



**Technical Data Report—  
Vegetation and Wetlands**

Ksi Lisims LNG – Natural Gas  
Liquefaction and Marine Terminal  
Project

June 2024

Prepared for:



**KSI LISIMS LNG**

Prepared by:

Stantec Consulting Ltd.

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## 1 Executive Summary

2 The Nisga'a Nation, Rockies LNG Limited Partnership (**Rockies LNG**) and Western LNG LLC (via its  
3 subsidiary, Western LNG) (each a Proponent and collectively referred to herein as the **Proponents**),  
4 are proposing to jointly develop an energy project, the Ksi Lisims LNG – Natural Gas Liquefaction and  
5 Marine Terminal Project (the **Project**), a floating liquefied natural gas (**FLNG**) production, storage and  
6 offloading facility, with supporting upland infrastructure and a marine terminal. The Project site (**Site**) is  
7 located at Wil Milit, on the northern end of Pearse Island, approximately 15 kilometres west of the  
8 Nisga'a community of Gingolx. The Site is on Category A fee simple land as defined in the  
9 *Nisga'a Final Agreement* (the Nisga'a Treaty) and is adjacent to a proposed water lot located on the  
10 east side of the Site, in Portland Canal.

11 This technical data report presents data and analysis of the existing conditions (i.e., pre-Project condition)  
12 of vegetation and wetlands, including the following:

- 13 • Plant species of conservation concern (federally and provincially listed)
- 14 • Invasive plant species, including noxious weeds, as defined by the British Columbia  
15 *Weed Control Act* and Regulation, and regionally categorized weeds listed by the Northwest Invasive  
16 Plant Council (NWIPC 2020)
- 17 • Botanical and cultural forest products, as identified by Nisga'a Nation
- 18 • Indigenous knowledge and Indigenous use, by Nisga'a Nation and other Indigenous groups
- 19 • Ecological communities of conservation concern (provincially listed)
- 20 • Old forest, defined as forests with an average mature tree age greater than 250 years
- 21 • Wetlands and wetland functions

22 The existing conditions of vegetation and wetlands were determined through a combination of review of  
23 existing information, field studies, and terrestrial ecosystem mapping.

24 A local study area (**LSA**) was identified and is defined by a 120-metre (**m**) buffer around the Site,  
25 including areas up to 2 m below the normal mean tide. A regional study area (**RSA**) was identified and is  
26 a 1000 m buffer around the Site, including areas up to 2 m below the normal mean tide to capture  
27 estuarine communities described by Mackenzie and Moran (2004) and tidal water wetlands described by  
28 the *Canadian Wetland Classification System* (NWWG 1997). Key results in the LSA and RSA are as  
29 follows:

- 30 • One red-listed plant species (arctic daisy, *Arctanthemum arcticum* ssp. *arcticum*) was recorded in  
31 six locations
- 32 • No noxious weeds or regionally categorized invasive plant species were observed during field studies  
33 or known to occur from desktop data sources



