



**Lower Kootenay Band
Seven Nations Soaring Eagles Healing Centre
Environmental Assessment**



Prepared for:
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1 INTRODUCTION

Masse Environmental Consultants Ltd. was retained by the Lower Kootenay Band to conduct an environmental assessment of the proposed Seven Nations Soaring Eagles Healing Centre project near Creston, BC. The purpose of this environmental assessment is to meet the current proponent requirements for Aboriginal Affairs and Northern Development Canada environmental review of proposed projects on First Nation Reserve Land.

The objectives of this study were to assess current plant and wildlife values, identify the potential impacts caused by the proposed project, and provide environmental mitigation strategies to reduce and/or remove risk of impact. A site visit was completed by Iraleigh Anderson A.Ag. and Jakob Dulisse RP.Bio. on July 24, 2018.

2 PROPOSED WORKS

2.1 Project Location

The project site is located on a rural residential lot, known locally as "Nick's Garden Lot", west of the Kootenay River on the Lower Kootenay Band Indian Reserve 1C (Creston I.R. No. 1C; UTM 11U 528677 5437251). The site is located ~8 km West of Creston, British Columbia, and is accessed ~6 km south of the Crowsnest Highway along West Creston Road (Figure 1). The project site is ~3 ha and comprises a small corner of I.R. 1C. The majority of I.R. 1C lies to the east of the project area, and straddles the Kootenay River.



Figure 1. Project Location

2.2 Project Description

The proposed Seven Nations Soaring Eagles Health Centre is envisioned as “a cultural, land based, live-in wellness program for Aboriginal adults recovering from alcohol and drug misuse/abuse or other dependencies. However, unlike most existing treatment centres, the Seven Nations Healing Centre will be built on a foundation of traditional ceremonial activities rather than on a foundation of addictions. [...] the site location will be land-based and culturally safe” (Lower Kootenay Band 2018).

The proposed infrastructure for this project includes ~ 711 m² of new buildings including four 2-bedroom cabins, a workshop, and a main building (~444 m²) (Lower Kootenay Band 2016, David Nairne Associates Ltd. 2018). The main building would be the primary center of activity on site and would include a kitchen, dining area, office space, multi-use spaces, and storage. A site concept has been developed by David Nairne Associates (Figure 2). In addition to the permanent structures, temporary tipi camping areas would also be created on site. The existing dwelling on the site will be retained and modified to provide extra lodging for guests and their families (David Nairne Associates Ltd. 2018).



Figure 2. Preliminary site concept.

3 SITE DESCRIPTION

3.1 Current and Historical Land Use

The site is located within the traditional territory of the Lower Kootenay Band of the Ktunaxa Nation. The project area is one of the only parcels of Lower Kootenay Band land with a developable building site above the Regional District of Central Kootenay flood construction level of 536.5 m (Regional District of Central Kootenay 2009). As such this land has been developed into a single family rural residential lot. A home on the property has been occupied since 1992 (Photo 1 and Photo 2), prior to which time the site had been regularly utilized as a camp spot by the Ktunaxa Nation. The primary neighboring land use is agricultural with cattle pastures to the east and south. The pasture to the east is included in Indian Reservation 1C and has been grazed for ~100 years (Curtis Wullum – *personal communication*). The north end of the project area neighbors the southern end of the Creston Valley Wildlife Management Area (CVWMA) – a 7,000 ha section of provincial crown land managed for important wildlife values, particularly wetland habitat for migratory waterfowl.



Photo 1. View west towards existing home within project area.



Photo 2. View east towards existing home within project area.

4 VEGETATION

The project area is located within the Interior Cedar-Hemlock very dry-warm variant (ICHxw) biogeoclimatic subzone. This zone is “characterized by very hot, very dry summers and mild winters dry winters with low snowfall” (MacKillop and Ehman 2016). The ICHxw is the warmest subzone in southeast BC (MacKillop and Ehman 2016).

Distinct ecological vegetation units were identified and sampled within the proposed project area (Table 1 and Figure 3). Within each type, general ecological conditions including vegetation cover, site disturbance, and presence of noxious weeds, potential red and blue-listed plant species occurrences, and any other ecological observations were recorded.

Vegetation conditions on site indicate a history of grazing by cattle and ungulates, and the cover of invasive weeds was significant in the herbaceous layer of each vegetation unit except the mixed forest. A list of plant species observed within the project area is provided in Appendix 1.

Table 1. Vegetation units within the project area.

Vegetation Unit	Location
1. Mixed Forest	Forested area northwest of road to pasture
2. Poplar - Disturbed	Forested area east of current home, and southeast of road to pasture
3. Herbaceous - Disturbed	All open areas within project area



Figure 3. Arrangement of vegetation units within the project area boundary.

4.1.1 Mixed Forest

The Mixed Forest in the northwest corner of the project area is the most intact vegetation unit when compared to other areas of the site. It is primarily made of a canopy mature trembling aspen (*Populus tremuloides*; Photo 3 and Photo 4) with a mix of conifers including western redcedar (*Thuja plicata*; Photo 5), ponderosa pine (*Pinus ponderosae*; Photo 6), Douglas fir (*Pseudotsuga menziesii*), and grand fir (*Abies grandis*). Canopy cover ranges from 60-100%, and there is a tall shrub layer which includes Saskatoon (*Amelanchier alnifolia*), beaked hazelnut (*Corylus cornuta*), Douglas maple (*Acer glabrum*), and black hawthorn (*Crataegus douglasii*). The forest floor is relatively open with a few low shrub species including prickly rose (*Rosa acicularis*), and Oregon grape (*Mahonia aquifolium*). A lack of understory herbs, high cover of bare soil, and evidence of old fencing indicate a history of grazing in this unit. However, the overall cover of invasive weeds under the shade of the forest canopy is very low. A few burdock (*Arctium minus*) were observed in the interior of this unit, but any other invasive species observed in this unit tended to occur on the margins of the adjacent Herbaceous - Disturbed vegetation unit. Heavy ungulate browse was noted on some shrubs within this unit, and Rocky Mountain elk (*Cervus canadensis*) are known to winter in the agricultural fields to the east (Curtis Wullum – *personal communication*). Veteran western redcedar, black cottonwood

(*Populus trichocarpa*), and ponderosa pine within this vegetation unit provide excellent habitat features for small mammals and nesting songbirds.

The northern margin of the mixed forest vegetation unit transitions into a small marsh/swamp complex in an old channel of Corn Creek within the neighboring Creston Valley Wildlife Area (CVWA). The marsh is dominated by sedges (*Carex* sp.), reed canary grass (*Phalaris arundinacea*), and marsh cinquefoil (*Comarum palustre*); while the swamp areas have tree cover from mountain alder (*Alnus incana*), an understory dominated by horsetail (*Equisetum arvense*), and buttercup (*Ranunculus* sp.), with high cover of bare ground. A small population of ~100 individual spurless touch-me-not (*Impatiens ecorruta*) were observed in this area, just beyond the boundary of the project area. Spurless touch-me-not is a provincially red-listed species (see section 6.1).



Photo 3. View north towards Mixed Forest vegetation unit.



Photo 4. Trembling aspen within Mixed Forest vegetation unit



Photo 5. Mature western redcedar and cottonwood within Mixed Forest vegetation unit.



Photo 6. Mature ponderosa pine within Mixed Forest vegetation unit.

4.1.2 Poplar – Disturbed

The Poplar – Disturbed vegetation unit comprises the stand of trembling aspen east of the home and southeast of the road to the pasture. This stand is more open compared to the Mixed Forest unit, with a more recent and/or intense history of grazing disturbance. The canopy cover in the Poplar – Disturbed unit ranges from 40-80% and is dominated by trembling aspen. The understory is simpler in this unit with sparse occurrence of conifers including grand fir, Douglas fir, and ponderosa pine. The tall shrub component is primarily mature black hawthorn, with a dense low shrub layer comprised almost entirely of snowberry (*Symphoricarpos albus*), with some feral domestic roses (*Rosa* sp.). These thorny and/or unpalatable shrubs species are among the least favored by cattle, and their dominance in this vegetation unit seems to indicate a history of overgrazing. Invasive species were patchy throughout this unit, and included Canada thistle (*Cirsium arvense*), St. John’s wort (*Hypericum perforatum*), and sulfur cinquefoil (*Potentilla recta*; Photo 7 and Photo 8).



Photo 7. Trembling aspen with agronomic grass ground cover in Poplar – Disturbed vegetation unit.



Photo 8. Canopy including aspen snags in Poplar – Disturbed vegetation unit.

4.1.3 Herbaceous – Disturbed

The most widespread unit within the project area is composed of a heterogeneous mosaic of invasive weeds and agronomic grasses (Photo 9). There are scattered clumps of mature black hawthorn, but this unit is defined primarily by a lack of tree and tall-shrub canopy. The species composition of the Herbaceous - Disturbed vegetation unit is highly variable ranging from a mowed turf of grass and hawkweed (*Hieracium* sp.) near the home, to grazed pasture east of the Poplar – Disturbed unit, to tall monocultures of wormwood (*Artemisia absinthum*), spotted knapweed (*Centaurea biebersteinii*), and flowering hawkweed. The monocultures of wormwood, knapweed, and hawkweed consist of tall, vigorous, reproductive plants which were producing a large output of seed at the time of the site visit, as they have likely been doing for many years. Seeds from these, and other invasive plant species, can persist in the soil seedbank for many years and will present a challenge during revegetation and landscaping after construction.

Agronomic grasses in this unit include timothy (*Phleum pretense*), reed canary grass, smooth brome (*Bromus inermis*), redtop (*Agrostis gigantea*), and quackgrass (*Agropyron repens*; Photo 10). Though these are useful pasture grasses, their rhizomatous habit and abundant production of viable seed means that these species often behave as weeds in gardens and landscaped areas. Other widespread invasive species present in this unit include ox-eye daisy (*Leucanthemum vulgare*), goatsbeard (*Tragopogon dubius*), and ribwort (*Plantago lanceolata*). There was also a relatively limited occurrence of blueweed (*Echium vulgare*), and common tansy (*Tanacetum vulgare*) within this unit. Proactive treatment of the blueweed and common tansy could prevent the spread and establishment of these species elsewhere on site. The development of woody plants in this unit is limited. The hooked thorn brambles of a domestic rose (*Rosa* sp.) occur as a weed throughout this unit, particularly on the fringes of adjacent vegetation units. There are several mature black hawthorns, apples (*Malus* sp.), and veteran Douglas fir throughout this unit (Photo 11 and Photo 12).



