



Development Permit Application

Referral Form – RDCK File DP2313E

Date: October 31, 2023

You are requested to comment on the attached DEVELOPMENT PERMIT for potential effect on your agency's interests. We would appreciate your response WITHIN 30 DAYS (PRIOR TO December 2, 2023). If no response is received within that time, it will be assumed that your agency's interests are unaffected.

LEGAL DESCRIPTION & GENERAL LOCATION:

7642 Highway 3A, Balfour
LOT 1 DISTRICT LOT 192 KOOTENAY DISTRICT PLAN EPP93903
PID: 030-972-221

PRESENT USE AND PURPOSE OF PERMIT REQUESTED:

This Watercourse Development Permit (WDP) application is the result of unauthorized development activity within 15 metres of Kootenay Lake. The following unauthorized development was completed within the WDP area: rock landscape walls, fill placement, bank re-grading, elevated deck and stairway, access path, removal of riparian vegetation including trees and shrubs. In addition, the owners would like to remove one potential hazard tree located along the top of bank within falling distance of the house. The owners are "seeking permission to retain the works completed within the WDP area and to help mitigate for the degradation and loss of riparian habitat". A Riparian Assessment (RA) has been completed by Masse Environmental LTD. and includes recommended mitigation works.

AREA OF PROPERTY AFFECTED	ALR STATUS	ZONING	OCF
0.46 ha	n/a	n/a	Official Community Plan Bylaw No. 2260 Suburban Residential (RS)

APPLICANT: Norm Cross

OTHER INFORMATION: ADVISORY PLANNING COMMISSION PLEASE NOTE:

If your Advisory Planning Commission plans to hold a meeting to discuss this Development Permit application, please note that the applicants must be provided with an opportunity to attend such meeting, in accordance with Section 461, subsection (8) of the *Local Government Act*, which reads as follows:

"If the commission is considering an amendment to a plan or bylaw, or the issue of a permit, the applicant for the amendment or permit is entitled to attend meetings of the commission and be heard."

Please fill out the Response Summary on the back of this form. If your agency's interests are 'Unaffected' no further information is necessary. In all other cases, we would appreciate receiving additional information to substantiate your position and, if necessary, outline any conditions related to your position. Please note any legislation or official government policy which would affect our consideration of this permit.

Stephanie Johnson, PLANNER
REGIONAL DISTRICT OF CENTRAL KOOTENAY

<input checked="" type="checkbox"/> MINISTRY OF TRANSPORTATION AND INFRASTRUCTURE <input checked="" type="checkbox"/> HABITAT BRANCH (Environment) <input checked="" type="checkbox"/> FRONTCOUNTER BC (MFLNRORD) <input type="checkbox"/> AGRICULTURAL LAND COMMISSION <input type="checkbox"/> REGIONAL AGROLOGIST <input type="checkbox"/> ENERGY & MINES <input type="checkbox"/> MUNICIPAL AFFAIRS & HOUSING	REGIONAL DISTRICT OF CENTRAL KOOTENAY DIRECTORS FOR: <input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input checked="" type="checkbox"/> E <input type="checkbox"/> F <input type="checkbox"/> G <input type="checkbox"/> H <input type="checkbox"/> I <input type="checkbox"/> J <input type="checkbox"/> K ALTERNATIVE DIRECTORS FOR: <input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input checked="" type="checkbox"/> E <input type="checkbox"/> F <input type="checkbox"/> G <input type="checkbox"/> H <input type="checkbox"/> I <input type="checkbox"/> J <input type="checkbox"/> K <input checked="" type="checkbox"/> APHC AREA E <input type="checkbox"/> RDCK FIRE SERVICES <input type="checkbox"/> RDCK EMERGENCY SERVICES
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- INTERIOR HEALTH, HBE TEAM
- KOOTENAY LAKES PARTNERSHIP
(FORESHORE DEVELOPMENT PERMITS)
- SCHOOL DISTRICT NO.
- WATER SYSTEM OR IRRIGATION DISTRICT
- UTILITIES (FORTIS, BC HYDRO, NELSON
HYDRO, COLUMBIA POWER)

- RDCK BUILDING SERVICES
- RDCK UTILITY SERVICES
- RDCK RESOURCE RECOVERY
- RDCK REGIONAL PARKS

INSERT COMMENTS ON REVERSE . . .

The personal information on this form is being collected pursuant to *Regional District of Central Kootenay Planning Procedures and Fees Bylaw No. 2457, 2015* for the purpose of determining whether the application will affect the interests of other agencies or adjacent property owners. The collection, use and disclosure of personal information are subject to the provisions of FIPPA. Any submissions made are considered a public record for the purposes of this application. Only personal contact information will be removed. If you have any questions about the collection of your personal information, contact the Regional District Privacy Officer at 250.352.6665 (toll free 1.800.268.7325), info@rdck.bc.ca, or RDCK Privacy Officer, Box 590, 202 Lakeside Drive, Nelson, BC V1L 5R4.

RESPONSE SUMMARY
FILE: DP2313E APPLICANT: NORM CROSS

Name:

Date:

Agency:

Title:

RETURN TO: **STEPHANIE JOHNSON**, PLANNER
DEVELOPMENT AND COMMUNITY SUSTAINABILITY SERVICES
REGIONAL DISTRICT OF CENTRAL KOOTENAY
BOX 590, 202 LAKESIDE DRIVE
NELSON, BC V1L 5R4
Ph. 250-352-1585
Email: plandept@rdck.bc.ca

RDCK Map



Esri Community Maps
 Contributors, Esri, Canada
 Esri, HERE, Garmin,
 SafeGraph,
 GeoTechnologies, Inc.



REGIONAL DISTRICT OF CENTRAL KOOTENAY
 Box 590, 202 Lakeside Drive,
 Nelson, BC V1L 5R4
 Phone: 1-800-268-7325 www.rdck.bc.ca
 maps@rdck.bc.ca

Legend

- Electoral Areas
- RDCK Streets
- Cadastre
- Address Points

Map Scale:

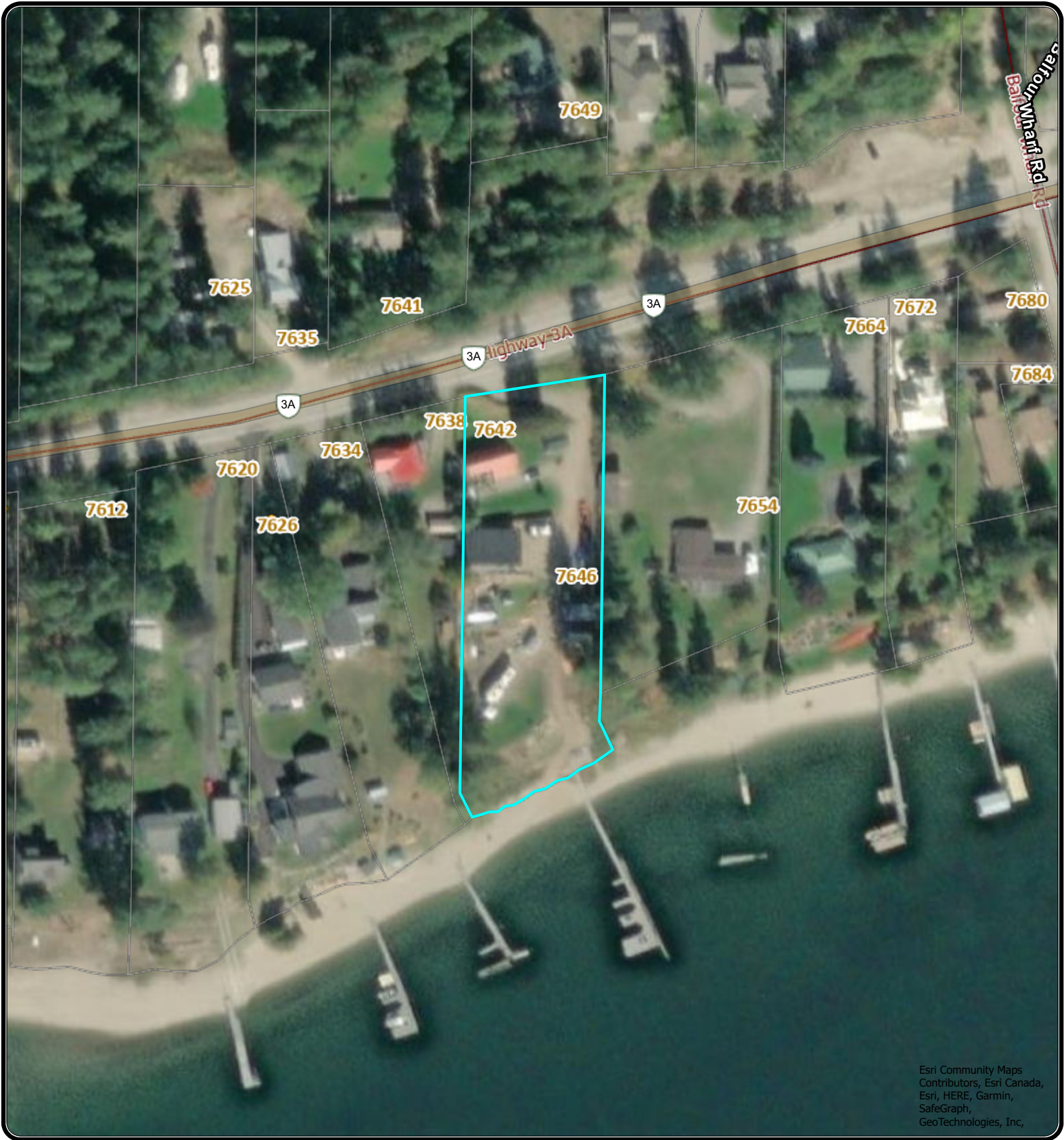
1:9,028

Date: October 19, 2023



The mapping information shown are approximate representations and should only be used for reference purposes. The Regional District of Central Kootenay is not responsible for any errors or omissions on this map.

RDCK Map







Esri Community Maps
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Legend

-  Electoral Areas
-  RDCK Streets
-  Cadastre
-  Address Points

Map Scale:

1:2,257

Date: October 19, 2023



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RDCK Map



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Legend

Official Community Plan

- Industrial
- Resource Area
- Suburban Residential

Development Permit Areas

- Industrial and Commercial

- Residential Cluster
- Watercourse
- Flood Construction Levels - 1990
- Electoral Areas
- RDCK Streets
- Cadastre
- Address Points

Map Scale:

1:2,257

Date: October 19, 2023



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Regional District of Central Kootenay
202 Lakeside Drive
Nelson, BC V1L 5R1

Oct 5, 2023

Attention: Planning Department

Re: 7642 Highway 3A Proposal Summary for Waterfront Development Permit Application

Norm and Berva Cross (Owners) are applying for a Watercourse Development Permit (WDP) application on their waterfront property at 7642 Highway 3A, Balfour, BC (PID 030-972-221).

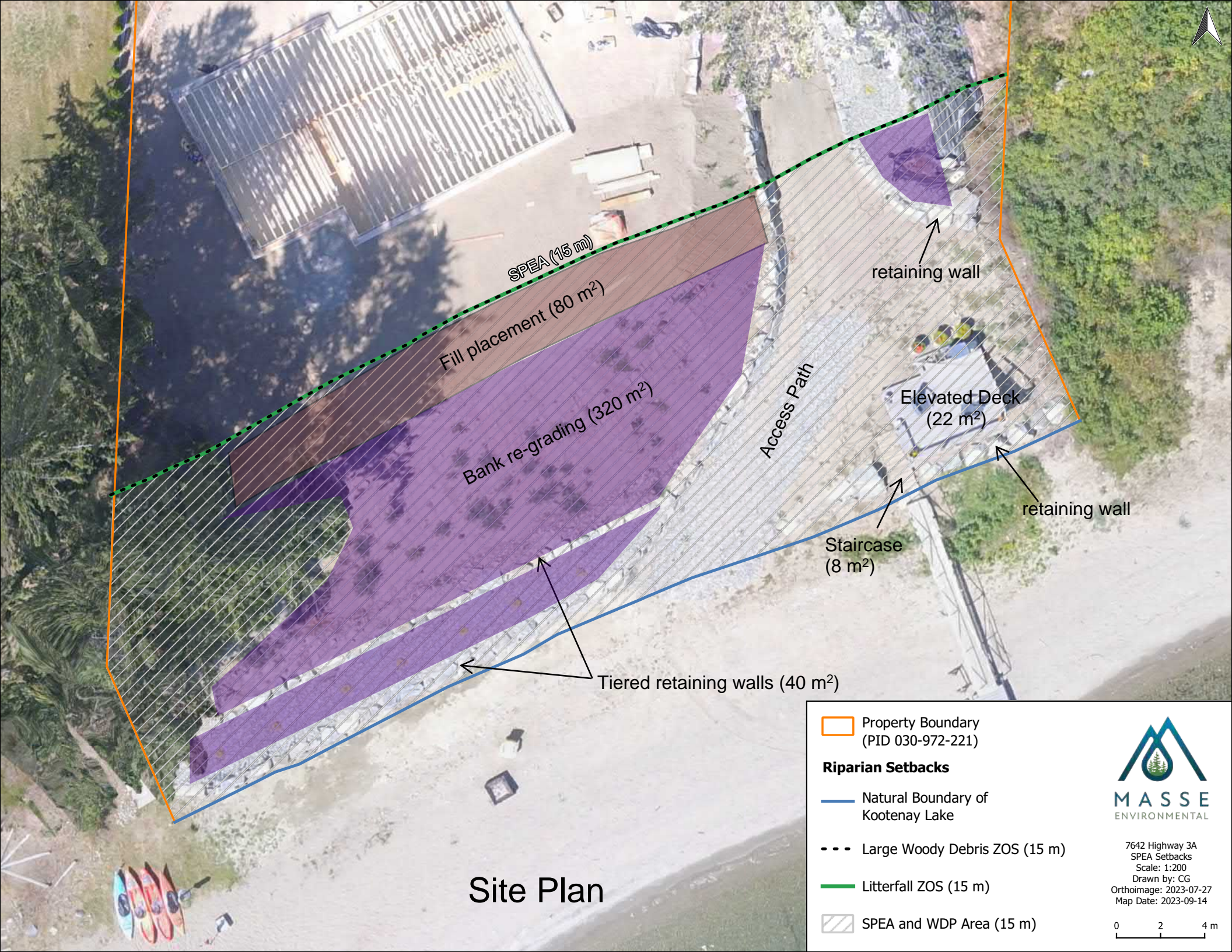
The WDP was triggered by an enforcement letter sent by the RDCK on July 5, 2023 indicating that unauthorized works within the WDP area had occurred which requires a WDP application. The following development was completed within the WDP area: rock landscape walls, fill placement, bank re-grading, elevated deck and stairway, access path, removal of riparian vegetation including trees and shrubs. In addition, the Owners would like to remove one potential hazard tree which is leaning (western red cedar 470 mm dbh) located along the top of bank within falling distance of the house.

