ENVIRONMENTAL ASSESSMENT

Lot 86 - 7379 Fintry Delta Road, West Kelowna, BC

Prepared For:

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1.0 INTRODUCTION

Ecoscape Environmental Consultants Ltd. (Ecoscape) has been retained by Timothy Robinson (property owner) to provide an Envionmental Assessment (EA) for a proposed development at 7379 Fintry Delta Road, West Kelowna, BC. The subject property is legally described as at Lot 86, Plan KAP 15329, Regional District of Central Okanagan (RDCO) and is located adjacent to Shorts Creek (**Figure 1**). The proposed development consists of a single-family dwelling with a detached garage.

Ecoscape prepared a preliminary setback assessment for the previous owner of the subject property in 2016 which has remained on file for the purposes of future development. The particulars of the setback assessment can be reviewed in Section 3.4 of this report and the Preliminary Setback Assessment Report has been attached as **Appendix A**.

This report has been prepared to satisfy the Regional District of Central Okanagan (RDCO) Sensitive Aquatic Development Permit Requirements in accordance with the Rural Westside Official Community Plan (OCP) (Bylaw 1274) (updated April 2014). This report addresses the RDCO Development Permit guidelines for Sensitive Aquatic DPAs, reviews the aquatic and terrestrial resource values of the subject property, assesses the impacts of the proposed works, and subsequently provides mitigation measures to protect the natural integrity of the riparian and foreshore area.

2.0 PROPOSED WORKS

The subject property is characterized as an undeveloped, vacant lot with minimal vegetation in an urban area. The property is located within a Sensitive Aquatic Development Permit Area (**Figure 2**). It is bounded by Shorts Creek to the north and east, Fintry Delta Road to the west, and residential housing to the south.

The proposed works consist of the development of a single-family dwelling with a detached garage. The most recent development plans obtained by Ecoscape portray an attached deck to be developed located within the Streamside Protection and Enhancement Area (SPEA) as determined and approved by Ecoscape in the 2016 Preliminary Setback Assessment Report (**Appendix A**). As outlined in the attached Floodplain Development Recommendations (**Appendix B**), the proposed works must be constructed for permanent flood protection, at levels 1.5 m above the natural boundary of Shorts Creek. Therefore, the site will be raised with fill to mitigate potential impacts from flooding and accommodate these recommendations, and the proposed deck will be raised and supported by posts.

3.0 ENVIRONMENTAL ASSESSMENT

A site visit was conducted on September 19, 2017 by Tina Deenik, B.Sc. and Carmen Chelick B.Sc., Natural Resource Biologists with Ecoscape. The condition of the proposed development footprint and riparian area was observed during the site visit. Riparian setback requirements from Okanagan Lake were determined following the Rural Westside Official Community Plan, with reference to the Provincial Riparian Areas Regulation (RAR).

A desktop assessment of the proposed work area at 7379 Fintry Delta Road, West Kelowna, BC, was completed by Ecoscape Environmental Scientist, Theresa Loewen, B.Sc., P.Ag., on February 11, 2020, in addition to reviewing photographs taken at the time of the site visit (**Photos 1 – 4**).

Sources of information queried for the assessment include:

- BC Ministry of Environment Species and Ecosystems Explorer;
- BC Ministry of Environment Fish Inventory Data Queries (FIDQ);
- BC Conservation Data Centre (CDC) Species at Risk occurrence records; and
- Provincial Best Management Practices (BMP)

3.1 Terrestrial and Riparian Resource Values

The proposed site is located within the Okanagan Very Dry Hot Interior Douglas Fir Variant (IDFxh1) biogeoclimatic zone described by the Biogeoclimatic Ecosystem Classification (BEC) program (Lloyd et al. 1990). It occurs as an elevation band above the PPxh1 and below the IDFdk2.

A detailed vegetation survey was not conducted during the site assessment. According to the Preliminary Setback Assessment Report (**Appendix A**) and photos of the site, the subject property is largely void of vegetation with some grasses, low shrubs and trees, and invasive species. It is considered that the subject property currently has low ecological value with high potential for riparian restoration. Riparian plantings have previously been undertaken along the creek in association with the flood mitigation works.

3.2 Wildlife and Species At Risk

A wildlife survey was not undertaken at the time of the site visit. However, a desktop review of potential occurences in the area was conducted on February 11, 2020.

Species At Risk are identified in the context of provincial and national ranking systems. The provincial ranking system applies to species that have been assessed by the BC Conservation Data Centre (CDC). The national ranking system applies to species that have been assessed by the Committee on the Status of Endangered Wildlife in Canada

(COSEWIC). The CDC was queried for critical habitat and potential mapped occurrences of at-risk species with the potential to occur within a 1km radius of the subject property (BC MoE 2019).

- Shape ID 77729, Occurrence ID 10497, is a red-listed ecological community of Black Cottonwood / Common Snowberry – Roses *(Populus trichocarpa / Symphoricarpos albus - Rosa spp*), occurs within the riparian area of Shorts Creek and therefore also encompasses the subject property.
- Shape ID 77730, Occurrence ID 10498, is a red-listed ecological community of Black Cottonwood - Douglas-fir / Common Snowberry - Red-osier Dogwood (*Populus trichocarpa - Pseudotsuga menziesii / Symphoricarpos albus - Cornus sericea*) occurs 729 m from the subject property, adjacent to the foreshore of Okanagan Lake and south of Fintry Delta Road.
- Shape ID 47937, Occurrence ID 8125, is a blue-listed species at risk, the Western Screech-owl, Macfarlanei Subspecies (*Megascops kennicottii macfarlanei*), with the potential to occur within a 1km radius of the subject property.
- Critical habitat ID 110420 for the Great Basin Gophersnake (*Pituophis catenifer deserticola*)
- Critical habitat ID 110305 for the Desert Nightsnake (*Hypsiglena chlorophaea*)
- Critical habitat ID 110190 for the Western Rattlesnake (Crotalus oreganus)

Several incidental observational occurences of at risk species have been recorded within 1 km of the subject property. Specifically, the provincially blue-listed Short Eared Owl *(Asio flammeus)*, last observed in 2006 (SO ID 8948) and the North American Racer *(Coluber constrictor)*, last observed in 2018 (IO ID 181483), along with the provincially red-listed Desert Nightsnake *(Hypsiglena chlorophaea),* last observed in 2015 (IO ID 150664). All three of these incidential observations occurred approximately 800m from the subject property.

A listing of animal species at risk with the potential to occur within the subject property is shown below in Table 1.

Table 1. Animal species at risk with the potential to occur within the subject property

Class	Common Name	Scientific Name	Provincial Status[1]	COSEWIC Listing[2]
Amphibians	Great Basin Spadefoot	*Spea intermontane*	Blue	T
Birds	Short-eared Owl	*Asio flammeus*	Blue	SC
	Olive-sided Flycatcher	*Contopus cooperi*	Blue	SC
	Yellow-breasted Chat	*Icteria virens*	Red	E
	Lewis's Woodpecker	*Melanerpes lewis*	Blue	T
	Flammulated Owl	*Psiloscops flammeolus*	Blue	SC
	Barn Swallow	*Hirundo rustica*	Blue	T
	Western Screech-Owl, *macfarlanei* subspecies	*Megascops kennicottii macfarlanei*	Blue	T
Mammals	Wolverine, luscus subspecies	*Gulo gulo luscus*	Blue	SC
	Grizzly Bear	*Ursus arctos*	Blue	SC
	American Badger	*Taxidea taxus*	Red	E
	Nuttall's Cottontail	*Sylvilagus nuttallii*	Blue	SC
	Spotted Bat	*Euderma maculatum*	Blue	SC
	Western Harvest Mouse	*Reithrodontomys megalotis*	Blue	E
Reptiles	Gopher Snake, *deserticola* subspecies	*Pituophis catenifer deserticola*	Blue	T
	Western Skink	*Plestiodon skiltonianus*	Blue	SC
	Western Rattlesnake	*Crotalus oreganus*	Blue	T
	North American Racer	*Coluber constrictor*	Blue	T
	Painted Turtle - Intermountain - Rocky Mountain Population	*Chrysemys picta* pop. 2	Blue	SC

Source: http://www.env.gov.bc.ca/cdc/

[1]**Provincial Status Blue:** List of ecological communities, and indigenous species and subspecies of special concern (formerly vulnerable) in British Columbia. **Red:** List of ecological communities, and indigenous species and subspecies that are extirpated, endangered or threatened in British Columbia. Red-listed species and sub-species may be legally designated as, or may be considered candidates for legal designations as Extirpated, Endangered or Threatened under the Wildlife Act (see http://www.env.gov.bc.ca/wld/faq.htm#2). Not all Red-listed taxa will necessarily become formally designated. Placing taxa on these lists flags them as being at risk and requiring investigation.
Yellow: Includes species that are apparently secure and not at risk of extinction. Yellow-listed species may have red- or blue-listed subspecies.
[2] **COESWIC Status: Special Concern (SC):** A wildlife species that may become threatened or endangered because of a combination of biological characteristics and identified threats.
Endangered (E): A wildlife species facing imminent extirpation or extinction.
Threatened (T): A wildlife species that is likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction.
SEARCH CRITERIA: Animals OR Plants

AND BC Conservation Status:Red (Extirpated, Endangered, or Threatened) OR Blue (Special Concern)
AND COSEWIC Status:Endangered OR Threatened OR Special Concern
AND Forest Districts:Okanagan Shuswap Forest District (DOS) (Restricted to Red, Blue, and Legally designated species)
AND MOE Regions:8- Okanagan (Restricted to Red, Blue, and Legally designated species)
AND Regional Districts: Central Okanagan (CORD)
AND Habitat Subtypes: Conifer Forest - Dry,Mixed Forest (deciduous/coniferous mix),Riparian Forest,Riparian Herbaceous,Riparian Shrub,Shrub - Natural (Restricted to Red, Blue, and Legally designated species)
Sort Order:Scientific Name Ascending

3.3 Aquatic Resources

Shorts Creek (Watershed Code 310-905500) is located to the east of the subject property.

