AGRICULTURAL ASSESSMENT
5760 Anderson Rd, Kelowna, BC

Prepared For:
Desjardins Contracting Ltd.

Prepared By:
Ecoscape Environmental Consultants Ltd.

June 2022

#102 – 450 Neave Ct. Kelowna, BC V1V 2M2 Phone: 250.491.7337 Fax: 250.491.7772 www.ecoscapeltd.com

5760 ANDERSON RD, KELOWNA, BC

Lot 54, Plan KAP475, District Lot 1, Osoyoos Div of Yale Land District, Except Plan H13691
PID: 012-301-965

Agricultural Assessment

Prepared For:
Desjardins Contracting Ltd.
Attn: Dave Desjardins
VIA email: dave@dcltd.net

Prepared By:
ECOSCAPE ENVIRONMENTAL CONSULTANTS LTD.
#102 – 450 Neave Court
Kelowna, BC V1V 2M2

June 22, 2022
Version 1

File No. 21-4144

TABLE OF CONTENTS

1.0 INTRODUCTION ..... - 4 -
1.1 Property Information & Proposed Works ..... - 4 -
1.2 Land Use of Surrounding Area ..... - 5 -
2.0 SITE ASSESSMENT AND METHODOLOGY ..... - 5 -
2.1 Land Capability Classification for Agriculture in British Columbia ..... - 6 -
3.0 SOIL SURVEY CHARACTERISTICS ..... - 7 -
4.0 CLIMATE ..... - 11 -
5.0 DRAINAGE & TOPOGRAPHY ..... - 11 -
6.0 FARM PLAN ..... - 12 -
7.0 POTENTIAL ENVIRONMENTAL IMPACTS OF FILL PLACEMENT ..... - 12 -
8.0 BEST MANAGEMENT PRACTICES AND MITIGATION MEASURES ..... - 13 -
8.1 General Requirements ..... - 13 -
8.2 Monitoring ..... - 14 -
8.3 Disturbance Limits ..... - 15 -
8.4 Site Clearing and Grubbing ..... - 15 -
8.5 Topsoil Management ..... - 17 -
8.6 Subgrade Preparation ..... - 18 -
8.7 Soil Replacement ..... - 18 -
8.8 Erosion and Sediment Control ..... - 20 -
8.9 Drainage/Water Management ..... - 21 -
8.10 Air Quality & Dust Management ..... - 22 -
8.11 Noise and Vibration Management ..... - 23 -
8.12 Emergency Spill Response ..... - 23 -
8.13 Site Clean Up ..... - 24 -
8.14 Invasive Plant Management and Site Restoration ..... - 25 -
9.0 SUMMARY AND CONCLUSION ..... - 28 -
10.0 CLOSURE ..... - 29 -
11.0 REFERENCES ..... - 30 -

FIGURES

FIGURE 1 ..... Site Location
FIGURE 2 ..... Proposed Works
FIGURE 3 ..... Ecosystems and Streams
FIGURE 4 ..... Soils & Agricultural Capability
FIGURE 5 ..... Soil Drainage
FIGURE 6 ..... Digital Elevation Model Analysis

APPENDICES

APPENDIX 1 ..... Site Plan by: Desjardins Contracting Ltd.
APPENDIX 2 ..... Cross Sections by: Desjardins Contracting Ltd.

1.0 INTRODUCTION

1.1 Property Information & Proposed Works

Ecoscape Environmental Consultants Ltd. (Ecoscape) has been retained by Desjardins Contracting Ltd. (client) on behalf of the landowner, Harman Bahniwal of Krazy Cherry Fruit Co. (H Bahniwal Holdings Ltd.), to complete an agricultural assessment ("*Agrologist Report*") at 5760 Anderson Road, Kelowna, BC (subject property), to fulfill the requirements of the Agricultural Land Commission (ALC) for a Notice of Intent (NOI) application for fill placement for the purposes of farm use.

The subject property is 12.63 acres, legally described as Lot 54, Plan KAP475, District Lot 1, Osoyoos Div of Yale Land District, Except Plan H13691, PID: 012-301-965 (**Figure 1**), located within the municipality of the Regional District of Central Okanagan (RDCO) within an agricultural area, bounded by Anderson Road to the east, and rural residential agricultural properties to the north, south, and west. RDCO municipal zoning of the subject property is A1 (agriculture) and mapping provided by the ALC indicates the property is located entirely within the Agricultural Land Reserve (ALR).

The purpose of this report is to provide an agricultural assessment of existing conditions for the subject property and a farm plan for the proposed fill placement and remediation works, as described below and detailed in **Appendices 1 & 2** and **Figure 2**. The purpose of the fill placement is to remediate previous disturbance to the property and restore the original grade in order to cultivate sweet cherries. The proposed works entail the following:

1) Retention of existing topsoil on the subject property, as much as possible given the historic stripping of the property, and reseeding of any disturbed areas or exposed slopes which are not proposed for cultivation, using an agricultural grass seed mix, to prevent invasive species and noxious weed growth within the subject property. The seed mix must include only species which are native to the Okanagan and non-invasive.
2) Placement of fill material in the amount of approximately 140,100 m^3 within a placement area of approximately 34,000 m^2 with a maximum depth of 10 m in steep areas and an average depth of 4 m (**Appendices 1 & 2**).
3) Fill placement is planned to commence as soon as possible upon the receipt of the appropriate permits and approvals, and is expected to complete by spring of 2023.
4) Fill will be transported by 13-yard dump trucks, with access to the property off of Anderson Rd. Trucking records will be maintained to include truck operator (name and business license), date of fill placement, volume of fill, and source location. Heavy equipment (i.e. graders) will be used to distribute the fill material.
5) All fill sources will be sampled and analyzed by an ISO/IEC17025:2017 accredited lab according to the BC Contaminated Sites Regulation (CSR) standards for agriculture and the ALC Bylaw No.2 and evaluated by a Qualified Professional in Agrology (P.Ag.) to ensure fill meets the CSR and ALC standards prior to fill placement. Approved Phase I or

Phase II ESA studies conducted recently by a qualified professional will also be acceptable in addition to a soil inspection by a P.Ag.

6) Site preparation for the planting 1 - 3 varieties of sweet cherries will commence following fill placement. Approximately 8 acres will be planted with high dentistry 14'x 8' spacing to maximize land usage. Krazy Cherry Fruit Co. will manage all aspects of the orchard operation - growing, harvesting and selling the fruit independently. Cherry trees will be sourced from Krazy Cherry Fruit Co.'s own cherry nursery, with planting planned to commence in spring 2023 once the property is filled and restored to the original grade before disturbance. Following planting, 8-ft deer fencing will be installed along the property boundaries. Irrigation will be drawn from the Glenmore Ellison Irrigation District (GEID) water source which is already supplied to the property. An Irrigation System Plan will be prepared by Victor and Growers Supply in Kelowna.

1.2 Land Use of Surrounding Area

Land use in the surrounding area is agricultural, with neighboring agricultural (A1) zoned properties with residential homes on private owned land (**Table 1**).

TABLE 1. Land use of surrounding properties.

Direction	Zoning*	Ownership	Land Cover/Use
North	A1	Private	Agriculture/Rural Residential
South	A1	Private	Agriculture/Rural Residential
East	A1	Private	Agriculture/Rural Residential
West	A1	Private	Agriculture/Rural Residential

**A1 = Agriculture*

2.0 SITE ASSESSMENT AND METHODOLOGY

A site assessment of the subject property to document existing conditions and review surrounding lands was carried out by Theresa Loewen, M.Sc., P.Ag., on April 19, 2022 and June 2, 2022 (**Photos 1 – 14**).

The property has an existing single-family residence and several outbuildings, which are proposed to be retained and are outside the proposed fill placement area. There is evidence of historic clearing and stripping that can be seen in the ortho imagery (**Figure 2**). The landowner acquired the property in May 2022. Personal communication with the previous landowner indicated that the property used to be an old gravel/borrow pit with some livestock. Currently the property is not being used for agriculture.

There is a "mapped unnamed stream line" that bisects Postill Drive and Anderson Road to the northeast before running through the subject property from the northeastern corner to the western border, eventually connecting with Mill Creek to the south (**Figure 3**). While this stream line is mapped as running through the subject property, large sections are underground, specifically within the subject property from Anderson Road at the point of entry. During the site assessment,

there appeared to be no evidence of a stream channel through the mapped path of the stream line. However, there are two patches of cattails and some aspen trees which appear to crop out from underground springs as shown in **Figure 3**, with no standing water observed at the time of the site visits, and no evidence of above-ground connectivity to a stream channel. For these reasons, it was determined that the mapped unnamed stream is not a stream as defined under the *Riparian Areas Protection Regulation* (RAPR). More details regarding site drainage can be found in Section 5.0.

Other sources of information queried for the assessment include:

- British Columbia Soil Information Finder Tool (BC SIFT);
- Agricultural Land Commission (ALC);
- Provincial Land Capability for Agriculture Rating System;
- Biogeoclimatic Maps;
- Agricultural Land Commission's Best Management Practices; and
- Provincial Best Management Practices (BMPs).

2.1 Land Capability Classification for Agriculture in British Columbia

The British Columbia Soil Information Finder Tool (BC SIFT) was accessed on June 2, 2022 to query soil survey and agricultural capability data for the subject property. Agricultural capability polygons present within the subject property can be seen in **Table 2** and **Figure 4**.

TABLE 2. Agricultural capability ratings within the subject property (BC SIFT, 2022).

Polygon	Unimproved Class[1]	Subclass 1[2]	Subclass 2	Improved Class	Composition
Knox Mountain	5	A	-	1	100%
Rutland	6	A	-	3AP	100%
Westbank	4	A	D	3D	100%
Gammil	6	A	-	3AP	80%
			-	3A	20%

[1] Class 1 land has minimal limitations when associated with the most amenable climates in the Province. In Class 2 to Class 5, the limitations increase. Class 6 lands have limitations that preclude arable agricultural activities yet are capable of sustaining native and/or perennial uncultivated agriculture. Class 7 lands have limitations that preclude all arable and natural grazing agricultural systems, regardless of the climate.

[2] A = soil moisture deficiency, D = undesirable soil structure, P = stoniness, T = topography

In BC, agricultural capability ratings and limitations are assessed through a classification system which describes seven land capability classes for agriculture (Classes 1 to 7)[1]. The land capability classification for agriculture has two main components: the capability class and the capability subclass, where the class identifies the potential for agriculture, and the subclass identifies limitations or special management practices needed to improve the soil, such as topography, stoniness, soil moisture deficiency, low fertility, etc. The best agricultural lands are rated Class 1

[1] Agricultural Land Commission June 2022.

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. Regular management practices required to make land productive include, drainage, irrigation, stone picking, fertilization etc[1].

Soil polygons within the subject property are classified as agricultural capability Class 4 (limitations that require special management practices or severely restrict the range of crops, or both), Class 5 (limitations that restrict the capability of producing perennial forage crops or other specially adapted crops) and Class 6 (nonarable but is capable of producing native and/or uncultivated perennial forage crops), with limitations of soil moisture deficiency and undesirable soil structure. Improved ratings include Classes 1 and 3 with limitations of soil moisture deficiency, undesirable soil structure, and stoniness.

The vast majority of the subject property is Knox Mountain soils of Class 5 with limitations of soil moisture deficiency (**Figure 4**). However, due to the suspected historic soil and gravel extraction, it is recommended that topography be considered as an additional limitation. Growing-season moisture deficits are common in the Okanagan, and can be managed with an established irrigation system.

3.0 SOIL SURVEY CHARACTERISTICS

Although a detailed site-specific investigation of the existing soils on the subject property has not been conducted, the following describes the characteristics of the geologic history and deposits contributing to existing soil conditions.

