Environmental Management Plan: Sprague Bay Dewatering and Marine Storage Site, Kinbasket Lake

Balcaen Consolidated Contracting Ltd.

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Disclaimer

This report is rendered solely for the use of Balcaen Consolidated Contracting Ltd. (Balcaen) in connection with the application for a new Licence of Occupation for a dewatering and marine storage site located at Sprague Bay on Kinbasket Lake (the Project). No person may rely on it for any other purpose without Estsék' Environmental Services LLP's (Estsék') prior written approval. Should a third party use this report without the approval of Estsék', they may not rely upon it. Estsék' accepts no responsibility for loss or damages suffered by any third party as a result of decisions made or actions taken based on this report.

The objective of this report is to identify potential environmental permitting requirements for Balcaen and to provide environmental management and mitigation objectives during operations of the Project.

This report is based on facts and opinions contained within the referenced documents. We have attempted to identify and consider relevant facts and documents pertaining to the scope of work, as of the time period during which we conducted this analysis. However, our opinions may change if new information is available or if information, we have relied on is altered.

The following assumptions were relied on during the preparation of this report:

- Balcaen will review and provide input/comments regarding operations prior to submission to any government agency or release to contractors.

We applied accepted professional practices and standards in developing and interpreting data. While we used accepted professional practices in interpreting data provided by Balcaen or third-party sources, we did not verify the accuracy of such data.

This Plan should be considered as a whole; selecting only portions of this report may result in a misleading view of the results, our opinions, or recommendations.

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1.0 Introduction

Balcaen Consolidated Contracting Ltd. (Balcaen) is applying for a Licence of Occupation (Foreshore Lease) under the *Land Act* for the Sprague Bay Dewatering and Marine Storage Site on the western shore of Kinbasket Lake, near the Mica Dam in east-central British Columbia (BC). This location is where log booms will be removed from the water and taken to various sawmilling operations in the north Kootenays, BC (the Project). This location will also be used to store equipment and supplies for future use. Bringing the site to an operational state may require installation of new infrastructure; however, no additional land will be acquired, and all infrastructure will be constructed on previously disturbed land.

Balcaen has retained Estsék' Environmental Services LLP (Estsék') to prepare this Environmental Management Plan (EMP) for the operation of the Sprague Bay Dewatering and Marine Storage Site.

1.1 Project Location

The Foreshore Lease is located on the western shore of Kinbasket Lake, to the east of the Mica Dam. A Project location map is shown in Figure 1. A detailed Project site overview indicating the Foreshore Lease boundary is shown in Figure 2. The Sprague Bay Dewatering and Marine Storage Site lease covers approximately 7 hectares (ha).

1.2 Scope of Work

An EMP is an action plan that identifies environmentally sensitive aspects of the Project and provides mitigation and monitoring measures aimed at reducing or eliminating environmental impact at all levels of a project or activity. This EMP outlines the scope of work that would occur on a regular basis in the Project area, including:

- Erosion and sediment control;
- Water quality management;
- Wildlife management;
- Vegetation and invasive plant management;
- Waste management;
- Spill management;
- Air quality and dust control;
- Heritage resource discovery; and
- Environmental monitoring requirements.

A site visit was completed on July 25-26, 2019 by two Estsék' environmental specialists. Environmental observations are detailed in the following sections.

1.3 Relevant Legislation

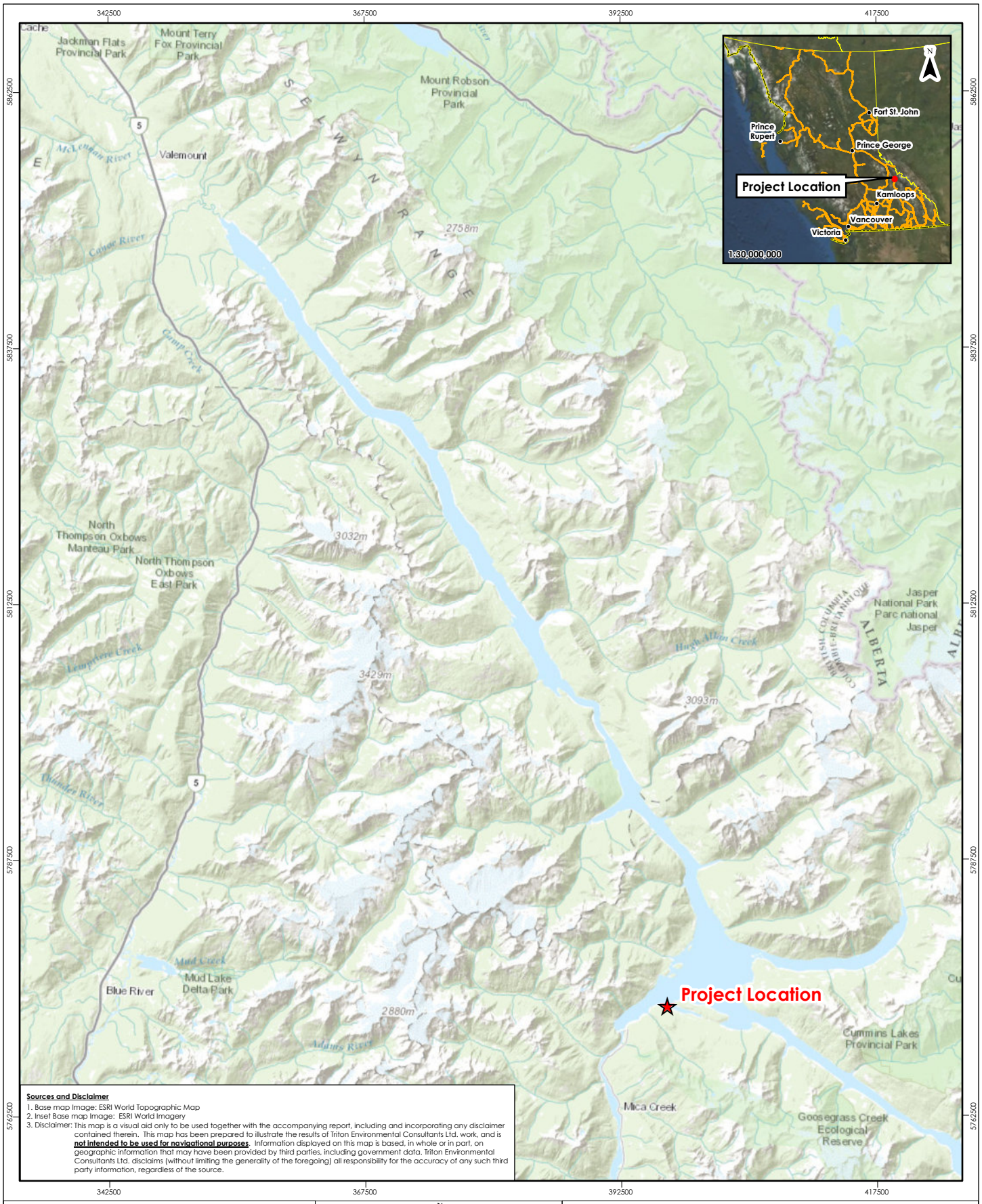
Environmental legislation relevant to and considered during the preparation of this EMP includes, but is not limited to the following:

Federal:

- *Fisheries Act*
- *Canadian Environmental Protection Act*
- *Migratory Birds Convention Act*
- *Canadian Navigable Waters Act*
- *Species at Risk Act*

Provincial:

- *Water Sustainability Act*
- *Environmental Management Act*
- *Wildlife Act*
- *Land Act*
- *Weed Control Act*
- *Integrated Pest Management Act*
- *Heritage Conservation Act*



Kinbasket Lake EMPs

Figure 1 - Sprague Bay Dewatering and Marine Storage Site Location

N W E S

Kilometers

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Project No:	10403
Date:	Sep 04, 2019
Scale:	1:500,000
Map Datum:	NAD 1983 UTM Zone 11N

Kinbasket Lake EMPs	N W E S	**File Path:** N:\ACTIVE\10403_Estsek_BalcaenKinbasketLake_EMP\ArcProProject\ArcMap\10403_SpragueBay_Fig3_20191219.mxd
Figure 3 - Sprague Bay Dewatering and Marine Storage Site Plan	Meters 0 150 300 600 900 1,200	**Project No:** 10403 **Date:** Dec 19, 2019 **Scale:** 1:40,000 **Map Projection:** UTM Zone 11 (NAD 1983)

2.0 Proposed Work and Operations

The proposed work with require the application for a new Foreshore Lease. All activities will be conducted on previously disturbed land that was historically as a marine storage site. Some new infrastructure may need to be installed to operate the dewatering and marine storage site.