The Shorts Creek watershed has an area of approximately 186 km^2 and drains gently sloping plateau headwaters before flowing over a series of waterfalls through a steep-sided canyon within the lower reaches of the watershed. Below the canyon, Shorts Creek flows over a large alluvial fan before discharging into Okanagan Lake. The main tributary to Shorts Creek is Dunwaters Creek. Forestry is the primary land use in the upper watershed, with Fintry Provincial Park located on the alluvial fan at the mouth (OBWB 2016).

Fish species present in Shorts Creek are listed below in Table 2. Because works will occur outside of the RAR setback, risks to fish and aquatic resource values remain low. However, the related mitigation measures presented in Section 5.0 must be adhered to in order to maintain protection of Shorts Creek and associated aquatic resource values.

Table 2. Fish Species found in Shorts Creek (BC MoE, accessed online on February 11, 2020)

Common Name	Scientific Name
Brook Trout	*Salvelinus fontinalis*
Kokanee Salmon	*Oncorhynchus nerka*
Largescale Sucker	*Catostomus macrocheilus*
Longnose Dace	*Rhinichthys cataractae*
Prickly Sculpin	*Cottus asper*
Rainbow Trout	*Oncorhynchus mykiss*
Sculpin (General)	*Cottus cognatus*
Sucker (General)	*Catostomus*

3.4 Riparian Setback

Riparian setback requirements for the subject property are regulated under the Provincial RAR and Rural Westside Official Community Plan (OCP). The Rural Westside OCP entitled Aquatic Ecosystem DP Design Guidelines, Appendix 2, addresses recommended leavestrips/setbacks.

A preliminary setback assessment was conducted on the subject property by Ecoscape in 2016. The purpose of the assessment was to provide an overview of the proposed

developable area based on the RDCO Official Community Plan setback requirements and the environmental constraints at the subject property. The *Local Government Act* allows the RDCO to amend the RAR setback and utilize a bend option where appropriate, which helps facilitate development on constrained lots such as this when development plans that result in no significant impacts are proposed.

Based upon the preliminary setback assessment of the subject property, considerable environmental constraints were noted which would result in limited development potential at the site. Given the restrictions at the subject property, a revised setback was discussed with RDCO resulting in a proposed developable area of 389 m^2 (**Figure 2**). The revisions to the setback were based upon environmental features at the property (i.e., current site condition), RDCO zoning requirements, allowances for septic fields, and allowances for a building site typical of the area. **Figure 3** details the proposed developable area (Building/Septic Envelope), relevant OCP side/rear/front yard setbacks and the septic setback (1.5 m vertical offset from the HWL)

The proposed developable area results in an encroachment into the SPEA of approximately 46 m^2 (**Figure 4**) or 33 m^2 (**Figure 5**), depending on the development option. In order to offset the encroachment into the SPEA, restoration and/or an area to remain undeveloped outside of the SPEA will be required. **Figures 4 and 5** detail the potential area outside of the SPEA to remain undeveloped (24 m^2). The exact area will be amended in conjunction with the Local Government Act at the time of development.

4.0 IMPACT ASSESSMENT

Ecoscape anticipates that, provided mitigation measures are adhered to, impacts on aquatic resource values as a result of the proposed works will be negligible. Without appropriate mitigation measures, proposed works could result in the following impacts:

- There is potential for the release of sediment into Shorts Creek. The release of fine sediments could result in a temporary increase in turbidity and deterioration of water quality. *This will be prevented through the installation of silt fencing or other suitable structure such as a berm, and by timing of works when water levels are lowest.*
- Improper handling and disposal of construction debris could result in the addition of deleterious substances to Shorts Creek and subsequent negative impacts to fish, wildlife, associated habitat, and water quality. *It is recommended that construction debris not be stored within the riparian area at any time.*
- Improper fuel storage and/or poorly maintained equipment used during construction could create spill potential that could negatively impact fish, wildlife,

and associated habitats. *It is recommended that a spill kit be kept on site at all times during construction.*

5.0 MITIGATION MEASURES

Ecoscape provides the following mitigation measures to minimize the risks of impacts during proposed works to fish, wildlife and associated habitats. Best Management Practices (BMPs) have been adapted from BC Ministry of Environment Standards and Best Practices for Instream Works. This document will be made available to the contractor prior to initiating the works and it should be kept onsite during proposed works to demonstrate that the contractor is aware of the recommendations and that they are being followed. The most relevant best management practices that should be adhered to during the proposed works include:

- Standards and Best Management Practices for Instream Works (BC MoWLAP 2004)
- Best Management Practices for Amphibians and Reptiles in Urban and Rural Environments in British Columbia – (BC WLAP 2004)
- Develop with Care Environmental Guidelines for Urban and Rural Land Development (BC MoE 2014)

The appropriate Development Permits and approvals must be obtained from the Regional District of Central Okanagan (RDCO) prior to construction activities within the subject property. The Development Permit must be kept onsite at all times.

Proposed works will result in an overall enhanced riparian condition at the subject property. Ecoscape provides the following mitigation measures to minimize the risks of impacts during proposed works to fish, wildlife and associated habitats. Best Management Practices (BMPs) have been adapted from BC Ministry of Environment Standards and Best Practices for Instream Works (2004). This document will be made available to the contractor prior to initiating the works and it should be kept onsite during debris removal to demonstrate that the contractor is aware of the recommendations and that they are being followed.

5.1 General Recommendations

- The Okanagan Region Provincial Habitat Officer's Terms and Conditions for changes in and about a stream must be adhered to throughout all stages of works (BC MoE 2011).

  https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/working-around-water/terms_and_conditions_okanagan.pdf

- Any instream activities are to be carried out following the provincial Standards and Best Practices for Instream Works (BC MoWLAP 2004).

  https://www2.gov.bc.ca/assets/gov/environment/natural-resource-stewardship/best-management-practices/iswstdsbpsmarch2004.pdf

- No works can occur below the high-water mark of Shorts Creek without having a provincial *Water Sustainability Act* Section 11 Notification or Approval application submitted, approved and in the possession of the property owner and contractor prior to any instream work. A copy of the Section 11 *Water Sustainability Act* Approval must be kept onsite throughout the duration of restoration works.

5.2 Timing Windows

Avian nesting timing windows should be considered to protect nesting birds within and adjacent to the proposed work area. The general nesting period of migratory birds in Canada within Zone A1a and A2 is March 31st to August 15th while peak nesting occurs between April 1 and July 31 (BC MoFLNRORD 2019). It is an offence under the provincial Wildlife Act and federal Migratory Birds Convention Act to harm a bird or its eggs during the nesting period.

The following methods should be implemented in relation to nesting bird work windows.

- If vegetation or tree clearing is planned to occur within the development footprint during peak nesting season (March 31 to August 15), a nesting bird survey should be conducted by a qualified environmental professional (QEP) prior to initiating construction and specifically vegetation removal. This is a key mitigation strategy to avoid harm to nesting individuals or species at risk. It is an offence to harm a bird or its eggs during the nesting period, as per the provincial Wildlife Act and federal Migratory Birds Convention Act.
- If active nests are found within the construction limits, a buffer will be established around the nest until such time that the environmental monitor (EM) can determine that nest has become inactive. The size of the buffer will depend on the species and nature of the surrounding habitat. Buffer sizes will generally follow provincial BMP guidelines or other accepted protocol (e.g., Environment Canada). In general, a minimum 20 m buffer will be established around songbird nests or other non-sensitive (i.e., not at risk) species.
- Clearing and other construction activities must be conducted within 72 hours following the completion of any pre-clearing nest surveys. If works are not conducted in that time, the nest surveys are considered to have expired and a follow-up survey will be completed to ensure that no new nests have been constructed.

- Wherever possible, trees with high wildlife value, such as veteran trees and large snags, must be conserved. Hazardous trees with wildlife value within the vicinity of the construction works should be assessed by a certified wildlife/danger trees assessor to determine levels of risk.

The least-risk work timing windows for fish are as follows:

- Rainbow Trout – Jul 22 - Oct 31
- Kokanee – Jun 1 - Aug 31
- General window for Shorts Creek – Aug 7 - Aug 26

No work for the proposed development within the subject property has been proposed below the highwater mark of Shorts Creek or any other watercourse, therefore the fisheries timing windows do not apply to the project.

5.3 Clearing and Grubbing

The clearing and grubbing limits should be minimized wherever possible and unnecessary impacts to native vegetation and soils should be avoided.

