingency plan and clean-up materials in place prior to project initiation.

Valued Ecosystem and Agricultural Components	Project Activities	Environmental and Agricultural Effects	Potential for Impact (low, medium, high)	Mitigation Measures
Vegetation	Excavation, land clearing, grubbing, topsoil stripping, site grading, hauling, and fill placement.	Disturbance of vegetation in study area and impacts to nearby cultivated fields and rangelands.	High	<ul style="list-style-type: none"> Physically mark clearing, grubbing and stripping boundaries on the site and limit vegetation disturbance/removal within that marked boundary. Avoid removal of the two mature ponderosa pine located within the west limits of the fill placement project area. Grade site to minimize impacts to native vegetation and adjoining agricultural lands. Restrict the operation of machinery to designated areas to minimize the impact on outlying vegetation. Where possible, retain large trees and snags, logs, rock crevices and dense shrubby thickets. Ensure equipment and materials are free of invasive plant materials. Minimize project footprint and avoid disturbance of the riparian area of Mission Creek. Undertake habitat restoration and offsetting for the loss of all vegetation (i.e., loss of vegetation from clearing the project area) to ensure no net loss of productive habitat capacity. A habitat offsetting plan shall be prepared by a qualified professional based on the vegetation removals and habitat values present within the project area. Seed all disturbed areas, including the active fill placement area, with a native seed and/or suitable agronomic seed mix during the spring (April-May) and fall (September-October). The seeding shall comply with the Canada Seed Act and BC Weed Control Act. The application rates shall comply with industry standards and best practices.
		Potential introduction of invasive and non-native vegetation to the study area.		
Wildlife and Wildlife Habitat	Excavation, land clearing, grubbing, topsoil stripping, site grading, hauling, and fill placement.	Permanent loss of wildlife habitat, including habitat for ungulates, small mammals, birds and herptiles in coniferous forest.	Low	<ul style="list-style-type: none"> Minimize the project footprint and avoid disturbance to adjoining habitats. Re-seed disturbed areas with native species to deter noxious weed invasion and to capture overland flow during rain events or snowmelt. During operation of the sludge drying ponds, all disturbed areas including the sludge material must be continually seeded with a native seed and/or suitable agronomic seed mix suitable for upland habitats within the Okanagan. All weeds and invasive vegetation must be removed regularly to avoid impacts on adjoining habitats. Undertake habitat restoration and offsetting for the loss of all habitat to ensure no net loss of productive habitat capacity. A habitat offsetting plan shall be prepared by a qualified professional based on the vegetation removals and habitat values present within the project area and in accordance with the habitat offsetting and restoration specified in this report (at a minimum).
		Impacts to species at risk populations and/or critical habitat.	Medium	
		Temporary disruption of wildlife behaviour from noise and air quality effects and increased human contact.		
Cultural Resources and Archaeology	Excavation, land clearing.	Disturbance/destruction of archaeological sites.	Low	<ul style="list-style-type: none"> If archaeological materials are discovered during construction, work must cease immediately and the contractor must contact the designated monitor who will in turn contact the Ministry of Tourism, Culture and the Arts, Archaeology Branch for further guidance.
Air Quality	Heavy equipment operating on site.	Dust and exhaust fumes may impact local air quality and vegetation.	Low	<ul style="list-style-type: none"> Spray stockpiled earthen materials and exposed soils with water as necessary to reduce airborne dust. When necessary in prevailing wind conditions, place wind fencing upwind of stockpiled materials that have the potential to create dust. Avoid unnecessary idling of machinery.
Health and Safety	Heavy equipment operating on site.	Personal health and safety of construction workers.	Low	<ul style="list-style-type: none"> Adhere to WorkSafe BC standards. Ensure appropriate safety information and warning signage is displayed in visually prominent areas during construction activities.

5.3 Environmental Effects Due to Incidents and Malfunctions

Precautions are required in the case of an incident or malfunction and best management practices should always be followed during the project. Safety measures must be in place to avoid leaks and spills associated with the operation of heavy machinery. A spill response and contingency plan must be developed and implemented prior to site mobilization. The purpose of the plan is to ensure that appropriate procedures are in place to respond and deal with spills of hazardous materials. The contractor (operator) must provide, in accordance with applicable federal, provincial or local requirements, suitable equipment and facilities and take all necessary precautions to prevent the discharge of contaminants which may pollute or degrade the natural environment.

All necessary spill abatement and clean-up equipment shall be stored on site at a convenient location where it is ready for use at all times. Any used spill abatement and clean-up materials must be promptly replaced, and a sufficient inventory of materials must be maintained throughout the project.

The operator's staff and all subcontractors must immediately report any spill of a toxic or hazardous material verbally to the Site Superintendent, Environmental Monitor, and (as required) to the Provincial Environmental Emergencies Program 24-hour telephone line: 1-800-663-3456.

All construction and operation personnel shall be familiar with the following spill response procedure.

Step 1

- Identify product and extent of contamination;
- Identify any safety concerns; and
- Notify Project Superintendent.

Step 2

- Eliminate the source of the spill;
- Contain the spill and mark the extent of the spill;
- Pick up spill using pads, booms, pillows or granular absorbent;
- For spills to water, isolate the contamination, if possible;
- Dispose of contaminated materials and spill cleaning equipment at suitable approved locations; and,
- Report the spill to the above noted personnel and fill out an incident report sheet for any incident that occurs.

5.4 Residual Effects

Residual effects are those effects that remain after the mitigation measures have been applied. Residual effects are anticipated to be low and localized, as the majority of the project is within disturbed grasslands with steep gradients and limited agricultural capability. Site restoration will be undertaken in general conformance with best practices as directed by a qualified professional, to improve agricultural capability while ensuring no net loss of productive habitat capacity.

6.0 MONITORING AND REPORTING

A monitoring program will be undertaken to ensure that the prescribed mitigation measures are adhered to for the duration of the project. An experienced Qualified Monitor will inspect, evaluate, and report on the effectiveness of work practices and mitigation measures and recommend and oversee improvements, as necessary. The Monitor will evaluate the compliance of the operator with specified work practices and procedures to avoid and/or minimize environmental and agricultural impacts. The Monitor will have the authority to stop work if there is potential for adverse effects and/or the activity is not in compliance with the regulatory requirements, and/or the specified mitigation measures.

As required, the Monitor will provide advice to the Operator concerning incident response, remediation procedures and methods to resolve non-conformances. The Operator will be obligated to inform the Monitor of any incidents and near misses that occur while the Monitor is not on-site. The Monitor is responsible for monitoring water quality for all activities that have potential to contribute to the sedimentation or release of deleterious substances to watercourses and connecting drainages.

6.1 Documentation and Records

The Monitor is responsible for maintaining documentation and records of all relevant information pertaining to applicable practices and mitigation measures. Relevant and/or significant information to be documented includes:

- accidents, spills, leaks, and releases and the reporting and clean-up procedures used;
- reviews, improvements and adjustments to mitigation measures;
- records of monitoring activities, including equipment inspection and maintenance;
- site operation and restoration activities; and,
- contingency measures utilized, if any.

7.0 OPERATING AND RECLAMATION PLAN

The fill placement will be conducted in accordance with the general guidelines for soil and fill use applications specific to the placement of fill on agricultural land in the Agricultural Land Reserve (ALR) to support soil bound agriculture. The operating and reclamation objectives include:

- Fill placement will aid the farm/farming activity;
- Fill placement will not reduce the agricultural capability of the land, degrade soils, or limit the range of crops that can be grown on the subject property compared to the current crop suitability of the land;
- Fill placement will follow standard agricultural best practices;
- Fill placement will aid in the rehabilitation of agricultural lands severely impacted by past fill activities or other activities that have degraded agricultural land whether permitted or not permitted;
- Fill placement will not foul, obstruct, or impede the flow of any waterway; and,
- The final finished grade of the subject property will compliment adjacent landforms and provide for a smooth transition between the land contours and drainage channels on adjacent lands and the reclaimed area.

The fill placement will be conducted in accordance with the specified mitigation measures and the plans and cross-sections shown on the design drawing. The fill placement will be implemented following a phased approach to limit the duration and extent of disturbance at all times. The existing access road will be used for hauling fill material to avoid disturbance to adjoining agricultural lands. Sampling and analysis of the fill will be conducted annually to ensure compliance with the Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health, the BC Hazardous Waste Regulation, and other applicable standards and guidelines.

Weed management will be conducted in compliance with Invasive Species Management in B.C. All disturbed areas, including the active fill placement area, will be seeded with a native seed and/or suitable agronomic seed mix during the spring (April-May) and fall (September-October). Erosion controls such as silt fence, straw logs and covering materials will be implemented and maintained throughout the fill placement project and afterwards until vegetation re-establishes. The erosion and sediment control measures will be inspected regularly and after every major rain. All necessary repairs will be undertaken immediately after damage has been discovered. A qualified professional will review and sign off on the completed fill placement.

Site reclamation will be undertaken in general conformance with best practices as directed by a qualified professional, to improve agricultural capability while ensuring no net loss of productive habitat capacity. Organic materials and topsoil will be stockpiled and redistributed over disturbed areas on site. The final finished grade of the project area will complement adjacent landforms and provide for a smooth transition between the land contours and drainage patterns on adjacent lands and the reclaimed area. The project area, stockpiles and any adjoining disturbed areas will be broadcast seeded and/or hydraulic seeded with a suitable agronomic and/or native seed mix to help prevent the establishment of invasive plants species.

8.0 SUMMARY AND CONCLUSION

The assessment report was prepared to evaluate the environmental and agricultural considerations of the proposed dried sludge fill placement within the BMID subject property. The fill placement project area is situated in a north-south oriented depression. There is limited capability and suitability for agriculture within the project area due to the steep slopes and the disturbed nature of the soils from past fill placement.

The dried sludge fill material will be hauled from the drying/containment areas located at the BMID water treatment plant site. Prior to the placement of fill, any suitable topsoil will be stripped and stockpiled for site reclamation activities. The fill will be placed in a manner that improves the agricultural capability of the land and avoids disturbance to adjoining vegetation. The finished grade of the fill will complement adjoining landforms and provide for a smooth transition between the land contours and drainage patterns in the area.

Residual effects are anticipated to be low and localized, as the project is within disturbed grasslands with steep gradients and limited agricultural capability. With the implementation of the recommended mitigation measures, significant adverse effects arising from the project can be avoided. Site restoration will be undertaken in general conformance with best practices as directed by a qualified professional, to improve agricultural capability while ensuring no net loss of productive habitat capacity.

A monitoring program will be undertaken to ensure that the operating and reclamation objectives are achieved, and the prescribed mitigation measures are adhered to for the duration of the project. An experienced qualified professional will inspect, evaluate, and report on the effectiveness of work practices and mitigation measures and recommend and oversee improvements, as necessary.

9.0 REFERENCES

- BC Conservation Data Centre. 2021. CDC Internet Mapping Service. Available: <http://www.env.gov.bc.ca/cdc/>. Accessed April 4, 2021.
- BC Ministry of Agriculture and Lands. 2021. Integrated Land and Resource Registry. Available: <https://apps.gov.bc.ca/apps/ilrr/html/ILRRWelcome.html>. Accessed May 3, 2021.
- BC Ministry of Agriculture and BC Ministry of Environment & Climate Change. 2018. BC Soil Information Finder Tool interactive mapping application. Available: <https://governmentofbc.maps.arcgis.com/apps/MapSeries/index.html?appid=cc25e43525c5471ca7b13d639bbcd7aa> Accessed May 5, 2021.
- BC Ministry of Environment. 2021. Amphibians and Reptiles. Available: <https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/wildlife/wildlife-conservation/amphibians-reptiles> Accessed April 4, 2021.
- BC Ministry of Environment. 2021. BC Species and Ecosystems Explorer. Available: <http://a100.gov.bc.ca/pub/eswp/> Accessed April 4, 2021.
- BC Ministry of Environment. 2019. Protecting BC's Biodiversity. Available: <https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/biodiversity> Accessed April 4, 2021.
- BC Ministry of Environment. 1986. Soils of the Okanagan and Similkameen Valleys. Report No.52, BC Soil Survey. Available: http://www.env.gov.bc.ca/esd/distdata/ecosystems/Soils_Reports/bc52_report.pdf Accessed April 29, 2021.
- BC Ministry of Forests, Lands and Natural Resource Operations. 2021. BC Water Resource Atlas. Available: http://www.env.gov.bc.ca/wsd/data_searches/wrbc/. Accessed April 23, 2021.
- BC Ministry of Forests, Lands and Natural Resource Operations. 2021. BC Habitat Wizard. Available: <http://www.env.gov.bc.ca/habwiz/>. Accessed April 23, 2021.
- BC Ministry of Forests, Lands, and Natural Resource Operation and Rural Development. 2018. Vegetation Resources Inventory – Field Calibration Procedures for Photo Interpretation. v.1.8.
- COSEWIC. 2012. COSEWIC assessment and status report on the American Badger *Taxidea taxus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. iv + 63 pp. (www.registrelep-sararegistry.gc.ca/default_e.cfm).
- eBird Canada. 2019. eBird online database – explore. Available: <https://ebird.org/canada/hotspots?env.minX=-139.052198&env.minY=48.308613&env.maxX=-114.054222&env.maxY=60.000064&yr=all&m=> Accessed April 23, 2021.
- Government of BC. 2021. iMap interaction mapping application. Available: <https://maps.gov.bc.ca/ess/hm/imap4m/> Accessed April 4, 2021.