Activities required to re-activate the dewatering and marine storage site include:

- Minor site preparation, including clearing and grading to re-establish equipment laydown areas, log yards, and access roads;
- Updating signage;
- Installation of boomstick anchors and chains; and
- Construction and/or re-activation of log dewatering site, as required.

Operational activities once re-activation is complete will include:

- Marine storage (seasonal) for the following equipment;
    - One 30-foot by 70-foot barge
    - One 30-foot by 72-foot barge
    - One 40-foot by 112-foot barge either moored on shore or anchored in Sprague Bay
    - One 36-foot tugboat (Forest Engineer)
    - One 34-foot tugboat (Canyon Clipper)
    - One 13-foot sidewinder boom boat
    - One 16-foot dozer tugboat
    - One school bus parts vehicle (ropes, drive shafts & miscellaneous marine components)
    - One 23-foot Argo crew boat
- Delivering log booms via tugboats from the Harvey Bay Log Dump along Kinbasket Lake;
- Parking;
- Removing logs from water (dewatering logs);
- Loading logs onto logging trucks;
- Transporting logs to nearby sawmills; and
- Periodically removing accumulated woody debris from log yards, log bunk areas, and dewatering site.

Kinbasket Lake is a man-made reservoir controlled by the Mica Dam. Kinbasket Lake has a normal operating range of approximately 35 m, and during periods below full pool, a large shoreline drawdown zone is exposed (Warnock and Caley 2018). Typical reservoir drawdown occurs during the winter months, beginning in January, reaching low pool level by approximately the end of April (Warnock and Caley 2018). The Sprague Bay Dewatering Site will operate from May to November, concurrent with towing of log booms across Kinbasket Lake from the Harvey Bay log dump during higher water and ice-free conditions.

Each log boom delivered to the dewatering site will typically comprise 50 to 100 bundles. Log booms are constructed to a maximum of 100 bundles, which covers a surface area of approximately 1,500 m^2. It is anticipated that, when operational, between 6 to 10 logging truck loads (300 to 400 m^3 of wood) per day will be removed from the Kinbasket Lake, dewatered, loaded onto trucks, and hauled to nearby mills.

Parking along the Sprague Bay spur road, which is under road permit R07264, will be minimal as most vehicles associated with Project operations will be located at the worksites associated with Forest License A17799. During Project operations, it would be likely that on average no more than two vehicles would be parked on the spur during daylight hours.

3.0 Regulatory Framework

To operate the dewatering and marine storage facility, Balcaen requires a Licence of Occupation (Foreshore Lease) under the *Land Act*. Applications for Crown land for the purposes of operating a log handling facility must be submitted to the Ministry of Forests, Lands, Natural Resource Operations, and Rural Development (MFLNRORD). The standard term for a Licence of Occupation is 10 years (BC MFLNRO 2011).

Although the Crown land application is the primary permitting requirement to operate the dewatering and marine storage site, there are several other pieces of environmental legislation that apply to the Project. The fish and fish habitat protection provisions of the *Fisheries Act* prohibit the harmful alteration, disruption, or destruction (HADD) of fish habitat as well as the death of fish. The *Fisheries Act* also prohibits the deposition of deleterious substances in water frequented by fish. Based on the new criteria listed on the Projects Near Water website (and implemented August 28, 2019; Fisheries and Oceans Canada [DFO] 2019), existing log dewatering and marine storage sites may require DFO review.

Kinbasket Lake is a scheduled waterway under the *Canadian Navigable Waters Act (*CNWA) and is considered navigable. New infrastructure will be constructed above the high-water mark where possible, however, based on new criteria listed under the CNWA, a review by Transport Canada may be required.

An application under Section 11 of the Provincial *Water Sustainability Act* (WSA) would be required for "changes in and about a stream" if alterations to the banks or portions of Kinbasket Lake, below the high-water mark, are contemplated as part of the operation.

Both the Federal *Migratory Bird Convention Act* and BC *Wildlife Act* prohibit the disturbance of birds, nests, or eggs. Mitigation to prevent adverse impacts to breeding birds is included in Sections 6.4 and 7.3.

The Federal *Species at Risk Act* (SARA) provides legislation to protect plant and wildlife species from extirpation and extinction and provides management and recovery strategies for threatened species. Species listed under SARA that have a moderate to high likelihood to occur in the Project area are summarized in Section 4.0.

The *Environmental Management Act* regulates the management of waste in British Columbia. The act enables the use of permits and regulations to govern discharges of waste materials to the environment. Section 7.5 provides mitigation measures for Waste Management at the Project site.

The spread of noxious weeds in BC is regulated under the *Weed Control Act*, which requires all landowners (and occupiers) to control the spread of noxious weeds on their property, the land they are using, and access routes; and under the *Integrated Pest Management Act*, which regulates the use of herbicide applications.

The *Heritage Conservation Act* protects potential and confirmed archaeological sites on both Crown land and private land. Any archaeological find must be reported to the Archaeological Branch of MFLNRORD.

4.0 Environmental Sensitivities

4.1 Site Assessment

A site assessment of the terrestrial and aquatic habitats in and around the dewatering and marine storage site was completed on July 25 and 26, 2019. The shoreline at the high-water mark (HWM) has a slope that varies from approximately 35 to 50% at the east end of the dewatering site and 10 to 15% to the west, where there in an historic boat launch area. Beach and shoreline substrates are mainly loose angular cobbles, and gravels with some sand. There is a rocky outcrop with angular boulders and bedrock present near the area where two old barges and a tugboat are located.

Trees upslope of the HWM are mainly spruce (*Picea* spp.), western hemlock (*Tsuga heterophylla)*, and western redcedar (*Thuja plicata*), with dominant shrubs being alder (*Alnus* spp.) and willow (*Salix* spp.). Migratory bird and amphibian habitats were observed in the Project area.

Two old barges and a tugboat were observed on the dewatering site, along with old cables and miscellaneous metal debris from past logging operations.

There is an existing overgrown road from the upland area down to the beach where the tugboat and barges are located. Minor erosion and sloughing were present on the road. There is a small watercourse crossing along the access road (approximately 170 m upland from the beach) with an existing 600 mm culvert in place. The culvert is slightly overgrown; however, no blockages were observed. This watercourse enters Kinbasket Lake approximately 170 m west of the proposed dewatering site (where the tugboat and barges were located) but is still within the foreshore lease area.

A bathymetric survey of the proposed foreshore lease area showed that the water depths ranged from 1 m to 49 m with an average of 13.9 m.

4.2 Fish and Fish Habitat

Kinbasket Lake is a man-made reservoir controlled by the Mica Dam. Kinbasket Lake has a normal operating range of approximately 35 m, and during periods below full pool, a large shoreline drawdown zone is exposed (Warnock and Caley 2018). Typical reservoir drawdown occurs during the winter months, beginning in January, reaching low pool level by approximately the end of April (Warnock and Caley 2018).

Fish sampling associated specifically with the log dewatering site has not been completed; however, a variety of fish reside in Kinbasket Lake (WSC: 300). Species that may utilize the fluvial habitat at the Project location include: Longnose Sucker (*Catostomus catostomus*), Prickly Sculpin (*Cottus asper*), Torrent Sculpin (*Cot. rhotheus),* Burbot (*Lota lota*), Peamouth Chub (*Mylocheilus caurinus*), Rainbow Trout (*Oncorhynchus mykiss*), Kokanee (*O. nerka*), Mountain Whitefish (*Prosopium williamsoni*), Northern Pikeminnow (*Ptychocheilus oregonensis*), Longnose Dace (*Rhinichthys*

cataractae), Redside Shiner (*Richardsonius balteatus*), and Bull Trout (*Salvelinus confluentus*) (BC MOECCS 2019; Ktunaxa Nation Council 2016).