Photo 9. Herbaceous – Disturbed vegetation unit including mowed area, and areas dominated by absinthe and hawkweed.



Photo 10. North area of Herbaceous – Disturbed vegetation unit dominated by agronomic grasses.



Photo 11. Hawthorn and apple trees in Herbaceous – Disturbed vegetation unit.



Photo 12. Veteran Douglas fir in Herbaceous - Disturbed vegetation unit, south side of the site.

5 WILDLIFE

The site was assessed for wildlife habitat features, habitat quality and incidental wildlife observations were recorded. Site assessment data was combined with background information from the B.C. Conservation Data Centre (CDC 2018), Committee on the Status of Endangered Wildlife in Canada (COSEWIC 2018), professional knowledge of the area, and from "A Habitat Management Plan for the Creston Valley Wildlife Management Area" (Wilson et al. 2004).

The Creston Valley provides a variety of excellent habitats, which support an exceptional diversity of vertebrate species. A total of 356 species of terrestrial vertebrates have been recorded in the nearby CVWMA (Wilson et al. 2004), including six amphibian, six reptile, 287 bird, and 57 mammal species (Appendix 2). While many of these species could potentially occur within the study area, it should be noted that many of the species listed in Appendix 2 are very infrequently recorded in the CVWMA and are therefore unlikely to occur at the project site.

A total of 19 species of birds and three species of mammals were detected on site (Appendix 2). (Note: this not a comprehensive list—a complete list of species present is not possible with one site visit conducted outside the bird breeding season).

5.1 Wildlife Habitat

The project area provides good habitat complexity for a range of terrestrial wildlife species and several habitat units are present, including some mature black cottonwood and trembling aspen stems (high-value wildlife trees; Photo 13), mixed conifer forest, a well-developed shrub understorey and some open/human modified habitat (Figure 3). There is also an ephemeral wetland (Photo 14 and Photo 15) just to the north of the project area, and a rocky outcrop to the northeast of the project area, both of which likely provide valuable amphibian and reptile habitat (Photo 16).

The project area includes several mature black cottonwood and trembling aspen trees in the Mixed Forest and Poplar – Disturbed vegetation units (Figure 3). These trees provide a variety of important wildlife habitat values including avian nesting, foraging, roosting, perching and communication opportunities, shaded riparian habitat, production of wildlife trees, and coarse woody debris contribution.

Many wildlife species in the project area are considered wildlife tree (i.e., dead, dying, diseased or insect-infected trees) dependent species, and black cottonwood is a particularly important wildlife tree species due to its high value as a cavity tree. Mature black cottonwood stands are ranked by the CDC as among the rarest plant communities of the province (Egan et al. 1997). Riparian cottonwood stands are usually cooler and moister than the surrounding landscape and therefore provide crucial habitat for a wide range of plant and animal species. For example, species at risk such as the western screech-owl and Lewis' woodpecker are associated with this habitat type.



Photo 13. Mature aspen and poplar and wildlife habitat trees in on east margin of Mixed Forest vegetation unit.



Photo 14. View south towards Mixed Forest vegetation unit from marsh north of project area.



Photo 15. Marsh wetland habitat immediately north of project area.

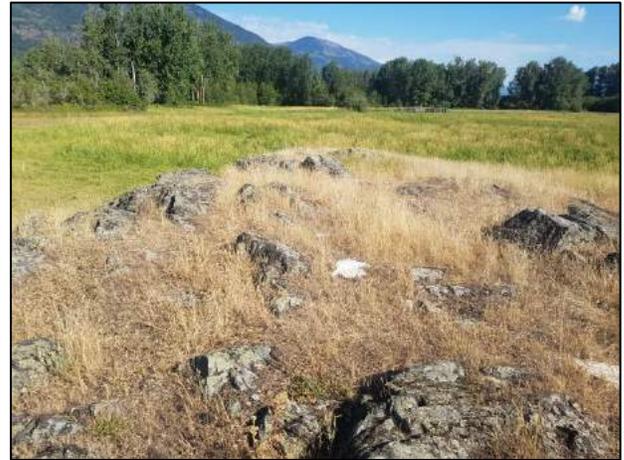


Photo 16. Rocky outcrop habitat east of project area.

6 SPECIES AT RISK

Wildlife and plant species in Canada are evaluated and ranked provincially by the B.C. Conservation Data Centre (CDC) and nationally by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). The CDC maintains a dynamic 'tracking list' with observation and ecological information regarding species of conservation concern, commonly referred to as 'Red- and Blue-listed' species (CDC 2018). Red-listed taxa are defined as native species, or subspecies that have, or are candidates for, Extirpated, Endangered, or Threatened status in British Columbia. Blue-listed taxa are native species or subspecies considered to be of Special Concern in British Columbia. COSEWIC also maintains a regularly updated list of Canadian species at risk at the national level (COSEWIC 2018) which are designated as Endangered (facing imminent extirpation or extinction), Threatened (likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction), Special Concern (may become a Threatened or Endangered species because of a combination of

biological characteristics and identified threats) and Data Deficient. For both lists, rankings are applied to species, subspecies, populations, and ecotypes. Wildlife and plant species at risk were evaluated for their potential of occurrence on site (Appendix 3 and Appendix 4).

6.1 Plant Species

A search of the BC Conservation Data Centre Species and Ecosystems Explorer database (CDC 2016) yielded 25 entries using the criteria: Interior Cedar Hemlock (ICH) biogeoclimatic zone and Kootenay Lake Forest District (DKL). Further searches based on specific habitat criteria (i.e., Deciduous/Broadleaf Forest, Roadside/Ditch, Urban/Suburban) generated an additional 19 entries for a total of 44 species (Appendix 3). Eleven species were ranked as “possible” to occur in the project area, and the remaining 33 species were ranked “unlikely” to occur. No species were ranked as “likely” to occur within the project area.

No red or blue listed species on this list were observed within the project area during the vegetation survey conducted on July 24, 2018 (Appendix 1), although this was only a single survey in mid-summer which may have precluded detection of some species.

A small population of ~100 individual spurless touch-me-not were observed in a wetland in the CVWMA, just a few meters north of the project boundary (11 U 528595 5437332; Photo 17 and Photo 18). Spurless touch-me-not is a provincially red-listed species, with a limited distribution in southeastern British Columbia. It is unlikely that spurless touch-me-not occur within the project area, because a distinct topographic/vegetational transition occurs along the northern boundary of this part of I.R. 1C. While wetland habitat suitable for spurless touch-me-not and other *Impatiens* species exists on many sites within the Kootenay River floodplain, no such habitat was identified within the project area.



Photo 17. Spurless touch-me-not located in wetland north of project area.

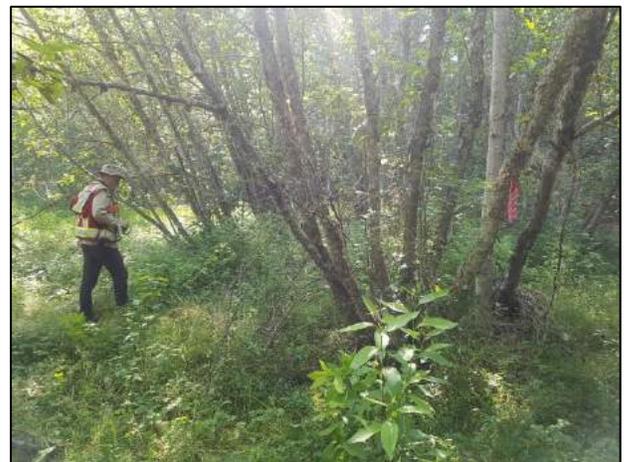


Photo 18. Swamp habitat of spurless touch-me-not located in wetland north of project area.

6.2 Wildlife Species

A total of 44 local terrestrial vertebrate taxa are considered at risk including four amphibian, three reptile, 23 bird and 13 mammal species (Appendix 4). Of these, three species are known to occur within the project area (bobolink, red-tailed chipmunk and grizzly bear), 10 species are estimated as 'likely' to occur within the project area (western toad, northern rubber boa, western skink, common nighthawk, black swift, western screech-owl, barn swallow, Townsend's big-eared bat, little brown myotis and fringed myotis) and an additional 10 species are classified as 'possibly' occurring on site (Appendix 4).

Of the species at risk known to occur and estimated as 'likely' to occur, the project has potential to impact some habitat used by following six species: northern rubber boa, western skink, western screech-owl, Townsend's big-eared bat, little brown myotis and fringed myotis. The recommendations discussed in section 8.2.2 below will reduce potential impacts to all wildlife, including these species at risk.

7 ARCHEOLOGICAL VALUES

The Ktunaxa Nation Council, Lands & Resources Sector have prepared preliminary reconnaissance archaeological report regarding this project (Allard 2018; Appendix 5). Initial observations indicate that the entire project area has moderate to high archeological potential, and that there may be undisturbed soils containing in situ archeological sites (Allard 2018). Because most of the soil disturbance on site is associated with the current buildings, if there are any areas of undisturbed soil, they most likely exist within the forested vegetation units.

8 IMPACT ASSESSMENT AND MITIGATION

An assessment of potential impacts was made based on the site concept prepared by David Nairne Architects (2018). Potential impacts and mitigation measures are summarized in Table 2 and Table 3. As the planning process for this project is still active, the final design and construction plans will be informed by the ecological values, impacts, and mitigation strategies described in this report.

Table 2. Summary of potential impacts and associated mitigation.

Activities	Potential Impact to Valued Ecosystem Components	Mitigation Measure ID (see Table 3)
Vegetation Removal and Earthworks	• Loss of upland and riparian vegetation, snags and coarse woody debris.	1,2,4,5
	• Loss or destruction of archaeological evidence.	1,4,
	• Loss of wildlife habitat and interference with nesting of breeding birds.	1,2,4,5,6,10
	• Increase in invasive species distribution throughout site, and adjacent areas.	1,2,3,4,5,6,7,8,9
Building Construction	• Harassment of wildlife species due to attractants, noise, dust.	1,
Healing Center Operation	• Disruption of reptile and ground nesting bird habitat on the rocky outcrop.	1,11
	• Loss of western screech owl habitat within Mixed Forest vegetation unit.	1,4,5,6,9,12

Table 3. Summary of mitigation measures.