The Owners are seeking permission to retain works completed within the WDP area and in order to help mitigate for the degradation and loss of riparian habitat both prior to re-development and post development, the riparian area will be restored by replanting a mixture of native riparian plant species. The development proposal was assessed by a Qualified Environmental Professional (QEP) in accordance with the Electoral Area E OCP No. 2260 and the Riparian Areas Protection Regulation. A Riparian Assessment Report with Mitigation Plan is attached to the WDP application submittal.

If you have any questions or comments, please contact me.

Sincerely,

Fiona Lau, ASCT, BTech
Masse Environmental Consultants Ltd.



Site Plan

SPEA (15 m)

Fill placement (80 m²)

Bank re-grading (320 m²)

Access Path

retaining wall

Elevated Deck (22 m²)

Staircase (8 m²)

retaining wall

Tiered retaining walls (40 m²)

Property Boundary (PID 030-972-221)

Riparian Setbacks

Natural Boundary of Kootenay Lake

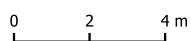
Large Woody Debris ZOS (15 m)

Litterfall ZOS (15 m)

SPEA and WDP Area (15 m)

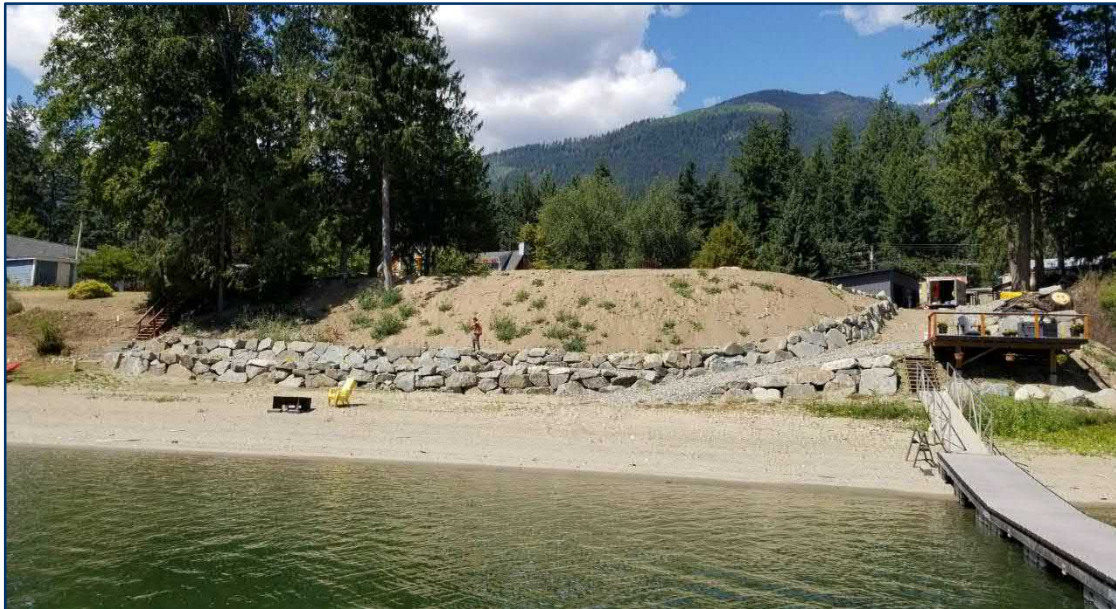


7642 Highway 3A
SPEA Setbacks
Scale: 1:200
Drawn by: CG
Orthoimage: 2023-07-27
Map Date: 2023-09-14





7642 Highway 3A, Balfour, BC
Riparian Assessment



Prepared for:
Regional District of Central Kootenay
202 Lakeside Drive
Nelson, BC, V1L 5R4

September 19, 2023

Disclosure Statement

This report has been prepared by Chanel Gagnon B.Sc., B.I.T., and Fiona Lau B.Tech., ASCT.

I, Fiona Lau, hereby certify that:

- a) I am a qualified environmental professional (QEP), as defined in the Riparian Areas Regulation made under the Fish Protection Act;
- b) I am qualified to carry out this part of the assessment of the development proposal made by the developer;
- c) I have carried out my assessment of the development proposal, and my assessment is set out in this Assessment Report; and
- d) In carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Schedule to the Riparian Areas Protection Regulation.

This report has been prepared by a QEP who has not acted for, or as an agent(s) of the RDCK and was at the expense of the property owner.

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1 INTRODUCTION

Masse Environmental Consultants Ltd. was retained by Norm and Berva Cross (Owners) to conduct a riparian assessment to accompany an application for a Watercourse Development Permit (WDP) on their waterfront property at 7642 Highway 3A, Balfour, BC (PID 030-972-221).

The WDP was triggered by an enforcement letter sent by the RDCK on July 5, 2023 indicating that unauthorized works within the WDP area had occurred which requires a WDP application. The following development was completed within the WDP area: rock landscape walls, fill placement, bank re-grading, elevated deck and stairway, access path, removal of riparian vegetation including trees and shrubs. In addition, riparian revegetation is proposed within the WDP area.

A site visit was completed on July 27, 2023, by Fiona Lau B.Tech., ASc T. and Chanel Gagnon, B.Sc., B.I.T to conduct a riparian assessment on the property. The riparian assessment evaluates the existing conditions of the riparian area (up to 30 m from the natural boundary of Kootenay Lake), identifies habitat values, assesses potential environmental impacts, and recommends measures to mitigate or compensate for the alteration of the riparian area to maintain ecological values. It is based on the following regulatory framework and best management practices documents:

- RDCK Electoral Area 'E' Rural Official Community Plan Bylaw No. 2260, 2013
- British Columbia Riparian Areas Protection Regulation
- Kootenay Lake Shoreline Management Guidelines
- British Columbia Water Sustainability Act
- Federal Migratory Birds Convention Act
- General BMPs and Standard Project Considerations (Ministry of Environment)
- Develop with Care. Environmental Guidelines for Urban and Rural Land Development in British Columbia
- On the Living Edge: Your Handbook for Waterfront Living

2 PROJECT OVERVIEW

2.1 Site Description

2.1.1 Location

The subject property is located in Area E of the Regional District of Central Kootenay (RDCK), in Balfour, BC (see Appendix 1 for Location Map). The property is 1.13 acres, with ~45 m of frontage on the West Arm of Kootenay Lake. The property has a southern aspect, with elevations ranging from ~533 to 548 and

is bordered by private properties to the west and east, Highway 3A to the north and Kootenay Lake to the south.

The subject lot from the south property line moving north is a steep embankment (~65% slope) for ~10 m then flattens out to a gentler slope (<5%). Previous disturbance as well as recent disturbance within the riparian area was noted, which involved riparian vegetation removal and soil disturbance (Photos 1-4 and cover photo); however, some native shrubs and a cluster of trees remain in the southwest corner of the property.

The area falls within the Very Dry Warm Interior Cedar Hemlock (ICHxw) biogeoclimatic subzone. The ICHxw is a relatively small subzone occurring at low elevations in the southernmost parts of the Columbia Basin in BC (MacKillop and Ehman 2016). The climate is characterized by very hot, very dry summers and mild dry winters (MacKillop and Ehman 2016). The ICHxw subzone contains forests with a diverse assemblage of tree and shrub species and a disproportionately large number of wildlife and plant species at risk (MacKillop and Ehman 2016).



Photo 1. Aerial image of subject property in 2009 (Google Earth 2023).



Photo 2. View of area on subject property in 2022 prior to most recent development activities (Photo credit Norm Cross).



Photo 3. Aerial image of subject property 2023 (RDCK 2023).



Photo 4. View of the recent landscaping works and riparian vegetation retained, looking north (July 27, 2023).

2.1.2 Watercourses

Kootenay Lake

Kootenay Lake borders the subject property along the southern boundary; it is a long, narrow and deep lake with a surface area of approximately 400 km². Kootenay Lake's main inflows include the Lower Duncan River to the north and the Kootenay River to the south and drains through the West Arm into the Kootenay River. Lake levels can vary up to 4 m throughout the year, affecting the extent of the exposed shoreline.

The foreshore of the property consists of a sloped beach (~12% gradient), with the substrate mainly consisting of sand and some fine gravel. Submergent vegetation is present approximately 22 m from the HWM at the time of the survey.

The visible natural boundary of Kootenay Lake was observed to be approximately along the southern property line (Parcelmap BC 2023). The natural boundary is commonly referred to as the "high water mark" around a lake or wetland. Based on the definition of high water mark¹, the property boundary shown on the SPEA map (Appendix 2) will be used to delineate the 15 m RDCK WDP area and streamside protection and enhancement area (SPEA) setbacks in accordance with the Riparian Area Protection Regulation (RAPR).

¹ High water mark means the visible high water mark of a watercourse where the presence and action of the water are so common and usual, and so long continued in all ordinary years, as to mark on the soil of the bed of the watercourse a character distinct from that of its banks, in vegetation, as well as in the nature of the soil itself, and includes the active floodplain (RDCK 2013).



Photo 5. View of foreshore, looking east. July 27, 2023.



Photo 6. Aerial view of the foreshore of property. July 27, 2023.

2.1.3 Riparian Vegetation

The riparian vegetation is sparse with minimal tree and shrub cover. There is a clump of mature western red cedars (*Thuja plicata*; Photo 7), on the west end of the bank and a few mature western red cedar and paper birch (*Betula papyrifera*) on the east end of the bank. A few sparse shrub species are present including saskatoon (*Amelanchier alnifolia*) and snowberry (*Symphoricarpos albus*).

The herb layer consists of mostly non-native and exotic species including black bindweed (*Fallopia convolvulus*), chicory (*Cichorium intubus*), common purslane (*portulaca oleracea*), dwarf mallow (*Malva neglecta*), field peppergrass (*Lepidium campestre*), hoary alyssum (*Berteroa incana*), Johnny jump up (*Viola tricolor*), lambs-quarters (*Chenopodium album*), prickly sow-thistle (*Sonchus asper*), purple-leaved willowherb (*Epilobium ciliatum*), redroot amaranth (*Amaranthus retroflexus*), spotted knapweed (*Centaurea stoebe*), western willow aster (native; *Symphytrichum lanceolatum*) and white campion (*Silene latifolia*).



Photo 7. Western redcedar clump southwest of the property (top of bank). July 27, 2023.



Photo 8. View of tree and low herb cover within the riparian area looking northeast. July 27, 2023.



Photo 9. Low herb cover on the bank, looking west. July 27, 2023.



Photo 10. Riparian vegetation and weeds on east end of bank above and below the HWM. July 27, 2023.

2.1.4 Aquatic Habitat

Fish habitat along this section of foreshore consists of shallow water habitat with submergent vegetation (Photo 11 and Photo 12). Shallow foreshore areas are used for rearing by smaller fishes and broadcast spawning by non-sport fish species (i.e., peamouth chub (*Mylocheilus caurinus*) and northern pikeminnow (*Ptychocheilus oregonensis*). Several species of regional interest reside in Kootenay Lake including Kokanee (*Oncorhynchus. nerka*), Rainbow Trout (*O. mykiss*), Bull Trout (*Salvelinus confluentus*; BC-Blue-Listed; SARA Special Concern), White Sturgeon (*Acipenser transmontanus* pop.1; BC Red-Listed, SARA Endangered), Westslope Cutthroat Trout (*O. clarki lewisi*; BC Blue-Listed; SARA Special Concern), and Burbot (*Lota lota* pop.1; BC-Red-Listed).

Mussel beds have been identified along the shoreline of Kootenay Lake in multiple locations both on the West Arm and main body of the lake. No evidence of mussels was seen on the shoreline (i.e., mussel

shells). A mussel survey was not conducted to determine presence or absence, as no works are proposed below the HWM.



Photo 11. View of shallow water habitat with sand and gravel substrate.



Photo 12. View of submergent vegetation. July 27, 2023.

2.1.5 Wildlife Habitat

Riparian ecosystems offer important habitat features for wildlife, affording them essential resources like water, shelter, and food. These areas frequently serve as migration corridors connecting aquatic, riparian, and upland environments, playing a pivotal role in the life cycles of numerous species. The western red cedar trees provide habitat for bird species such as cavity nesters, songbirds, Piciformes (woodpeckers, sapsuckers, flickers etc.) and raptors. Warm southern aspects and rocky sites provide suitable habitat for reptiles such as garter snakes (*Thamnophis* spp.), Northern alligator lizard (*Elgaria coerulea*), Northern rubber boa (*Charina bottae*; SARA Special Concern), and Western skink (*Plestiodon skiltonianus*; BC Blue-listed; SARA Special Concern).

During the site assessment the following wildlife observations were documented:

- A spotted sandpiper (*Actitis macularius*) was observed on the foreshore of the property.

2.1.6 Species at Risk

The BC Conservation Data Center (CDC) occurrence data and critical habitat for Federally listed species were queried within iMap BC, using a 10 km buffer around the center point of the subject property. In addition, the Wildlife Species Inventory observation points within iMap BC and iNaturalist were also queried for nearby observations within a 5 km buffer around the property.

The search identified two species at risk that have potential occurrence likelihoods of 'possible' or 'likely' on the property:

- 1) Coeur d'Alene Salamander (*Plethodon idahoensis*) recorded observation near Pilot Bay Provincial Park ~9 km away.
- 2) Western skink (BC blue listed; COSEWIC and SARA Special Concern) recorded observation ~8 km west and east of the subject property, along Highway 3a in rocky outcrops and coarse talus slopes.