Hope, G.D., Mitchell, W.R., Lloyd, D.A., Erickson, W.R., Harper, W.L., and Wikeem, B.M. 1991. Chapter 10: Interior Douglas-fir Zone in Ecosystems of British Columbia Eds. Meidinger, D. and Pojar, J. British Columbia Ministry of Forests, Research Branch, Victoria, British Columbia.

iNaturalist. 2021. Explore – Observations database mapping application. Available:
https://www.inaturalist.org/observations?place_id=any Accessed April 4.

Iverson, K., Curran, D., Fleming, T., and Haney, A. 2008. Sensitive Ecosystem Inventory Okanagan Valley: Vernon to Osoyoos 2000-2007. Methods, Ecological Descriptions, Results and Conservation Tools. Available:
http://a100.gov.bc.ca/appsdata/acat/documents/r15326/sei_ok_valley_2000_2007_final_1224694292657_8e248a8d30d931f7d0dfae76458d9f18d94704392c82.pdf Accessed April 23, 2021.

Regional District of Central Okanagan. 2021. Environmentally Sensitive Areas. Available:
<https://www.regionaldistrict.com/your-services/planning-section/environmental/development-permits-areas/sensitive-areas.aspx> Accessed March 15, 2021.

Species at Risk Public Registry. 2021. Schedule 1 – List of Wildlife species at Risk. Available:
<https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html>
Accessed March 15, 2021.

APPENDIX A

SITE PHOTOS

Fill Placement Area (PID: 001-715-224): Site Photos – 2020-11-06; 2021-03-22



Photo 1.1: Adjoining lands to the south of the fill placement area



Photo 1.2: Northwest fill placement limits and adjoining access road

Fill Placement Area (PID: 001-715-224): Site Photos – 2020-11-06; 2021-03-22



Photo 1.3: Access road and FortisBC electrical substation and transmission line



Photo 1.4: View looking towards the south limits of the fill placement area

Fill Placement Area (PID: 001-715-224): Site Photos – 2020-11-06; 2021-03-22



Photo 1.5: South limits of the fill placement area



Photo 1.6: View looking northwest across the fill placement area

Fill Placement Area (PID: 001-715-224): Site Photos – 2020-11-06; 2021-03-22



Photo 1.7: View of the fill placement area looking southwest from the steep side slope



Photo 1.8: Disturbed trail and side slope to the east of the fill placement area

Fill Placement Area (PID: 001-715-224): Site Photos – 2020-11-06; 2021-03-22



Photo 1.9: Cobbles and boulders at the toe of the slope within the fill placement area



Photo 1.10: Fractured rock within the fill placement area

Fill Placement Area (PID: 001-715-224): Site Photos – 2020-11-06; 2021-03-22



Photo 1.11: Ponderosa pine, rose *spp.* and Siberian elm along slope at south project limits



Photo 1.12: Invasive Siberian elm trees within the south limits of the fill placement area

Fill Placement Area (PID: 001-715-224): Site Photos – 2020-11-06; 2021-03-22



Photo 1.13: Rose *spp.* near south limits of the fill placement area



Photo 1.14: Pile of boulders inside the south limits of the fill placement area

Fill Placement Area (PID: 001-715-224): Site Photos – 2020-11-06; 2021-03-22



Photo 1.15: Fractured rock within the south limits of the fill placement area



Photo 1.16: Sandy, gravelly textured soils along east side slope of the fill placement area

Fill Placement Area (PID: 001-715-224): Site Photos – 2020-11-06; 2021-03-22



Photo 1.17: Crested wheatgrass within the fill placement limits



Photo 1.18: Sandy, gravelly textured soils of the east slope of the fill placement area

Fill Placement Area (PID: 001-715-224): Site Photos – 2020-11-06; 2021-03-22



Photo 1.19: Large woody debris within the northwest limits of the fill placement area



Photo 1.20: sandy, gravelly soils of west slope of the fill placement area

Fill Placement Area (PID: 001-715-224): Site Photos – 2020-11-06; 2021-03-22



Photo 1.21: West-facing slope grasses above the fill placement area



Photo 1.22: Mature ponderosa pine trees within the west limit of the fill placement area

Fill Placement Area (PID: 001-715-224): Site Photos – 2020-11-06; 2021-03-22



Photo 1.23: Fill placement and site disturbance along the southwest limits of the project area

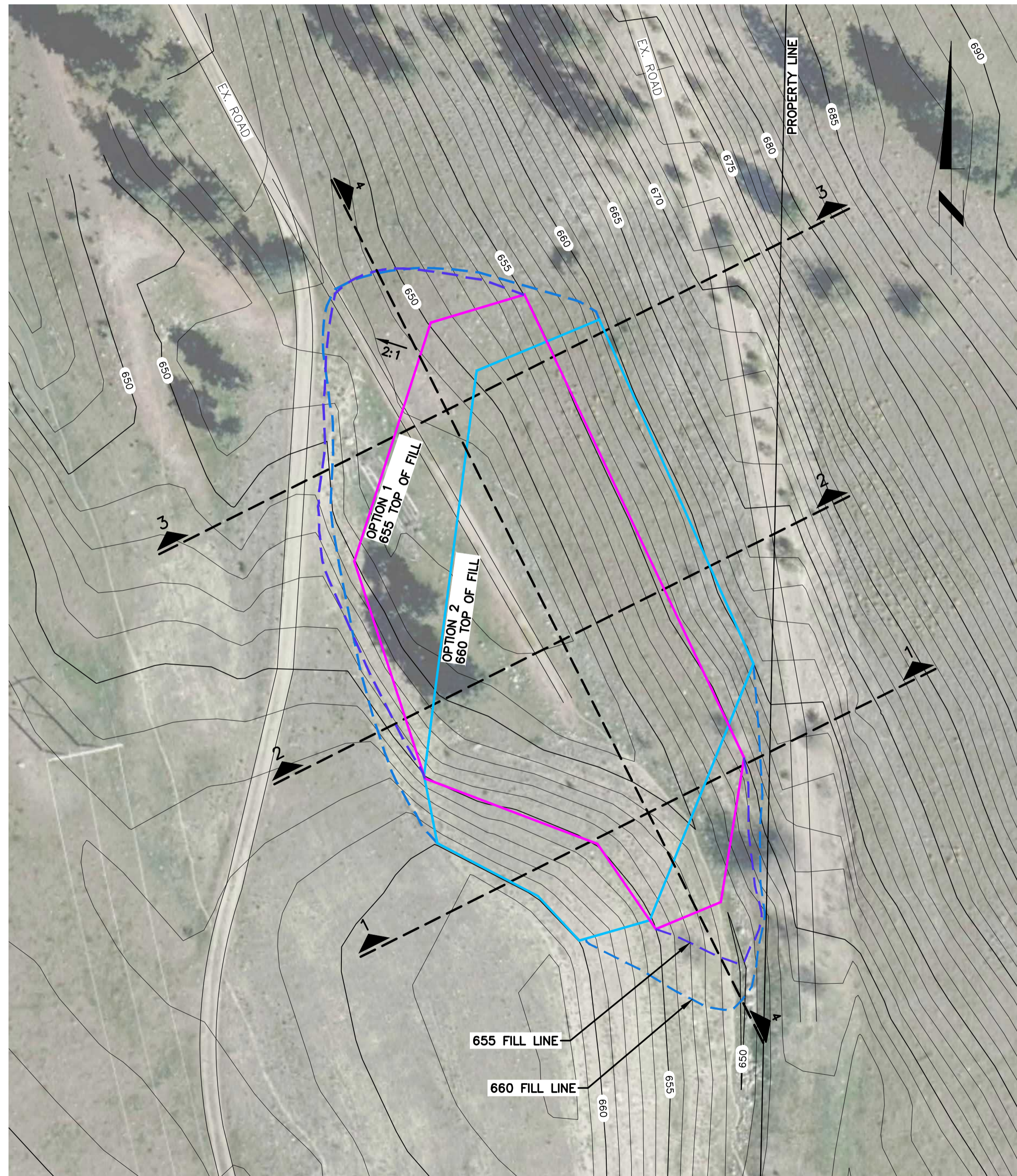


Photo 1.24: Site access and overhead electrical transmission lines west of the fill placement area