The conservation status of these species was assessed using the BC Species and Ecosystems Explorer (BCSEE; Table 3; BC Conservation Data Centre (BC CDC 2019)). Bull Trout are Provincially Blue-listed (a species of special concern) and are known to occur in Kinbasket Lake.

White Sturgeon (*Acipenser transmontanus* pop. 2*)* is known to occur in the upper Columbia River, which is directly connected to Kinbasket Lake; this species is Provincially Red-listed (at risk of being extirpated, endangered, or threatened) and SARA-listed. There is potential habitat at the log dewatering site for White Sturgeon, however, there are no recorded observations of White Sturgeon near the Project area. No other species with the potential to occur are Blue- or Red-listed or listed on Schedule 1 of the Federal *Species at Risk Act* (SARA)[1].

4.3 Ecological Communities

The Project area falls within the Columbia variant of the Interior Cedar Hemlock Very Wet Cool (ICHvk1) Biogeoclimatic Ecosystem Classification (BEC) subzone variant in the Southern Rocky Mountain Trench Ecoregion and Big Bend Trench Ecosection (Data BC 2019). Within this subzone in the Columbia Forest District[2], there are four Blue-listed ecological communities that have the potential to occur (BC CDC 2019). These ecosystems are associated with stream floodplain and wetland fen and swamp habitats. None of these habitat types were identified within the Project footprint during the site assessment. No additional disturbance outside of the existing Project footprint is anticipated, and as such, no impacts to rare or endangered ecological communities are expected to occur.

Table 1. Rare and endangered ecosystems in the ICHvk1 BEC Subzone in the Columbia Forest District

Scientific Name	*Ecosystem Name*	*BC List*	*BEC Zone*	*Probability to Occur on Project Site*
Alnus incana / Equisetum arvense	mountain alder / common horsetail	Blue	ICHvk1/ Fl01	Moderate: This ecosystem is a terrestrial flood or low bench flood area.
Carex lasiocarpa / Drepanocladus aduncus	slender sedge / common hook-moss	Blue	ICHvk1/ Wf05;	Low: This ecosystem is a wetland realm, peatland, or fen wetland.

[1] Some subspecies of those known to occur are of greater conservation concern, but these subspecies do not occur in the Project area (e.g., *Nahanni* lineage Arctic Grayling).

[2] Forest District boundaries are no longer used in BC. This site is now considered to be located in the Selkirk Natural Resource District; however, the BC CDC website still uses Forest Districts in their search criteria.

Scientific Name	***Ecosystem Name***	***BC List***	***BEC Zone***	***Probability to Occur on Project Site***
Salix sitchensis / Carex sitchensis	Sitka willow / Sitka sedge	Blue	ICHvk1/ Ws06;	Low: This ecosystem is a wetland realm, mineral or swamp wetland.
Trichophorum cespitosum / Campylium stellatum	tufted clubrush / golden star-moss	Blue	ICHvk1/ Wf11;	Low: This ecosystem is a wetland realm, peatland, or fen wetland.

4.4 Rare and Endangered Plants and Lichens

There are 3 Red-, 12 Blue-, and 3 SARA listed vascular and non-vascular plants with the potential to occur in the ICHvk1 BEC subzone in the Columbia Forest District (BC CDC 2019; Table 1). No rare or endangered plant species were identified on-site during the 2019 field assessment.

4.5 Invasive Plants and Animals

The Invasive Alien Plant Program (IAPP) does not have any records of invasive plant species within 1 km of the Project location (Data BC 2019; BC MFLNRORD 2019). There are records of oxeye daisy (*Leucanthemum vulgare*), and orange and yellow hawkweeds (*Hieracium* spp.) along the forest service road, just north of the Mica Dam, approximately 1.5 km from the Project site. There are no records of invasive aquatic species within 2 km of the Project location (Data BC 2019).

Table 2. Rare and endangered plant species in the ICHvk1 BEC Subzone in the Columbia Forest District

Scientific Name	*Common Name*	*BC List*	*SARA*	*Habitat Comment*	*Potential Habitat Present*	*Potential Project Interaction with Habitat*
Arnica longifolia	seep-spring arnica	Blue	Not Listed	Moist to wet meadows and seepage slopes in subalpine and alpine zones (BC CDC 2019)	No	Low, preferred habitat is not present at the Project site.
Bartramia halleriana	Haller's apple moss	Red	1-T	Moss found on shaded, often north-facing, damp siliceous cliffs and talus slopes (BC CDC 2019)	No	Low, preferred habitat is not present at the Project site.
Botrychium montanum	mountain moonwort	Blue	Not Listed	Mesic, shady coniferous forests in the upper montane and lower subalpine zones (BC CDC 2019)	No	Low, preferred habitat is not present at the Project site.
Campylium calcareum		Red	Not Listed	Moss found on shaded boulders (BC CDC 2019)	Yes	Low, shaded boulders may be present on the Project site; however, the site is previously disturbed and potential habitat is limited.
Campylium radicale		Blue	Not Listed	Moss found on decaying leaves, twigs, and humus or mucky soil in swampy places (Crum 1981)	Yes	Low, preferred habitat may be present on the Project site; however, the area is previously disturbed and potential habitat is limited.
Epipactis gigantea	giant helleborine	Yellow	3	Moist streambanks, fens, marshes, and swamps, and around hot springs in the lowland and montane zones (BC CDC 2019)	Yes	Low, there is a stream entering the Project site, however preferred habitat (i.e., near hot springs in lowland and montane zones) is not present at the Project site.

Scientific Name	***Common Name***	***BC List***	***SARA***	***Habitat Comment***	***Potential Habitat Present***	***Potential Project Interaction with Habitat***
Grimmia mollis		Blue	Not Listed	Moss found on rocks in or near mountain streams, in glacial melt and snow-bed runoff in arctic and alpine regions (Crum 1981)	No	Low, preferred habitat is not present at the Project site.
Hygrohypnum alpinum		Blue	Not Listed	Moss found on irrigated emergent, acidic rock in montane streams; moderate elevations (BC CDC 2019)	No	Low, preferred habitat is not present at the Project site.
Leptogium cyanescens	blue-blue vinyl	Red	Not Listed	Lichen found on fern fronds, large leaves, plant debris, soil (humus), rock (CNALH 2019)	Yes	Low, preferred habitat may be present on the Project site; however, the area is previously disturbed and no new clearing is anticipated.
Liparis loeselii	yellow widelip orchid	Blue	Not Listed	Moist thickets and fens in the montane zone (BC CDC 2019)	No	Low, preferred habitat is not present at the Project site.
Orthotrichum pallens		Blue	Not Listed	Moss found on the bark of trees, sometimes on dry calcareous and granitic rocks (Crum 1981)	Yes	Low, preferred habitat may be present on the Project site; however, the area is previously disturbed and no new clearing is anticipated.
Pinus albicaulis	whitebark pine	Blue	1-E	Found within montane forests and on thin, rocky, cold soils at or near timberline (BC CDC 2019)	No	Low, preferred habitat is not present at the Project site.
Platyhypnidium riparioides		Blue	Not Listed	Aquatic moss	Unknown	Unknown, no habitat information
Pohlia elongata		Blue	Not Listed	Moss found on humus-rich soil banks, along streams and paths, tree bases; moderate to high elevations (FNA 2019)	Yes	Low, preferred habitat may be present on the Project site; however, the area is previously disturbed.

Scientific Name	***Common Name***	***BC List***	***SARA***	***Habitat Comment***	***Potential Habitat Present***	***Potential Project Interaction with Habitat***
Scrophularia lanceolata	lance-leaved figwort	Blue	Not Listed	Moist to mesic roadsides, clearings, thickets, and forest edges in the lowland and montane zones (BC CDC 2019)	Yes	Moderate, preferred habitat may be present on site, but the area is previously disturbed and potential habitat is limited.
Ulota curvifolia		Blue	Not Listed	Moss found on noncalcareous rock in arctic and alpine areas (Crum 1981)	No	Low, preferred habitat is not present at the Project site.