2.1.7 Invasive Species

Central Kootenay Invasive Species Society (CKISS) manages invasive species using a prioritized approach. The management strategy for a specific species is based on a number of factors including the phase of invasion and the potential impacts of the species (CKISS 2023). Priority species lists can be found at <https://ckiss.ca/species/invasive-plant-priority-lists/>. It is recommended that species identified for Prevention (1), Eradication (2) and Containment (3) as per the Priority List developed by CKISS be managed accordingly within the SPEA. Based on the CKISS 2023 Priority List, hoary alyssum was identified as Priority Level 3 species.

Refer to Section 5.5 for recommended invasive species management. within SPEA.

2.2 Existing Development

Prior to 2022, the riparian area was disturbed by the previous Owners. Pre-existing site conditions within the riparian area (prior to current ownership) consisted of some riparian vegetation removal, exposed soils, weed establishment and an access path to the foreshore. Based on historic photos of the property, the riparian area was partially vegetated and somewhat degraded (Photo 1 and Photo 2). There were no known structures located within the 15 m WDP area, prior to re-development. As part of the property re-development, a large shop structure (located ~15 m from the natural boundary; Photo 2) was demolished to accommodate for the construction of the new home located ~ 19 m from the natural boundary. The Owner has also constructed a new shop building at the north end of the property next to the existing house.

In 2023, the current Owners as part of the re-development of the property (new home construction), undertook unauthorized landscaping within the 15 m WDP area which included ground disturbance, vegetation removal, placement of fill material, regrading of bank, construction of tiered rock retaining walls, re-alignment and construction of an access path, and construction of an elevated deck and stair (Photos 13-16). The retaining walls were constructed to protect the property from erosion potential

during high lake levels as well as to help retain soils on the steep embankment (per. comm. Norm Cross 2023).

The area of ground disturbance within the WDP area was estimated to be ~420 m². It is unknown exactly how much riparian vegetation was removed; however, one mature Interior Douglas Fir tree (890 mm dbh) was removed at the south-east corner.

The property is serviced by the Balfour water system and the septic field is sited in the center of the property >30m from the natural boundary. Refer to Appendix 2 for the site plan showing structures and septic locations.



Photo 13. Tiered rock retaining wall. July 27, 2023.



Photo 14. Crushed gravel access road. July 27, 2023

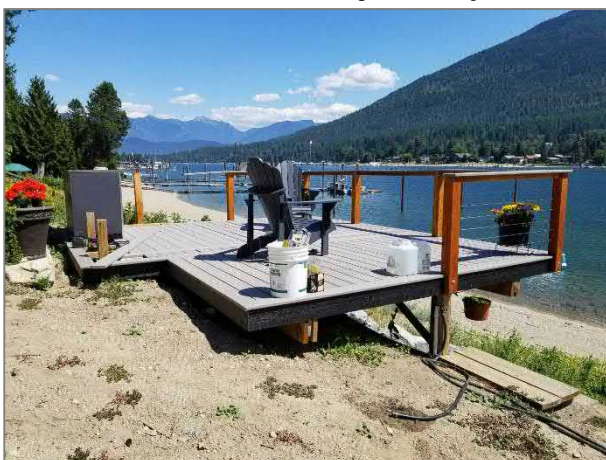


Photo 15. Elevated deck, looking southeast. July 27, 2023.

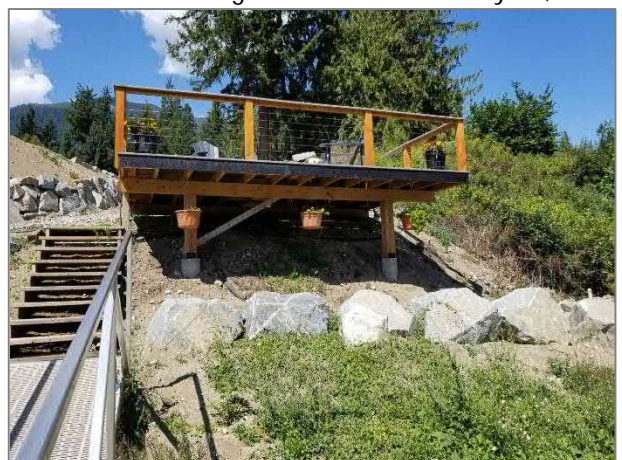


Photo 16. Elevated deck and staircase, looking north. July 27, 2023.

2.3 Proposed Development

The Owners are seeking authorization for the following works that were completed within the WDP area:

- Placement of ~0.45 m of fill material between the 11-15 m setback to raise the elevation of the natural ground (~80 m²);
- Regrading of bank face (~320 m²);
- Construction of tiered rock retaining walls: First tier (~57 m long x ~0.5 m wide and ~1.2 m high) and second tier (~25 m long x ~0.5 m wide and ~1 m high) (~40m²);
- Re-alignment of access path down to the foreshore (19 m x 3.5 m; ~66 m²);
- Construction of an elevated deck (~4.96 m x ~4.4 m; ~22 m²) located on the northeast corner of the property, ~1.2 m from the natural boundary, and
- Construction of a staircase to the dock (~8 m²).

In addition, the Owners would like to remove one potential hazard tree which is leaning (western red cedar 470 mm dbh) located along the top of bank within falling distance of the house. Refer to Appendix 3 showing recent development located within the riparian area.

To help mitigate for the disturbance to the riparian area and loss of riparian habitat, revegetation of the disturbed areas is proposed (Refer to Section 6 and Mitigation Plan ((Masse 2023)).

2.4 Archeological and Heritage Resources

The subject property was flagged as high archaeological risk; however, further assessment of archaeological risk is beyond the scope of this report. For further information please consult the Kootenay Lake Shoreline Guidance Document (KLP 2020).

Kootenay Lake is part of the traditional territory of the Ktunaxa, Sinixt and Syilx (Okanagan) First Nations and archaeological evidence is documented at multiple sites along the shoreline and mountain sides of Kootenay Lake. Archaeological Chance Find Procedures are provided in Appendix 4 for guidance on which protocols to follow in the event of a chance archaeological find to ensure that archaeological sites are documented and protected as required for compliance with the BC Heritage Conservation Act.

3 REGULATORY OVERVIEW

3.1 Riparian Area Protection Regulation (RAPR) Review

The 15 m WDP setback from the boundary of Kootenay Lake was compared with the Riparian Area Protection Regulation (RAPR) criteria by conducting a detailed assessment of the subject property in order

to calculate the Streamside Protection and Enhancement Area (SPEA) setback. Results for the Zones of Sensitivity (ZOS) and SPEA are presented in Table 1 and Appendix 3.

As per the RAPR, the large woody debris (LWD) and litter ZOS were plotted 15 m inland from the HWM of Kootenay Lake with the shade ZOS plotted 30 m south from the HWM of Kootenay Lake, resulting in no shade ZOS. The SPEA setback is determined based on the ZOS with the greatest width. Therefore, within the subject property the SPEA from the HWM of Kootenay Lake is 15 m (Table 1).

Table 1. Results of detailed RAPR assessment for Kootenay Lake.

Feature Type	SPVT ¹	Zones of Sensitivity			SPEA ³
		LWD ²	Litter fall	Shade	
Kootenay Lake	TR	15 m	15 m	0 m	15m

¹SPVT: site potential vegetation type (TR-tree)

²LWD- large woody debris

³SPEA- streamside protection and enhancement area

3.2 Kootenay Lake Shoreline Management Guidelines

The Kootenay Lake Foreshore Integrated Management Planning (FIMP; Schleppe and McPherson 2022), the Foreshore Inventory Mapping (FIM; KLP 2023) and the Kootenay Lake Shoreline Management Guidelines (KLP 2020) were used to help determine site-specific risks for riparian habitat, Ktunaxa Nation cultural values, and archaeological resources along the shoreline (Table 2). The property is within FIM segment 42.

Table 2. Aquatic and archaeological risk results

Aquatic Habitat Index Rating (AHI)	Aquatic Sensitivity	Archaeological Risk	Enhanced Engagement Required (Work below HWM)
Very Low	Yes	Orange	Yes

4 IMPACT ASSESSMENT

The impact assessment considered the existing site conditions, construction of the rock retaining walls, elevated deck, staircase, access path and removal of riparian vegetation.

The removal of riparian vegetation directly affects fish and fish habitat in Kootenay Lake by reducing leaf litter and insect drop, as well as large woody debris recruitment. In addition, the increased area of exposed soils can cause sedimentation into the lake potentially impacting local water quality and burying nearby spawning gravels. The disturbance and permanent loss of riparian vegetation which has occurred on the

property adds to the cumulative impacts around Kootenay Lake and the reduction of both wildlife and fish habitat.

The access path constructed is estimated to be approximately the same footprint size as the existing access path, however this could not be confirmed as the historical aerial imagery is not clear. As there was an existing access path, there are no additional habitat impacts associated with the new access path within the riparian area.

The deck is elevated approximately 1.5 meter above the ground along the front, which does allow light to penetrate underneath for the benefit of vegetation growth. This design also provides passage underneath for small animals. The design follows best management practices, although it will also inhibit the natural regeneration of taller shrubs and trees, therefore is considered an impact to the riparian area.

The unauthorized landscaping and elevated deck and stairway development have caused a total of ~470 m² of disturbance to the riparian area. Within that, there is an estimated habitat loss of ~70 m² caused by the placement of retaining walls, stairway and elevated deck structure.

It is important to note that the riparian area was partially de-graded prior to the unauthorized landscaping activities completed. Habitat loss calculations are based on any area within the WDP that has riparian vegetation potential, and where proposed development is sited.

In order to help mitigate for the degradation and loss of riparian habitat both prior to re-development and post development, ~453 m² will be restored by replanting a mixture of native riparian plant species.

In addition, the implementation of protective measures outlined below will help to minimize adverse effects on the SPEA.

5 MEASURES TO PROTECT THE INTEGRITY OF THE SPEA

This section provides measures to protect the integrity of the SPEA as described in the RAPR, as well as recommended best management practices.

5.1 Danger Trees

A Douglas-fir (*Pseudotsuga menziesii*) was removed from the subject property as it was leaning over the deck structure and was considered a hazard (per. comm Norm Cross 2023) and a leaning western red cedar is proposed for removal along the top of bank as it is in falling distance of the new home. Further

assessment of potential danger trees is outside the scope of this report. Any proposed danger tree removal should be assessed by a certified arborist, prior to removal.

5.2 Windthrow

No significant clearing of trees was completed on the property; therefore, changes to windthrow risk are minimal. Additional assessment of windthrow risk is beyond the scope of this report, and any such assessment should be led by a Registered Professional Forester (RPF).

5.3 Slope Stability

Signs of slope instability were observed on the steep bank, based on the tree sweeping. The combination of gravity, erosion, and weakened soil structure can contribute to trees sweeping. Further assessment of geotechnical hazard is beyond the scope of this report, and any such assessment should be led by a P.Geol. or P.Eng.

5.4 Protection of Trees and Vegetation in the SPEA

Currently, there is no further development proposed within the SPEA other than landscaping. During revegetation activities, avoid cutting and severing root systems.

5.5 Encroachment

Future development on the site should occur outside of the 15 m SPEA (see Appendix 2). If future development within the 15 m SPEA is proposed, a new WDP application will be required prior to any development.

5.1 Sediment and Erosion Control

In order to prevent erosion of the property and to prevent sediment from entering Kootenay Lake, soil disturbance will be minimized as much as possible and exposed soils will be re-vegetated as soon as possible.

Immediate mitigation measures to be completed include:

- Reseeding of disturbed soils with the prescribed seed mix detailed in the mitigation plan (Masse 2023). Application of weed-free mulch on exposed soils can be applied as an additional measure if erosion of soils and lack of seed germination is observed.
- Surface flows from the upland driveway will be re-directed away from the riparian area either into existing vegetation or an onsite stormwater system (i.e., infiltration trench).

5.2 Stormwater Management

The re-development of the property will result in an increase in the total impervious area. The following mitigation measures will help decrease stormwater impacts to the SPEA:

- Groundwater and surface water will be conveyed around any area where disturbed/exposed soils may occur.
- Pervious materials (e.g., gravel) are recommended for driveways, parking areas, and pathways. This minimizes stormwater runoff from impervious materials (e.g., asphalt and concrete), which must be managed using natural hydrologic pathways. Storm water will not be permitted to discharge directly into Kootenay Lake.
- Design roof rainwater collection systems that direct rainwater into suitable landscape features which can absorb and utilize runoff. Roof runoff will not be permitted to discharge directly into Kootenay Lake.
- Stormwater discharges must adhere to the Water Sustainability Act or any other applicable legislation.

5.3 Floodplain Concerns

There are no floodplain concerns observed on the subject property.

5.4 Fish and Wildlife Protection

To minimize disturbance to fish, wildlife, and their habitat, the following measures will be implemented:

- Adhere to erosion and sediment control and stormwater best management practices outlined in this report to ensure that there is no release of deleterious materials into Kootenay Lake.
- Works in and around the remaining trees should be monitored for nesting birds or bats if works are to be completed during the songbird breeding season (early-April – mid-August) (ECCC 2023b). Monitoring should be completed by a Qualified Environmental Professional (QEP), who will propose measures to protect any active nests, if found.
- Follow the Guidelines for Raptor Conservation during Urban and Rural Land Development in British Columbia (MOE 2013) if any active raptor nests are discovered within 100 m of the subject property. Active raptor nests are legally protected at all times of the year and some inactive nests (ex: Bald Eagle nests) are similarly protected.
- Avoid any modifications to the beach substrate and preserve the remaining foreshore vegetation.
- Ensure that any power equipment used is well-maintained and leak free.

5.5 Invasive Plant Management

It is recommended that hoary alyssum (Priority Level 3 species by CKISS (2023)) be managed within the SPEA in order to help contain and reduce its further establishment and proliferation. Management procedures for hoary alyssum is provided in Appendix 5.