- 1 • Habitat supporting botanical and cultural forest products used by the Nisga'a Nation and other  
2 Indigenous groups exists throughout the LSA and RSA. All representative species (or species  
3 groups) were observed during field studies, except pine mushroom (*Tricholoma murrillianum*).  
4 An estimated 0.5 hectares (ha) (<1%) of the LSA and 35.9 ha (6%) of the RSA has well drained  
5 podzolic soils that could potentially support pine mushroom.
- 6 • Site series potentially supporting 50.7 ha (17%) in the LSA and 83.8 ha (14%) in the RSA of  
7 four red-listed ecological communities and two blue-listed ecological communities, including red-listed  
8 floodplain (3.9 ha; 1% in the LSA and 4.3 ha; <1% in the RSA) and estuarine wetlands (6.2 ha; 2% in  
9 the LSA and 6.6 ha; 1% in the RSA); blue-listed upland forest (9.4 ha; 3%; 24.3 ha; 4% in the RSA)  
10 and forested swamp (31.2 ha; 11% in the LSA and 48.6 ha; 8% in the RSA).
- 11 • Old forest occurs within six ecological communities covering 141.6 ha (50%) of the LSA and 347 ha  
12 (58%) of the RSA. No regulation-based old growth deferral areas are in the LSA or RSA.
- 13 • Wetlands cover half of the LSA; 143.0 ha (50%) and 261. ha (44%) of the RSA. Freshwater wetlands  
14 account for 79.2 ha (28%) of the LSA and 187.9 ha (31%) of the RSA. Estuarine and marine wetlands  
15 comprise 63.8 ha (22%) of the LSA and 73.6 ha (12%) of the RSA. Three bog, two swamp, and  
16 one shallow open water (freshwater) wetland associations occur in the LSA and RSA. Bogs are the  
17 most abundant wetland class at 45.3 ha (16%) in the LSA and 136.6 ha (23%) in the RSA. Swamps  
18 comprise 32.3 ha (11%) in the LSA and 49.7 ha (8%) in the RSA, and shallow open water  
19 (freshwater) accounts for 1.6 ha in the LSA (1%) and RSA (<1%). Tidal water wetlands cover 57.5 ha  
20 (20%) in the LSA and 66.9 ha (11%) in the RSA, and estuarine wetlands comprise 6.3 ha (2%) in the  
21 LSA and 6.7 ha (1%) in the RSA.
- 22 • Wetlands in the LSA and RSA support a variety of hydrological, biogeochemical, and habitat  
23 functions. Specific habitat functions include the following:
- 24 – Habitat for the red-listed arctic daisy (six occurrences)
- 25 – Habitat for three red-listed (6.2 ha in the LSA and 6.6 ha in the RSA) and one blue-listed (31.2 ha  
26 in the LSA and 48.6 ha in the RSA) wetland communities
- 27 – Habitat for eelgrass, recorded in two locations in the LSA and RSA
- 28 – Habitat for mammals, including grizzly bear (*Ursus arctos*) which is federally listed as special  
29 concern, black bear (*Ursus americanus*), grey wolf (*Canis lupus*), Pacific marten (*Martes caurina*),  
30 moose (*Alces alces*), and black-tailed deer (*Odocoileus hemionus*)
- 31 – Foraging and/or roosting habitat for eight known bat species, including the little brown myotis  
32 (*Myotis lucifugus*), which is *Species at Risk Act (SARA)*-listed as endangered
- 33 – Breeding and/or foraging habitat for migratory birds, including songbirds, raptors (including  
34 bald eagle), shorebirds and gull, and habitat for 10 SARA-listed migratory bird species.
- 35 – Breeding and dispersal habitat for amphibians, including western toad (*Anaxyrus boreas*),  
36 which is SARA listed as special concern



- 1       – Habitat for SARA listed wildlife species at risk, including:
- 2           o Seven wildlife species at risk documented in the LSA and RSA during field studies, including
- 3           northern goshawk (*Accipiter gentilis laingi*), marbled murrelet (*Brachyramphus marmoratus*),
- 4           great blue heron fannini subspecies (*Ardea herodias fannini*), black swift (*Cypseloides niger*),
- 5           western toad, little brown myotis, and grizzly bear
- 6           o Three wildlife species at risk with effective habitat modelled in the LSA and RSA:
- 7           western screech-owl (*Megascops kennicottii kennicottii*), olive-sided flycatcher
- 8           (*Contopus cooperi*), and barn swallow (*Hirundo rustica*)
- 9           o Four wildlife species at risk with ranges and habitat types that overlap with wetlands of the
- 10          LSA and RSA: lesser yellowlegs (*Tringa flavipes*), band-tailed pigeon (*Patagioenas fasciata*),
- 11          peregrine falcon, pealei subspecies (*Falco peregrinus pealei*), and northern myotis
- 12          (*Myotis septentrionalis*)

13   A transmission line study area (**TLSA**) was selected to encompass several potential transmission line

14   scenarios. Key findings for the TLSA, based on a review of existing desktop data include:

- 15   • No known occurrences of red- or blue-listed plant or lichen species
- 16   • Habitat supporting all representative botanical and cultural forest product species used by the
- 17   Nisga'a Nation and other Indigenous groups is present throughout the TLSA. The ecosystems
- 18   mapped in the TLSA support western redcedar, yellow-cedar, Labrador tea, devil's club,
- 19   green false-hellebore, huckleberries and blueberries, and freshwater aquatic plants (e.g., sedges).
- 20   Known pine mushroom harvesting areas mapped by Integrated Resources Policy Branch (1995) on
- 21   the east side of the TLSA, across Portland Canal from Pearse Island.
- 22   • No noxious weeds or regionally categorized invasive plant species were identified within the TLSA
- 23   from desktop data sources.
- 24   • Site series potentially supporting four red-listed ecological communities and eleven blue-listed
- 25   ecological communities are mapped in the TLSA.
- 26   • The TLSA is predominantly covered by old forest; no regulation-based old growth deferral areas are
- 27   within the TLSA.
- 28   • Wetland types mapped in the TLSA include freshwater shrubby and treed bogs and swamps,
- 29   sedge fens, and estuarine marshes.

