



**REGIONAL DISTRICT OF CENTRAL KOOTENAY**  
**DEVELOPMENT PERMIT**  
**DP2309D (Ainsworth Hot Springs Ltd.)**

Date: August 10, 2023

Issued pursuant to Sections 490 and 491 of the Local Government Act

1. This Development Permit is issued to Ainsworth Hot Springs Ltd. as the registered owners (hereinafter called the “Permittees”) and shall only apply to those lands within the Regional District of Central Kootenay, in the Province of British Columbia legally described as BLOCK Z SECTION 5 TOWNSHIP 1 KOOTENAY DISTRICT PLAN 245A (PID: 006-093-931) as shown on the attached Schedules 1, 2 and 3, forming part of this Permit, referred to hereafter as the “said lands”.
2. This Development Permit is issued subject to compliance with all of the bylaws of the Regional District of Central Kootenay applicable thereto, except as specifically varied or supplemented by this Permit.
3. This Development Permit shall not have the effect of varying the use or density of land as specified in the applicable Zoning Bylaw of the Regional District of Central Kootenay, nor a Floodplain Specification under Section 524 of the Local Government Act.
4. The said lands have been designated Parks and Recreation (PR) and are located within a ‘Watercourse Development Permit Area (WDPA)’ pursuant to the *Electoral Area ‘D’ Comprehensive Land Use Bylaw No. 2435, 2016*.
5. The Permittee has applied to the Regional District of Central Kootenay for a Watercourse Development Permit in order to construct an expansion to the existing Wastewater Treatment Plant (WWTP) and a crane pad supported by a retaining structure. Pursuant to this Development Permit and subject to the terms and conditions herein contained, as well as all other applicable Regional District Bylaws, the Regional District of Central Kootenay hereby authorizes the use of the said lands for this purpose.
6. The Permittee is required to obtain approval in writing from the Regional District of Central Kootenay prior to any further disturbance, construction of any new buildings, external additions to existing structures or for any deviation from the development authorized under Section 5 and Schedule 2 of this Development Permit. Furthermore, the Permittees are hereby advised of the following requirements:
  - 6.1 The Regional District of Central Kootenay Building Department requires that the Permittees obtain a demolition permit and/or building permit prior to the removal of any existing buildings and structures, the renovation, expansion or alteration of any existing building and the construction of any new building.
  - 6.2 Development is authorized in accordance with the terms described in the report titled *“Ainsworth Hot Springs Resort Wastewater Treatment Plant Upgrades Riparian Assessment”* prepared by Masse Environmental Consultants Ltd., dated April 17, 2023 and attached to this permit as Schedule 3. Compliance with all recommendations is required. Recommendations can be categorized as follows:
    - 6.2.1 Measures to protect the integrity of the Streamside Protection and Enhancement Area (SPEA). This includes the protection of vegetation and trees within the SPEA, encroachment, sediment and erosion control, storm water management, protection of fish habitat, scheduling of environmentally sensitive activities, management of equipment and

fuel/lubricant materials and invasive plant management. All work shall be done in accordance with Sections 6 of the attached report.

- 6.2.1.1 **Protection of Trees and Vegetation in the SPEA** – The proposed work will require minimal clearing of vegetation prior to the commencement of work to accommodate construction activities. The following mitigation measures will be implemented to protect existing vegetation within the SPEA:
- Clearing of vegetation will be kept to the minimum possible area required for access, staging, construction works, restoration and safety considerations.
  - Native plant species will be retained and non- native species shall be flagged for removal by the QEP.
- 6.2.1.2 **Encroachment** - Encroachment into the SPEA is limited to the construction of the build-up area for the crane pad and restoration area. Further development beyond these areas is discouraged to preserve the function of the riparian vegetation, and to promote re-establishment of vegetation within the restoration area.
- 6.2.1.3 **Sediment and Erosion Control** - In order to prevent sediment from entering Kootenay Lake and minimize potential impacts to fish habitat, exposed soils will be minimized with respect to extent and duration. The contractor will install silt fencing around the perimeter of the proposed crane pad as shown on the Site Plan (Appendix 3)
- 6.2.1.4 **Stormwater Management** - The following measures shall be implemented:
- Crane pad will be capped with pervious non erodible material, such as gravel.
  - Ensure ditching and drainage on site are maintained to direct clean surface flows away from the road surfaces.
  - Ensure that the french drain discharge point is armoured with cobble to minimize erosion of beach materials.
- 6.2.1.5 **Protection of Fish and Wildlife Habitat** - To minimize disturbance to fish, wildlife and their habitat, the following measures will be implemented
- Adhere to sediment and stormwater best practices outlined in this report to ensure that there is no release of deleterious materials into Kootenay Lake.
  - If clearing activities will take place during the nesting bird period (early-April to mid-August), a nesting sweep conducted by a QEP is recommended prior to clearing activities commencing. If an active nest is identified during the construction works, the QEP is to be notified and develop appropriate mitigation measures.
- 6.2.1.6 **Invasive Plant Management** - Construction activities can potentially increase prevalence of invasive plant species which can outcompete native riparian vegetation, causing damage to habitat and ecosystem function. The following mitigation measures are recommended to reduce the establishment and proliferation of invasive plant species on site:
- All equipment should be thoroughly washed and inspected before entering the project site to prevent the import of new invasive plant seeds and root fragments.
  - The amount of soil disturbance should be minimized.

- Remove invasive spotted knapweed, Himalayan blackberry, and curled dock within the SPEA.
- Invasive plants shall be removed and taken off site to be deeply buried (min 2m deep) and/or disposed of at a licensed landfill facility.

6.2.2 In order to restore habitat functions within the disturbed area of the SPEA, the Revegetation Plan outlined in Section 7 of the report (Schedule 3) and shown in the "Proposed Site Plan Showing SPEA Setbacks" (Schedule 2) shall be implemented.

7. A building permit shall be required prior to any construction involving land in this location at which time the Permittees shall be required to address sewage disposal issues to the satisfaction of the Interior Health Authority and Regional District of Central Kootenay Senior Building Official.
8. As a condition of the issuance of this Permit, the Regional District shall hold an irrevocable Letter of Credit or certified cheque submitted by the Permittee in the amount of **\$6,193.00** to ensure the landscaping requirements as set forth in Section 6 are completed and in accordance with the following provisions:
  - 8.2 A condition of the posting of the Letter of Credit is that should the Permittee fail to carry out the works and services as herein above stated, according to terms and conditions of this permit within the time provided, the Regional District may use the Letter of Credit to complete these works or services by servants, agents or contractors, and any surplus shall be paid over to the Permittee. If the amount of funds is insufficient to cover the actual cost of completing the works, then the Permittee shall pay such deficiency to the Regional District immediately upon receipt of the Regional District's bill for same.
  - 8.3 The Permittee shall complete the landscaping works required by this Permit prior to April 5, 2025. Within this time period the required landscaping must be inspected by the Qualified Environmental Professional who will then send confirmation to the Regional District of Central Kootenay that the work has been done in accordance to their specifications.
  - 8.4 If the landscaping is not approved within this time period, the Regional District has the option of continuing to renew the Letter of Credit until the required landscaping is completed or has the option of drawing from the Letter of Credit to complete the required landscaping. In this event, the Regional District or its agents have the irrevocable right to enter into the property to undertake the required landscaping for which the Letter of Credit was submitted.
  - 8.5 If the landscaping is approved within this time period without the Regional District having to draw the on the Letter of Credit, 90% of the original amount of the Letter of Credit shall be returned to the Permittee.
  - 8.6 A hold back of 10% of the original amount of the Letter of Credit shall be retained until a final inspection is undertaken within 12 months of the date of the original inspection and approval was given to the landscaping. If the landscaping receives approval at final inspection, the 10% hold back will be returned to the Permittee. If after the final inspection, approval of the landscaping is not given, the Regional District has the option of continuing to renew the Letter of Credit until the required landscaping is approved or has the option of drawing on the Letter of Credit the funds to complete the required landscaping. In this event, the Regional District or its agents have the irrevocable right to enter onto the property to undertake the required landscaping for which the Letter of Credit was submitted.
9. The said lands shall be developed strictly in accordance with the terms and conditions of this Development Permit and the requirements of all applicable Regional District Bylaws as well as any plans and specifications which may, from time to time, be attached to this Permit shall form a part thereof.
10. In accordance with the Local Government Act, if the development authorized by this Development Permit is not commenced within two years of the date of this Permit, this Permit shall lapse.