6 MITIGATION PLAN

The Shoreline Management Guidelines for Kootenay Lake outlines general principles for shoreline development in order to achieve a “No Net Loss” of habitats present. The principle is achieved by applying the following priority sequence of mitigation options: 1. Avoidance of environmental impacts; 2. Minimization of unavoidable impacts; 3. On-site restoration; and 4. Offset residual impacts that cannot be minimized through compensation (KLP 2018).

Avoidance and Minimization were not achievable with the re-development as the disturbance has already occurred; therefore, On-site restoration is being proposed and is presented as a separate Mitigation Plan document (Masse 2023).

The on-site restoration, which involves revegetation of the degraded site, is aimed to provide compensation for the loss of the two mature trees and the loss and disturbance of riparian habitat caused by development activities. Overtime, the restoration efforts will hopefully surpass the pre-existing habitat conditions prior to the re-development of the property. Restoring the function of the riparian area is anticipated to take many years and will require ongoing maintenance and stewardship by the Owners to help ensure the success of the mitigation plan.

This Mitigation Plan provides general prescriptions for site preparation and revegetation, as well as recommendations for the maintenance and monitoring of the revegetated areas.

7 CONCLUSION

Overall, the measures to protect the SPEA and the proposed Mitigation Plan will help mitigate against the environmental impacts caused by development activities within the SPEA. The proposed development within the SPEA has caused the direct loss of 70 m² of riparian habitat adding to the cumulative impacts around Kootenay Lake. As the restoration areas become established with native species, the riparian function will be improved and generally restored along the foreshore over time.

Sincerely,



Chanel Gagnon, B.Sc., B.I.T.
chanel@masseenvironmental.com



Fiona Lau, BTech., ASCT.
Masse Environmental Consultants

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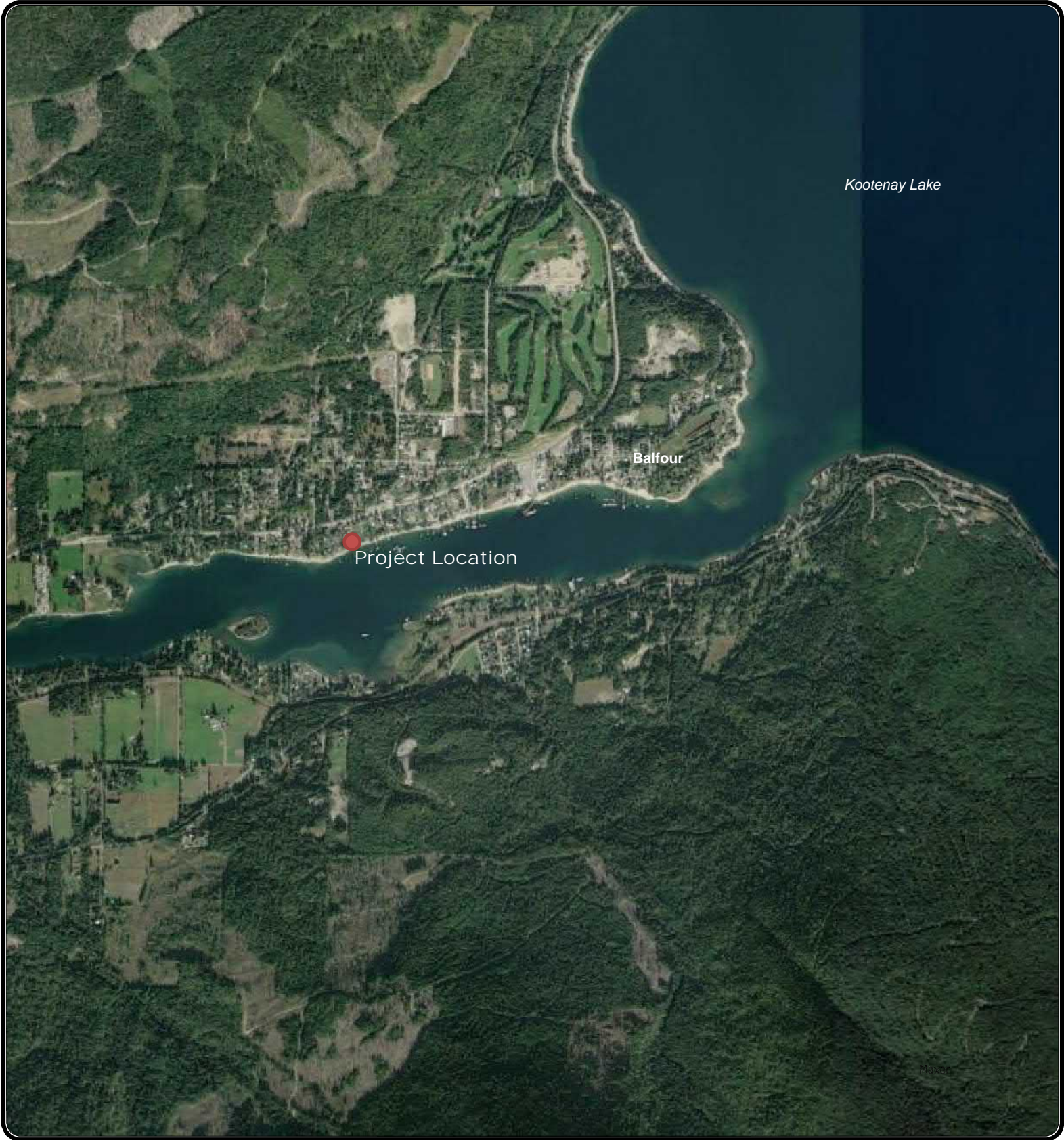
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Schleppe, J.¹, and S. McPherson². 2022. Kootenay Lake Foreshore Integrated Management Planning. Prepared for Living Lakes Canada. Prepared by: Ecoscape Environmental Consultants Ltd.¹, and Lotic Environmental Ltd.²

APPENDIX 1. SITE LOCATION MAP

RDCK Map



REGIONAL DISTRICT OF CENTRAL KOOTENAY
Box 590, 202 Lakeside Drive,
Nelson, BC V1L 5R4
Phone: 1-800-268-7325 www.rdck.bc.ca
maps@rdck.bc.ca

Legend

 Electoral Areas

Project Location Map 7642 Hwy 3 A, Balfour BC

Map Scale:

1:36,112

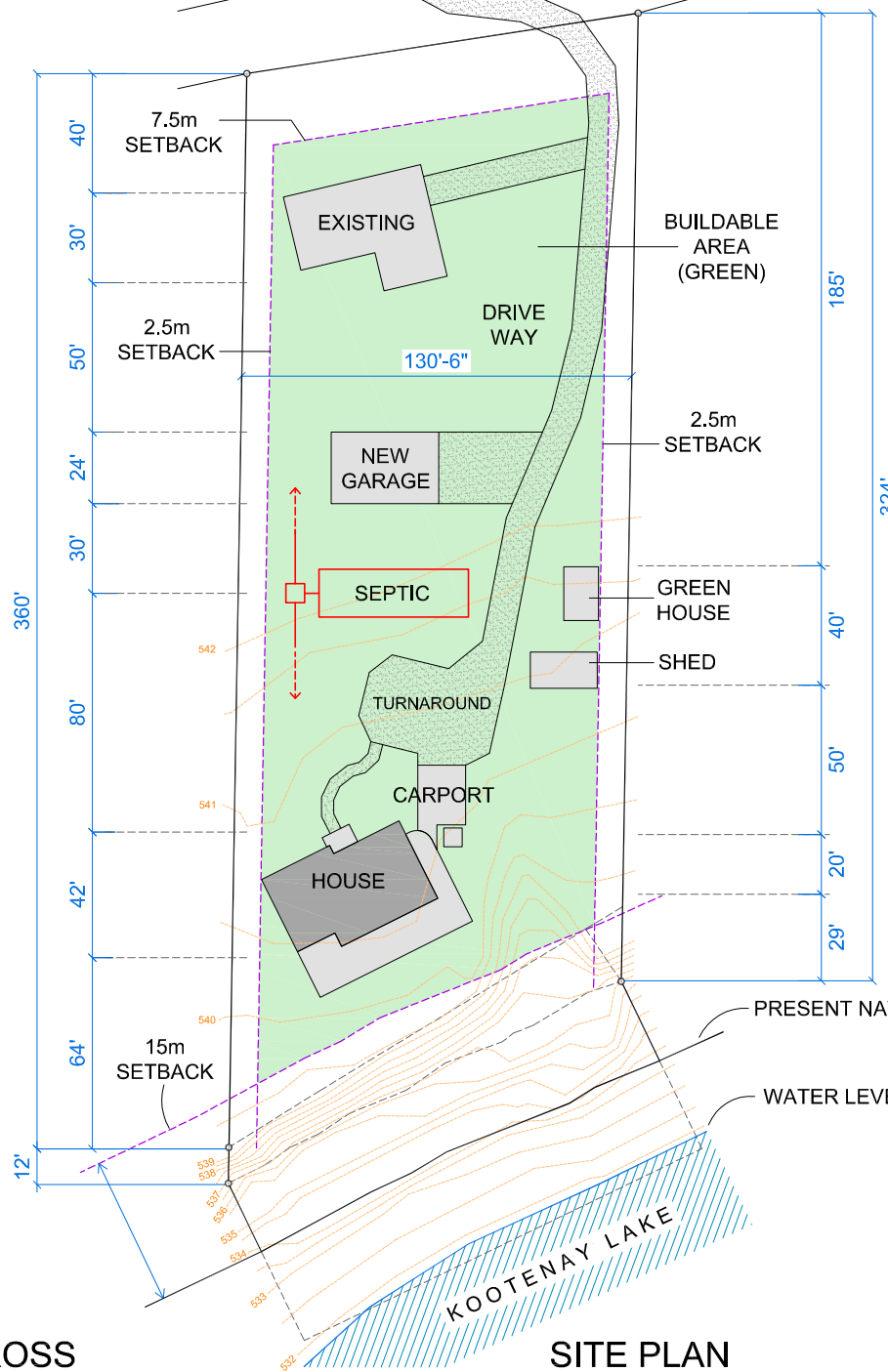
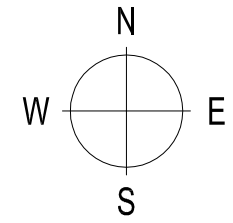
Date: September 18, 2023



The mapping information shown are approximate representations and should only be used for reference purposes. The Regional District of Central Kootenay is not responsible for any errors or omissions on this map.

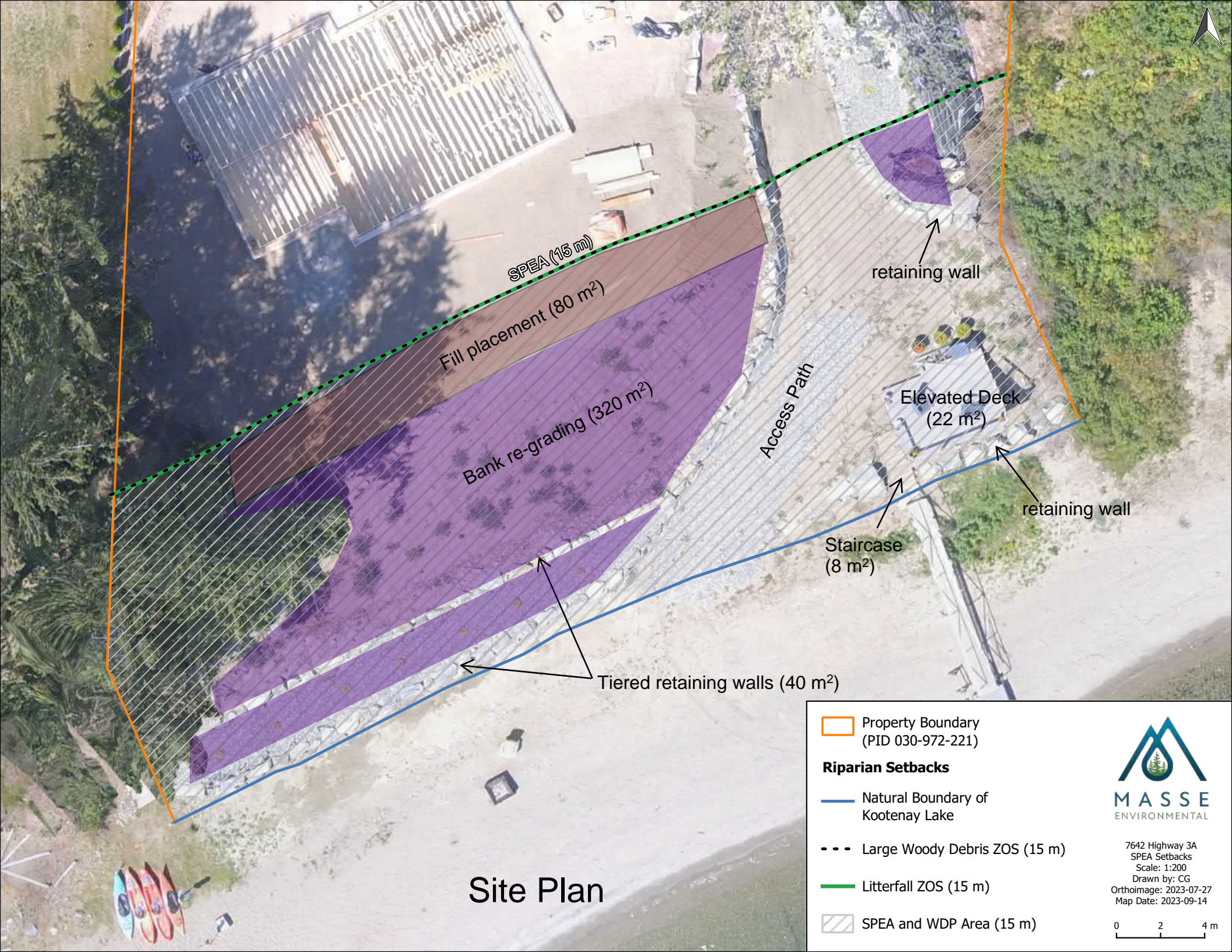
APPENDIX 2. SITE PLAN

HWY 31A




CONTOUR LINES AT 0.5m (19-5/8") INTERVALS


APPENDIX 3. SPEA MAP AND PROPOSED (COMPLETED) DEVELOPMENT WITHIN SPEA/WDA AREA





Site Plan


 Property Boundary (PID 030-972-221)


Riparian Setbacks

 Natural Boundary of Kootenay Lake

 Large Woody Debris ZOS (15 m)

 Litterfall ZOS (15 m)

 SPEA and WDP Area (15 m)



7642 Highway 3A
SPEA Setbacks
Scale: 1:200
Drawn by: CG
Orthoimage: 2023-07-27
Map Date: 2023-09-14

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APPENDIX 4. ARCHAEOLOGICAL CHANCE FIND PROCEDURE.