ID	Mitigation Measure
1	A Construction Environmental Management Plan should be prepared prior to works. The CEMP should include a spill response plan, environmental monitoring procedures, procedures for chance finds of archaeological material, and best management practices for equipment and machinery.
2	Limit clearing, grubbing and excavation to minimum area required for access, staging, and construction. Flag project area before crews arrive to clearly delineate work areas. Clearing should be avoided in the Mixed Forest vegetation unit.
3	Develop and implement revegetation plan for disturbed areas of the site incorporating appropriate native species.
4	Limit trail building on site, and avoid building trails in the Mixed Forest vegetation unit.
5	Avoid removal of mature cottonwood and Douglas fir.
6	Environmental monitor should visit site to flag mature trees, and delineate areas of vegetation which will be retained.
7	Treat blueweed and common tansy where they occur to prevent these species from becoming established in the project area.
8	Pressure wash or steam clean equipment prior to entering the project area to help prevent the introduction of invasive weeds.
9	Revegetate disturbed areas with native species immediately following disturbance.
10	Avoid removal of trees and vegetation during the breeding bird period from late March to late August.
11	Avoid development, occupation, or use of rocky outcrop area.
12	Implement procedures for chance finds of archaeological material.

The following sections describe potential project impacts to plant and wildlife species, and provide mitigation suggestions which could minimize the ecological impact of construction and development within the project area.

8.1 Vegetation

8.1.1 Impact Assessment

The proposed development will involve land clearing and permanent conversion of at least 711 m² of land into a small cluster of institutional and residential buildings. A slightly larger footprint within the project area will be required for construction activities and equipment storage.

The level of potential impact to native plant species and communities varies with the available building site options within the project area. While the proposed development within the Herbaceous – Disturbed vegetation unit would cause virtually no loss of current native plant species habitat, development within either of the forested vegetation units would necessarily cause the loss of native plant cover, the loss of potential future recruitment sites for rare and at risk plant species, as well as the wildlife habitat value associated with current structurally diverse native plant communities.

8.1.2 Mitigation

The forested vegetation units are the most valuable current plant communities within the project area. Ongoing planning for this development should prioritize the complete retention of native trees, shrubs, and groundcover within these vegetation units. These forested plant communities should not be cleared during construction, or modified for the purposes of healing center operations. If development activities and healing center operations are restricted to previously disturbed area within the Herbaceous – Disturbed polygon (Figure 3), then the impacts to native plant species and communities will be minimized.

The following measures are recommended to minimize impacts to plants and plant communities:

- Avoid any modification or removal of vegetation within the Mixed – Forest vegetation unit.
- The footprint of the proposed trail (see “Spiritual Walk” in Figure 2) through the Poplar – Disturbed vegetation unit should be minimized and no mature cottonwood or snags should be removed to build this trail. All land-clearing required for this trail should occur outside of the regional breeding bird period from late March to late August.
- Preferentially site all buildings within previously cleared areas within the Herbaceous – Disturbed vegetation unit, and limit access and clearing of forested areas. If clearing is required within the Poplar - Disturbed vegetation unit, then avoid the removal of mature cottonwood and Douglas fir.
- Retain all veteran Douglas fir, and as many mature shrubs within the Herbaceous – Disturbed vegetation unit as possible. These features contribute to the quality and quantity of songbird habitat, and will increase the natural atmosphere of the healing center.

- A qualified environmental professional (QEP) should be retained to clearly define work areas with flagging before any work begins within the project area. Bright continuous flagging should be used to delineate “no work” areas around forest margins, veteran trees, and mature shrubs. A significant buffer of up to 15 m may be required to protect the root systems of some trees and shrubs. The QEP should establish flagging and/or fencing around valued vegetation, and to instruct construction contractors on safe operation near these features.
- Limit clearing, grubbing and excavation to the minimum extent required. The overwhelming abundance of invasive species on site will contribute to the rapid colonization of newly disturbed areas by these species. Even with mechanical and/or chemical control it will be difficult to prevent colonization and establishment of invasive and weedy species in newly disturbed areas.
- Due to the observed abundance of invasive and weedy plants and seed within the project area, it will be essential to have a plan to manage these species in all landscaped areas. A landscaping plan for the healing center should include plans to plant vigorous native shrubs which can compete with invasive plants, as well as plans for ongoing irrigation, and invasive plant management for at least 3-5 years.
- Manually remove all blueweed and common tansy to prevent these species from becoming more widely established on site.
- Pressure wash or steam clean earthmoving machinery and any other equipment that retains mud or soil prior to entering the project area to help prevent the introduction of new invasive weeds, and be sure to take the same measures to clean all equipment when it leaves the project area to prevent the export of invasive plant propagules which are abundant on site.
- Retain existing vegetation to the greatest extent possible.

No residual effects are expected if the mitigation measures above are implemented.

8.2 Wildlife

8.2.1 Impact Assessment

An area of at least 711 m² will be disturbed and permanently altered during the construction of buildings and associated infrastructure, resulting in the loss of wildlife habitat features within the work zone.

The main wildlife concern for this project is the potential disturbance/loss of habitat within two project areas: 1) open, rocky outcropping which provides high value habitat for reptiles (Figure 3) and; 2) the Mixed Forest vegetation unit which is important habitat to wildlife tree users including owls (the western screech-owl is known as occurring in the immediate area) and bats (Figure 3). It is understood these areas can be avoided to conserve these values (Curtis Wullum, pers. comm.).

8.2.2 Mitigation

Project construction should be limited to the Herbaceous – Disturbed polygon (Figure 3); there are many building site options in this area and focussing construction here would minimise impacts to wildlife habitat. In addition, many of the wildlife habitat values currently present on site can be retained by following these recommendations:

- Minimize the project footprint as much as possible to maximize the amount of shrub and tree cover retained at the boundaries of the work zone. If possible, retain areas of shrub and tree cover within the work zone.
- Revegetate the project site immediately following construction with pre-project native plant species composition. Revegetate with mature vegetation if possible.
- Avoid incursions into forest zones
- Retain wildlife trees including mature cottonwood, Douglas fir and any large snags.
- If removal of trees or vegetation is required, it should be conducted outside of the migratory bird nesting season (Late March-Late August), to prevent disruption of migratory bird reproduction.
- Development, use, and occupation of the rocky outcrop should be avoided altogether

No residual effects are expected if the mitigation measures above are implemented.

8.3 Archaeological Values

8.3.1 Impact Assessment

The preliminary archeological report indicates that the potential impact to any in situ archeological sites is unknown at this time (Allard 2018, Appendix 5). A targeted shovel testing program focusing on areas that will be disturbed during development of the healing center is recommended to assess whether archaeological materials exist in the project area (Allard 2018).

8.3.2 Mitigation

The CEMP for the project will include a chance find procedure (Appendix 6). Chance find procedures provide contractors with guidance on how to manage incidental archaeological discoveries during construction activities. All contractors conducting earthworks within the project area should be made aware of the chance find procedure.

8.4 General Mitigation Measures

In addition to the specific measures outlined above, the following general measures are required:

- A QEP should be retained to prepare a Construction Environmental Management Plan (CEMP), and conduct on site environmental monitoring during the construction phase of the project.
- The CEMP should summarize current best management practices for equipment operation which must be followed to prevent environmental degradation, and reduce threats to wildlife and plant species.

9 CONCLUSION

The proposed development of a healing center will have minimal environmental impact if the footprint is constrained to those parts of the project area which have been previously cleared. Plant and animal species at risk including the western screech owl, and the spurless touch-me-not are known from areas within the immediate vicinity of the project area. Loss of forest cover within the project area, particularly within the Mixed – Forest vegetation unit, could decrease the current and future habitat available for western screech owl, and other wildlife species known from the area. Likewise, extensive land clearing and land conversion could cause the loss of potential native plant habitat, and the degradation of nearby native plant communities which currently support at risk plant species such as spurless touch-me-not.

Adherence to the mitigation measures outlined in this report will ensure that the significant social value of the healing center development will not compromise the ecological values which have been identified in and around the project area.

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Appendix 1. Plant Species List

Vascular plant species observed during the site visit.

Species	Vegetation Unit		
	1	2	3
Trees			
apple			x
black cottonwood	x	x	
Douglas-fir	x	x	x
grand fir	x	x	
Norway maple	x		
paper birch	x	x	
ponderosa pine	x	x	
trembling aspen	x	x	x
western redcedar	x		
Shrubs			
beaked hazelnut	x		
black hawthorn	x	x	x
common snowberry		x	x
Douglas maple	x		
domestic rose		x	x
prickly rose	x		
saskatoon	x		
tall Oregon-grape	x		
Herbaceous			
Canada thistle		x	x
cheatgrass			x
common burdock	x		x
blueweed			x
common tansy ^{3a}			x
common timothy			x
false Solomon's-seal	x		
great mullein			x
hawkweed		x	x
oxeye daisy			x
quackgrass			x
redtop			x
reed canarygrass	x		x
ribwort plantain		x	x
smooth brome		x	x
spotted knapweed ^{3a}		x	x
St. John's wort		x	
sulphur cinquefoil		x	

		Vegetation Unit		
		1	2	3
sweet-scented bedstraw	<i>Galium triflorum</i>	x		
tall blue lettuce	<i>Lactuca biennis</i>			x
wild strawberry	<i>Fragaria virginiana</i>	x		x
wormwood	<i>Artemisia absinthum</i>			x
yarrow	<i>Achillea millefolium</i>	x	x	x
yellow salsify	<i>Tragopogon dubius</i>			x

Appendix 2. Wildlife Occurrence Review Summary

List of terrestrial vertebrate species potentially occurring within the project area¹. Shaded species have been confirmed within the project area.

