5101 UPPER BOOTH RD. S. & LOT 9 ANDERSON RD., KELOWNA, BC

Updated Environmental Assessment for the Sunset Ranch Development

PID: 027-168-158 & 025-561-529

Prepared For:
James Kay
Acorn Group
Sunset Two Properties Ltd., Box 2010
Kelowna, BC
V1X 4K5
VIA email: james@acornhomes.com

Prepared By:
Ecoscape Environmental Consultants Ltd.
#102 – 450 Neave Court
Kelowna, BC V1V 2M2

March 2022

File No. 21-3654

TABLE OF CONTENTS

FIGURES

APPENDICES

1.0 INTRODUCTION

Ecoscape Environmental Consultants Ltd. (Ecoscape) was retained by James Kay of Acorn Group (Acorn) to complete an Environmental Assessment for the proposed development at 5101 Upper Booth Road South and Lot 9 Anderson Road, Kelowna, within the Regional District of Central Okanagan (RDCO) BC (**Figure 1**; subject properties). The subject properties are legally described as Lot B, Plan KAP84569, Section 7, Township 24, Osoyoos Div. of Yale Land District, Except Plan KAS3281 PH. 1 and 2, and an undivided 1/7 share in Lot 2 Plan KAP72369; and, Lot 9, Plan KAP72369, Section 7, Township 24, Osoyoos Div. of Yale Land District, and an undivided 1/7 share in Lot 2 see Plan as to limited access, respectively. The subject properties are zoned as Comprehensive Development Residential Golf Course Zone – Sunset Ranch (CD-1B and CD-1C; Bylaw 871, 2020). There have been multiple Environmental Assessment reports completed for the proposed development (Hawes and Aresnault, 2001 of EBA Engineering Consultants Ltd., 2001; Schleppe, 2008 of Ecoscape). The subject properties are located within the Sensitive Aquatic, Form and Character and Concept Development Plan Development Permit Areas (DPA), as described in the RDCO Ellison Official Community Plan (Bylaw 1124, 2017). The subject properties are overlain by Rockface Creek, a tributary of Rockface Creek and Scotty Creek to the south.

The purpose of this report is to address the RDCO Development Permit guidelines for developments in the Aquatic DPAs and their Terms of Reference, specify an appropriate Streamside Protection and Enhancement Area (SPEA) or riparian buffer, propose covenant swaps, specify potential environmental impacts of the proposed work, and outline the existing conditions of the subject properties. This report also provides an updated assessment of potentially existing terrestrial and aquatic resource values, the potential for rare and/or endangered species and habitats, and recommendations where appropriate to maintain and or improve the natural integrity of existing terrestrial and aquatic communities.

In addition, this EA is intended to accompany a provincial *Water Sustainability Act* (WSA) Section 11 application for culvert installations in order to facilitate road upgrade(s). At this stage, culvert deign(s) have not been developed and this EA will be updated and revised as necessary to encompass this scope of work. Mitigation measures have been provided for standard culvert installations and will be updated and revised as necessary.

2.0 PROPOSED WORKS

The proposed development includes the remaining development of the Sunset Ranch Golf Course and Community at the end of Anderson Road on Sunset Ranch Drive at the subject properties (**Figure 2**). As described in the CD1 Zoning Bylaw 871, Lot 9 is zoned for 64 units on the 5.2 ha lot and Lot B is allocated a maximum of 80 lots on the 8.8 ha. It is anticipated that culvert installation(s) under the *Water Sustainability Act* will be required in order to facilitate the road upgrades to the proposed developments over the watercourses on the subject properties. In addition, during field

visits of the subject properties in 2007 associated with the 2008 Ecoscape report, it was noted that some of the areas protected by a steep slope covenant might actually be less than 30% slopes. These steep slope covenants were registered based upon topography information that was compiled by air photo interpretation and the developer did not have the benefit of a detailed topographic survey. **Appendix A** provides a topographical survey from 2008 that confirms that substantial portions of the covenant area are less than a 30% slope. Golder and Associates Ltd. (geotechnical engineers) have assessed the small isolated portions of the covenant areas that are greater than 30% slopes and have determined that they are suitable for development (Daniel and Imada, 2008; **Appendix B**).

Given the above, the developer and Ecoscape initiated planning to replace steep slope covenant areas for areas of higher environmental significance as a measure to mitigate environmental impacts, minimize stream crossings, and direct development to more suitable areas. This conceptual idea was informally presented to RDCO environment staff in 2008 (Brent Magnan and Todd Cashin) and again in 2021 (Brittany Lange). The concept approach protected higher quality habitats onsite and reduced one stream/riparian areas crossing. A copy of the registered covenants are provided in **Appendix C.**

3.0 INFORMATION SOURCE

The following databases were queried to find relevant information on the subject property and surrounding lands:

- BC Conservation Data Centre (CDC);
- BC Ecosystems Explorer;
- BC Habitat Wizard;
- Sensitive Ecosystem Inventory for of the Central Okanagan 2000-2001 (Iverson et al., 2004); and,
- Species at Risk Act Public Registry.

4.0 ENVIRONMENTAL SETTING

4.1 Terrestrial Conditions

A site visit was conducted on March 12, 2021 by Scott Sanford, B.Sc., R.P.Bio and Leanne McDonald, B.Sc., P.Ag., B.I.T. with Ecoscape. The subject properties are bordered by the developed portions of Sunset Ranch residential areas and Rockface Creek to the north, golf course to the west, agricultural land to the east, and Scotty Creek to the south.

The subject properties occurs within the Okanagan variant Very Dry Hot subzone of the Ponderosa Pine biogeoclimatic zone (PPxh1). The PP zone occupies low elevations within the very dry valleys of the southern Interior Plateau of BC and is generally the driest forested region in the province. The climate consists of hot dry conditions in the summer and cool conditions with little snow in the winter. Historically, fire has played an essential role in the ecology of this zone. The PPxh1 is dominated by open canopy forests of Ponderosa pine with a bunchgrass understory (Hope et al., 1991).

The subject properties are surrounded by urban development and are generally comprised of native vegetation surrounding the mapped streams and is comprised of non-native grasses and herbs to in the disturbed areas to the south. Site photos are included in **Appendix D**.

Terrestrial Ecosystem Mapping (TEM) polygons from the Sensitive Ecosystem Inventory for the Central Okanagan (Iverson et al., 2004) was referenced to determine the ecosystems present within the subject properties and modifications were made based on existing site conditions (**Table 1**; **Figure 3**).

TABLE 1. Ecosystem communities occurring within the subject properties.

Ecosystem Code	Polygon Number	Site Series	Site Series Name	Provincial Status
AS	2, 3, 5	00	Trembling Aspen – Common Snowberry – Kentucky Bluegrass, cool aspect	Red
CD	1, 7	00	Black Cottonwood / Interior Douglas-fir – Common Snowberry – Red-osier Dogwood Riparian	Red
DM	11, 12, 14	08	Interior Douglas-fir – Water Birch – Douglas Maple, fluvial terrace	Red
ES	16	-	Exposed Soil	-
FB	4, 9, 10, 15, 18	00	Rough-Fescue – Bluebunch Wheatgrass, cheatgrass seral association	-
GP	16	-	Gravel Pit	-
RI	13	-	River/Stream	-
RW	6	-	Rural	-
RZ	8, 17	-	Road Surface	-

RED: Ecological communities that are Extirpated, Endangered, or Threatened in British Columbia.
BLUE: Ecological communities that are considered to be of Special Concern in British Columbia.
YELLOW: Species and ecological communities that are apparently secure and not at risk of extinction.
NA (NO STATUS): Ecological communities that have not been ranked.

The subject properties were overlain by 18 TEM polygons comprised of nine ecosystems. Polygons 1 and 7 were comprised of Black Cottonwood / Interior Douglas-fir – Common Snowberry – Red-osier Dogwood riparian young mixed forest ecosystems associated with Rockface Creek and its tributary on the west side of Trickle Creek Drive running south through the western subject property parcel. These habitats are diverse and rich sites comprised of a mature Black Cottonwood

(*Populus trichocarpa*) and Interior Douglas-fir (*Pseudotsuga menziesii* var. *glauca*) forest with a rich and shrubby understorey comprised of Douglas Maple (*Acer glabrum*), Common Snowberry (*Symphoricarpos albus*), and Red-osier Dogwood (*Cornus stolonifera*). These ecosystems are provincially Red-listed, meaning they are endangered or threatened in British Columbia.

On the east side of Trickle Creek Drive (Polygons 2, 3 and 5; **Photo 4**), the habitat associated with Rockface Creek and its tributary was Trembling Aspen – Common Snowberry – Kentucky Bluegrass, cool aspect, young mixed forest ecosystem; a Red-listed ecosystem. These habitats are typically associated with large, broad depressions in grassland areas where they collect the surrounding grassland moisture. The overstory is comprised of Trembling Aspen (*Populus tremuloides*) and a shrubby understory comprised of Common Snowberry, Nootka Rose (*Rosa nutkana*), Saskatoon (*Amelanchier alnifolia*) and tall Oregon-grape (*Mahonia aquifolium*).

The majority of the subject properties (Polygons 4, 9, 10, 15 and 18) were comprised Rough Fescue – Bluebunch Wheatgrass, Cheatgrass seral association throughout the majority of the disturbed areas upslope of the mapped watercourses (**Photo 5**). These seral association habitats include more than 10% weeds with little to no Bluebunch Wheatgrass (*Pseudoroegneria spicata*). Non-native weeds that dominate these habitats include Diffuse Knapweed (*Centaurea diffusa*), Cheatgrass (*Bromus tectorum*), and Sulphur Cinquefoil (*Potentilla recta*).

The riparian habitat associated with Scotty Creek (Polygon 13) was Interior Douglas-fir – Water Birch – Douglas Maple, fluvial terrace, young mixed forest (Polygons 11, 12 and 14); a Red-listed ecosystem. These habitats are associated with intermittent or permanent streams or subsurface water flow and consist of a diverse overstory of Interior Douglas-fir, Trembling Aspen, Paper Birch (*Betula paperifera*), and Black Cottonwood. The understory is equally as diverse and typically consists of Common Snowberry, Douglas Maple, Mock Orange (*Philadelphus lewisii*), Nootka Rose, and Red-osier Dogwood.

The remaining TEM polygons associated with the subject properties are non-sensitive. Polygons 8 and 17 consist of the road surfaces through the subject properties; Polygon 6 consists of the rural area associated with an existing single-family dwelling bordering the golf course to the west; and, Polygon 16 consists of 70% exposed soil and 30% gravel pit for the disturbed area on the eastern subject property parcel.

4.1.1 Vegetation

A limited vegetation survey was conducted. The subject properties are primarily comprised of riparian habitats and disturbed grasslands. Vegetation is primarily limited to non-native grasses and herbs and the native riparian vegetation associated with the mapped watercourses. No plant species-at-risk were observed within the subject properties. However, due to the timing of the inventory (i.e., very early spring), a comprehensive vegetation survey was not possible.

Consequently, the presence or absence of rare or endangered plant species could not be confirmed.

TABLE 2. Native plant species observed within the subject properties.

Family	Scientific Name	Common Name	BC List [1]	SARA Schedule 1 [2]
Berberidaceae	*Berberis aquifolium*	Tall Oregon-Grape	Yellow	-
Betulaceae	*Alnus viridis*	Sitka Alder	Yellow	-
Betulaceae	*Betula occidentalis*	Water Birch	Yellow	-
Caprifoliaceae	*Symphoricarpos albus*	Common Snowberry	Yellow	-
Cornaceae	*Cronus sericea*	Red-osier Dogwood	Yellow	-
Cupressaceae	*Juniperus scopulorum*	Rocky Mountain Juniper	Yellow	-
Equisetaceae	*Equisetum* sp.	Scouring Rush	Yellow	-
Hydrangeaceae	*Philadelphus lewisii*	Mock-orange	Yellow	-
Pinaceae	*Abies* sp.	Fir	Yellow	-
Pinaceae	*Pinus ponderosa*	Ponderosa Pine	Yellow	-
Pinaceae	*Pseudotsuga menziesii* var. *glauca*	Interior Douglas-fir	Yellow	-
Plantaginaceae	*Penstemon fruticosus*	Shrubby Penstemon	Yellow	-
Poaceae	*Pseudoroegneria spicata*	Bluebunch Wheatgrass	Yellow	-
Ranunculaceae	*Ranunculus* sp.	Buttercup	Yellow	-
Rosaceae	*Crataegus douglasii*	Black Hawthron	Yellow	-
Rosaceae	*Rosa* sp.	Rose	Yellow	-
Salicaceae	*Populus tremuloides*	Trembling Aspen	Yellow	-
Salicaceae	*Populus tricocharpa*	Black Cottonwood	Yellow	-
Sapindaceae	*Acer glabrum*	Douglas Maple	Yellow	-

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

TABLE 3. Exotic plant species observed within the subject properties.