Chance Find Procedures for Archaeological Material

This document provides information on how a developer and/or their contractor(s) can manage for potential archaeological material discoveries while undertaking construction and/or maintenance activities. This document can provide assistance to in-field contractors in the identification of archaeological remains and the procedures to follow if a discovery is made. The discovery of human remains initiates a different course of action and is outlined separately.

Under the provincial *Heritage Conservation Act (HCA)*, archaeological sites that pre-date 1846 are automatically protected whether on public or private land. Protected sites may not be damaged, altered or moved in any way without a Section 12 or 14 Permit as issued through the *HCA*. It is illegal to collect or remove any heritage object from an archaeological site unless authorized to do so under permit.

1. Activities occurring outside of known Archaeological Sites:

When archaeological material is encountered outside of known archaeological site areas work in the vicinity must stop immediately no matter what type of material or feature has been identified. Alteration to an archaeological site can only occur under a Section 12 (Site Alteration Permit) or Section 14 (Heritage Inspection Permit) *Heritage Conservation Act* permit. Such permit applications should be prepared by a professional archaeologist.

If archaeological material is discovered during the course of construction activities:

1.1 Stop Work: Halt all work in the area of the discovery and safely secure the area. Contact the project manager or site foreman.

1.2 Contact an Archaeologist: An archaeologist should be contacted as soon as possible. For a list of qualified archaeologists in the area, the proponent is directed to the BC Association of Professional Consulting Archaeologists website: www.bcapa.ca. The proponent may also wish to contact the Ktunaxa Nation Council's Archaeology Technician Nathalie Allard for direction (1-250-426-9549; nallard@ktunaxa.org).

1.3 Archaeologist provides guidance: The archaeologist will direct the proponent on the next courses of action, which will include notifying the Archaeology

Branch and First Nations with interest in the area.

2. Activities Occurring within Known Archaeological Site Boundaries:

Land altering activity within a previously recorded archaeological site must be conducted under a Section 12 HCA Site Alteration Permit (SAP), in some cases with an onsite archaeological monitor. It is common for additional archaeological material and features to be encountered during activities occurring within previously recorded archaeological sites. Minor finds (lithic flakes, diffuse charcoal or fire altered rock) may not require work to stop, however significant finds require a level of assessment by a professional archaeologist, and it is up to the onsite project manager to determine the level of significance based on criteria presented below.

2.1 Significant Cultural Finds that Require a Professional Archaeologist (described in detail in Section 4)

- Intact archaeological features, which can include but are not limited to hearths, cultural depressions (e.g. cache pits, house depressions) and rock alignments or forms (e.g. tipi rings, cairns, blinds)
- Significant archaeological materials, which include but are not limited to, the presence of formed lithic tools (e.g. projectile point, microblade core, scraper), a dense concentration of lithic waste flakes, or artistic items
- Human Remains (described in detail in Section 3)

2.2 Archaeological Site Management Options

- 2.2.1 **Site Avoidance:** If the boundaries of a site have been delineated, redesign the proposed development to avoid impacting the site. Avoidance is normally the fastest and most cost effective option for managing archaeological sites. Site avoidance could also be achieved through minimizing ground disturbance by looking for alternative constructive methods.
- 2.2.2 **Mitigation:** If it is not feasible to avoid the site through project redesign, it is necessary to conduct systematic data collection and analysis within the site prior to its loss. This could include surface collection and/or excavation. This work can be time-consuming and therefore expensive to conduct.
- 2.2.3 **Protection:** It may be possible to protect all or portions of the site which will be impacted through installation of barriers during the development period and possibly for a longer period of time. Methods for barrier construction could include fencing around site boundaries or applying

geotextile to the ground surface and capping it with fill. The exact method used would be site-specific.

3. Chance Find Procedures for Identified Human Remains

Procedures in the event of the discovery of human remains during construction are covered in depth by an Archaeology Branch Policy Statement, found on their website at www.for.gov.bc.ca/archaeology, and are summarized below.

- 3.1 Stop all construction activities immediately in the area of found or suspected human remains and contact the RCMP and/or Office of the Coroner.
- 3.2 The coroner must determine whether the remains are of contemporary forensic concern or archaeological/aboriginal.
- 3.3 If the remains are found to be of aboriginal ancestry then the next step involves the relevant First Nations collaboratively determining the appropriate treatment of those remains.

The key to respectfully dealing with ancient aboriginal remains is to involve the appropriate First Nations as early as possible in the process. However this must be done in a manner that does not interfere with the coroner's office ability to conduct their business in the manner that they see fit.

4. Site Identification Guide

The following are characteristics typical to site types found within the Ktunaxa Traditional Territory.

4.1 Artifact Scatters

Lithic (stone) scatters from the production and maintenance of stone tools are the most common type of archaeological site found in the region. Other materials that may be represented in artifact scatters are Fire Broken Rock (FBR), bone, antler and tooth.

Lithics: What to look for

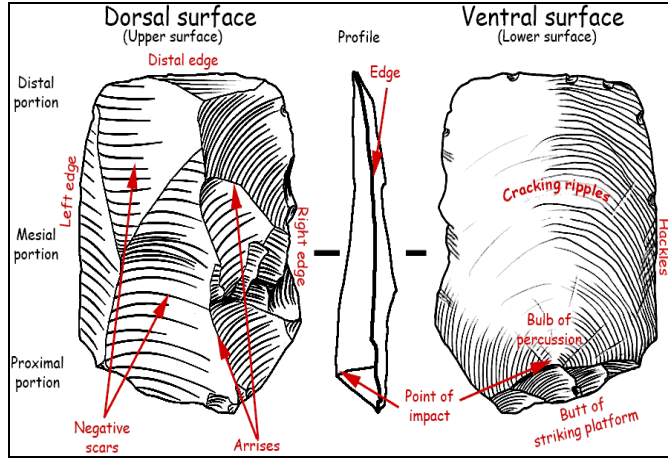


Image 1: Basic flake morphology



Image 2: Examples of lithic flakes

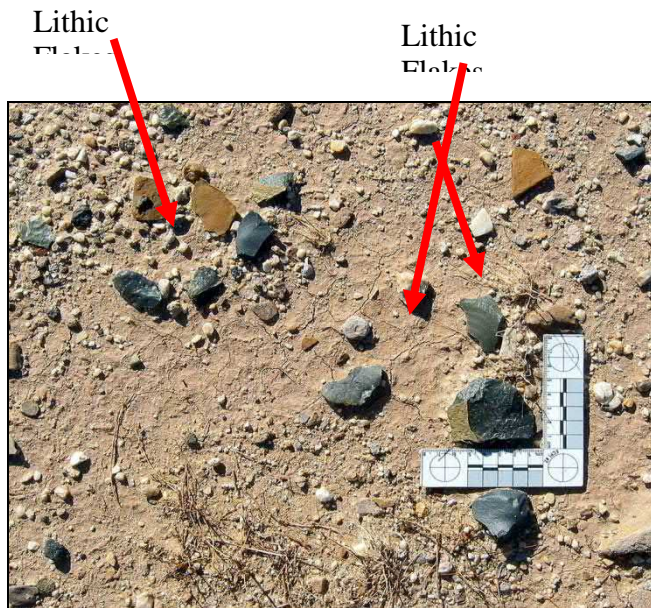


Image 3: Example of lithic scatter found on ground surface



Image 4: Example of formed lithic artifacts

Zakōqnuuk

Zaqam

Lower Kootenay

Tobacco Plains



Image 5: Ground stone artifacts

Bone, Tooth and Antler Artifacts: What to Look For

- Obvious shaping
- Incising
- Unnatural holes



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Lower Kootenay

Tobacco Plains

Image 6: Bone and Antler artifacts

4.2 Fire Broken Rock and Hearths

Fire-broken rock (FBR) results from the use of fire during cooking, heating and processing activities. FBR is often associated with other features including hearths and cultural depressions, but can also be thinly scattered in concentrations away from the features with which they were first associated.

When looking for FBR, note concentrations of roughly fractured rock from rapid heating and cooling, rock showing signs of burning or oxidation and/or reddening or blackening of surrounding matrix.



Image 7: Example of FBR; note the zig/zag pattern of breakage common to FBR. A hearth feature is evidence of a fire pit or other fireplace feature of any period. Hearths were used for cooking, heating, and processing of some stone, wood, faunal, and floral resources and may be either lined with a wide range of materials like stone or left unlined. Occasionally site formation processes (e.g., farming or excavation) deform or disperse hearth features, making them difficult to identify without careful study.

Hearths: What to look for

- FBR
- reddening or blackening of the associated soil/sediment
- charcoal
- layering of FBR and charcoal, and
- depressions in the earth associated with FBR, reddened or blackened matrix and charcoal.

Takisqnuuk

Taqam

Lower Kootenay

Tobacco Plains



Image 8: Example of a hearth uncovered along the wall of an excavation unit

4.3 Cultural Depressions

Any depression seen on the ground surface that appears to have been excavated by man can be a cultural depression and have archaeological significance. These “pits” were dug for a variety of reasons such as for food storage, cooking or as a base for a dwelling.

They can range in size from 1m across to 7-10m across, and are usually found associated with other artifacts such as FBR and lithic scatters.

To identify a cultural depression, look for:

- Subtle to deep scours on the ground surface that are circular to rectilinear in shape
- A raised rim along the edge of a depression
- Depressions associated with artifacts and FBR
- Depressions associated with fire reddening and blackening of the matrix

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Lower Kootenay

Tobacco Plains



Image 9: Example of a large cultural depression in a natural setting

4.6 Rock Alignments

There are several types of rock alignments that occur within the culture area, which include tipi rings, medicine wheels, cairns and blinds. When attempting to identify rock alignments, look for a group of rocks that look purposefully placed as in a circle, pile or line; isolated groups of rock that do not seem to belong to that landscape; and/or rocks which form a pattern.



Image 10: Example of a Cairn or piling of rocks



Image 11: Example of a tipi ring in a natural setting

Takisánuuk

Taqam

Lower Kootenay

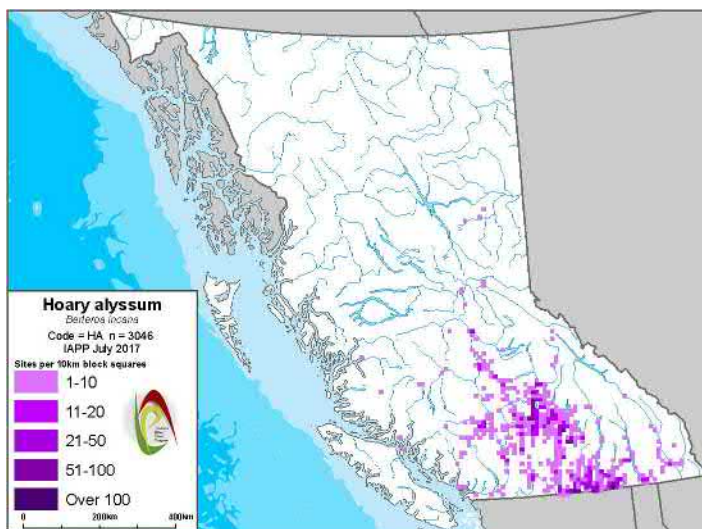
Tobacco Plains

APPENDIX 5. HOARY ALYSSUM FACTSHEET

Hoary Alyssum *Berteroa incana*

Legal Status

Invasive Plants Regulation, Forest and Range Practices Act; Noxious Weed (Regional), BC Weed Control Act



Fruits: Flattened oval seed pods are chambered, 5-6 mm in length, held close to the stem, and have star-shaped hairs. Each chamber contains 5-7 black seeds. Seeds are 2-3 mm in length and aligned in rows in chambers. Styles remain, leaving a prominent point at the tip.

Similar Non-Native Species: (i) Pale alyssum (*Alyssum alyssoides*); (ii) desert alyssum (*Alyssum desertorum*); (iii) wall alyssum (*Alyssum murale*); and (iv) falseflax (*Camelina sativa*). All similar species can be differentiated by seed head size, number of seeds per chamber, flower colour, or location of pods on the stem



Distribution

Hoary alyssum is currently found in South-Central and Southeastern BC including the Okanagan, Cariboo, Boundary, Thompson, and Kootenay areas.

Identification

Flowers: Small (5-8 mm in length), white flowers with deeply notched petals that are carried on slender stalks. Sepals are hairy and transient.

Stems: Multiple or single (annual) erect, thin stems arise from the base of the plant and branch near the top. Stems are covered in whitish, star-shaped hairs and range from 0.3 to 1.1 m in height. Plants may be fully branched and rounded under certain soil, nutrient, and moisture conditions.

Leaves: Upper leaves are elliptical, face upward, generally lack stalks, and clasp the stem. Lower leaves have slender stalks and are 3-5 cm in length. All leaves are gray and have star-shaped hairs that are rough to touch, like sandpaper.

Ecological Characteristics

Habitat: Prefers dry or gravelly soils and direct sunlight. Generally found at low to mid elevations in disturbed plant communities, roadside ditches, embankments, and heavily grazed pastures. Can invade dry land, irrigated alfalfa fields, and rangelands and tends to increase in forage crops following periods of drought or winterkill.

Reproduction: Annual, biennial, or short-lived perennial that reproduces by seed. Each plant flowers and produces a large number of seeds between early summer and fall (frost), resulting in the ability to spread rapidly. Perennial form overwinters as a rosette.

Dispersal: Seed is dispersed as a contaminant in hay and spread by vehicles, equipment, footwear, wildlife, and birds.