Common Name	Scientific Name	BC Status ²	Federal Status ²	Breeding Status
AMPHIBIANS				
Coeur d'Alene Salamander	<i>Plethodon idahoensis</i>		SC	B
Columbia Spotted Frog	<i>Rana luteiventris</i>			B
Long-toed Salamander	<i>Ambystoma macrodactylum</i>			B
Northern Leopard Frog	<i>Lithobates pipiens</i>	Red	E	B
Northern Pacific Treefrog	<i>Psuedacris regilla</i>			B
Western Toad	<i>Anaxyrus boreas</i>		SC	B
REPTILES				
Common Garter Snake	<i>Thamnophis sirtalis</i>			B
Northern Alligator Lizard	<i>Elgaria coerulea</i>			B
Painted Turtle	<i>Chrysemys picta</i>	Blue	SC	B
Northern Rubber Boa	<i>Charina bottae</i>		SC	B
Western Skink	<i>Plestiodon skiltonianus</i>	Blue	SC	B
Western Terrestrial Garter Snake	<i>Thamnophis elegans</i>			B
BIRDS				
American Avocet	<i>Recurvirostra americana</i>	Blue		B
American Bittern	<i>Botaurus lentiginosus</i>	Blue		B
American Coot	<i>Fulica americana</i>			B
American Crow	<i>Corvus brachyrhynchos</i>			B
American Dipper	<i>Cinclus mexicanus</i>			B
American Golden-Plover	<i>Pluvialis dominica</i>	Blue		B
American Goldfinch	<i>Carduelis tristis</i>			B
American Kestrel	<i>Falco sparverius</i>			B
American Pipit	<i>Anthus rubescens</i>			B
American Redstart	<i>Setophaga ruticilla</i>			B
American Robin	<i>Turdus migratorius</i>			B
American Tree Sparrow	<i>Spizella arborea</i>			B
American White Pelican	<i>Pelecanus erythrorhynchos</i>	Red	NAR	
American Wigeon	<i>Anas americana</i>			B
Anna's Hummingbird	<i>Calypte anna</i>			B
Back and White Warbler	<i>Mniotilta varia</i>			B
Baird's Sandpiper	<i>Calidris bairdii</i>			B
Bald Eagle	<i>Haliaeetus leucocephalus</i>			B
Band-tailed Pigeon	<i>Columba fasciata</i>			B
Bank Swallow	<i>Riparia riparia</i>			B
Barn Owl	<i>Tyto alba</i>	Red	T	
Barn Swallow	<i>Hirundo rustica</i>	Blue	T	B
Barred Owl	<i>Strix varia</i>			B
Barrow's Goldeneye	<i>Bucephala islandica</i>			B
Belted Kingfisher	<i>Ceryle alcyon</i>			B
Black Swift	<i>Cypseloides niger</i>	Blue	E	B
Black Tern	<i>Chlidonias niger</i>			B
Black-backed Woodpecker	<i>Picoides arcticus</i>			B
Black-bellied Plover	<i>Pluvialis squatarola</i>			B
Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>			B
Black-billed Magpie	<i>Pica hudsonia</i>			B
Black-capped Chickadee	<i>Poecile atricapilla</i>			B
Black-chinned Hummingbird	<i>Archilochus alexandri</i>			B
Black-crowned Night-Heron	<i>Nycticorax nycticorax</i>			B
Black-headed Grosbeak	<i>Pheucticus melanocephalus</i>			B

Common Name	Scientific Name	BC Status ²	Federal Status ²	Breeding Status
Black-necked Stilt	<i>Himantopus mexicanus</i>			
Black-throated Blue Warbler	<i>Dendroica caerulescens</i>			
Blue Grosbeak	<i>Guiraca caerulea</i>			
Blue Grouse	<i>Dendragapus obscurus</i>			B
Blue Jay	<i>Cyanocitta cristata</i>			B
Blue-winged Teal	<i>Anas discors</i>			B
Bobolink	<i>Dolichonyx oryzivorus</i>	Blue	T	B
Bohemian Waxwing	<i>Bombycilla garrulus</i>			
Bonaparte's Gull	<i>Larus philadelphia</i>			
Boreal Chickadee	<i>Poecile hudsonica</i>			
Boreal Owl	<i>Aegolius funereus</i>			
Brant	<i>Branta bernicla</i>			
Brewer's Blackbird	<i>Euphagus cyanocephalus</i>			B
Brown Creeper	<i>Certhia americana</i>			B
Brown Thrasher	<i>Toxostoma rufum</i>			
Brown-headed Cowbird	<i>Molothrus ater</i>			B
Bufflehead	<i>Bucephala albeola</i>			B
Bullock's Oriole	<i>Icterus bullockii</i>			B
California Gull	<i>Larus californicus</i>	Blue		
California Quail	<i>Callipepla californica</i>	Introduced		B
Calliope Hummingbird	<i>Stellula calliope</i>			B
Canada Goose	<i>Branta canadensis</i>			B
Canvasback	<i>Aythya valisineria</i>			B
Caspian Tern	<i>Sterna caspia</i>	Blue	NAR	
Cassin's Vireo	<i>Vireo cassinii</i>			B
Cassin's Finch	<i>Carpodacus cassinii</i>			B
Cattle Egret	<i>Bubulcus ibis</i>			
Cedar Waxwing	<i>Bombycilla cedrorum</i>			B
Chestnut-backed Chickadee	<i>Poecile rufescens</i>			B
Chipping Sparrow	<i>Spizella passerina</i>			B
Chukar	<i>Alectoris chukar</i>	Introduced		
Cinnamon Teal	<i>Anas cyanoptera</i>			B
Clark's Grebe	<i>Aechmophorus clarkii</i>			B
Clark's Nutcracker	<i>Nucifraga columbiana</i>			B
Clay-colored Sparrow	<i>Spizella pallida</i>			B
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>			B
Common Goldeneye	<i>Bucephala clangula</i>			B
Common Grackle	<i>Quiscalus quiscula</i>			
Common Loon	<i>Gavia immer</i>			B
Common Merganser	<i>Mergus merganser</i>			B
Common Nighthawk	<i>Chordeiles minor</i>		SC	B
Common Raven	<i>Corvus corax</i>			B
Common Redpoll	<i>Carduelis flammea</i>			
Common Snipe	<i>Gallinago gallinago</i>			B
Common Tern	<i>Sterna hirundo</i>			
Common Yellowthroat	<i>Geothlypis trichas</i>			B
Cooper's Hawk	<i>Accipiter cooperii</i>			B
Dark-eyed Junco	<i>Junco hyemalis</i>			B
Double-crested Cormorant	<i>Phalacrocorax auritus</i>	Blue	NAR	B
Downy Woodpecker	<i>Picoides pubescens</i>			B
Dunlin	<i>Calidris alpina</i>			
Dusky Flycatcher	<i>Empidonax oberholseri</i>			B
Eared Grebe	<i>Podiceps nigricollis</i>	Blue		B
Eastern Kingbird	<i>Tyrannus tyrannus</i>			B
Eastern Phoebe	<i>Sayornis phoebe</i>			

Common Name	Scientific Name	BC Status ²	Federal Status ²	Breeding Status
Eurasian Wigeon	<i>Anas penelope</i>			
European Starling	<i>Sturnus vulgaris</i>	Introduced		B
Evening Grosbeak	<i>Coccothraustes vespertinus</i>		SC	B
Ferruginous Hawk	<i>Buteo regalis</i>		T	
Forster's Tern	<i>Sterna forsteri</i>	Red	DD	B
Fox Sparrow	<i>Passerella iliaca</i>			
Franklin's Gull	<i>Larus pipixcan</i>			
Gadwall	<i>Anas strepera</i>			B
Glaucous Gull	<i>Larus hyperboreus</i>			
Glaucous-winged Gull	<i>Larus glaucescens</i>			
Golden Eagle	<i>Aquila chrysaetos</i>			
Golden-crowned Kinglet	<i>Regulus satrapa</i>			B
Golden-crowned Sparrow	<i>Zonotrichia atricapilla</i>			
Grasshopper Sparrow	<i>Ammodramus savannarum</i>	Red		
Gray Catbird	<i>Dumetella carolinensis</i>			B
Gray Flycatcher	<i>Empidonax wrightii</i>	Blue	NAR	
Gray Jay	<i>Perisoreus canadensis</i>			B
Gray Partridge	<i>Perdix perdix</i>	Introduced		
Gray-crowned Rosy-Finch	<i>Leucosticte tephrocotis</i>			
Great Blue Heron <i>herodias</i>	<i>Ardea herodias herodias</i>	Blue		B
Great Egret	<i>Ardea alba</i>			
Great Gray Owl	<i>Strix nebulosa</i>			
Great Horned Owl	<i>Bubo virginianus</i>			B
Greater Scaup	<i>Aythya marila</i>			
Greater White-fronted Goose	<i>Anser albifrons</i>			
Greater Yellowlegs	<i>Tringa melanoleuca</i>			
Green Heron	<i>Butorides virescens</i>	Blue		
Green-winged Teal	<i>Anas crecca</i>			B
Gyr Falcon	<i>Falco rusticolus</i>	Blue	NAR	
Hairy Woodpecker	<i>Picoides villosus</i>			B
Hammond's Flycatcher	<i>Empidonax hammondii</i>			B
Harlequin Duck	<i>Histrionicus histrionicus</i>			
Harris's Sparrow	<i>Zonotrichia querula</i>			
Hermit Thrush	<i>Catharus guttatus</i>			B
Herring Gull	<i>Larus argentatus</i>			
Hooded Merganser	<i>Lophodytes cucullatus</i>			B
Horned Grebe	<i>Podiceps auritus</i>			B
Horned Lark	<i>Eremophila alpestris</i>			
House Finch	<i>Carpodacus mexicanus</i>			B
House Sparrow	<i>Passer domesticus</i>	Introduced		B
House Wren	<i>Troglodytes aedon</i>			B
Indigo Bunting	<i>Passerina cyanea</i>			B
Killdeer	<i>Charadrius vociferus</i>			B
Lapland Longspur	<i>Calcarius lapponicus</i>			
Lark Bunting	<i>Calamospiza melanocorys</i>			
Lark Sparrow	<i>Chondestes grammacus</i>	Blue		
Lazuli Bunting	<i>Passerina amoena</i>			B
Least Flycatcher	<i>Empidonax minimus</i>			B
Least Sandpiper	<i>Calidris minutilla</i>			
Lesser Scaup	<i>Aythya affinis</i>			B
Lesser Yellowlegs	<i>Tringa flavipes</i>			
Lewis's Woodpecker	<i>Melanerpes lewis</i>	Blue	T	
Lincoln's Sparrow	<i>Melospiza lincolnii</i>			
Loggerhead Shrike	<i>Lanius ludovicianus</i>			
Long-billed Curlew	<i>Numenius americanus</i>	Blue	SC	B