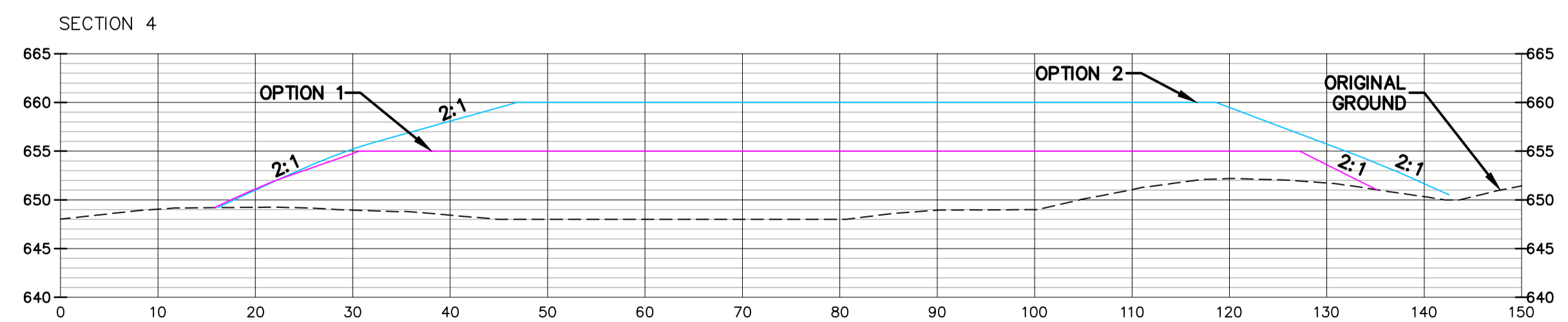
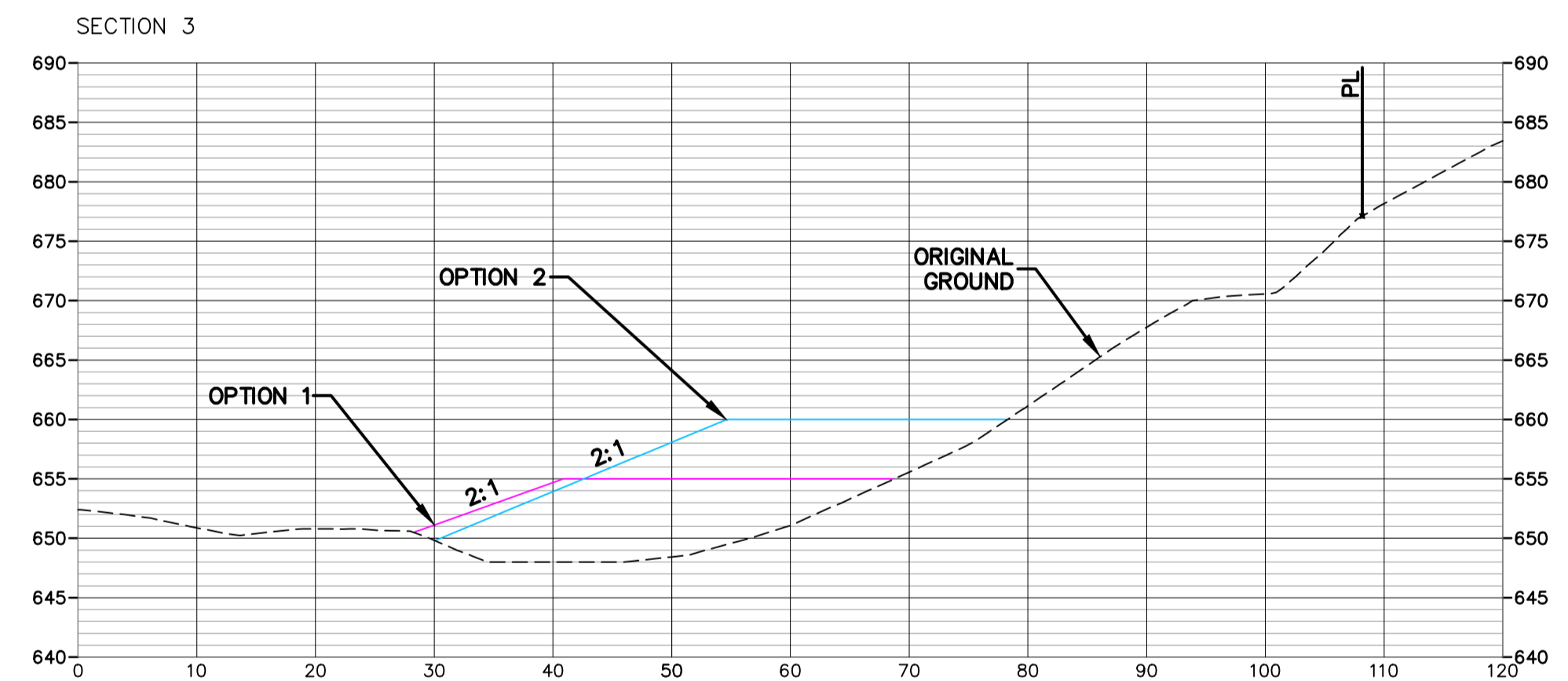
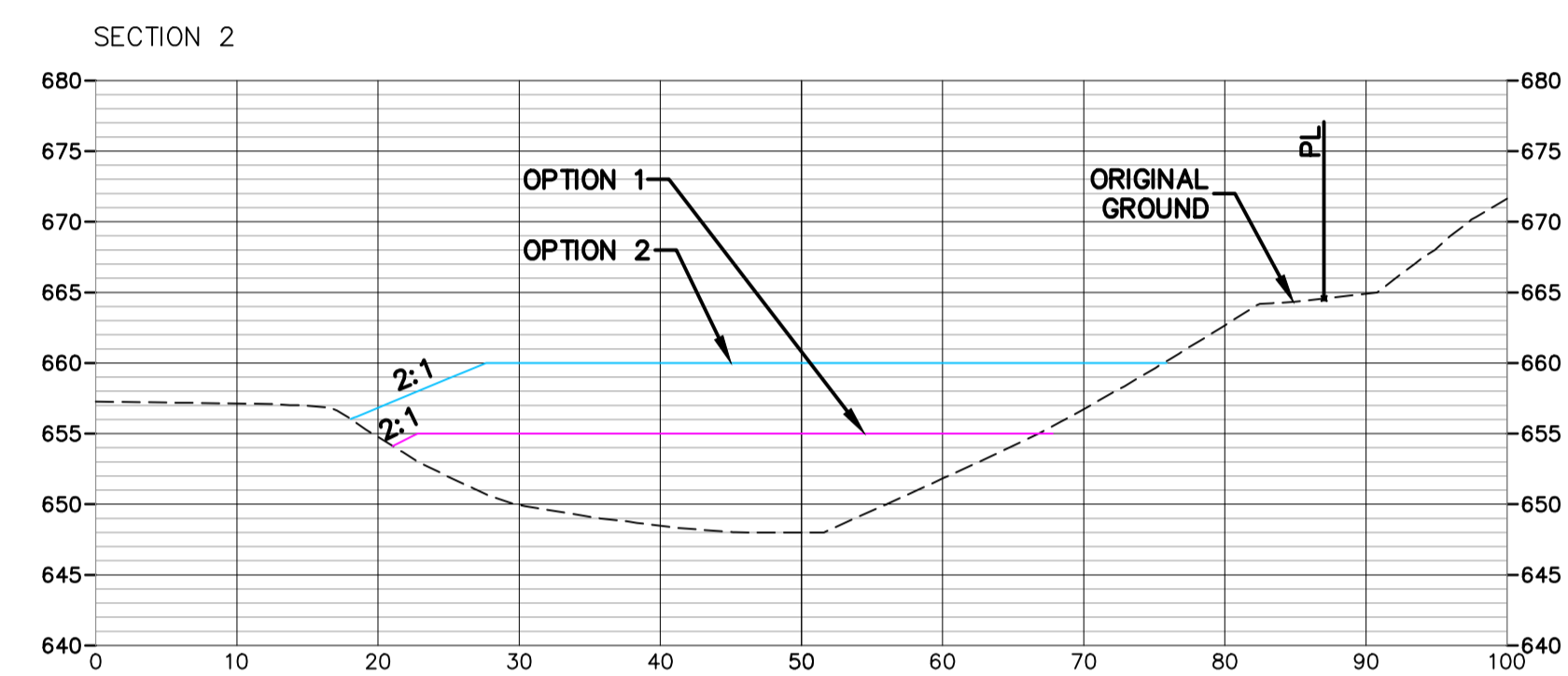
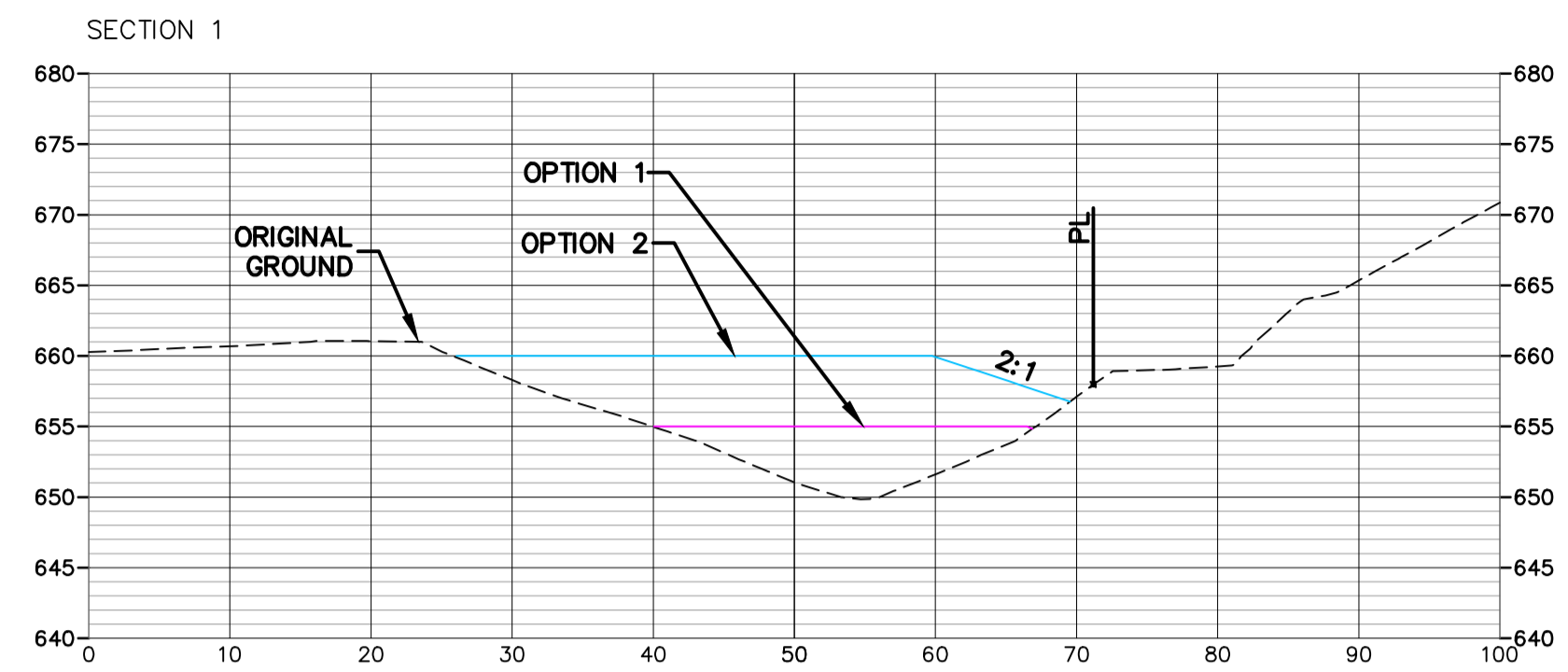
APPENDIX B

DESIGN DRAWINGS

OPTION VOLUMES		
OPTION #	TOP OF FILL ELEVATION (m)	FILL CAPACITY (m ³)
OPTION 1	655	17235
OPTION 2	660	34680



SITE PLAN
1:500



NOTE:
ORIGINAL GROUND CONTOURS SHOWN AT 1.0m INTERVALS
BASED ON CITY OF KELOWNA GIS DATA 2019.

SLUDGE FILL OPTIONS
PROJECT No. 17097-44
DRAWING No. SK-01
SCALE 1:500
December 2, 2020



APPENDIX C

AQUIFER AND GROUNDWATER WELL SEARCH RESULTS



Groundwater Wells and Aquifers

Well Summary

Well Tag Number: 24117	Well Status: New	Observation Well Number:
Well Identification Plate Number:	Well Class: Unknown	Observation Well Status:
Owner Name: PETER DEGENHARDT	Well Subclass:	Environmental Monitoring System (EMS) ID:
Intended Water Use: Unknown Well Use	Aquifer Number: 46Z	Alternative specs submitted: No
Artesian Condition: No		

Licensing Information

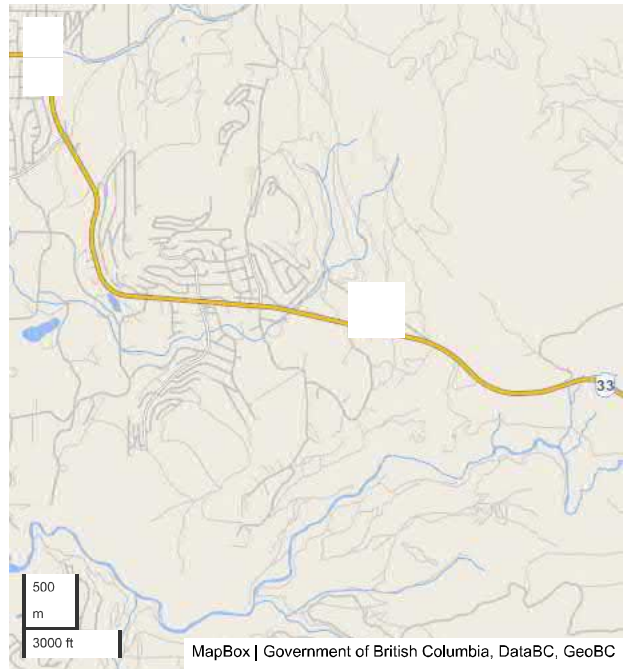
Licensed Status: Unlicensed **Licence Number:**

Location Information

Street Address: HWY 33
Town/City: RUTLAND

Legal Description:

Lot	A
Plan	23176
District Lot	
Block	
Section	18
Township	27
Range	
Land District	41
Property Identification Description (PID)	



MapBox | Government of British Columbia, DataBC, GeoBC

Description of Well Location:

Geographic Coordinates - North American Datum of 1983 (NAD 83)

Latitude: 49.865538 **Longitude:** -119.333858
UTM Easting: 332281 **UTM Northing:** 5526293
Zone: 11 **Coordinate Acquisition Code:** (200 m accuracy) Digitized from 1:50,000 maps

Well Activity

Activity	Work Start Date	Work End Date	Drilling Company	Date Entered
Legacy record	1970-10-28	1970-10-28	Pacific Water Wells	August 13th 2003 at 8:00 AM

Well Work Dates

Start Date of Construction	End Date of Construction	Start Date of Alteration	End Date of Alteration	Start Date of Decommission	End Date of Decommission
1970-10-28	1970-10-28				

Well Completion Data

Total Depth Drilled:	Estimated Well Yield: 1.5 USgpm	Static Water Level (BTOC): 20 feet btoc
Finished Well Depth: 50 ft bgl	Well Cap:	Artesian Flow:
Final Casing Stick Up:	Well Disinfected Status: Not Disinfected	Artesian Pressure (head):
Depth to Bedrock:	Drilling Method: Other	Artesian Pressure (PSI):
Ground elevation:	Method of determining elevation: Unknown	Orientation of Well: VERTICAL

Lithology

From (ft bgl)	To (ft bgl)	Raw Data	Description	Moisture	Colour	Hardness	Observations	Water Bearing Flow Estimate (USGPM)
0	20	cobbles and boulders						
20	40	stoney clay						
40	45	stones, fine sand, w.b.						
45	50	till						

Casing Details

From (ft bgl)	To (ft bgl)	Casing Type	Casing Material	Diameter (in)	Wall Thickness (in)	Drive Shoe
There are no records to show						

Surface Seal and Backfill Details

Surface Seal Material:	Backfill Material Above Surface Seal:
Surface Seal Installation Method:	Backfill Depth:
Surface Seal Thickness:	
Surface Seal Depth:	

Liner Details

Liner Material:		Liner perforations
Liner Diameter:	Liner Thickness:	
Liner from:	Liner to:	

From (ft bgl)	To (ft bgl)
There are no records to show	

Screen Details

Intake Method:	Installed Screens
Type:	
Material:	
Opening:	
Bottom:	

From (ft bgl)	To (ft bgl)	Diameter (in)	Assembly Type	Slot Size
There are no records to show				

Well Development

Developed by:	Development Total Duration:
----------------------	------------------------------------

Well Yield

Estimation Method:	Estimation Rate:	Estimation Duration:
Static Water Level Before Test:	Drawdown:	
Hydrofracturing Performed: No	Increase in Yield Due to Hydrofracturing:	

Well Decommission Information

Reason for Decommission:	Method of Decommission:
Sealant Material:	Backfill Material:
Decommission Details:	

Comments

METHOD OF DRILLING = DRILLED

Alternative Specs Submitted: Yes

Documents

- [WTN 24117 Well Record.pdf](#)

Disclaimer

The information provided should not be used as a basis for making financial or any other commitments. The Government of British Columbia accepts no liability for the accuracy, availability, suitability, reliability, usability, completeness or timeliness of the data or graphical depictions rendered from the data.