11. In accordance with the Local Government Act, 'Notice' shall be filed in the Land Title Office that the said lands are subject to this Development Permit.
12. The terms of this Development Permit including subsequent amendments, are binding on all persons who acquire an interest in the said lands associated with this Permit.
13. It is understood and agreed that the Regional District has made no representations, covenants, warranties, guarantees, promises, or agreement (verbal or otherwise) with the Permittees other than those in this Development Permit. It is solely the responsibility of the Permittees to ensure that the requirements of all other applicable government agencies are satisfied.
14. This Development Permit does not constitute a building permit.
15. This Development Permit shall come into force and effect 14 days after the date of issuance unless a Waiver of Appeal is received from the Permittees at which time the Development Permit shall be deemed to be issued upon receipt of the Waiver of Appeal. OR If a Notice of Appeal is received the Development Permit shall be suspended until such time as the Board of the Regional District of Central Kootenay has decided the Appeal.

*Nelson Wight* for

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Sangita Sudan, General Manager of Development Services

August 11, 2023

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Date of Approval (date of review and approval)

August 22, 2023

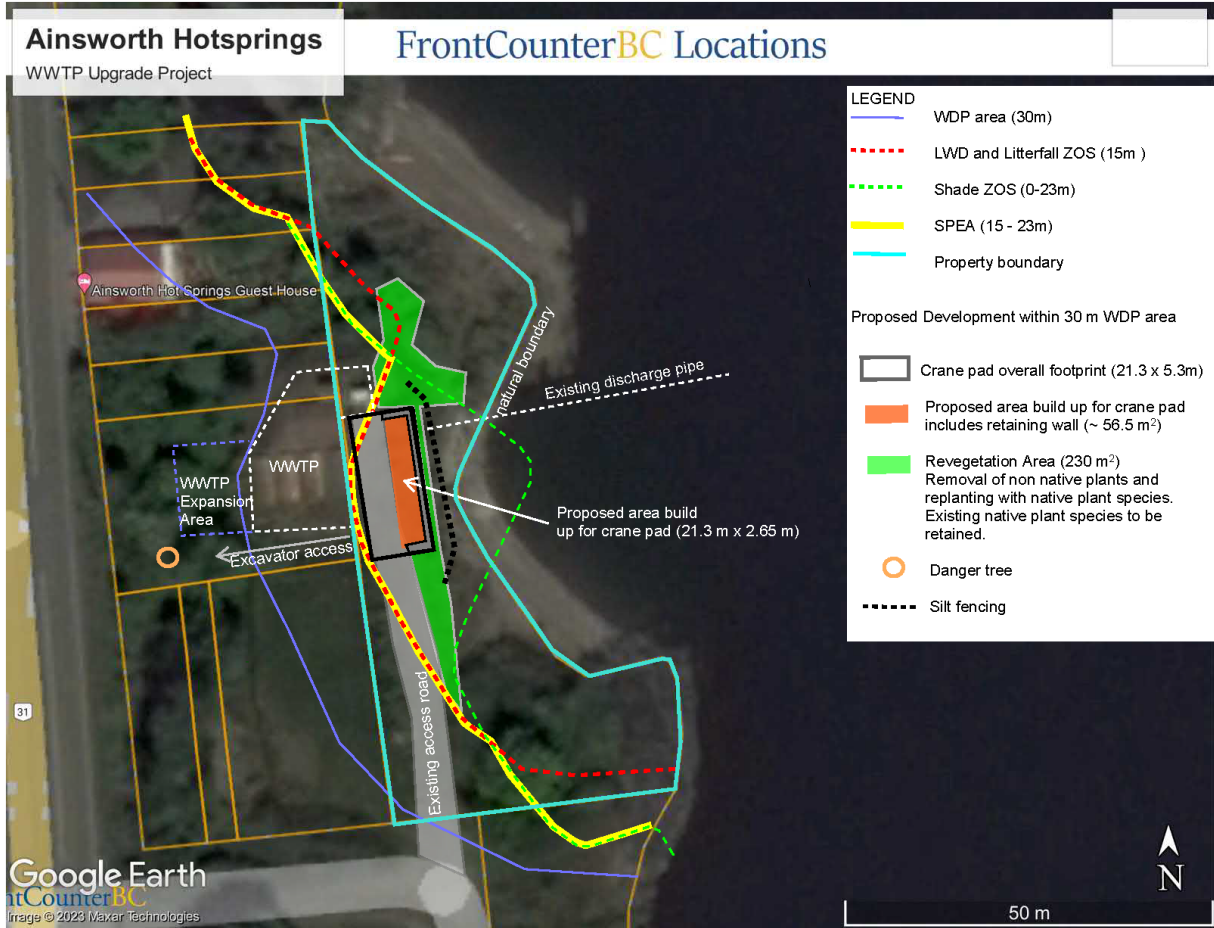
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Date of Issuance (pending receipt of securities)

Schedule 1: Location Map



**Schedule 2:** "Proposed Site Plan Showing SPEA Setbacks" prepared by Masse Environmental Consultants, dated April 17, 2023.



**Schedule 3:** *“Ainsworth Hot Springs Resort Wastewater Treatment Plant Upgrades Riparian Assessment”*  
prepared by Masse Environmental Consultants Ltd., dated April 17, 2023



# Ainsworth Hot Springs Resort Wastewater Treatment Plant Upgrades Riparian Assessment



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

April 17, 2023



Prepared by:  
Masse Environmental Consultants  
812 Vernon Street  
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Project Number 2019-702

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### 1 INTRODUCTION

Masse Environmental Consultants Ltd. was retained by the Ainsworth Hot Springs Resort to conduct a riparian assessment to accompany an application for a Watercourse Development Permit (WDP) on their waterfront property in Ainsworth, BC (PID 006-093-931, Block Z Section 5 Township 1 Kootenay District Plan 245A). This lot provides the only access to the waste water treatment plant (WWTP) for the Ainsworth Hot Springs Resort sited on the adjacent uphill property to the west (PID 006-095-402, Block D Plan NEP245A Township 1 Section 5 Kootenay Land District Parcel C). The proposed work on the waterfront lot includes widening a portion of the access trail using a lock block retaining wall to accommodate a permanent crane pad to allow for the installation of WWTP components (concrete tanks) and future maintenance activities.

A site visit was completed on April 11, 2023, by Fiona Lau B.Tech., A.Sc.T. and Beth Newbery B.Sc., B.I.T, to conduct a riparian assessment for the proposed crane pad and concrete lock block retaining wall. The riparian assessment evaluates the existing conditions of the riparian area for 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 environmental values. It is based on the following regulatory framework and best management practices documents:

- RDCK Electoral Area 'D' Rural Official Community Plan Bylaw No. 2435, 2016
- British Columbia Riparian Areas Regulation
- British Columbia Water Sustainability Act
- British Columbia Wildlife Act
- Federal Fisheries Act
- Federal Migratory Birds Convention Act
- Requirements and Best Management Practices for Making Changes In and About A Stream in British Columbia
- Develop with Care. Environmental Guidelines for Urban and Rural Land Development in British Columbia

This report has been prepared by Fiona Lau, ASCT., and reviewed by Ico de Zwart, RPBio.

I, Fiona Lau, hereby certify that:

- a) I am a qualified environmental professional, 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 Regulation.