Family	Scientific Name	Common Name	BC List [1]
Asteraceae	*Arctium* sp.	Burdock	Exotic – Regionally Noxious
Asteraceae	*Centaurea diffusa*	Diffuse Knapweed	Exotic – Provincially Noxious
Plantaginaceae	*Linaria genistifolia*	Dalmatian Toadflax	Exotic
Poaceae	*Bromus tectorum*	Cheatgrass	Exotic
Roaceae	*Potentilla recta*	Sulphur Cinquefoil	Exotic – Regionally Noxious
Scrophulariaceae	*Verbascum thapsus*	Great Mullein	Exotic

[1] **Exotic**: Species that have been moved by humans to areas outside of their native ranges where they have become established.

Supplementing the above observations, the BC Conservation Data Centre (CDC) was accessed on March 5, 2021 and reviewed for at-risk ecological communities that occur within a 1.0 km radius of the subject property. The search results are provided in **Table 4**.

TABLE 4. CDC listed at-risk ecological community occurrences within 1 km of the subject properties (CDC, 2021).

Common Name	Scientific Name	BC List[1]	Occurrence ID	Distance
Baltic Rush – Common Silverweed	*Juncus balticus – Potentilla anserina*	Red	11327	Approximately 500 m southwest of the subject properties.
Black Cottonwood – Douglas-fir / Douglas Maple – Common Snowberry	*Populus trichocarpa – Pseudotsuga menziesii / Acer glabrum – Symphoricarpos albus*	Red	10421 and 10420	Approximately 470 m northeast and 680 m northwest of the subject properties
Hard-stemmed Bulrush, Depp Marsh	*Schoenoplectus acutus*, Deep Marsh	Blue	12519	Approximately 500 m southwest of the subject properties.
Trembling Aspen / Common Snowberry / Kentucky Bluegrass	*Populus tremuloides / Symphoricarpos albus / Poa pratensis*	Red	10993	Partially overlays the subject properties.

[1] **Yellow**: Not considered at risk. **Blue**: Of special concern. **Red**: Endangered or threatened. **Various**: May be one of multiple potential listings, depending upon more detailed taxonomic classification.

4.2 Wildlife

Due to the scope of this assessment, a detailed wildlife assessment of the project area was not conducted. Consequently, the presence or absence of species-at-risk could not be confirmed. Incidental observations of mammals included white-tailed deer (*Odocoileus virginianus*), grey squirrel (*Sciurus carolinensis*) and red squirrel (*Tamiasciurus hudsonicus*) and black bear (*Ursus americanus*), coyote, (*Canis latrans*) and elk (*Cervus canadensis*) scat. Incidental bird species observations are summarized in **Table 5**. The mature vegetation in the project area may provide foraging, shelter, perching and/or nesting habitat for birds, small mammals and/or herptiles.

TABLE 5. Bird species observed within the subject properties.

Family	Scientific Name	Common Name	BC List [1]	MBCA species[2]	SARA Schedule 1[3]
Accipitridae	*Buteo swainsoni*	Swainson's Hawk	Red	No	NAR
Columbidae	*Streptopelia decaocto*	Eurasian Collared Dove	Exotic	Yes	NAR
Bombycillidae	*Bombycilla garrulus*	Bohemian Waxwing	Yellow	Yes	NAR
Emberizidae	*Junco hyemalis*	Dark-eyed Junco	Yellow	Yes	NAR
Paridae	*Poecile atricapillus*	Black-capped Chickadee	Yellow	Yes	NAR
Picidae	*Colaptes auratus*	Northern Flicker	Yellow	Yes	NAR
Picidae	*Picoides pubescens*	Downy Woodpecker	Yellow	Yes	NAR
Sittidae	*Sitta canadensis*	Red-breasted Nuthatch	Yellow	Yes	NAR
Sittidae	*Sitta pygmaea*	Pygmy Nuthatch	Yellow	Yes	NAR

[1] **Yellow**: Not considered at risk. **Blue**: Of special concern. **Red**: Endangered or threatened. **Various**: May be one of multiple potential listings, depending upon more detailed taxonomic classification.
[2] **Migratory Birds Convention Act (MBCA):** whether a species is protected under the MBCA.
[3] **NAR = Not at Risk**: A wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances. **SC = Special Concern**: A wildlife species that may become threatened or endangered because of a combination of biological characteristics and identified threats. **E = Endangered**: A wildlife species facing imminent extirpation or extinction. **T = Threatened**: A wildlife species that is likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction. **DD = Data Deficient**: A category that applies when the available information is insufficient (a) to resolve a wildlife species' eligibility for assessment or (b) to permit an assessment of the wildlife species' risk of extinction.

4.2.1 Important Habitat Features

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

- Several mature *Populus* spp. and Interior Douglas-firs had cavities in them. Specifically, two dominate wildlife trees were observed just east of Trickle Creek Drive on either side of Rockface Creek tributary (**Photo 1 and 3**). Wildlife trees such as these provide important habitat for a variety of bird species and should be retained where possible. Considering multiple native cavity nesters were observed during the site visit (Black-capped Chickadee, Nuthatches, Woodpeckers), it is likely that trees with cavities, blown out tops and/or dead snags are utilized for nesting and winter shelter.

4.2.2 Species at Risk

The CDC was accessed on March 5, 2021 and reviewed for publicly available species-at-risk, wildlife species inventory (WSI) and critical habitat polygon occurrences within a 1.0 km radius of the subject property. Species at risk results are provided in **Table 6** and critical habitat occurrences are

provided in **Table 7**. In addition, the subject property is overlain by a masked CDC occurrence record. Ecoscape did not obtain details about the masked occurrence record from the CDC.

TABLE 6. CDC listed at-risk species occurrences within 1 km of the subject properties (CDC, 2021).

Common Name	Species	SARA Schedule 1	Object ID	Distance	Critical Habitat
American Badger	*Taxidea taxus*	Endangered	11126651	Approximately 890 m west of the subject property.	Non-forested grassland and shrubland ecosystems, however their range is between 16 to 64 km2 and can therefore migrate through a range of habitats [1]
Northern Rubber Boa	*Charina bottae*	Special Concern	40107483 and 40107307	Approximately 460 m north and 130 m south of the subject properties.	Rock outcrops, rock piles, rock bluffs, or talus slopes. In the forest, the snakes are frequently found in openings under or near rocks and woody debris. In dry lowland areas, they may inhabit shrubby, treeless areas.[2]

[1] **Yellow**: Not considered at risk. **Blue**: Of special concern. **Red**: Endangered or threatened.
[1] COSEWIC, 2012; [2.] COSEWIC, 2016.

TABLE 7. Critical habitat occurrences within 1 km of the subject properties (CDC, 2021).

Common Name	Species	SARA Schedule 1	Critical Habitat ID	Critical Habitat Status	Distance	Critical Habitat
Lewis's Woodpecker	*Melanerpes lewis*	Threatened	5852	Final	Overlays the subject properties.	Open forest or grassland with scattered trees, riparian forests adjacent to open areas and burns. Large diameter trees for perching and nesting and a diverse understory[1]

[1] **Yellow**: Not considered at risk. **Blue**: Of special concern. **Red**: Endangered or threatened.
[1.] COSEWIC, 2010.

Data from the BC Species and Ecosystems Explorer was also queried and species-at-risk that use the habitat types occurring on the subject properties were determined. This determination was done by querying BC-listed species-at-risk within the relevant biogeoclimatic zone and examining their habitat type usage (MOE, 2021). Only species with frequently-facultative use or obligate use

of habitat types on site have been indicated within **Table 8**. Those species with occasional-facultative use or have little to no likelihood of occurring were omitted.

TABLE 8. Species-at-Risk frequent-use habitat presence (MOE, 2021).

Species Group	Scientific Name	Common Name	BC List [1]	SARA Schedule 1	Likelihood to occur
Amphibians	*Anaxyrus boreas*	Western Toad	Yellow	Special Concern	Moderate
	Lithobates pipiens	Northern Leopard Frog	Red	Endangered	Low
	Spea intermontana	Great Basin Spadefoot	Blue	Threatened	Low
Birds	*Ammodramus savannarum*	Grasshopper Sparrow	Red	-	Moderate
	Ardea herodias herodias	Great Blue Heron, herodias subspecies	Blue	-	High
	Asio flammeus	Short-eared Owl	Blue	Special Concern	Moderate
	Buteo lagopus	Rough-legged Hawk	Blue	-	Moderate
	Buteo swainsoni	Swainson's Hawk	Red	-	Moderate
	Butorides virescens	Green Heron	Blue	-	Low
	Catherpes mexicanus	Canyon Wren	Blue	-	Low
	Chondestes grammacus	Lark Sparrow	Blue	-	Moderate
	Chordeiles minor	Common Nighthawk	Yellow	Threatened	Moderate
	Coccothraustes vespertinus	Evening Grosbeak	Yellow	Special Concern	Moderate
	Contopus cooperi	Olive-sided Flycatcher	Blue	Threatened	Moderate
	Cypseloides niger	Black Swift	Blue	Endangered	Low
	Dolichonyx oryzivorus	Bobolink	Blue	Threatened	Low
	Empidonax wrightii	Gray Flycatcher	Blue	-	Moderate
	Eremophila alpestris merrilli	Horned Lark, *merrilli* subspecies	Blue	-	Moderate
	Hirundo rustica	Barn Swallow	Blue	Threatened	Moderate
	Larus californicus	California Gull	Blue	-	Low

TABLE 8. Species-at-Risk frequent-use habitat presence (MOE, 2021).

Species Group	Scientific Name	Common Name	BC List [1]	SARA Schedule 1	Likelihood to occur
	Megascops kennicottii macfarlanei	Western Screech-Owl, *macfarlanei* subspecies	Blue	Threatened	Moderate
	Melanerpes lewis	Lewis's Woodpecker	Blue	Threatened	High
	Numenius americanus	Long-billed Curlew	Blue	Special Concern	Low
	Pluvialis dominica	American Golden-Plover	Blue	-	Low
	Psiloscops flammeolus	Flammulated Owl	Blue	Special Concern	Moderate
	Sphyrapicus thyroideus thyroideus	Williamson's Sapsucker, *thyroideus* subspecies	Blue	-	Low
	Tyto alba	Barn Owl	Red	-	Low
Gastropods	*Galba truncatula*	Attenuate Fossaria	Blue	-	Moderate
	Hemphillia camelus	Pale Jumping-slug	Blue	-	Moderate
	Promenetus umbilicatellus	Umbilicate Sprite	Blue	-	Moderate
	Stagnicola apicina	Abbreviate Pondsnail	Blue	-	Moderate
Insects	*Apodemia mormo*	Mormon Metalmark	Red	Endangered	Low
	Argia vivida	Vivid Dancer	Blue	Special Concern	Moderate
	Callophrys affinis	Immaculate Green Hairstreak	Blue	-	Moderate
	Cicindela decemnotata	Badlands Tiger Beetle	Red	-	Low
	Danaus plexippus	Monarch	Red	Special Concern	Low
	Hesperia nevada	Nevada Skipper	Blue	-	Moderate
	Lycaena nivalis	Lilac-bordered Copper	Blue	-	Moderate
	Ophiogomphus occidentis	Sinuous Snaketail	Blue	-	Moderate
	Pholisora catullus	Common Sootywing	Blue	-	Moderate

TABLE 8. Species-at-Risk frequent-use habitat presence (MOE, 2021).

Species Group	Scientific Name	Common Name	BC List [1]	SARA Schedule 1	Likelihood to occur
	Polites sabuleti	Sandhill Skipper	Red	-	Low
	Pyrgus communis	Checkered Skipper	Blue	-	Moderate
	Satyrium semiluna	Half-moon Hairstreak	Red	Endangered	Low
	Speyeria mormonia erinna	Mormon Fritillary, erinna subspecies	Red	-	Low
Mammals	*Antrozous pallidus*	Pallid Bat	Red	Threatened	Low
	Corynorhinus townsendii	Townsend's Big-eared Bat	Blue	-	Moderate
	Euderma maculatum	Spotted Bat	Blue	Special Concern	Low
	Myotis ciliolabrum	Western Small-footed Myotis	Blue	-	Moderate
	Myotis lucifugus	Little Brown Myotis	Yellow	Endangered	Moderate
	Myotis thysanodes	Fringed Myotis	Red	-	Moderate
	Ovis canadensis	Bighorn Sheep	Blue	-	Low
	Perognathus parvus	Columbia Plateau Pocket Mouse	Blue	-	Moderate
	Reithrodontomys megalotis	Western Harvest Mouse	Blue	-	Moderate
	Sorex merriami	Merriam's Shrew		-	Low
	Sorex preblei	Preble's Shrew		-	Low
	Taxidea taxus	American Badger	Red	Endangered	Low
Reptiles	*Charina bottae*	Northern Rubber Boa	Yellow	Special Concern	High
	Coluber constrictor	North American Racer	Blue	Special Concern	High
	Crotalus oreganus	Western Rattlesnake	Blue	Threatened	Moderate
	Hypsiglena chlorophaea	Desert Nightsnake	Red	Endangered	Low

TABLE 8. Species-at-Risk frequent-use habitat presence (MOE, 2021).