Several glacial advances and retreats together with glaciofluvial action have produced a variety of deposits and sediments that form most of the soil parent materials within the area (Wittneben, 1986).

The British Columbia Soil Information Finder Tool (BC SIFT) was accessed on June 2, 2022 to query the soil survey data, as displayed in **Table 3** and **Figure 4**.

TABLE 3. Surficial deposit characteristics in the area of the subject property (BC SIFT, 2021).

Soil Name	Texture	Drainage	Deposition Mode	Classification	Percent Composition
Knox Mountain	Sandy Loam - Loam	Well Drained	Glaciofluvial	Eluviated Eutric Brunisol	100%
Rutland	Sandy Loam	Rapidly Drained	Glaciofluvial	Orthic Dark Brown Chernozem	100%
Westbank	Silty Clay	Moderately Well-Drained	Glaciolacustrine	Orthic Gray Luvisol	100%
Gammil	Loamy Sand	Rapidly Drained	Glaciofluvial	Eluviated Eutric Brunisol	80%

The Knox Mountain Soil Group[2]

Parkhill soils are classified as Eluviated Eutric Brunisol (E.EB), with common horizons of LFH, Ae or Aej, Bm or Btj, Ck, or C. These soils have the general properties specified for soils of the Brunisolic order and the Eutric Brunisol great group. They differ from Orthic Eutric Brunisols by having an eluvial horizon, Ae or Aej, at least 2 cm thick. The underlying horizon may be a Btj with thin clay skins on some surfaces or, less commonly, a Bfj. Otherwise, they have the diagnostic properties of Orthic Eutric Brunisols.

Knox Mountain soils are generally characterized by native soil profiles undisturbed by agriculture with 0% coarse fragments by volume, where the water table is not present in the soil at any time and there are no root restricting layers.

Drainage is well drained, where water is removed from the soil readily but not rapidly. Excess water flows downward readily into underlying pervious material or laterally as subsurface flow. Soils have intermediate available water storage capacity (4-5 cm) within the control section, and are generally intermediate in texture and depth. Water source is precipitation. On slopes subsurface flow may occur for short durations, but additions are equaled by losses.

Parent materials were deposited by glaciofluvial action in the uppermost layer, where material is moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and may occur in the form of outwash plains, deltas, kames eskers, and kame terraces, and have a medium acidic to neutral pH (5.6 – 7.4) and moderately coarse textures. Below the uppermost layer, glaciolacustrine deposits can be found where there is evidence that the lacustrine materials were deposited in contact with glacial ice (kettles or an otherwise irregular surface that is neither simply the result of normal settling and compaction in silt nor the result of piping; slump structures resulting from loss of support caused by melting of retaining ice; presence of numerous ice-rafted stones in the lacustrine silts). This material is moderately to very strong calcareous with 6 - 40 $CaCO_3$ equivalent (%).

According to Wittneben (1986), Knox Mountain soils have developed in loamy to sandy fluvioglacial veneers, between 10 to 50 cm thick, and overlie interstratified silty and sandy glaciolacustrine sediments. Surface and subsurface textures are sandy loam or loam, which subsoil consists of alternating bands of silty clay loam, clay loam and loamy fine sand. These soils are moderately pervious and have moderate water holding capacity. Most Knox Mountain soils are well suited for agriculture, including pasture, hay, or orchards.

The Rutland Soil Group[2]

Rutland soils are classified as Orthic Dark Brown Chernozem, with common horizons of Ah, Bm, Cca, or Ck. The Orthic Dark Brown Chernozem subgroup may be thought of as the central concept of Dark Brown Chernozems. It encompasses the properties specified for the Chernozemic order and the Dark Brown Chernozem great group. Usually, Orthic Dark Brown Chernozems have brownish-colored, prismatic B horizons, and light-colored horizons of carbonate accumulation similar to those of Orthic Brown Chernozems. Orthic Dark Brown Chernozems have a Chernozemic

[2] British Columbia Soil Information Finder Tool (BC SIFT), 2022

A horizon with a color value darker than 3.5 moist and between 3.5-4.5 dry. The B horizon (Bm, Btj, Bt) is at least 5 cm thick that does not contain alkaline earth carbonates. They lack an Ae horizon at least 2 cm thick. They lack a Bnjtj horizon or a similar horizon characteristic of intergrades to the Solonetzic order. They lack evidence of gleying as indicated by faint to distinct mottling within 50 cm of the mineral surface.

Rutland soils are generally characterized by native soil profiles undisturbed by agriculture with 63% coarse fragments by volume, where the water table is not present in the soil at any time and there are no root restricting layers.

Drainage is rapidly drained, where water is removed from the soil rapidly in relation to supply. Excess water flows downward if underlying material is pervious. Subsurface flow may occur on steep gradients during heavy rainfall. Soils have low available water storage capacity (2.5-4 cm) within the control section, and are usually coarse textured, or shallow, or both. Water source is precipitation.

Parent materials were deposited by glaciofluvial action, where material is moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and may occur in the form of outwash plains, deltas, kames eskers, and kame terraces, and are moderately to strongly calcareous (6 - 40 $CaCO_3$ equivalent (%)).

According to Wittneben (1986), Rutland soils have developed in moderately coarse textured veneer between 10 and 25 cm thick which overlies gravelly and stony very coarse textured glaciofluvial deposits. Surface soil textures are dominantly sandy loam or loamy sand while subsurface and subsoil textures are gravelly sand or gravelling loamy sand, with stones and cobbles common. These soils are rapidly drained, rapidly pervious, have slow surface runoff and low water storage capacity. The main limitations to agriculture are gravelly and stony textures, rapid permeability and low water holding capacity. Tree fruits and grapes are most commonly cultivated in these soils with irrigation.

The Westbank Soil Group[3]

Westbank soils are classified as Orthic Gray Luvisol, with common horizons of LFH, Ae, AB, Bt, C, or Ck. These soils have the properties specified for the Luvisolic order and the Gray Luvisol great group. They have well-developed Ae and Bt horizons and usually have organic surface horizons. Faint mottling may occur immediately above or within the Bt horizon. Orthic Gray Luvisol have an Ae horizon with a chroma of less than 3 unless the chroma of the parent material is 4 or more, and a Bt horizon, but lack a Bf horizon and a fragipan. They may have a dark-colored, mineral-organic surface horizon (Ah or Ahe) less than 5 cm thick. They may have an Ap horizon, but its dry color value must be 5 or higher. They have distinct mottling, that indicates gleying does not occur within 50 cm of the mineral surface. Prominent mottling does not occur at depths of 50-100 cm.

Westbank soils are generally characterized by native soil profiles undisturbed by agriculture with 0% coarse fragments by volume, where the water table is present in the soil during an unspecified period. Root restrictions occur in the third layer with an undifferentiated restriction.

[3] British Columbia Soil Information Finder Tool (BC SIFT), 2022

Drainage is moderately well drained, where water is removed from the soil somewhat slowly in relation to supply. Excess water is removed somewhat slowly due to low perviousness, shallow water table, lack of gradient, or some combination of these. Soils have intermediate to high water storage capacity (5-6 cm) within the control section and are usually medium to fined textured. Precipitation is the dominant water source in medium to fine textured soils; precipitation and significant additions by subsurface flow are necessary in coarse textured soils.

Parent materials are glaciolacustrine deposits which can be found where there is evidence that the lacustrine materials were deposited in contact with glacial ice (kettles or an otherwise irregular surface that is neither simply the result of normal settling and compaction in silt nor the result of piping; slump structures resulting from loss of support caused by melting of retaining ice; presence of numerous ice-rafted stones in the lacustrine silts). The deposits are calcareous and saline.

According to Wittneben (1986), Westbank soils consist of fine to moderately fine textured glaciolacustrine deposits. Surface and subsurface textures are silty clay loam, clay loam, or clay. Subsoil textures are clay or heavy clay but may become sandy below about 200 cm. Westbank soils are moderately well drained, slowly pervious, and have high water holding capacity. Soils are moderately suited for agriculture, although dense, clayey subsoils inhibit root growth and water movement. Tree fruits, grapes, and hay or pasture are most commonly cultivated in these soils. Pudding and structure degradation can occur if the soils are cultivated when wet.

The Gammil Soil Group[4]

Gammil soils are also classified as Eluviated Eutric Brunisol (E.EB), as described above.

Gammil soils are generally characterized by native soil profiles undisturbed by agriculture with 42% coarse fragments by volume, where the water table is not present in the soil at any time and there are no root restricting layers.

Drainage is rapidly drained, where water is removed from the soil rapidly in relation to supply. Excess water flows downward if underlying material is pervious. Subsurface flow may occur on steep gradients during heavy rainfall. Soils have low available water storage capacity (2.5-4 cm) within the control section, and are usually coarse textured, or shallow, or both. Water source is precipitation.

Parent materials were deposited by glaciofluvial action, where material is moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and may occur in the form of outwash plains, deltas, kames eskers, and kame terraces, and are weakly calcareous (< 6% $CaCO_3$ equivalent).

According to Wittneben (1986), Gammil soils are deep, coarse-textured, stony and gravelly fluvioglacial deposits capped by 10 – 25 cm of sandy materials. Surface textures are gravelly sandy loam, sandy loam, or loamy sand while subsurface textures vary from gravelly loamy sand to gravelly sand. These soils are well to rapidly drained, rapidly pervious, have low water holding capacity and slow surface runoff. The main limitations to agriculture are stoniness, low water

[4] British Columbia Soil Information Finder Tool (BC SIFT), 2022

holding capacity and adverse topography, but areas with gentle slopes are suitable for treefruits grapes, or hay production.

4.0 CLIMATE

The subject property occurs within the Okanagan Very Dry Hot Ponderosa Pine (PPxh1) biogeoclimatic zone that is described by the Biogeoclimatic Ecosystem Classification (BEC) program (Lloyd et al., 1990). The PPxh1 is the driest forested zone in British Columbia, occurring only at lower elevations in the southern valleys of BC, at the northern extent of a much larger range than runs through eastern Washington and Oregon. Areas of the PPxh1 zone have cool winters with low snowfall, and hot, dry, summers with growing-season moisture deficits resulting in a mosaic of open forest and grassland ecosystems (Iverson & Uunila, 2006).

Climate data for the subject property indicates the subject property has approximately 167 frost free days, 2,215 growing degree days above 5˚C, mean annual precipitation of 359 mm, and summer heat moisture index of 123 (BC SIFT, 2021).

According to climate normal data from Environment Canada from the "Kelowna East" station between 1981 and 2010, the average annual total precipitation (rain and snow) is 414 mm with an average of 329.6 mm of rainfall. The highest precipitation typically occurs between May and July, which is generally followed by a moisture deficit during the late summer. Temperature extremes for the area occur in December and July, and daily average temperatures were -2.6°C and 20.4°C, respectively.

5.0 DRAINAGE & TOPOGRAPHY

There is a "mapped unnamed stream line" that bisects Postill Drive and Anderson Road to the northeast before running through the subject property from the northeastern corner to the western border, eventually connecting with Mill Creek to the south (**Figure 3**). While this stream line is mapped as running through the subject property, large sections are underground, specifically within the subject property from Anderson Road at the point of entry. During the site assessment, there appeared to be no evidence of a stream channel through the mapped path of the stream. However, there are two patches of cattails and some aspen trees which appear to crop out from underground springs as shown in **Figure 3**, with no standing water observed at the time of the site visits. These areas appear to be local depressions acting as moisture receiving areas and/or areas of high water table, which is known to be common in the Ellison area. To mitigate drainage issues, Ecoscape recommends a swale be incorporated into the drainage plan with respect to fill placement to accommodate any seasonal changes and to reduce the risk of water accumulating in planted areas. This can be done in a field-fit manner at the time of fill placement according to site conditions.