30



## 1 Abbreviations

BC	British Columbia
BC EAA	British Columbia <i>Environmental Assessment Act</i>
BEC	biogeoclimatic ecosystem classification
BC CDC	British Columbia Conservation Data Centre
CMA	Coastal Mountain-heather Alpine BEC Zone
CWH	Coastal Western Hemlock BEC Zone
CWHvh2	Central variant of the Very Wet Hypermaritime subzone of the CWH
CWHvm1	the Submontane variant of the Very Wet Maritime subzone
CWHvm2	the Montane variant of the Very Wet Maritime subzone
CWHwm	the Wet Maritime subzone
EA	environmental assessment
Ed	estuarine meadow
Em	estuarine marsh
ha	hectares
IA	impact assessment
IAA	<i>Impact Assessment Act</i>
km	kilometre
LSA	local study area
m	metre
MH	Mountain Hemlock BEC Zone
MHmm1	the Windward variant of the Moist Maritime (forested) subzone
MHmmp1	the Windward variant of the Moist Maritime (Parkland) subzone



**TECHNICAL DATA REPORT—VEGETATION AND WETLANDS  
KSI LISIMS LNG PROJECT**



Abbreviations  
June 2024

MHwh1	the Windward variant of the Wet Hypermaritime (Forested) subzone
MHwhp1	the Windward variant of the Wet Hypermaritime (Parkland) subzone
Nisga'a Treaty	<i>Nisga'a Final Agreement Act</i>
N/A	not applicable
OBIA	object-based image analysis
RSA	regional study area
SIL	survey intensity level
SARA	<i>Species at Risk Act</i>
the Application	Application for an Environmental Assessment Certificate
the Project	Ksi Lisims LNG – Natural Gas Liquefaction and Marine Terminal Project
the Proponents	Nisga'a Nation, Rockies LNG Limited Partnership and Western LNG
the Site	Project site
TDR	technical data report
TEM	terrestrial ecosystem mapping
TLSA	transmission line study area
VCs	valued components



## 1 1.0 INTRODUCTION

2 The Nisga'a Nation, Rockies LNG Limited Partnership (**Rockies LNG**) and Western LNG LLC (via its  
3 subsidiary, Western LNG) (each a Proponent and collectively referred to herein as the **Proponents**),  
4 are proposing to jointly develop an energy project, the Ksi Lisims LNG – Natural Gas Liquefaction and  
5 Marine Terminal Project (the **Project**), a floating liquefied natural gas (**FLNG**) production, storage and  
6 offloading facility, with supporting upland infrastructure and a marine terminal. The Project site (**Site**) is  
7 located at Wil Milit, on the northern end of Pearse Island, approximately 15 kilometres (**km**) west of the  
8 Nisga'a community of Gingolx. The Site is on Category A fee simple land as defined in the *Nisga'a Final*  
9 *Agreement Act (the Nisga'a Treaty)* and is adjacent to a proposed water lot located on the east side of  
10 the Site, in Portland Canal.

11 The Project is subject to an environmental assessment (**EA**) under the British Columbia *Environmental*  
12 *Assessment Act (BC EAA)* and an impact assessment (**IA**) under the federal *Impact Assessment Act*  
13 (**IAA**). The Government of BC requested substitution of the provincial review process for the  
14 federal impact assessment process from the federal Minister of Environment and Climate Change.  
15 The federal Minister of Environment and Climate Change approved the request for substitution.  
16 The Proponents are required to provide an application for an Environmental Assessment Certificate  
17 (the **Application**). Given the location of the Project on Category A Lands owned by the Nisga'a Nation  
18 the Application will also meet requirements of Chapter 10, paragraph 8 of the *Nisga'a Treaty*.  
19 Accordingly, an Application that focuses on a suite of valued components (**VCs**) has been prepared.  
20 VCs are components of the natural and human environment that are considered by the Proponents,  
21 public, Indigenous nations, scientists and other technical specialists, and government agencies involved  
22 in the assessment process to have scientific, ecological, economic, social, cultural, archaeological,  
23 historical, or other importance. This technical data report (**TDR**) presents the existing conditions  
24 (i.e., pre-Project conditions) for the Vegetation and Wetlands VC to support the Application and permitting  
25 requirements. Vegetation resources addressed in this TDR include:

- 26 • **Plant species of conservation concern**—vascular and non-vascular plant species and lichen  
27 species designated as endangered, threatened, or special concern by the Committee on the Status of  
28 Endangered Wildlife in Canada or the federal *Species at Risk Act* as well as those red- and  
29 blue-listed by the British Columbia Conservation Data Centre (**BC CDC**) (BC CDC 2022)
- 30 • **Invasive plant species**—noxious weeds, as defined by the British Columbia *Weed Control Act* and  
31 Weed Control Regulation, and regionally categorized weeds listed by the Northwest Invasive Plant  
32 Council (NWIPC 2020)
- 33 • **Botanical and cultural forest products**—Indigenous use species Nisga'a Nation requested be  
34 assessed
- 35 • **Ecological communities of conservation concern**—plant associations that are red- or blue-listed  
36 by the BC CDC (2022)