SARA Schedules

SARA schedule 1 is the official list of species at risk in Canada and includes species that are extirpated (extinct in Canada), endangered, threatened, and of special concern. Once a species is listed on Schedule 1, protection and recovery measures are developed and implemented.
SARA schedules 2 and 3 consist of species that were designated at risk by COSEWIC (Committee on the Status of Endangered Wildlife in Canada) prior to the creation of SARA. These species are not yet officially protected under SARA and are to be assessed and considered for addition to Schedule 1 of SARA.

SARA Listing Categories

Endangered species (E): means a wildlife species that is facing imminent extirpation or extinction.
Threatened species (T): means a wildlife species that is likely to become an endangered species if nothing is done to reverse the factors leading to its extirpation or extinction.
Species of special concern (SC): means a wildlife species that may become a threatened or endangered species because of a combination of biological characteristics and identified threats.

Provincial Status

Red-listed = candidates for extirpated, endangered, or threatened status rankings

Blue-listed = species of special concern

4.6 Rare and Endangered Wildlife

There are 36 Blue-listed and 5 Red-listed wildlife species with the potential to occur in the ICH BEC zone in the Columbia Forest District (BC CDC 2019). In addition, there are 18 species on Schedule 1 of the *Species at Risk Act* (SARA) (Table 3). Numerous species have the moderate potential to occur at the log dewatering and marine storage site (i.e., Western Grebe, Caspian Tern, Olive-sided Flycatcher, Variegated Fritillary, Prairie Fossaria, Pale Jumping Slug, Magnum Mantleslug, Rotund Physa, Sinuous Snaketail, Wrinkled Marshsnail, and Little Brown Myotis), but due to previous disturbances on the site, habitat that would be considered important to the species does not occur, and as such, their presence would be considered incidental. The Project site does not overlap any mapped critical habitat areas for these moderate potential species.

The Project area is not within but is adjacent to an identified critical habitat for species at risk polygon for Caribou, southern mountain population (Data BC 2019). This adjacent species at risk polygon is also considered Ungulate Winter Range (Unit u-3-005) which contains habitat that is necessary to meet the winter habitat requirements for mountain caribou and where no timber harvesting or road construction is to occur (MOE 2009). The Project overlaps Caribou Population ID 1890, Columbia north, Herd 44 where there is an estimated population of 196 animals (Data BC 2019).

Given the proximity of the Project site to Kinbasket Lake and the wide range of aquatic and terrestrial habitats used by Western Toads, they have a high potential to be present on-site. Barn Swallows also have a high potential to be present on-site, given their affinity for open areas near waterbodies, and that their nesting habitat includes buildings and other man-made infrastructure. As such, Western Toad and Barn Swallow are considered potential species of management concern at the Project site.

Table 3. Listed wildlife species with potential to occur in the ICHvk1 BEC Subzone in the Columbia Forest District

Scientific Name	*Common Name*	*BC List*	*SARA*	*Habitat Comment*	*Potential Habitat Present*	*Potential Project Interaction with Habitat*
Amphibians and Reptiles						
Anaxyrus boreas	Western Toad	Yellow	1-SC	Found in a variety of aquatic and terrestrial habitats. Breeds in shallow, littoral zones of lakes, temporary and permanent pools and wetlands, bogs/fens, and roadside ditches; tadpoles associate with benthic habitats (BC CDC 2019).	Yes	High. Western Toads are likely to be encountered in various locations in the Project area. There is a moderate potential for impact to unidentified breeding and hibernacula, but these sites are widely distributed and common in the ICH BEC zone.
Chrysemys picta pop. 2	Painted Turtle - Intermountain - Rocky Mountain Population	Blue	1-SC	Lives in slow-moving, shallow waters with soft bottoms, basking sites, and aquatic vegetation (i.e., streams, marshes, swamps, ponds, lakes, and reservoirs). May colonize seasonally flooded areas near permanent water (BC CDC 2019).	Yes	Low. Preferred habitat may be present at the Project site; however, the shoreline was observed to be composed mainly of cobbles and boulders with little to no aquatic vegetation which is not preferred habitat. Nearby recorded observations are near Golden, BC, ~95 to 100 km south of the Project.
Lithobates pipiens	Northern Leopard Frog	Red	1-E	Breeds in shallow water near the shores of herbaceous wetlands. Prefers decaying vegetation on a muck bottom, at edges of open water, and sparsely vegetated areas with cattail and patches of spikerush. Areas must not dry up prior to mass emergence. Forages in grassy meadows and in semi-aquatic sites along pond margins (BC CDC 2019).	No	Low, preferred habitat is not present at the Project site. There is a lack of herbaceous wetlands, decaying vegetation, cattail, and grassy meadows.
Plethodon idahoensis	Coeur d'Alene Salamander	Yellow	1-SC	Steep gradient creeks, waterfall splash zones, rock walls or caves with seepages, deep, wet talus, and avalanche paths where there is fissured bedrock associated with moisture (BC CDC 2019)	No	Low, preferred habitat is not present at the Project site.

Scientific Name	*Common Name*	*BC List*	*SARA*	*Habitat Comment*	*Potential Habitat Present*	*Potential Project Interaction with Habitat*
Birds						
Accipiter gentilis atricapillus	Northern Goshawk, *atricapillus* subspecies	Blue	Not Listed	Found in large, coniferous forests with open understories and high canopy cover; usually nests in large, mature coniferous trees (BC CDC 2019).	Yes	Low. Nesting typically occurs in dense coniferous forests which are not present within the Project area but may be present in adjacent forested land.
Aechmophorus occidentalis	Western Grebe	Red	1-SC	Marshes, lakes, and bays. Nests on large inland bodies of water. Nests usually in or very close to water deep enough to allow bird to swim submerged. Nest typically is anchored to, or build up over, living vegetation (BC CDC 2019).	Yes	Moderate. Preferred habitat types are limited in distribution near the Project area, however, no new clearing is anticipated during the Project.
Ardea herodias herodias	Great Blue Heron, *herodias* subspecies	Blue	Not Listed	Agriculture fields, grasslands, anthropogenic areas, lakes, riparian forests, and river habitats (BC CDC 2019)	Yes	Low. Lake and riparian forest areas provide habitat for Great Blue Heron, however due to the lack of other preferred habitats (agriculture fields and grasslands), the potential for their presence on site would be considered low.
Botaurus lentiginosus	American Bittern	Blue	Not Listed	Agricultural, grassland, shrub, riparian, lakes, wetland (BC CDC 2019)	Yes	Low. Lake and riparian areas provide habitat for American Bittern however due to the lack of other preferred habitats (agricultural, grasslands and wetlands), the potential for their presence on site would be considered low.
Buteo platypterus	Broad-winged Hawk	Blue	Not Listed	Trembling aspen woodland during migration and mixed deciduous woodland during the summer. Selects breeding territories within large patches of undisturbed deciduous or mixed forests, near wet areas and forest openings and on a slope (BC CDC 2019).	Yes	Low. Preferred habitat types are limited in distribution near the Project area. There is a lack of aspen and deciduous woodlands in the area.