- Disturbance beyond the identified development footprint must not occur without further assessment.
- In the event that land and/or natural vegetation is disturbed or damaged beyond the development footprint area, these areas should be restored and/or replanted with plant material indigenous to the area under the direction of the Environmental Monitor.
- Preventing the establishment of non-native and invasive weeds can be achieved by limiting disturbance to soils and native vegetation where possible. Areas that have previously been disturbed should be restored with native plantings or grass seeding. Infestation areas should be controlled with regular manual removal of weeds (e.g., mowing, pulling).
- Whenever possible, equipment/machinery used must not be operated or stored within the drip line of trees and equipment and must not come into contact with trees outside of the marked limits of disturbance, which could result in physical damage to the bark or limbs.

5.4 Spill Management and Deleterious Substances

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. The following BMPs are adapted from the Standards and Best Practices for Instream Works (BC MWLAP, 2004).

- Preventative measures the contractor will undertake to prevent spills from occurring include safe containment, labelling, and storage of all deleterious substances present onsite, securing stored hazardous or toxic materials to prevent vandalism or theft, disposing of used containers properly, and using appropriate personal protective equipment when handling, transporting, or disposing of hazardous or toxic substances.
- The contractor will ensure that all equipment is inspected daily for fluid/fuel leaks and maintained in good working order.
- Standalone fuel tanks, generators, and other potential spill sources will be surrounded by a secondary containment designed to hold back 110% of the volume of the container materials.
- Hydraulic fluid used in any machinery adjacent to Shorts Creek must be a biodegradable hydraulic fluid to minimize environmental impact in the event of a leak or spill.
- Onsite machinery must be in good operating condition, clean and free of leaks, excess oil, and grease. Equipment used must be pressure washed off-site, prior to construction works, to remove surface oil and grease.
- All spill events will be recorded and reported to the site supervisor and EM. In the event of a spill, the site supervisor will be immediately notified by workers onsite. The supervisor will then be responsible for contacting a mechanic (if necessary), the Project Manager and EM.
- Any spill will be reported immediately to the Project Manager and the EM. In the event of any fluid spills or leak exceeding 5 L or any spill quantity in or near water, the Spill Response Plan must be followed including immediate containment, cleanup/mitigation, and immediate reporting to the EM.
- Spills shall be contained, absorbed, and disposed of in accordance with the regulations outlined in the Environmental Management Act and using the following general steps:
    - Assess, monitor and prevent the hazard or threat
    - Stabilize, contain, remove and clean up the hazard or threat
    - Evacuate persons
    - Recover and rehabilitate wildlife
    - Restore wildlife habitat

  - Take other steps to address the long-term impacts resulting from the spill
  - Report the spill event (within 48 hours)
- Copies of contact phone numbers for notification of all of the required authorities in the event of a spill/emergency response will be posted and clearly visible at the site.
- Spill containment kits will be kept in machines operating onsite or readily available during construction activities in case of the accidental release of a deleterious substance to the environment. Kits will generally include absorbent pads and/or socks, pillows, disposal bags, disposable gloves, and goggles.
- Any spills of a toxic substance or a reportable quantity shall be immediately reported to the Provincial Emergency Program 24-hour hotline at 1-800-663-3456 and the EM.
- In areas where contaminated sites are identified during construction activities, they will be managed for human and ecological health risks. This may include collecting soil samples to submit to a lab, additional excavations to attempt delineation and consultation with contaminated sites risk management specialists.
- Soil from known contaminated sites will be characterized prior to removal and then sent for disposal to an appropriate waste management facility.

5.5 Erosion and Sediment Control

This section addresses minimizing the potential for the introduction of deleterious substances to Okanagan Lake and the SPEA. The following recommendations must be adhered to throughout all stages of design, demolition, and construction:

- The release of fine sediments, concrete-laden water or other substances deleterious to the environment (e.g., gasoline, construction debris) must be prevented at all times.
- Silt fencing or other suitable temporary mitigation features such as berms must be installed between the proposed works/soil disturbance and adjacent sensitive areas to mitigate the risks to terrestrial and aquatic resources associated with runoff and sediment transport. It is recommended that the erosion and sediment control measures be installed immediately adjacent the building footprint. Brightly coloured snow fencing must be installed immediately adjacent the development footprint as well.
- If silt fencing is used, it must be staked into the ground and trenched a minimum of 15 centimeters to prevent movement of material underneath the fence and must remain taut to prevent material from moving over the fence. Silt fencing must contain sufficient storage capacity to collect runoff and sediment deposition during

storm events. If a berm is used, it must be elevated enough to capture water/sediment runoff (at least 30 cm/1 foot or more depending upon soil permeability and site conditions). Ongoing monitoring and maintenance of the mitigation features (silt fence/berm) must occur on a regular basis to ensure adequate function.

- Demolition debris and any fill material must not be stored or deposited within the SPEA. Material not required for backfill must be transported offsite.
- All construction debris must be kept outside of the SPEA and must be removed from the property on a regular basis.
- Spill containment kits appropriate for the number of machines onsite must be kept readily available in case of the accidental release of a deleterious substance to the environment. Any spills of a deleterious substance of reportable quantities must be immediately reported to Emergency Management BC's 24 hour hotline at 1-800-663-3456 and the RDCO.
- Concrete will be used with house construction. Sediments, debris, concrete, concrete fines, or wash water associated with pouring of the concrete must not come into contact with Okanagan Lake or be discharged within 30 m of the HWL. The concrete cast in place must remain inside sealed formed structures until cured.
- Equipment and tools used for concrete works must be washed offsite away from any watercourses. Concrete waste water must not be washed into any watercourse or the storm water system (i.e. must not be poured in a location that drains into municipal catch basins and subsequently into watercourses).
- Stormwater management onsite will need to be designed to allow a slow rate of infiltration and avoid the potential for surface runoff and erosion of soils downslope.

5.6 Air Quality, Noise, and Vibration

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

- Exposed soils will be watered as required to suppress dust. Sediment-laden runoff must not be conveyed to adjacent watercourses or surface water drainages. Oil and other petroleum products will not be used for dust suppression. Alternative dust suppressants will be approved by the EM prior to application.
- All road surfaces must be kept clean and free of fine materials (i.e., swept or scraped) regularly to prevent the increase of airborne particulate matter.

- Idle time of construction equipment and contractor vehicles must be kept to a minimum to reduce the release of greenhouse gases. The contractor will inform and educate employees and sub-contractors on the importance of minimizing idling time and develop guidelines to direct the practice of reducing unnecessary idling. In general, contractor vehicles and equipment will be turned off when not in use.

- Works will generally be permitted from 7:00AM to 7:00PM, Monday to Saturday.

Vibration caused by jackhammers or other heavy equipment used for the proposed works have the potential to cause serious harm to fish. Damage to fish organs, fish eggs or larvae may result if appropriate mitigation measures are not implemented. The recommendations provided are most pertinent to works occurring during spawning periods in Okanagan Lake, but should be considered for works occurring at any time. Recommendation to mitigate harm to fish and fish habitat include:

- Fisheries and Oceans Canada Guidelines for use of Explosives In or Near Canadian Waters http://www.dfo-mpo.gc.ca/Library/232046.pdf should be adhered to at all times, specifically where the noise and vibration levels from use of impact hammers has the potential to exceed guidelines.

5.7 Invasive Plant Management

The principles of a noxious weed management plan are provided below. The intent of the weed management plan will be to reduce the potential to spread noxious weeds within or beyond the subject property. The basic principles include: suppression of weed growth; prevention or suppression of weed seed production; reduction of weed seed reserves in the soil; and prevention or reduction of weed spread.

- Preventing the spread of non-native and invasive plant species can be achieved by limiting disturbance to soils and native vegetation where possible. Areas that have previously been disturbed must be restored with a combination of native plantings and grass seeding under the direction of the EM. Infestation areas must be controlled with regular manual removal of weeds (e.g., mowing, pulling), which should only occur before they have flowered or gone to seed. The use of herbicide treatments is not recommended.

- If invasive plant species become established, manual weed removal should occur. The use of chemical pesticides/herbicides and fertilizers should be avoided due to proximity to Okanagan Lake.

- Invasive plant species should be disposed of in the 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.

- At a minimum, hydroseed or loose grass seed must be applied to re-vegetate disturbed areas, this must be completed under the direction of the EM. Specifically, disturbed areas associated with the proposed storm water pipeline must be hydroseeded.
- Grass seed must be Canada Agricultural Grade #1 to minimize weed seed counts and a native mix of hydroseed grasses. A suitable grass seed mix is provided below. Alternative mixes must be reviewed and approved by the EM prior to application. The grass seed mixture must not contain native varieties and/or non-native varieties that are known to be noxious or invasive. Fodder species such as clover and alfalfa must not be included in the mixture.
- Timing of grass seeding is critical to optimize success and it is recommended that seeding should occur in late spring between April and June or late summer/early fall in September. over seeding (to obtain adequate coverage and reduce competition by invasive plant species) is required at least twice during the growing season. Seeding should occur once between April and June and once in September. Seeding over multiple years may be required to gain adequate coverage.
- Grass seed should be at sufficient density that no more than 50% of surface soil is visible when rough cut areas are mown to a height of 100 mm.
- Preventing further establishment of invasive plants by applying native grass seed to existing and future disturbed areas is recommended.
- The contractor will ensure that all equipment and vehicles are washed and free of weed seeds prior to mobilization and de-mobilization. Vehicles and equipment should not be stored, parked, or staged within weed infested areas if possible. Contractor clothing and footwear 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.