Species Group	Scientific Name	Common Name	BC List [1]	SARA Schedule 1	Likelihood to occur
	Pituophis catenifer deserticola	Great Basin Gopher Snake	Blue	Threatened	Moderate
	Plestiodon skitonianus	Western Skink	Blue	Special Concern	Moderate
Turtles	*Chrysemys picta pop. 2*	Painted Turtle	Blue	Special Concern	Low

4.3 Aquatic Conditions

The subject properties are bounded by Rockface Creek to the north, a tributary of Rockface Creek runs through the center of the subject properties and Scotty Creek is to the south. Rockface Creek is a 2nd order stream approximately 4.74 km in total length and is not documented to contain fish. The Sensitive Habitat Inventory Mapping (SHIM) conducted for the creek describes it as a natural, ephemeral creek with cascade/pool (segment 6) and riffle/pool (segment 8) morphology through the subject properties. Substrates in segment 6 were comprised of 5% organic, 30% fines, 30% gravel, and 35% cobble with a medium level of compaction. The associated riparian habitat was described as a mature, natural coniferous forest with heavy cover and large woody debris. Substrates in segment 8 included 50% fines, 40% gravel, and 10% cobble with a low level of compaction. The associated riparian habitat was described as a mature, natural broadleaf forest with heavy cover with overhanging vegetation and abundant large woody debris.

The tributary of Rockface Creek is an ephemeral creek that is likely a remnant of historic land uses (i.e., reservoir above). Although the creek does not contain a well-defined channel in upstream areas below the RDCO park land situated between the two subject properties (**Photo 8**), springs and groundwater are close to the surface and result in a poorly defined channel in lower areas (**Photo 9**). Given this, Ecoscape considered this area to be riparian gully with a highly intermittent flow pattern (i.e., very ephemeral stream). The SHIM describes the creek as natural, non-channelized spring-fed gully with riffle/pool morphology. Substrates consist of 80% organic, 10% fines, 5% cobble and 5% boulder with a low level of compaction. The associated riparian habitat was described as a mature, natural mixed forest. In addition, a remnant catch basin was observed (**Photo 11**) that appears to still be capturing some upslope flow, but appeared to still be conveyed via a poorly defined channel downstream west towards Trickle Creek Road (**Photo 12**).

Scotty Creek is a 3rd order stream approximately 14.52 km in total length approximately 35 m south of the subject properties. Scotty Creek is documented to contain Rainbow Trout (*Oncorhynchus mykiss*). Segment 12 of the SHIM for the creek is described as a natural, non-channelized stream with cascade/pool morphology. Substrates were described as 10% fines, 15% gravel, 60% cobble and 15% boulders with a medium level of compaction. The associated riparian habitat was described as a natural, mature, mixed forest (RDCO GIS Team, 2020).

5.0 RIPARIAN SETBACK ASSESSMENT

Riparian setback requirements for the subject properties are regulated under the Provincial *Riparian Areas Protection Regulation* (RAPR) and RDCO Official Community Plan. As per RAPR, the setback determination is based on the identified *stream boundary*. As per the Provincial RAPR Technical Assessment Manual, riparian setbacks are based on Zones of Sensitivity (ZOS) for the following three different factors:

- Litter fall and insect drop;
- Large woody debris, bank, and channel stability; and
- Shade.

The SPEA is then determined from the ZOS with the greatest setback area. Although Rockface Creek and its tributary are not considered fish-bearing, they do connect to Scotty Creek, a fish-bearing watercourse, and as such, both watercourses are *streams* under RAPR. The provincial RAPR results in a 10 m setback from the *stream boundary* of Rockface Creek and its tributary and a 11.9 m setback from Scotty Creek at the subject properties. However, these setbacks are depicted from the surveyed top of bank, which results in a more conservative setback than if they were from the *stream boundary*, which has not been surveyed. **Figure 4** illustrates the various setbacks (from the top of bank, which is well beyond the *stream boundary*) from the watercourses and the resultant SPEA.

Although RAPR results in 10 m and 11.9 m setbacks respectively from the watercourses, RDCO requires a 15 m setback from the top of bank of Rockface Creek, Rockface Creek tributary and Scotty Creek (pers. comm. Brittany Lange, RDCO). Therefore, the SPEA represented in **Figure 4** is a 15 m setback from the surveyed top of bank of the watercourses. Although the proposed development is shown as encroaching upon the SPEA in **Figure 2**, as described above the proposed encroachments are not encroaching within the RAPR SPEA, but rather the RDCO 15 m setbacks, which are significantly more conservative. Consequently, the proposed development would be considered RAPR compliant.

6.0 ENVIRONMENTALLY SENSITIVE AREAS ANALYSIS

An environmental sensitivity analysis was conducted to categorize the subject property based on its degree of environmental sensitivity. Evaluation criteria considered in the analysis included: provincial CDC status (i.e., Red or Blue listed), rare and endangered species habitat suitability, landscape condition (i.e., connectivity, fragmentation), and level of disturbance. ESA descriptions are taken from the RDCO Terms of Reference for Professional Reports:

- **ESA-1 Very High:** These areas contain significant vegetation and wildlife characteristics representing a diverse range of sensitive habitat. These features contribute significantly to the overall connectivity of the habitat and ecosystems. Avoidance and conservation of ESA-1 designations should be the primary objective. If development should occur within these areas (only after it proves impossible or impractical to maintain the same level of ecological function) compensation will promote no net loss to the habitat (typically with a 3:1 replacement of equivalent functioning habitat).
- **ESA-2 High**: These areas contribute toward the overall diversity and contiguous nature of the surrounding natural features. If development is pursued in these areas portions of the habitat should be retained and integrated to maintain the contiguous nature of the landscape. Some loss to these ESAs can be offset by habitat improvements to the remaining natural areas found on property.
- **ESA-3 Moderate**: These areas represent disturbed habitats or fragmented features. They contribute to the diversity to the landscape, although based on 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 improvements in other more sensitive natural areas found on property.
- **ESA-4 Low**: These areas contribute little or no value to the overall diversity or vegetation, soils, terrain and wildlife characteristics of the area. Development is encouraged to be focused to these sites before consideration developing higher rated sites of the area. These areas shall not be considered as areas for restoration and enhancement or as recruitment as higher value ESA in offsetting development in other areas.

The ESA composition of the proposed development within the subject property is summarized in **Table 9** and depicted on **Figure 5.** Environmental sensitivity analysis indicates that the majority of the subject properties are represented by Moderate valued (ESA-3) areas at 46.8%. These areas correspond to the disturbed upland habitats to the south and upslope of the riparian habitats. High valued (ESA-2) areas represent 30.1% of the subject property and correspond to the riparian habitats associated with Rockface Creek and its tributary. Low valued (ESA-4) areas correspond to the existing road surfaces and the exposed soil/gravel pit area to the south. Very High valued (ESA-

1) areas are limited on the subject properties at 4% and only correspond to the riparian habitats associated with Scotty Creek.

TABLE 9. Percent composition of ESAs within the subject properties.

ESA Value	ESA Area Outside Proposed Development (m^2)	ESA Area Within Proposed Development (m^2)	Total ESA Area (m^2)	Percentage of Property (%)
Very High (ESA 1)	4,078	1,313	5,391	4.20
High (ESA 2)	32,664	6,667	39,331	30.7
Moderate (ESA 3)	13,015	46,991	60,006	46.8
Low (ESA 4)	1,642	21,949	23,591	18.4
Total	**51,400**	**76,920**	**128,320**	**100**

7.0 COVENANTS

EBA was commissioned to complete an environmental assessment (Hawes and Arsenault, 2001) for the initial application (RDCO File DP01-11). Generally, Ecoscape understands that the intent of the original development permit was to protect areas within 15 m measured from the top of bank of the watercourses in the vicinity of the subject properties. However, areas covenanted during the original process were measured from the approximate creek high water level, and it is our understanding that these covenants were initially accepted by the RDCO until it was determined they were incorrect. During review of historical letters provided to Ecoscape (e.g., MWLAP, 2001; MWLAP, 2001b) there is mention of the high water level and top of bank as the benchmark for setback determination. As correspondence is confusing regarding the original agreed upon benchmark for setbacks, an alternative arrangement was informally proposed to the RDCO that was developed by Ecoscape and Acorn. The alternative arrangement considered the original site plan that was developed and aimed to mitigate/minimize environmental concerns associated with the proposed development.

Ecoscape has attended meetings with RDCO staff to review mitigation strategies previously proposed (Leupin, 2007; Leupin, 2007b). In meetings with RDCO staff, it was determined that any improvements to Sunset Ranch Park will need to be developed, reviewed by staff, and must address a variety of issues. During field visits of the subject properties in 2007 associated with the 2008 Ecoscape report and observed again during the 2021 visit, it was noted that some of the areas protected by a steep slope covenant might actually be less than 30% slopes. It is understood that these original steep slope covenants were determined using topography information that was

compiled by air photo interpretation (pers. comm, G.Bird, Acorn). **Appendix A** provides a topographical survey from 2008 that confirms that substantial portions of the covenant area are less than a 30% slope. Golder and Associates Ltd. (geotechnical engineers) have assessed the small isolated portions of the covenant areas that are greater than 30% slopes and have determined that they are suitable for development (Daniel and Imada, 2008; **Appendix B**).

Given the above, the developer and Ecoscape initiated planning to replace steep slope covenant areas for areas of higher environmental significance as a measure to mitigate environmental impacts, minimize stream crossings, and direct development to more suitable areas. This conceptual idea was informally presented to RDCO environment staff (Brent Magnan and Todd Cashin in 2008 and Brittany Lange in 2021).

Ecoscape has proposed covenant boundaries based upon biological requirements (i.e., protection of riparian setback areas) and replacing areas of lower environmental value for areas of higher environmental value. To facilitate this, a steep slope covenant will need to be removed and a subsequent environmental covenant will be registered. The proposed covenant locations are found in **Figure 2**. The following summarizes the proposed covenants swaps and new covenants to be registered:

- The total area of an existing steep slope covenant to be removed is 5,871 m^2;
- The total area of proposed environmental covenant to be registered as a replacement for the existing steep slope covenant and new covenanted environmental areas is 9,518 m^2; and,
- The total area of lands that should have previously been registered as an environmental covenant as measured from top of bank (i.e., RDCO 15 m setback from top of bank) that will be encroached upon as part of the proposed development is 4,469 m^2.

The above results in an approximate 2.1:1 gain in areas protected as greenspace in the new covenants, balancing encroachment in some of the riparian setback areas. The development is still proposing to encroach into 4,469 m^2 in areas that should have been previously covenanted; however, the proposed replacement of the steep slope covenants for the environmental covenants will result in the protection of greater value habitat compared to the existing.

8.0 IMPACT ASSESSMENT

The proposed development includes the remaining development of the Sunset Ranch Golf Course and Community at the end of Anderson Road on Sunset Ranch Drive at the subject properties (**Figure 2**). As described in the CD1 Zoning Bylaw 871, Lot 9 is zoned for 64 units on the 5.2 ha lot and Lot B is allocated a maximum of 80 lots on the 8.8 ha.

Environmental impacts of removing a steep slope covenant of little biological value are minimal. This community contains no habitat considered critical for wildlife species, and contains minimal resemblance to a natural ecological community (i.e., high coverage of invasive plants, fragmented due to fence line, etc.). Given the low value, the loss of this community is considered negligible to species at risk or of concern and is preferred over developments within the riparian corridor.

The addition of the red listed community to a covenant area and reduction of one stream crossing within this same community are considered a significant environmental benefit of the proposed plan. Based upon our previous mapping of top of bank, some areas of this community would not be protected via covenant whether the existing covenant or new one was drafted. Thus, by adding the fringe areas of this community, fragmentation, edge effects, and other significant impacts are reduced. This will help maintain the more environmentally sensitive areas on the subject properties. Further, if the initial development permit were fulfilled and all areas 15 m from top of bank were protected via setbacks, there would still be a greater impact to this community. Thus, this solution presents the most preferred option from a biological perspective because the most important communities are protected and edge effects and fragmentation have been reduced.

In addition, the Agriculture Land Commission required that the proposed subdivision provide a barrier to wildlife both onto and off the subject properties via a wildlife fence. This constructed fence line acts as a significant barrier to wildlife movement, reducing values on the subject properties, but consequently, protecting large wildlife from entering roadways and residential areas. However, in some areas, small wildlife can go around or under the fence. This factor generally infers that vegetation communities present are only accessible to smaller, more mobile species (e.g., birds, rodents) and that the subject properties are unlikely to contain critical habitat for large species (e.g., deer winter range). This point is presented to frame context for the impacts discussed below.