Scientific Name	***Common Name***	***BC List***	***SARA***	***Habitat Comment***	***Potential Habitat Present***	***Potential Project Interaction with Habitat***
Chordeiles minor	Common Nighthawk	Yellow	1-T	Found in mountains and plains in open and semi-open areas: open coniferous forests, grasslands, vicinity of cities/towns. Nests on ground on bare sites in open areas (BC CDC 2019).	Yes	Low. Preferred habitat types are limited in distribution near the Project area.
Contopus cooperi	Olive-sided Flycatcher	Blue	1-T	Breeds in various forest and woodland habitats and along the forested edges of lakes, ponds, and streams. Nesting sites contain dead, standing trees (BC CDC 2019).	Yes	Moderate. Though potential habitat exists, there is a lack of dead, standing trees in the Project area and the Project will not be clearing or otherwise disturbing forested areas.
Cypseloides niger	Black Swift	Blue	Not Listed	Breeds almost exclusively on small ledges or shallow crevices in steep rock faces or canyons, usually behind or near waterfalls. Foraging habitat ranges from forests, towns, lakes, rivers, alpine meadows, and mountain peaks (Campbell et al. 1990).	Yes	Low, though potential foraging habitat exists, breeding habitat is not present in the Project area.
Dolichonyx oryzivorus	Bobolink	Blue	1-T	Habitat with moderate to tall vegetation, moderate to dense vegetation, and moderately deep litter lacking woody vegetation. Found in native and tame grasslands, haylands, grazed pastures, no-till cropland, small-grain fields, old fields, wet meadows, and planted cover (BC CDC 2019).	No	Low, preferred habitat is not present at the Project site.
Hirundo rustica	Barn Swallow	Blue	1-T	Found in open areas, near water; nests in barns or other buildings, under bridges, in caves or cliff crevices, usually on vertical surface close to ceiling (BC CDC 2019).	Yes	High. Stationary equipment, stored logs, and other infrastructure could provide nesting habitat. Moving the structures or operating nearby may disturb nesting birds.
Hydroprogne caspia	Caspian Tern	Blue	Not Listed	Nests on sandy or gravelly beaches and shell banks along coasts or large inland lakes; sometimes with other water birds (BC CDC 2019).	Yes	Moderate. Potential nesting habitat is present in the Project area. Disturbance to the shoreline may disturb nesting locations.

Scientific Name	***Common Name***	***BC List***	***SARA***	***Habitat Comment***	***Potential Habitat Present***	***Potential Project Interaction with Habitat***
Numenius americanus	Long-billed Curlew	Blue	1-SC	Prairies and grassy meadows near water. Nests in dry prairies and moist meadows. Winters on beaches and mudflats (BC CDC 2019).	No	Low. Preferred habitat is not present at the Project site.
Podiceps nigricollis	Eared Grebe	Blue	Not Listed	Prefers marshes and wetlands with shallow, eutrophic water and plenty of submerged vegetation (BC CDC 2019).	Yes	Low. Preferred habitat may be located on the Project site, however, there is a lack of submerged vegetation along the Project shoreline.
Recurvirostra americana	American Avocet	Blue	Not Listed	Lowland marshes, mudflats, ponds, alkaline lakes, and estuaries. Nests on open flats or areas with scattered tufts of grass on islands or along lakes and marshes (BC CDC 2019).	Yes	Low. Preferred habitat may be located on the Project site, however, there is a lack of open flats or areas with scattered tufts of grass.
Invertebrates						
Argia vivida	Vivid Dancer	Blue	Not Listed	Dragonfly. Associated with cool or hot springs (BC CDC 2019).	No	Low. Preferred habitat is not present at the Project site.
Boloria alberta	Albert's Fritillary	Blue	Not Listed	Butterfly. Alpine areas, steep rock and scree slopes, windswept ridges, and habitat that is in high and inaccessible areas (BC CDC 2019).	No	Low. Preferred habitat is not present at the Project site.
Colias pelidne	Pelidne Sulphur	Blue	Not Listed	Butterfly. Subarctic forest openings and meadows, alpine meadows just above treeline, bogs, and even along road sides (BC CDC 2019).	No	Low. Preferred habitat is not present at the Project site.
Danaus plexippus	Monarch	Blue	1-SC	Butterfly. Breeding areas are virtually all patches of milkweed in North America. Overwinters in high altitude Mexican conifer forests, coastal California conifers, or Eucalyptus groves (BC CDC 2019).	No	Low. Preferred habitat is not present at the Project site.
Euptoieta claudia	Variegated Fritillary	Blue	Not Listed	Butterfly. Any open to sparsely treed habitat. A stray or opportunistic transient breeder in most of US and entire Canadian range (BC CDC 2019).	Yes	Moderate. Potential habitat may be present on the Project area. Area may be used by transient butterflies but no new clearing is anticipated.

Scientific Name	***Common Name***	***BC List***	***SARA***	***Habitat Comment***	***Potential Habitat Present***	***Potential Project Interaction with Habitat***
Galba bulimoides	Prairie Fossaria	Blue	Not Listed	Snail. Perennial water habitats (lakes, ponds, and slow-moving streams) and vernal habitats (roadside ditches, temporary pools). Seepage areas and small streams; characteristically in seasonal flowing water (BC CDC 2019).	Yes	Moderate. Preferred habitat may be present on the Project site.
Hemphillia camelus	Pale Jumping-slug	Blue	Not Listed	Slug. In dry to moist coniferous forests, on and around mossy stumps, rocks, and logs; also in leaf litter (BC CDC 2019).	Yes	Moderate. Preferred habitat may be present in the wooded areas adjacent to the Project site.
Magnipelta mycophaga	Magnum Mantleslug	Blue	1-SC	Slug. Under moist logs, pieces of bark, in depressions in moist earth, and within talus in cool, moist coniferous forests (BC CDC 2019).	Yes	Moderate. Preferred habitat may be present in the wooded areas adjacent to the Project site.
Physella columbiana	Rotund Physa	Red	Not Listed	Mollusc. Large-river species, restricted to relatively pure, deep, well-oxygenated water in areas normally covered by several feet or more of water (BC CDC 2019).	Yes	Moderate. Preferred habitat may be present along the Project area shoreline. Disturbance to the shoreline may affect this species.
Oeneis jutta chermocki	Jutta Arctic, *chermocki* subspecies	Blue	Not Listed	Butterfly. Black spruce bogs, moist taiga, moist tundra; dry lodgepole pine woodland. Usually very near and often perching on trunks of conifers (BC CDC 2019).	No	Low. Preferred habitat is not present at the Project site.
Ophiogomphus occidentis	Sinuous Snaketail	Blue	Not Listed	Dragonfly. Clear streams and lakeshores; uncommon in settled areas, at least partly because the burrowing larvae are sensitive to changes in water flow and siltation (BC CDC 2019).	Yes	Moderate. Preferred habitat may be present along the Project area.
Polites themistocles themistocles	Tawny-edged Skipper, *themistocles* subspecies	Blue	Not Listed	Butterfly. Grassy habitats from prairie swales and mountain meadows to old fields, right-of-ways, pastures, in some regions even lawns; probably most often mesic (BC CDC 2019).	No	Low. Preferred habitat is not present at the Project site.

Scientific Name	***Common Name***	***BC List***	***SARA***	***Habitat Comment***	***Potential Habitat Present***	***Potential Project Interaction with Habitat***
Sphaerium occidentale	Herrington Fingernailclam	Blue	Not Listed	Clam. Vernal pools and ditches, among grass and leaves (BC CDC 2019).	No	Low. Preferred habitat is not present at the Project site.
Sphaerium striatinum	Striated Fingernailclam	Blue	Not Listed	Lives in streams, rivers, large lakes, and occasionally smaller lakes with sand, gravel, or sandy mud substrates (Klinkenberg 2019).	Yes	Low. The lake may provide habitat for the Striated Fingernailclam, however, the area has been previously used for log dump activities and no new infrastructure under the HWM will be constructed.
Stagnicola caperata	Wrinkled Marshsnail	Blue	Not Listed	Snail. Ditches, shallow pools, vernal ponds, or in spring-flooded margins of permanent-water habitats, and occasionally in large permanent lakes, rivers, and swamps (BC CDC 2019).	Yes	Moderate. Preferred habitat may be present along the Project area shoreline. Disturbance to the shoreline may affect this species.
Stagnicola traski	Widelip Pondsnail	Blue	Not Listed	Freshwater snail. No habitat information available.	Unknown	Unknown
Fish						
Acipenser transmontanus pop. 2	White Sturgeon (Upper Columbia River Population)	Red	Not Listed	Large cool rivers or streams. Some populations in BC are restricted to large lakes. Bottom feeders (BC CDC 2019).	Yes	Moderate. The lake provides habitat for the White Sturgeon, however, there are no recorded observations near Sprague bay. Removing log booms from the water is not likely to deter fish migration and feeding in Sprague Bay.
Oncorhynchus clarkii lewisi	Cutthroat Trout, *lewisi* subspecies	Blue	1-SC	Small mountain streams, main rivers, and large natural lakes; requires cool, clean, well-oxygenated water (BC CDC 2019).	Yes	Low. The lake may provide habitat for Cutthroat Trout, however, there are no recorded observations in the reservoir.