5.8 Restoration

The proposed development will require a Development Permit through the RDCO. RDCO Development Permits typically require some form of restoration on disturbed lots, and the permits detail restoration requirements to be completed within the SPEA. In this case, there is an area of approximately 158 m^2 that is located outside of the development footprint that could be restored. The following are restoration plantings that are recommended (Table 3), noting that a formal landscape restoration plan has not yet been developed. Any changes or substitutions to the recommended plantings must be review by Ecoscape prior to implementation.

Table 3. Riparian Restoration Plantings			
Common Name	**Scientific Name**	**Size**	**Quantity**
TREES			
Pacific willow	*Salix lucida ssp lasiandra*	1-2 gal	
Trembling aspen	*Populus tremuloides*	1-2 gal	
Interior Douglas-fir	*Pseudotsuga menziesii var. glauca*	1-2 gal	
Paper birch	*Betula papyrifera*	1-2 gal	
Black cottonwood	*Populus balsamifera ssp. trichocarpa*	1-2 gal	
Subtotal			10
SHRUBS			
Red-osier dogwood	*Cornus sericea*	1 gal	
Sandbar willow	*Salix exigua*	1 gal	
Saskatoon	*Amelanchier alnifolia*	1 gal	
Common snowberry	*Symphoricarpos albus*	1 gal	
Tall Oregon-grape	*Mahonia aquifolium*	1 gal	
Douglas maple	*Acer glabrum*	1 gal	
Subtotal			46
Total			**56**

- Planted species must be native to the Okanagan and suited to site conditions.
- Planting must occur in spring or fall 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 under the direction of the 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.
- Plant spacing is generally recommended at 1 to 1.5 m on center for shrubs and up to 3 m on center for trees. However, on fill slopes, planting of shrubs will be within planting pockets with shrubs located closer than 1 m.

- 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.
- A target of 80% plant survival is recommended after three (3) years. If the total number of plants drops below 80% of the original number planted, fill/replacement planting will be required.
- The contractor completing the restoration works should inspect plants monthly during the growing season, replacing any dead or diseased plants.
- Silt fencing and other temporary mitigation features must be removed upon substantial completion of works if the risk of surface erosion and sediment transport has been adequately mitigated with other permanent measures. This will be under the guidance of the EM.
- Specific locations of planting areas will be determined at the time of restoration through consultation with the Environmental Monitor (EM) in a field fit manner
- Grass seed should be Canada Agricultural Grade #1 to minimize weed seed counts. The recommended grass seed mix is provided in Table 4. The EM should review the grass seed composition prior to broadcast.

Table 4. Recommended Grass Seed Mix for Riparian Areas

Suitable Location	Common Name	Scientific Name
Riparian Environments	Bluejoint Reedgrass	*Calamagrostis canadensis*
	Tufted Hairgrass	*Deschampsia cespitosa*
	Alkaligrass	*Puccinellia nuttalliana*
	Prairie Cordgrass	*Spartina pectinata*
	Beaked Sedge	*Carex rostrata*
	Green Sedge	*Carex viridula*
	Canada Goldenrod	*Solidago canadensis*
	Baneberry	*Actaea rubra*
	Fireweed	*Epilobium angustifolium*
	Red Fescue	*Festuca rubra*

Meadow Barley	*Hordeum brachyantherum*
Dagger Leaf Rush	*Juncus ensifolius*
Common Spikerush	*Eleocharis macrostachya*

6.0 ENVIRONMENTAL MONITORING

It is recommended that a suitably qualified environmental monitor (EM) be retained during construction to document compliance with mitigation measures and provide guidance for implementation of best practices. If greater disturbance occurs due to unforeseen circumstances, the EM will recommend further measures to protect/restore the natural integrity of the site. The EM must be notified a minimum of 48 hours prior to initiation of construction works to schedule a pre-construction site visit.

- A pre-construction meeting must 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. At this time, the location of erosion and sediment control measures will be reviewed.
- The EM will be an appropriately Qualified Environmental Professional (QEP) who will halt construction activities should an incident arise that causes undue harm (unforeseen or from lack of due care) to terrestrial, aquatic or riparian resource values.
- Environmental monitoring is typically conducted on a minimum monthly basis for the duration of the construction works. However, this will be dependent on the nature of the works occurring, construction schedule, and RDCO requirements.
- Summary monitoring reports are recommended on a regular basis (i.e., monthly) to be submitted to the client and appropriate contractors. A final report will be submitted upon substantial completion of construction and restoration works.
- If monitoring and restoration works are planned, it is recommended that follow-up monitoring of restoration works take place 1, 2, and 3 years post-completion to document 80% survival of installed plant material, establishment of grass seed, and successful invasive plant control/management. Ongoing maintenance and replanting may be recommended as required, with reports provided to the client and appropriate contractors.

7.0 PERFORMANCE BONDING

Performance bonding is typically 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 restoration works and monitoring 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 restoration works has been achieved.

A cost estimate has been prepared to address the RDCO performance bonding requirements. Ecoscape estimates that the total cost for planting and associated environmental monitoring of restoration will be approximately $2,696, not including GST (Table 5). The bonding is estimated to be **$3,370.**

Table 5. Cost estimate for restoration works and environmental monitoring of restoration

Item	Quantity	Unit	Cost of materials	Cost installed
Native plantings (56 plants based on $12/plant)	56	1 gallon	$672	$2,196
Substantial completion environmental monitoring (based on 1 site visit and 1 report)				$500
		Subtotal		$2,696
		125% Bond		$3,370

Please note that this is a general estimate based on sourcing of materials and labour separately and based on communication with local landscapers/plant suppliers. This is only a basic estimate provided to estimate the required bonding and should not be used for development costing. A quote from a landscape/reclamation company which will handle most components of the works may prove to be more accurate. If a separate quote is prepared, it must be reviewed by Ecoscape prior to implementation.

8.0 CLOSURE

This Environmental Assessment has been prepared for the exclusive use of Timothy Robinson, for proposed works located at 7379 Fintry Delta Road, West Kelowna, BC. Ecoscape has prepared this EA with the understanding that all available information on the proposed works have been disclosed. Timothy Robinson has acknowledged that in order for Ecoscape to properly provide the professional service, Ecoscape is relying upon full disclosure and accuracy of this informations.

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

Respectfully Submitted,
ECOSCAPE Environmental Consultants Ltd.

Prepared by:

Theresa Loewen, B.Sc., P.Ag.
Environmental Scientist
Direct Line: (250) 491-7337 ext. 217

Reviewed by:

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

Attachments: Photos
Figure 1. Site Location
Figure 2. Riparian Areas Regulation Assessment
Figure 3. Septic Setback and Elevation Points
Figure 4. Buildable Area with Reduced Overhangs
Figure 5. Buildable Area with Reduced Workshop
Appendix A: 2016 Preliminary Setback Assessment
Appendix B: Floodplain Development Recommendations by Dobson Engineering Ltd.

9.0 REFERENCES

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PHOTOS

Photo 1: Looking northwest towards the flood protection works undertaken upstream of the subject property (all photos taken November 30, 2016).

Photo 2: View looking north of flood protection works completed upstream of the subject property.

Photo 3: View looking north of the Shorts Creek floodplain area located immediately below the subject property.

Photo 4: View looking northwest of the subject property.

FIGURES

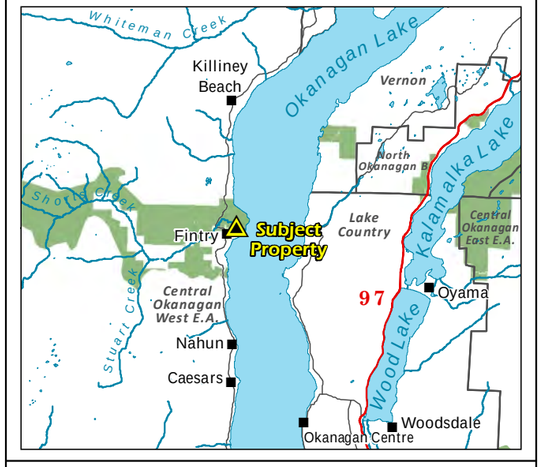
FIGURE 1
Site Location

Project:	Environmental Assessment
Location:	Regional District of Central Okanagan
Project No.:	19-3044
Prepared for:	Timothy Robinson
Prepared by:	Ecoscape Environmental Consultants Ltd. Carmen Chelick, GIS Technologist
Coordinate System:	NAD83-UTM Zone 11
Imagery:	ESRI World Imagery
Map Date:	February 13, 2020

LEGEND

- Regional Location of Subject Property
- Places
- Subject Property
- Cadastre
- Municipal Boundary
- Lakes
- Parks and Protected Lands
- Okanagan Wetlands
- BC Conservation Data Centre Polygons
- Critical Habitat for Species-at-Risk
- Highway
- Major Roads
- Streams
- WSI Incidental Observation
- WSI Survey Observation

Regional Location of Subject Property



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ECOSCAPE Environmental Consultants Ltd.