Drainage data for the area indicates the majority of the property is well-drained (**Figure 5**).

According to the BC SIFT (2022), slopes in the area are approximately 18%, with an average slope of 9%. For the subject property, the average slope is 11% with some areas in excess of 80% (**Figure 6**). Elevation ranges within the subject property from 462 m to 473 m (**Figure 6**).

To improve the topographic limitations, filling and grading areas of steep slopes and low-lying areas can help to reduce or eliminate frost pockets.

6.0 FARM PLAN

The purpose of the fill placement is to restore the property to its original state prior to disturbance of fill export and gravel extraction and to eliminate the introduced agricultural limitations of topography, by importing fill of agricultural quality and raising the land to a uniform grade to eliminate the frost pockets, draws, and low-lying areas, in order to plant sweet cherries.

The subject property is 12.63 acres and is not currently being used for agriculture. The landowner proposes to cultivate approximately 8 acres and retain the single-family home on the property. Fill placement is planned to commence as soon as possible upon the receipt of the appropriate permits and approvals, and is expected to complete by spring of 2023.

Site preparation for the planting 1 - 3 varieties of sweet cherries will commence following fill placement. Approximately 8 acres will be planted with high dentistry 14'x 8' spacing to maximize land usage. Krazy Cherry Fruit Co. will manage all aspects of the orchard operation - growing, harvesting and selling the fruit independently. Cherry trees will be sourced from Krazy Cherry Fruit Co.'s own cherry nursery, with planting planned to commence in spring 2023 once the property is filled and restored to the original grade before disturbance. Following planting, 8-ft deer fencing will be installed along the property boundaries. Irrigation will be drawn from the Glenmore Ellison Irrigation District (GEID) water source which is already supplied to the property. An Irrigation System Plan will be prepared by Victor and Growers Supply in Kelowna.

In the words of the landowner, "this land is being wasted and not being put to use. Being in the Okanagan Valley it is very hard to come by useable ALR land, that being said if this land was filled and properly prepared it would serve as a great site for cherries or other fruit trees allowing us to maximize ALR land. Right now there is no use for the land, with the previous soil being taken out there is a big dip in the property. Bringing more soil and raising the level of the land would allow it to be used for planting because it would allow the cold air coming from the mountains to flow through the property rather than settling in the field, it would also allow for better air and precipitation drainage. This site would be amazing for late season cherries as there are other cherry orchard[s] in the area as well as apple orchards."

7.0 POTENTIAL ENVIRONMENTAL IMPACTS OF FILL PLACEMENT

Ecoscape has not completed an environmental impact assessment for this project. Ecoscape anticipates that, with due diligence and the appropriate mitigation measures in place, the risks for adverse impacts from fill placement to the environment and surrounding area can be appropriately mitigated.

Ecoscape recognizes that the proposed works could result in the following potential impacts:

- Potential for the release of deleterious substances (e.g., fuel, oil, concrete, hydraulic fluid) to the environment during the proposed works or as a result of improper storage, equipment re-fueling, and/or poorly maintained equipment.

- Potential for the release of sediment due to improper containment measures or lack of attention to detail during the placement of materials using heavy equipment.
- Disturbance beyond the proposed footprint if not clearly marked or identified before and during the works. Clear and visible fencing or flagging around the site will aid in preventing disturbance outside of the proposed works area.
- Potential for the establishment of invasive plant species during disturbance of land within the study area. An agricultural seed mix should be used to revegetate any disturbed area from the proposed works and must not include any invasive grass species or species not native to the Okanagan.
- Potential for sediment accumulation on road surfaces and noise disturbances to surrounding residents from fill placement traffic.

The following Best Management Practices and Mitigation Measures should be adhered to in order to protect potential aquatic and terrestrial life.

8.0 BEST MANAGEMENT PRACTICES AND MITIGATION MEASURES

Recommendations to avoid or minimize the potential impacts that may arise during the proposed fill placement works are summarized below and based on Best Management Practices of the Province of BC and the Agricultural Land Commission.

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

- All works should generally conform to the Develop with Care Guidelines (2014) and other standard Best Management Practices for British Columbia found at:

  https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/laws-policies-standards-guidance/best-management-practices/develop-with-care
- All applicable ALC bylaws and policies, including but not limited to: Bylaw No.2, Policies P-10, P-13 and L-23.

8.1 General Requirements

- All conditions outlined within this report and the ALC Approval Letter must be followed throughout the entirety of the proposed works period. ***Copies of all permits and/or approvals must be kept onsite at all times for reference.***
- All fill sources must be sampled and analyzed by an ISO/IEC17025:2017 accredited lab according to the BC Contaminated Sites Regulation (CSR) standards for agriculture and the ALC Bylaw No.2 and evaluated by a Qualified Professional in Agrology (P.Ag.) to ensure fill meets the CSR and ALC standards ***prior to fill***

placement. Approved Phase I or Phase II ESA studies conducted recently by a qualified professional will also be acceptable.

- ***Trucking records must be maintained*** to include truck operator (name and business license), date of fill placement, volume of fill, and source location.
- The release of fine sediments, construction debris or other substances deleterious to the environment or watercourses must be prevented at all times.
- Ensure that onsite machinery is in good operating condition, clean and free of leaks, excess oil or grease.
- No works may take place in or around a stream, as defined by the *Water Sustainability Act*, without a Provincial permit in-hand. An EM must be onsite full time during any instream works.
- Road surfaces adjacent to the project area must be kept clean and free of fine materials. Sediment accumulation upon the road surfaces must be removed (i.e., swept or scraped) on a regular basis and disposed of appropriately.
- Existing topsoil must be retained where possible, stockpiled outside the fill placement area, tarped, and kept free of invasive species establishment. Topsoil must be replaced after fill placement has completed.
- Soil must not be salvaged, moved, stockpiled, or replaced during conditions of adverse soil moisture content including when the soil is frozen (to prevent slumping) or powdery dry.
- Compaction must be minimized by selecting soil materials with low clay contents for replacement in the root zone.
- The use of native material (salvaged topsoil and overburden) is preferable to the use of materials sourced from off site to avoid potential issues with drainage and excessive stoniness in the upper soil profile.
- Surface drainage from the reclaimed area must be maintained at all times in order to prevent erosion, flooding, siltation or other degradation of soils, adjacent lands or waterways.
- Any run-off must be diverted into catchment ponds or silt traps prior to discharge into natural watercourses or road ditches.

8.2 Monitoring

On-site supervision by a qualified registered professional with expertise in soils and reclamation is required during the soil salvaging, stockpiling, storage and soil replacement process. A Qualified Professional in Agrology (P.Ag.) should be retained for monitoring (EM) to oversee fill activities and conduct site inspections to document compliance with the ALC requirements, BMPs, permit conditions, and other recommendations. In the event that greater disturbance occurs due to

unforeseen circumstances, the EM will recommend further measures to protect or restore the natural integrity of the site.

- A pre-construction meeting should be held between the EM and the contractor(s) undertaking the work onsite to ensure a common understanding of the ALC guidelines, mitigation measures and best practices required for the project. The EM will attend other routine meetings, as required.
- It is the contractor's responsibility to provide the EM with a detailed construction schedule and inform the EM of any changes to that schedule.
- The EM will be an approved Qualified Professional in Agrology (P.Ag.) authorized to halt construction activities should an incident arise that is causing undue harm (unforeseen or from lack of due care) to terrestrial, aquatic, or riparian resource values.
- A copy of this report describing mitigation measures and BMPs will be kept readily available at the site for reference while the work is being conducted.
- Reports will be submitted to the ALC at a frequency outlined in the Approval Letter based on volume of material placed. A final report will be generated upon the substantial completion of construction works summarizing the project activities and listing any deficiencies noted throughout the works.

8.3 Disturbance Limits

- Disturbance limits should be clearly delineated before the start of works. Disturbance beyond the identified development footprint must not occur without further assessment.
- Native vegetation, including trees, shrubs, and groundcover, must be retained as much as possible to mitigate the establishment of additional invasive plant species.
- Material stockpiling must not take place within the drip line of trees.
- In the event that land and/or natural vegetation is disturbed or damaged beyond the development footprint area, these areas should be restored and/or replanted with plant material native to the area under the direction of the EM.

8.4 Site Clearing and Grubbing

- Disturbance beyond the identified development footprint must not occur without further assessment.
- Native vegetation, including trees, shrubs, and groundcover, must be retained as much as possible to mitigate the establishment of invasive plants and to maintain the existing ecological value within the study area.

- In the event that land and/or natural vegetation is disturbed or damaged beyond the development footprint area, these areas must be restored and/or replanted with plant material indigenous to the area under the direction of the EM.
- Whenever possible, equipment/machinery used must not be operated or stored within the drip line of trees and equipment must not come into contact with trees outside of the marked limits of disturbance, which could result in physical damage to the bark or limbs.

Avian nesting timing windows should be considered if trees are to be removed, to protect nesting birds within and adjacent to the proposed work area. The general nesting period of migratory birds in Canada within Zone A1a and A2 is March 31st to August 15th (BC MoFLNRORD 2020). The following methods should be implemented in relation to nesting bird work windows:

- Section 6 of the Federal Migratory Birds Convention Regulation protects both the nests and eggs of migratory birds. The project area falls within the Canadian Avian Nesting Zone A1 (MECCS 2020). The general avian nesting period for migratory birds within this zone is March 26th to August 9th. Section 34 of the Provincial Wildlife Act protects all birds and their eggs, and Section 34(c) protects their nests while they are occupied by a bird or egg. The project area falls within the Northern Okanagan Basin ecodistrict. The avian nesting period for all birds within this ecodistrict is **February 1st to September 14th** (Birds Canada 2021).
- If vegetation clearing activities are required during the identified avian nesting period, pre-clearing nesting surveys may be required by an Environmental Monitor (EM) to identify active nests.
- If active nests are found within the construction limits, a buffer will be established around the nest until such time that the environmental monitor (EM) can determine that nest has become inactive. The size of the buffer will depend on the species and nature of the surrounding habitat. Buffer sizes will generally follow provincial BMP guidelines or other accepted protocol (e.g., Environment Canada). In general, a minimum 20 m buffer will be established around songbird nests or other non-sensitive (i.e., not at risk) species.
- Clearing and other construction activities must be conducted within **72 hours** following the completion of any pre-clearing nest surveys. If works are not conducted in that time, the nest surveys are considered to have expired and a follow-up survey will be completed to ensure that no new nests have been constructed.
- Wherever possible, trees with high wildlife value, such as veteran trees and large snags, must be conserved. Hazardous trees with wildlife value within the vicinity of the construction works should be assessed by a certified wildlife/danger trees assessor to determine levels of risk.

- Best management practices relating to raptors and their nests can be found in Guidelines for Raptor Conservation during Urban and Rural Land Development in BC (2013).

8.5 Topsoil Management

Prior to any extraction, all existing topsoil must be salvaged under the direction of the qualified registered professional for use during reclamation. Additional salvaging of subsoil and overburden may be necessary on sites where backfill sourced from off-site is not readily available, topsoil is shallow or where there is limited overburden available. The recommendations for soil handling procedures are as follows:

- Soil must be salvaged from all of the following areas:
    - the proposed pit or quarry area;
    - the access roads; and,
    - the proposed stockpile areas for the subsoil and overburden.
- Topsoil, subsoil and any overburden must be salvaged and stored separately. o
    - Separation between piles should be no less than 3 m.
- Topsoil must be salvaged using an excavator with a clean-out bucket.
- Materials must be transported to an appropriately designated storage area that will not be disturbed by extraction activities in order to avoid double handling of materials.
- A uniform layer of bark mulch or sawdust should be laid down on the storage surface prior to placement of any salvaged material.
- The areas required for stockpile storage must be based on estimates of initial soil salvaging volumes.
- Stockpiled soils must be windrowed and located in an area where they will not be disturbed and will not impede site drainage.
- Drainage from, onto and around the stockpiles must be controlled by ditches, drains or intercepts as required.
- Stockpiled soil must not be removed from the property without written permission from the Commission.
- Salvage piles should be limited in height (2 to 3 meters). Higher piles must not exceed a 3H:1V slope (horizontal: vertical).
- Stockpiles must be seeded and established with an appropriate plant cover or other suitable soil erosion control measure must be applied to protect the stockpiles from wind or water erosion.