# TECHNICAL DATA REPORT—VEGETATION AND WETLANDS KSI LISIMS LNG PROJECT



Introduction  
June 2024

- 1 • **Old forest**—in the Coastal Western Hemlock (**CWH**) and Mountain Hemlock (**MH**) biogeoclimatic  
2 ecosystem classification (**BEC**) zones, defined as forests with an average mature tree age greater  
3 than 250 years, indicated by a structural stage of 7a. Very old forest is greater than 400 years old,  
4 indicated by a structural stage of 7b (MOFR and MOE 2010)
- 5 • **Wetlands and wetland functions**—wetlands are defined as “land which is saturated for a long  
6 enough period to promote wetland or aquatic processes as indicated by hydric soils, hydrophytic  
7 vegetation, and various kinds of biological activity that are adapted to the wet environment”  
8 (NWWG 1997). Wetlands are described and classified to site associations following *Wetlands of*  
9 *British Columbia: A Guide to Identification* (Mackenzie and Moran 2004), with tidal water wetlands  
10 classified by the *Canadian Wetland Classification System* (National Wetlands Working Group 1997).  
11 Wetland functions include hydrological, biogeochemical, and habitat functions, as described by  
12 Hanson et al. (2008)
- 13 Information on the existing conditions of vegetation and wetlands was collected through desktop and field  
14 studies as described in the following sections.

15



Study Areas  
June 2024

## 1 2.0 STUDY AREAS

2 The local, regional, and transmission line study areas presented in this TDR represent the areas where  
3 data was compiled/collected to allow for an understanding of the environment in support of the  
4 Project-specific effects assessment and the cumulative effects assessment (Figure 2.3–1).

### 5 2.1 LOCAL STUDY AREA

6 The Vegetation and Wetlands local study area (**LSA**) is defined by a 120 m buffer around the Site,  
7 including areas up to 2 metres (m) below the normal mean tide to capture estuarine communities  
8 described by Mackenzie and Moran (2004) and tidal water wetlands as described by the  
9 *Canadian Wetland Classification System* (NWWG 1997). This boundary was selected because vegetation  
10 species and communities are potentially susceptible to direct and indirect effects associated with  
11 vegetation clearing around the Site. Edge effects can typically influence temperature and moisture levels  
12 60 m to 120 m from the cleared edge (Chen et al. 1990; Voller 1998). The LSA represents the area where  
13 field surveys were focused and is large enough to allow for changes to the Site without requiring  
14 additional field data collection on existing conditions. The Vegetation and Wetlands LSA encompasses  
15 approximately 285 hectares (ha).