It has been approximated that the total disturbance area for the proposed development would be 76,920 m^2 (**Figure 2**). The proposed development occurs within all ESAs with the majority of the development occurring within ESA 3 (Moderate Significance) and ESA 4 (Low Significance), or approximately 46.8% and 18.4%, respectively. The total proposed development footprint occurs over 59.9%, as summarized in **Table 10**. The proposed development within the subject properties would result in a relative loss of 1.0% of ESA 1 (Very High Value), 5.20% of ESA 2 (High Value), 36.6% of ESA 3 (Moderate Value) and 17.1% of ESA 4 (Low Value) of the total subject properties. The proposed development is directed to preexisting disturbance, and is preferred ecologically when compared to previously prepared plans for the site.

TABLE 10. Area and percent composition of ESAs and disturbance within the subject properties.

ESA Value	Total ESA Area (m^2)	Percentage of Property (%)	ESAs Disturbed by Proposed Development (m^2)	Percent of ESAs Disturbed by Proposed Development (%)	ESA Relative Loss (Total Project Impact) (%)
Very High (ESA 1)	5,391	4.20	1,313	24.4	1.0
High (ESA 2)	39,331	30.7	6,667	17.0	5.20
Moderate (ESA 3)	60,006	46.8	46,991	78.3	36.6
Low (ESA 4)	23,591	18.4	21,949	93.0	17.1
Total	**128,320**	**100**	**76,920**	**-**	**59.9**

Ecoscape anticipates that if all recommendations and mitigation measures within this report are adhered to, the potential environmental effects of the works on the local flora and fauna will be minimized. Our assessment does not consider the cumulative effects of the proposed development on a larger terrestrial or aquatic area or the cumulative impacts originating from developments across the RDCO and similar proposals occurring within nearby habitats or within a specific municipality.

Cumulative impact assessments that contain specific insights into cumulative impacts at a regional or local scale for a development such as this are not currently possible, as much of the current local and regional data currently available is not up to date. The data that is available, such as Sensitive Inventory Mapping (SEI), Sensitive Habitat Inventory Mapping (SHIM) etc. are dated and cannot be used effectively to analyze cumulative changes of a development of this scale across the entire RDCO or within the valley. When this is combined with an understanding that general wildlife populations, including species at risk population data are unknown, meaning the impacts to either ecosystems or wildlife they support, with any specificity is not feasible. Ecoscape understands that the Agriculture Land Commission mandated wildlife fence acts as a significant barrier to wildlife movement, protecting large wildlife from entering roadways and residential areas. However, in some areas, small wildlife can go around or under the fence. This factor generally infers that vegetation communities present are only accessible to smaller, more mobile species (e.g., birds, rodents) and that the cumulative impacts from the development on large wildlife has already occurred. Generally, this development will impact mostly modified greenspace and these impacts are limited because of preexisting conditions such as the wildlife exclusion fencing. Thus, the cumulative impacts of this proposed development would be lesser, to some extent, when compared to others that have less wildlife exclusion. It is felt that this development will not

significantly contribute to cumulative impacts within the RDCO, but understanding the magnitude of any potential cumulative impacts is extremely challenging.

Ecoscape recommends that the RDCO consider updating existing background datasets such as the SEI on a regular and recurring interval. Alternatively, the RDCO may wish to consider that these datasets are required to be updated with each assessment, to have a "real-time" understanding of regional data. This approach would make it feasible to compare losses at a regional scale within the RDCO because the current condition and status would be known. While this approach would still make comment on wildlife populations challenging, it would allow comparison of the total areas available of a specific habitat type within the RDCO or adjacent to a specific development.

Without appropriate mitigation measures, the proposed works could have the following environmental impacts:

- Potential to directly or indirectly impact wildlife and wildlife habitat during construction, including disruption of migration, breeding, or other behavior as a result of construction noise, impacts to air quality, and other alterations to existing wildlife habitat and cover. This includes herptiles and avian species that could potentially be foraging or nesting in the area;
- Potential for the release of other deleterious substances (e.g., fuel, oil, hydraulic fluid, construction materials, debris, fine sediments) to the SPEA, watercourses and/or environment as a result of improper storage, equipment re-fueling, erosive processes and/or poorly maintained equipment;
- Potential encroachment in the SPEA. Delineation must occur immediately adjacent to the work area to prevent encroachment into the setback area. A clearly delineated limit of disturbance should be installed prior to initiating construction activities;
- Potential to introduce or facilitate the spread of invasive and noxious plant species resulting from ground disturbance and seed dispersal;
- Improper handling and disposal of construction materials and debris could result in the addition of deleterious substances to the SPEA, Rockface Creek, Rockface Creek tributary, Scotty Creek and/or any connecting drainages and subsequent negative impacts to fish, wildlife, associated habitat, and surface water quality; and,
- Improper fuel storage and/or poorly maintained equipment used during construction could create spill potential that could negatively impact fish, wildlife, and associated habitats.

9.0 MITIGATION MEASURES

Ecoscape provides the following mitigation measures to minimize the risks of impacts to wildlife and associated habitats during proposed works. This document will be made available to the

contractor prior to initiating the works and it should be kept onsite during works. This will be to demonstrate that the contractor is aware of the recommendations and that they are being followed.

9.1 General

- The appropriate Development Permits and approvals must be obtained from the RDCO prior to construction activities within the subject properties. The Development Permit must be kept onsite at all times;
- Prior to any instream works, including the installation of any culverts required to facilitate road construction, it will be necessary to obtain a *Water Sustainability Act* Section 11 permit;
- If exposed soils are to be left for any length of time, the bank must be covered with poly sheeting or suitable alternative to provide temporary stability and retention of fine materials;
- Hunting, harassing, feeding, trapping, baiting or luring of any wildlife will not be conducted at any time;
- Interactions or encounters with large mammals (deer, elk, moose, bear etc.) should be reported to the Environmental Monitor (EM) immediately. If a large mammal enters the work area, work is to be stopped to allow the animal to vacate the area on its own; and,
- All potential wildlife attractants, including food, beverages, and other strong smelling or perfumed materials must be removed from the site daily.

9.2 Best Management Practices

Ecoscape provides the following mitigation measures to minimize the risks of impacts to wildlife and associated habitats. Best Management Practices (BMPs) have been adapted from BC Ministry of Environment Standards and Best Practices for Instream Works (2004).

There are numerous Provincial Best Management Practices that are applicable to the proposed works and should be adhered to. The following is a brief list of pertinent BMPs for this project:

- Develop with Care Environmental Guidelines for Urban and Rural Land Development (Polster et al., 2014);
- Guidelines for Amphibian and Reptile Conservation during Road Building and Management Activities in British Columbia (Ministry of Environment and Climate Change Strategy, 2020);
- Guidelines for Amphibian and Reptile Conservation during Urban and Rural Land Development in British Columbia (BC MFLNRO, 2014);

- Best Management Practices for Amphibian and Reptile Salvages in British Columbia (BC MFLNRO, 2016);
- Standards and Best Practices for Instream Works (BC MoWLAP, 2004); and,
- Guidelines for Raptor Conservation during Urban and Rural Land Development in British Columbia (BC MFLNRO, 2013).

9.3 Work Timing Windows

9.3.1 Avian Nesting Periods

Avian nesting periods should be considered to protect nesting birds within and adjacent to the proposed work area.

- Section 6 of the Federal *Migratory Birds Convention Regulation* protects both the nests and eggs of migratory birds. Section 34(a) of the Provincial *Wildlife Act* protects all birds and their eggs, Section 34(b) protects the nests of eagles, peregrine falcons, gyrfalcons, ospreys, herons or burrowing owls year-round, and Section 34(c) protects the nests of other bird species while they are occupied by a bird or egg. The subject properties falls within the Northern Okanagan Basin ecodistrict. The avian nesting period for birds within this ecodistrict who's nests are not protected year-round under Section 34(b) is **March 9th to September 12th** (Birds Canada, 2020);
- If vegetation clearing activities are required during the identified avian nesting period, pre-clearing nesting surveys are required by an EM to identify active nests;
- If active nests are found within the clearing limits, a buffer will be established around the nest until such time that the EM can determine that nest has become inactive. The size of the buffer will depend on the species and nature of the surrounding habitat. Buffer sizes will generally follow provincial BMP guidelines or other accepted protocol (e.g., Environment Canada). In general, a minimum 20 m buffer will be established around songbird nests or other non-sensitive (i.e., not at risk) species;
- Clearing and other construction activities must be conducted within 72 hours following the completion of the pre-clearing nesting surveys. If works are not conducted in that time, the nesting surveys are considered to have expired and a follow-up survey will be completed to ensure that no new nests have been constructed; and,
- The nests of Bald Eagle, Golden Eagle, Peregrine falcon, Gyrfalcon, Osprey and Burrowing Owl are protected year-round whether they are active or not as per Section 34(b) of the *Wildlife Act*. Best management practices relating to raptors and their nests can be found in Guidelines for Raptor Conservation during Urban and Rural Land Development in BC (2013).

9.4 Disturbance Limits

- Prior to any site disturbance, the 15 m RDCO riparian setback boundary measured from the surveyed top of bank must be clearly marked/staked in the field by the legal surveyor to prevent encroachment. The setback boundary should be delineated using orange snow fence (or flagging tape), which will also help prevent any construction debris from leaving the work area or entering the watercourses;
- All covenant areas, including proposed and existing must be clearly delineated using orange snow fence, prior to any ground disturbance by the legal surveyor to prevent encroachment. The snow fence should be erected at least 1 m from the covenant boundaries to prevent disturbance;
- Where covenant areas form the property boundary, a chain link or other fence should be erected along the covenant boundary to protect the area from incremental encroachment post development. This fencing should be erected prior to any land clearing or development activities;
- Where covenants occur within a property, long term protection of the covenant area should occur. To facilitate this, Ecoscape recommends that a smaller post and rail fence or some other type of fence be used. This fencing should be erected either prior to site clearing, or post clearing only if snow fencing is used to delineate the area during clearing activities;
- The EM should complete a field review of the proposed covenant locations, fencing, and other recommendations contained herein to document compliance with the above;
- The operation or parking of equipment below the driplines of the trees must be avoided;
- Fencing of the tree driplines in proximity to proposed works with brightly coloured snow fence or suitable alternative is recommended. Installation direction can be provided by the environmental monitor (EM) onsite;
- To avoid long term damage to native trees adjacent to the development footprint, stockpiling of fill, location of construction materials or equipment, staging or parking must not occur within the tree drip line, riparian setbacks or covenant areas or beyond the delineated areas of disturbance;
- Efforts must be made during construction works to avoid impacting the root systems, branches, bark, and trunk of trees adjacent to the development footprint. If any roots are damaged during construction, they must be cut clean with a chain saw/hand saw; and,
- Equipment and vehicle access should use existing roads, trails, and other disturbed areas to minimize the disturbance footprint.

9.5 Clearing and Grubbing

- No works can occur below the high-water mark of Rockface Creek, Rockface Creek tributary or Scotty Creek without having a Provincial *Water Sustainability Act* Section 11 Notification or Approval application submitted, approved and in the possession of the owner and contractor prior to works. This document must be kept on site at all times so it can be provided to Ministry representatives or officers upon request;
- Clearing and grubbing limits must be clearly marked in the field prior to construction and minimized wherever possible. Unnecessary impacts to native vegetation and soils must be avoided at all times. Delineation of the development footprint must use brightly coloured snow fence, flagging and or stakes, or suitable alternative reviewed with the EM;
- 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 subject properties; and,
- 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.

9.6 Erosion and Sediment Control

This section addresses minimizing the potential for the introduction of deleterious substances to the watercourses, connecting drainages, and the RDCO riparian setbacks. The following recommendations must be adhered to throughout all stages of demolition and construction:

- The release of silt, sediment, sediment-laden water, raw concrete, concrete leachate, or any other deleterious substances into any drainage or areas of high environmental value (i.e., SPEA, RDCO riparian setbacks, covenants) must be prevented at all times;
- Silt fence must be installed between the proposed development and the watercourses, any connecting drainages, the proposed covenant areas, and steep slopes that are denuded during construction to mitigate the risks to aquatic and terrestrial resources associated with runoff and sediment transport. ***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 development;

- Steep sloped areas could also be treated with a surface treatment, such as straw, coconut matting, or some other alternative. Ecoscape has observed that use of coconut matting significantly helps establishment of hydroseed;
- Ensure that onsite machinery is in good operating condition, clean, and free of leaks, excess oil or grease. No equipment refueling can take place within 30 m of the watercourses;
- Erosion and sediment control (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.

9.7 Worksite Isolation

- Isolation of the work area from the wetted level of the watercourses must occur, if required for the installation of road culvert(s). The use of a heavy felt geotextile fabric, lake curtain, coffer dams or similar is recommended in combination with anchoring of the fencing/curtain to ensure sediment movement beneath the fence does not occur. Fencing must be staked and secured tightly against the shore;
- The anchor/weight that holds the curtain to the bottom of the watercourse must be of sufficient weight that it will not lift off the bottom during construction activities or storm/wave events. Both anchors for the curtain and stakes/pins to the substrate must be used to ensure that the curtain does not lift off the bottom;
- Disturbance to watercourse substrates must be kept to a minimum with work site isolation activities; and,

- Regular inspections and maintenance of all erosion and sediment control measures will be required. The contractor must have all the necessary materials readily available to complete maintenance activities, including additional curtain materials, anchors, stakes, etc. If significant repairs are required, works may need to be delayed until the curtain can be repaired.