8.6 Subgrade Preparation

The Commission frequently requires the backfilling of pits to ensure that the final elevation is consistent with adjacent land and the property's relative original elevation. Therefore, once all extraction activities are complete, the pit should be filled with suitable material that consists of either the stockpiled overburden and/or fill sourced from offsite. Subgrade preparation must proceed as follows:

- If imported fill is used to backfill, the fill must have the following characteristics:
    - must be of mineral origin only (organic soils are not permitted as fill material but can be used as a top-dress);
    - have a coarse fragment content less than 5% with no boulders >25 cm in the top 1 metre of the soil profile; and,
    - the texture of the soil must be no coarser than loamy sand and no finer than silt loam.
- The following are prohibited materials in the ALR and must not be used as fill: o concrete or demolition waste, including masonry rubble, concrete, cement, rebar, drywall, and wood waste;
    - asphalt;
    - glass;
    - synthetic polymer;
    - treated wood; and,
    - unchipped lumber.
- The final contours of the subgrade must be gently sloping in such a manner as to conform to the surrounding landscape.
- Depending on the site topography, any permitted side slopes and/or benches should be recontoured so that slopes are no steeper than 3.5H:1V (horizontal: vertical) to allow for use of farm equipment on the slopes. Steeper slopes may be allowed in some cases depending on the configuration of the field in order to maximize the amount of flat land (e.g., long narrow extraction pits).
- To avoid severe erosion of topsoil, land that is intended for the production of annual crops should have slopes no greater than 20H:1V or 5% slope (Class 1).
- In the Lower Fraser Valley and Metro Vancouver, the slopes must be less than 1% on cropland to minimize sheet and rill erosion.
- If necessary, upon completion of backfilling, the subgrade should be chisel plowed to a minimum depth of 60 cm in two directions at right angles.

8.7 Soil Replacement

Once the subgrade materials have been regraded, available topsoil and/or other suitable soil materials must be used to provide a rooting bed for crops.

General Recommendations

- Any stockpiled soils must be replaced in the reverse order from which they were removed.
- The recommended soil profile should consist of (from surface to at depth):
  - 20 – 30 cm of topsoil;
  - 30 cm of subsoil;
  - 50 cm of free draining subgrade; and,
  - Overburden or backfill (variable thickness).
- The placement of stakes, flagged to the desired replacement thickness, must be employed to assist the machine operator.
- Soil materials should be end dumped and leveled with low ground pressure equipment, such as tracked bulldozers.
- Vehicles and equipment must be restricted to designated roads or routes, so that ripping and subsoiling activities can be limited to these specific areas.
- Random, repeated running of equipment over leveled areas must be minimized wherever possible.

Subsoil Placement:

- If subsoil has been retained, the subsoil must be replaced in one lift.
- If fill is used as subsoil, then the fill must have a coarse fragment (fragments >2 mm diameter) content of less than 5% and must not contain any boulders (rock fragments >25 cm).
- Once the subsoil is in place, roughening the subsoil surface is required to hold topsoil in place following initial placement.
- If compaction does occur, rip the affected areas to a depth of 60 cm or more with shanks spaced 60 cm apart and then cross rip perpendicular to the first direction.

Topsoil Placement:

- Topsoil thickness should be equivalent to what was present before disturbance.
- Coarse fragments must not be introduced in the top 25 cm of the soil profile.
- Prior to replacement of the topsoil, soils must be screened separately to remove coarse fragments.
- Where the percentage of the coarse fragment content by volume is less than 5%, screening is not necessary. The qualified registered professional must determine if screening is necessary.
- Screening must be carried out under appropriate soil moisture conditions.

- Topsoil should not be replaced in areas such as roads or wet depressions that will not be used for productive agriculture unless required for grass establishment for erosion control.
- If the native topsoil has been removed, then a 20 - 30 cm lift of imported topsoil must be uniformly spread over the disturbance area. The texture of the soil must be no coarser than loamy sand or finer than silt loam.
- A suitable organic matter should be top-dressed over the reclamation area. This organic matter may be added in the form of animal or poultry manure or as a cereal or forage cover crop and turned into the soil.

8.8 Erosion and Sediment Control

The following section details the mitigations and recommendations related to erosion and sediment control (ESC) that must be adhered to throughout the duration of the project where applicable.

- Stockpile locations, staging and equipment storage areas, and environmentally sensitive areas should be delineated at the start of construction.
- Works involving ground disturbance should not be conducted during heavy rains wherever feasible to reduce the potential for sediment and erosion issues. Exposed soils along slopes must be stabilized and covered where appropriate using erosion control blankets (ECB), poly sheeting, tarps, or other suitable materials to reduce the potential for erosion resulting from rainfall, seepage, or other unexpected causes.
- Silt fence and other appropriate ESC measures should be installed prior to the start of construction in appropriate locations as identified by the EM. Silt fence must be installed between the proposed development and any areas of potential migration to mitigate the risks to resources associated with runoff and sediment transport. Silt fencing must be installed as directed by the EM in a field-fit manner. Silt fence must be staked into the ground and trenched a minimum of 15 cm to prevent flow underneath the fence and must remain taut to prevent material from moving over the fence. Silt fencing should contain sufficient storage capacity to collect runoff and sediment deposition during storm events. Silt fencing will be monitored on a regular basis and any damages or areas where the integrity and function of the fencing has been compromised should be repaired or replaced promptly. Silt fence must remain in place where required until the completion of the project;
- If erosion becomes a problem during construction and there is a risk of siltation to the adjacent naturally vegetated areas and watercourses (i.e. during heavy rain events), silt fence must be installed immediately adjacent to the development footprint to mitigate for potential sediment transport and erosion downslope of the works. Silt fence must be staked into the ground and trenched to prevent flow underneath the fence.

- ESC recommendations by the EM must be implemented within 24 hours.
- It is the contractor's responsibility to inspect all mitigation measures daily and additional measures will be installed, maintained, and repaired or replaced as required using a field-fit, adaptive approach.
- Road surfaces adjacent to the project area must be kept clean and free of fine materials. Sediment accumulation upon the road surfaces must be removed (i.e., swept or scraped) on a regular basis and disposed of appropriately.
- The release of silt, sediment, sediment-laden water, or any other deleterious substance into any ditch, watercourse (creek, river, lake, wetland), ravine, or other drainage feature must be prevented at all times. Similarly, there is to be no sediment release into areas of vegetation growth or sensitive areas in levels that would adversely alter growing or hydraulic conditions.
- No equipment refueling can take place within 30 m of a watercourse;
- It is the contractor's responsibility to regularly monitor weather forecasts and adjust ESC measures or proposed construction activities as required based upon the existing conditions of the site.
- ESC should incorporate the measures described below to mitigate risks during construction works. The plan is generally based upon provincial BMPs and other specifications and includes the following principles:
    - Construction works should be conducted during periods of warm, dry weather with no forecasted precipitation;
    - Construction works should be scheduled to reduce the overall amount of time soils are exposed;
    - Natural drainage patterns should be maintained where possible;
    - Existing native vegetation should be retained where possible; and,
    - Stormwater and sediment-laden runoff should be directed away from exposed soils within the construction area.
- Exposed soils along slopes should be stabilized and covered where appropriate using geotextile fabric, polyethylene sheeting, tarps, or other suitable materials to reduce the potential for erosion resulting from rainfall, seepage, or other unexpected causes; and,
- Adjacent roadways should be kept clean and free of fine materials. Sediment accumulation upon the road surfaces must be removed and disposed of appropriately.

8.9 Drainage/Water Management

A drainage plan should be prepared for the site by a qualified registered professional to ensure that water is appropriately managed on and offsite. Prior to the installation, drainage plans must be submitted to the Commission for review and approval. The following drainage and erosion

control measures should be considered when designing the plan; however, this will vary depending on specific site conditions:

- Interceptor drains and grassed water runs to slow the velocity of runoff water and prevent erosion.
- Placement of toe slope drains to collect and remove seepage from the subsoil.
- Use of temporary diversion drainage on new areas of topsoil and seeded areas.
- Sedimentation impoundments to protect water quality in downstream areas. The size and location of impoundments is determined by runoff volumes, erosion rates, and required retention times.
- Installation of a soil drainage system (subsurface drainage as needed). This will depend on the end use and agricultural capability.
- Installation of a layer of porous drainage material to reduce the amount of water in the soil.
- The drainage must be installed upon completion of rehabilitation of each phase and prior to establishing any perennial crops other than forage.
- The reclaimed area must be monitored by the qualified professional following re-seeding to determine if sufficient drainage has been provided. If poorly drained areas persist, it may be necessary to install additional drainage structures.

8.10 Air Quality & Dust Management

Air quality standards must be met at all times during the project. Dust control can be achieved by reducing the spatial extents and amount of time that soils are exposed to construction activities. Reducing traffic speed and volume can also reduce dust concerns. Surface and air movement of dust during project activities can be mitigated through preventive measures and design criteria.

Dust generating activities include dust from wheels of vehicles and machinery and stockpiling and movement of soil.

Avoidance, containment, and suppression of dust and dusty processes must be ensured by the following measures, where applicable:

- Exposed soils will be watered as required to suppress dust. Sediment-laden runoff must not be conveyed to any watercourses or surface water drainages. Oil and other petroleum products will not be used for dust suppression. Alternative dust suppressants will be approved by the EM prior to application;
- All road surfaces must be kept clean and free of fine materials (i.e., swept or scraped) regularly to prevent the increase of airborne particulate matter;
- Road sweeping/cleaning of entrance and access;
- All material leaving site in fully enclosed trailers (tarped);

- Wetting of material prior to disturbance (if appropriate);
- Provision and use of water truck with sprayers over vehicle entrance and onsite haul routes/roads;
- Provision and use of water truck with sprayers provided in strategic positions in working area and stockpiles as appropriate to conditions;
- Reduction of speed by vehicles onsite;
- Closing down various or all operations during severe wind events;
- Operator procedures i.e. good housekeeping to keep clean and tidy site;
- Transport management; and
- Additional measures may include cleaning, dampening of haul roads and limiting site speeds, and further onsite restrictions as required.

At all times during fill placement, dust will be monitored by visual assessments. The contractor is responsible for the operation of the dust management plan and all site operatives will be trained and required to take necessary mitigation action. They will also be required to take preventative action to avoid dust.

8.11 Noise and Vibration Management

- Works will generally be conducted in accordance with City of Kelowna bylaws, within business hours (i.e. 7:00AM to 7:00PM, Monday to Friday).
- Idle time of construction equipment and contractor vehicles must be kept to a minimum to reduce noise and the release of greenhouse gases. The contractor will inform and educate employees and sub-contractors on the importance of minimizing idling time and develop guidelines to direct the practice of reducing unnecessary idling. In general, contractor vehicles and equipment will be turned off when not in use.

8.12 Emergency Spill Response

Spills of deleterious substances can be prevented through awareness of the potential for negative impacts and with responsible housekeeping practices onsite. Maintenance of a clean site and the proper use, storage, and disposal of deleterious liquids and their containers are important to mitigate the potentially harmful effects of spills and/or leaks. The following BMPs are adapted from Chilibeck et al. (1992) to provide guidance in the control of deleterious substances.