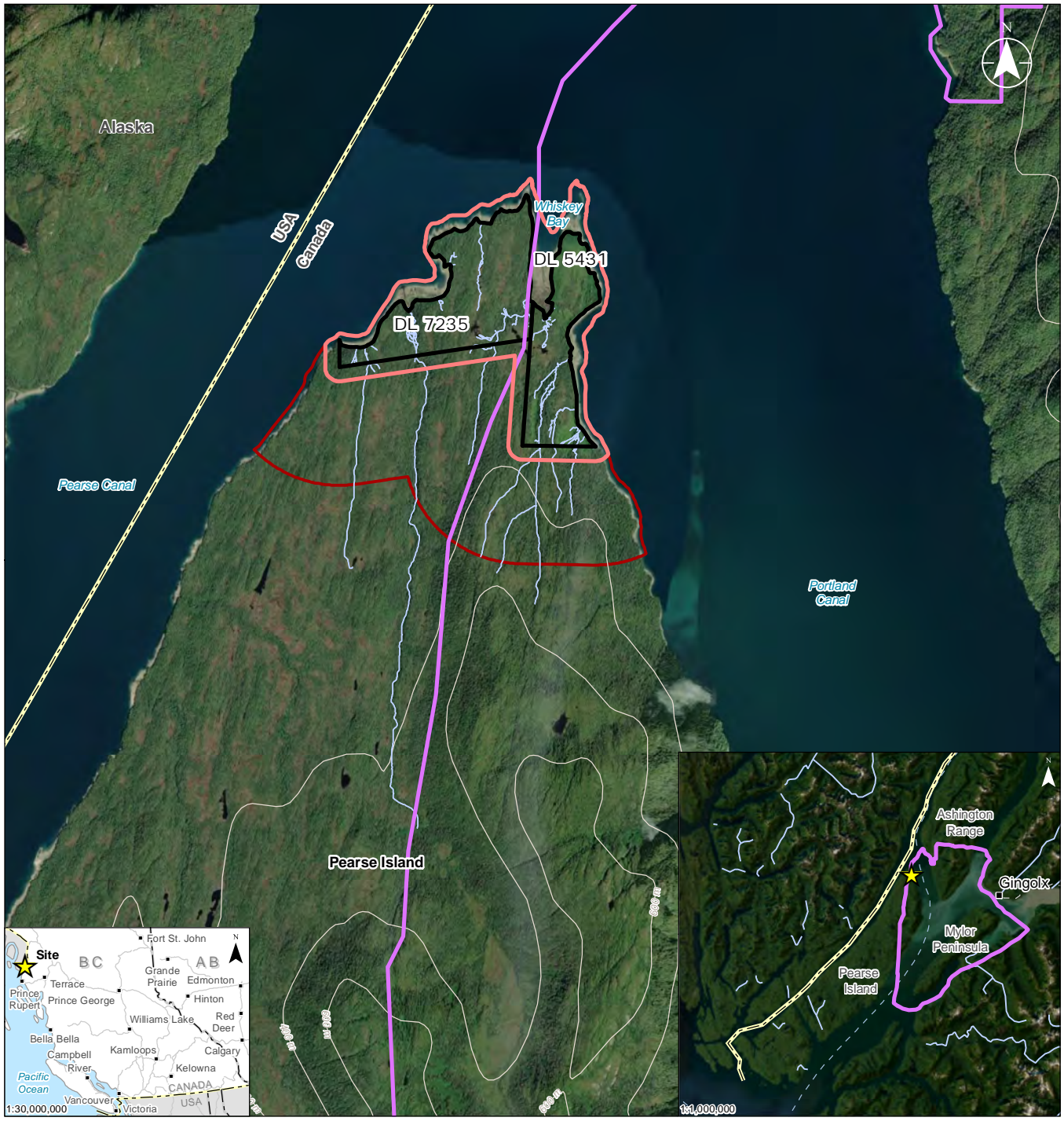
### 16 2.2 REGIONAL STUDY AREA

17 The Vegetation and Wetlands regional study area (**RSA**) is defined as a 1000 m buffer around the Site,  
18 including areas up to 2 m below the normal mean tide to capture estuarine communities described by  
19 Mackenzie and Moran (2004) and tidal water wetlands described by the *Canadian Wetland Classification*  
20 *System* (NWWG 1997). The spatial extent of the Vegetation and Wetlands RSA was selected based on  
21 the extent to which residual Project effects are expected to act cumulatively with similar residual effects  
22 from other projects and activities on Vegetation and Wetlands and aligns the assessment area with the  
23 Wildlife and Wildlife Habitat LSA. The Vegetation and Wetlands RSA encompasses approximately  
24 600 ha.

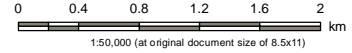
### 25 2.3 TRANSMISSION LINE STUDY AREA

26 The transmission line study area (**TLSA**) is a broad area between the Project and Nisga'a Lands  
27 (as defined under the Nisga'a Treaty) within which a portion of the third-party transmission line will be  
28 developed. The TLSA is defined to encompass the likely options for the transmission line, including  
29 necessary rights-of-way as well as associated infrastructure. The portion of the transmission line within  
30 the TLSA will tie into to a transmission line that will be developed on Nisga'a Lands, connecting to the  
31 BC Hydro grid. The TLSA encompasses portions of Nisga'a Category A Lands and the Nass Area but  
32 does not include Nisga'a Lands (as defined in the Nisga'a Treaty). The spatial extent of TLSA was  
33 selected to encompass several transmission line scenarios. The TLSA encompasses approximately  
34 36,400 ha.