9.7.1 Water Quality

If the isolated worksite becomes inundated with water at the time of construction, the silt curtain must remain in place until sediments within the containment area have settled and turbidity levels are within allowable limits; this needs to be approved by the EM prior to removal. Works must be conducted in accordance with the *Water Sustainability Act*. If there are unforeseen circumstances, and there are problems with turbid water, then the following recommendations apply:

- Water quality sampling will be conducted in situ with a portable HACH 2100P Turbidimeter (or equivalent) to measure ambient Nephelometric Turbidity Units (NTU) and/or a Hanna HI98129 portable pH meter (or equivalent). If sampling of total suspended solids (TSS) is deemed necessary, samples will be collected in 1 litre bottles and analyzed ex situ at a reputable laboratory (e.g., CARO). Other alternative, calibrated meters or laboratories may also be used;
- Turbidity levels will be monitored as required and must conform with the following allowable turbidity levels under the Ministry of Environment guidelines for fish and aquatic habitats (BC MoE, 2019):
    - During clear flow periods, induced turbidity should not exceed 8 NTU above background levels at any given time and no more than an average of 2 NTU above background levels over a 30-day period; and,
    - During turbid flow periods, induced turbidity should not exceed background levels by more than 5 NTU at any time when background turbidity is between 8 and 50 NTU. When background exceeds 50 NTU, turbidity should not be increased by more than 10% of the measured background level at any one time.
- pH levels will also be monitored as required. Levels must conform to BC MOE guidelines:
    - Emergency measures must be implemented if downstream pH has changed more than 1.0 pH unit, measured to an accuracy of +/- 0.2 pH units from the background level, or is recorded to be below 6.0 or above 9.0 pH units; and,
    - CO_2 diffusing system must be readily available on site during any wet concrete/grouting work. Should a breach in containment occur, the CO_2 will be dissolved in water to

neutralize any spikes in pH that may potentially be caused by concrete leachate. The EM will monitor pH levels and utilize this equipment as necessary.

9.7.2 Fish Salvage

If the isolated worksite becomes inundated with water, a salvage of the isolated area for fish will need to be conducted prior to initiating works.

- A Scientific Fish Collection Permit with the Permitting and Authorization Bureau of the Ministry of Environment must be obtained prior to any fish salvage procedure and a copy of the permit must remain onsite during salvage activities;
- Fish salvage activities will be conducted by the EM using active techniques such as beach seines, pole seines and electrofishing;
- All salvaged fish are to be released back into the applicable watercourse in similar habitat away from the work area; and,
- If damage occurs to the isolation area and the potential exists that fish have been able to re-enter the area, subsequent fish salvages should be completed by the EM as necessary.

9.8 Turbid Water Management

If water is encountered during excavations, dewatering may be required. Options for turbid water management include the following:

- Discharging water in small quantities to well-vegetated areas of the site to allow for infiltration and reduction of runoff potential;
- Discharging water to a sump that could be established towards the eastern section of the subject properties (away from the watercourses);
- Discharging to local stormwater will only be an option if prior approval is gained from the RDCO; and,
- Discharge to the watercourses may be an option provided that water discharged is within the allowable limits for turbidity under the ambient water quality guidelines for turbidity, suspended and benthic sediments; see below (BC MoE, 2019). Any water discharged to the watercourses must be approved by the EM prior to discharge and the EM would need to be onsite full time.

Turbidity levels under the Ministry of Environment guidelines for fish and aquatic habitats (BC MoE, 2019) are as follows:

- During clear flow periods, induced turbidity should not exceed 8 NTU above background levels at any given time and no more than an average of 2 NTU above background levels over a 30 day period; and,
- During turbid flow periods, induced turbidity should not exceed background levels by more than 5 NTU at any time when background turbidity is between 8 and 50 NTU. When background exceeds 50 NTU, turbidity should not be increased by more than 10% of the measured background level at any one time.

9.9 Waste Material and Spills

- All construction debris must be kept outside of the SPEA and covenants and should be removed from the property on a regular basis and disposed of appropriately;
- Stockpiling of fill material within the SPEA or covenants must not occur without consent from the EM. Any fill material, if required for construction, must be located outside of the SPEA/covenants/RDCO riparian setbacks beyond the silt fence;
- Spills of deleterious substances can be prevented through awareness of the potential for negative impact on aquatic habitats 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;
- Ensure equipment and machinery are in good operating condition, free of leaks, excess oil, and grease. Equipment needs to be pressure/steam-washed prior to use within close proximity of a watercourse;
- 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*;
- 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; and,
- 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**, as well as Ecoscape at **1-250-491-7337**.

9.10 Site Cleanup

Upon substantial completion of construction activities:

- Silt fencing, snow fence and other temporary mitigation features must be removed if the risk of surface erosion and sediment transport has been adequately mitigated with other permanent measures; and,
- All equipment, supplies, waste, and other materials must be removed from the site.

9.11 Habitat Restoration

The proposed development will encroach 4,469 m^2 into the RDCO 15 m riparian setbacks, and a total of 6,667m^2 ESA-2 and 1,313 m^2 of ESA-1 would be lost to the development. A total of 861 m^2 have already been given back and restored in the environmental setbacks in the northern portions of the Sunset Ranch development. In addition, it is proposed that 9,518 m^2 of new environmental covenants be registered as a replacement for the 5,871 m^2 of existing steep slope covenants with low environmental value and would also function as an approximate 2.1:1 gain for the proposed 4,469 m^2 encroachment into the riparian setbacks. Therefore, a total restoration area of 10,379 m^2 is proposed to offset for loss ESA-1 and ESA-2 areas and encroachment into the RDCO riparian setbacks.

The addition of the red listed community to a covenant area and reduction of one stream crossing within this same community are considered a significant environmental benefit of the proposed plan. Based upon our previous mapping of top of bank, some areas of this community would not be protected via covenant whether the existing covenant or new one was drafted.

Table 11 provides Ecoscape's recommendation of species and quantities of native trees and shrubs to be planted within the proposed new environmental covenants (9,518 m^2; **Figure 2**). Quantities have been estimated based on 40% coverage (i.e., 3,807 m^2) as the majority of these areas are already comprised of a functioning native riparian habitat and will be refined at the time of construction as needed. Focus will then be on invasive species management in areas already vegetated (see Section 9.11.1).

TABLE 11. Recommended plantings for proposed replacement covenants.

Common Name	Scientific Name	Min. Size
Trees		
Black Cottonwood	*Populus balsamifera*	2 gal
Trembling Aspen	*Populus tremuloides*	2 gal
	Subtotal	**269**
Tall Shrubs		
Douglas Maple	*Acer glabrum*	1 gal
Sitka Alder	*Alnus viridis*	1 gal
Water Birch	*Betula occidentalis*	1 gal
	Subtotal	**592**
Low Shrubs		
Common Snowberry	*Symphoricarpos albus*	1 gal
Mock Orange	*Philadelphus lewisii*	1 gal
Nootka Rose	*Rosa nootka*	1 gal
Tall Oregon-grape	*Berberis aquifolium*	1 gal
	Subtotal	**485**
	Total	**1,346**

General Recommendations for planting within the SPEA:

- Changes to the overall plant list in terms of species selected is permissible but must be approved by the EM prior to substitution. The proposed planting list and layout should be reviewed by the EM prior to planting and all plants should be flagged for review. Only native vegetation from local stock can be planted within the SPEA, unless approved by the EM;
- Shrubs should approximately be spaced at about 1.5 m on center or less in order to match the planting density observed in the natural riparian vegetation communities. No removal of vegetation within the SPEA can occur;
- Planting must occur in spring between April and June or fall between September and October when temperatures are cooler and many plants are dormant, to ensure greater planting success;
- Plants should be installed in groups or clusters and make use of suitable micro-climates, such as moisture-receiving areas, coarse woody debris, and remnant patches of natural

areas. This will help prevent plant mortality by limiting competition with invasive species. Planting should not be completed in an evenly distributed, grid-like pattern;

- The placement and distribution of plantings will be completed in a field-fit manner at the time of restoration through consultation with the Environmental Monitor (EM);
- Plantings should target depressions to capture local moisture from rain or runoff. Woody debris/wood fiber mulch spread around the base of plantings may help to deter establishment of and competition from invasive plant species;
- Flagging of native plants will be helpful for future monitoring purposes, flagging must not be tied around the main stem such that girdling of the plant will occur as it grows;
- Seed and plant material must be sourced from within the southern interior to avoid complications associated with transplanting coastal species or northern species into dry southern interior conditions;
- To promote germination and establishment of vegetation, temporary irrigation should be supplied for at least the first two growing seasons. If no irrigation is proposed for restoration areas, it is recommended that regular maintenance is conducted to improve planting survival. This may include: additional fertilizing, routine watering and/or replanting, and the removal of invasive species. Poor growth, elevated erosion problems, and/or animal intrusion should be mitigated to promote plant growth; and,
- The contractor completing the restoration works should inspect plants monthly during the growing season, replacing any dead or diseased plants.

All disturbed soils must be restored with native Grade A grass seed free of invasive species to minimize establishment of invasive plant species, erosion, and to restore the area to early successional conditions.

- 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. These conditions may be given to a seed provider to determine the most appropriate species to provide.

9.11.1 Invasive Species Management

Ongoing invasive species control through mechanical means (i.e., hand pulling and mowing) will be required within any areas with exposed/disturbed soils on the subject properties.

- Any contractor working within the properties must 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;
- Care must be taken to ensure that invasive species removal does not impact existing or planted native tree and shrub species; and,
- 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.

Identification of existing weed populations and prevention of spread is the most efficient form of weed management. To this end, the EM will employ the following weed management plan measures:

- The EM will identify and delineate any existing species and populations of weeds present within the work site;
- The EM will inform and educate the contractor about the weed species and locations onsite. If necessary, weed infested areas will be delineated with flagging tape or snow fencing to prevent access;
- Where feasible, the existing weeds will be removed (by hand pulling) and dispose of offsite at an appropriate landfill;
- Areas where weed populations have been identified will not be used for excavation and placement of fill. If excavation of weed infested areas is required, the soils will be disposed of offsite;
- Pesticides, herbicides, or other chemical control measures will not be used within the SPEA;
- Prevention of the spread of invasive plant species can be achieved by limiting disturbance to soils and native vegetation; and,
- Invasive species removal should occur before peak flowering times to avoid seed distribution and further spread of invasive species.

9.12 Bonding

Performance bonding may be required by the RDCO to ensure that the recommended mitigation measures are adhered to and any restoration is completed as required. Bonding in the amount of 125% of the estimated value of the prescribed works (i.e., monitoring) and is generally required to ensure faithful performance and that all mitigation measures are completed and function as intended. Security deposits shall remain in effect until the RDCO has been notified, in writing by the EM that the objectives have been met and substantial completion of the works have been achieved.

A performance bond estimate has been prepared to address the performance bonding requirements of the Development Permit (DP) (**Table 12**). Ecoscape estimates that the total cost for habitat restoration works based on 40% coverage of the proposed covenant areas (not inclusive of proposed development) will be approximately $47,380.00, not including GST. The bonding is estimated to be **$59,225.00** (125% of estimated cost).

TABLE 12. Cost estimate for performance bonding.

Item	Quantity	Cost per Unit	Material Cost	Installed Cost*
Trees (1 gal pot)	269	$10.00	$2,690.00	$8,070.00
Shrubs (1 gal pot)	1,077	$10.00	$10,770.00	$32,310.00
Invasive species management (hand-pulling, mowing, etc.…)				$2,500.00
Environmental protection (erosion control, etc.)				$2,000.00
Environmental monitoring (includes substantial and total completion reports)**				$2,500.00
			Total	**$47,380.00**
			Bond amount (125% of Total)	**$59,225.00**

*Costs provided are estimates for bonding purposes only. These costs may vary depending upon site conditions.
**The above estimate for environmental monitoring is over the maintenance phase only.
NOTE: Costs provided are estimates for bonding purposes only. These costs may vary depending upon site conditions.

9.13 Environmental Monitoring

An environmental monitor (EM) should be retained to document compliance with proposed mitigation measures and to provide guidance during construction works. In the event that greater disturbance occurs due to unforeseen circumstances, the EM should recommend further measures to protect/restore the natural integrity of the site. The EM should be an appropriately Qualified Environmental Professional (QEP).