ATTACHMENT		A
This forms part of application		
# A23-0001		
Planner Initials	CD	 City of Kelowna <small>DEVELOPMENT PLANNING</small>



Groundwater Wells and Aquifers

Well Summary

Well Tag Number: 76783
Well Identification Plate Number:
Owner Name: DOUG APPEL
Intended Water Use: Private Domestic
Artesian Condition: No

Well Status: New
Well Class: Water Supply
Well Subclass: Not Applicable
Aquifer Number: 1191

Observation Well Number:
Observation Well Status:
Environmental Monitoring System (EMS) ID:
Alternative specs submitted: No

Licensing Information

Licensed Status: Unlicensed

Licence Number:

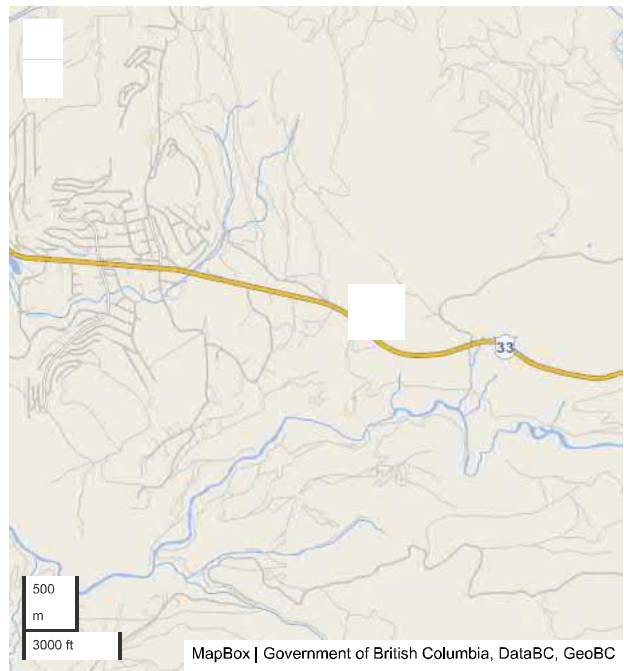
Location Information

Street Address: 3205 HWY 33E
Town/City: KELOWNA

Legal Description:

Lot	A
Plan	20065
District Lot	
Block	
Section	17
Township	27
Range	
Land District	41
Property Identification Description (PID)	

Description of Well Location: EX PL KAP71010



Geographic Coordinates - North American Datum of 1983 (NAD 83)

Latitude: 49.8622 **Longitude:** -119.32108
UTM Easting: 333188 **UTM Northing:** 5525893
Zone: 11 **Coordinate Acquisition Code:** (100 m accuracy) Digitized from old Dept. of Lands, Forests and Water Resources maps

Well Activity

Activity	Work Start Date	Work End Date	Drilling Company	Date Entered
Legacy record	1999-08-30		Cyclone Drilling Ltd.	August 13th 2003 at 9:26 AM

Well Work Dates

Start Date of Construction	End Date of Construction	Start Date of Alteration	End Date of Alteration	Start Date of Decommission	End Date of Decommission
1999-08-30					

ATTACHMENT A
 This forms part of application # A23-0001
 Planner Initials: CD

 City of Kelowna
 DEVELOPMENT PLANNING

Well Completion Data

Total Depth Drilled:
Finished Well Depth: 620 ft bgl
Final Casing Stick Up:
Depth to Bedrock:
Ground elevation:

Estimated Well Yield:
Well Cap: STEEL CAP WELDED TO CASING
Well Disinfected Status: Not Disinfected
Drilling Method: Air Rotary
Method of determining elevation: Unknown

Static Water Level (BTOC):
Artesian Flow:
Artesian Pressure (head):
Artesian Pressure (PSI):
Orientation of Well: VERTICAL

Lithology

From (ft bgl)	To (ft bgl)	Raw Data	Description	Moisture	Colour	Hardness	Observations	Water Bearing Flow Estimate (USGPM)
0	8	BROWN SAND & GRAVEL			brown			
8	135	BLACK WHITE & GREEN GRANITE BEDROCK			black		CASING STOPPED @ 8FT	
135	341	VERY HARD BLACK WHITE & GREEN BEDROCK			black	Very Hard		
341	347	MED TAN & GREY GRANITE BEDROCK			tan	Medium		
347	359	HARD BLACK WHITE & GREEN BEDROCK			black	Hard		
359	372	MED TAN & GREY BEDROCK			tan	Medium		
372	410	HARD BLACK WHITE & GREEN BEDROCK			black	Hard		
410	560	MED BLACK WHITE & GREEN BEDROCK			black	Medium		
560	570	MED TAN & GREY BEDROCK			tan	Medium		
570	575	HARD BLACK WHITE & GREEN BEDROCK			black	Hard		
575	580	TAN & BLACK BEDROCK			tan			
580	595	GREY & GREEN BEDROCK			grey			
595	620	MED BLACK & WHITE BEDROCK			black	Medium		

Casing Details

From (ft bgl)	To (ft bgl)	Casing Type	Casing Material	Diameter (in)	Wall Thickness (in)	Drive Shoe
0	8		Other	6.63	0.25	

Surface Seal and Backfill Details

Surface Seal Material:
Surface Seal Installation Method:
Surface Seal Thickness:
Surface Seal Depth:

Backfill Material Above Surface Seal:
Backfill Depth:

Liner Details

Liner Material:	Liner Thickness:	Liner Diameter:	Liner from:	Liner to:	Liner perforations				
					<table border="1"> <thead> <tr> <th>From (ft bgl)</th> <th>To (ft bgl)</th> </tr> </thead> <tbody> <tr> <td colspan="2" style="text-align: center;">There are no records to show</td> </tr> </tbody> </table>	From (ft bgl)	To (ft bgl)	There are no records to show	
From (ft bgl)	To (ft bgl)								
There are no records to show									

Screen Details

Intake Method:	Installed Screens				
Type:	From (ft bgl)	To (ft bgl)	Diameter (in)	Assembly Type	Slot Size
Material:	There are no records to show				
Opening:					
Bottom:					

Well Development

Developed by: _____ **Development Total Duration:** _____

ATTACHMENT A

This forms part of application # A23-0001


 City of Kelowna
DEVELOPMENT PLANNING

Planner Initials **CD**

Well Yield

Estimation Method:

Static Water Level Before Test:

Hydrofracturing Performed: No

Estimation Rate:

Drawdown:

Increase in Yield Due to Hydrofracturing:

Estimation Duration:

Well Decommission Information

Reason for Decommission:

Sealant Material:

Decommission Details:

Method of Decommission:

Backfill Material:

Comments

NEXT TO RODEO GROUNDS. SOFT SPOTS & FRACTURES AT 21' 42' 85' 93' 106' 110' 130' 135' 350' 367' 519' 525 TO 535 560' 565'

Alternative Specs Submitted: Yes

Documents

- [WTN 76783 Well Record.pdf](#)

Disclaimer

The information provided should not be used as a basis for making financial or any other commitments. The Government of British Columbia accepts no liability for the accuracy, availability, suitability, reliability, usability, completeness or timeliness of the data or graphical depictions rendered from the data.

ATTACHMENT		A
This forms part of application		
# A23-0001		
Planner Initials	CD	 City of Kelowna DEVELOPMENT PLANNING

APPENDIX D

FIELD SURVEYS

Vegetation Observations within the Study Area

Common Name	Scientific Name	Coniferous Woodland	Grassland	Disturbed
Trees				
Interior Douglas-fir	<i>Pseudotsuga menziesii var. glauca</i>	X		X
Ponderosa Pine	<i>Pinus ponderosa</i>	X	X	X
Siberian elm	<i>Ulmus Pumila</i>		X	X
Shrubs				
Prickly Rose	<i>Rosa acicularis</i>		X	X
Saskatoon	<i>Amelanchier alnifolia</i>		X	X
Tall Oregon-grape	<i>Mahonia aquifolium</i>		X	X
Native Herbaceous				
Bluebunch Wheatgrass	<i>Agropyron spicatum</i>		X	X
Idaho Fescue	<i>Festuca idahoensis</i>		X	X
Yarrow	<i>Achillea millefolium</i>		X	X
Non-Native Herbaceous				
Common Dandelion	<i>Taraxacum officinale</i>		X	X
Cheatgrass	<i>Bromus tectorum</i>		X	X
Crested Wheatgrass	<i>Agropyron cristatum</i>		X	X
Great Mullein	<i>Verbascum thapsus</i>		X	X
Kentucky bluegrass	<i>Poa pratensis</i>		X	X
*Spotted Knapweed	<i>Centaurea diffusa</i>		X	X

*Provincially Noxious Plants

**Regionally Noxious Plants

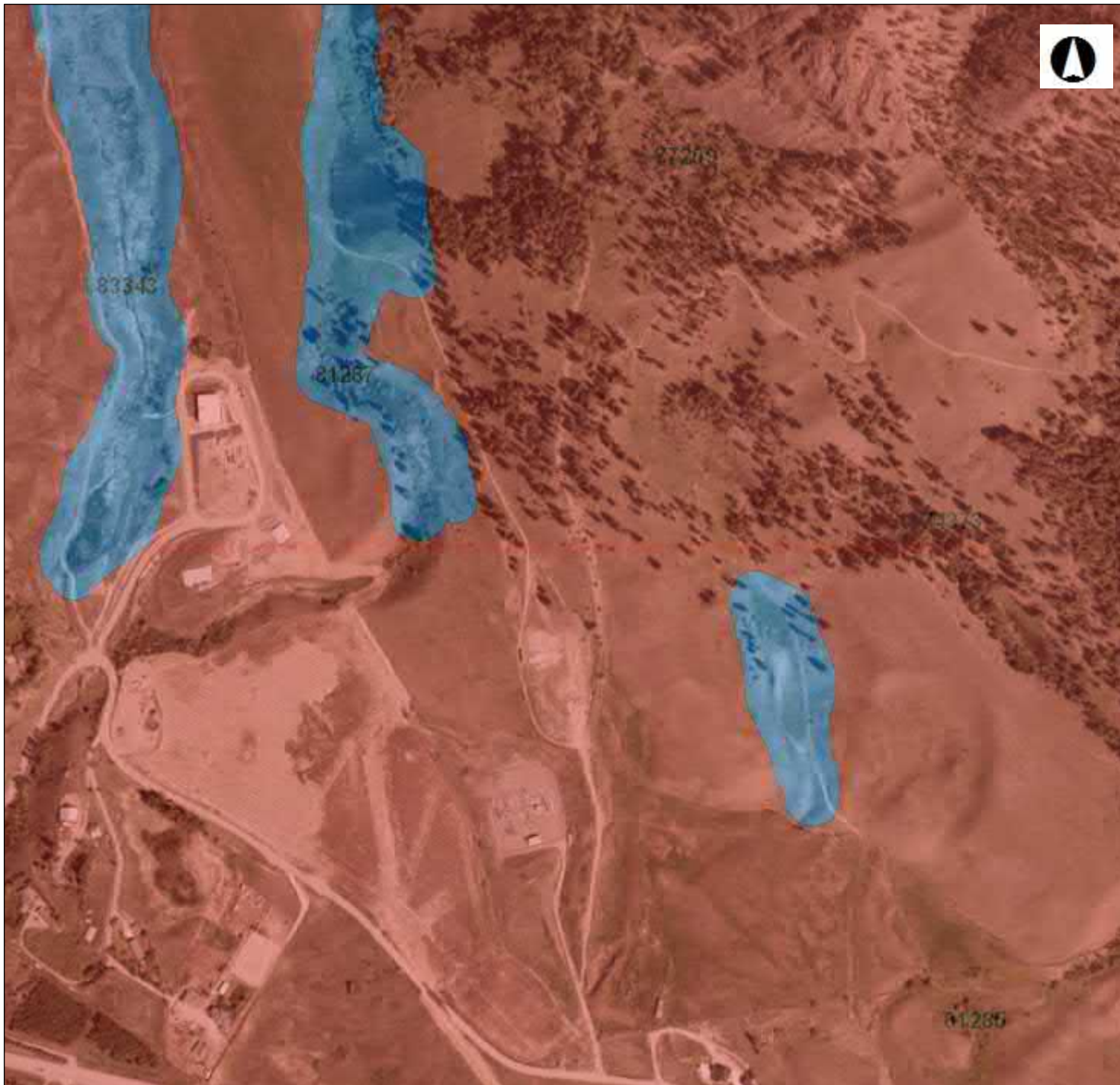
***Invasive Plants of Concern

Wildlife Observations within the Study Area

Common Name	Scientific Name	Coniferous Woodlands	Grassland	Disturbed
Mammals				
Deer sp.	<i>Odocoileus sp.</i>		X	X
Red Squirrel	<i>Tamiasciurus hudsonicus</i>	X		
Birds				
Common Raven	<i>Corvus corax</i>	X		
Red-breasted Nuthatch	<i>Sitta canadensis</i>	X		

APPENDIX E

SENSITIVE SPECIES AND ECOSYSTEMS SEARCH RESULTS



CDC Occurrence Map

Legend

Species and Ecosystems at Available Occurrences - CD

FEATURE_CODE

- Animal - Vertebrate
- Animal - Invertebrate
- Plant - Vascular
- Plant - Non-vascular
- Ecological Community

■ Species and Ecosystems at Secured) Publicly Available

Species and Ecosystems at and Historical) Publicly Available CDC

FEATURE_CODE

- Animal - Vertebrate

0 0.20 0.41 km



1: 10,000

Copyright/Disclaimer

The material contained in this web site is owned by the Government of British Columbia and protected by copyright law. It may not be reproduced or redistributed without the prior written permission of the Province of British Columbia. To request permission to reproduce all or part of the material on this web site please complete the Copyright Permission Request Form which can be accessed through the Copyright Information Page

CAUTION: Maps obtained using this site are not designed to assist in navigation. These maps may be generalized and may not reflect current conditions. Uncharted hazards may exist. DO NOT USE THESE MAPS FOR NAVIGATIONAL PURPOSES.