Common Name	Scientific Name	BC Status ²	Federal Status ²	Breeding Status
Long-billed Dowitcher	<i>Limnodromus scolopaceus</i>			
Long-eared Owl	<i>Asio otus</i>			B
Long-tailed Duck	<i>Clangula hyemalis</i>			
Long-tailed Jaeger	<i>Stercorarius longicaudus</i>			
MacGillivray's Warbler	<i>Oporornis tolmiei</i>			B
Mallard	<i>Anas platyrhynchos</i>			B
Marbled Godwit	<i>Limosa fedoa</i>			
Marsh Wren	<i>Cistothorus palustris</i>			B
Merlin	<i>Falco columbarius</i>			B
Mew Gull	<i>Larus canus</i>			
Mountain Bluebird	<i>Sialia currucoides</i>			B
Mountain Chickadee	<i>Poecile gambeli</i>			B
Mountain Quail	<i>Oreortyx pictus</i>	Introduced		
Mourning Dove	<i>Zenaidura macroura</i>			B
Mute Swan	<i>Cygnus olor</i>	Introduced		
Nashville Warbler	<i>Vermivora ruficapilla</i>			B
Northern Bobwhite	<i>Colinus virginianus</i>	Introduced		
Northern Flicker	<i>Colaptes auratus</i>			B
Northern Goshawk <i>atricapillus</i>	<i>Accipiter gentilis atricapillus</i>			B
Northern Harrier	<i>Circus cyaneus</i>			B
Northern Hawk Owl	<i>Surnia ulula</i>			
Northern Mockingbird	<i>Mimus polyglottos</i>			
Northern Pintail	<i>Anas acuta</i>			B
Northern Pygmy-Owl	<i>Glaucidium gnoma</i>			
Northern Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>			B
Northern Saw-whet Owl	<i>Aegolius acadicus</i>			B
Northern Shoveler	<i>Anas clypeata</i>			B
Northern Shrike	<i>Lanius excubitor</i>			
Northern Waterthrush	<i>Seiurus noveboracensis</i>			B
Olive-sided Flycatcher	<i>Contopus cooperi</i>	Blue	SC	
Orange-crowned Warbler	<i>Vermivora celata</i>			B
Orchard Oriole	<i>Icterus spurius</i>			
Osprey	<i>Pandion haliaetus</i>			B
Pacific Loon	<i>Gavia pacifica</i>			
Pacific-slope Flycatcher	<i>Empidonax difficilis</i>			
Parasitic Jaeger	<i>Stercorarius parasiticus</i>			
Pectoral Sandpiper	<i>Calidris melanotos</i>			
Peregrine Falcon <i>anatum</i>	<i>Falco peregrinus anatum</i>	Red	NAR	
Pied-billed Grebe	<i>Podilymbus podiceps</i>			B
Pileated Woodpecker	<i>Dryocopus pileatus</i>			B
Pine Grosbeak	<i>Pinicola enucleator</i>			
Pine Siskin	<i>Carduelis pinus</i>			B
Pomarine Jaeger	<i>Stercorarius pomarinus</i>			
Prairie Falcon	<i>Falco mexicanus</i>	Red	NAR	
Purple Finch	<i>Carpodacus purpureus</i>			
Purple Martin	<i>Progne subis</i>	Blue		
Red Crossbill	<i>Loxia curvirostra</i>			B
Red Phalarope	<i>Phalaropus fulicaria</i>			
Red-breasted Merganser	<i>Mergus serrator</i>			
Red-breasted Nuthatch	<i>Sitta canadensis</i>			B
Red-eyed Vireo	<i>Vireo olivaceus</i>			B
Redhead	<i>Aythya americana</i>			B
Red-naped Sapsucker	<i>Sphyrapicus nuchalis</i>			B
Red-necked Grebe	<i>Podiceps grisegena</i>			B
Red-necked Phalarope	<i>Phalaropus lobatus</i>	Blue	SC	

Common Name	Scientific Name	BC Status ²	Federal Status ²	Breeding Status
Red-tailed Hawk	<i>Buteo jamaicensis</i>			B
Red-winged Blackbird	<i>Agelaius phoeniceus</i>			B
Ring-billed Gull	<i>Larus delawarensis</i>			
Ring-necked Duck	<i>Aythya collaris</i>			B
Ring-necked Pheasant	<i>Phasianus colchicus</i>	Introduced		B
Rock Dove	<i>Columba livia</i>	Introduced		B
Rock Wren	<i>Salpinctes obsoletus</i>			
Ross's Goose	<i>Chen rossii</i>			
Rough-legged Hawk	<i>Buteo lagopus</i>			
Ruby-crowned Kinglet	<i>Regulus calendula</i>			B
Ruddy Duck	<i>Oxyura jamaicensis</i>			B
Ruffed Grouse	<i>Bonasa umbellus</i>			B
Rufous Hummingbird	<i>Selasphorus rufus</i>			B
Rusty Blackbird	<i>Euphagus carolinus</i>	Blue	SC	
Sabine's Gull	<i>Xema sabini</i>			
Sage Thrasher	<i>Oreoscoptes montanus</i>	Red	E	
Sanderling	<i>Calidris alba</i>			
Sandhill Crane	<i>Grus canadensis</i>			
Savannah Sparrow	<i>Passerculus sandwichensis</i>			B
Say's Phoebe	<i>Sayornis saya</i>			B
Scissor-tailed Flycatcher	<i>Tyrannus forficatus</i>			
Semipalmated Plover	<i>Charadrius semipalmatus</i>			
Semipalmated Sandpiper	<i>Calidris pusilla</i>			
Sharp-shinned Hawk	<i>Accipiter striatus</i>			B
Short-billed Dowitcher	<i>Limnodromus griseus</i>	Blue		
Short-eared Owl	<i>Asio flammeus</i>	Blue	SC	B
Snow Bunting	<i>Plectrophenax nivalis</i>			
Snow Goose	<i>Chen caerulescens</i>			
Snowy Owl	<i>Nyctea scandiaca</i>			
Solitary Sandpiper	<i>Tringa solitaria</i>			
Song Sparrow	<i>Melospiza melodia</i>			B
Sora	<i>Porzana carolina</i>			B
Spotted Sandpiper	<i>Actitis macularia</i>			B
Spotted Towhee	<i>Pipilo maculatus</i>			B
Spruce Grouse	<i>Falcapennis canadensis</i>			
Steller's Jay	<i>Cyanocitta stelleri</i>			B
Stilt Sandpiper	<i>Calidris himantopus</i>			
Surf Scoter	<i>Melanitta perspicillata</i>	Blue		
Swainson's Hawk	<i>Buteo swainsoni</i>	Red		
Swainson's Thrush	<i>Catharus ustulatus</i>			B
Tennessee Warbler	<i>Vermivora peregrina</i>			
Three-toed Woodpecker	<i>Picoides tridactylus</i>			B
Townsend's Solitaire	<i>Myadestes townsendi</i>			B
Townsend's Warbler	<i>Dendroica townsendi</i>			B
Tree Swallow	<i>Tachycineta bicolor</i>			B
Trumpeter Swan	<i>Cygnus buccinator</i>			
Tundra Swan	<i>Cygnus columbianus</i>			
Turkey Vulture	<i>Cathartes aura</i>			
Varied Thrush	<i>Ixoreus naevius</i>			B
Vaux's Swift	<i>Chaetura vauxi</i>			B
Veery	<i>Catharus fuscescens</i>			B
Vermilion Flycatcher	<i>Pyrocephalus rubinus</i>			
Vesper Sparrow	<i>Pooecetes gramineus</i>			
Violet-green Swallow	<i>Tachycineta thalassina</i>			B
Virginia Rail	<i>Rallus limicola</i>			B

Common Name	Scientific Name	BC Status ²	Federal Status ²	Breeding Status
Warbling Vireo	<i>Vireo gilvus</i>			B
Western Bluebird	<i>Sialia mexicana</i>			B
Western Grebe	<i>Aechmophorus occidentalis</i>	Red	SC	B
Western Kingbird	<i>Tyrannus verticalis</i>			B
Western Meadowlark	<i>Sturnella neglecta</i>			B
Western Sandpiper	<i>Calidris mauri</i>			
Western Screech-Owl	<i>Megascops kennicottii</i>	Blue	T	B
Western Tanager	<i>Piranga ludoviciana</i>			B
Western Wood-Pewee	<i>Contopus sordidulus</i>			B
Whimbrel	<i>Numenius phaeopus</i>			
White-breasted Nuthatch	<i>Sitta carolinensis</i>			
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>			
White-faced Ibis	<i>Plegadis chihi</i>			
White-headed Woodpecker	<i>Picoides albolarvatus</i>	Red	E	
White-throated Sparrow	<i>Zonotrichia albicollis</i>			
White-throated Swift	<i>Aeronautes saxatilis</i>			
White-winged Crossbill	<i>Loxia leucoptera</i>			
White-winged Scoter	<i>Melanitta fusca</i>			
Wild Turkey	<i>Meleagris gallopavo</i>	Introduced		B
Willet	<i>Catoptrophorus semipalmatus</i>			
Willow Flycatcher	<i>Empidonax traillii</i>			B
Wilson's Phalarope	<i>Phalaropus tricolor</i>			B
Wilson's Warbler	<i>Wilsonia pusilla</i>			B
Winter Wren	<i>Troglodytes troglodytes</i>			B
Wood Duck	<i>Aix sponsa</i>			B
Yellow -billed Cuckoo	<i>Coccyzus americanus</i>	Red		
Yellow Warbler	<i>Dendroica petechia</i>			B
Yellow-billed Loon	<i>Gavia adamsii</i>			
Yellow-breasted Chat	<i>Icteria virens</i>	Red	E	B
Yellow-headed Blackbird	<i>Xanthocephalus xanthocephalus</i>			B
Yellow-rumped Warbler	<i>Dendroica coronata</i>			B
MAMMALS				
American Badger	<i>Taxidea taxus</i>	Red	E	
Beaver	<i>Castor canadensis</i>			
Big Brown Bat	<i>Eptesicus fuscus</i>			
Black Bear	<i>Ursus americanus</i>			
Bobcat	<i>Lynx rufus</i>			
Bushy-tailed Woodrat	<i>Neotoma cinerea</i>			
Caribou	<i>Rangifer tarandus (southern pop.)</i>	Red	E	
Columbian Ground Squirrel	<i>Spermophilus columbianus</i>			
Common Shrew	<i>Sorex cinereus</i>			
Common Water Shrew	<i>Sorex palustris</i>			
Cougar	<i>Puma concolor</i>			
Coyote	<i>Canis latrans</i>			
Deer Mouse	<i>Peromyscus maniculatus</i>			
Dusky Shrew	<i>Sorex monticolus</i>			
Elk	<i>Cervus elaphus</i>			
Ermine	<i>Mustela erminea</i>			
Fringed Myotis	<i>Myotis thysanodes</i>	Blue	DD	
Golden-mantled Ground Squirrel	<i>Spermophilus lateralis</i>			
Grizzly Bear	<i>Ursus arctos</i>	Blue	SC	
Heather Vole	<i>Phenacomys intermedius</i>			
Hoary Bat	<i>Lasiurus cinereus</i>			