The EM's duties and schedule will include, as a minimum, the following:

- 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 mitigation measures and best practices required for the project;
- The EM will be an appropriately Qualified Environmental Professional (QEP) 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;
- Environmental monitoring on a monthly basis to project completion is typical; however, this will be dependent on the works occurring and RDCO requirements. At minimum, a start-up meeting with the General Contractor, site visits during forms and foundations, and monthly thereafter are recommended. If large concrete pours are required, an inspection of the forms for potential gaps should occur;
- Visits should be conducted during construction and will target higher-risk activities. The EM should be notified prior to high-risk activities so they can schedule site visits accordingly;
- EM reports will generally be generated for each visit and submitted to the client;
- A copy of the development permit and this assessment report should be kept readily available at the site for reference while the work is being conducted; and,
- Monitoring reports should be completed on a regular basis and submitted to all relevant contractors and regulatory agencies. A further report should be generated upon substantial completion of construction and any restoration works. A follow-up monitoring visit two years post construction may be required by the RDCO to document survival of native riparian plantings.

10.0CONCLUSION

This updated report for the remaining development of Sunset Ranch includes provisions for protection of the most important habitats on the subject properties. Protection of the most important habitats is contingent upon exchange of a steep slope covenant areas of lower environmental value with areas of greater environmental significance. Golder Associates has assessed the steep slope areas, and has confirmed that they are suitable for development (Daniel and Imada, 2008; **Appendix B**). Thus, from an environmental perspective, this proposal is considered to protect more habitat than if the original development plan was constructed.

As per the requirements of the RDCO, this report also identifies potential environmental impacts and appropriate mitigation measures to protect the natural integrity of both terrestrial and aquatic communities. In addition, this report addresses the RAPR and provides riparian setbacks for the proposed development. Provided that mitigation measures within this report are adhered to, impacts to the aquatic and terrestrial communities should be avoided.

11.0CLOSURE

This report has been prepared for the exclusive use of James Kay of the Acorn Group. Ecoscape has prepared this assessment 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:

Leanne McDonald, B.Sc., P.Ag., B.I.T.
Intermediate Natural Resource Biologist
Direct Line: (250) 491-7337 ext. 217

Reviewed by:

Jason Schleppe, M.Sc., R.P.Bio.
Senior Natural Resource Biologist
Direct Line: (250) 491-7337 ext. 202

Mary Ann Olson-Russello, M.Sc., R.P.Bio.
Senior Natural Resource Biologist
Direct Line: (250) 491-7337 ext. 205

12.0 REFERENCES

Birds Canada, 2020. Nesting Calendar Query Tool [web application]. https://www.birdscanada.org/apps/rnest/index.jsp

British Columbia Conservation Data Centre (CDC).2021. CDC iMap [web application]. B.C. Ministry of Environment and Climate Change Strategy (MECCS). Victoria, B.C. http://maps.gov.bc.ca/ess/hm/cdc/

British Columbia Ministry of Forests, Lands, Natural Resource Operations and Rural Development (MFLNRORD). 2019. Okanagan Timing Windows: Nesting Birds. https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-licensing-rights/working-around-water/regional-terms-conditions-timing-windows/okanagan-timing-windows

British Columbia Ministry of Forests, Lands, Natural Resource Operations and Rural Development (MFLNRORD). 2021. BC Habitat Wizard [web application]. https://maps.gov.bc.ca/ess/hm/habwiz/

British Columbia Ministry of Environment (BC MoE). 2014. Guidelines for Amphibian and Reptile Conservation during Urban and Rural Land Development in British Columbia. https://www.for.gov.bc.ca/ftp/toc/external/!publish/SAR/Amphibian%20and%20Reptile%20BMPs_final%20(old%202004).pdf

British Columbia Ministry of Environment (BC MoE). 2013. Guidelines for Raptor Conservation during Urban & Rural Land Development in BC. https://www2.gov.bc.ca/assets/gov/environment/natural-resource-stewardship/best-management-practices/raptor_conservation_guidelines_2013.pdf

British Columbia Ministry of Environment (BC MoE). 2021. BC Species and Ecosystems Explorer [web application] http://a100.gov.bc.ca/pub/eswp/

COSEWIC. 2010. COSEWIC assessment and status report on the Lewis's Woodpecker Melanerpes lewis in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. x + 23 pp. (www.sararegistry.gc.ca/status/status_e.cfm).

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.

COSEWIC. 2016. COSEWIC assessment and status report on the Northern Rubber Boa Charina bottae in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xiii + 38 pp.

Daniel, Chris and Gerald Imada. 2008. Construction on Slopes Greater than 30% Sunset Ranch Stage 2 Phase 4, Kelowna, BC. Letter dated April 9, 2008. File: 06-1440-040

Hawes, K. and D. Arsenault. 2001. Environmental Assessment and Management Plan Sunset Ranch Golf Course Residential Community Development. Prepared by: EBA Engineering Consultants Ltd. Prepared for Acorn Communities Ltd. October 2001. File #: 0805-01-86848

Hope, G.D., W.R. Mitchell, D.A. Lloyd, W.R. Erickson, W.L. Harper, and B.M. Wikeem. 1991. Chapter 9: Ponderosa Pine Zone in Ecosystems of British Columbia Eds. Meidinger, D. and J. Pojar British Columbia Ministry of Forests, Research Branch, Victoria, British Columbia.

Iverson, K., C. Cadrin, D.S. Filatow, C., and Erwin. 2008. Sensitive Ecosystems Inventory Central Okanagan, 2000-2001.

Leupin, E. 2007. Environmental Management Plan for DP01-011. Prepared by Ecoscape Environmental Consultants Ltd. October 2006. Prepared for Acorn Communities Ltd. File #: 06-071.

Leupin, 2007b. Enhancement Opportunity Letter to Acorn Communities Ltd.

MWLAP, 2001. Letter from Mike Ladd to Ministry of Transportation on May 3, 2001 regarding the proposed subdivision

MWLAP, 2001b. Letter from Mike Ladd to RDCO on May 1, 2001.

Polster, D., J. Cullington, T. Douglas, and T. Hooper, 2014. Develop with Care: Environmental Guidelines for Urban and Rural Land Development in British Columbia. Prepared for the BC Ministry of Environment. Victoria (BC)

Regional District of Central Okanagan (RDCO). 2017. Ellison Official Community Plan. Bylaw No. 1124

Regional District of Central Okanagan (RDCO). 2020. Zoning Bylaw No. 871 Schedule A.

Regional District of Central Okanagan (RDCO) GIS Team. 2020. RDCO GIS Interactive Mapping.

FIGURES

FIGURE 1
Site Location

Project:	Environmental Assessment
Location:	RDCO
Project No.:	21-3654
Prepared for:	Acorn Group
Prepared by:	Ecoscape Environmental Consultants Ltd. Josh Castanier, GIS Technician
Coordinate System:	NAD83-UTM Zone 11
Imagery:	RDCO 2019
Field Visit:	March 12, 2021
Map Date:	July 28, 2021

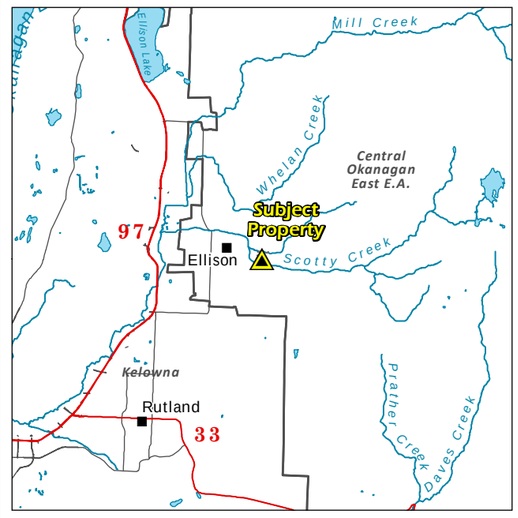
LEGEND

- Regional Location of Study Area
- Streams
- Wildlife Species Inventory (Survey)
- Wildlife Species Inventory (Incidental)
- Okanagan Critical Habitat (Species at Risk)
- BC Conservation Data Center (CDC) Polygons*
- Subject Property
- Cadastre

*A large Okanagan Critical Habitat polygon covers the entire map and subject property area representing the following wildlife species but is not shown on this figure:
- Western Rattlesnake (*Crotalus oreganus*)
- Desert Nightsnake (*Hypsiglena chlorophaea*)
- Great Basin Gophersnake (*Pituophis catenifer deserticola*)
-Lewis Woodpecker (*Melanerpes lewis*)

BC Conservation Data (CDC polygons) include:
-American Badger (*Taxidea taxus*)

Regional Location of Study Area



ECOSCAPE Environmental Consultants Ltd.

331200 331400 331600 331800 332000 332200 332400 332600
5534400 5534200 5533800 5533600 5533400

ULMAN RD
DARYL RD
ESQUIRE RD
ARVID CRT
CAMELBACK DR
SCOTTY CREEK RD
LAKHA RD
ROCKFACE CREEK
SCOTTY CREEK

trembling aspen / common snowberry / Kentucky bluegrass

trembling aspen / common snowberry / Kentucky bluegrass

trembling aspen / common snowberry / Kentucky bluegrass

Subject Property
Anderson Rd,
Kelowna, BC
Lot 9, KAP 72369
PID 025-561-529
5.44 Hectares

Subject Property
2101 Upper Booth Rd S,
Kelowna, BC
Lot B, KAP 84569
PID 027-168-158
4.8 Hectares

Northern Rubber Boa

hard-stemmed bulrush
Baltic Deep Marsh
silverweed

0 50 100 200 300 400 500
Meters

*Refer to the legend for blanket Species at Risk Occurrence data

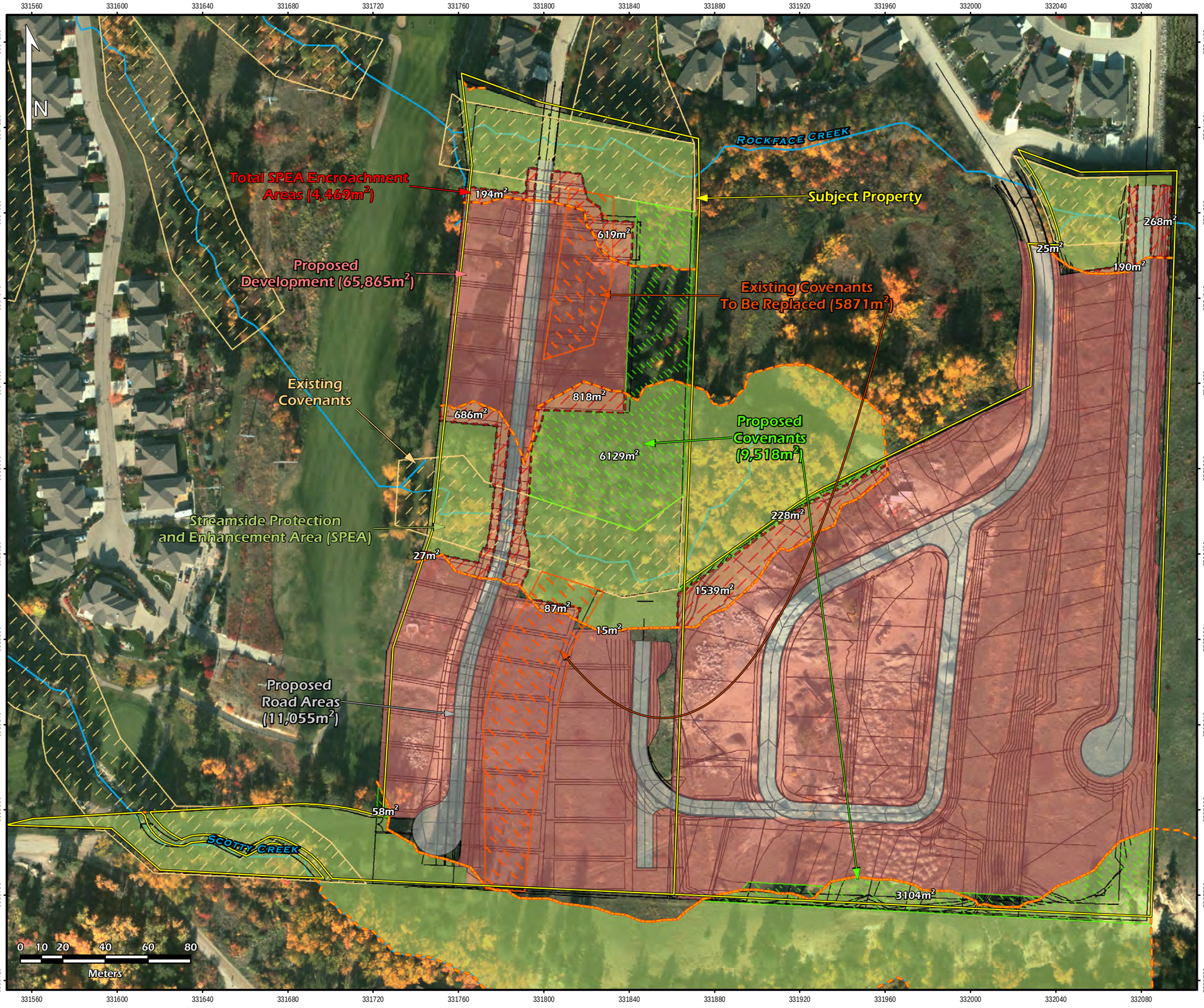


FIGURE 2
Proposed Works

Project:	Environmental Assessment
Location:	RDCO
Project No.:	21-3654
Prepared for:	Acorn Group
Prepared by:	Ecoscape Environmental Consultants Ltd. Josh Castanier, GIS Technician
Coordinate System:	NAD83-UTM Zone 11
Imagery:	RDCO 2019
Field Visit:	March 12, 2021
Map Date:	March 1, 2022

LEGEND

- Streams
- Site Plan
- Existing Covenants
- Existing Covenants to be Replaced
- Encroachment Areas
- Proposed Covenants
- *Streamside Protection and Enhancement Area (SPEA)*
- Subject Property
- Cadastre

ECOSCAPE
Environmental Consultants Ltd.