Datum: NAD83

Projection: WGS_1984_Web_Mercator_Auxiliary_Sphere

Key Map of British Columbia

ATTACHMENT A

This forms part of application

A23-0001

Planner Initials CD



City of Kelowna
DEVELOPMENT PLANNING



BC Conservation Data Centre: Ecosystem Occurrence Report

Shape ID: 77209

Scientific Name: *Populus trichocarpa* - *Pseudotsuga menziesii* / *Acer glabrum* - *Symphoricarpos albus*
English Name: black cottonwood - Douglas fir / Douglas maple - common snowberry

Identifiers

Occurrence ID: 10411
Shape ID: 77209
Element Group: Ecological Community

Status

Provincial Rank: S1S2
BC List: Red
Global Rank: GNR

Locators

Survey Site: MINE HILL, RUTLAND, 2 KILOMETRES EAST OF
Directions:
Biogeoclimatic Unit: IDF xh 1
Ecosection: NOB

Occurrence Information

First Observation Date: 1994 **Last Observation Date:** 2010

Occurrence Data:

This deciduous riparian occurrence is based on Terrestrial Ecosystem Mapping and has been confirmed by a field inspection. The element occurrence occupies an estimated 6% (0.85 ha) of the area shown. The element occurrence is mapped as a mature forest.

General Description:

This element occurrence is located in a depression on the lower slopes of the Okanagan Valley. It is surrounded by grasslands and coniferous woodlands. It is associated with coniferous forest and grasslands.

Environmental Summary:

This occurrence is mapped on morainal and glacial river deposits.

Occurrence Rank and Occurrence Rank Factors

Rank*: E : Verified extant (viability not assessed)

Note: in the case of Ecological Communities, viability should read as ecological integrity

Rank Date:

Rank Comments:

Condition of Occurrence:

Size of Occurrence:

0.85 ha

Landscape Context:

Version

Version Date: 2012-11-28

Version Author: Iverson, K. and A. Haney

Mapping Information

Estimated Representation Accuracy: Low

Estimated Representation Accuracy Comments: The ecological community occupies 6.21% (0.85 ha) of the mapped occurrence.

Confident that full extent is represented by Occurrence: ?

Confidence extent Definition: Uncertain whether full extent of EO is known

Additional Inventory Needed: Y

Inventory Comments: The sample plot is from the Central Okanagan Sensitive Ecosystems Inventory.

This element occurrence is based on available ecosystem mapping. Many factors influence the reliability of an ecosystem map. Depending on the scale of aerial images used to capture the ecosystems, very small ecosystems and some types of disturbance may not be visible and will not be mapped. If the air photos are not current, new disturbance may have occurred since the time of mapping and the inventory may not accurately represent the current state of the landscape. Other factors, such as the skill and experience of the mapper within the study area, and the field survey intensity level will also influence the reliability of the map.

Documentation

References:

- Cadrin, C.M., and J. Christy. 2013a. Element occurrence and element occurrence rank specifications for riparian, broadleaf forests and shrublands of the southern interior of British Columbia. Unpublished document. Version April, 2013. B.C. Minist. Environ., Conservation Data Centre, Victoria, B.C. 4 pp.
- Iverson, K. and C. Cadrin. 2003. Sensitive Ecosystems Inventory: Central Okanagan, 2000-2001. Volume 1: Methodology, Ecological Descriptions, Results and Conservation Tools. Technical Report Series No. 399, Canadian Wildlife Service, Pacific and Yukon Region, British Columbia. 219pp.
- Iverson, K., C. Cadrin, D. Spaeth Filatow, and C. Erwin. 2004. Sensitive Ecosystems Inventory: Central Okanagan, 2000-2001. Volume 2: Terrestrial Ecosystem Mapping, Surface Erosion and Slope Stability, and Expanded Legend. Unpublished report. Minist. Environment, Victoria, BC. and Canadian Wildlife Service, Pacific and Yukon Region.
- Iverson, K., D. Curran, T. Fleming, and A. Haney. 2008. Sensitive Ecosystems Inventory: Okanagan Valley: Vernon to Osoyoos, 2000-2007. Methods, Ecological Descriptions, Results and Conservation Tools. Technical Report Series No. 495, Canadian Wildlife Service, Pacific and Yukon Region, British Columbia. 224pp.
- Terrestrial Ecosystem Mapping [TEM] of portions of the PPxh1 and IDFxh1 in the Central Okanagan. 2002i. Prepared for the Regional District of the Central Okanagan and the Ministry of Sustainable Resource Management, by K. Iverson, C. Erwin, C. Sinnemann, L. Lacelle and D. Spaeth Filatow. 1:20,000 spatial data.
- Terrestrial Ecosystem Mapping [TEM] of the Central Okanagan Valley: updated Mar. 2009c. Prepared for Okanagan Collaborative Conservation program by A. Haney and K. Iverson. 1:20,000 spatial data.

Please visit the website http://www.env.gov.bc.ca/cdc/gis/eo_data_fields_06.htm for definitions of the data fields used in this occurrence report.

Suggested Citation:

B.C. Conservation Data Centre. 2014. Occurrence Report Summary, Shape ID: 77209, black cottonwood - Douglas fir / Douglas maple - common snowberry. B.C. Ministry of Environment. Available: <http://maps.gov.bc.ca/ess/hm/cdc>, (accessed Apr 29, 2021).



BC Conservation Data Centre: Ecosystem Occurrence Report

Shape ID: 81287

Scientific Name: *Populus tremuloides* / *Symphoricarpos albus* / *Poa pratensis*
English Name: trembling aspen / common snowberry / Kentucky bluegrass

Identifiers

Occurrence ID: 10989
Shape ID: 81287
Element Group: Ecological Community

Status

Provincial Rank: S2
BC List: Red
Global Rank: GNR

Locators

Survey Site: BLACK KNIGHT MOUNTAIN, 1.6 KILOMETRES WEST OF
Directions:
Biogeoclimatic Unit: PP xh 1;IDF mw 1;IDF xh 1;IDF xh 1a
Ecosection: NOB;NOH

Occurrence Information

First Observation Date: 1994 **Last Observation Date:** 2012

Occurrence Data:

This broadleaf woodland occurrence is based on Terrestrial Ecosystem Mapping but has not been confirmed by a field inspection. The element occurrence occupies an estimated 48% (30 ha) of the area shown. The occurrence is mapped primarily as a young broadleaf woodland with a small patch of shrub stage broadleaf woodland.

General Description:

This element occurrence is located on the lower slopes of the Okanagan Valley in draws. It is surrounded by grasslands and coniferous woodlands with urban development along the southwest edge of the occurrence. It is associated with grasslands, coniferous forest and rural development.

Environmental Summary:

The occurrence is mapped on medium textured and moderately well drained till and glacial river deposits partially overlain by gravity deposited materials, and river deposits.

ATTACHMENT A	
This forms part of application # A23-0001	
Planner Initials	CD
City of Kelowna DEVELOPMENT PLANNING	

Occurrence Rank and Occurrence Rank Factors

Rank*: E : Verified extant (viability not assessed)

Note: in the case of Ecological Communities, viability should read as ecological integrity

Rank Date:

Rank Comments:

Condition of Occurrence:

Size of Occurrence:

29.53 ha

Landscape Context:

Version

Version Date: 2014-11-27

Version Author: Iverson, K. and A. Haney

Mapping Information

Estimated Representation Accuracy: Medium

Estimated Representation Accuracy Comments: The ecological community occupies 48.16% (29.53 ha) of the mapped occurrence.

Confident that full extent is represented by Occurrence: ?

Confidence extent Definition: Uncertain whether full extent of EO is known

Additional Inventory Needed: Y

Inventory Comments: This element occurrence is based on available ecosystem mapping. Many factors influence the reliability of an ecosystem map. Depending on the scale of aerial images used to capture the ecosystems, very small ecosystems and some types of disturbance may not be visible and will not be mapped. If the air photos are not current, new disturbance may have occurred since the time of mapping and the inventory may not accurately represent the current state of the landscape. Other factors, such as the skill and experience of the mapper within the study area, and the field survey intensity level will also influence the reliability of the map.

Documentation

References:

- Cadrin, C.M., and J. Christy. 2013a. Element occurrence and element occurrence rank specifications for riparian, broadleaf forests and shrublands of the southern interior of British Columbia. Unpublished document. Version April, 2013. B.C. Minist. Environ., Conservation Data Centre, Victoria, B.C. 4 pp.
- Iverson, K. and C. Cadrin. 2003. Sensitive Ecosystems Inventory: Central Okanagan, 2000-2001. Volume 1: Methodology, Ecological Descriptions, Results and Conservation Tools. Technical Report Series No. 399, Canadian Wildlife Service, Pacific and Yukon Region, British Columbia. 219pp.
- Iverson, K. and P. Uunila. 2008. Sensitive Ecosystems Inventory: Kelowna, 2007. Volume 2: Terrestrial Ecosystem Mapping, Terrain, Terrain Stability, and Soil Erosion Potential Mapping, and Expanded Legend. Unpublished report.
- Iverson, K., C. Cadrin, D. Spaeth Filatow, and C. Erwin. 2004. Sensitive Ecosystems Inventory: Central Okanagan, 2000-2001. Volume 2: Terrestrial Ecosystem Mapping, Surface Erosion and Slope Stability, and Expanded Legend. Unpublished report. Minist. Environment, Victoria, BC. and Canadian Wildlife Service, Pacific and Yukon Region.
- Terrestrial Ecosystem Mapping [TEM] of portions of the PPxh1 and IDFxh1 in the Central Okanagan. 2002i. Prepared for the Regional District of the Central Okanagan and the Ministry of Sustainable Resource Management, by K. Iverson, C. Erwin, C. Sinnemann, L. Lacelle and D. Spaeth Filatow. 1:20,000 spatial data.
- Terrestrial Ecosystem Mapping [TEM] of the Central Okanagan Valley: updated Mar. 2009c. Prepared for Okanagan Collaborative Conservation program by A. Haney and K. Iverson. 1:20,000 spatial data.
- Terrestrial Ecosystem Mapping [TEM] of the City of Kelowna. October 2008b. K. Iverson and P. Uunila. 1:10,000 spatial data.

Please visit the website http://www.env.gov.bc.ca/cdc/gis/eo_data_fields_06.htm for definitions of the data fields used in this occurrence report.

Suggested Citation:

B.C. Conservation Data Centre. 2014. Occurrence Report Summary, Shape ID: 81287, trembling aspen / common snowberry / Kentucky bluegrass. B.C. Ministry of Environment. Available: <http://maps.gov.bc.ca/ess/hm/cdc>, (accessed Apr 29, 2021).





BC Conservation Data Centre: Ecosystem Occurrence Report

Shape ID: 83343

Scientific Name: *Juncus balticus* - *Potentilla anserina*

English Name: Baltic rush - common silverweed

Identifiers

Occurrence ID: 11330

Shape ID: 83343

Element Group: Ecological Community

Status

Provincial Rank: S2

BC List: Red

Global Rank: GNR

Locators

Survey Site: BLACK KNIGHT MOUNTAIN, 1.5 KILOMETRES SOUTHWEST OF

Directions:

Biogeoclimatic Unit: IDF xh 1;IDF xh 1a

Ecosection: NOB

Occurrence Information

First Observation Date: 1994

Last Observation Date: 2009

Occurrence Data:

This wet meadow occurrence is based on Terrestrial Ecosystem Mapping and has been confirmed by a field inspection. The element occurrence occupies an estimated 14.0 percent or 3.03 ha of the area shown. The site is dominated by Kentucky bluegrass, baltic rush and agrostis. The vegetation on these sites is strongly driven by water levels. Annual and seasonal fluctuations in water levels results in changes to the vegetation over time. The vegetation and ecological community on this site may have changed since the time of mapping (or since the last field visit).

General Description:

This element occurrence is located on the lower slopes of the Okanagan Valley in depressions 1.5 kilometres southwest of Black Knight Mountain. It is surrounded by grasslands and small patches of forest with urban development to the southeast. It is associated with a marsh, moist grasslands, and aspen copse.