Common Name	Scientific Name	BC Status ²	Federal Status ²	Breeding Status
House Mouse	<i>Mus musculus</i>	Introduced		
Little Brown Myotis	<i>Myotis lucifugus</i>		E	
Long-legged Myotis	<i>Myotis volans</i>			
Long-tailed Vole	<i>Microtus longicaudus</i>			
Long-tailed Weasel	<i>Mustela frenata</i>			
Lynx	<i>Lynx canadensis</i>			
Marten	<i>Martes americana</i>			
Meadow Vole	<i>Microtus pennsylvanicus</i>			
Mink	<i>Mustela vison</i>			
Moose	<i>Alces alces</i>			
Mountain Goat	<i>Oreamnos americanus</i>			
Mule Deer	<i>Odocoileus hemionus</i>			
Muskrat	<i>Ondatra zibethicus</i>			
Northern Flying Squirrel	<i>Glaucomys sabrinus</i>			
Northern Pocket Gopher <i>segregatus</i>	<i>Thomomys talpoides segregatus</i>	Red		
Porcupine	<i>Erethizon dorsatum</i>			
Pygmy Shrew	<i>Sorex hoyi</i>			
Raccoon	<i>Procyon lotor</i>			
Red Fox	<i>Vulpes vulpes</i>			
Red Squirrel	<i>Tamiasciurus hudsonicus</i>			
Red-tailed Chipmunk <i>simulans</i>	<i>Tamias ruficaudus simulans</i>	Blue		
River Otter	<i>Lontra canadensis</i>			
Silver-haired Bat	<i>Lasionycteris noctivagans</i>			
Snowshoe Hare	<i>Lepus americanus</i>			
Southern Red-backed Vole	<i>Clethrionomys gapperi</i>			
Striped Skunk	<i>Mephitis mephitis</i>			
Townsend's Big-eared Bat	<i>Corynorhinus townsendii</i>	Blue		
Vagrant Shrew	<i>Sorex vagrans</i>			
Water Vole	<i>Microtus richardsoni</i>			
Western Jumping Mouse	<i>Zapus princeps</i>			
Western Long-eared Myotis	<i>Myotis evotis</i>			
White-tailed Deer	<i>Odocoileus virginianus</i>			
Wolverine	<i>Gulo gulo luscus</i>	Blue	SC	
Woodchuck	<i>Marmota monax</i>			
Yellow-pine Chipmunk	<i>Tamias amoenus</i>			
Yuma Myotis	<i>Myotis yumanensis</i>			

¹ Information Sources: Wilson et al. 2004; B.C. Conservation Data Centre 2018; Campbell et al. 1990a; Campbell et al. 1990b; Campbell et al. 2001; Cannings et al. 1999; Committee On the Status of Endangered Wildlife In Canada 2018; Eder and Pattie 2001; Fraser et al. 1999; Nagorsen and Brigham 1993; Nagorsen 2005; M-A Beaucher, pers. comm., J. Craig, pers. comm., T. Hill, pers. comm., D. Nagorsen, pers. comm.

² Red = native species, or subspecies that have, or are candidates for, Extirpated, Endangered, or Threatened status in British Columbia; Blue = native species or subspecies considered to be of Special Concern (formerly Vulnerable) in British Columbia; ²Endangered (E)= facing imminent extirpation or extinction; Threatened (T) = Likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction. Special concern (SC) = may become a threatened or an endangered because of characteristics that make it is particularly sensitive to human activities or natural events; DD=(Data Deficient) insufficient scientific information to support status designation; NAR=(Not At Risk) has been evaluated and found to be not at risk; **B**=known to breed within the Creston Valley Wildlife Management Area.

Appendix 3. Plant Species at Risk Review Summary

Summary of at risk plant query including provincial and federal status, and determination of occurrence potential within project area.

Species	BC Status ¹	Federal Status ²	Occurrence in Project Area	Species Summary
<i>Barbula convoluta</i> var. <i>eustegia</i>	Red		Unlikely	Sandy shores or pine woodlands
<i>Campylium calcareum</i>	Red		Unlikely	Grows on shaded boulders.
<i>Hygrohypnum alpinum</i>	Blue		Possible	Reported from several locations in Kootenay Lake Forest District from riparian sites.
<i>Platyhypnidium riparioides</i>	Blue		Unlikely	Grows on rock substrate in flowing water.
<i>Tortula obtusifolia</i>	Blue		Unlikely	Habitat includes calcareous rock or soil.
alkali-marsh butterweed <i>Senecio hydrophilus</i>	Red		Unlikely	Wet, often alkaline swamps and meadows in the montane zone. Occurs in Creston Valley and lower Salmo River.
American sweet-flag <i>Acorus americanus</i>	Blue		Unlikely	Habitat includes riparian and wetland marsh / swamp. Known to occur in the Creston Valley.
banded cord-moss <i>Entosthodon fascicularis</i>	Blue	Special Concern	Unlikely	Reported from dry creek side in nearby Yahk.
beardless wildrye <i>Elymus curvatus</i>	Red		Possible	Riparian forests, dry conifer forests and mixed forests. Found near Crawford Bay.
California Jacob's ladder <i>Polemonium californicum</i>	Red		Unlikely	Open to shaded areas in woodlands 1600-3100 meters.
California-tea <i>Rupertia physodes</i>	Blue		Unlikely	Rare occurrence mesic open forests in southwest BC.
coast manroot <i>Marah oregana</i>	Red		Unlikely	Restricted to Vancouver Island and the gulf islands.
coastal wood fern <i>Dryopteris arguta</i>	Blue	Special Concern	Unlikely	Known occurrences only in southwest BC.
Drummond's thistle <i>Cirsium drummondii</i>	Blue		Unlikely	Rare in the Peace river area where it occurs in open habitats.

Species		BC Status ¹	Federal Status ²	Occurrence in Project Area	Species Summary
harsh popcornflower	<i>Plagiobothrys hispidulus</i>	Blue		Possible	Found on disturbed areas of open ground on two sites in the Flathead Valley in extreme southeast BC.
heterocodon	<i>Heterocodon rariflorus</i>	Blue		Unlikely	Found on moist seepage sites, vernal pools and conifer forests in the lowland and lower montane zones. Closest occurrence observed on Highway 3 west of Castlegar.
Howell's triteleia	<i>Triteleia howellii</i>	Red	Endangered	Unlikely	Rare in southwest BC.
lance-leaved figwort	<i>Scrophularia lanceolata</i>	Blue		Possible	Located on moist to mesic roadsides, clearings, thickets and forest edges in the lowland and montane zones. Closest recorded observation between Kaslo and New Denver.
Lindley's microseris	<i>Uropappus lindleyi</i>	Red	Endangered	Unlikely	Rare in southwest BC.
Macoun's meadow-foam	<i>Limnanthes macounii</i>	Red	Threatened	Unlikely	Grows in seepage sites in extreme southwest BC.
marginated streamside moss	<i>Scouleria marginata</i>	Red	Endangered	Unlikely	Found on rocks in the splash zone of streams and waterfalls, often submerged at least part of the year. Confirmed in DKL, ICH.
meadow willow	<i>Salix petiolaris</i>	Blue		Unlikely	Grows in wet montane forests in BC Peace Country.
monardella	<i>Monardella odoratissima</i> ssp. <i>discolor</i>	Red		Possible	Dry shrublands in the steppe and montane zones.
Montana larkspur	<i>Delphinium bicolor</i> ssp. <i>bicolor</i>	Blue		Possible	Prefers dry grasslands, shrublands, rocky slopes and forests, sagebrush and antelope brush from the steppe to subalpine zones.
Montana lupine	<i>Lupinus arbustus</i> ssp. <i>pseudoparviflorus</i>	Blue		Possible	Habitat includes dry meadows, gravelly ridges, rocky slopes, sagebrush-steppe and open forests in the montane zone. Occurs in the Creston area near town.
northern tansymustard	<i>Descurainia sophioides</i>	Blue		Unlikely	Rare in northern BC.

Species		BC Status ¹	Federal Status ²	Occurrence in Project Area	Species Summary
Nuttall's sunflower	<i>Helianthus nuttallii</i> ssp. <i>rydbergii</i>	Red		Possible	Widely scattered distribution throughout US Rockies and prairies. There are only a few occurrences throughout BC.
Pacific jewelweed	<i>Impatiens x pacifica</i>	Red		Possible	Rare hybrid between <i>I. ecomuta</i> and <i>I. capensis</i> which would occupy similar habitat.
peduncled sedge	<i>Carex pedunculata</i>	Blue		Unlikely	A species of montane forests
prairie buttercup	<i>Ranunculus rhomboideus</i>	Blue		Unlikely	Dry grassland species occurring in BC Peace Country.
prairie wedgrass	<i>Sphenopholis obtusata</i>	Red		Unlikely	Moist meadows, streambanks, shallow ponds and hot springs; nearest reported occurrence near Osoyoos.
purple meadowrue	<i>Thalictrum dasycarpum</i>	Red		Possible	Habitat includes wet meadows, streambanks, and woodlands in the montane zone. Closest occurrences in the Pend d'Oreille Valley near confluence with Salmo River.
purple sanicle	<i>Sanicula bipinnatifida</i>	Red	Threatened	Unlikely	Rare in southwest BC.
Smith's fairybells	<i>Prosartes smithii</i>	Blue		Unlikely	Restricted to southern Vancouver Island.
Sprengel's sedge	<i>Carex sprengelii</i>	Blue		Unlikely	Grows in alluvial woodlands. Distributed in east central BC.
spurless touch-me-not	<i>Impatiens ecomuta</i>	Red		Possible	Generally prefers riparian forests, lakes, ponds, marsh. Found in marsh only meters North of project boundary.
streambank lupine	<i>Lupinus rivularis</i>	Red	Endangered	Unlikely	Restricted to extreme southwest BC.
sweet-marsh butterweed	<i>Senecio hydrophiloides</i>	Blue		Possible	Found in wet to moist meadows, riparian forests, wetland marshes and forest openings. Generally in the montane and lower subalpine zones. Closest occurrence located near Yahk.
Taimyr campion	<i>Silene ostenfeldii</i>	Blue		Unlikely	High elevation calcareous slopes in northwest BC.
tall beggarticks	<i>Bidens vulgata</i>	Blue		Possible	Habitat includes riparian and wetland bog/fen/swamp/marsh/vernal pools. Found near Creston and Wynndel.
tall bugbane	<i>Actaea elata</i> var. <i>elata</i>	Red	Endangered	Unlikely	Tall wildflower, with only BC occurrence is in Chilliwack area.