© The Illustrated Flora of BC

Impacts

Economic: Infestations can reduce hay quality and value.

Ecological: Can displace weak plant communities; however, hoary alyssum's potential to invade healthy, natural plant communities is unknown.

Animal Health: Toxic to horses, it can cause fever, limb edema, and laminitis. Sensitivity varies when small or single doses are ingested, and death has only been reported in horses that have consumed hay infested with a large proportion (30-70%) of hoary alyssum.

Integrated Pest Management

IPM is a decision-making process that includes identification and inventory of invasive plant populations, assessment of the risks that they pose, development of well-informed control options that may include a number of methods, site treatment, and monitoring.

Prevention

- » Report infestations:
 - Regional Invasive Species Committees: www.bcinvases.ca/about/partners/bc-stakeholders/regional-committee-map
 - Online: www.gov.bc.ca/invasive-species
 - Toll Free: 1-888-933-3722
- » Check hay or straw bales for potential contamination and monitor for hoary alyssum on both disturbed and undisturbed sites.
- » Look for seed mixtures that indicate where the seed material was collected, request only non-invasive species, and know the level of 'contamination' from your seed supplier by requesting a 'Certificate of Analysis'.
- » Ensure soil, gravel, and other fill material are not contaminated.
- » Avoid unloading, parking, or storing equipment and vehicles in infested areas.
- » Minimize soil disturbance during activities and re-vegetate exposed soil as soon as possible.
- » Remove plants, plant parts, and seeds from personal gear, clothing, pets, vehicles, and equipment. Wash vehicles, including tires and undercarriage, and equipment at designated cleaning sites before leaving infested areas.
- » Bag or tarp plants, plant parts, and seeds before transporting to a designated disposal site (e.g. landfill).
- » Maintain or establish healthy plant communities that are resistant to invasion by invasive plants.

Biocontrol

- » There are no biocontrol agents available for hoary alyssum.



Thank you to the BC Ministry of Environment and the BC Ministry of Transportation and Infrastructure for providing project funding, and to those who advised the development of these management recommendations

Mechanical Control

- » Mowing will reduce seed production, but cut plants will regenerate low to the ground below mower height. Mowing several times during the season, beginning before seed set and reducing mower height with each cutting, will improve effectiveness.
- » Small populations can be effectively controlled by repeated hand pulling or hoeing if done before seed set, the root crown is removed, and exposed soil is seeded with an appropriate seed mixture to establish competition.
- » Monitor controlled infestations throughout growing season.

Chemical Control

Herbicide recommendations and use must first consider site characteristics and be prescribed based on site goals and objectives. Herbicide labels and other sources of information must be reviewed before selecting and applying herbicides.

- » A combination aminopyralid + metsulfuron methyl or a combination of 2,4-D + dicamba are most effective. 2,4-D, dicamba, and metsulfuron methyl have shown acceptable control when applied individually. Glyphosate is effective, but it kills off other competing vegetation, creating more area for hoary alyssum seeds to germinate and grow.
- » Foliar herbicide applications are most effective when done during spring and fall, but can be applied during the summer if the plant is green and actively growing. Repeat applications will be necessary for effective control.
- » Application of pesticides on Crown land must be carried out following a confirmed Pest Management Plan (Integrated Pest Management Act) and under the supervision of a certified pesticide applicator. www.env.gov.bc.ca/epd/ipmp/



B. Stewart

References/Links

- » BC Ministry of Forests, Lands, and Natural Resource Operations, Invasive Alien Plant Program (IAPP). www.for.gov.bc.ca/hra/Plants/application.htm
- » E-Flora BC, an Electronic Atlas of the Plants of BC. www.eflora.bc.ca/
- » Toxicity to Horses, Forage Quality and Control. University of Minnesota.



Additional
Contact Info



7642 Highway 3A, Balfour, BC

Mitigation Plan



Prepared for:

Regional District of Central Kootenay

202 Lakeside Drive

Nelson, BC, V1L 5R4

Sep 18, 2023

Prepared by:
Masse Environmental Consultants
812 Vernon Street
Nelson, BC, V1L 4G4

Project Number 2023-1075

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1 INTRODUCTION

On behalf of Norm and Berva Cross (Owners), Masse Environmental Consultants Ltd. (Masse) has prepared this Mitigation Plan to accompany the Riparian Assessment Report prepared for 7642 Highway 3A, Rural Nelson, BC. Both documents form the principal components of a Watercourse Development Permit (WDP) Application for the unauthorized works. The unauthorized works includes the constructed rock retaining wall, access ramp, elevated deck structure and stairway, and removal of two trees.

This Mitigation Plan provides the details and prescriptions recommended for helping to restore the ecological values of the property (to the extent possible). It is designed to be used in conjunction with the Riparian Assessment Report and does not aim to repeat the information presented in that document unless to simplify or clarify a mitigation measure or best management practices.

The mitigation plan is proposed over two phases:

- Phase 1: Erosion and Sediment Control (Fall 2023)
- Phase 2: Riparian Revegetation (Spring 2024)

We are recommending that an interim WDP be issued for Phase 1 of the work this Fall (2023), to mitigate for any potential erosion and sediment issues on the bank.

2 IMPACT ASSESSMENT OVERVIEW AND MITIGATION PLAN STRATEGY

Unauthorized works have occurred within the WDP and Streamside Protection and Enhancement Area (SPEA) according to the Riparian Areas Protection Regulation (RAPR) criteria (MFLNRORD 2019). The Shoreline Management Guidelines for Kootenay Lake (KLP 2020) outlines general principles for shoreline development in order to achieve a “No Net Loss” of habitats present. The principle is achieved by applying the following priority sequence of mitigation options:

1. Avoidance of environmental impacts;
2. Minimization of unavoidable impacts;
3. On-site restoration of unavoidable impacts; and
4. Compensation for residual impacts.

As most of the proposed development has already been completed, this Mitigation Plan focuses on onsite restoration of impacted and degraded areas. To help mitigate for the loss and degradation of riparian habitat caused by both historical and recent development; ~453 m² will be restored through riparian revegetation.

Provided that the recommendations in this plan and the measures to protect the SPEA outlined in the Riparian Assessment Report are implemented and followed, the negative impacts associated with the unauthorized works and future use of the property will be minimized and the riparian function within the revegetated areas will be partially restored over time.

3 REVEGETATION PLAN

The proposed revegetation is designed with a focus on naturalizing the foreshore and will require appropriate growing medium and planting with native potted stock, plugs and live cuttings. The Owner has stockpiled suitable topsoil onsite for revegetation purposes. The landscape design shall provide mixed plant structure and layering, which meets or exceeds the below prescription. The proposed revegetation will require ongoing maintenance (i.e., irrigation and weeding), until it becomes naturalized over the moderate to long term. The revegetation works will occur with a two-phase approach and has been divided into four specific planting areas:

- Area 1- Foreshore Complexing (~14 m²)
- Area 2 - Lower Bench (~50 m²)
- Area 3 - Exposed Slope (~270 m²)
- Area 4 - Top of Bank (~119 m²)

3.1 Phase 1- Erosion and Sediment Control

To reduce the risk of soil erosion and sedimentation into Kootenay Lake, removal of weeds and application of seed this fall is proposed in Areas 3 and 4 and along the access path. The objective of applying the seed is to stabilize the exposed soils and prepare the area for proposed planting in the spring 2024. Refer to Table 1 for recommended seed mix. This seed mix is available at Interior Seed and Fertilizer.

Table 1. Recommended Riparian Seed Mix blend (Applied at a rate of 25 kg/ha)

Native Riparian Blend #1	% by weight	% by Species
Slender wheatgrass	25.0%	18.0 %
Streambank wheat grass	25.0%	18.0 %
Fringed brome grass	24.7%	9.0 %
Northern wheat grass	20.0 %	14.0%
Sheep fescue	3.0 %	10.0%
Tufted hairgrass	1%	11.0%
Fowl bluegrass	1%	9.0%
Yarrow	0.3%	3.0%

To reduce the risk of erosion on the access path and the potential for sedimentation into Kootenay Lake, surface flows from the upland driveway will be re-directed away from the riparian area either into existing vegetation or an onsite storm water system (ie infiltration trench).

3.2 Phase 2- Riparian Revegetation

Phase 2 of the mitigation plan includes planting of 12 trees (minimum 2 gallon pot size) and > 400 native trees, shrubs and grasses (plugs, 4" pots and/or live cuttings) within the riparian area. Revegetation prescriptions are outlined in Table 2.

Table 2. Revegetation Plan Prescription

Restoration Area	Size (m ²)	Prescription
Area 1: Foreshore complexing	~14	<ul style="list-style-type: none"> • Retain existing riparian vegetation on the foreshore. • Plant a mixture of >30 flood tolerant trees, shrubs, and grasses either cuttings, 1 gallon pots or plug size (Table 3).
Area 2: Lower bench	~50	<ul style="list-style-type: none"> • Plant a mix of >20 native trees, shrubs and grasses either cuttings, 1 gallon pots or plugs (Table 3).
Area 3: Exposed slope	~270	<ul style="list-style-type: none"> • Apply the seed mix in the fall of 2023. • Plant 6 trees (min 2 gallon pot size) on the slope. • Plant a mix of >350 native tree and shrub plugs (Table 3).
Area 4: Top of bank	~119	<ul style="list-style-type: none"> • Apply the seed mix in the fall of 2023 • Plant 6 trees (min 2 gallon pot size) along the top of the bank.

3.3 Recommended Plant Species

A list of recommended trees, shrubs and grasses that will be used for revegetation is provided in Table 3 and a plant collage is found in Appendix 2. Final species selection is at owners' discretion. The Owners plan to propagate their own plants; however, any additional plants needed can be purchased from Sagebrush Nursery located in Oliver BC (<https://sagebrushnursery.com>) or Peels Nursery located in Mission, BC (<https://www.peelsnurseries.com/>). Instructions for Harvesting, Transporting, and Storing Live Cuttings is found in Appendix 3.

Table 3. Recommended plant species for revegetation.

Common Name	Latin Name
Area 1 – Foreshore Complexing	
Trees	
lodgepole pine	<i>Pinus contorta</i>
water birch	<i>Betula occidentalis</i>
Shrubs	
mountain alder	<i>Alnus incana</i>
Red-osier dogwood	<i>Cornus sericea</i>
Sandbar willow	<i>Salix exigua</i>
Saskatoon	<i>Amelanchier alnifolia</i>
Grasses, Sedges and Rushes	
Canada bluejoint	<i>Calamagrostis canadensis</i>
Karl Foerster feather reed grass	<i>Calamagrostis acutiflora</i>
Beaked sedge	<i>Carex utriculata</i>
Baltic rush	<i>Juncus balticus</i>
Area 2- Lower Bench	
creeping juniper	<i>Juniperus horizontalis</i>
kinnikinnick	<i>Arctostaphylos uva-ursi</i>
rose sp.	<i>Rosa sp.</i>
scoulers willow	<i>Salix scouleriana</i>
Grasses	
Elijah blue fescue	<i>Festuca glauca</i>
Karl Foerster feather reed grass	<i>Calamagrostis acutiflora</i>
Area 3- Exposed Bank / Area 4–Top of slope	
Trees	
Black cottonwood	<i>Populus trichocarpa</i>
Interior Douglas Fir	<i>Pseudotsuga menziesii</i>)
Paper birch	<i>Betula papyrifera</i>
Trembling aspen	<i>Populus tremuloides</i>
Mountain Pine or other native pine	<i>Pinus uncinata</i>
Western red cedar	<i>Thuja plicata</i>
Shrubs	
Beaked hazelnut	<i>Corylus cornuta</i>
Douglas maple	<i>Acer glabrum</i>
mountain alder	<i>Alnus incana</i>
kinnikinnick	<i>Arctostaphylos uva-ursi</i>
mallow ninebark	<i>Physocarpus malvaceus</i>
oceanspray	<i>Holodiscus discolor</i>
Oregon grape	<i>Mahonia aquifolium</i>
Rose sp.	<i>Rosa sp.</i>
scoulers willow	<i>Salix scouleriana</i>
snowberry	<i>Symphoricarpos albus</i>

These species were selected based on their suitability for the property (ecoregion, exposure, and moisture regime) and based on the following resources:

- Conservation, Restoration and Stewardship of Low Elevation Brushland (GB), Grassland (Gg) and Dry Forest Ecosystems in the West Kootenay Region (McKenzie and Hill 2023).

- British Columbia FireSmart Landscaping Guide
- Invasive Species Council of BC Grow Me Instead Guide
- The EcoGarden Project Plant List for West Kootenay Gardens (CKISS N.D.)
- Riparian Factsheet No. 6 – Riparian Plant Acquisition and Planting (Ministry of Agriculture 2012).
- A Resource for Kootenay Lake Living

3.4 General Planting Guidelines

The following re-vegetation strategy is recommended:

- Refer to Appendix 4 for instructions for harvesting, transporting, and storing live cuttings.
- Conifer trees shall be planted at minimum 3 m spacing.
- Deciduous trees, shrubs and forbes will be planted at 1-2 plants per m² for smaller shrubs and 1 shrub per 2 m² for larger shrubs (McKenzie and Hill 2023). Planting in clusters vs. grid formation is preferred and produces a more natural appearance.
- Planting should occur in the early spring or fall and will not occur during the hottest summer months unless the owners are prepared to irrigate this area daily.
- Shrub and tree roots will be inoculated with mycorrhizae during installation.
- Mix 50% compost and topsoil with onsite soils into each planting hole.
- Irrigate initially and throughout the growing season (May-September) for a minimum of 3-5 years until plants are established and thereafter as required.

3.5 Environmental Monitoring

The anticipated effort for environmental monitoring and professional guidance on this project includes the following:

- QEP to provide guidance during revegetation, as required.
- QEP will conduct a post site visit once revegetation is complete to assess compliance and completion of the project and submit an environmental summary report to the RDCK.