- Site
- Boundaries of District Lots 7235 and 5431
- Transmission Line Study Area
- Vegetation and Wetlands Local Study Area
- Vegetation and Wetlands Regional Study Area
- International Boundary
- Topographic Contour
- Watercourse (Project-Mapped)



Project Location: Pearse Island, BC  
 Project Number: 123221820  
 Prepared by TQUILICHINI on 20220609  
 Requested by MONEL on 20220609  
 Checked by SMOSS on 20220610

Client/Project/Report  
 Ksi Lisims LNG  
 Natural Gas Liquefaction and Marine Terminal  
 Technical Data Report - Vegetation and Wetlands  
 Figure No.  
**2.3-1**  
 Title  
**Vegetation and Wetlands Local, Regional and Transmission Line Study Areas**

**Notes**  
 1. Coordinate System: NAD 1983 UTM Zone 9N  
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada  
 3. Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

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## 1 3.0 REVIEW OF EXISTING DATA

2 A review of information and data sources regarding vegetation and wetland resources in the LSA, RSA,  
3 and TLSA was completed to inform field studies, mapping, and reporting on existing conditions.  
4 Information sources include traditional knowledge and information on traditional use, publicly available  
5 datasets, relevant literature, and information collected during surveys for past EA projects.

### 6 3.1 REGIONAL SETTING

7 The terrestrial portion of the TLSA is located within the Southern Boundary Ranges Ecosession  
8 (Pearse Island and Ashington Range) and Kitimat Ranges Ecosession (Mylor Peninsula), while the  
9 marine portion is within the North Coast Fjords Ecosession (marine areas of the TLSA). The Vegetation  
10 and Wetlands RSA is located within the Southern Boundary Ranges Ecosession and North Coast Fjords  
11 Ecosession. The Southern Boundary Ranges Ecosession is an area of wet rugged mountains that are  
12 capped with glaciers, small icefields, and exposed granitic and metamorphic bedrock. This area was  
13 heavily impacted by glaciation. The Kitimat Ranges Ecosession is an area of steep-sided mountains  
14 dissected by fjords and are composed of largely eroded granitic rock (Demarchi 2011). The North Coast  
15 Fjords Ecosession is the marine environment that occurs east of Hecate Strait and consists of channels  
16 and deep fjords (Demarchi 2011). Fjords in this area are generally steep with straight sides and inlets and  
17 canals divide the TLSA into three landmasses: Pearse Island to the west, Ashington Range to the north,  
18 and the Mylor Peninsula to the east (Figure 2.3–1).

19 The TLSA is located within the CWH, MH, and Coastal Mountain-heather Alpine (**CMA**) BEC zones  
20 (Table 3.1–1; Figure 3.1–1). A majority of the terrestrial portion of the TLSA is covered by the CWH zone  
21 (84%), with some MH in high elevation areas (15%), and a small amount of CMA (1%). The MH and MH  
22 parkland is scattered in peaks on Pearse Island, concentrated in the centre of the Ashington Range in the  
23 north of the TLSA, and in two high elevation areas in the east of the TLSA (Figure 3.1–1). CMA is only  
24 present at the highest portions of the Ashington Range. The Vegetation and Wetlands RSA is located  
25 entirely within the CWH BEC zone (Table 3.1–1; Figure 3.1–1).

26 The CWH is the zone of low- to middle-elevation forest in the Prince Rupert Forest Region, ranging in  
27 elevation from sea level to 1000 m. It has a maritime climate with relatively mild temperatures and  
28 heavy rainfall. The growing season tends to be cool and cloudy, with winters extremely wet and quite  
29 mild. Low-elevation coastal areas receive little snow (Banner et al. 1993). The natural vegetation of the  
30 CWH is dominated by old-growth conifer stands (rainforests) of western hemlock (*Tsuga heterophylla*),  
31 western redcedar (*Thuja plicata*), and amabilis fir (*Abies amabilis*). Sitka spruce (*Picea sitchensis*) is  
32 common but never dominant and occurs mainly on alluvial soils. Shore pine and yellow-cedar  
33 (*Callitropsis nootkatensis*) are abundant on the outer coast where a scrubby forest grows on organic soils  
34 over bedrock (Banner et al. 1993).



Review of Existing Data  
June 2024

1 The MH BEC zone occupies the high elevation or subalpine zones of the coastal regions (400 to 1,600 m  
2 elevation) and is located almost entirely on the western slopes of the Coast Mountains with some  
3 occurrences on the eastern slopes (Banner et al. 1993). The climate within this zone is characterized by  
4 short, cool summers, rainy autumns, and long, cool, wet winters with heavy snow cover for five to  
5 nine months. Mountain hemlock (*Tsuga mertensiana*) and amabilis fir are the characteristic dominant tree  
6 species (Banner et al. 1993).

7 The CMA BEC zone is an alpine zone that occurs along the windward spine of the Coast Mountains  
8 where the snowpack is deep and summers are moderated by maritime influences. The treeline is lower in  
9 elevation than in the alpine of comparable latitudes in the dry interior caused by heavy and prolonged  
10 snow cover. In the north part of the province, the CMA begins at 1000 m. Most of the land area is  
11 occupied by glaciers or recently exposed bare rock (Mackenzie 2007). The CMA is treeless, but tree  
12 species are common at lower alpine elevations in stunted or krummholz form, however, krummholz is  
13 usually not extensive. The most common krummholz species are mountain hemlock, yellow-cedar, and  
14 subalpine fir (*Abies lasiocarpa*) in coastal alpine areas. Most alpine vegetation is dominated by shrubs,  
15 herbs, mosses, liverworts, and lichens (Banner et al. 1993).