Species		BC Status ¹	Federal Status ²	Occurrence in Project Area	Species Summary
white meconella	<i>Meconella oregana</i>	Red	Endangered	Unlikely	Restricted to Vancouver Island and the gulf islands.
whitebark pine	<i>Pinus albicaulis</i>	Blue	Endangered	Unlikely	Mesic to dry slopes in the subalpine to alpine zones.
wild licorice	<i>Glycyrrhiza lepidota</i>	Blue		Unlikely	Habitat includes moist to wet fields, streambanks, riparian forests and riparian herbaceous and open forests in the montane zone. Known locations are outside the study area. Closest known location is Lower Arrow Lake at Tulip Creek.

¹Red = Candidate species for attaining extirpated, endangered, or threatened status within British Columbia. Blue = Species considered to be of special concern within British Columbia.

²Endangered = Facing imminent extirpation or extinction. Threatened = Likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction.

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, BC Species and Ecosystem Explorer, and references therein.

Appendix 4. Wildlife Species at Risk Review Summary

Local terrestrial vertebrate species at risk and their potential occurrence within the project area¹.

Species	BC Status ¹	Federal Status ²	Potential occurrence/ concern within project area	Species summary
AMPHIBIANS				
Northern Leopard Frog <i>Lithobates pipiens</i>	Red	E	Extremely Unlikely Limited range within the Creston Valley, but once was more common throughout valley. Habitat within project area is unsuitable for this species.	Wetland species; captive rearing measures are currently underway; no suitable habitat in project area.
Rocky Mountain Tailed Frog <i>Ascaphus montanus</i>	Blue	T	Extremely Unlikely Not known to occur within the Creston Valley. Habitat within project area is unsuitable for this species.	Aquatic species associated with mountain streams; occurs in several drainages well to the east of the Creston Valley.
Western Toad <i>Anaxyrus boreas</i>		SC	Likely There is no breeding habitat within project area but may occur occasionally during non-breeding season, especially in temporary wetland immediately to the north of the project property	Terrestrial species; requires clean standing water for breeding.
Coeur d'Alene Salamander <i>Plethodon idahoensis</i>		SC	Extremely Unlikely Habitat within project area is unsuitable for this species. Poor dispersal ability.	Very dependent on moisture and lives in wet seeps, waterfall splash zones and riparian areas of streams, especially in areas with fissured bedrock; in the Creston Valley, this salamander often uses abandoned mine shafts.
REPTILES				
Painted Turtle <i>Chrysemys picta</i>	Blue	SC	Possible May occasionally occur in temporary wetland immediately to the north of the project property but the species prefers permanent wetlands.	Highly aquatic and occurs in slow-moving, shallow lakes, ponds, and streams.
Northern Rubber Boa <i>Charina bottae</i>		SC	Likely Likely occurs in project area, especially at the rocky outcrop (Figure 3), which is excellent reptile habitat.	Fossorial species; occurs in a variety of habitats; often found in dry, open areas with rocky outcroppings and cover rocks; this species is relatively common in the immediate area (pers. obs.); ground disturbance at occupation sites could affect this species.
Western Skink <i>Plestiodon skiltonianus</i>	Blue	SC	Likely Likely occurs in project area, especially at the rocky outcrop (Figure 3), which is excellent reptile habitat.	Found in open, rocky areas with sandy soil and good sun exposure; locally abundant in appropriate habitat; this species is relatively common in the immediate area (pers. obs.); ground disturbance at occupation sites could affect this species.
BIRDS				
Western Grebe	Red	SC	Extremely Unlikely	Aquatic species prefers larger, shallower water

Species	BC Status ¹	Federal Status ²	Potential occurrence/ concern within project area	Species summary
<i>Aechmophorus occidentalis</i>			Habitat within project area is unsuitable for this species.	bodies for nesting; breeds at Leach Lake and Duck Lake in the CVWMA.
Eared Grebe <i>Podiceps nigricollis</i>	Blue		Extremely Unlikely Habitat within project area is unsuitable for this species.	Uncommon in the Creston Valley; usually nests in small colonies in sheltered wetland areas.
Common Nighthawk <i>Chordeiles minor</i>		SC	Likely Species may forage over project area and the rocky outcrop may be suitable for breeding although there is likely too much disturbance from livestock.	Diurnal and nocturnal aerial forager; ground nester in dry, open areas often with rocky outcroppings.
White-throated Swift <i>Aeronautes saxatalis</i>	Blue		Unlikely There is no breeding habitat within project area for this species but may forage over project site occasionally.	Aerial forager; nests on cliffs; patchy distribution in B.C.
Black Swift <i>Cypseloides niger</i>	Blue	E	Likely There is no breeding habitat within project area for this species but likely forages over project site occasionally.	Aerial insectivore; breeds on cliff faces, often in association with waterfalls.
Long-billed Curlew <i>Numenius americanus</i>	Blue	SC	Possible May occasionally occur in fields adjacent to project area.	Grassland species; may breed in agricultural fields of West Creston.
Forster's Tern <i>Sterna forsteri</i>	Red	DD	Extremely Unlikely Habitat within project area is unsuitable for this species.	Breeds in open, shallow bodies of water. Occurs in wetland/lake habitat; breeds at Leach Lake and Duck Lake in the CVWMA.
Double-crested Cormorant <i>Phalacrocorax auritus</i>	Blue	NAR	Extremely Unlikely Habitat within project area is unsuitable for this species.	Aquatic species; breeds in Creston Valley at at least one known colony near Duck Lake but likely expanding in range in the valley; will forage in lakes and ponds.
Great Blue Heron <i>Ardea herodias herodias</i>	Blue		Possible Habitat within project area is low quality but individuals may forage within the temporary wetland to the immediate north of the project property.	Often nests in groups, especially in stands of larger trees with black cottonwood; nests are usually located near foraging habitat like slow-moving rivers, sloughs and marshy lakes; species may be very sensitive to disturbance near nest sites.
American Bittern <i>Botaurus lentiginosus</i>	Blue		Unlikely Habitat within project area is unsuitable for this species.	This species is associated with wetlands with abundant emergent vegetation such as reeds and cattails.
Short-eared Owl <i>Asio flammeus</i>	Blue	SC	Possible May occasionally occur in agricultural fields adjacent to project area.	Ground nesting grassland species. Rare breeder in the CVWMA.
Western Screech-Owl <i>Megascops kennicottii macfarlanei</i>	Blue	T	Likely This species has been recorded in the immediate area (Hausleitner and Dulisse	Secondary cavity nester; associated with mature riparian habitat, especially if large diameter black cottonwood is present;

Species	BC Status ¹	Federal Status ²	Potential occurrence/ concern within project area	Species summary
			2009) and the mixed forest habitat at the north of the project area is excellent western screech-owl habitat.	disturbance to the forested polygons within the project area should be avoided to protect western screech-owl habitat.
Flammulated Owl <i>Psiloscoops flammeolus</i>	Blue	SC	Unlikely Breeds in mature conifer forest, often dominated by Douglas-fir	A few records for upland areas north of Wyndell.
Lewis's Woodpecker <i>Melanerpes lewis</i>	Blue	T	Possible May use large black cottonwoods adjacent to project area.	Cavity nester in dry forests or riparian black cottonwood; cottonwood trees should be retained as important habitat for this species; uncommon in the Creston Valley.
Williamson's Sapsucker <i>Sphyrapicus thyroideus</i>	Blue	E	Extremely Unlikely Habitat within project area is unsuitable for this species.	Not known to occur in the Creston Valley; rare and associated with mature conifer forest (especially with a western larch component) in the Cranbrook area.
Prairie Falcon <i>Falco mexicanus</i>	Red	NAR	Possible There is no nesting habitat within the within project area but individuals may occasionally forage in the area.	Infrequently recorded during fall migration; nesting requires open areas with cliffs; known to occur in east Creston Valley.
Peregrine Falcon <i>Falco peregrinus anatum</i>	Red	NAR	Possible There is no nesting habitat within the within project area but individuals may occasionally forage in the area.	Prefers open foraging areas; uncommon in the Creston Valley but known to breed to the north in the Nature Conservancy of Canada Darkwoods conservation property.
Olive-sided Flycatcher <i>Contopus cooperi</i>	Blue	SC	Possible Habitat within project area is not high quality for this species.	Associated with forest edge habitat, often near water; most nests occur in coniferous trees
Barn Swallow <i>Hirundo rustica</i>	Blue	T	Likely Likely forages over site; no nesting habitat present on project site.	Aerial forager over forests and in open area; often nests in open buildings.
Evening Grosbeak <i>Hirundo rustica</i>	SC		Possible May occur in forested portion of project area.	Occurs in a wide variety of forest types, especially dominated by conifers.
Bobolink <i>Dolichonyx oryzivorus</i>	Blue	T	Occurs 1994 and 1995 records in open fields at south end of Nick Slough, north of West Creston Rd. (CDC 2018).	Breeds in un-mowed, tall grass fields; Creston Valley is one of the main breeding areas for this species in B.C.
Rusty Blackbird <i>Euphagus carolinus</i>	Blue	SC	Unlikely Not known to occur within the project area.	Migrant species in the Creston Valley.
Yellow-breasted Chat <i>Icteria virens</i>	Red	E	Unlikely Habitat within project area is unsuitable.	Rare breeder in the CVWMA; prefers extensive, thick, riparian shrub habitat at low elevations.
MAMMALS				
Least Chipmunk <i>Neotamias minimus selkirki</i>	Red		Extremely Unlikely Habitat within project area is unsuitable and	Known from two higher elevation (2134-2380 m) sites the Purcell Mountains.