Environmental Summary:

The occurrence is on glaciofluvial and lacustrine deposits partially overlain by slopewash.

Occurrence Rank and Occurrence Rank Factors

Rank*: E : Verified extant (viability not assessed)

Note: in the case of Ecological Communities, viability should read as ecological integrity

Rank Date:

Rank Comments:

Condition of Occurrence:

Size of Occurrence:

3.03 ha

Landscape Context:

Version

Version Date: 2013-03-23

Version Author: Iverson, K. and A. Haney

Mapping Information

Estimated Representation Accuracy: Low

Estimated Representation Accuracy Comments: The ecological community occupies 14% (3.03 ha) of the mapped occurrence.

Confident that full extent is represented by Occurrence: ?

Confidence extent Definition: Uncertain whether full extent of EO is known

Additional Inventory Needed: Y

Inventory Comments: This element occurrence is based on available ecosystem mapping. Many factors influence the reliability of an ecosystem map. Depending on the scale of aerial images used to capture the ecosystems, very small ecosystems and some types of disturbance may not be visible and will not be mapped. If the air photos are not current, new disturbance may have occurred since the time of mapping and the inventory may not accurately represent the current state of the landscape. Other factors, such as the skill and experience of the mapper within the study area, and the field survey intensity level will also influence the reliability of the map.

Documentation

References:

Cadrin, C.M., and K. Iverson. 2013. Element occurrence and element occurrence rank specifications for wet transition grasslands of British Columbia. Unpublished document. Version July, 2013. B.C. Minist. Environ., Conservation Data Centre, Victoria, B.C. 3 pp.

Iverson, K. and P. Uunila. 2008. Sensitive Ecosystems Inventory: Kelowna, 2007. Volume 2: Terrestrial Ecosystem Mapping, Terrain, Terrain Stability, and Soil Erosion Potential Mapping, and Expanded Legend. Unpublished report.

Iverson, K., D. Curran, T. Fleming, and A. Haney. 2008. Sensitive Ecosystems Inventory: Okanagan Valley: Vernon to Osoyoos, 2000-2007. Methods, Ecological Descriptions, Results and Conservation Tools. Technical Report Series No. 495, Canadian Wildlife Service, Pacific and Yukon Region, British Columbia. 224pp.

Terrestrial Ecosystem Mapping [TEM] of the Central Okanagan Valley: updated Mar. 2009c. Prepared for Okanagan Collaborative Conservation program by A. Haney and K. Iverson. 1:20,000 spatial data.

Terrestrial Ecosystem Mapping [TEM] of the City of Kelowna. October 2008b. K. Iverson and P. Uunila. 1:10,000 spatial data.

Please visit the website http://www.env.gov.bc.ca/cdc/gis/eo_data_fields_06.htm for definitions of the data fields used in this occurrence report.

Suggested Citation:

B.C. Conservation Data Centre. 2014. Occurrence Report Summary, Shape ID: 83343, Baltic rush - common silverweed. B.C. Ministry of Environment. Available: <http://maps.gov.bc.ca/ess/hm/cdc>, (accessed Apr 29, 2021).



BC Species & Ecosystems Explorer

Modify Search (/pub/eswp/search.do?method=change)

New Search (/pub/eswp/search.do?method=reset)

Export Results

Help

Search Results 59 records

Show 100 rows

Column Visibility

Sort Order

English Name

Ascending

Scientific Name	English Name	Biogeoclimatic Units	Provincial	BC List	Global	COSEWIC	SARA	P
<i>Taxidea taxus</i> (/pub/eswp/reports.do?elcode=AMAJF04010)	American Badger	BG ESSF ICH IDF IMA MS PP SBPS	S2 (2015)	Red	G5 (2016)	E (2012)	1-E (2018)	
<i>Botaurus lentiginosus</i> (/pub/eswp/reports.do?elcode=ABNGA01020)	American Bittern	BG BWBS CDF CWH ICH IDF MS PP SBPS SBS	S3B, SNRN (2015)	Blue	G5 (2016)			
<i>Pluvialis dominica</i> (/pub/eswp/reports.do?elcode=ABNNB02030)	American Golden-Plover	BAFA BG BWBS CDF CWH ICH IDF MS PP SBS SWB	S3S4B (2015)	Blue	G5 (2016)			
<i>Cicindela decemnotata</i> (/pub/eswp/reports.do?elcode=IICOL023C0)	Badlands Tiger Beetle	BG PP	S1S3 (2017)	Red	G4G5 (2018)			








ATTACHMENT A

This forms part of application # A23-0001

Planner Initials CD

City of Kelowna
DEVELOPMENT PLANNING

Scientific Name	English Name	Biogeoclimatic Units	Provincial	BC List	Global	COSEWIC	SARA	P
 <i>Tyto alba</i> (/pub/eswp/reports.do?elcode=ABNSA01010)	Barn Owl	BG BWBS CDF CWH ICH IDF PP	S2? (2015)	Red	G5 (2016)	T (2010)	1-T (2018)	
 <i>Hirundo rustica</i> (/pub/eswp/reports.do?elcode=ABPAU09030)	Barn Swallow	BAFA BG BWBS CDF CWH ESSF ICH IDF IMA MH MS PP SBPS SBS SWB	S3S4B (2015)	Blue	G5 (2016)	T (2011)	1-T (2017)	
 <i>Ovis canadensis</i> (/pub/eswp/reports.do?elcode=AMALE04010)	Bighorn Sheep	BAFA BG ESSF ICH IDF IMA MS PP	S3? (2015)	Blue	G4 (2016)			
 <i>Dolichonyx oryzivorus</i> (/pub/eswp/reports.do?elcode=ABPBXA9010)	Bobolink	BG BWBS CDF CWH ICH IDF PP SBS	S3B (2015)	Blue	G5 (2016)	T (2010)	1-T (2017)	
 <i>Athene cucularia</i> (/pub/eswp/reports.do?elcode=ABNSB10010)	Burrowing Owl	BG CDF IDF PP	S1B (2015)	Red	G4 (2016)	E (2017)	1-E (2003)	

Scientific Name	English Name	Biogeoclimatic Units	Provincial	BC List	Global	COSEWIC	SARA	P
 <i>Larus californicus</i> (/pub/eswp/reports.do?elcode=ABNNM03110)	California Gull	BG BWBS CDF CWH ICH IDF MS PP SBS	S2S3B (2015)	Blue	G5 (2016)			
 <i>Satyrrium californica</i> (/pub/eswp/reports.do?elcode=IILEPD4040)	California Hairstreak	BG ESSF ICH IDF IMA MS PP	S3 (2020)	Blue	G5 (2016)			
 <i>Rangifer tarandus</i> pop. 1 (/pub/eswp/reports.do?elcode=AMALC04013)	Caribou (Southern Mountain Population)	BAFA ESSF ICH IMA	S1 (2017)	Red	G5TNR	E (2014)	1-T (2003)	
 <i>Pyrgus communis</i> (/pub/eswp/reports.do?elcode=IILEP38050)	Checkered Skipper	BG ESSF ICH IDF IMA MS PP	S3 (2020)	Blue	G5 (2021)			
 <i>Chordeiles minor</i> (/pub/eswp/reports.do?elcode=ABNTA02020)	Common Nighthawk	BG BWBS CDF CWH ESSF ICH IDF MH MS PP SBPS SBS SWB	S4B (2015)	Yellow	G5 (2016)	SC (2018)	1-T (2010)	
 <i>Hypsiglena chlorophaea</i> (/pub/eswp/reports.do?elcode=ARADB18020)	Desert Nightsnake	BG IDF PP	S2 (2018)	Red	G5 (2016)	E (2011)	1-E (2003)	
 <i>Myotis thysanodes</i> (/pub/eswp/reports.do?elcode=AMACC01090)	Fringed Myotis	BG ICH IDF PP	S3 (2015)	Blue	G4 (2016)	DD (2004)	3 (2005)	









ATTACHMENT A

This forms part of application # A23-0001

Planner Initials CD



City of Kelowna
DEVELOPMENT PLANNING

Scientific Name	English Name	Biogeoclimatic Units	Provincial	BC List	Global	COSEWIC	SARA	P
 <i>Pituophis catenifer deserticola</i> (/pub/eswp/reports.do?elcode=ARADB26022)	Gopher Snake, <i>deserticola</i> subspecies	BG IDF PP	S3 (2018)	Blue	G5T5 (2016)	T (2013)	1-T (2005)	
 <i>Ammodramus savannarum</i> (/pub/eswp/reports.do?elcode=ABPBXA0020)	Grasshopper Sparrow	BG CDF IDF PP	S1B (2018)	Red	G5 (2016)			
 <i>Perognathus parvus</i> (/pub/eswp/reports.do?elcode=AMAFD01100)	Columbia Plateau Pocket Mouse	BG IDF PP	S3 (2015)	Blue	G5 (2016)			
 <i>Spea intermontana</i> (/pub/eswp/reports.do?elcode=AAABF02030)	Great Basin Spadefoot	BG IDF MS PP	S3 (2018)	Blue	G5 (2016)	T (2019)	1-T (2003)	
 <i>Centrocercus urophasianus</i> (/pub/eswp/reports.do?elcode=ABNLC12010)	Greater Sage-Grouse	BG	SX (2015)	Red	G3G4 (2016)	XT (2008)	1-XT (2003)	
 <i>Ursus arctos</i> (/pub/eswp/reports.do?elcode=AMAJB01020)	Grizzly Bear	BAFA BWBS CMA CWH ESSF ICH IDF IMA MH MS SBPS SBS SWB	S3? (2015)	Blue	G4 (2016)	SC (2012)	1-SC (2018)	
 <i>Falco rusticolus</i> (/pub/eswp/reports.do?elcode=ABNKD06080)	Gyrfalcon	BAFA BG BWBS CDF CWH ICH IDF SBPS SBS SWB	S3S4B, SNRN (2015)	Blue	G5 (2016)	NAR (1987)		
 <i>Satyrium semiluna</i> (/pub/eswp/reports.do?elcode=ILLEPD4024)	Half-moon Hairstreak	BG ESSF IDF IMA MS PP	S1 (2020)	Red	G4 (2021)	E (2006)	1-E (2007)	


ATTACHMENT A

This forms part of application # A23-0001



City of Kelowna
DEVELOPMENT PLANNING

Planner Initials CD

Scientific Name	English Name	Biogeoclimatic Units	Provincial	BC List	Global	COSEWIC	SARA	P
 <i>Eremophila alpestris merrilli</i> (/pub/eswp/reports.do?elcode=ABPAT0201F)	Horned Lark, <i>merrilli</i> subspecies	BG ICH IDF PP	S3? (2017)	Blue	G5T4 (2016)			
 <i>Callophrys affinis</i> (/pub/eswp/reports.do?elcode=ILLEPE2050)	Immaculate Green Hairstreak	BG ESSF IDF MS PP	S2S3 (2020)	Blue	G5 (1998)			
 <i>Chondestes grammacus</i> (/pub/eswp/reports.do?elcode=ABPBX96010)	Lark Sparrow	BG BWBS CDF CWH ICH IDF MS PP SBPS SBS	S3S4B (2015)	Blue	G5 (2016)			
 <i>Melanerpes lewis</i> (/pub/eswp/reports.do?elcode=ABNYF04010)	Lewis's Woodpecker	BG CDF CWH ICH IDF PP SBS	S2S3B (2015)	Blue	G4 (2016)	T (2010)	1-T (2012)	
 <i>Lycaena nivalis</i> (/pub/eswp/reports.do?elcode=ILLEPC1140)	Lilac-bordered Copper	BG ESSF ICH IDF MS PP	S3 (2020)	Blue	G5 (2016)			
 <i>Myotis lucifugus</i> (/pub/eswp/reports.do?elcode=AMACC01010)	Little Brown Myotis	BG BWBS CDF CWH ESSF ICH IDF MH MS PP SBPS SBS SWB	S4 (2015)	Yellow	G3 (2016)	E (2013)	1-E (2014)	








ATTACHMENT A

This forms part of application # A23-0001

Planner Initials CD



City of Kelowna
DEVELOPMENT PLANNING

Scientific Name	English Name	Biogeoclimatic Units	Provincial	BC List	Global	COSEWIC	SARA	P
 <i>Numerius americanus</i> (/pub/eswp/reports.do?elcode=ABNNF07070)	Long-billed Curlew	BG CDF CWH ICH IDF PP SBPS SBS	S3B (2018)	Blue	G5 (2016)	SC (2011)	1-SC (2005)	
 <i>Sorex merriami</i> (/pub/eswp/reports.do?elcode=AMABA01230)	Merriam's Shrew	BG PP	S1 (2015)	Red	G4 (2016)			
 <i>Danaus plexippus</i> (/pub/eswp/reports.do?elcode=IILEPP2010)	Monarch	BG CDF CWH ESSF ICH IDF MS PP	S1?B (2020)	Red	G4 (2015)	E (2016)	1-SC (2003)	
 <i>Apodemia mormo</i> (/pub/eswp/reports.do?elcode=IILEPH7010)	Mormon Metalmark	BG ESSF IDF PP	S1S2 (2020)	Red	G5 (2016)	E (2014)	1-E (2005)	
 <i>Oreamnos americanus</i> (/pub/eswp/reports.do?elcode=AMALE02010)	Mountain Goat	BAFA BG BWBS CDF CMA CWH ESSF ICH IDF IMA MH MS PP SBPS SBS SWB	S3 (2015)	Blue	G5 (2016)			
 <i>Hesperia nevada</i> (/pub/eswp/reports.do?elcode=IILEP65180)	Nevada Skipper	BG ESSF IDF MS PP	S3S4 (2020)	Blue	G5 (2020)			
 <i>Coluber constrictor</i> (/pub/eswp/reports.do?elcode=ARADB07010)	North American Racer	BG ICH IDF PP	S2S3 (2018)	Blue	G5 (2016)	T (2015)	1-SC (2006)	