## 2 PROJECT OVERVIEW

### 2.1 Site Location

The subject property is located in the village of Ainsworth, BC (see Appendix 1 for Location Map), is ~0.5 acres (0.2 ha) in size and is bordered by private properties to the north, west and south, and Kootenay Lake to the east.

The project area is within the Interior Cedar Hemlock dry warm variant 1 (ICHdw1) biogeoclimatic subzone, which occurs at low-mid elevations along Kootenay Lake and Kootenay River (MacKillop and Ehman 2016). The ICHdw1 subzone is characterized by moist, warm springs, hot and dry summers and dry winters with moderately shallow snowpack. Winter rain-on-snow events are frequent and snow-free areas are common, particularly on warm-aspect sites. The ICHdw1 is a highly productive biogeoclimatic unit (MacKillop and Ehman 2016).

### 2.2 Existing Site Conditions

The property has an eastern aspect and has mixed topography ranging from gently sloping areas to steeper banks up to 50% slope along the edge of the access road. The property has been partially disturbed by historical land clearing activities and access road construction, and most recently non-native plant removal within the proposed crane pad area (Photos 1-2).

#### 2.2.1 Watercourses

Kootenay Lake borders the subject property along the east boundary; it is a long, narrow and deep lake with a surface area of approximately 400 km<sup>2</sup>. 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. Kootenay Lake typically experiences one seasonal water level increase annually, which occurs in the late spring and early summer months (late May through July). Lake levels can vary up to 4 m throughout the year, affecting the extent of exposed shoreline.

During the site visit, the visible high-water mark (HWM) of Kootenay Lake was confirmed at ~534 m elevation (Parcelmap BC 2023; Crowsnest Engineering 2023). Based on the definition of natural boundary,

the natural boundary line shown on the site plan (Appendix 3) will be used as the HWM from which the streamside protection area setbacks will be determined as per the Riparian Area Protection Regulation.

“Natural Boundary” means the visible high water mark of any lake, river, stream or other body of water is 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 body of water a character distinct from that of its banks, in vegetation, as well as in the nature of the soil itself (MOE 2016).”

### 2.2.2 Existing Development

Existing development within the riparian assessment area (30 m from the natural boundary of Kootenay Lake) includes a WWTP, associated infrastructure and a ~3 m wide access trail off Water Street along the waterfront to the plant (Photos 1-4). An effluent discharge pipe transects the property and discharges treated wastewater into the lake (Photo 5).



Photo 1. View of existing access road to waste water treatment plant, looking north.



Photo 2. View of slope between Kootenay Lake and access trail, looking south.



Photo 3. View of WWTP and expansion area looking north.



Photo 4. View of WWTP looking east.



Photo 5. View of existing WWTP discharge line entering Kootenay Lake.

### 2.3 Proposed Development

The proposed development within the 30 m WDP area of Kootenay Lake involves the construction of a 21.3 m long x 5.3 wide permanent crane pad with lock block retaining wall sited partially within the existing trail footprint. An area of 21.3 m x 2.65 m is proposed to be built up along the east side of the trail towards the foreshore to support the crane pad. The proposed encroachment within the WDP area totals a footprint ~56.5 m<sup>2</sup>. The crane pad construction will involve removal of existing native soils within the footprint and constructing the crane pad with structural gravel and sand with layers of geogrid material.

Refer to Appendix 2 for Engineering Design and Appendix 3 for Proposed Site Plan.

The WWTP is undergoing a significant upgrade and requires the construction of a crane pad to support the installation of two new large concrete tanks, which will be placed behind the existing two tanks within

the uphill adjacent lot. Alternate options for crane pad location were discussed with Doug Leduc (Maintenance Manager, Ainsworth Hot Springs Resort) along the south side of the uphill property; however, there is limited width and inadequate turning radius, and permission to encroach onto the neighbour’s property to the south was not granted. The proposed crane pad and retaining wall is sited partially within the existing access road footprint and encroaches 2.65 m towards the lake within a previously disturbed area consisting of fill material, non native sweetbriar rose (*Rosa rubiginosa*), one red osier dogwood (*Cornus sericea*) and grasses. The Owner is proposing that the crane pad be permanent, as crane use and a staging area for future maintenance of the WWTP infrastructure is expected. All works will be completed from the existing access road, with no machinery entering onto the beach area.

### 3 REGULATORY OVERVIEW

To determine whether the 30 m WDP setback from the HWM of Kootenay Lake aligns with the Riparian Area Protection Regulation (RAPR) criteria, a detailed assessment of the subject property was conducted to calculate the Streamside Protection and Enhancement Area (SPEA) setbacks. 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 0 m – 23 m from the HWM from Kootenay Lake. 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 15-23 m.

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

Feature Type	SPVT <sup>1</sup>	Zones of Sensitivity			SPEA <sup>3</sup>
		LWD <sup>2</sup>	Litter fall	Shade	
Kootenay Lake	TR	15 m	15 m	0-23 m	15-23m

<sup>1</sup> SPVT: site potential vegetation type (TR-tree)

<sup>2</sup> LWD- large woody debris

<sup>3</sup> SPEA- streamside protection and enhancement area

#### 3.1 Kootenay Lake Shoreline Management Guidelines

The Kootenay Lake Foreshore Inventory Mapping (FIM) and the Kootenay Lake Shoreline Management Guidelines documents (Schleppe and McPherson 2022; Schleppe and Cormano 2013, KLP 2020) were used to help determine site-specific risks for riparian habitat, Ktunaxa Nation cultural values, and archaeological resources along the shoreline. The property is within FIM segment 54.



Table 2. Aquatic and archaeological risk results.

Aquatic Habitat Index Rating (AHI)	Aquatic Sensitivity	Archaeological Risk	Enhanced Engagement Required
Low	Yes	high	Yes

The subject parcel 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). Archaeological Chance Find Procedures are provided in Appendix 4.

#### 4 ENVIRONMENTAL RESOURCES

##### 4.1 Fish and Aquatic Habitat

The foreshore of the property consists of a sloped beach (~15% gradient) with substrate consisting of mixed substrate: mostly gravel with sand, angular cobble, boulders, exposed bedrock and mineral deposits (Photo 6 and Photo 7). The mineral deposits are from the hot springs water, which have a high mineral content and have created a thin, cementitious, layer near the high-water mark. Fish habitat along this section of foreshore supports juvenile rearing habitat with larger substrates providing some cover for fish. No known kokanee spawning has been reported in this area.

Kootenay Lake supports a variety of fish species, including several species of regional interest, such as Kokanee (*O. nerka*), Rainbow Trout (*Oncorhynchus mykiss*), Bull Trout (*Salvelinus confluentus*), White Sturgeon (*Acipenser transmontanus*), Westslope Cutthroat Trout (*O. clarki lewisi*), and Burbot (*Lota lota*). A mussel survey was completed along this section of foreshore by Masse in 2017 and found no mussels present (Masse 2017).



Photo 6. View of beach looking south east.



Photo 7. View of typical substrate along the shoreline.

#### 4.2 Vegetation

The riparian area along Kootenay Lake is degraded by development activities associated with the construction of the wastewater treatment plant and access trail in 2002 and colonization of non-native plants. Foreshore areas at the north and south ends of the property are not as impacted and support a mix of native shrub and tree habitat. Native vegetation occurring along the shoreline consists of black cottonwood (*Populus balsamifera*), alder (*alnus* sp.), red osier dogwood (*Cornus sericea*) and grasses. Non native species include a fruit tree, sweetbriar rose, Himalayan blackberry, aster sp (*Symphyotrichum* sp), spotted knapweed (*Centaurea stoebe*; invasive), curled dock (*Rumex crispus*; invasive), and dandelion (*Taraxacum officinale*).



Photo 8. Sweetbriar rose and cottonwood along foreshore area.