FIGURE 2

Riparian Areas Regulation Assesment

Project:	Environmental Assessment
Location:	Regional District of Central Okanagan
Project No.:	19-3044
Prepared for:	Timothy Robinson
Prepared by:	Ecoscape Environmental Consultants Ltd. Carmen Chelick, GIS Technologist
Coordinate System:	NAD83-UTM Zone 11
Imagery:	ESRI World Imagery
Map Date:	February 13, 2020

LEGEND

- Subject Property
- Legal (Cadastre)
- OCP Front/Side/Rear Setbacks
- Streams
- Surveyed High Water Level
- 10 Metre Offset from High Water Level
- 30 Metre Riparian Assessment Regulation Area
- Zone of Sensitivity - Large Woody Debris (30 meters)
- Zone of Sensitivity - Litterfall (15 meters)
- Zone of Sensitivity - Shade (30 meters due south)
- Streamside Protection and Enhancement Area (SPEA)
- Building/Septic Envelope
- Encroachment into SPEA

DISCLAIMER
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N

Lot 88

Riparian Assessment Regulation Area (30 m)

Zone of Sensitivity - Litterfall and Insect Drop (15m)

Lot 87

Shorts Creek Surveyed High Water Level

Shorts Creek

10 m Setback from High Water Level

Fintry Delta Road

Streamside Protection and Enhancement Area (SPEA)

Encroachment into SPEA (57 m²)

Lot 86

Lot 4

Building Envelope (389 m²)

Subject Property

Zone of Sensitivity - Large Woody Debris (30 m)

Zone of Sensitivity - Shade (30m due South)

Lot 5

Lot 85

Lot 6

Lot 84

0 2.5 5 10 15 20 25

Meters

321240 321245 321250 321255 321260 321265 321270 321275 321280 321285 321290 321295 321300 321305 321310 321315 321320 321325 321330

5556610 5556605 5556600 5556595 5556590 5556585 5556580 5556575 5556570 5556565 5556560 5556555 5556550 5556545 5556540 5556535

FIGURE 3

Septic Setback and Elevation Points

Project:	Environmental Assessment
Location:	Regional District of Central Okanagan
Project No.:	19-3044
Prepared for:	Timothy Robinson
Prepared by:	Ecoscape Environmental Consultants Ltd. Carmen Chelick, GIS Technologist
Coordinate System:	NAD83-UTM Zone 11
Imagery:	ESRI World Imagery
Map Date:	February 13, 2020

LEGEND

- Subject Property
- Legal (Cadastre)
- Surveyed High Water Level
- Septic Setback (1.5m Vertical Offset from High Water Level)
- Streams

DISCLAIMER
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ECOSCAPE Environmental Consultants Ltd.

Shorts Creek

Shorts Creek Surveyed High Water Level

Septic Setback (1.5m Vertical Offset from High Water Level)

Subject Property

FINTRY DELTA ROAD

LOT 88

LOT 87

LOT 86

LOT 85

LOT 6

LOT 5

LOT 4

LOT 3

N

0 2.5 5 10 15 20 25

Meters

321240 321250 321260 321270 321280 321290 321300 321310 321320 321330 321340

5556630 5556620 5556610 5556600 5556590 5556580 5556570 5556560 5556550

FIGURE 4

Buildable Area with Reduced Overhangs

Project:	Environmental Assessment
Location:	Regional District of Central Okanagan
Project No.:	19-3044
Prepared for:	Timothy Robinson
Prepared by:	Ecoscape Environmental Consultants Ltd. Carmen Chelick, GIS Technologist
Coordinate System:	NAD83-UTM Zone 11
Imagery:	ESRI World Imagery
Map Date:	February 13, 2020

LEGEND

- Subject Property
- Legal (Cadastre)
- OCP Front/Side/Rear Setbacks
- Streams
- Surveyed High Water Level
- 10 Metre Offset from High Water Level
- 30 Metre Riparian Assessment Regulation Area
- Zone of Sensitivity - Large Woody Debris (30 meters)
- Zone of Sensitivity - Litterfall (15 meters)
- Zone of Sensitivity - Shade (30 meters due south)
- Streamside Protection and Enhancement Area (SPEA)
- Proposed Works
- Proposed Building Overhang
- Encroachment Area
- Flex Area

DISCLAIMER
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ECOSCAPE Environmental Consultants Ltd.

N

Lot 88
Riparian Assessment Regulation Area (30 m)
Zone of Sensitivity - Litterfall and Insect Drop (15m)
Lot 87
Shorts Creek Surveyed High Water Level
Shorts Creek
Streamside Protection and Enhancement Area (SPEA)
10 m Setback from High Water Level
FINTRY DELTA ROAD
Encroachment Area (46 m²)
Lot 86
Lot 4
Subject Property
Lot 5
Proposed Works
Flex Area (24 m²)
Zone of Sensitivity - Large Woody Debris (30 m)
Zone of Sensitivity - Shade (30m due South)
Lot 85
Lot 6
Lot 84

0 2.5 5 10 15 20 25
Meters

321240 321245 321250 321255 321260 321265 321270 321275 321280 321285 321290 321295 321300 321305 321310 321315 321320 321325 321330

5556610 5556605 5556600 5556595 5556590 5556585 5556580 5556575 5556570 5556565 5556560 5556555 5556550 5556545 5556540 5556535

FIGURE 5

Buildable Area with Reduced Workshop

Project:	Environmental Assessment
Location:	Regional District of Central Okanagan
Project No.:	19-3044
Prepared for:	Timothy Robinson
Prepared by:	Ecoscape Environmental Consultants Ltd. Carmen Chelick, GIS Technologist
Coordinate System:	NAD83-UTM Zone 11
Imagery:	ESRI World Imagery
Map Date:	February 13, 2020

LEGEND

- Subject Property
- Legal (Cadastre)
- OCP Front/Side/Rear Setbacks
- Streams
- Surveyed High Water Level
- 10 Metre Offset from High Water Level
- 30 Metre Riparian Assessment Regulation Area
- Zone of Sensitivity - Large Woody Debris (30 meters)
- Zone of Sensitivity - Litterfall (15 meters)
- Zone of Sensitivity - Shade (30 meters due south)
- Streamside Protection and Enhancement Area (SPEA)
- Proposed Works
- Proposed Building Overhang
- Encroachment Area
- Flex Area

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ECOSCAPE Environmental Consultants Ltd.

N

Lot 88
Riparian Assessment Regulation Area (30 m)
Zone of Sensitivity - Litterfall and Insect Drop (15m)
Lot 87
Shorts Creek Surveyed High Water Level
Shorts Creek
10 m Setback from High Water Level
Fintry Delta Road
Streamside Protection and Enhancement Area (SPEA)
Encroachment Area (33 m²)
Lot 86
Lot 4
Subject Property
Lot 5
Proposed Works
Flex Area (24 m²)
Zone of Sensitivity - Large Woody Debris (30 m)
Lot 85
Zone of Sensitivity - Shade (30m due South)
Lot 6
Lot 84

0 2.5 5 10 15 20 25
Meters

321240 321245 321250 321255 321260 321265 321270 321275 321280 321285 321290 321295 321300 321305 321310 321315 321320 321325 321330

5556610 5556605 5556600 5556595 5556590 5556585 5556580 5556575 5556570 5556565 5556560 5556555 5556550 5556545 5556540 5556535

APPENDIX A

2016 Preliminary Setback Assessment

July 25, 2016 Project No: 15-1504.02

Rob MacPherson
Via Email: rtmacpherson@shaw.ca

Subject: Preliminary Setback Assessment

Ecoscape Environmental Consultants Ltd. (Ecoscape) has been retained by Rob MacPherson to conduct a preliminary assessment of potential environmental considerations for a property in Fintry, BC. The subject property is legally described as at Lot 86, Plan KAP 15329, Regional District of Central Okanagan (RDCO) and is adjacent to Shorts Creek. It is understood that the property owner is looking to sell the subject property, however, at this stage no specific development plan has been prepared and submission to the Riparian Areas Regulation (RAR) notification system will not occur at this time. A preliminary setback assessment has been prepared that will remain on the property file to be utilized when and if future development occurs, allowing the owner to sell the property with a known developable area. The purpose of the current assessment is to provide an overview of the proposed developable area based on the RDCO Official Community Plan setback requirements and the environmental constraints at the subject property. The *Local Government Act* allows the RDCO to amend the RAR setback and utilize a bend option where appropriate, which helps facilitate development on constrained lots such as this when development plans that result in no significant impacts are proposed.

Shorts Creek (Watershed Code 310-905500), is located to the east of the subject property. Fish species documented within Shorts Creek include rainbow trout (*Oncoryynchus mykiss*), brook trout (*Salvelinus fontinalis*), longnose dace (*Rhinichthys cataractae*), prickly sculpin (*Cottus asper*), largescale sucker (*Catostomus macrocheilus*) and kokanee (*Oncorhynchus nerka)* (BC MFLNRO, 2016, Webster, 2015). Shorts Creek is typically dry during the spawning season, however, kokanee were observed in the most recent enumeration of stream spawning kokanee completed in 2014 (Webster, 2015). The subject property is largely void of vegetation and consists of grasses, a few low shrubs and some invasive species. It is considered that the subject property currently has low ecological value. The subject property has a high potential for Riparian restoration. Riparian plantings have previously been undertaken along the creek in association with the flood mitigation works.

It is understood that flood protection/mitigation works have occurred upstream of the subject property along Shorts Creek (Photos 1 and 2). As a result of this past flooding and mitigation work the high water level (HWL) of Shorts Creek was altered to address erosion and flooding concerns adjacent to the subject property. Ecoscape completed a site visit in November 2015

to survey the HWL of Shorts Creek. The location of the HWL is detailed on Figure 1, attached. Figure 1 also details the Riparian Areas Regulation Assessment for the subject property. Riparian setbacks are based on Zones of Sensitivity (ZOS) for the following three different factors:

- Litter fall and insect drop (15 metres);
- Large woody debris, bank, and channel stability (30 metres); and
- Shade (30 metres due south).