16 The TLSA overlaps four CWH variants: the Central variant of the Very Wet Hypermaritime subzone  
17 (**CWHvh2**), the Submontane variant of the Very Wet Maritime subzone (**CWHvm1**), the Montane variant  
18 of the Very Wet Maritime subzone (**CWHvm2**), and the Wet Maritime subzone (**CWHwm**; Table 3.1–1,  
19 Figure 3.1–1). The CWHvh2 variant covers the majority of the terrestrial portion of the TLSA  
20 (76%; Table 3.1–1, Figure 3.1–1). The Vegetation and Wetlands RSA is located entirely within the  
21 CWHvh2 variant (Table 3.1–1; Figure 3.1–1).

22 The CWHvh2 variant occupies the outer coastal areas and ranges in elevation from 0 to 600 m.  
23 The terrain is subdued and rocky, the climate is extremely wet, and the vegetation is a mosaic of poor  
24 forest and bog, with productive forests restricted to moderate and steep slopes or floodplains  
25 (Banner et al. 1993). The forested areas of the CWHvh2 are dominated by western redcedar, followed by  
26 western hemlock, and yellow-cedar. Typical understory vegetation includes salal (*Gaultheria shallon*),  
27 deer fern (*Struthiopteris spicant*), cordilleran bunchberry (*Cornus unalaschkensis*), false lily-of-the-valley  
28 (*Maianthemum dilatatum*), fern-leaved goldthread (*Coptis asplenifolia*), and skunk cabbage  
29 (*Lysichiton americanus*) (Banner et al. 1993). The CWHvm1 variant has an elevation range of 0 to 400 m  
30 (Banner et al. 1993). Dominant tree species in the CWHvm1 variant include western hemlock, amabilis fir,  
31 western redcedar, and Sitka spruce. The CWHvm2 variant occurs above and inland of the CWHvm1  
32 (approximately 400 - 800 m elevation) and below the MH zone, with a cooler climate and shorter growing  
33 season and lower ecosystem productivity and biological diversity compared to CWHvm1  
34 (Banner et al. 1993). Forested areas of the CWHvm2 variant are dominated by western hemlock,  
35 amabilis fir, yellow cedar, and mountain hemlock. The CWHwm is the most northern subzone of the  
36 CWH BEC zone. This subzone has an elevation range of 0 to 600 m and is characterized by a  
37 maritime climate with heavier snow and a shorter growing season compared to more southerly subzones  
38 (Banner et al. 1993). The CWHwm has a steep, rocky terrain and low plant diversity, with the area  
39 dominated by western hemlock and Sitka spruce.