Species	BC Status ¹	Federal Status ²	Potential occurrence/ concern within project area	Species summary
			the project site is outside the known range of this taxon.	
Red-tailed Chipmunk <i>Tamias ruficaudus simulans</i>	Blue		Occurs Records of several individuals from the immediate area (Nick's Island) in 1949 and 1951 (CDC 2018).	Often found in human influenced landscapes and with associated with coarse woody debris; although the subspecies has a small distribution, it does not appear to be at risk and is apparently adaptable to changes in habitat.
Northern Pocket Gopher <i>Thomomys talpoides segregatus</i>	Red		Extremely Unlikely This subspecies is restricted to a small area near Wyndell; there is extensive pocket gopher use within the open areas of the project area and a dead pocket gopher was found on site	Fossorial species; feeds on plant material.
Townsend's Big-eared Bat <i>Corynorhinus townsendii</i>	Blue		Likely Known to occur within the CWVMA and there are records in the area; individuals likely forage over project area and may use suitable wildlife trees, especially mature black cottonwood.	Inhabits low to mid elevation deciduous and coniferous forests, and roosts and hibernates in caves, mine shafts, buildings, and tree cavities; feed mainly on lepidopterans and other non-aquatic invertebrates; cottonwood trees should be retained as important habitat for this species.
Little Brown Myotis <i>Myotis lucifugus</i>		E	Likely Known to occur within the CWVMA and there is suitable habitat in the vicinity; individuals likely forage over project area and may use suitable wildlife trees, especially mature black cottonwood.	Will use a wide variety of habitats; roosts in buildings, caves, rock crevices, tree cavities and under bark; cottonwood trees should be retained as important habitat for this species.
Fringed Myotis <i>Myotis thysanodes</i>	Blue	DD	Likely Known to occur within the CWVMA and there is suitable habitat in the vicinity; individuals likely forage over project area and may use suitable wildlife trees, especially mature black cottonwood.	Associated with grassland and dry forest habitat; feeds mainly on beetles, lepidopterans and other non-aquatic invertebrates; cottonwood trees should be retained as important habitat for this species.
Wolverine <i>Gulo gulo luscus</i>	Blue	SC	Unlikely Individuals have very large home ranges and may occur within the project area rarely.	Uncommon in our area, occurs mainly in subalpine and alpine habitat; high levels of human activity in area likely prevent its occurrence.
Fisher <i>Pekania pennanti</i>	Blue		Extremely Unlikely Species is extirpated from this region.	Trapping for fur has impacted regional populations of this species.
American Badger <i>Taxidea taxus</i>	Red	E	Unlikely This species is a very rare visitant to Creston Valley.	Occurs in non-forested areas, brushlands, and open forests with grass and forb understorey; historically, did occur in the area, but has largely been extirpated.
Grizzly Bear	Blue	SC	Occurs	Primarily associated with forest areas, at

Species	BC Status ¹	Federal Status ²	Potential occurrence/ concern within project area	Species summary
<i>Ursus arctos</i>			Individuals have very large home ranges and occur within the project area occasionally (Cathy Cholpecki - <i>personal communication</i>).	higher elevations, and away from human populations; frequently occurs in wetlands areas within the CVWMA.
Caribou <i>Rangifer tarandus</i> (southern pop.)	Red	E	Extremely Unlikely May have historically ranged within the project area.	Small remnant herds mainly restricted to high elevation old-growth forests; has been severely impacted by forest management practices.
Mountain Goat <i>Oreamnos americanus</i>	Blue		Extremely Unlikely Habitat within project area is unsuitable.	Not known to occur in lower elevations in the Creston Valley.
Bighorn Sheep <i>Ovis canadensis</i>	Blue		Extremely Unlikely Habitat within project area is unsuitable.	Not known to occur in lower elevations in the Creston Valley.

¹Red = native species, or subspecies that have, or are candidates for, Extirpated, Endangered, or Threatened status in British Columbia; Blue = native species or subspecies considered to be of Special Concern (formerly Vulnerable) in British Columbia; ²Endangered (E)= facing imminent extirpation or extinction; Threatened (T) = Likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction. Special concern (SC) = may become a threatened or an endangered because of characteristics that make it is particularly sensitive to human activities or natural events; DD=(Data Deficient) insufficient scientific information to support status designation; NAR=(Not At Risk) has been evaluated and found to be not at risk; information Sources: Wilson et al. 2004; B.C. Conservation Data Centre 2018; Campbell et al. 1990a; Campbell et al. 1990b; Campbell et al. 2001; Cannings et al. 1999; Committee On the Status of Endangered Wildlife In Canada 2018; Eder and Pattie 2001; Fraser et al. 1999; Nagorsen 2004; Nagorsen and Brigham 1993.

Appendix 5. Preliminary Field Reconnaissance Archaeological Report



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Preliminary Field Reconnaissance Archaeological Report

Date: September 20th, 2018
Proponent: Yaqan Nukiy Band
Contact: Curtis Wullum Lands Manager
Prepared by: Nathalie Allard Kakiłwizkił pikakniłs qapsin?is

Re: Yaqan Nukiy Healing Centre

Background

On August 7th, 2018, the Ktunaxa Nation Council (Nathalie Allard and Nicole Kapell) completed a Preliminary Field Reconnaissance (PFR) of the Nicks Garden Lot 1R1C in preparation of the proposed development of the Healing Center. The Healing Center will include main house/gathering place, several smaller cabins and an area proposed for tipis. The ground disturbance is anticipated to include walkways and access, foundation and other associated infrastructure (water, electricity, etc.).

Results

The entire project area was observed to have moderate to high archaeological potential. The project area is situated on level terrain gently sloping down to the east. It is in close proximity to the Kootenay River as well as several previously recorded archaeological sites. There is an occupied residence directly adjacent to the future healing center which will remain. The project area is a mixture of historic disturbance (related to the building of the residence) and intact, vegetated/treed areas. It is unknown the extent to which intact soils, and therefore in situ archaeological sites, remain, however there is still potential for finding archaeological materials during construction.

Recommendations

It is recommended that once the plans for the locations of the building, cabins and associated infrastructure are finalized, a targeted shovel testing program is implemented. This shovel testing program can focus on areas that will be disturbed, attempting to assess whether archaeological sites or materials are present in the area. It is more timely and cost effective to wait until development plans are more concrete.

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Lower Kootenay

Tobacco Plains

In the event that archaeological materials are discovered, discussion regarding project redesign can occur in order to negate impact to the site. Other mitigation options can also be discussed at this time.

If you have any questions, please contact me.

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www.ktunaxa.org

Appendix 6. 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.bcaca.ca. The proponent may also wish to contact the Ktunaxa Nation Council's Cultural Resources Stewardship Technician for direction (1-250-420-2739; nikapell@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 Altered Rock (FAR), bone, antler and tooth.

Lithics: What to look for

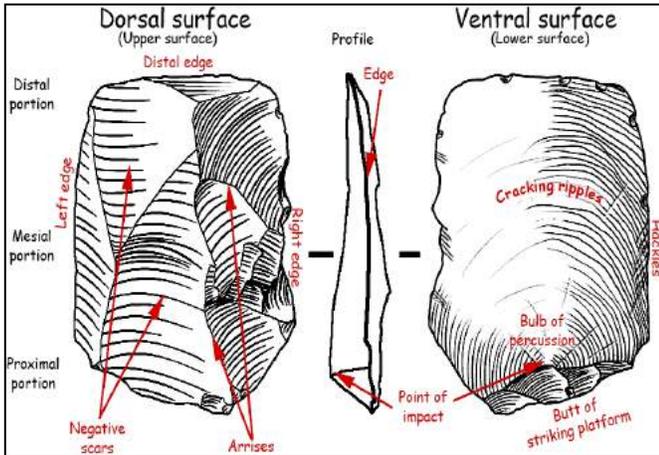


Image 1: Basic flake morphology



Image 2: Examples of lithic flakes

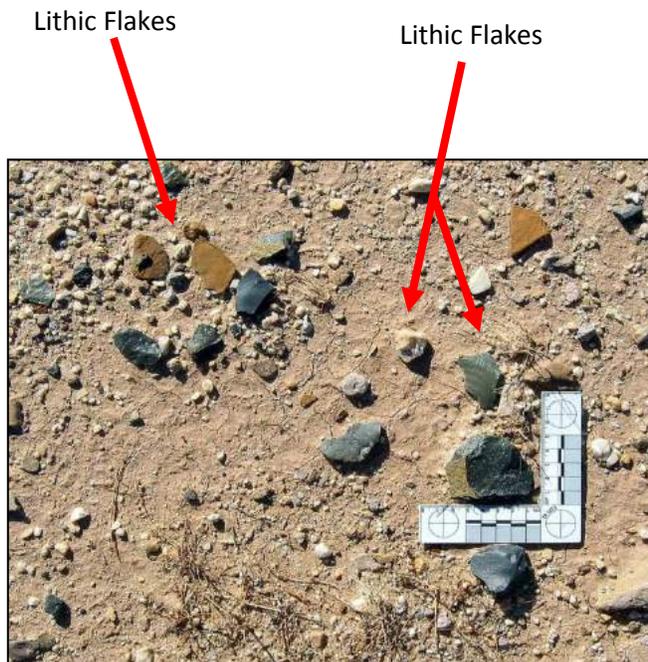


Image 3: Example of lithic scatter found on ground surface



Image 4: Example of formed lithic artifacts

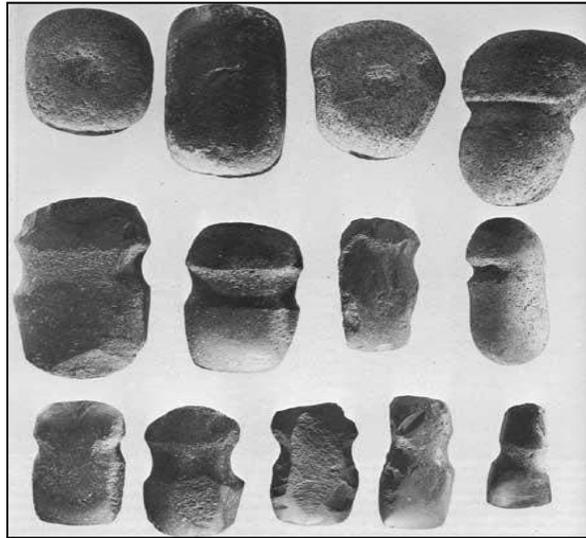


Image 5: Ground stone artifacts

Bone, Tooth and Antler Artifacts: What to Look For

- Obvious shaping
- Incising
- Unnatural holes



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 FAR and charcoal, and
- depressions in the earth associated with FAR, 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 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 FAR 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 FAR
- 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