The SPEA is then determined from the ZOS with the greatest setback area. The provincial RAR results in a 30 m setback from the HWL of Shorts Creek at the subject property due to the width of the stream. It is acknowledged that the alterations to the stream channel, coupled with erosion have increased the width of the creek, and subsequently affected the RAR setbacks (i.e., they have been increased), which has put an increased constraint on the subject property. Figure 1 illustrates the various setbacks from the creek and the resultant SPEA at the subject property.

Based upon the preliminary setback assessment of the subject property, considerable environmental constraints were noted which would result in limited development potential at the site. Due to flooding/mitigation works the course of Shorts Creek has been altered resulting in a HWL that is closer to the subject property (Photo 3). It is considered that overtime the course of Shorts Creek may naturally change which could result in a reduction in the setback associated with the subject property as the stream naturalizes and returns to a more natural stream channel character. However, this cannot be confirmed without additional hydrogeological review and this could take several years to occur. Given the restrictions at the subject property, a revised setback was discussed with RDCO resulting in a proposed developable area of 389 m^2. The revisions to the setback were based upon environmental features at the property (i.e., current site condition), RDCO zoning requirements, allowances for septic fields, and allowances for a building site typical of the area. Figure 1 details the proposed developable area (Building/Septic Envelope), relevant OCP side/rear/front yard setbacks and the septic setback (1.5 m vertical offset from the HWL). The photos provide documentation of the current condition of the subject property. This results in a setback of between 22-30 m from the current surveyed HWL of Shorts Creek. The proposed developable area results in an encroachment into the SPEA of approximately 57 m^2. In order to offset the encroachment into the SPEA, restoration and/or an area to remain undeveloped outside of the SPEA will be required. Figure 1 details the potential area outside of the SPEA to remain undeveloped (28 m^2), the exact area will be amended in conjunction with the *Local Government Act* at the time of development.

There is currently no development proposed at the subject property. However, when development is planned it is understood that a Development Permit will be required through the RDCO. RDCO Development Permits typically require some form of restoration on disturbed lot, and the permits detail restoration requirements to be completed within the SPEA. In this case, there is an area of ~158 m^2 that is located outside of the development footprint that could be restored. The following are restoration plantings that are

recommended (Table 1), noting that a formal landscape restoration plan has not been developed because the details of planting locations would need to be developed in conjunction with the future land owners. Any changes or substitutions to the recommended plantings must be review by Ecoscape prior to implementation.

Table 1. Riparian Restoration Plantings

Common Name	Scientific Name	Size	Quantity
TREES			
Pacific willow	*Salix lucida ssp lasiandra*	1-2 gal	
Trembling aspen	*Populus tremuloides*	1-2 gal	
Interior Douglas-fir	*Pseudotsuga menziesii var. glauca*	1-2 gal	
Paper birch	*Betula papyrifera*	1-2 gal	
Black cottonwood	*Populus balsamifera ssp. trichocarpa*	1-2 gal	
		Subtotal	10
SHRUBS			
Red-osier dogwood	*Cornus sericea*	1 gal	
Sandbar willow	*Salix exigua*	1 gal	
Saskatoon	*Amelanchier alnifolia*	1 gal	
Common snowberry	*Symphoricarpos albus*	1 gal	
Tall Oregon-grape	*Mahonia aquifolium*	1 gal	
Douglas maple	*Acer glabrum*	1 gal	
		Subtotal	46
		Total	**56**

This letter has been prepared for the exclusive use of Mr. Rob MacPherson. Ecoscape has prepared this letter with the understanding that all available information on the present and proposed condition of the site has been disclosed. Mr. MacPherson has acknowledged that in order for Ecoscape to properly provide the 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:

KBlack

Katrina Black, B.Sc., B.I.T.
Natural Resource Biologist
Direct Line: (250) 491-7337 ext.215

Reviewed by:

COLLEGE OF APPLIED BIOLOGY Jason L. Schleppe #1795 CAB

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

Attachments: Figure 1.
Photos

References:

British Columbia Ministry of Forests, Lands and Natural Resource Operations (BC MFLNRO). 2016. Fisheries Inventory Data Queries. Available Online: http://a100.gov.bc.ca/pub/fidq/fissSpeciesSelect.do Accessed online: July 19, 2016.

Webster, J. 2015. Enumeration and Biological Sampling of Stream Spawning Kokanee from the Okanagan Basin's Main Lakes, 2014. Prepared by Chara Consulting for the Ministry of Forests Lands and Natural Resource Operations.

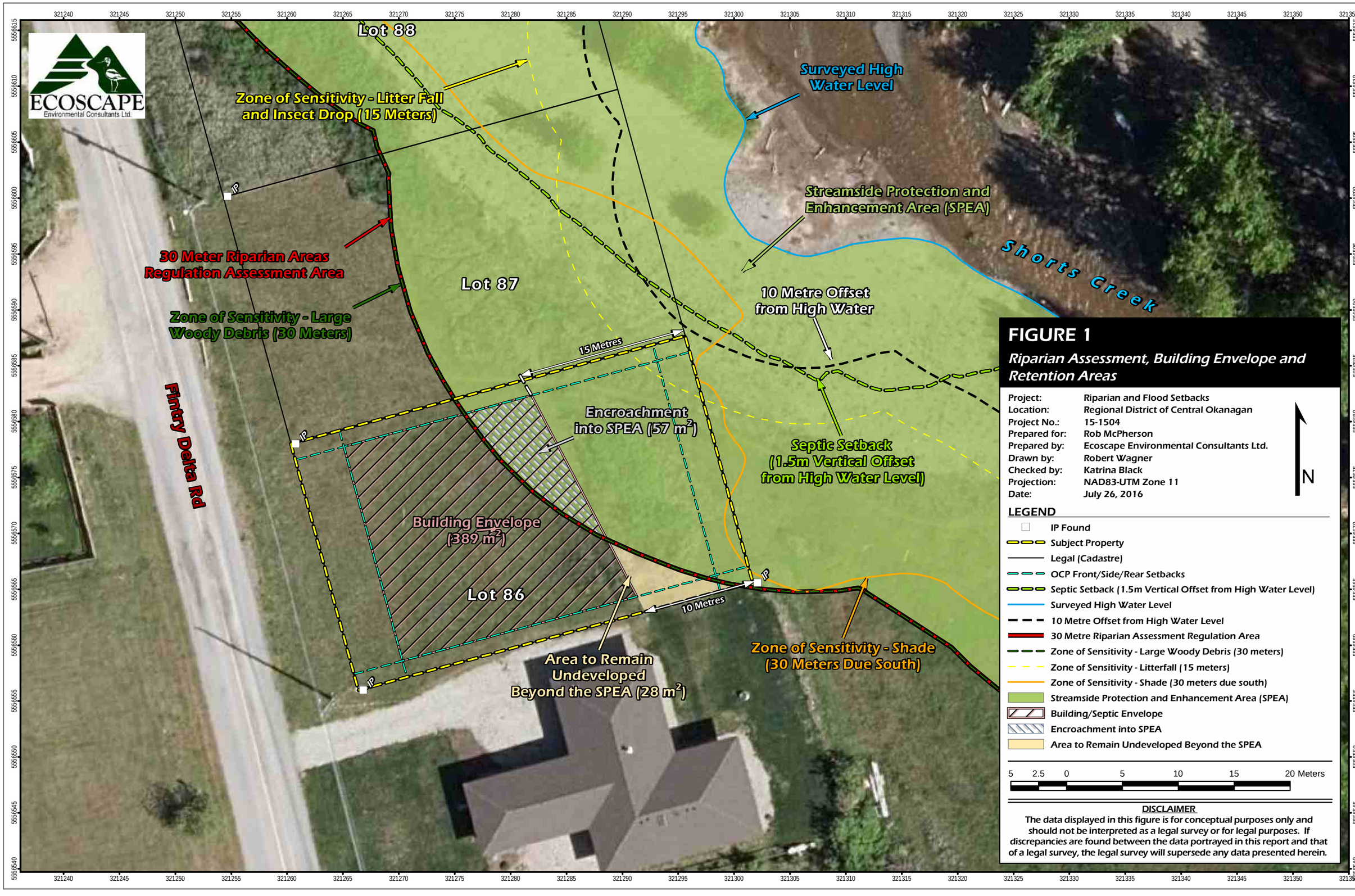
Photo 1: Looking northwest towards the flood protection works undertaken upstream of the subject property (all photos taken November 30, 2016).

Photo 2: View looking north of flood protection works completed upstream of the subject property.

Photo 3: View looking north of the Shorts Creek floodplain area located immediately below the subject property.

Photo 4: View looking northwest of the subject property.

FIGURE



ECOSCAPE
Environmental Consultants Ltd.