ATTACHMENT A

This forms part of application # A23-0001

Planner Initials



City of Kelowna
DEVELOPMENT PLANNING

Scientific Name	English Name	Biogeoclimatic Units	Provincial	BC List	Global	COSEWIC	SARA	P
 <i>Charina bottae</i> (/pub/eswp/reports.do?elcode=ARADA01010)	Northern Rubber Boa	BG CWH ICH IDF PP	S4 (2018)	Yellow	G5 (2016)	SC (2016)	1-SC (2005)	
 <i>Sylvilagus nuttallii</i> (/pub/eswp/reports.do?elcode=AMAEB01060)	Nuttall's Cottontail	BG IDF PP	S3 (2015)	Blue	G5 (2016)	SC (2016)	1-SC (2007)	
 <i>Antrozous pallidus</i> (/pub/eswp/reports.do?elcode=AMACC10010)	Pallid Bat	BG PP	S2 (2015)	Red	G4 (2016)	T (2010)	1-T (2003)	
 <i>Falco peregrinus anatum</i> (/pub/eswp/reports.do?elcode=ABNKD06071)	Peregrine Falcon, <i>anatum</i> subspecies	BG BWBS CDF CWH IDF MS PP SBS	S2? (2011)	Red	G4T4 (2016)	NAR (2017)	1-SC (2012)	
 <i>Falco mexicanus</i> (/pub/eswp/reports.do?elcode=ABNKD06090)	Prairie Falcon	BG BWBS CDF CWH ESSF ICH IDF MS PP SBS	S1 (2018)	Red	G5 (2016)	NAR (1996)		
 <i>Sorex preblei</i> (/pub/eswp/reports.do?elcode=AMABA01030)	Preble's Shrew	BG IDF PP	S1S2 (2015)	Red	G4 (2016)			
 <i>Phrynosoma douglasii</i> (/pub/eswp/reports.do?elcode=ARACF12030)	Pygmy Short-horned Lizard	BG	SX (2018)	Red	G5 (2005)	XT (2018)	1-XX (2003)	






ATTACHMENT A








This forms part of application
A23-0001

Planner Initials **CD**

City of **Kelowna**
DEVELOPMENT PLANNING



Scientific Name	English Name	Biogeoclimatic Units	Provincial	BC List	Global	COSEWIC	SARA	P
 <i>Buteo lagopus</i> (/pub/eswp/reports.do?elcode=ABNKC19130)	Rough-legged Hawk	BAFA BG BWBS CDF CWH ESSF ICH IDF IMA MS PP SBPS SBS SWB	S3N (2015)	Blue	G5 (2016)	NAR (1995)		
 <i>Polites sabuleti</i> (/pub/eswp/reports.do?elcode=IILEP66020)	Sandhill Skipper	BG ESSF ICH IDF MS PP	S2 (2020)	Red	G5 (2021)			
 <i>Tympanuchus phasianellus columbianus</i> (/pub/eswp/reports.do?elcode=ABNLC13033)	Sharp-tailed Grouse, columbianus subspecies	BG IDF PP SBPS SBS	S2S3 (2005)	Blue	G5T3 (2016)			
 <i>Asio flammeus</i> (/pub/eswp/reports.do?elcode=ABNSB13040)	Short-eared Owl	BG BWBS CDF CWH ICH IDF MS PP SBPS SBS SWB	S3B,S2N (2015)	Blue	G5 (2016)	SC (2008)	1-SC (2012)	
 <i>Epargyreus clarus</i> (/pub/eswp/reports.do?elcode=IILEP04020)	Silver-spotted Skipper	CDF CWH ESSF ICH IDF MH MS PP	S3 (2020)	Blue	G5 (2020)			

Scientific Name	English Name	Biogeoclimatic Units	Provincial	BC List	Global	COSEWIC	SARA	P
 <i>Calcarius pictus</i> (/pub/eswp/reports.do?elcode=ABPBXA6030)	Smith's Longspur	BAFA BG BWBS CDF CMA CWH IDF MS PP SBS SWB	S3S5B (2015)	Blue	G4G5 (2016)			
 <i>Buteo swainsoni</i> (/pub/eswp/reports.do?elcode=ABNKC19070)	Swainson's Hawk	BG BWBS CDF ICH IDF MS PP SBS	S2B (2015)	Red	G5 (2016)			
 <i>Corynorhinus townsendii</i> (/pub/eswp/reports.do?elcode=AMACC08010)	Townsend's Big-eared Bat	BG CDF CWH ICH IDF PP	S3S4 (2015)	Blue	G4 (2016)			
 <i>Bartramia longicauda</i> (/pub/eswp/reports.do?elcode=ABNNF06010)	Upland Sandpiper	BG BWBS CDF CWH ICH IDF SBPS SBS SWB	S2B (2015)	Red	G5 (2016)			
 <i>Reithrodontomys megalotis</i> (/pub/eswp/reports.do?elcode=AMAFF02030)	Western Harvest Mouse	BG IDF PP	S3 (2015)	Blue	G5 (2016)	E (2019)	1-SC (2009)	
 <i>Crotalus oreganus</i> (/pub/eswp/reports.do?elcode=ARADE02140)	Western Rattlesnake	BG IDF PP	S2S3 (2018)	Blue	G5 (2016)	T (2015)	1-T (2005)	
 <i>Plestiodon skiltonianus</i> (/pub/eswp/reports.do?elcode=ARACH01110)	Western Skink	BG ICH IDF PP	S3S4 (2018)	Blue	G5 (2016)	SC (2014)	1-SC (2005)	




ATTACHMENT A

This forms part of application
A23-0001

Planner Initials CD

City of Kelowna
DEVELOPMENT PLANNING



Scientific Name	English Name	Biogeoclimatic Units	Provincial	BC List	Global	COSEWIC	SARA	P
 <i>Anaxyrus boreas</i> (/pub/eswp/reports.do?elcode=AAABB01030)	Western Toad	BG BWBS CDF CWH ESSF ICH IDF PP SBS SWB	S4 (2016)	Yellow	G4 (2008)	SC (2012)	1-SC (2018)	
 <i>Lepus townsendii</i> (/pub/eswp/reports.do?elcode=AMAEB03040)	White-tailed Jackrabbit	BG ESSF ICH IDF IMA MS PP	SX (2015)	Red	G5 (2016)			
 <i>Gulo gulo luscus</i> (/pub/eswp/reports.do?elcode=AMAJF03011)	Wolverine, <i>luscus</i> subspecies	BAFA BWBS CMA CWH ESSF ICH IDF IMA MH MS SBPS SBS SWB	S3 (2010)	Blue	G4T4 (2016)	SC (2014)	1-SC (2018)	

Showing 1 to 59 of 59 entries



Search Criteria

Animals
 AND BC Conservation Status:Red (Extirpated, Endangered, or Threatened) OR Blue (Special Concern)
 OR SARA Schedule 1 Status:True
 OR COSEWIC Status:Endangered OR Threatened
 AND Distribution: Native
 AND Area Of Interest: User Defined Polygon
 AND Habitat Subtypes: Grassland
 Sort Order:English Name Ascending

Notes

ATTACHMENT A
 This forms part of application
 # A23-0001
 City of Kelowna
 DEVELOPMENT PLANNING
 Planner Initials CD



1. Citation: B.C. Conservation Data Centre. 2021. BC Species and Ecosystems Explorer. B.C. Minist. of Environ. Victoria, B.C. Available: <https://a100.gov.bc.ca/pub/eswp/> (<https://a100.gov.bc.ca/pub/eswp/>) (accessed Apr 29, 2021).

Moved Permanently

The document has moved here (https://www.env.gov.bc.ca/atrisk/help/animal_fdnotes.htm).

[Home \(//www2.gov.bc.ca/gov/content/home\)](http://www2.gov.bc.ca/gov/content/home)

[About gov.bc.ca \(//www2.gov.bc.ca/gov/content/about-gov-bc-ca\)](http://www2.gov.bc.ca/gov/content/about-gov-bc-ca)

[Disclaimer \(//www2.gov.bc.ca/gov/content/home/disclaimer\)](http://www2.gov.bc.ca/gov/content/home/disclaimer)

[Privacy \(//www2.gov.bc.ca/gov/content/home/privacy\)](http://www2.gov.bc.ca/gov/content/home/privacy)

[Accessibility \(//www2.gov.bc.ca/gov/content/home/accessible-government\)](http://www2.gov.bc.ca/gov/content/home/accessible-government)

[Copyright \(//www2.gov.bc.ca/gov/content/home/copyright\)](http://www2.gov.bc.ca/gov/content/home/copyright)

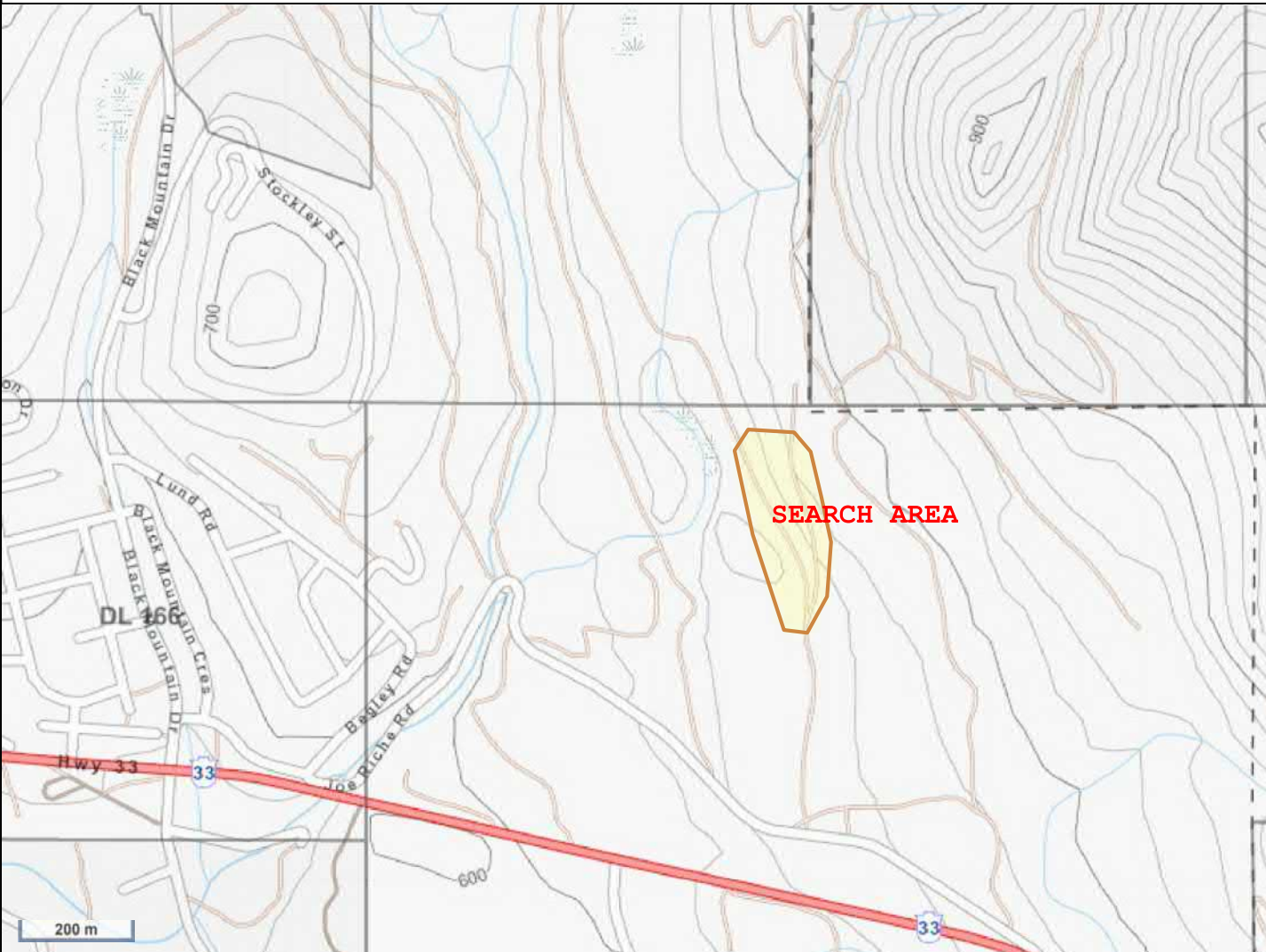
[Contact Us \(//www2.gov.bc.ca/gov/content/home/get-help-with-government-services\)](http://www2.gov.bc.ca/gov/content/home/get-help-with-government-services)

ATTACHMENT		A
This forms part of application # A23-0001		
Planner Initials	CD	 City of Kelowna DEVELOPMENT PLANNING

APPENDIX F

CULTURAL RESOURCES AND ARCHAEOLOGY SEARCH RESULTS

ILRR Archaeological Search Map



*This map is a user generated static output from an Internet mapping site and is for general reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.
THIS MAP IS NOT TO BE USED FOR NAVIGATION.*

Printed from the ILRR CWM Mapviewer



Legend

- Crown Land Parcels (Tantalis)**
- Surveyed Parcel Base - Outlined
 - Surveyed Parcel Base - Legal Descriptions
 - Label Text

ATTACHMENT A


This forms part of application # A23-0001

Planner Initials CD



City of Kelowna
DEVELOPMENT PLANNING

Center: 49°52'23", -119°20'7"
Scale: 1 : 16,927
SRS: EPSC:3857
UTM Zone: 11



Generate Report: Display Options

Help ()



No interest records found that intersect with your query parameter. Modify your query parameters and resubmit.