- Construction debris and stockpiled material must be removed from the site regularly and disposed of appropriately.
- All potential wildlife attractants, including food, beverages, and other strong smelling or perfumed materials must be removed from the site daily.
- The contractor will ensure that all equipment is inspected daily for fluid/fuel leaks and maintained in good working order.

- No equipment refueling or servicing is to be undertaken within 30 m of a watercourse whenever possible.
- All spill events will be recorded and reported to the site supervisor and EM. In the event of a spill, the site supervisor will be immediately notified by workers onsite. The supervisor will then be responsible for contacting a mechanic (if necessary), the Project Manager and the EM.
- Spills occurring on dry land will be contained, scraped and disposed of appropriately. Contaminated material will be stored on tarps and covered to prevent mobilization and will be disposed of in accordance with the *Environmental Management Act*.
- Spills shall be contained, absorbed, and disposed of in accordance with the regulations outlined in the *Environmental Management Act* and using the following general steps:
    - Assess, monitor and prevent the hazard or threat;
    - Stabilize, contain, remove and clean up the hazard or threat;
    - Evacuate persons;
    - Recover and rehabilitate wildlife;
    - Restore wildlife habitat;
- Take other steps to address the long-term impacts resulting from the spill.
- Copies of contact phone numbers for notification of all of the required authorities in the event of a spill/emergency response should be posted and clearly visible at the site.
- Spill containment kits must be kept readily available onsite during construction in case of the accidental release of a deleterious substance to the environment. Any spills of a toxic substance should be immediately reported to the **Emergency Management BC 24-hour hotline at 1-800-663-3456**.

8.13 Site Clean Up

Site cleanup and restoration refers to activities used to return disturbed areas within the subject property to a state resembling the natural state. Note that protection of existing ecosystems is generally much more efficient than ecosystem enhancement and restoration following construction. The following recommendations apply to the site cleanup efforts:

- Silt fencing, snow fence and other temporary mitigation features must be removed upon substantial completion of works when the risk of surface erosion and sediment transport has been adequately mitigated with other permanent measures.
- All equipment, supplies, waste, concrete, and other non-biodegradable materials must be removed from the site following the substantial completion of construction activities.

8.14 Invasive Plant Management and Site Restoration

Any areas of exposed soils, slopes, or general disturbance where agricultural planting is not proposed should be reseeded with an agricultural grass seed mix native to the Okanagan, to prevent the establishment of invasive species. Should further restoration be required, plant species selected should be native to the area and suitable to the growing conditions where the plantings have been proposed.

- Grass seed mixes must be approved by the EM before purchase and use. Restoration grass mixes cannot include species considered invasive within BC;
- All seed mixes will be submitted to a certified seed testing laboratory for germination and purity analysis. Seed analysis certificates are to be provided prior to purchase;
- Grass seed should be broadcast and hand-raked into the soil. For steep slopes or large areas, hydroseed may be used; and,
- Grass seed mixes should be suitable for the environmental conditions seen in **Table 4** below. These conditions may be given to a seed provider to determine the most appropriate species to provide.

TABLE 4. Recommended Native Grass Seed Mix for Disturbed Areas.

Common Name	Scientific Name	Percent
Tall wheatgrass	*Thinopyrum ponticum*	*25%*
Slender wheatgrass	*Elymus trachycaulus*	*15%*
Blue bunch wheatgrass	*Elymus spicatus*	*25%*
Rough Fescue	*Festuca campestris*	*10%*
Idaho Fescue	*Festuca idahoensis*	*11%*
Perennial rye	*Lolium perenne*	*10%*
Sandberg bluegrass	*Poa secunda*	*2%*
Junegrass	*Koeleria macrantha*	*1%*
Canada bluegrass	*Poa compressa*	*1%*

The timing of grass seeding is critical to optimize success and it is recommended that seeding should occur in spring between April and June or fall between September and October. Over seeding may be required in concurrent growing seasons to obtain adequate coverage and reduce competition by invasive plant species.

Watering should occur for the first two growing seasons, until grass is established. Spring and fall irrigation should be timed to water every 3 or 4 days. In summer, watering should be deep, but infrequent – occurring once per week. Irrigation should be timed to augment rainfall and a rainfall sensor would help to reduce water consumption. Hand watering and drip irrigation are both acceptable methods. Care should be taken during watering to ensure that overland flows do not

result in sedimentation to neighboring properties. A target of 80% plant survival is recommended after two years.

Weed control must be practiced at all times.

- Weeds must be controlled before seed set. The most common practices include:
    - Cultural methods such as reseeding with an appropriate vegetative mix that can out-compete weeds;
    - Mechanical methods such as tillage, mowing, mulching or use of black plastic sheeting; and,
    - Chemical methods such as the use of herbicides.
- All newly reclaimed areas must be reseeded as soon as possible after soil replacement.

Special care should be taken to minimize the presence of non-native and invasive species. Prevention of the spread of non-native and invasive species can be achieved by limiting disturbance to soils and native vegetation where possible. Areas that have previously been disturbed should be restored with native plantings or grass seeding. Infestation areas should be controlled with regular removal of weeds. The basic principles of weed control include:

- Suppression of weed growth;
- Prevention or suppression of weed seed production;
- Reduction of weed seed reserves in the soil; and
- Prevention or reduction of weed spread.

Exotic plants are those which are not native to BC, but have been introduced to the area through human activity. Invasive plants are exotic plants that are able to reliably outcompete native species, spreading into native areas and eroding the functionality of native ecosystems. Invasive plants must be managed as part of works. *Successful management of invasive plants during the construction phase improves the success rate of the maintenance phase.* Due to disturbed nature of the property, a concerted effort must be made to reduce invasive species. Any areas where invasive species are removed, and ground is disturbed, must be reseeded.

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

Management Strategies and Activities:

- Removing Whole Plants *(ex. Manual Removal, Grubbing with Hoes, Scuffle Hoeing, Severing Roots, Whole Plant Removal with Large Equipment)*

- Cutting *(ex. Bladed Hand Tools, Pruners, Loppers, Shears, and Saws, Brushcutters and Stringtrimmers, Chainsaws, Mowing/Cutting with Larger Equipment, Stump Grinding)*
- Covering with Sheet Barriers *(ex. Mulching, tarping, solarizing)*
- Community-Scale Control *(ex. Competitive planting, burning, grazing, mechanized tilling)*
- Biocontrol
- Chemical control (ex. Herbicide) - *A BC-licensed herbicide applicator should be consulted as to the legal requirements for application of herbicide on site*.

Types of Invasive Plants:

- Some invasive plant species are annuals – meaning they only live for one year and die off over the winter. The seeds they drop are required to maintain the population into the next year. In a population of annual species, mowing, string-trimming, and other mechanical means may be used to cut the plants above the roots.
- Some invasive plant species are biennials – meaning they live for two years and die off before their third. Their first year is often focused on growth and does not produce seeds. During this time, it can often be recognized as a flat, radial growth of leaves called a "rosette". Because of this low growth habit, rosettes must be removed by hand and cannot be mowed or string-trimmed. In their second year they typically grow a tall stock which produces flowers and then seeds. In this second year, the plant can be removed mechanically as normal, or, in some species, only the seed stalk can be cut, leaving the rest of the plant in the ground.
- Some invasive plant species are perennials – meaning they live for multiple years. In this case, the entire plant must be removed or it will continue to produce and drop seeds and continue to increase the size of the population. In this case, *mowing and string-trimming will be ineffective at removing the population.*
- Some species, such as *Cirsium arvense* (Canada thistle) or *Rumex crispus* (curled dock), have specific management requirements, which can be communicated by the environmental monitor once these species have been identified.
- In areas sufficiently far from watercourses, herbicide may be used. Consult a BC-registered herbicide applicator for application services and best management practices around herbicide application.

Timing:

- *It is important that invasive plants be removed before they have gone to seed*. Depending on the species, individual plants can produce thousands of seeds. Allowing these seeds to develop and enter the soil can prolong the restoration period.

- Invasive plant management visits should be documented. The labour required during each visit should decrease as invasive plant populations are removed.

Ongoing invasive species control will be required within any areas with exposed/disturbed soils and restoration areas in the first few years until vegetation becomes established. Species that are aggressive have the potential to outcompete native species.

The contractor will ensure that all equipment and vehicles are washed and free of weed seeds prior to mobilization and de-mobilization. Vehicles and equipment should not be stored, parked, or staged within weed infested areas if possible. Contractor clothing should also be inspected daily for signs of weed seeds. If found, weed seeds should be disposed of in a contained refuse bin for offsite disposal.

Invasive plant species must be disposed of in a landfill; however, invasive species material must not be composted in the yard waste section of the landfill. Invasive plant species must not be transported to or deposited in other natural areas.

9.0 SUMMARY AND CONCLUSION

The purpose of this report is to provide an agricultural assessment of existing conditions at 5760 Anderson Road, Kelowna, BC and a farm plan for the proposed fill placement and remediation works to restore the original property grade to cultivate sweet cherries.

A review of the subject property and assessment of available data revealed that the agricultural capability of the property may be improved from Classes 4 – 6 to Class 1 and 3 with irrigation. However, due to the suspected historic soil and gravel extraction that occurred, it is recommended that topography be considered as an additional limitation. Growing-season moisture deficits are common in the Okanagan, and can be managed with an established irrigation system. Fill placement in low-lying areas and grading of steep slopes will help to reduce frost pockets.

The subject property is situated in an agricultural area with a variety of agricultural operations including orchards, livestock, ground crops, and some vineyards. For these reasons, the property is well-suited for agricultural development, specifically tree fruits.

An overview of the potential impacts of fill placement, best management practices, and mitigation measures have been recommended for the placement of fill, and Ecoscape anticipates that with due diligence and the appropriate mitigation measures in place, the risks for adverse impacts to the agricultural capability and the environment can be appropriately mitigated.

10.0 CLOSURE

This report has been prepared for the exclusive use of Desjardins Contracting Ltd. (client). Ecoscape has prepared this report with the understanding that all available information on the present and proposed condition of the site has been disclosed. The client has acknowledged that in order for Ecoscape to properly provide its professional service, Ecoscape is relying upon full disclosure and accuracy of this information.

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

Respectfully Submitted,

ECOSCAPE Environmental Consultants Ltd.

Prepared by:

Theresa Loewen, M.Sc., P.Ag.
Agroecologist
Direct Line: (250) 491-7337 ext. 214

Attachments: Site Photographs

Figure 1	Site Location
Figure 2	Proposed Works
Figure 3	Ecosystems and Streams
Figure 4	Soils & Agricultural Capability
Figure 5	Soil Drainage
Figure 6	Digital Elevation Model Analysis
Appendix 1	Site Plan by: Desjardins Contracting Ltd.
Appendix 2	Cross Sections by: Desjardins Contracting Ltd.

11.0 REFERENCES

Birds Canada, 2021. Nesting Calendar Query Tool [web application]. https://www.birdscanada.org/apps/rnest/index.jsp

British Columbia Soil Information Finder Tool. Accessed online: Accessed online June 2, 2022. https://governmentofbc.maps.arcgis.com/apps/MapSeries/index.html?appid=cc25e43525c5471ca7b13d639bbcd7aa

Chilibeck. B, G. Chislett, G. Norris. 1992. Land Development Guidelines for the Protection of Aquatic Habitat. Available: http://www.sxd.sala.ubc.ca/9_resources/fed_%20files/fed%20land%20development%20guidelines.pdf.