Scientific Name	***Common Name***	***BC List***	***SARA***	***Habitat Comment***	***Potential Habitat Present***	***Potential Project Interaction with Habitat***
Salvelinus confluentus	Bull Trout	Blue	Not Listed	Habitat includes the bottom of deep pools in cold rivers and large tributary streams, often in moderate to fast currents with temperatures of 45-50°F; also large cold water lakes and reservoirs (BC CDC 2019).	Yes	Moderate. The lake provides habitat for Bull Trout and there are recorded observations in Sprague Bay. Removing log booms from the water is not likely to deter fish migration in Sprague Bay.
Mammals						
Gulo gulo luscus	Wolverine, *luscus* subspecies	Blue	1-SC	Found in alpine and arctic tundra, boreal and mountain forests (coniferous), usually in areas with snow on the ground in winter. Riparian areas may be important winter habitat. May disperse through atypical habitat. When inactive, occupies den in cave, rock crevice, under fallen tree, in thicket, or similar site. Terrestrial and may climb trees (BC CDC 2019).	No	Low. There is a potential that species could be transient in the area but key habitat elements (i.e., alpine and arctic tundra, and denning caves) for this species are lacking.
Myotis lucifugus	Little Brown Myotis	Yellow	1-E	Uses a wide range of habitats and often uses human-made structures for resting and maternity sites; also uses caves and hollow trees (BC CDC 2019.)	Yes	Moderate. Stationary equipment, stored logs, and other infrastructure could provide habitat. Moving the structures or operating nearby may disturb resting or maternity sites.
Myotis septentrionalis	Northern Myotis	Blue	1-E	Associated with old-growth forests composed of trees 100 years old or older. Hibernation occurs primarily in caves, mines, and tunnels, typically those with large passages and entrances, relatively constant and cool temperatures, high humidity, and no air currents (BC CDC 2019).	Yes	Low. Foraging habitat is widely available for the species; no potential hibernation habitat is known to be present, and roosting sites are widely available and unlikely to be degraded by Project activities.
Oreamnos americanus	Mountain Goat	Blue	Not Listed	Prefers steep, forested slopes in the subalpine to alpine zones, but migrates between elevations as the	No	Low. Preferred habitat is not present at the Project site.

Scientific Name	*Common Name*	*BC List*	*SARA*	*Habitat Comment*	*Potential Habitat Present*	*Potential Project Interaction with Habitat*
				seasons change (lower elevations in winter, higher in summer) (Klinkenberg 2019).		
Ovis canadensis	Bighorn Sheep	Blue	Not Listed	Occurs in mesic to xeric, alpine to desert grasslands or shrub-steppe in mountains, foothills, or river canyons (BC CDC 2019).	No	Low. Preferred habitat is not present at the Project site.
Pekania pennanti	Fisher	Blue	Not Listed	Prefers dense coniferous or mixed forests with dense canopies and generally avoids open areas and human disturbance (BC CDC 2019).	No	Low. Riparian areas are present but late-successional forests are lacking. The species tends to utilize areas away from human settlements.
Rangifer tarandus pop. 1	Caribou, southern mountain population	Red	1-T	For all seasons, the strongest predictor of Caribou habitat is landscapes dominated by old forest (BC CDC 2019).	Yes	Low. Preferred habitat is not present at the Project site, but is in adjacent, surrounding areas.
Ursus arctos	Grizzly Bear	Blue	1-SC	Wide ranging species that occupies a variety of habitat (Klinkenberg 2019).	Yes	Low. Grizzly Bears may use the habitat types found in the Project area, but they generally avoid areas of human occupation and the Project area is unlikely to provide any critical habitat elements.

SARA Schedules

SARA schedule 1 is the official list of wildlife species at risk in Canada and includes species that are extirpated (extinct in Canada), endangered, threatened, and of special concern. Once a species is listed on Schedule 1, protection and recovery measures are developed and implemented.

SARA Listing Categories

Endangered species (E): means a wildlife species that is facing imminent extirpation or extinction.
Threatened species (T): means a wildlife species that is likely to become an endangered species if nothing is done to reverse the factors leading to its extirpation or extinction.
Species of special concern (SC): means a wildlife species that may become a threatened or endangered species because of a combination of biological characteristics and identified threats.

Provincial Status

Red-listed = candidates for extirpated, endangered, or threatened status rankings
Blue-listed = species of special concern
Yellow = species that is at the least risk of being lost

4.7 Other Wildlife Species

Some disturbance-tolerant wildlife, including Black Bear (*Ursus americanus*), Red Fox (*Vulpes vulpes*), and Coyote (*Canis latrans*) may occasionally travel through the Project area; however, due to the high level of disturbance and minimal valuable vegetation and habitat present, most wildlife will avoid the area. Kinbasket Lake may be used by wildlife such as waterfowl, otter, mink, and beaver, but important habitat for these species is not expected to be present and their presence would be considered incidental.

The Project does not overlap any identified Wildlife Habitat Areas (WHA; Data BC 2019).

5.0 Description of Potential Adverse Effects

The potential adverse effects of primary concern associated with the Sprague Bay Log Dewatering and Marine Storage site are:

- The build-up of small wood debris within Kinbasket Lake, and its potential effect on fish habitat and water quality;
- Runoff that contains wood leachates from upland areas and its effect on water quality; and
- The potential for disturbance to Western Toads and nesting Barn Swallows.

5.1 Wood Debris Effects

The decomposition of organic material, including bark and wood debris built up on the lake bottom, increases the biochemical oxygen demand (BOD) and can deplete dissolved oxygen (DO) from surrounding water (BC MOE 1997). This can cause anaerobic conditions that are unfavourable and potentially lethal to fish, invertebrates, and underwater flora (CCME 1999). This effect has been well-documented in marine environments, where most log dumps are located, but there is relatively little literature documenting these effects in freshwater environments. However, one study conducted on Babine Lake, in northern BC, found that in-water storage of logs resulted in depleted DO levels and reduced abundance of zooplankton compared to a reference site, which reduced prey availability for juvenile Sockeye Salmon (Power and Northcote 1991). Bark and woody debris accumulation at the log dewatering site is expected to be significantly reduced compared to log dumps, given that much of the bark and loose debris will have fallen off during the processing, dumping, and log boom transport of the logs to the dewatering site. Bark and woody debris management will be implemented to ensure water quality is maintained (Section 6.1).

5.2 Upland Runoff of Wood Leachate

Leachate generated from woody debris stored on land has been shown to have adverse effects on aquatic life when the leachate runoff is directed into nearby aquatic ecosystems (Rex et al. 2016). High organic matter content and chemical oxygen demand (COD) can result in depletion of DO levels, similar to debris that is deposited in water. Leachate generated from some species, such as trembling aspen (*Populus tremuloides*), also contains phenols and resins that are directly toxic to aquatic life (Taylor and Carmichael 2003), however, these species are not harvested by Balcaen and will not be stored on-site. These substances also reduce survival and growth of vegetation species when they permeate adjacent soils, which may affect the reclamation of upland areas, and ongoing runoff may result in adverse effects to aquatic ecosystems after log dewatering operations are halted (until the toxic compounds biodegrade).

Given that the waters of Kinbasket Lake would dilute runoff, toxic effects would likely be limited to the immediate point(s) of entry of runoff containing toxic wood leachates. As there is some inflow from the nearby tributaries and the site is less than 5 km from Mica

Dam where water is released regularly, it is unlikely runoff could become concentrated near the Project site. However, given its known toxicity, deposition of this leachate into the fish-bearing waters of Kinbasket Lake without implementing the appropriate mitigation measures may be considered a contravention of section 36(3) of the *Fisheries Act*.