Photo 9. Sweet briar and red osier dogwood along foreshore next to proposed crane pad.



Photo 10. Red osier dogwood and grass located along the toe of the proposed retaining wall.



Photo 11. View of riparian area looking north of proposed crane pad.

#### 4.3 Wildlife

The riparian area along Kootenay Lake provides suitable habitat for reptiles such as western skink (*Plestiodon skiltonianus*) and garter snakes (*Thamnophis* spp.) and a variety of songbirds. Woody debris was observed along the upper portion of the beach providing cover habitat for reptiles. Shrubs and deciduous trees provide potential nesting habitat for songbirds, although no nests were observed during the site visit. Black-capped chickadees (*Poecile atricapillus*) were observed flying over and resting in the shrubs within the subject property. The property lacks mature tall trees and/or snags, therefore does not provide suitable nesting or perch habitat for raptors. Mammals that may use the riparian area within the subject property include American black bear (*Ursus americanus*) and white tail deer (*Odocoileus virginianus*). No tracks or droppings were observed during the site visit.

#### 4.4 Species at Risk

BC Conservation Data Center (CDC) occurrence data and critical habitat for Federally listed species at risk were queried within iMap BC (BC 2023), using a 10 km buffer around the center point of the subject property. The query results are presented in

Table 3. Four species at risk were identified within this buffer. Potential occurrence on the property was assessed as likely, possible, unlikely, or unknown, according to known species habitat affinities and the habitat profile of the property, and in proximity to mapped occurrences.

Table 3. Species at risk with potential occurrence based on iMap BC 10 km radius query.

Common Name (Scientific Name)	Likelihood of Occurrence on Subject Property	Comment	BC Conservation Status <sup>1</sup>	COSEWIC <sup>2</sup> / SARA <sup>2</sup>
Western Painted Turtle ( <i>Chrysemys picta</i> pop. 2)	Unlikely	CDC occurrence mapped ~8.1 km southeast of the subject property in Fraser Lake (Shape ID: 96554, Occurrence ID: 12181).	Blue	SC
Western Skink ( <i>Plestiodon skiltonianus</i> )	Possible	CDC occurrence mapped ~2.32 km south of the subject property (Shape ID: 29876, Occurrence ID: 6928).	Blue	SC
White Sturgeon (Upper Kootenay River Population) ( <i>Acipenser transmontanus</i> pop. 1)	Unlikely	Found in Kootenay Lake (Shape ID: 1370, Occurrence ID: 4745). Associated with deep lakes and large rivers.	Red	E
Whitebark pine ( <i>Pinus albicaulis</i> )	Unlikely	CCD occurrence is mapped within ~8.9 km east of the subject property (Shape ID: 136836, Occurrence ID: 17125). Habitat is subalpine and timberline zones, so it is not expected at the subject site.	Blue	E

<sup>1</sup>Red = Species that is at risk of being lost (extirpated, endangered, or threatened) within British Columbia. Blue = Species considered to be of special concern within British Columbia. <sup>2</sup>(E)Endangered = Facing imminent extirpation or extinction.

(T)Threatened = Likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction.  
(SC)Special concern = May become a threatened or an endangered species because of a combination of biological characteristics and identified threats. Information sources: British Columbia Conservation Data Centre, and personal sightings.

### 4.5 Archeological and Heritage Resources

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. A review of archaeological resources on this property is outside the scope of this report. 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.

## 5 IMPACT ASSESSMENT

The proposed works were assessed based on current site conditions and proposed construction activities within the SPEA. Impacts associated with the crane pad and retaining wall within the riparian area include permanent loss of current and potential riparian habitat within the footprint of the build up area for the crane pad (~56.5m<sup>2</sup>) which includes removal of one red osier dogwood and grasses. Much of the sweetbriar rose has already been removed from within the proposed crane pad footprint. In addition, there is potential for the introduction of sediment into Kootenay Lake from disturbed areas during construction works.

To mitigate for the loss of current and potential riparian habitat, an area ~230 m<sup>2</sup> in size along the foreshore will be restored by removal of non native plant species and revegetation with native trees and shrubs (Refer to Section 7).

Provided that measures to protect the SPEA are followed, and the recommended revegetation plan is implemented, the negative impacts from the proposed works will be minimized and riparian function within the revegetation area will be restored over time.

## 6 MEASURES TO PROTECT THE INTEGRITY OF THE SPEA

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

### 6.1 Danger Trees

A paper birch tree in poor health was observed at the south-west corner of Block D lot and is close to the proposed work zone for the waste water treatment upgrade. It is recommended that this tree be assessed by an arborist to determine if it is a hazard tree. All further assessment of potential danger trees is outside the scope of this project.

### 6.2 Windthrow

No windthrow risk indicators were observed during the site visit. Further assessment of windthrow risk is beyond the scope of this report, and any such assessment should be led by a Registered Professional Forester (RPF).

### 6.3 Slope Stability

No slope stability hazard indicators were observed during the site visit. 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.

### 6.4 Protection of Trees and Vegetation in the SPEA

The proposed work will require minimal clearing of vegetation prior to the commencement of work to accommodate construction activities. The following mitigation measures will be implemented to protect existing vegetation within the SPEA:

- Clearing of vegetation will be kept to the minimum possible area required for access, staging, construction works, restoration and safety considerations.
- Native plant species will be retained and non- native species shall be flagged for removal by the QEP.

### 6.5 Encroachment

Encroachment into the SPEA is limited to the construction of the build up area for the crane pad and restoration area. Further development beyond these areas is discouraged to preserve the function of the riparian vegetation, and to promote re-establishment of vegetation within the restoration area.

### 6.6 Sediment and Erosion Control

In order to prevent sediment from entering Kootenay Lake and minimize potential impacts to fish habitat, exposed soils will be minimized with respect to extent and duration. The contractor will install silt fencing around the perimeter of the proposed crane pad as shown on the Site Plan (Appendix 3)

## 6.7 Stormwater Management

The following stormwater management measures shall be implemented:

- Crane pad will be capped with pervious non erodible material, such as gravel.
- Ensure ditching and drainage on site are maintained to direct clean surface flows away from the road surfaces.
- Ensure that the french drain discharge point is armoured with cobble to minimize erosion of beach materials.

## 6.8 Floodplain Concerns

The proposed development is located within the 15 meter floodplain setback of Kootenay Lake. The fill material proposed to be placed within the floodplain setback supports the upgrade works for the WWTP and does not support a structure. There were no floodplain concerns observed on the subject property.

## 6.9 Protection of Fish and Wildlife Habitat

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

- Adhere to sediment and stormwater best practices outlined in this report to ensure that there is no release of deleterious materials into Kootenay Lake.
- If clearing activities will take place during the nesting bird period (early-April to mid-August), a nesting sweep conducted by a QEP is recommended prior to clearing activities commencing. If an active nest is identified during the construction works, the QEP is to be notified and develop appropriate mitigation measures.

## 6.10 Invasive Plant Management

Construction activities can potentially increase prevalence of invasive plant species which can out-compete native riparian vegetation, causing damage to habitat and ecosystem function. The following mitigation measures are recommended to reduce the establishment and proliferation of invasive plant species on site:

- All equipment should be thoroughly washed and inspected before entering the project site to prevent the import of new invasive plant seeds and root fragments.
- The amount of soil disturbance should be minimized.
- Remove invasive spotted knapweed, Himalayan blackberry, and curled dock within the SPEA.
- Invasive plants shall be removed and taken off site to be deeply buried (min 2m deep) and/or disposed of at a licensed landfill facility.

## 7 REVEGETATION PLAN

To mitigate for the loss of potential riparian habitat within the SPEA, a degraded riparian area has been identified for restoration and enhancement (~230 m<sup>2</sup>; Appendix 3). Revegetation will include removal of all non-native plants, planting of 5 native trees and ~80 shrubs (including cuttings). Plants species, quantities and placement shall be determined by the Qualified Environmental Professional (QEP) assigned to the project. Plant species recommended for the revegetation area are listed in Table 4. Disturbed soils shall be re-seeded with an Interior Forestland seed mix (Table 5) to prevent erosion and establishment of invasive weeds at a rate of 25 kg/Ha.