FIGURE 3
Ecosystem Polygons

Project:	Environmental Assessment
Location:	RDCO
Project No.:	21-3654
Prepared for:	Acorn Group
Prepared by:	Ecoscape Environmental Consultants Ltd. Josh Castanier, GIS Technician
Coordinate System:	NAD83-UTM Zone 11
Imagery:	RDCO 2019
Field Visit:	March 12, 2021
Map Date:	March 23, 2021

LEGEND

- Streams
- Countours (2m)
- Ecosystem Polygons
- Subject Property
- Cadastre

Ecosystem Polygon Key

Polygon Number

2402

Decile (60%) → 6PFks6C ← Stand Modifier

Ecosystem Unit → 2PFks3 ← Structural Stage

2FWwc6Ckc

Site Modifiers ← Seral Stage

Ecosystem Units

AS	Trembling Aspen – Snowberry -Kentucky Bluegrass
CD	Black cottonwood / Douglas-fir – Common Snowberry – Red-osier Dogwood Riparian
DM	Douglas-fir – Water Birch – Douglas maple
ES	Exposed Soil
FB	Rough fescue – Bluebunch wheatgrass cheatgrass seral association
GP	Gravel Pit
RI	River
RW	Rural
RZ	Road Surface

Site Modifiers

c	coarse textured soils
k	cool aspect (slope >25%)
s	shallow soils (20-100 cm to bedrock)
v	very shallow (< 20 cm to bedrock)
w	warm aspect (slope > 25%)

Structural Stage

1	Sparce/bryoid
2b	Herb - Graminoid-dominated
3a	Shrub/Herb - Low Shrub
3b	Shrub/Herb - Tall Shrub
4	Pole Sapling
5	Young Forest
6	Mature Forest
7	Old Forest

Seral Stage/Weed Modifiers

kc	knapweed - cheatgrass
wk	bluebunch wheatgrass - knapweed

ECOSCAPE Environmental Consultants Ltd.

Subject Property

ROCK FACE CREEK

SCOTTY CREEK

1 10CD
2 10ASk
3 10ASk
4 FBkc
5 10ASk
6 10RW
7 10CD
8 10RZ
9 10FBkc
10 10FBkc
11 10DMg
12 10DMg
13 10RI
14 10DMg
15 10FBkc
16 7ES 3GP
17 10RZ
18 10FBkc

0 12.5 25 50 75 100
Meters

331550 331600 331650 331700 331750 331800 331850 331900 331950 332000 332050 332100
5534150 5534100 5534050 5534000 5533950 5533900 5533850 5533800 5533750

FIGURE 4
Riparian Areas Regulation Assessment

Project:	Environmental Assessment
Location:	RDCO
Project No.:	21-3654
Prepared for:	Acorn Group
Prepared by:	Ecoscape Environmental Consultants Ltd.
	Josh Castanier, GIS Technician
Coordinate System:	NAD83-UTM Zone 11
Imagery:	RDCO 2019
Field Visit:	March 12, 2021
Map Date:	July 29, 2021

LEGEND

- Streams
- Surveyed Top of Bank
- Riparian Areas Regulation Assessment Boundary (30 Metres)
- Zone of Sensitivity - Large Woody Debris
- Zone of Sensitivity - Litterfall and Insect Drop
- Zone of Sensitivity - Shade
- *Streamside Protection and Enhancement Area (SPEA)*
- Subject Property

ECOSCAPE Environmental Consultants Ltd.

FIGURE 5
Environmental Sensitivity Analysis

Project:	Environmental Assessment
Location:	RDCO
Project No.:	21-3654
Prepared for:	Acorn Group
Prepared by:	Ecoscape Environmental Consultants Ltd. Josh Castanier, GIS Technician
Coordinate System:	NAD83-UTM Zone 11
Imagery:	RDCO 2019
Field Visit:	March 12, 2021
Map Date:	March 23, 2021

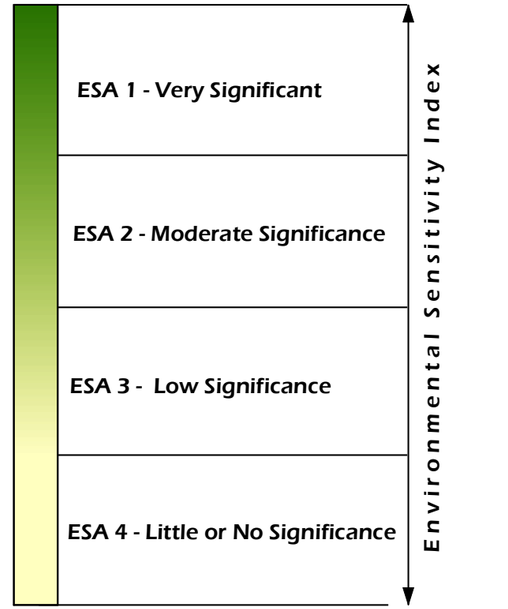
LEGEND

- "99" Ecosystem Polygon Number
- Streams
- Subject Property
- Cadastre

Environmental Sensitivity Rating

- Very Significant (ESA 1)
- Moderate (ESA 2)
- Low (ESA 3)
- Little or No Significance (ESA 4)

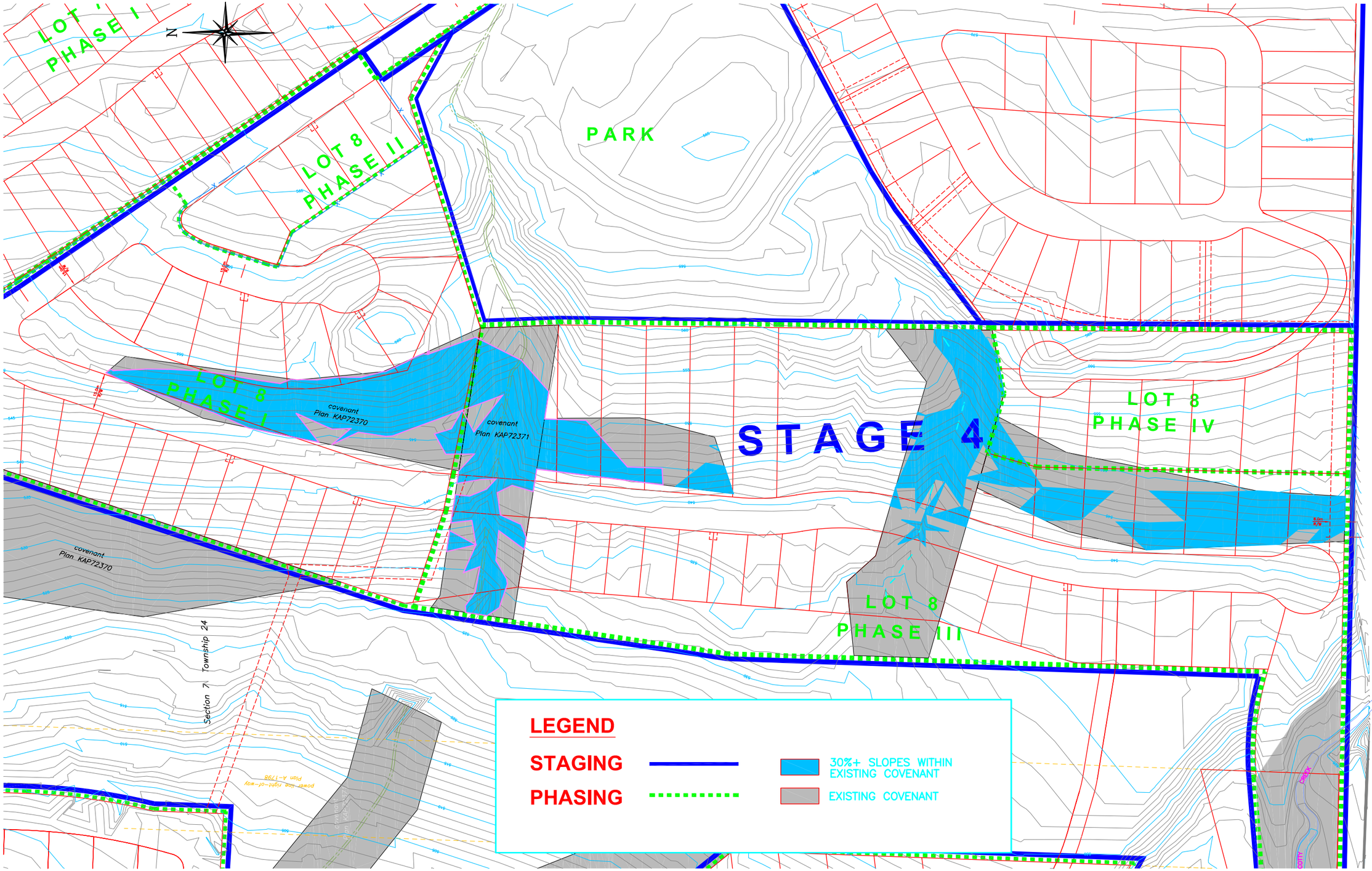
Environmental Sensitivity Gradient



ECOSCAPE
Environmental Consultants Ltd.

APPENDIX A

Topographical Survey Provided By: Protech Consultants Ltd.



LEGEND

CABLE TV	CAP	SAN #	SANITARY MH (EXISTING OR FUTURE)
GAS	CATCH BASIN	SAN #	SANITARY MH (PROPOSED)
SAN. SEWER	ELECTRICAL BOX	STM #	STORM MH (EXISTING OR FUTURE)
STORM SEWER	HYDRANT	STM #	STORM MH (PROPOSED)
U.G. ELECTRICAL	VALVE		TRANSFORMER
U.G. TELEPHONE	LAMP STANDARD		UTILITY JUNCTION BOX
WATER			

No.	MM/DD/YY DATE	BY	REVISION	Chk'd	No.	MM/DD/YY DATE	BY	REVISION	Chk'd

REGIONAL DISTRICT OF CENTRAL OKANAGAN

P.ENG.

DRAWN	JK
DESIGN	MDY
CHECKED	
DATE	MARCH 2008
SCALE	1:1500

PROTECH
CONSULTANTS LTD.
Phone 860-1771 200 - 1461 St. Paul Street Kelowna, B.C. FAX 860-1994

SUNSET RANCH DEVELOPMENT
STAGE 4 PHASE III COVENANT

DRAWING NO. 3112 COVENANT

REV. NO. 0

APPENDIX B

Slope Letter Provided By: Golder Associates Ltd.

Golder Associates Ltd.

220 - 1755 Springfield Road
Kelowna, British Columbia, Canada V1Y 5V5
Telephone (250) 860-8424
Fax (250) 860-9874

April 9, 2008 06-1440-040

Acorn Communities Ltd.
P.O. Box 2010
Kelowna, BC V1X 4K5

Attention: Mr. Greg Bird

RE: CONSTRUCTION ON SLOPES GREATER THAN 30 PERCENT
SUNSET RANCH, PROPOSED STAGE 4, PHASE 2, KELOWNA, BC

Dear Sir:

This letter is to provide comments on the feasibility of constructing homes on portions of the proposed Sunset Ranch Stage 4, Phase 2 area with natural slopes in the order of 30%. The proposed Phase 2 development borders on the southern edge of Stage 4, Phase 1, extending roughly 350 m to the south. The area is currently occupied by an unpaved access road in the approximate location of the proposed southern extension of Road "S", and by several residential and outbuilding structures.

In general, the Phase 2 area is a west-facing slope, with slopes ranging from subhorizontal to greater than 30%. The area to the east (upslope) of the existing access road is a mixture of grassland and forest. The area to the west (downslope) of the road is a plateau ranging in width from roughly 150 m in the south to less than 10 m in the north. The land surface dips to the west beyond the plateau. The plateau is generally free of trees, while the slopes to the west are typically forested. The slope angles to the west of the plateau are comparable to those above the access road. The Phase 2 area is traversed by two east-west trending gullies, the first abutting the southern edge of Stage 4, Phase 1, and the second roughly 150 m further south.