Sort Order By	<p>Select one of the following:</p> <p>Identifier: Interest Record:</p> <p><input checked="" type="radio"/> Issuing Agency <input type="radio"/> Status</p> <p><input type="radio"/> ILRR Interest <input type="radio"/> Type</p> <p> <input type="radio"/> Responsible Agency</p>
Identifier(s)	<p>Select an Issuing Agency Business Identifier:</p> <p><input type="radio"/> Primary business identifier for agency</p> <p><input checked="" type="radio"/> All business identifiers for an agency</p>
Report Description	<input style="width: 100%; height: 20px;" type="text"/>
Output Format	<p>Select one of the following:</p> <p><input checked="" type="radio"/> Screen <input type="radio"/> File <input type="radio"/> Batch</p>

You have requested a report that may include information of a confidential and sensitive nature. Please protect the information accordingly.

Cancel

Next

ATTACHMENT A

This forms part of application
A23-0001

Planner Initials CD



City of Kelowna
DEVELOPMENT PLANNING

APPENDIX G

CONTAMINATED SITES SEARCH RESULTS

ILRR Contaminated Sites Search Map



Legend

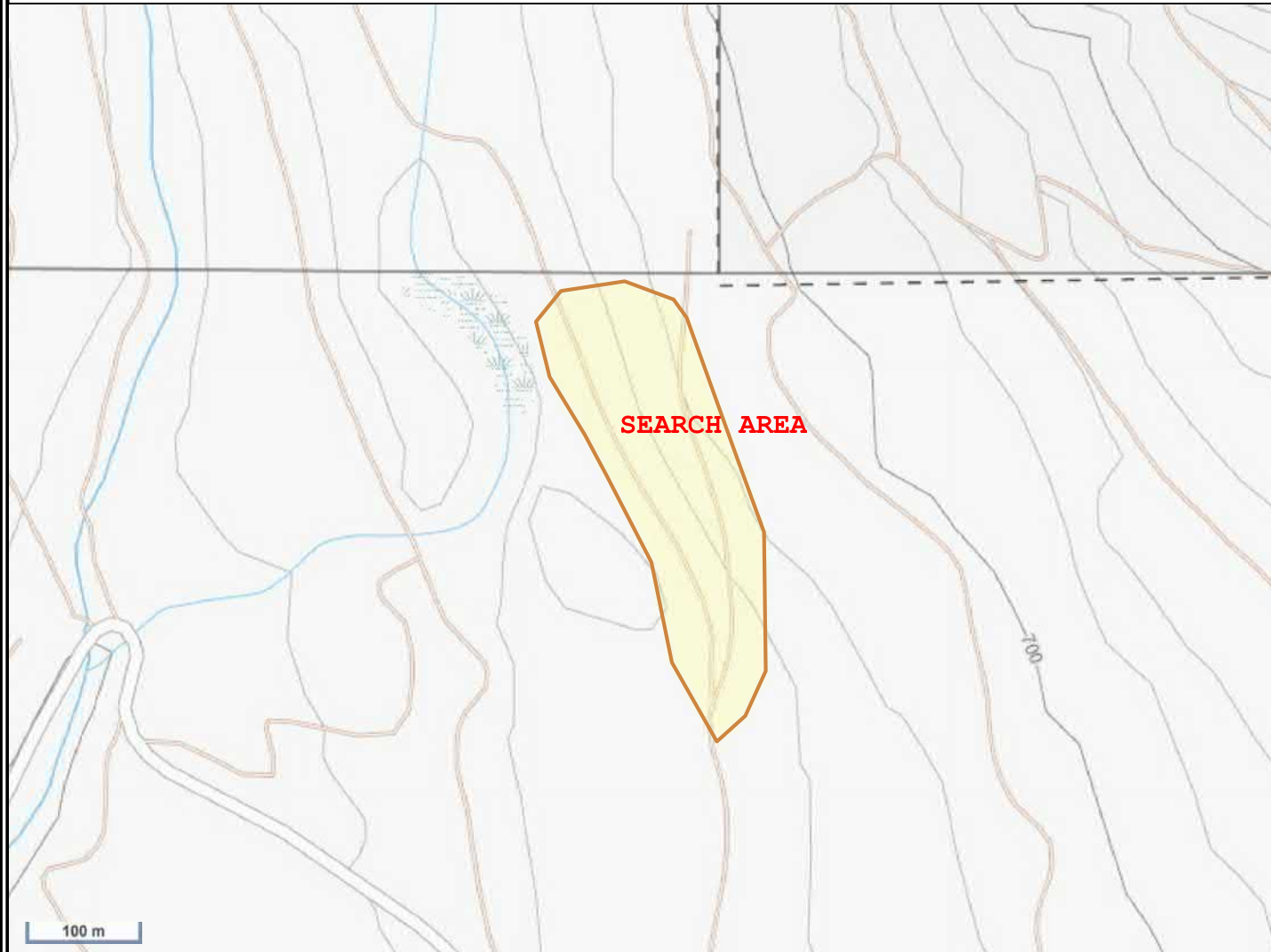
Crown Land Parcels (Tantalis)

Surveyed Parcel Base - Outlined



Surveyed Parcel Base - Legal Descriptions

Label Text



ATTACHMENT A

This forms part of application

A23-0001

Planner
Initials CD



Center: 49°52'21", -119°19'55"

Scale: 1 : 8,464

SRS: EPSG:3857

UTM Zone: 11



This map is a user generated static output from an Internet mapping site and is for general reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.
THIS MAP IS NOT TO BE USED FOR NAVIGATION.

Printed from the ILRR CWM Mapviewer

Generate Report: Display Options

Help ()



No interest records found that intersect with your query parameter. Modify your query parameters and resubmit.

Sort Order By	<p>Select one of the following:</p> <p>Identifier: Interest Record:</p> <p><input checked="" type="radio"/> Issuing Agency <input type="radio"/> Status</p> <p><input type="radio"/> ILRR Interest <input type="radio"/> Type</p> <p> <input type="radio"/> Responsible Agency</p>
Identifier(s)	<p>Select an Issuing Agency Business Identifier:</p> <p><input type="radio"/> Primary business identifier for agency</p> <p><input checked="" type="radio"/> All business identifiers for an agency</p>
Report Description	<input type="text"/>
Output Format	<p>Select one of the following:</p> <p><input checked="" type="radio"/> Screen <input type="radio"/> File <input type="radio"/> Batch</p>

You have requested a report that may include information of a confidential and sensitive nature. Please protect the information accordingly.

Cancel

Next

ATTACHMENT A

This forms part of application
A23-0001

Planner
Initials

CD



City of Kelowna
DEVELOPMENT PLANNING



Office: (250) 765-5169
Fax: (250) 765-0277
www.bmid.ca

File No. 447

March 6, 2023

City of Kelowna
Development Planning Department
1435 Water St
Kelowna, BC, Canada V1Y 1J4

ATTACHMENT	B
This forms part of application # A23-0001	
Planner Initials	CD
 City of Kelowna DEVELOPMENT PLANNING	

Attention: Corey Davis – Development Tech (Engineering), City of Kelowna
Dear Corey:

RE: A23-0001 Supplemental Letter of Rationale

This letter is intended to serve as a supplemental letter of rationale for the Black Mountain Irrigation District's (BMID) ALC application No. A23-0001: Soil Fill Application for Non-Farm Use. BMID is the registered owner of Lot 8 Plan KAP1991 located at 2458 Joe Riche Road. The property is 117.76 hectares (290.98 acres) and is mostly within the ALR. The property is zoned A1 under City of Kelowna bylaws. BMID is proposing to use approximately 0.6 hectares (1.48 acres) of the property to place up to 34,680 cubic meters of fill material over the course of 10+ years. This letter provides a project background and outlines BMID's commitment to the following objectives:

- 1) *Improve the long-term agricultural capability of the land;*
- 2) *Mitigate environmental and aesthetic impacts;*
- 3) *Maintain safe and unobstructed access to the Black Mountain Regional Park;*
- 4) *Minimize economic burdens placed on BMID's ratepayers.*

Project Background

The fill material is an inert dried sludge produced every year from BMID's Water Treatment Plant (WTP) operations along Mission Creek. BMID's WTP currently serves approximately 26,000 domestic and agricultural customers. The dried sludge is made up of polyaluminum coagulant used for the WTP process and dissolved compounds removed from the Mission Creek source water. Testing and review by a Qualified Professional determined that the dried sludge material is considered non-hazardous under applicable Canadian regulations and guidelines. BMID conducts annual testing of the dried sludge, and the records show consistent results. The dried sludge is not a desirable fertilizer or topsoil, but it is a suitable sub-surface soil for agricultural lands.

BMID has been conducting all sludge disposal activities on the site of the WTP for over two decades. However, the remaining space is limited due to the site's surrounding steep slopes and proximity to Mission Creek. Continuing development and densification in the Black Mountain and surrounding communities increases the demand on BMID's WTP and thus increases the sludge produced from the water treatment plant each year. It is foreseen that Mission Creek will be one of the primary drinking water sources for all of Kelowna in the future. Thus, securing a long-term sludge disposal site is necessary to sustain the community's water supply.

Improve Agricultural Capability of the Land

Under the direction of a Professional Agrologist, BMID will conduct the fill placement activities in a manner which complements adjoining landforms and improves the long-term agricultural capability of the site. The final grade will be covered with original stockpiled topsoil and seeded with an



Office: (250) 765-5169
Fax: (250) 765-0277
www.bmid.ca

File No. 447

appropriate agricultural or native grassland seed mix. BMID is committed to supporting agricultural growth in the Kelowna region by ensuring a sustainable supply of irrigation water and potentially leasing of District lands for farm uses such as grazing or orchards.

Mitigate Environmental and Aesthetic Impacts

The site was selected because of the disturbed nature of adjoining landforms and the proposed fill area being located down and out of view to the public. Each year during fill operations the lifts of fill material will be leveled to prevent sedimentation runoff. Interim weed management will be implemented for adjoining disturbed areas by removing invasive vegetation and seeding with a native grassland mix. The proposed site has significant capacity and future alternative sites will not be required for many years (10+ years).

Alternative sites on the property at 2458 Joe Riche Road would be less desirable due to the undisturbed nature of the lands and proximity to sensitive wetland ecosystems. Furthermore, these alternative sites would be openly visible to residents in the Black Mountain area. Using the landfill as an alternative site would significantly increase the emissions produced from transporting the dried sludge and shorten the lifespan of the landfill unnecessarily.

Maintain Safe Access to Black Mountain Regional Park

BMID is working with RDCO Parks to ensure safe and unobstructed access to the Black Mountain Regional Park is maintained during and after the fill operations. The RDCO has a registered access easement over BMID's lands, and they currently use the easement area for the purpose of accessing the park. Fill placement activities for each year will occur over a short period on few occasions, and scheduling of fill placement works will be coordinated with the RDCO Parks personnel.

Minimize Burden to BMID Ratepayers

Using the landfill as an alternative site would incur significant increased costs for BMID's ratepayers through additional tipping and trucking fees. The proposed site is about 7.5 kilometers one-way from BMID's WTP whereas the landfill is about 21 kilometers one-way through the city. BMID has a responsibility to minimize economic burdens for its ratepayers while tending to the other objectives outlined above.

In summary, disposing dried sludge material is an annual requirement for BMID to provide its customers with clean drinking water. The proposed site is the best available solution for balancing our community's long-term agricultural, environmental, and economic interests. This approach is supported by BMID's Senior Management and Elected Board of Trustees.

BMID appreciates your time and attention taken to review this proposal.

Sincerely,

Brenden Russell EIT
Projects & Development Coordinator
Black Mountain Irrigation District

ATTACHMENT		B
This forms part of application		
# A23-0001		
Planner Initials	<input type="text" value="CD"/>	

cc. Sandy Mah RPF – Parks Planner, Regional District of Central Okanagan