Table 4. Recommended native plant species.

Species	Scientific Name	Pot Size
Western red cedar	<i>Thuja plicata</i>	#2 or #5
Black cottonwood	<i>Populus balsamifera</i>	#2
Paper birch	<i>Betula papyifera</i>	#2
Mountain alder	<i>Alnus incana</i>	#1 or #2
Red osier dogwood	<i>Cornus sericea</i>	live cuttings
Bebbs willow	<i>Salix bebbiana</i>	#1
Scoulers willow	<i>Salix scouleriana</i>	#1
Sandbar willow	<i>Salix exigua</i>	#1
Black hawthorn	<i>Crataegus douglasii</i>	#1 or #2
Saskatoon berry	<i>Amelanchier alnifolia</i>	#1 or #2
Blue elderberry	<i>Sambucus nigra</i>	#1 or #2
Snowberry	<i>Symphoricarpos albus</i>	#1
Oregon grape	<i>Mahonia aquifolium</i>	#1
Nootka or Wood rose	<i>Rosa nutkana</i> or <i>Rose woodsii</i>	#1

Table 5. Interior Forestland Mix

Species	Weight %
Intermediate Wheatgrass	50
Perennial Ryegrass	22
Hard Fescue	13
Annual Ryegrass	11
Canada Bluegrass	3
Red Top	1

### General Planting and Maintenance Guidelines

- Planting should not occur during periods of hot dry weather unless they are irrigated daily.
- Cuttings shall be locally sourced red osier dogwood and willow species with a minimum height of 1.5 m and minimum diameter of 2 cm.

- Install cuttings into each planting hole and ensure good contact between the cutting and soil for roots to sprout. Cuttings should be buried ~2/3 the length of the cutting and spaced >0.5m apart.
- Trees shall be spaced at >3 m apart and shrubs spaced >1 m apart.
- Minimize impact to the existing shrubs located within the revegetation area.
- Locally adapted native plants are preferable to those collected or grown outside the region. The species listed in
- Table 4 are available from Sagebrush Nursery in Oliver <https://sagebrushnursery.com> , or Nupqu Native <https://nupqu.com/native-plants-nursery-home/> near Kimberley.
- Planting holes shall be a minimum of 3 times the size of the pot.
- Compost shall be mixed into native soils in each planting hole.
- Use transplant fertilizer (ie. Mykes Mycorrhizae Tree and Shrub or similar) as per manufacturers specifications in each planting hole.
- Place bark mulch around each plant to a depth of 3" to help suppress weeds and maintain moisture in the soil.
- Seed to be spread on disturbed soils at a rate of 25 kg/ha.
- Plantings which do not survive should be replaced to ensure complete establishment of native plants, and exclusion of exotic plants.
- Regularly irrigate new plantings during the plant establishment period for a minimum of 3 years and thereafter as required.
- Pull any invasive weeds on a yearly basis prior to going to seed.

## 8 ENVIRONMENTAL MONITORING

Environmental support is recommended during the revegetation activities to ensure that the recommended measures are implemented adequately and improve the success rate.

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

- QEP to conduct site visit during the initial stages of construction to ensure that mitigation measures are implemented.
- QEP to conduct monitoring and provide guidance during the implementation of the revegetation plan, as required.
- QEP will conduct a post construction site visit once planting is complete to assess compliance and completion of the project.
- QEP will prepare an environmental summary report and submit to the RDCK.



Further effectiveness monitoring of mitigation measures may also be required. The following indicators of success of riparian plantings should be documented:

- Plant composition includes only native plant species.
- After 3 years, the survival of >75% of planted species will be a reasonable indication that the revegetation plan has been successfully completed.

## 9 CONCLUSION

Overall, the proposed development along the foreshore will cause direct loss of one red osier dogwood and potential riparian habitat. The proposed revegetation along the foreshore will help mitigate the riparian habitat loss caused by the proposed development; however, the crane pad and retaining wall are located completely within the riparian area of Kootenay Lake and will add to the cumulative impacts along the foreshore. Provided that measures to protect the SPEA are followed, any negative impacts from the crane pad and retaining wall construction to fish and wildlife are anticipated to be minimal.

## 10 CLOSURE

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

I, Fiona Lau, certify that I am qualified to carry out this assessment; and that the assessment methods under the Regulation have been followed; and that, in my professional opinion:

- (i) if the development is implemented as proposed, or
- (ii) if the streamside protection and enhancement areas identified in the report are protected from the development, and
- (iii) if the developer implements the measures identified in the report to protect the integrity of those areas from the effects of the development,

then there will be no harmful alteration, disruption or destruction of natural features, functions and conditions that support fish life processes in the riparian assessment area.


If you have any comments or questions, please do not hesitate to contact the undersigned.

Sincerely,



Fiona Lau, BTech., ASCT.

[fiona@masseenvironmental.com](mailto:fiona@masseenvironmental.com)



Ico de Zwart, RPBio

Masse Environmental Consultants

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APPENDIX 1. SITE LOCATION MAP

# RDCK Map



## Legend

### Project Location Map

### Ainsworth Hot Springs WWTP Upgrade Project

**Map Scale:**

1:100,000

Date: April 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.



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## APPENDIX 2. ENGINEERED DRAWINGS