FIGURE 1

Riparian Assessment, Building Envelope and Retention Areas

Project:	Riparian and Flood Setbacks
Location:	Regional District of Central Okanagan
Project No.:	15-1504
Prepared for:	Rob McPherson
Prepared by:	Ecoscape Environmental Consultants Ltd.
Drawn by:	Robert Wagner
Checked by:	Katrina Black
Projection:	NAD83-UTM Zone 11
Date:	July 26, 2016

N

LEGEND

- IP Found
- Subject Property
- Legal (Cadastre)
- OCP Front/Side/Rear Setbacks
- Septic Setback (1.5m Vertical Offset from High Water Level)
- Surveyed High Water Level
- 10 Metre Offset from High Water Level
- 30 Metre Riparian Assessment Regulation Area
- Zone of Sensitivity - Large Woody Debris (30 meters)
- Zone of Sensitivity - Litterfall (15 meters)
- Zone of Sensitivity - Shade (30 meters due south)
- Streamside Protection and Enhancement Area (SPEA)
- Building/Septic Envelope
- Encroachment into SPEA
- Area to Remain Undeveloped Beyond the SPEA

5 2.5 0 5 10 15 20 Meters

DISCLAIMER

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

APPENDIX B

Floodplain Development Recommendations by Dobson Engineering Ltd.

Project: 19047

February 3, 2020

Mr. Tim Robinson
2860 Lakeview Road
West Kelowna, BC V1Z 1Y4

Re: 7379 Fintry Delta Road – Floodplain Development Recommendations for Proposed new Residential Structure

This report has been prepared to address the requirements set out in the Regional District of Central Okanagan Zoning Bylaw no. 871 with regards to the proposed construction of a new residential dwelling at 7379 Fintry Delta Road (Figure 1). This property is adjacent to Shorts Creek. This report addresses the recommended minimum set back of the dwelling from the creek and flood construction level.

1. Zoning Bylaw #871 Floodplain Regulations

The sections of the floodplain regulation 3.28, that apply are:

1. *The underside of any floor system, or the top of any pad supporting any space or room, including a manufactured home, that is used for dwelling purposes, business, or the storage of goods, which are susceptible to damage by floodwater must be above the applicable flood construction level specified herein.*
    - *1.1 The following elevations are specified as flood construction levels, except that where more than one flood construction level is applicable, the higher elevation shall be the flood construction level:*
        - *1.1.3 1.5 metres (4.9 ft) above the natural boundary of any other watercourse.*
    - *1.2 The specified flood construction levels shall not apply to:*
    - *1.2.1 That portion of a building or structure used exclusively as a carport, garage or entrance foyer;*
    - *1.2.3 Hot water tanks and furnaces behind standard dykes;*

    Except that all main electrical switchgear for any of the uses listed above shall be no lower than the flood construction level.

2. *Any landfill required to support a floor system or pad must not extend within any applicable floodplain setback specified herein:*
    - *2.1 The following distances are specified as floodplain setbacks, except that where than one floodplain setback is applicable, the greater distance shall be the floodplain setback:*
        - *2.1.4 15.0 metres (49.2 ft) from the natural boundary of any other nearby watercourse.*

2. Summary of Floodplain Conditions at 7379 Fintry Delta Road

The property 7379 Fintry Delta Road, shown in Figure 1, is situated on the Fintry Delta fan, adjacent to Shorts Creek. In the late 1990s and early 2000s there was ongoing erosion of the south bank of the creek that impacted lots 7389 and 7385 situated to the north of 7379. As is evident on the image, only the very

north east corner of 7379 was impacted by the erosion. The debris flow risk on the fan is low as there are canyon reaches immediately upstream of the fan apex as well as upstream of the Westside Road. During extreme flow events fluxes in bedload are attenuated by the canyons before reaching the fan. If a debris flow was to reach the apex of the fan, the runout would be to the north of current stream channel, distant from the residential properties south of the creek.

In 2013 the Central Okanagan Regional District was provided funding by Emergency Management BC for the construction of the permanent flood protection works shown in Figure 1. These works permanently shifted the creek away from the south bank, as can be seen in the 2016 imagery used in Figure 1. Since the flood protection works were constructed in 2013 and the creek diverted away from the properties, the formerly eroded areas are no longer at risk and vegetation is growing back. Since the construction of the flood protection works the flood risks to 7379 Fintry Delta Road is rated as low.

3. Other building constraints

In addition to the Floodplain Regulations set out in Bylaw #871 there are also building constraints regarding the siting of the onsite sewerage disposal system and the Riparian Area Regulation. The impacts from these other constraints will be addressed by other professionals and are not considered in this report.

4. Recommendations Flood Construction Level and Floodplain Setback

As summarized in section 2 of this report, the flood protection works have provided permanent flood protection to 7379 Fintry Delta Road. With regards to the applicable Floodplain Regulations summarized in section 2 of this report, the following recommendations are provided for the siting of a dwelling on this lot:

a) Flood construction level – Section 3.28, 1.1, 1.1.3 in Bylaw #871 stipulates a flood construction level of 1.5m above the natural boundary of a watercourse (Shorts Creek). Based on the survey data provided by Ecoscape Environmental Consultants, as shown in Ecoscape Figure 1, the natural ground elevations range from ~350m in the western portion of the lot to ~349.9m in the eastern portion, so basically a flat lot.

    1. The natural boundary as indicated by the highwater mark surveyed by Ecoscape and shown on Figure 1 as would apply to this property has an elevation of ~346.9m (refer to the red X and "NB" shown on Ecoscape Figure 1). Based on this elevation for the natural boundary, the flood construction level would be 346.9+1.5 = 348.4m. However, this elevation is lower than the natural ground elevation of ~350m. The recommended elevation for the underside of any floor system, or the top of any pad supporting any space or room, including a manufactured home, that is used for dwelling purposes, business, or the storage of goods, which are susceptible to damage by floodwater should be no less than 0.4m above the surrounding natural ground level. For 7379 Fintry Delta Road the recommended flood construction level is 350.4m (3.5m above the surveyed natural boundary). The basis for this recommended elevation is to provide protection from any overland flow, not from Shorts Creek but from intense rainstorms that occur frequently during the spring and summer period.

b) Floodplain setback - Section 3.28, 2.1, 2.1.4 in Bylaw #871 stipulates a floodplain setback of 15.0m from the natural boundary of any nearby watercourse (Shorts Creek). Based on the natural boundary noted on Ecoscape Figure 1 and further detailed in Figure 3, the 15m setback crosses close to the northeast corner of the lot. Any dwelling on this property would be situated further away from the required 15m.

5. Summary

When siting a residence on 7379 Fintry Delta Road, it is recommended that a flood construction level of 350.4m be used. This recommended elevation exceeds the minimum elevation of 348.4m based on Bylaw # 871, section 3.28, 1.1, 1.1.3 in order to provide appropriate flood protection to the residence from overland flows that can occur during intense rainstorms. The floodplain setback stipulated in the bylaw, section 3.28, 2.1, 2.1.4 is 15m and a residence would be located beyond this distance from the creek.

It is recommended that the residence be located on the property towards the eastern portion of the lot so that the septic field can be placed as far from Shorts Creek as practical, for environmental reasons. According to the Senior Fisheries Biologist with the Fish and Wildlife Branch in Penticton, Shorts Creek has a unique run of kokanee that needs protection from contamination from septic fields.

6. Recommendations

After receiving approval from the RDCO to proceed wit the final residence design, it is recommended that a copy of this report along with a copy of the Ecoscape Setback Memo be provided to architect designing the residence so that they can incorporate the necessary elections and setbacks into the design plans.

7. Flood Assurance Statement

The professional practice guidelines *Legislated Flood Assessments in a Changing Climate in BC*, prepared by the Engineers and Geoscientists of BC, requires that a Flood Assurance Statement be completed as part of this assessment. A copy of the signed statement is provided in Appendix A.

8. Closure and Limitations

This report has been prepared exclusively for use by Mr. Tim Robinson and the Central Okanagan Regional District. The assessments were carried out in accordance with generally accepted practice. Professional judgment has been applied in the interpretations provided in this report. No other warranty is made, either expressed or implied. Please note that the flood hazard assessment is based on the conditions at the subject property at the time of the assessments. If conditions change, or if observed features are found to be different, please contact the undersigned for a follow up review.