Sincerely,



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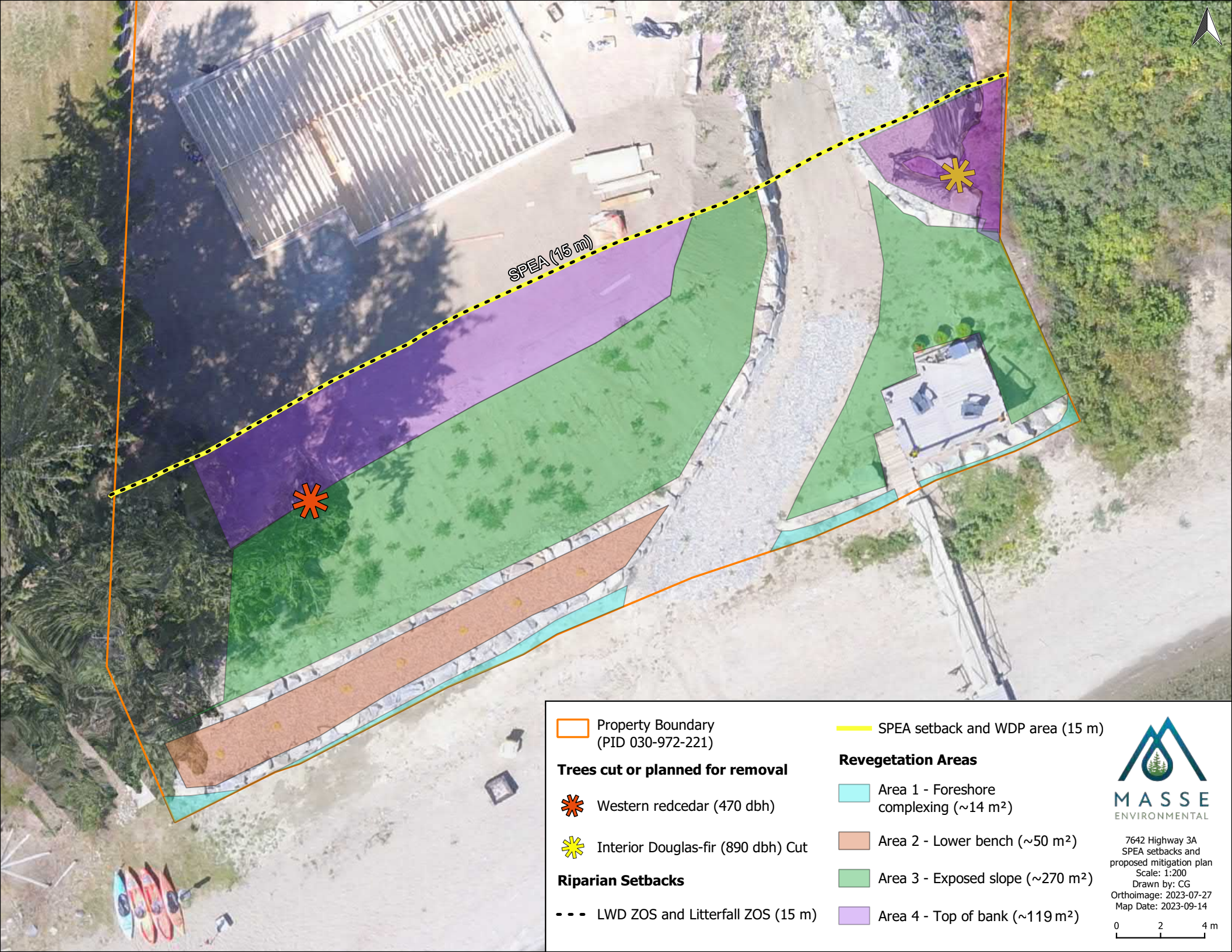
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APPENDIX 1. PROPOSED SITE PLAN



SPEA (15 m)

Property Boundary
(PID 030-972-221)

Trees cut or planned for removal

- Western redcedar (470 dbh)
- Interior Douglas-fir (890 dbh) Cut

Riparian Setbacks

- LWD ZOS and Litterfall ZOS (15 m)

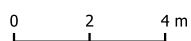
SPEA setback and WDP area (15 m)

Revegetation Areas

- Area 1 - Foreshore complexing (~14 m²)
- Area 2 - Lower bench (~50 m²)
- Area 3 - Exposed slope (~270 m²)
- Area 4 - Top of bank (~119 m²)



7642 Highway 3A
SPEA setbacks and
proposed mitigation plan
Scale: 1:200
Drawn by: CG
Orthoimage: 2023-07-27
Map Date: 2023-09-14



APPENDIX 2. NATIVE PLANT COLLAGE



Kinnikinnick



Ocean Spray



Mallow Ninebark



Creeping juniper



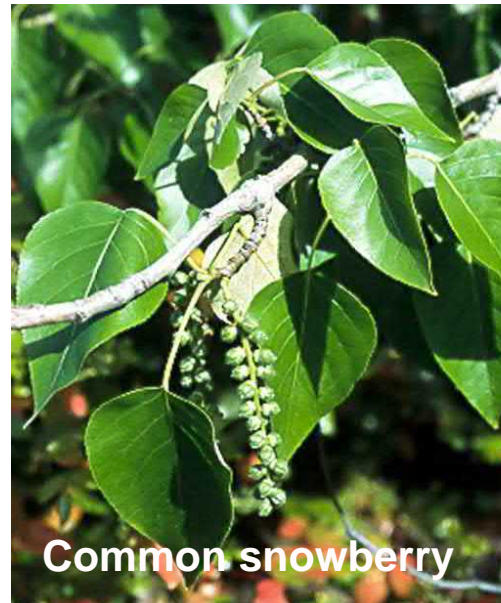
Red Osier Dogwood



Sandbar willow



Mountain alder



Common snowberry



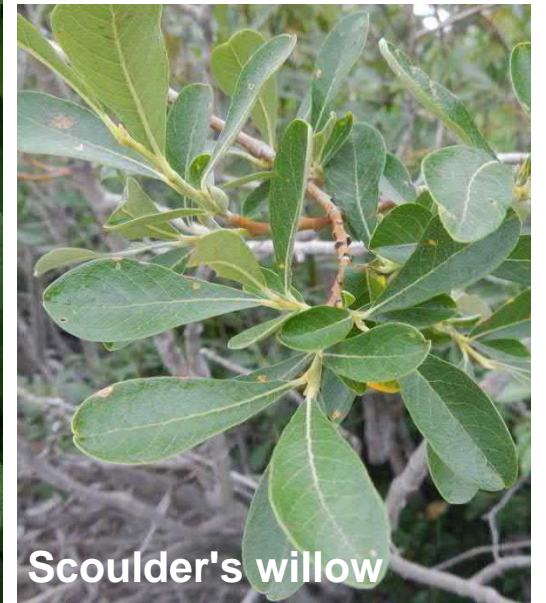
Common snowberry



Douglas Maple



Rose



Scouler's willow



Lodgepole pine
Dinwoodie



Western red cedar



Mountain pine



Karl Foerster Feather
Reed Grass



Elijah Blue
Fescue



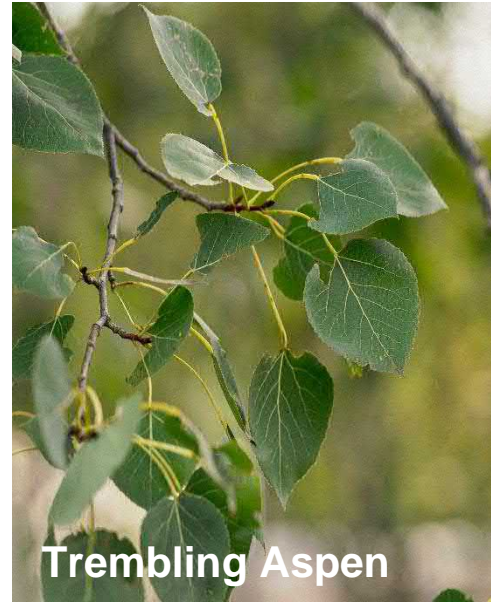
Lewis's Mock Orange



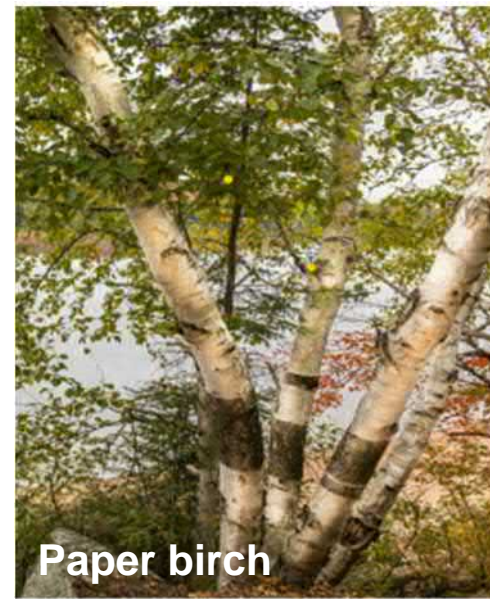
Douglas Fir



Water Birch



Trembling Aspen



Paper birch



Beaked hazelnut

APPENDIX 3. INSTRUCTIONS FOR HARVESTING, TRANSPORTING, AND STORING LIVE CUTTINGS

Instructions for Harvesting, Transporting, and Storing Live Cuttings

for

Vegetating and Stabilizing Streambanks

Phil Balch

October 2008



INTRODUCTION

Live cuttings are leafless stem cuttings of woody plant species. These cuttings can be planted in various configurations to achieve certain vegetative and stabilization goals. The planting method(s) will be specified in the project or planting design. These methods may include: live siltation, brush layering, branch packing, brush mattress, live stakes, live poles, vegetated geogrids, live crib-walls, joint planting, live fascines, and many others.

Willow and cottonwood cuttings are commonly used for riparian rehabilitation because they are easily established from cuttings. Although this document is primarily intended for willow species, the occasional inclusion of cottonwoods, sycamores, or other species as cuttings is acceptable. For additional species suitability, see the USDA, NRCS, publication National Engineering Handbook (NEH) Part 650. Chapter 16: Streambank and Shoreline Protection.



Cuttings can be obtained from commercial nurseries or cut from native stands located near project sites. When buying cuttings from commercial sources, the source and species shall be compatible with the planting area, i.e. native to the area and suitable for the local climate.

CUTTINGS FROM NATIVE STANDS

Native willow stands located near the project site are the best source of cuttings. On large stream systems, native willow stands are normally found on point bars directly across the river from project areas. Native stands of willow and cottonwood may have insect and disease infestations which can stress the plants. Extremely dry years or long periods of drought may also cause plant stress. This stress may reduce plant energy reserves resulting in decreased plant survival. When planning the number of cuttings to harvest, take stress indicators into account and harvest extra plants if needed.



Permission to harvest from the landowner, private or public, must be obtained prior to harvesting live cuttings.

CUTTINGS

Establishment success is significantly increased if cuttings are taken from live willows during the dormant season. This is the period between the fall leaf drop and the plant leaf budding in the spring.

See "Storage" section for procedures when harvesting well before the projected planting date.

Cutting Diameter

Cuttings shall be 1/2 inch diameter or larger depending upon the species. Ideal trees for cuttings should be from 3/4 inch to 3 inches in base diameter. Larger diameter cuttings have more energy and stored reserves than smaller diameter cuttings, but are often more difficult to place into the ground. Cuttings from 2 to 3 inches in diameter typically have the highest survival rates.

Cuttings as large as 8 inches can be used as poles instead of live stakes. Live poles provide more resistance to higher velocity flows and create roughness which reduces water velocity. However, larger diameter cuttings require longer cutting lengths and should be planted deeper in the soil. Deciding factors for selecting the cutting diameter are: stand density, size of the selected native species, and the selected planting method. When planting, cuttings should be large enough that they will not bend or break while being driven during installation. Smaller diameter cuttings, or limbs removed from larger cuttings are more suitable for brush mattresses, brush layering, branch packing, live fascines, or vegetated geo-grids.

Cutting Length

Cuttings shall have at least two leaf nodes, or bud scars, above the ground as illustrated on page 6. Cutting length is largely determined by the depth to the mid-summer vadose zone, or the area of moist soil at the lower bank. For ease of handling and transportation, cuttings should be harvested and stored at full length and then cut into shorter lengths prior to planting. Plantings should be placed on the lower portion of the streambank slope. Cuttings shall be long enough so the stem base reaches into the vadose zone. This zone extends slightly above the water surface elevation in most situations (See illustration on page 6).

- Several inches of the bottom of each cutting should be in the vadose zone.
- Each cutting should have a minimum of 2-4 buds above the ground.
- Observe the 2/3 or 3/4 rule: 2/3 to 3/4 of the cutting length should be placed below the soil surface.

Harvest of Cuttings

Once cutting size, source location is determined — and landowner permission obtained — the actual cutting process can begin. Lopping shears, pruning shears, a small wood saw, brush cutters, or a chain saw are appropriate tools for harvesting cuttings. Desired cutting size will determine the appropriate tool(s).



- Make clean cuts. Ensure all equipment is sharp.
- Use live wood at least 1 year old or older. Do not use very old or dry wood.
- Larger wood is difficult to root. The best wood is 2-5 years old with smooth bark which is not deeply furrowed.
- Avoid current year's growth. It lacks the stored energy reserves necessary to consistently sprout when planted.
- When harvesting from native stands, make sure the stand will not be denuded or destroyed by your cutting activity, most willow species will sprout and grow from base of harvested plant.
- Trim off all side branches so only the main stem remains.
- The side branches can be used in live fascines, branch packing, brush layering, etc.
- Harvested plant material shall be 3/4 inch to 3 inches in diameter at the base and 6 to 12 feet tall.
- A processing alternative, when cutting limbs into live stakes, is to cut the top of cutting with a horizontal cut and bottom of cutting with a 45 degree cut, (See illustration on page 6). This allows quick recognition of the cutting top (see Caring for Harvested Cuttings).
- Care should be taken to select plant materials that are free of physical damage, disease, and insect damage.

Caring for Harvested Cuttings

One of the most important steps in this process is the identification of **TOP** of cutting. If cuttings are planted upside down, mortality will occur. Leaf scars are the most reliable indicator to identify the cutting top. Buds emerging from leaf scar always point up. Another key is the stem. Usually, the smaller diameter end is the top of cutting; however this is not always obvious.