**NOTES:**

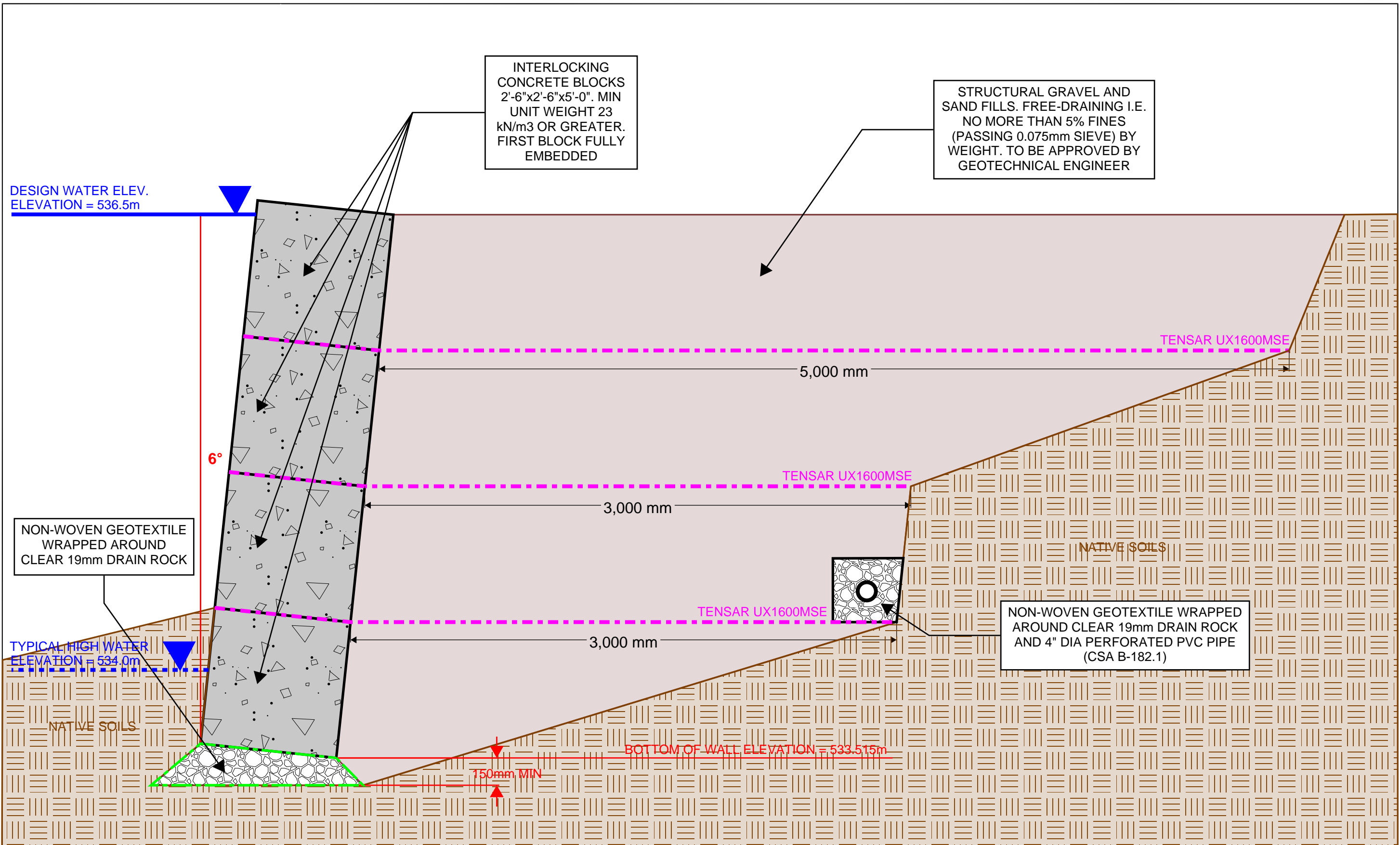
1. STATIC GLOBAL STABILITY EXCEEDS A FACTOR-OF-SAFETY OF 1.5, AND EXCEEDS 1.1 UNDER SEISMIC CONDITIONS. WALL DESIGN MEETS OR EXCEEDS ACCEPTABLE FACTORS-OF-SAFETY IN RELATION TO SOIL BEARING CAPACITY, OVERTURNING, SLIDING AT BASE, SLIP ON REINFORCEMENT, REINFORCEMENT PULLOUT AND GLOBAL SLOPE STABILITY UNDER STATIC AND SEISMIC CONDITIONS UNDER ANTICIPATED SURCHARGE AND POINT LOADS.
2. SUB-GRADE BENEATH FIRST COURSE OF CONCRETE BLOCKS TO COMPRISE UN-DISTURBED NATIVE SOILS OR WELL-COMPACTED GRANULAR BACKFILL. THE RECEIVING SURFACE SHALL BE CLEARED OF SHRUBS, TREES, LARGE ROCKS, STUMPS, ETC. DEPRESSIONS SHALL BE FILLED, AND SOFT SPOTS SHOULD BE DUG OUT AND REPLACED WITH FILL MATERIALS ACCEPTABLE TO THE GEOTECHNICAL ENGINEER. PROOF-COMPACT THE SUB-GRADE SURFACES BEFORE PREPARING THE SUB-BASE. SUBGRADE SURFACES TO BE APPROVED BY THE GEOTECHNICAL ENGINEER PRIOR TO BUILDUP.
3. MSE WALL SUB-BASE TO COMPRISE MIN. 150MM OF 19-25MM WELL-GRADED CLEAR CRUSHED GRAVEL WITH LESS THAN 5% FINES (PASSING 0.075MM SIEVE) BY WEIGHT. PLACE AND COMPACT IN LIFTS AS NEEDED TO MEET BASE OF WALL ELEVATION. SUB-BASE TO BE WRAPPED ALL-AROUND WITH A SUITABLE NON-WOVEN GEOTEXTILE (NILEX 4545 OR APPROVED EQUIVALENT).
4. IF SEEPAGE FROM BENEATH THE BASE OF WALL ELEVATION IS NOTED, NOTIFY THE GEOTECHNICAL ENGINEER FOR FURTHER REVIEW.
5. BLOCKS TO BE NOMINAL 750MM X 750MM X 1500MM, MONOLITHIC CAST CONCRETE WITHOUT VOIDS OR HONEYCOMBING. MIN UNIT CONCRETE WEIGHT OF 23 KN/M3 OR GREATER. BLOCKS OF INACCURATE DIMENSION EXCEEDING 10MM VARIANCE FROM NOMINAL WIDTH, LENGTH, OR DEPTH, AND OF TRAPEZOIDAL OR PARALLELOGRAM SHAPE SHALL BE REJECTED AND NOT USED IN ANY PART OF ANY WALL.
6. BLOCKS TO BE SET WITH A 6-DEGREE BATTER AS SHOWN ON TYPICAL SECTION DRAWING. FINISHED WALL FACES TO HAVE A MINIMUM BATTER ANGLE OF 4-DEGREES. BLOCKS WITH LESS THAN 4-DEGREE BATTER FOLLOWING COMPLETION OF ADJACENT COMPACTION ARE TO BE REMOVED AND RE-SET TO THE SPECIFIED BATTER ANGLE.
7. WALL DRAIN TO COMPRISE PERFORATED PVC DRAIN PIPE (CSA B-182.1) SURROUNDED WITH 19-25MM CLEAR ROCK AND A FULL-WRAP OF NON-WOVEN GEOTEXTILE (NILEX 4545 OR APPROVED EQUIVALENT). PIPES TO BE SET TO DRAIN TO NATURAL DEPRESSIONS IN THE FACE GRADE, TO THE ENDS OF THE WALL, OR AS DIRECTED BY THE ENGINEER.
8. PLACE SPECIFIED GEO-GRID FOR EACH LEVEL OF WALL BLOCKS. GEO-GRID TO BE INSTALLED WITH THE STRONG AXIS AS INDICATED ON THESE DRAWINGS. SPECIFIED GEO-GRID IS TENSAR UX1600MSE. BADLY DAMAGED OR IMPROPERLY HANDLED GEOSYNTHETICS SHALL BE REJECTED. MOST GEOSYNTHETICS TEND TO BE WEAKENED WHEN EXPOSED TO DIRECT SUNLIGHT OR EXTREME TEMPERATURES FOR EXTENDED PERIODS OF TIME, AND THUS CARE SHALL BE TAKEN DURING HANDLING AND STORAGE OF GEOSYNTHETICS. TRACKED EQUIPMENT IS NOT ALLOWED TO OPERATE DIRECTLY ON EXPOSED GEO-GRID, AND MAY ONLY BE OPERATED OVER GEO-GRID WHEN A MINIMUM 300MM (12") COMPACTED FILL SEPARATION LAYER EXISTS. WHERE REQUIRED, TRACKED EQUIPMENT SHALL TAKE CARE TO MINIMIZE TURNING IN ORDER TO REDUCE THE POSSIBILITY OF INDUCING SLACK IN THE GEOSYNTHETIC LAYER BELOW.
9. GEO-GRID IS TO BE STRETCHED TAUT AFTER PLACEMENT OF EACH FACING BLOCK, SUCH THAT BACKFILL OCCURS ONTO A TAUT LAYER OF GEO-GRID. HOLD GEO-GRID IN PLACE WITH STAKES OR PINS, OR USE OTHER MEANS TO RESTRAIN GEO-GRID WHEN PLACING GRAVEL AND SAND FILLS. BACKFILL IS TO BE PLACED STARTING CLOSE TO THE WALL, AND MOVING BACK AWAY FROM THE WALL FACE TO AVOID THE INTRODUCTION OF PUCKERING OR SLACK DURING CONSTRUCTION.
10. REINFORCED BACKFILL TO COMPRISE WELL-GRADED 100MM (4") MINUS GRAVEL AND SAND, WITH LESS THAN 5% PASSING THE 0.075MM (NO. 200) SIEVE BY WEIGHT. REINFORCED BACKFILL TO BE SPREAD AND PLACED IN MAX 300MM (LOOSE THICKNESS) LIFTS. REFER TO NOTES BELOW FOR PLACEMENT AND COMPACTION METHODS.
11. BACKFILL MATERIALS OUTSIDE OF THE REINFORCED FILL ZONE OT COMPRISE CLEAN GRANULAR SOILS AS PRE-APPROVED BY THE GEOTECHNICAL ENGINEER. THESE FILL MATERIALS ARE TO BE PLACED AND COMPACTED IN LIFTS.
12. STRICT ATTENTION SHALL BE GIVEN TO ENSURE GOOD COMPACTION OF FILL IN THE CONSTRUCTION OF THIS WALL, ESPECIALLY IN AREAS NEAR THE WALL FACE. GOOD COMPACITON IS ESPECIALLY IMPORTANT NEAR CORNERS OR THE ENDS OF WALLS. THE QUALITY OF THE IMPORTED FILL AND ITS COMPACTION ARE TWO OF THE LARGEST DETERMINING FATORS IN THE PERFORMANCE OF THIS TYPE OF RETAINING SYSTEM.