Golder Associates Ltd. (Golder) has provided geotechnical services during development of Stage 4, Phase 1, including completion of an initial geotechnical investigation to geotechnical inspection during construction. The soil conditions in Phase 1 have generally consisted of surficial organic soils in the order of 0.5 m in thickness over a 0.5 to 2.0 m thick compact to dense mixed and interlayered sequence of silt, sand and gravel with a variable clay, cobble and boulder content, over a dense to very dense mixture of silt, sand and gravel with a variable cobble and boulder content, inferred to be glacial till. Groundwater seepage into excavations has generally been localized in areas which are difficult to predict prior to construction.

Based on the proximity of Phases 1 and 2, and the similarity of the topography in the areas, it is believed to be reasonable to assume, for preliminary planning purposes, that the soil and groundwater conditions in the two areas will be similar. Based on this assumption, construction of homes in portions of Phase 2 with slopes in the order of 30% is considered to be feasible from a geotechnical perspective, provided appropriate geotechnical design and construction procedures are followed. Development in this area may require construction of retaining walls, reinforced fills, and groundwater collection and disposal systems, among other features, and associated higher construction costs should be anticipated. Golder recommends that a geotechnical investigation be completed in this area to provide geotechnical recommendations for the design of Phase 2.

We trust the foregoing provides the information you require at this time. Please do not hesitate to contact this office to discuss the contents of this letter at your convenience.

Yours very truly,

GOLDER ASSOCIATES LTD.

Chris R. Daniel, E.I.T. (APENS)
Geotechnical Group

Gerald Imada, P.Eng.
Associate, Senior Geotechnical Engineer

CD/GI/cfh

http://capws/06l440040acornhomessunsetranchregionaldistrictcentalokanagan/reports/wp final/06-1440-040 slope letter stage 4.2 slope letter april 9-08 doc

APPENDIX C

Covenants KAP72730 and 72371

REFERENCE PLAN TO ACCOMPANY COVENANTS IN LOTS 1, 4, 6 & 8 PLAN KAP 72369 SEC. 7 TP. 24 O.D.Y.D.

PURSUANT TO SECTION 219 OF THE LAND TITLE ACT.

SCALE 1:2000 BCGS 82E.094

50 0 50 100 150 200 250 METRES.

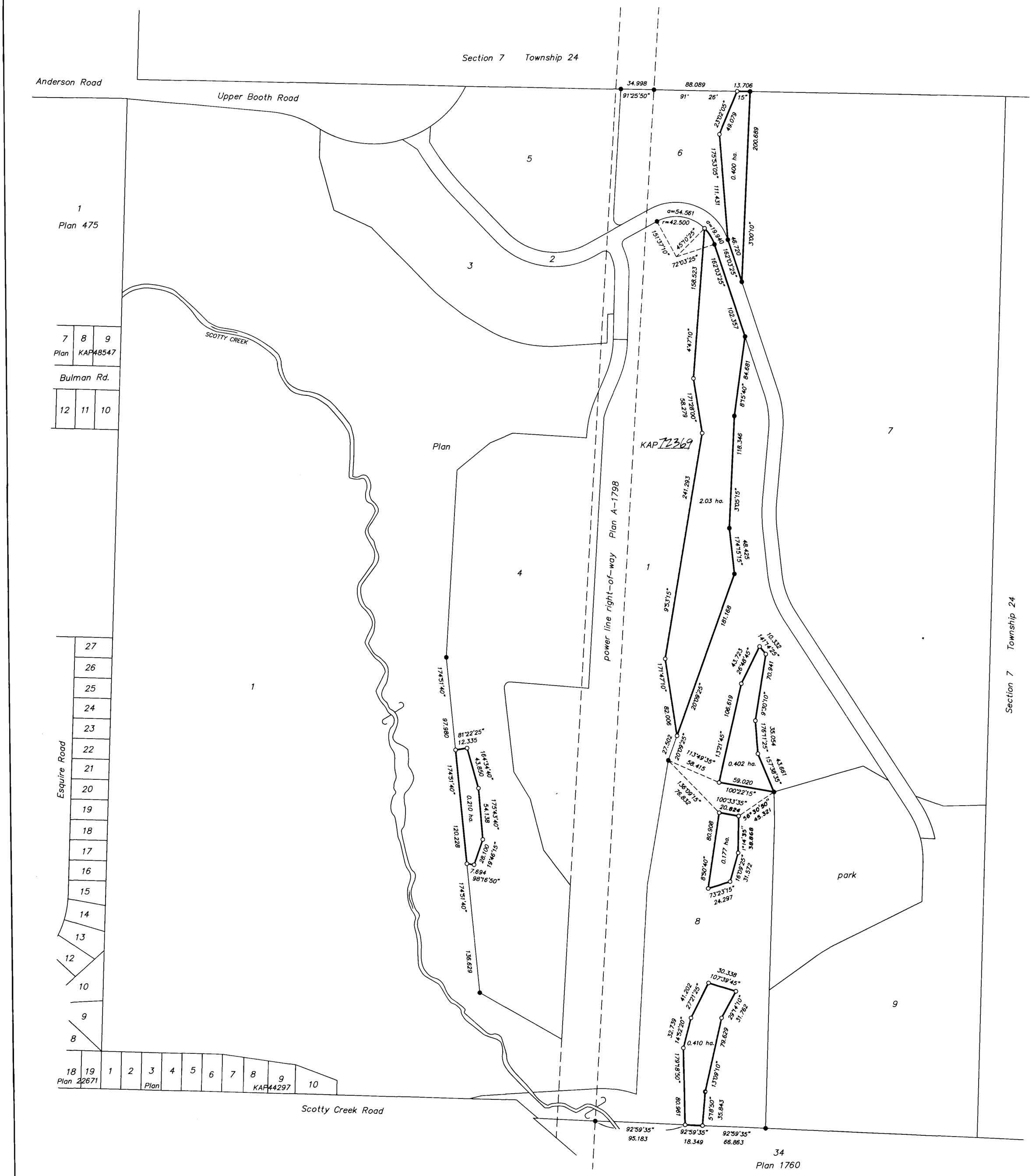
N

PLAN No. KAP 72370

Deposited in the Land Title Office at Kamloops, B.C.
this 9 day of DEC., 2002

Dan Smith
Registrar

KT135774



This plan lies within the Central Okanagan Regional District.

LEGEND

All distances are in metres.

- ● Iron Post Found
- ○ Iron Post Set

Grid bearings are derived from Plan KAP 72369.

I, Douglas A. Goddard a British Columbia Land Surveyor of the City of Kelowna in British Columbia certify that I was present at and personally superintended the survey represented by this plan and that the survey and plan are correct. The survey was completed on the 27th day of June, 2002.

B.C.L.S.

file 11062 fb 230 11062L8.dwg

D.A. Goddard Land Surveying Inc.
200–1449 ST. PAUL STREET KELOWNA PHONE 763–3733

REFERENCE PLAN TO ACCOMPANY COVENANTS IN LOTS 1, 8 & 9 PLAN KAP 72369 SEC. 7 TP. 24 O.D.Y.D.

PURSUANT TO SECTION 219 OF THE LAND TITLE ACT.

SCALE 1:2000 BCGS 82E.094

50 0 50 100 150 200 250 METRES.

N

PLAN No. KAP 72371

Deposited in the Land Title Office at Kamloops, B.C.
this 9 day of DEC., 2002

Registrar

KT135776

Section 7 Township 24

Anderson Road

Upper Booth Road

easement Plan 39858

190.350

1'59'50"

1 Plan 475

5

6

2

3

4

7

Plan KAP72369

power line right-of-way Plan A-1798

Section 7 Township 24

1'59'50" 35.356 post-post

1'59'50" 14.205

7 8 9 Plan KAP48547

Bulman Rd.

12 11 10

PRESENT NATURAL BOUNDARY SCOTTY CREEK

parcel 'A' 1.67 ha.

parcel 'B' 1.80 ha.

parcel 'C' 0.124 ha.

parcel 'D' 0.126 ha.

parcel 'E' 0.147 ha.

parcel 'F' 0.977 ha.

parcel 'G' 0.373 ha.

parcel 'H' 0.466 ha.

parcel 'I' 0.133 ha.

park

27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 10 9 8

Esquire Road

18 19 Plan 22671 1 2 3 Plan 4 5 6 7 8 9 KAP44297 10

Scotty Creek Road

SEE DETAIL

8

9

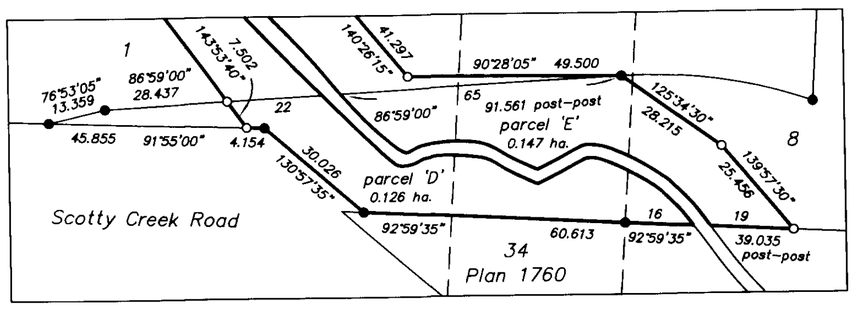
34 Plan 1760

CURVE TABLE

#	ARC	RADIUS
C1	34.658	107.500
C2	5.220	107.500

LINE TABLE

#	DISTANCE	BEARING
L1	11.803	35°06'45"
L2	16.068	79°59'30"
L3	12.050	78°36'40"
L4	17.306	53°26'35"
L5	21.673	108°53'30"
L6	15.565	146°50'40"
L7	14.222	90°04'50"
L8	20.169	96°45'35"
L9	15.717	119°10'30"
L10	22.971	105°14'00"
L11	20.405	112°28'25"
L12	24.504	1°22'45"
L13	19.180	155°37'25"
L14	9.625	158°08'30"
L15	10.410	116°19'40"
L16	24.535	25°27'10"
L17	26.987	22°21'40"
L18	24.804	162°20'10"
L19	27.279	156°26'35"
L20	18.588	142°12'30"
L21	24.029	14°51'45"
L22	13.716	25°14'00"
L23	28.989	140°59'00"
L24	18.606	175°24'00"
L25	15.455	20°59'25"
L26	16.664	158°43'55"
L27	18.881	138°35'20"
L28	22.027	16°34'05"
L29	13.835	12°55'25"
L30	16.737	128°37'05"
L31	21.894	147°14'55"
L32	18.602	137°38'20"
L33	11.203	92°23'15"
L34	13.995	111°24'40"
L35	10.847	179°30'25"
L36	9.530	168°36'15"
L37	14.824	128°27'05"



DETAIL
SCALE 1:1000

This plan lies within the Central Okanagan Regional District.

LEGEND

All distances are in metres.

- ● Iron Post Found
- ○ Iron Post Set
- ⊗ Standard Capped Iron Post Found

Grid bearings are derived from Plan KAP 72369.

I, Douglas A. Goddard a British Columbia Land Surveyor of the City of Kelowna in British Columbia certify that I was present at and personally superintended the survey represented by this plan and that the survey and plan are correct. The survey was completed on the 27th day of June, 2002.

B.C.L.S.

file 11062 fb 230 11062L2.dwg

D.A. Goddard Land Surveying Inc.
200–1449 ST. PAUL STREET KELOWNA PHONE 763–3733

APPENDIX D

Site Photos

Photo 1. View of wildlife trees (mature Trembling Aspen) along Rockface Creek (all photos taken March 12, 2021).

Photo 2. View of Rockface Creek looking east from Trickle Creek Drive.

Photo 3. View of wildlife trees (mature Trembling Aspen) further east along Rockface Creek.

Photo 4. View of AS community along Rockface Creek.

Photo 5. View looking at FB ecosystem associated with Polygon 4.

Photo 6. View of exposed soils associated with Polygon 16.

Photo 7. View looking at GP associated with Polygon 14.

Photo 8. View of Rockface Creek tributary along the eastern portion of the subject properties.

Photo 9. View of wetted areas within undefined channel portion of Rockface Creek tributary.

Photo 10. View of areas further west within the subject properties of Rockface Creek tributary, where the channel is more defined and wetted.

Photo 11. View of remnant catch basin associated with Rockface Creek tributary.

Photo 12. View of slightly more defined channel of Rockface Creek tributary looking west towards Trickle Creek Road.

Photo 13. View of CD ecosystem associated with Polygon 7.

Photo 14. View looking east along Scotty Creek (Polygon 13) and DM ecosystem (Polygon 12).

Photo 15. View looking east at Polygon 15 from the southwest area of the subject properties.

Photo 16. View looking west at the western subject property boundary.

Photo 17. View of suspected culvert requirement along the eastern subject properties' boundary over Rockface Creek.

Photo 18. View looking south at the road (Polygon 17) and Polygon 15 along the northeastern boundary of the subject properties.

Photo 19. View west at the proposed wetland/stormwater pond area on RDCO lands.

Photo 20. View looking at catch basin likely associated with Rockface Creek and its tributary just north of the northwestern subject properties' boundary.