Transportation and Storage

After being harvested, the cuttings should be tied into bundles small enough to be easily carried by 1 or 2 people. Each bundle may contain 25 – 50 trees, depending on their size. Placing the same number of cuttings in each bundle makes it easier to count the number of harvested cuttings.

During harvesting, transportation, and storage, willow bundles should be kept moist and protected from sunlight and wind by covering or wrapping the bundles with wet burlap or a reflective moisture barrier to protect cuttings from becoming desiccated.

To minimize storage time, harvest cuttings in early spring within two to three weeks of the planned planting date. If this is not possible, cuttings can be harvested in late fall or winter and stored in a large cooler at 34-38°F until immediately prior to planting. Cuttings can be stored for several months in this manner. If cuttings are kept in a cooler, root cellar, garage, or shop floor, make sure the storage area is dark, moist, and cool at all times. Maintain a storage temperature slightly above freezing. Cuttings may be wrapped in a black tarp or plastic to be kept dark, if stored in an out building. Cuttings should be checked periodically for signs of frost damage and/or to insure that mold is not forming.



Pre-plant Soaking of Cuttings

Soaking plant material, prior to planting, significantly increases the survival rate. Prior to planting, all cuttings should be soaked for a minimum of 36 hours, regardless whether they are stored or harvested for immediate planting. Research shows that soaking the cuttings for 7 to 10 days can double the survival rate. Cuttings should be removed from water prior to root emergence from the bark. This normally takes 7 to 10 days. Soaking initiates the root growth processes within the inner layer of bark in willows and cottonwoods.



Only the bottom 1/3 of the cuttings needs to be soaked. However, soaking the entire cutting is not detrimental. Soaking can be accomplished in any container that will hold enough water to the required depth. Cuttings can also be soaked in streams, ponds, lakes, or other bodies of water. Avoid soaking cuttings in areas that are susceptible to flooding or where beavers are present.

PLANTING LIVE CUTTINGS

Spacing Considerations

Plant the cuttings about 3-4 feet apart for all live cuttings. This spacing is suitable for both within and between rows. Normally, only the lower slope should be planted with willows. Live cuttings should be

planted on the first and/or second row above the edge of water. The first row is normally planted approximately 4 feet from the waters edge at low flow. Subsequent rows should be planted an additional 3 - 4 feet up slope from the previous row. Each row should be planted on an off-set pattern from the previous row (See attached design details on pages 6 and 7).

When to Plant

Cuttings should be planted in early spring after frost has left the soil, but no later than June 1. Avoid planting cuttings or rooted stock in summer because of heat stress and a shortened growing period.

Planting Methods and Planting Cuttings

One or two-person posthole power augers, hand soil augers, planting bars, shovels, soil probes, or simply pushing or driving the cutting into moist soil are appropriate tools to plant cuttings. When planting, keep several things in mind:

- Push the cutting into the soil when possible.
- If the soil is too firm to push the cutting into the soil, the cutting can be driven into the soil using a hammer. A 2-3 pound “dead blow hammer”, or shot filled mallet, works well to drive cuttings. This type of hammer reduces the chance of splitting the cutting or stake.
- If a cutting is split while driving, trim the cutting to below the split to prevent desiccation and plant mortality.
- It is essential to have firm contact between the cutting and soil. Avoid creating air pockets around the cutting that can prevent roots from developing. Holding on to the cutting with one hand while driving reduces air pocket formation.
- Avoid damaging buds when inserting the cutting into the hole or when driving the cutting.
- If the soil is too compacted to drive the cutting, a hole can be formed by driving a rebar or other metal rod into the soil first and then placing the cutting into the hole. The hole diameter shall be smaller than the cutting diameter to prevent air pocket formation.
- Holes can be created with any of the tools mentioned at the start of this section.
- The planting depth will determine the planting method. Deeper holes will be made easier by using a power auger.
- If the hole dug is larger than the cutting, additional soil will be required to form a good soil to stem contact. Preference should be given to local topsoil to encourage mycorrhizal formation and/or nodule formation by nitrogen-fixing organisms. Do not backfill with clay.
- Carefully tamp the soil around the cutting firmly several times as you fill any drilled or augered hole.
- “Water In” the back-filled soil around large cutting holes to settle soil and provide good soil to cutting contact.



MANAGEMENT AND MAINTENANCE

Proper management is necessary to maintain healthy, competitive plants that perform the desired function. This is as important as the initial planting to ensure rehabilitation of the riparian area. Some maintenance is expected on-site for several years after planting. For the first few years after planting, vegetation should be evaluated and monitored annually, or after any flood event. Some replanting may be needed in succeeding years in order to insure the establishment of a functioning riparian corridor.

Monitoring of the site is necessary to detect any in-stream dead organic material (i.e. old logs, dead root masses, branches, etc.). In-channel organic material may cause erosive cross currents that can erode a planted streambank. If this condition develops, the organic material should be removed or repositioned. Any trimming of cuttings should be done in the dormant season so growth will not be slowed during the growing season. During the establishment period, leave standing dead branches within the plantings to reduce stream flow velocities, thus protecting the established plantings.

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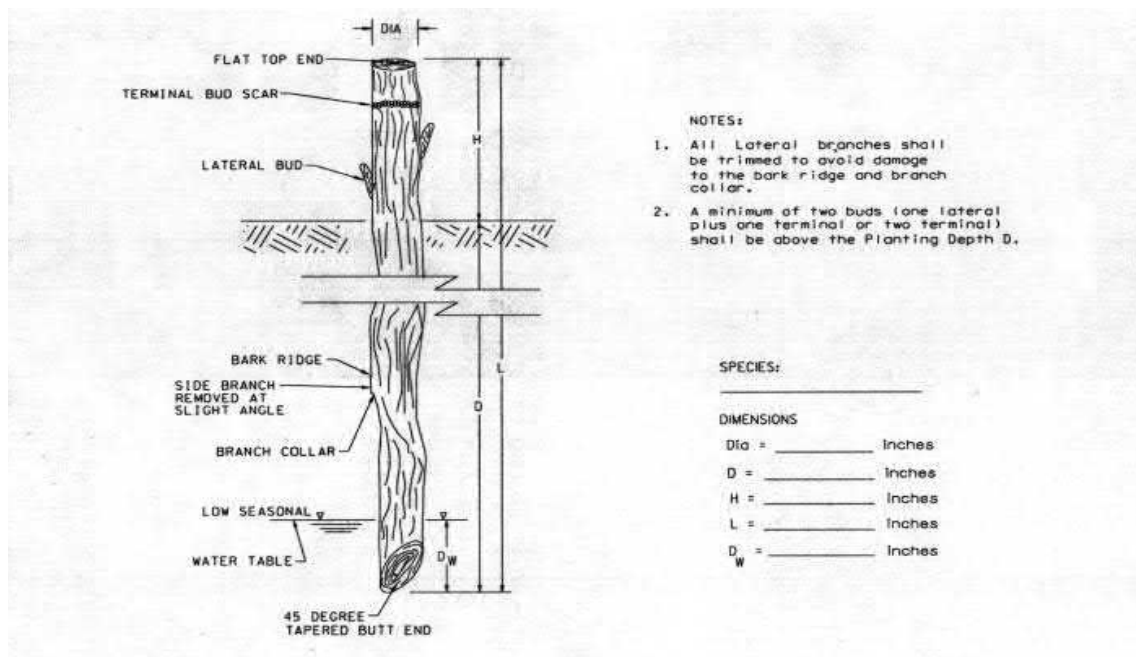
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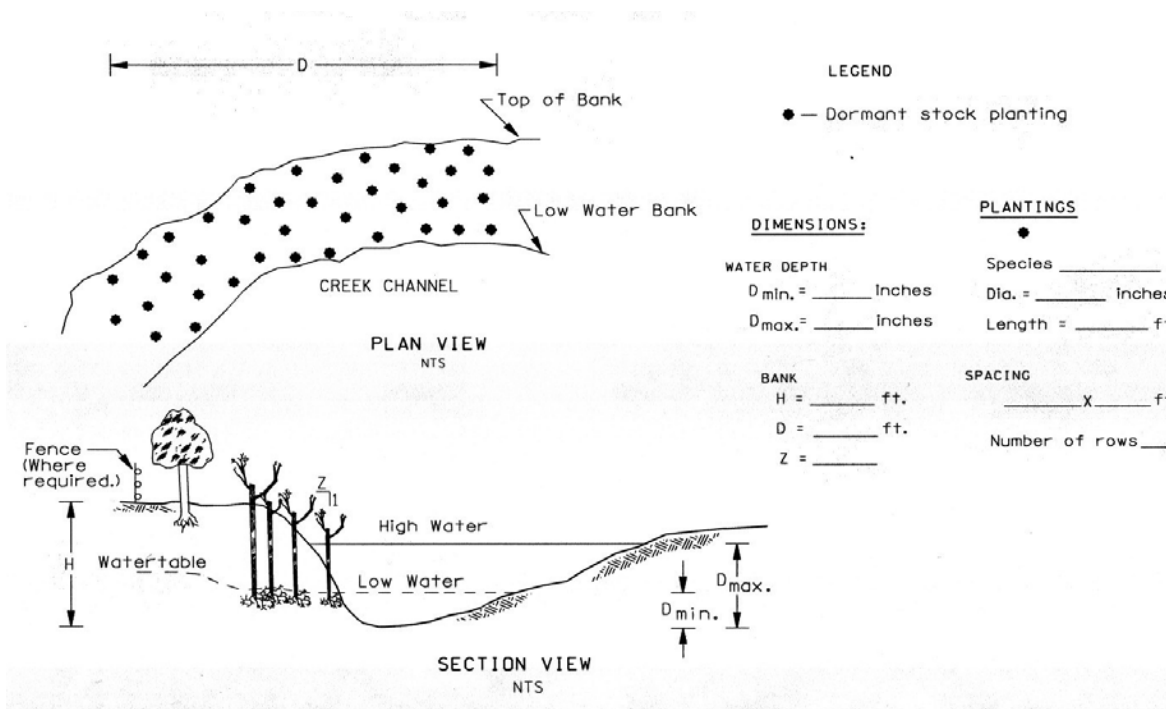
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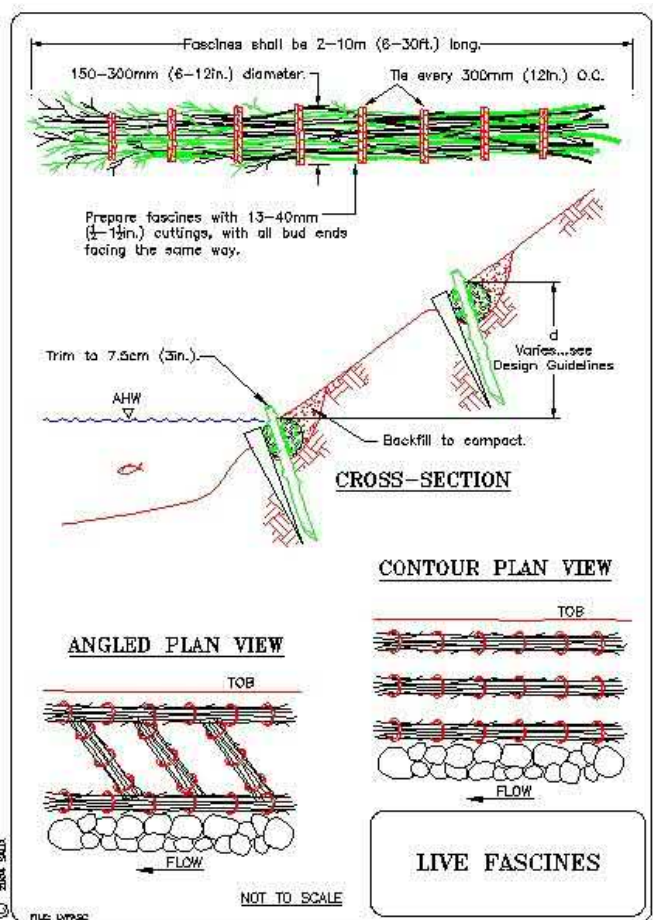
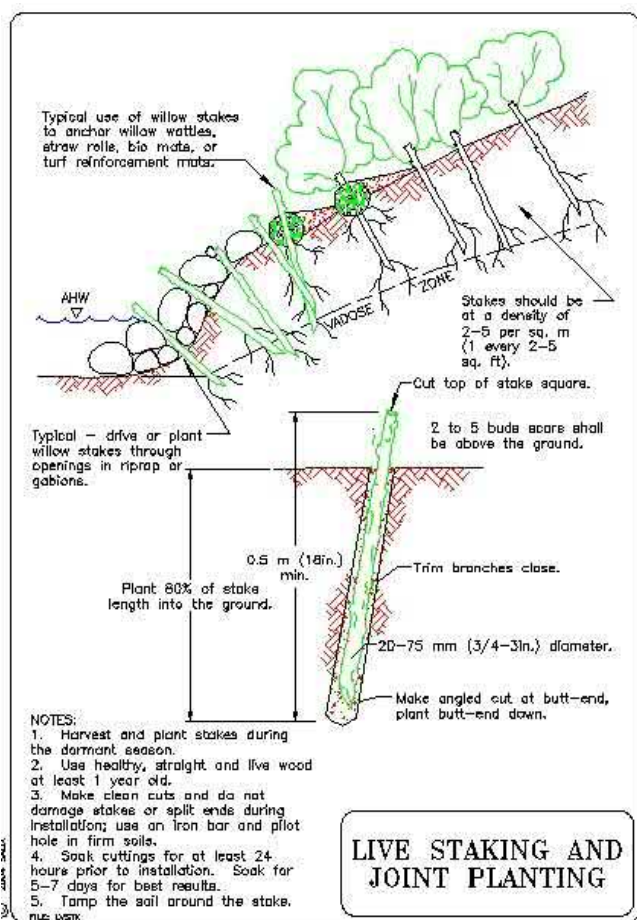
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Source – USDA – Soil Conservation Service



Source – USDA – Soil Conservation Service



Used with Permission John McCullah - Salix Applied Earthcare. Source – Environmentally Sensitive Streambank Stabilization (ESENSS).