13. THE FILL MATERIAL IN THE REINFORCED ZONE SHOULD GENERALLY BE COMPACTED WITHIN 2% OF THE OPTIMUM MOISTURE CONTENT %. ADDITION OF WATER, IF REQUIRED, TO BE UNDERTAKEN PRIOR TO COMPACTION.
14. TWO TOTAL ROUNDS OF DENSITY TESTING SHALL BE UNDERTAKEN FOR THIS BLOACK WALL. CARE SHOULD BE TAKEN BY THE CONTRACTOR TO NOTE THE DEGREE OF EFFORT (# OF PASSES WITH A GIVEN PIECE OF COMPACTION EQUIPMENT FOR A GIVEN LOOSE LIFT THICKNESS) REQUIRED TO ACHIEVE SATISFACTORY COMPACTION, AND THIS SHALL DEFINE COMPACTION REQUIREMENTS FOR SUBSEQUENT UNTESTED LIFTS. ADDITIONAL FIELD DENSITY TESTING MAY BE REQUESTED BY THE ENGINEER BASED ON REVIEW OF PREVIOUS TEST RESULTS OR OBSERVED MATERIAL BEHAVIOURS AND/OR PLACEMENT METHODS. WE RECOMMEND THAT DENSITY TESTING OCCUR EARLY IN THE WORK TO VALIDATE PROPOSED COMPACTION REGIME. TARGET DENSITY IS 100% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY (SPMDD). A PROCEDURAL SPECIFICATION IS OFTEN USED WHEN A HIGH PERCENTRACGE OF COURSE MATERIALS (GREATER THAN 30% RETAINED ON 19MM/3/4" SIEVE) PREVENTS THE USE OF STANDARD NUCLEAR COMPACTION TESTING. FOR PROCEDURAL SPECIFICATION, 3-5 PASSES WITH CONVENTIONAL VIBRATORY ROLLER COMPACTION EQUIPMENT IS GENERALLY ADEQUATE, THOUGH ACTUAL REQUIREMENTS ON THE REQUIRED NUMBER OF PASSES WILL BE AS DETERMINED BY THE GEOTECHNICAL ENGINEER IN THE FIELD, IF REQUIRED.
15. FILL MATERIALS SHOULD BE UNLOADED, SPREAD, AND COMPACTED IN SUCH A WAY THAT WILL MINIMIZE THE DEVELOPMENT OF WRINKLES OR DISPLACEMENT OF GEOSYNTHETICS. PLACEMENT OF REINFORCED FILL NEAR THE FRONT OF A WALL SHOULD GENERALLY NOT LAG BEHIND THE REMAINDER OF THE WALL BY MORE THAN ONE COMPACTION LIFT.
16. GENERALLY, ONLY HAND-OPERATED LIGHTER-WEIGHT TAMPERS OR PLATE PACKERS ARE ALLOWED WITHIN 0.3M (12") OF THE BACK OF A WALL BLOCK.
17. AT THE END OF EACH DAY DURING CONSTRUCTION, THE LAST LIFT OF BACKFILL SHOULD BE SLOPED AWAY FROM THE WALL FACE, OR OTHER UPSLOPE DIVERSION MEASURES SHOULD BE ENACTED SUCH THAT SURFACE RUNOFF IS DIRECTED AWAY FROM THE WALL FACE. ENCROACHMENT OF SURFACE RUNOFF FROM ADJACENT AREAS SHOULD BE PREVENTED. THE FINAL TOP SURFACE SHOULD BE GRADED TO DIRECT SURFACE FLOWS AWAY FROM THE WALL FACES.
18. THE GEO-GRID-TO-BLOCK MECHANICAL CONNECTION IS SIMPLY OBSTAINED BY LAYING THE GEO-GRID OVER THE FULL-WIDTH OF THE BLOCK, WITH ONE COMPLETE TRANSVERSE BAR OF THE GEO-GRID FALLING IN FRONT OF THE RAISED KEY-WAY ON THE BLOCK TOP. TRANSVERSE BARS OF THE GEOGRID ARE CUT ON EITHER SIDE OF THE KEY-WAY SO THAT THE GEO-GRID DEFORMS UPWARD/DOWNWARD INTO THE VACITY OF THE OVERLYING/UNDERLYING BLOCK. THIS AFFORDS A SIMPLE, EFFECTIVE CONNECTION WHICH HAS BEEN TESTED IN PULLOUT AND FOUND TO PROVIDE ANCHORAGE IN EXCESS OF THE LONG-TERM ALLOWABLE DESIGN LOAD OF THE GEO-GRID.
19. PRELIMINARY CONTROL-POINT ESTABLISHMENT SURVEY HAS BEEN PROVIDED BY THIS OFFICE, AND WAS UNDERTAKEN VIA LONG-DURATION STATIC GNSS OBSERVATION. ALL REFERENCE ELEVATIONS SHOWN ON THE DRAWINGS HAVE BEEN TRANSLATED FROM OUR CONTROL-POINT BY THE CONTRACTOR, AND ACCORDINGLY ALL ELEVATIONS SHOWN ON THIS DRAWING ARE CONTRACTOR-DERIVED. THE CONTRACTOR SHOULD RE-VERIFY THESE ELEVATIONS ARE ACCURATE PRIOR TO BEGINNING THE WORK. IT IS CRITICAL THAT THE DESIGN HIGH-WATER ELEVATION BE VERIFIED WITH RESPECT TO TOP OF THE WALL AS CURRENTLY DESIGNED.
20. THE WALL HAS BEEN DESIGNED CONSIDERING A "PERMANENT" SURCHARGE LOADING ON THE UPPER BENCH OF 12kPA, REPRESENTATIVE OF TYPICAL VEHICULAR LOADING. NO SURCHARGE LOADING SHOULD OCCUR WITHIN 0.3M (12") OF THE BACK (RETAINED) FACE OF THE BLOCK WALL. IF DESIGN HIGH-WATER LEVELS OCCUR AND INUNDATE THE RETAINED SOILS, VEHICULAR ACCESS SHOULD NOT OCCUR UNTIL WATER LEVELS RECEED.
21. THE WALL HAS BEEN DESIGNED CONSIDERING TEMPORARY CONSTRUCTION SURCHARGE LOADINGS OF 12kPA REPRESENTATIVE OF TYPICAL VEHICULAR LOADING, AS WELL AS FOUR OUTRIGGER CRANE LOADING PADS. OUTRIGGER PAD DIMENSIONS PROVIDED TO OUR OFFICE COMPRISE 40" SQUARE OUTRIGGER PADS, WITH A LOAD OF 35,000LBS ON EACH PAD. THIS RESULTS IN AN APPLIED GROUND PRESSURE OF APPROXIMATELY 3500PSF (170kPA). THIS WALL WAS DESIGNED FOR TWO OF THE OUTRIGGER PADS TO BE PLACED NO CLOSER THAN 5.5 METRES (18FT) FROM THE RETAINED SIDE OF THE WALL FACE. THE FAR-SIDE OUTRIGGERS SHALL BE PLACED ON PADS BUILT UP FROM THE LOW SIDE EXISTING BENCH, AND SHALL NOT BE PLACED ANYWHERE WITHIN THE UPPER BENCH. FURTHERMORE, THIS WORST-CASE CONSTRUCTION LOADING HAS CONSIDERED A MAXIMUM WATER LEVEL OF NO MORE THAN 434.5M ELEVATION. IF WATER LEVELS ARE ABOVE ELEVATION 434.5M, THE WORK SHOULD NOT OCCUR UNTIL WATER LEVELS DROP, OR THE GEOTECHNICAL ENGINEER SHOULD BE NOTIFIED FOR FURTHER REVIEW AND COMMENT PRIOR TO PROCEEDING.
22. HANDRAILS WILL LIKELY BE REQUIRED TO MEET WORKSAFE BC REQUIREMENTS. HANDRAIL DESIGN BY OTHERS, AND MAY BE ANCHORED INTO CONCRETE BLOCKS AS REQUIRED, PROVIDED DESIGN FACTORED HORIZONTAL FORCES DO NOT EXCEED OVERTURNING RESTRAINT PRODUCED BY THE INDIVIDUAL WEIGHT OF A SINGLE LOCK BLOCK.