Iverson, K., and Uunila, P. 2006. Sensitive Ecosystems Inventory: District of Lake Country, 2005. Volume 2: Terrestrial Ecosystem Mapping, Terrain, Terrain Stability, and Erosion Potential Mapping, and Expanded Legend.

Ministry of Environment. 1983. Land capability classification for agriculture in British Columbia. MOE Manual 1. Ministry of Environment and Ministry of Agriculture. Kelowna, BC. 62pp. Accessed from https://www.alc.gov.bc.ca/assets/alc/assets/library/agricultural-capability/land_capability_classification_for_agriculture_in_bc_1983.pdf

Lloyd, D., K. Angove, G. Hope, and C. Thompson, 1990. A guide to site identification and interpretation for the Kamloops Forest Region. Land Management Handbook No. 23. February, 1990. BC Ministry of Forests.

Meteorological Service of Canada. 2012. Climate Normals 1971-2000. http://climate.weather.gc.ca/climate_normals/index_e.html

Okulitch, A.V. 2013. Geology, Okanagan Watershed, British Columbia; Geological Survey of Canada. Open File 6839, scale 1:100 000. Doi:10.4095/292220

Wittneben, U. 1986. Soils of the Okanagan and Similkameen Valleys. MOE Technical Report 18. BC Ministry of Environment, Victoria, BC230 pp. + maps. Accessed from https://sis.agr.gc.ca/cansis/publications/surveys/bc/bc52/index.html.

Photo 1. View facing west standing within the proposed fill placement area. Photos 1-6 taken April 19, 2022.

Photo 2. Landscape view facing west from the driveway of proposed fill placement area.

Photo 3. View facing southwest of adjacent property and slopes.

Photo 4. View facing east of the cattail area and aspen trees in the southeast portion of the property.

Photo 5. View facing west of the cattail area in the northern portion of the property.

Photo 6. View facing east of the existing residence and outbuildings, to be retained.

Photo 7. View facing northeast of gravel driveway off Anderson Road, of the mapped stream line (approximate location denoted by the blue arrow). Photos 7 – 14 taken June 2, 2022.

Photo 8. View facing south of the mapped stream line (approximate location denoted by the blue arrow).

Photo 9. View facing southwest standing within the mapped stream line.

Photo 10. View facing west of aspen and cattails.

Photo 11. View facing south standing within fill placement depression area.

Photo 12. View facing west of extent of cattails.

Photo 13. View facing south of aspen and cattails.

Photo 14. View facing west of extent of cattails in the northern portion of the property, showing neighbouring residence and agricultural buildings in the background to the north and west.

FIGURES

FIGURE 1
Site Location and Species at Risk Occurrences

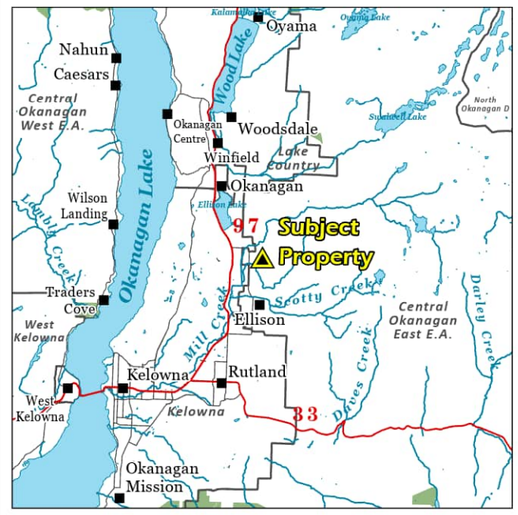
Project:	Agricultural Capability Assessment
Location:	5760 Anderson Rd, RDCO
Project No.:	21-4144
Prepared for:	Desjardins Contracting Ltd.
Prepared by:	Ecoscape Environmental Consultants Ltd. Dan Austin, GIS Specialist
Coordinate System:	NAD83-UTM Zone 11
Imagery:	RDCO 2021
Field Visit:	April 19, 2022
Map Date:	June 2, 2022

LEGEND

- WSI Survey
- WSI Incidental
- Streams
- Subject Property
- Cadastre
- Okanagan Critical Habitat (Species at Risk)*
- BC Conservation Data Center (CDC) Polygons

*A large Okanagan Critical Habitat polygon covers the entire map and subject property area representing the following wildlife species but is not shown on this figure:
-American Badger (Taxidea taxus)

Regional Location of Subject Property

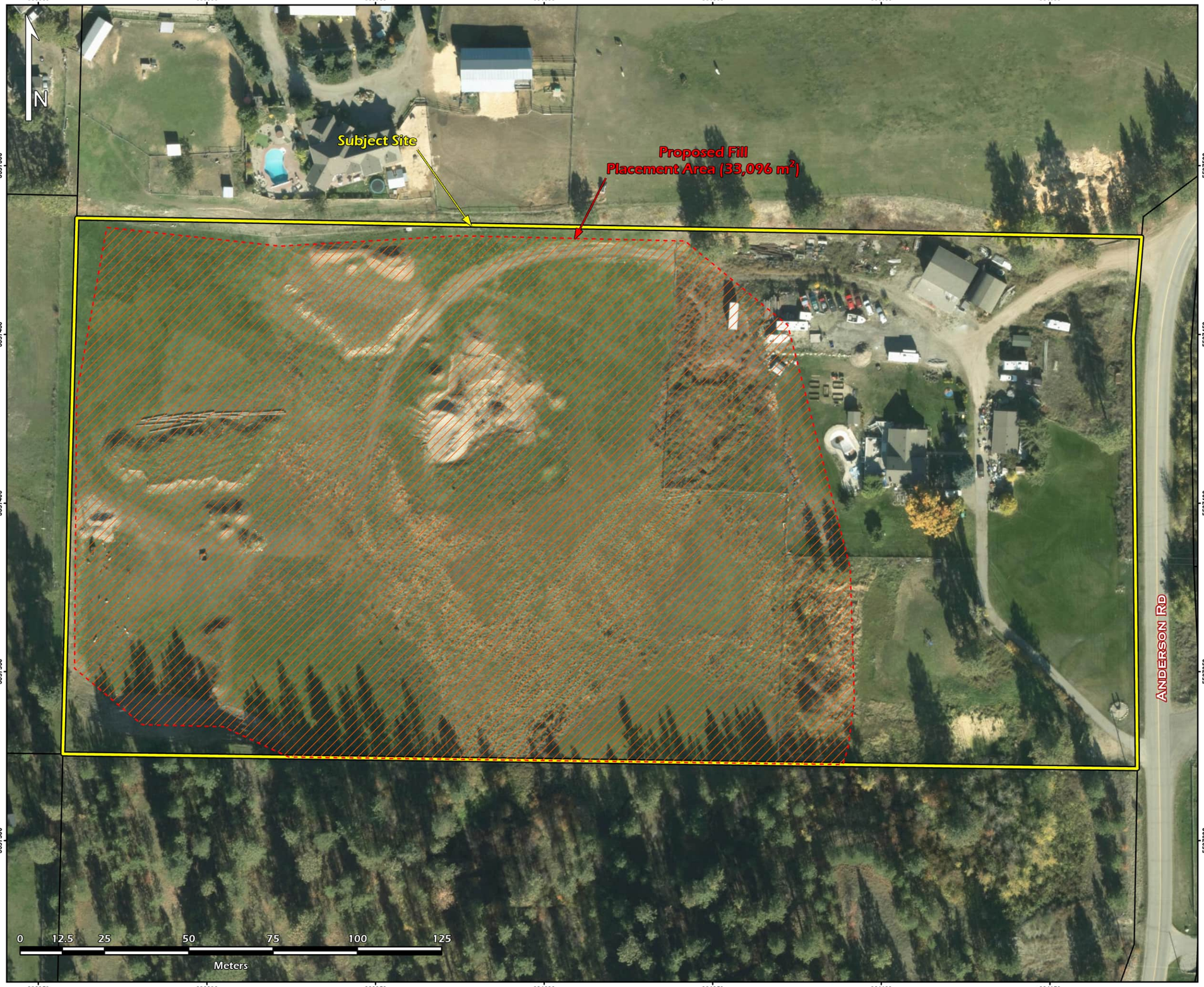


DISCLAIMER
The data displayed is for conceptual purposes only and should not be interpreted as a legal survey or for legal purposes. If discrepancies are found between the data portrayed in this report and that of a legal survey, the legal survey will supersede any data presented herein.

ECOSCAPE Environmental Consultants Ltd.

FIGURE 2
Proposed Works

Project:	Agricultural Capability Assessment
Location:	5760 Anderson Rd, RDCO
Project No.:	21-4144
Prepared for:	Desjardins Contracting Ltd.
Prepared by:	Ecoscape Environmental Consultants Ltd.
	Dan Austin, GIS Specialist
Coordinate System:	NAD83-UTM Zone 11
Imagery:	RDCO 2021
Field Visit:	April 19, 2022
Map Date:	June 22, 2022



LEGEND

- Streams
- Proposed Fill Placement Area
- Subject Property
- Cadastre

DISCLAIMER

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

ECOSCAPE
Environmental Consultants Ltd.