5.3 Effects to Amphibian Habitat

Western Toads use a wide range of terrestrial and aquatic habitats throughout BC. Adult toads are opportunistic carnivores, feeding mainly on invertebrates in terrestrial and riparian environments, such as worms, spiders, bees, beetles, ants, arachnids, crayfish, sow bugs, and grasshoppers (BC CDC 2019). Lotic habitats with little to no flow are suitable for Western Toads (BC CDC 2019).

If Western Toads or other amphibians are discovered during construction and operations, and potential impacts cannot be avoided through mitigation measures, there would be potential to disturb habitat and individual amphibians, which is a contravention of the *Species at Risk Act* and BC *Wildlife Act.*

5.4 Effects on Nesting Barn Swallows

Barn Swallows are relatively widespread through the central interior of BC and commonly occur in suburban areas (Campbell et al. 1997). They forage for flying insects over open areas; Kinbasket Lake and the cleared Project area provide suitable foraging opportunities for this species. Despite their apparent adaptability to anthropogenic disturbances, declines in this species have been noted (Campbell et al. 1997).

Nesting has been documented on a variety of anthropogenic structures, including sheds, industrial buildings, bridges, and wharves (Campbell et al. 1997). As such, stationary infrastructure may be used by Barn Swallows for nesting. If an active nest is found on any infrastructure or equipment, there would be potential to destroy the nest or disrupt nesting activities, which is a contravention of the *Migratory Bird Convention Act, Species at Risk Act,* and BC *Wildlife Act.*

6.0 Proposed Mitigation of Potential Effects

6.1 Mitigation for Build-up of Woody Debris

The build-up of woody debris will be minimized by clearing accumulated debris from the upland areas in and around the log dump to reduce the potential for this material to be re-deposited into the water or become submerged as the reservoir rises during the operational period of the dewatering site. Clearing this debris on a monthly basis (at a minimum) is proposed, concurrent with scheduled shutdowns and where access permits. Berming the log dewatering area, either with native granular fill or imported structures, such as concrete lock-blocks or jersey barriers, may assist in keeping debris confined to upland areas without spilling over the banks into the reservoir.

Debris build-up below the high-water mark will be removed with an excavator operating from the shoreline during low-pool conditions. Optionally, a long-boom excavator could be used to provide increased reach, if necessary. Woody debris will be pulled up the bank, and stockpiled above the high-water mark in a manner that it will not re-enter the reservoir. Given that log bundles will have been subjected to significant upland handling, dumping to the reservoir, and boom transport prior to arriving at the dewatering site, much of the loose bark and debris is likely to have fallen off before arriving at the site, and significant woody debris accumulation is not anticipated. A separate EMP has been produced for the Harvey Bay log dump location with details of activities and mitigation measures that will occur at that location.

6.2 Mitigation for Site Runoff

Site runoff can be mitigated through the incorporation of industry standard Best Management Practices (BMPs):

- The site will be graded to ensure runoff is directed away from woody debris storage areas and sediment sources, and so runoff does not directly enter any water body.
- The log sort and storage area will be bermed to prevent movement of debris and water outside of that area.
- Stored woody debris will be piled to minimize the amount of surface area and thus the potential for leachate generation. The debris storage area will be bermed so that runoff is collected and diverted away from the waste pile. Collected woody debris will not be stored adjacent to the reservoir; it will be removed from site for appropriate disposal.
- If water runoff is observed, it will be collected into a sump, where sediment will be allowed to settle and the water will have more time to naturally infiltrate to ground. Surface water releases from the sump should not occur if runoff that potentially contains wood leachate is collected.

6.3 Mitigation for the Effects on Amphibian Habitat

Amphibian habitat is limited within the existing Project footprint due to existing disturbance, but the shoreline of Kinbasket Lake and other adjacent areas (e.g., forested areas, standing water) provide habitat that could result in transient individuals occurring on-site. The shoreline and nearshore areas of Kinbasket Lake do not have any littoral development that could provide rearing or breeding opportunities for amphibians.

Flat areas that are exposed at lower reservoir levels feature depressions that may become filled with stagnant water, some large woody debris, and graminoid and herbaceous vegetation. These depressions are more likely to occur during the fall and winter months when the reservoir is at low levels, and there is a lower potential for amphibians to be present. Crews will monitor the site for amphibian presence and implement mitigation measures, including fencing and salvage (all salvages will be conducted by a qualified professional under an Amphibian Salvage Permit), as necessary.

6.4 Mitigation for the Effects on Barn Swallows

While operations are occurring within the bird nest window (March 5 to September 7; ECCC 2019), there is a potential for Barn Swallows to nest in and around stored logs, equipment, and stationary infrastructure. During the bird nest window, these areas should be searched prior to use. If not used daily, it is recommended to move equipment regularly to discourage birds from nesting. If necessary, a nest deterrent (e.g., tarping, installing decoys, netting equipment when not in use, or using bird spikes) may be required.

If active nests are encountered, a buffer must be established, and activities should be adjusted to avoid the area until it is confirmed the birds have fledged and are no longer reliant on the nest. The size of the buffer will be determined by a qualified professional and will depend on the bird species, type of vegetation, and nest activity.

7.0 Environmental Mitigation Plan

7.1 Erosion and Sediment Control

The following practices and measures will be implemented to mitigate erosion and sediment runoff from the Project site:

- Grade the Project area so that runoff is directed away from woody debris storage areas and sediment sources, and so runoff does not directly enter any water body.
- High traffic areas may become muddy during rain events or rain-on-snow events. It is recommended to grade to redistribute gravels, or import gravels from nearby areas, to any areas with fine-textured soils where equipment operates.
- Retain existing vegetation wherever possible.
- Do not disturb existing embankments or embankment protection where possible.
- Provide, implement, inspect, and maintain temporary measures, which may include, but are not limited to, sand bags, silt fences, geotextiles, polyethylene sheeting, water pumps, spill kits, straw bales, drainage swales, ditches, drains, temporary drainage piping, sedimentation basins, vegetative cover, and other materials required to prevent erosion and migration of silt, mud, sediment, and other debris off-site or to other areas of the site where damage may result.
- Clean out materials on silt fencing if sediment or debris accumulation exceeds 30 cm.
- Promptly implement corrective measures as necessary.

7.2 Water Quality Management

Water quality in Kinbasket Lake has the potential to be impacted by log dewatering operations through disturbance to lakebed sediment, surface runoff, accumulation of bark and woody debris on the lakebed, and the introduction of deleterious substances.

Surface runoff mitigation includes the use of site grading, water diversion, and storage facilities to reduce the amount of sediment flowing off-site and into the Kinbasket Lake; mitigation measures and BMPs for erosion and sediment control are described in Section 7.1.

Bark and woody debris management is crucial to ensuring water quality is maintained. The decomposition of organic material, including bark and woody debris built up on the lake bottom, increases the BOD and can deplete DO from surrounding water (BC MOE 1997). This can cause anaerobic conditions that are unfavourable and potentially lethal to fish, invertebrates, and underwater flora (CCME 1999). Woody debris management is discussed in greater detail in Section 6.1.

Sections 7.5 to 7.7 discuss measures to mitigate the introduction of deleterious substances including waste, fuel, and dust.

7.3 Wildlife Management

As the Project will remain within the current disturbance footprint, no new clearing is anticipated. However, should any vegetation clearing be necessary (i.e., re-opening overgrown roads or landings, widening roads, etc.) during the bird nest window (March 5 to September 7; ECCC 2019), bird and bird nest sweeps will be conducted by a Qualified Professional prior to clearing. Birds may also nest in and around stored logs and equipment, so these areas should also be searched prior to use and operations during the bird nest window. If active nests are encountered, a buffer must be established, and clearing and/or operational activity should be adjusted to avoid the area until it is confirmed the birds have fledged/left the nest.