DRAWING REFERENCES:

- AINS-2022-001-0001 - GENERAL NOTES
- AINS-2022-001-0002 - RETAINING WALL DETAIL

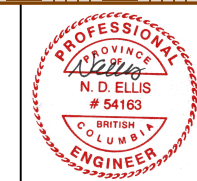
			 <p><b>Crowsnest Engineering</b> EGBC Permit to Practice No. 1002717 1025 Bridgeview Crescent, Castlegar BC (C) 1-647-239-5264 (E) contact@crowsnestengineering.com</p>	 <p><b>Ainsworth</b> hot springs resort</p>	 <p>PROFESSIONAL ENGINEER N. D. ELLIS # 54163 BRITISH COLUMBIA</p>	<p>TITLE Ainsworth WWTP Upgrades Project New Concrete Block Geosynthetic Reinforced Earth Retaining Wall</p>		
0	04APR2023	GENERAL NOTES				SCALE 1:20	DRAWING NUMBER AINS-2022-001-0001	REV. 0
REV.	DATE (YYYYMMDD)	DESCRIPTION						



REV.	DATE	DESCRIPTION
0	04APR2023	RETAINING WALL DETAIL

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**Ainsworth**  
hot springs resort



TITLE  
Ainsworth WWTP Upgrades Project  
New Concrete Block Geosynthetic  
Reinforced Earth Retaining Wall

SCALE 1:20  
DRAWING NUMBER AINS-2022-001-0002

REV. 0

APPENDIX 3. PROPOSED SITE PLAN SHOWING SPEA SETBACKS



# Ainsworth Hot Springs

WWTP Upgrade Project

# FrontCounterBC Locations

## LEGEND

- WDP area (30m)
- LWD and Litterfall ZOS (15m )
- Shade ZOS (0-23m)
- SPEA (15 - 23m)
- Property boundary

## Proposed Development within 30 m WDP area

- Crane pad overall footprint (21.3 x 5.3m)
- Proposed area build up for crane pad includes retaining wall (~ 56.5 m<sup>2</sup>)
- Revegetation Area (230 m<sup>2</sup>)  
Removal of non native plants and replanting with native plant species. Existing native plant species to be retained.
- Danger tree
- Silt fencing



50 m

APPENDIX 4. ARCHAEOLOGICAL CHANGE 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](http://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](mailto: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](http://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

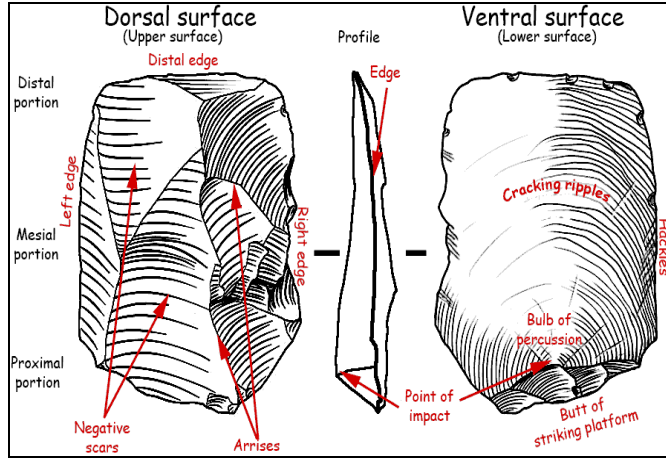


Image 1: Basic flake morphology



Image 2: Examples of lithic flakes

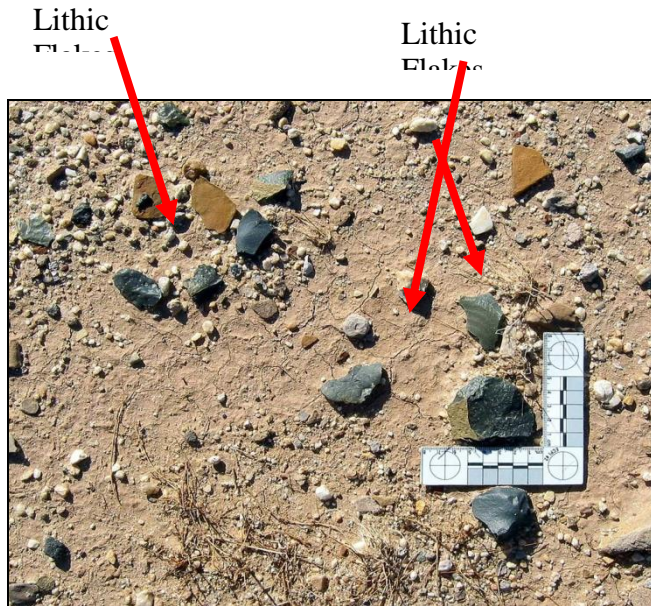


Image 3: Example of lithic scatter found on ground surface



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.

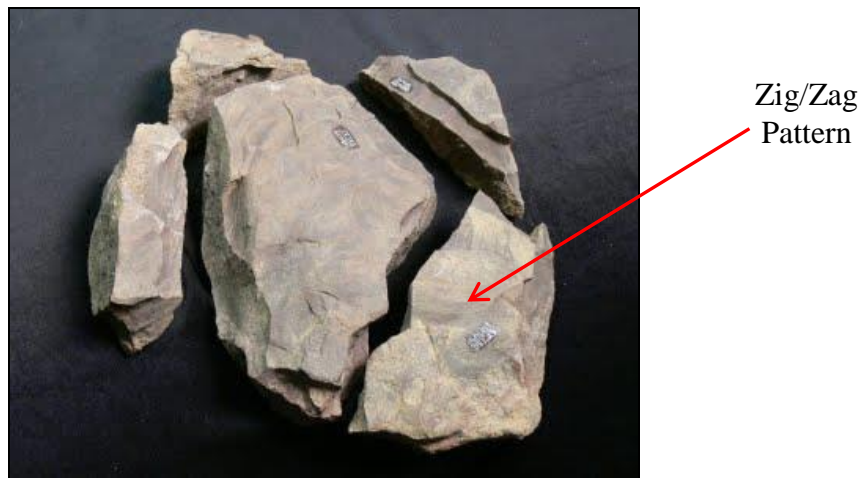


Image 7: Example of FBR; note the zig/zag pattern of breakage common to FBR. A hearth feature is evidence of a fire pit or other fireplace feature of any period. Hearths were used for cooking, heating, and processing of some stone, wood, faunal, and floral resources and may be either lined with a wide 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.





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



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

*Takisóqnuuk*

*Taqam*

*Lower Kootenay*

*Tobacco Plains*