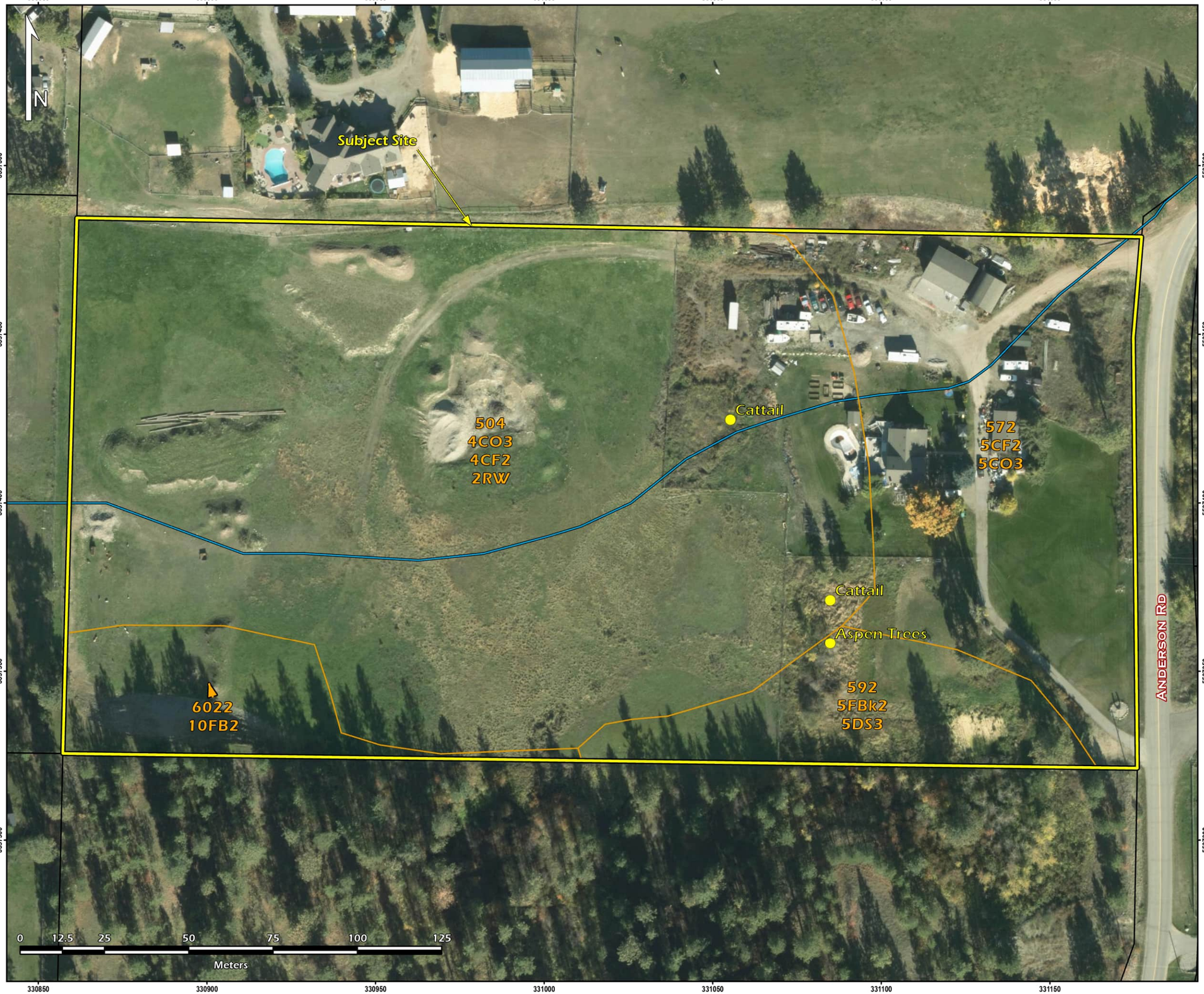


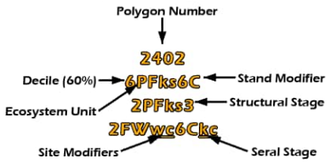
FIGURE 3
Ecosystems & Streams

Project:	Agricultural Capability Assessment
Location:	5760 Anderson Rd, RDCO
Project No.:	21-4144
Prepared for:	Desjardins Contracting Ltd.
Prepared by:	Ecoscape Environmental Consultants Ltd.
	Dan Austin, GIS Specialist
Coordinate System:	NAD83-UTM Zone 11
Imagery:	RDCO 2021
Field Visit:	April 19, 2022
Map Date:	June 21, 2022

LEGEND

- Location of Note
- Streams
- Full Base Ecosystem Polygons
- Subject Property
- Cadastre

Ecosystem Polygon Key



Ecosystem Unit	
CF	Cultivated Field
CO	Cultivated Orchard
DS	FdPy - Snowberry - Spirea
FB	Rough fescue – Bluebunch wheatgrass
RW	Rural

Site Modifier	
k	cool aspect (285 – 135°) slope (26% – 100%)

Structural Stage	
2	Herb
3b	Shrub/Herb

ECOSCAPE Environmental Consultants Ltd.

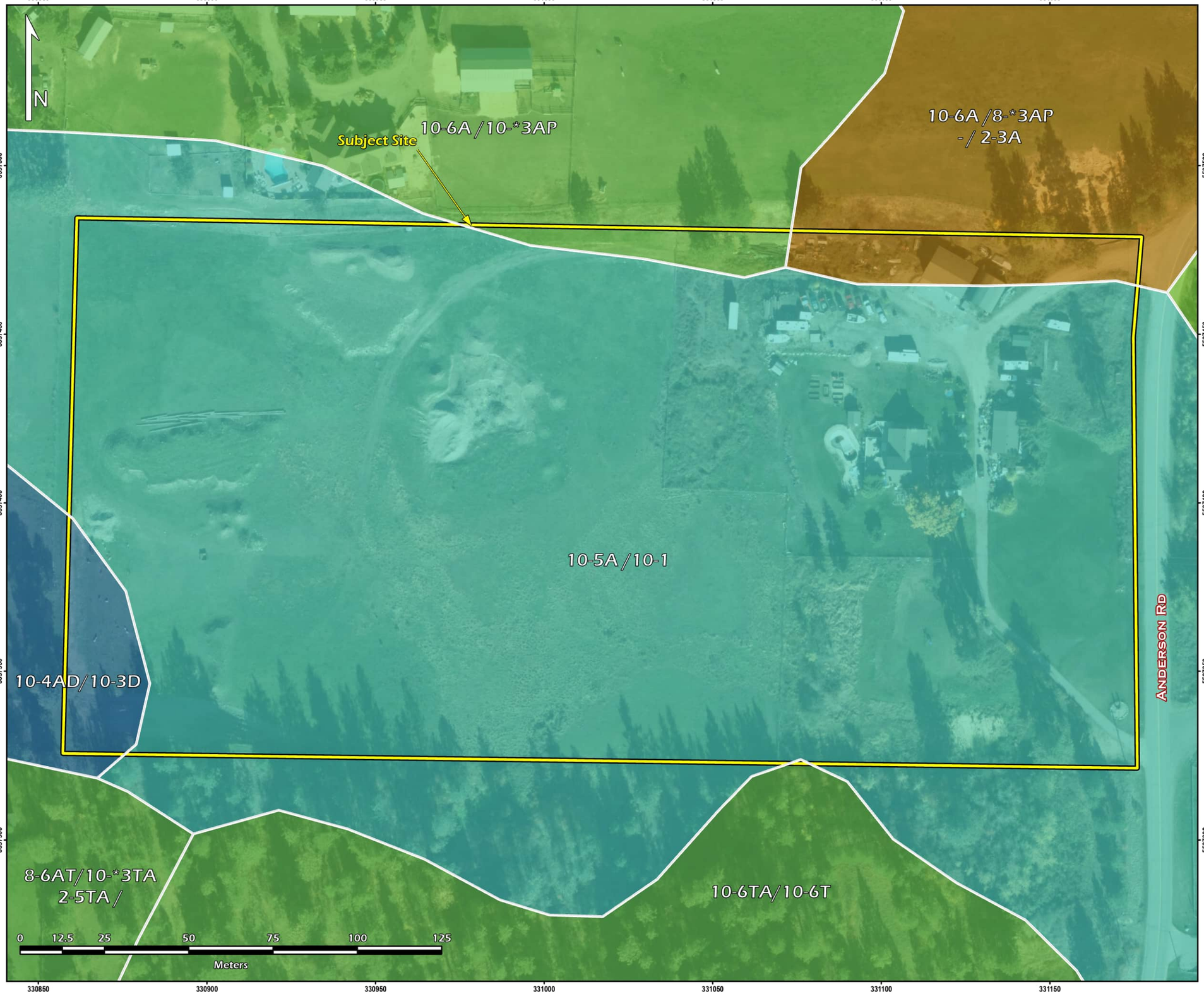


FIGURE 4
Agricultural Capability

Project:	Agricultural Capability Assessment
Location:	5760 Anderson Rd, RDCO
Project No.:	21-4144
Prepared for:	Desjardins Contracting Ltd.
Prepared by:	Ecoscape Environmental Consultants Ltd.
	Dan Austin, GIS Specialist
Coordinate System:	NAD83-UTM Zone 11
Imagery:	RDCO 2021
Field Visit:	April 19, 2022
Map Date:	June 22, 2022

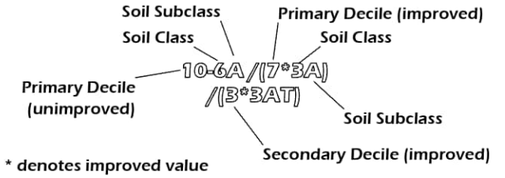
LEGEND

- Subject Property
- Cadastre
- Agricultural Capability

Soil Name

- GAMMIL
- KNOX MOUNTAIN
- PARADISE
- RUTLAND
- WESTBANK

Agricultural Capability Label



* denotes improved value

Class	Description
1	Land in this class either has no or only very slight limitations that restrict its use for the production of common agricultural crops.
2	Land in this class has minor limitations that require good ongoing management practises or slightly restrict the range of crops, or both.
3	Land in this class has minor limitations that require good ongoing management practises or slightly restrict the range of crops, or both.
4	Land in this class has limitations that require special management practises or severely restrict the range of crops, or both.
5	Land in this class has limitations that restrict its capability to producing perennial forage crops or other specially adapted crops
6	Land in this class is nonarable but is capable of producing native and or uncultivated perennial forage crops.
7	Land in this class has no capapbility for arable or sustained natura grazing.
Sublcasses	**Description**
A & M	Soil moisture deficiency
C	Adverse climate (excluding precipitation)
D	Undesirable soil structure
E	Erosion
F	Low fertility
I	Inundation (flooding by streams, etc.)
N	Salinity
P	Stoniness
R	Shallow soil over bedrock and/or bedrock outcroppings
T	Topography
W	Excess water (groundwater)
S & X	Cumulative and minor adverse conditions

ECOSCAPE Environmental Consultants Ltd.

FIGURE 5
Soil Drainage

Project:	Agricultural Capability Assessment
Location:	5760 Anderson Rd, RDCO
Project No.:	21-4144
Prepared for:	Desjardins Contracting Ltd.
Prepared by:	Ecoscape Environmental Consultants Ltd.
	Dan Austin, GIS Specialist
Coordinate System:	NAD83-UTM Zone 11
Imagery:	RDCO 2021
Field Visit:	April 19, 2022
Map Date:	June 22, 2022

LEGEND

- Streams
- Subject Property
- Cadastre

Soil Drainage

- Moderately Well Drained
- Rapid Drainage
- Well Drained

330850 330900 330950 331000 331050 331100 331150

5537600 5537450 5537400 5537350 5537300

N

Subject Site

ANDERSON RD

0 12.5 25 50 75 100 125

Meters

DISCLAIMER

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

ECOSCAPE Environmental Consultants Ltd

FIGURE 6
Digital Elevation Model Analysis

Project:	Agricultural Capability Assessment
Location:	5760 Anderson Rd, RDCO
Project No.:	21-4144
Prepared for:	Desjardins Contracting Ltd.
Prepared by:	Ecoscape Environmental Consultants Ltd.
	Dan Austin, GIS Specialist
Coordinate System:	NAD83-UTM Zone 11
Imagery:	RDCO 2021
Field Visit:	April 19, 2022
Map Date:	June 22, 2022

LEGEND

- Streams
- Subject Property
- Cadastre

Slope Class (percent)

- Level (<0.5)
- Nearly Level (0.5 - 1.9)
- Very Gentle Slope (1.9 - 5.2)
- Gentle Slope (5.2 - 8.8)
- Moderate Slope (8.8 - 15)
- Strong Slope (15.0 - 29.6)
- Very Strong Slope (29.6 - 44.5)
- Extreme Slope (44.5 - 70)
- Steep Slope (70.0 - 100)
- Very Steep Slope (>100.001)

Statistics	Slope (%)	Elevation (masl)
Average	11.08	462.38
Mininum	0.00	456.13
Maximum	84.83	473.74
Std. Dev.	12.82	4.30

ECOSCAPE Environmental Consultants Ltd.