PROFESSIONAL ENGINEER — PROVINCE OF BRITISH COLUMBIA — D. A. DOBSON

C. W. POMEROY # 44733 — PROFESSIONAL ENGINEER

2020-02-03

Prepared by D.A. Dobson, PEng

Reviewed by Caleb Pomeroy, PEng

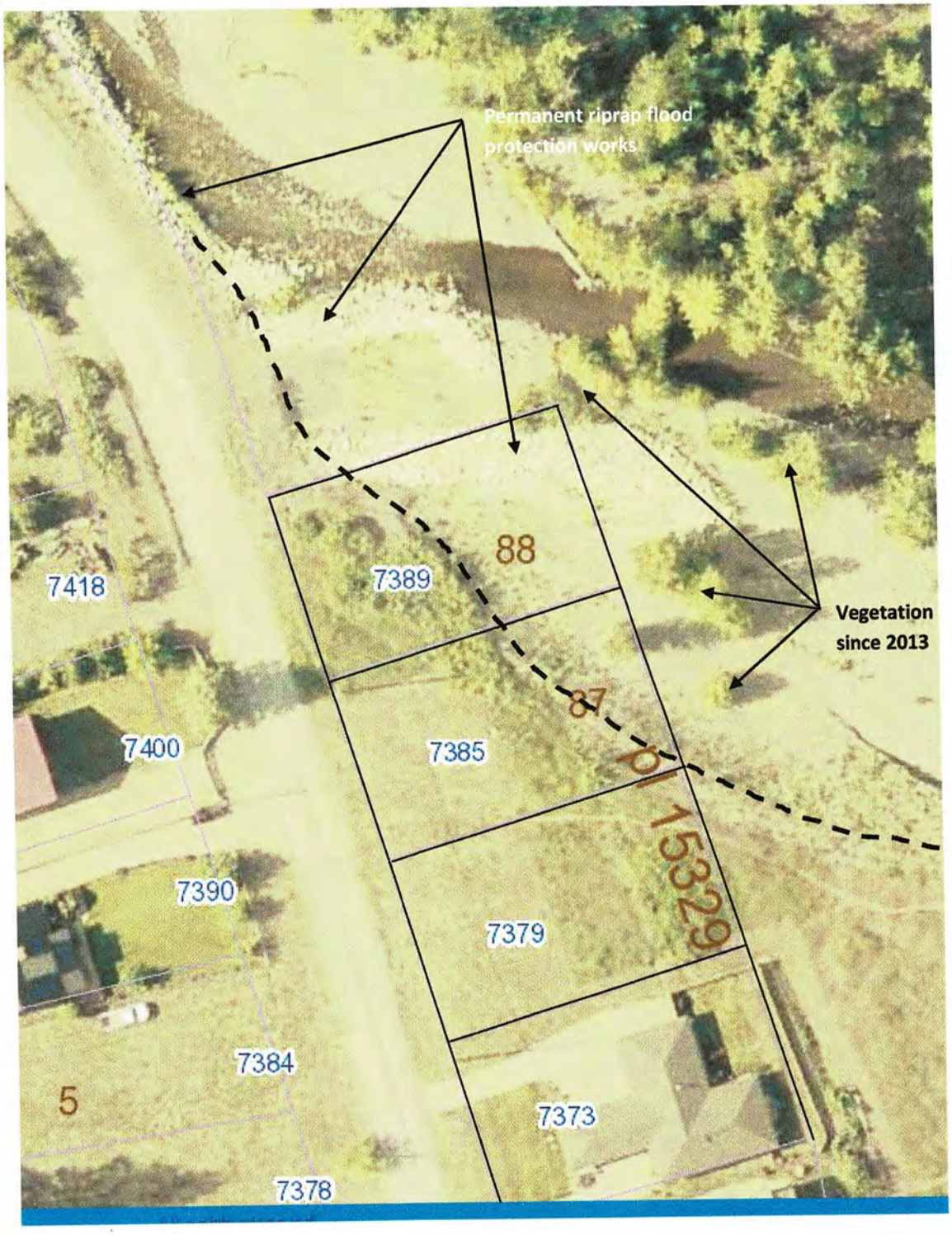


Figure 1 – Subject property 7379 Fintry Delta Road and Shorts Creek

Appendix A

EGBC Flood Guidelines Flood Assurance Statement

FLOOD ASSURANCE STATEMENT

Note: This statement is to be read and completed in conjunction with the current Engineers and Geoscientists BC *Professional Practice Guidelines – Legislated Flood Assessments in a Changing Climate in BC* ("the guidelines") and is to be provided for flood assessments for the purposes of the *Land Title Act*, Community Charter, or the *Local Government Act*. Defined terms are capitalized; see the Defined Terms section of the guidelines for definitions.

To: The Approving Authority Date: January 22, 2020

Regional District of Central Okanagan

Central Okanagan Regional District, 1450 KLO Road, Kelowna, BC V1W 2K8

Jurisdiction and address

With reference to (CHECK ONE):

- ☐ *Land Title Act* (Section 86) – Subdivision Approval
- ☐ *Local Government Act* (Part 14, Division 7) – Development Permit
- ☒ Community Charter (Section 56) – Building Permit
- ☐ *Local Government Act* (Section 524) – Flood Plain Bylaw Variance
- ☐ *Local Government Act* (Section 524) – Flood Plain Bylaw Exemption

For the following property ("the Property"):

Lot 86 Plan KAP15329, DL 686, ODYD aka 7379 Fintry Delta Road, Kelowna, BC

Legal description and civic address of the Property

The undersigned hereby gives assurance that he/she is a Qualified Professional and is a Professional Engineer or Professional Geoscientist who fulfils the education, training, and experience requirements as outlined in the guidelines.

I have signed, sealed, and dated, and thereby certified, the attached Flood Assessment Report on the Property in accordance with the guidelines. That report and this statement must be read in conjunction with each other. In preparing that Flood Assessment Report I have:

[CHECK TO THE LEFT OF APPLICABLE ITEMS]

__X__ 1. Consulted with representatives of the following government organizations:
RDCO Planning Staff

__X__ 2. Collected and reviewed appropriate background information

__X__ 3. Reviewed the Proposed Development on the Property

__X__ 4. Investigated the presence of Covenants on the Property, and reported any relevant information

__X__ 5. Conducted field work on and, if required, beyond the Property

__X__ 6. Reported on the results of the field work on and, if required, beyond the Property

_____ 7. Considered any changed conditions on and, if required, beyond the Property

8. For a Flood Hazard analysis I have:
   - __X__ 8.1 Reviewed and characterized, if appropriate, Flood Hazard that may affect the Property
   - __X__ 8.2 Estimated the Flood Hazard on the Property
   - __X__ 8.3 Considered (if appropriate) the effects of climate change and land use change
   - _____ 8.4 Relied on a previous Flood Hazard Assessment (FHA) by others
   - __X__ 8.5 Identified any potential hazards that are not addressed by the Flood Assessment Report

9. For a Flood Risk analysis I have:
   - __X__ 9.1 Estimated the Flood Risk on the Property
   - __X__ 9.2 Identified existing and anticipated future Elements at Risk on and, if required, beyond the Property
   - __X__ 9.3 Estimated the Consequences to those Elements at Risk

10. In order to mitigate the estimated Flood Hazard for the Property, the following approach is taken:
- [X] 10.1 A standard-based approach
- [ ] 10.2 A Risk-based approach
- [X] 10.3 The approach outlined in the guidelines, Appendix F: Flood Assessment Considerations for Development Approvals
- [ ] 10.4 No mitigation is required because the completed flood assessment determined that the site is not subject to a Flood Hazard

11. Where the Approving Authority has adopted a specific level of Flood Hazard or Flood Risk tolerance, I have:
- [ ] 11.1 Made a finding on the level of Flood Hazard or Flood Risk on the Property
- [ ] 11.2 Compared the level of Flood Hazard or Flood Risk tolerance adopted by the Approving Authority with my findings
- [X] 11.3 Made recommendations to reduce the Flood Hazard or Flood Risk on the Property

12. Where the Approving Authority has not adopted a level of Flood Hazard or Flood Risk tolerance, I have:
- [ ] 12.1 Described the method of Flood Hazard analysis or Flood Risk analysis used
- [ ] 12.2 Referred to an appropriate and identified provincial or national guideline for level of Flood Hazard or Flood Risk
- [X] 12.3 Made a finding on the level of Flood Hazard of Flood Risk tolerance on the Property
- [X] 12.4 Compared the guidelines with the findings of my flood assessment
- [X] 12.5 Made recommendations to reduce the Flood Hazard or Flood Risk

- [X] 13. Considered the potential for transfer of Flood Risk and the potential impacts to adjacent properties
- [ ] 14. Reported on the requirements for implementation of the mitigation recommendations, including the need for subsequent professional certifications and future inspections.

Based on my comparison between:

[CHECK ONE]

- ☐ The findings from the flood assessment and the adopted level of Flood Hazard or Flood Risk tolerance (item 11.2 above)
- ☒ The findings from the flood assessment and the appropriate and identified provincial or national guideline for level of Flood Hazard or Flood Risk tolerance (item 12.4 above)

I hereby give my assurance that, based on the conditions contained in the attached Flood Assessment Report:

[CHECK ONE]

- ☐ For subdivision approval, as required by the *Land Title Act* (Section 86), "that the land may be used safely for the use intended":

  [CHECK ONE]

  - ☐ With one or more recommended registered Covenants.
  - ☒ Without any registered Covenant.
- ☒ For a development permit, as required by the *Local Government Act* (Part 14, Division 7), my Flood Assessment Report will "assist the local government in determining what conditions or requirements it will impose under subsection (2) of this section [Section 491 (4)]".
- ☒ For a building permit, as required by the Community Charter (Section 56), "the land may be used safely for the use intended":

  [CHECK ONE]

  - ☐ With one or more recommended registered Covenants.
  - ☒ Without any registered Covenant.
- ☐ For flood plain bylaw variance, as required by the *Flood Hazard Area Land Use Management Guidelines* and the *Amendment Section 3.5 and 3.6* associated with the *Local Government Act* (Section 524), "the development may occur safely".
- ☐ For flood plain bylaw exemption, as required by the *Local Government Act* (Section 524), "the land may be used safely for the use intended".

FLOOD ASSURANCE STATEMENT

I certify that I am a Qualified Professional as defined below.

January 22, 2020

Date

Dobson Engineering Ltd.

Prepared by

D. A. Dobson, PEng

Name (print)

Signature

2580 Dunsmuir Road

Address

Kelowna, BC V1W 2V3

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Telephone

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Email

Watershed Engineering Ltd.

Reviewed by

Caleb W. Pomeroy, P.Eng.

Name (print)

Signature

2020-02-03

(Affix PROFESSIONAL SEAL here)

If the Qualified Professional is a member of a firm, complete the following:

I am a member of the firm Dobson Engineering Ltd.
and I sign this letter on behalf of the firm.

(Name of firm)