Although not located within the critical habitat for species at risk and UWR polygons, the Project does overlap with Caribou Population ID 1890, Columbia north, Herd 44 where there is an estimated population of 196 animals (Data BC 2019). As works at the Sprague Bay Dewatering and Marine Storage Site are expected to be contained within previously disturbed areas with no new access or area required, direct effects to Caribou habitat associated with this Project are not anticipated. General Caribou mitigation will be implemented throughout the log dewatering and marine storage activities:

- If Caribou are within 500 m of the Project footprint, activities will be delayed or rescheduled until the animal(s) are more than 500 m away.
- Prior to any vegetation clearing and ground disturbance (i.e. re-opening overgrown roads or landings, widening roads, and road maintenance), a Qualified Professional will conduct visual searches for Caribou, by walking within a defined radius of the Project footprint (along existing roads and the shoreline, as well as safely accessible land off these areas on Crown land within 500 m of the Project footprint). The QP will search for Caribou as well as recent signs (e.g., tracks droppings) that would indicate Caribou are using the area.
- If Caribou are inadvertently encountered on the Project footprint during Project activities, the following procedures will be implemented:
    - Vehicles or equipment will stop with engines turned off and lights off or dimmed. Vehicles/equipment will remain stopped until the Caribou moves away from the Project footprint or access route.
    - Project personnel will not harass or attempt to move or scare Caribou off the road, and will not use horns or other alarms.
    - Once the animal has moved away, the vehicle/equipment will proceed with caution, moving slowly.
    - Other personnel working nearby will be advised that there are Caribou in the area.
- Observations of Caribou will be recorded (noting date, time and location) and submitted to the BC MFLNRORD online reporting system for incidental wildlife observations.

If wildlife such as bears, deer, or moose are observed near or within the Project site, they will be avoided, and activities will stop in the immediate area until the wildlife leaves the site. Wildlife sightings will be immediately reported directly to the Site Supervisor. Any aggressive behaviour by wildlife toward the crew will result in work shutdown until the wildlife vacates the area, or a Conservation Officer is dispatched to resolve the conflict. Harassment of wildlife will not be tolerated, and crews will be made aware of managing potential encounters during safety or pre-task meetings.

7.4 Vegetation Management

The Project area currently contains very minimal vegetation as it is already highly disturbed. Some clearing of overgrown roads and landings may be required; however, all proposed maintenance and operation activities will be conducted in the current disturbance footprint; no new or additional areas are anticipated to be cleared.

Invasive plants and noxious weeds have the potential to be introduced and spread through the site and beyond due to the high levels of vehicle traffic and the disturbed nature of the site. Periodic assessments for weed infestations should be conducted. If weeds listed as noxious under the *Weed Control Act* are observed, a qualified professional should be retained to manage the outbreak.

Noxious weeds have not been documented within 1 km of the Project area, but have been recorded along the forest service road into the Project approximately 1.5 km away.

BMPs to ensure noxious weed and invasive plants are not spread or propagated throughout the Project area include the following:

- New equipment entering site, or equipment that is returning to site from being taken off-site for any period of time, will be washed clean of soil, seeds, and plant parts prior to entering the Project site.
- If possible, staging and laydown areas will be located such that they are not in infested areas.
- Any noxious and invasive species noted in this area will be removed by hand and placed in a bag for disposal. This will reduce the spread of these species by equipment required in this area.

7.5 Waste Management

Garbage can attract a variety of wildlife species, which may result in an increased risk of mortality due to negative wildlife-human interactions. Effective garbage management will involve:

- Frequent emptying of trash receptacles;
- Maintenance of clean work areas;
- Enforcement of litter prevention;

- Keeping food in vehicles or other designated areas that are inaccessible to wildlife; and
- The use of wildlife-proof trash containers.

The following general practices will be followed during operational activities:

- Collection and removal of all waste materials will follow Federal (e.g., *Transportation of Dangerous Goods Act*) and Provincial (e.g., *Environmental Management Act*) waste management legislation, including requirements regarding containment, handling, manifesting, and disposal.
- Storage and labelling of hazardous materials will be in accordance with WHMIS requirements, as set out in BC's Occupational Health and Safety Regulation of the *Workers Compensation Act*.
- Reusable and recyclable materials will be segregated from other materials where applicable.

7.6 Spill Management Plan

The spill response planning will focus on prevention and containment. The following site-specific controls will be implemented:

- Balcaen will provide spill kits at all refuelling, lubrication, and repair locations and on heavy equipment for immediate spill response.
- Balcaen will provide all workers with a copy of their Environmental Emergency Response Plan which details spill response and clean-up procedures.
- All on-site staff will be knowledgeable about hazardous material storage, handling requirements, and spill kit location and deployment.
- Floating sorbent booms will be available and staged near the shoreline where they can be deployed quickly in the event there is a release to water.
- All vehicles and machinery will be refuelled a minimum of 30 m away from the HWM.
- To prevent vandalism during periods of inactivity (if applicable), all fuels, lubricants, and toxic substances will be stored in locked structures that are located a minimum of 30 m away from the watercourse.
- All waste fuel or products such as filters will be secured in spill-proof containers and discarded at an approved facility.
- All reportable spills will be cleaned up and reported following the procedures set out in Balcaen's Environmental Emergency Response Plan.

7.7 Air Quality and Dust Control

Vehicle and equipment emissions and fugitive dust dispersal are the primary sources of potential negative air quality associated with the operation of the log dewatering and marine storage site. To reduce effects, the following mitigation measures are proposed:

- Equipment will be maintained in good working order.
- Excessive idling of vehicles and equipment will not be permitted unless necessary to prevent engine problems during cold weather.
- Dust suppressants (i.e., water, calcium chloride, or tree lignin-based suppressants) may be applied on access roads and yards as required. Watering for dust control must not result in puddling, rutting by equipment or vehicles, the tracking of mud onto roads, or the siltation of watercourses. Proper regulatory approval is required prior to removing water from Kinbasket Lake for dust suppression.

7.8 Heritage Resource Discovery

Artifacts or sites of archeological significance or cultural value are protected under the *Heritage Conservation Act*. If a significant resource feature is discovered, the procedures listed below will be followed:

- The Site Supervisor will be immediately notified.
- All activity near the potential archaeological material will halt immediately.
- The location of the find will be recorded and it will be left in place.
- The Archaeology Branch of MFLNRORD will be contacted.
- Operations will not resume until the Archaeology Branch provides approval.

7.9 Environmental Monitoring Plan

Balcaen will conduct environmental monitoring at the Sprague Bay Log Dewatering and Marine Storage Site to ensure regulatory compliance is being met and environmental protection measures are effective, including the monitoring of woody debris accumulations below the high water mark. Additional daily monitoring conducted by the crew will include the following:

- Inspect each piece of equipment to ensure it is clean and free of leaks.
- Visually observe the ground around equipment for hydrocarbon stains and look for oil sheens on the surface of the water.
- Inspect erosion and sediment control measures to ensure they are functioning as intended.

7.10 Reclamation Plan

The intent of reclamation is to rehabilitate the area back to pre-disturbance conditions. The Project area has been used as a log dewatering site in previous years and so less disturbed adjoining areas would be used to provide reference for the pre-disturbance state. Should the log dewatering and marine storage site no longer be required, the following reclamation procedures will be implemented:

- All remaining woody debris will be removed and disposed of at an approved facility.

- The gantry and any associated infrastructure will be completely removed from the site.
- Access roads and storage yards will be graded and decompacted (if necessary) to establish original ground contours and drainage.
- Any contaminated soils found on-site will be removed and disposed of at an approved facility.
- Shoreline areas will be re-vegetated using native shrubs.
- Disturbed areas will be seeded with an approved, weed-free seed mixture.

8.0 References

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APPENDIX 1

SITE VISIT PHOTOGRAPHS

Photo 1. View south from Kinbasket Lake at general overview of the Sprague Bay site

Photo 2. View southeast from Kinbasket Lake at the shoreline to the Project site

Photo 3. View southwest from Kinbasket Lake at the log dewatering site from the east side of the site

Photo 4. View of general shoreline conditions at the log dewatering site

Photo 5. View of existing equipment (tugboat and barges) located in the Project area

Photo 6. View north at rock outcrop from where old barges are sitting along the shoreline

Photo 7. View along overgrown road in upland area toward north to where tugboat is located

Photo 8. View along overgrown road in upland area to the south from where the tugboat is located

Photo 9. View east along the existing access road where sloughing is present

Photo 10. View of water at shoreline; rocky with cobbles/boulders and limited aquatic vegetation