330900 331000 331100

5637600 5637400 5637300

N

Subject Site

460m 470m

ANDERSON RD

0 12.5 25 50 75 100 125

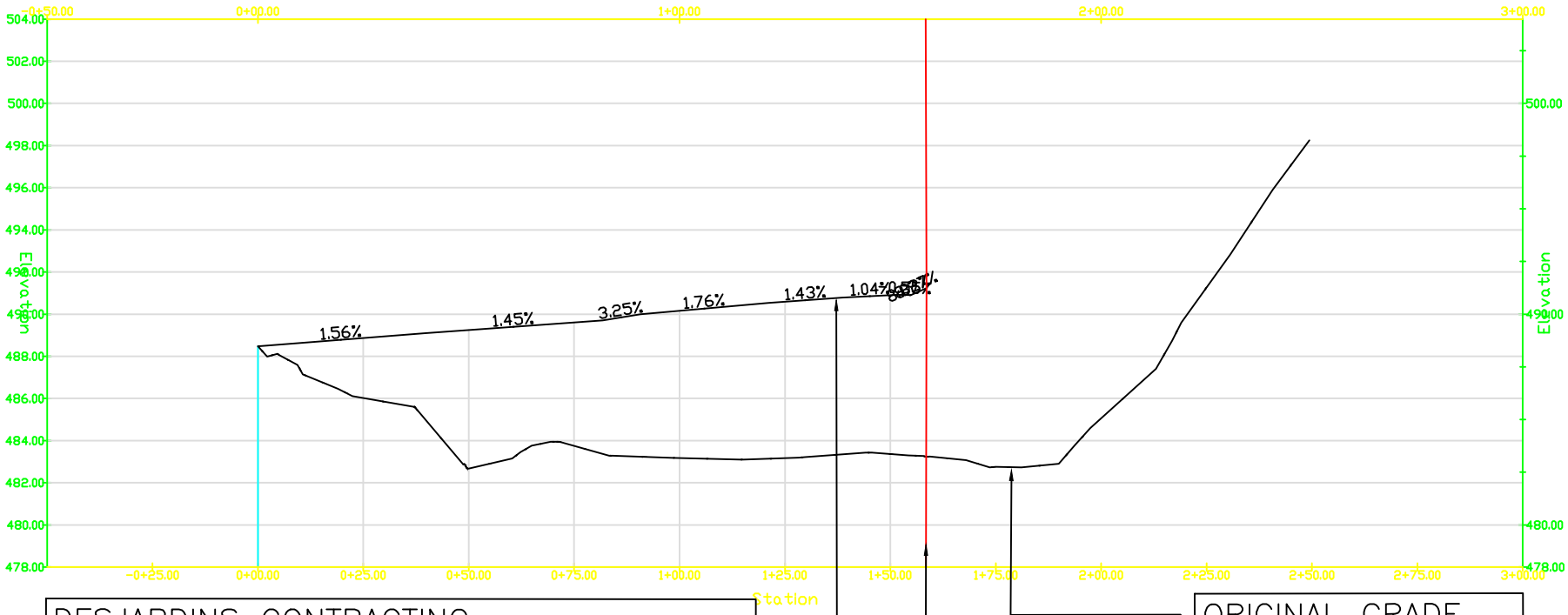
Meters

APPENDIX 1
Site Plan by: Desjardins Contracting Ltd.


N
1:1 SLOPE 2m OFF PROPERTY LINE
DESJARDINS CONTRACTING
5760 ANDERSON
LAND GRADE REDESIGN
IMPORT VOLUME
140100m³
CUT VOLUME 0m³
AREA
34000m²
MAX FILL
10m
LEGEND
CROSS SECTIONS
CONTOUR
BOUNDRY
PROPERTY LINE

APPENDIX 2
Cross Sections by: Desjardins Contracting Ltd.

Profile View of CENTER NORTH SOUTH



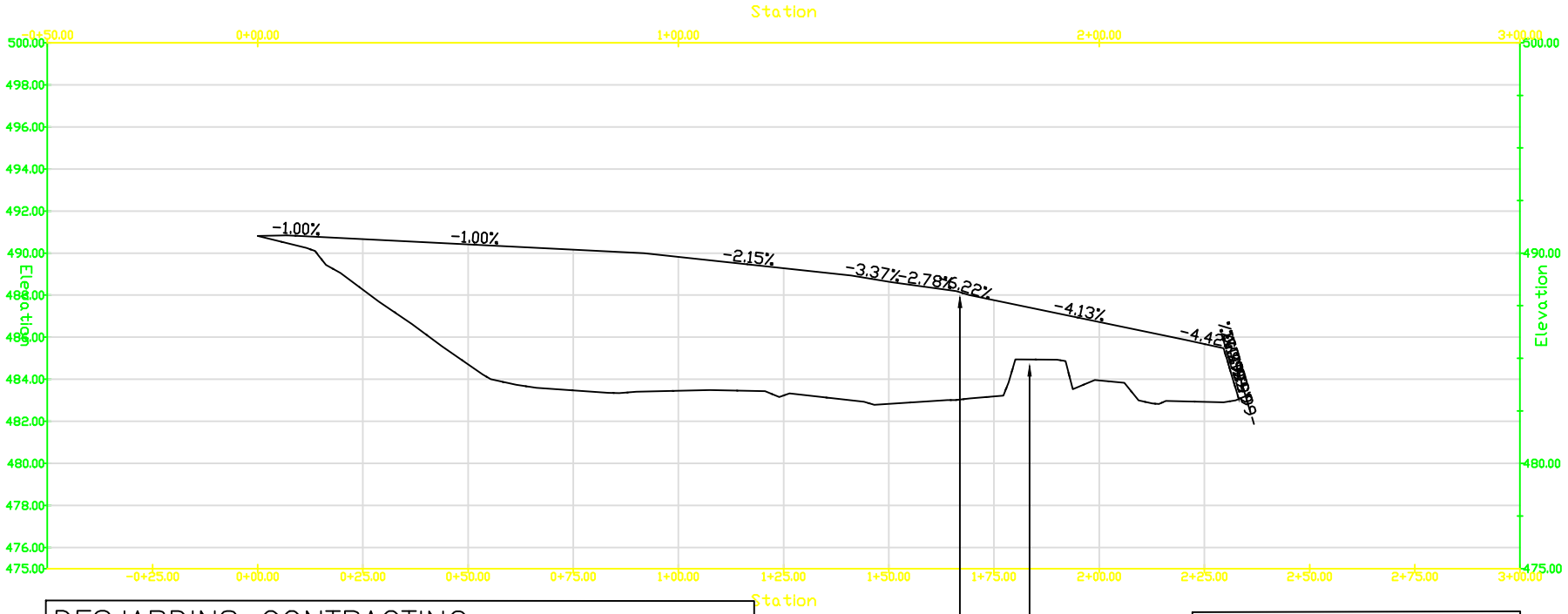
DESJARDINS CONTRACTING
5760 ANDERSON LAND GRADE REDESIGN
07/06/2022

ORIGINAL GRADE

PROPERTY LINE

PROPOSED GRADE

Profile View of CENTER EAST WEST

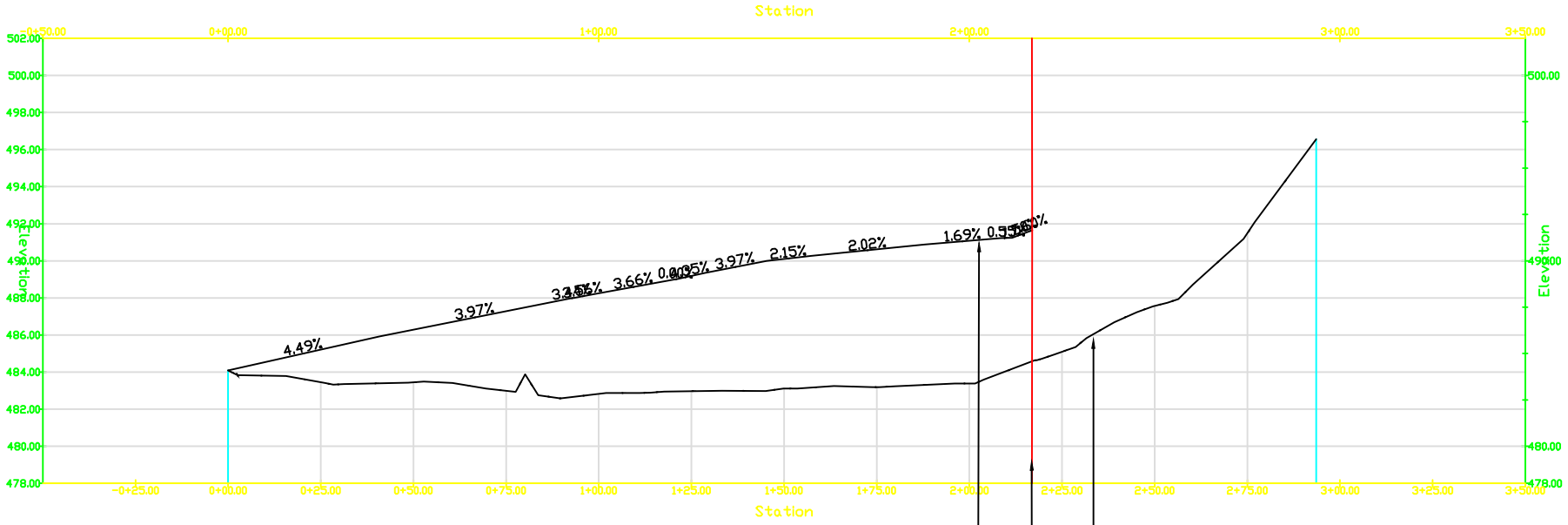


DESJARDINS CONTRACTING
5760 ANDERSON LAND GRADE REDESIGN
07/06/2022

ORIGINAL GRADE

PROPOSED GRADE

Profile View of CROSS SITE NW - SE



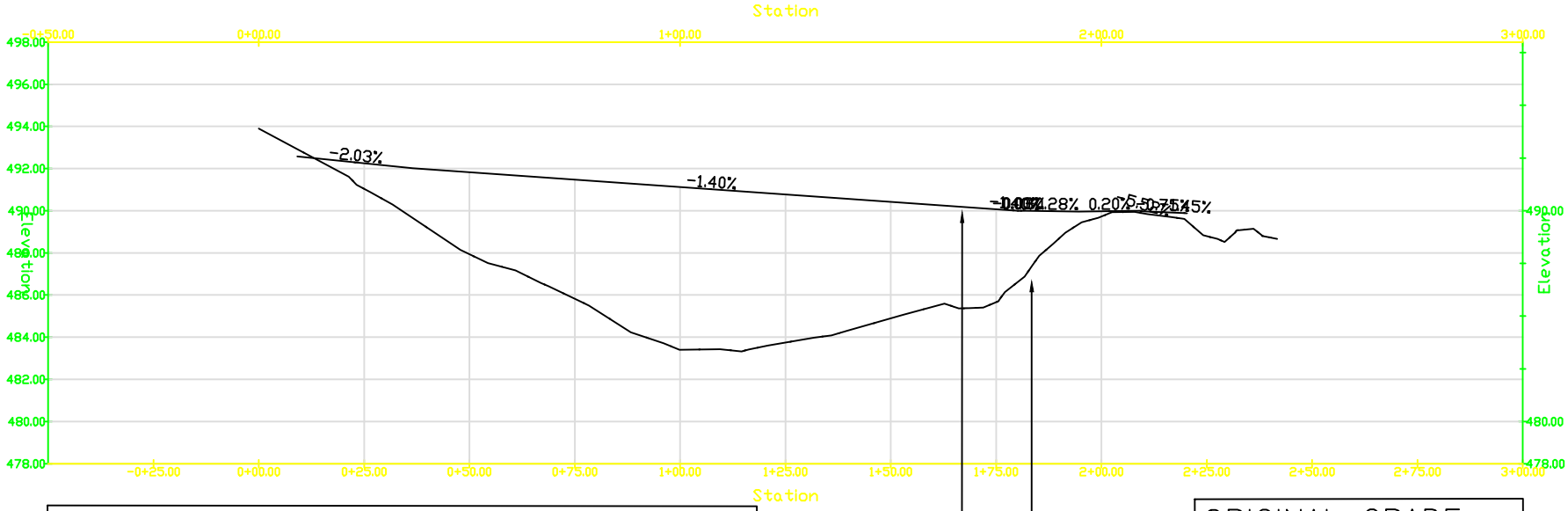
DESJARDINS CONTRACTING
5760 ANDERSON LAND GRADE REDESIGN
07/06/2022

ORIGINAL GRADE

PROPERTY LINE

PROPOSED GRADE

Profile View of SOUTH PROPERTY LINE



DESJARDINS CONTRACTING
5760 ANDERSON LAND GRADE REDESIGN
07/06/2022

ORIGINAL GRADE

PROPOSED GRADE