Review of Existing Data  
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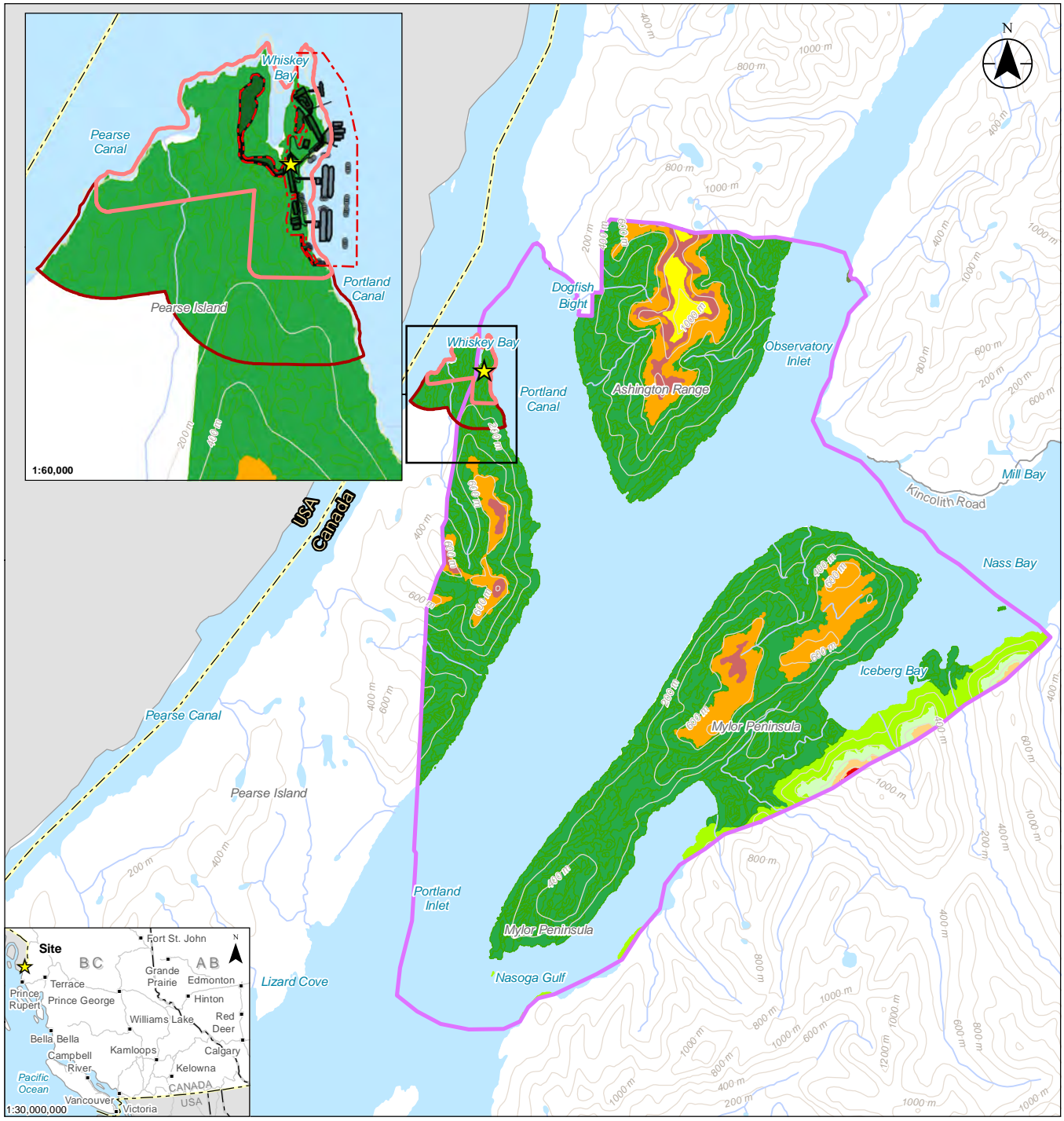
1 The TLSA overlaps four MH variants: the Windward variant of the Moist Maritime (forested) subzone  
2 (**MHmm1**), the Windward variant of the Moist Maritime (Parkland) subzone (**MHmmp1**), the  
3 Windward variant of the Wet Hypermaritime (Forested) subzone (**MHwh1**), and the Windward variant of  
4 the Wet Hypermaritime (Parkland) subzone (**MHwhp1**; Table 3.1–1, Figure 3.1–1). The MHmm1 variant  
5 is found on the western side of the Coastal Mountains at elevations of 800 to 1,200 m, and is dominated  
6 by yellow cedar (mainly on seepage sites), as well as other maritime species such as deer fern and  
7 deer-cabbage (*Nephrophyllidium crista-galli*). Subalpine fir is generally absent except in areas of severe  
8 cold air ponding (Banner et al. 1993). The MHwh1 variant is found on the scattered patches of higher  
9 ground on the outer coastal islands and adjacent low-lying mainland. This variant is located directly above  
10 the CWHvh2 variant, ranging from 600 to 1,100 m elevation, and is dominated by yellow cedar and  
11 mountain hemlock (Banner et al. 1993). The parkland subzones (MHmmp1 and MHwhp1) are located  
12 above the forested subzones and occupy the transition from the treeline to true alpine tundra  
13 (i.e., the CMA). Parkland subzones are characterized by discontinuous forest cover interspersed with  
14 subalpine health, lush herb meadows, and subalpine bogs and fens. Bogs and fens become increasingly  
15 common as one moves westward. Parkland subzones contain a variety of alpine/subalpine plants,  
16 including mountain-heather (*Cassiope* and *Phyllodoce* sp.) and partridge-foot (*Luetkea pectinate*)  
17 (Banner et al. 1993).

18 **Table 3.1–1 BEC Units Mapped within the TLSA**

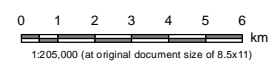
BEC Zone	BEC Unit	Area (ha) of Terrestrial Portion of TLSA	Percentage (%) of Terrestrial Portion of TLSA
CMA	CMA	216.8	1
CWH	CWHvh2	12,700.0	76
	CWHvm1	991.2	6
	CWHvm2	263.0	2
	CWHwm	7.3	<1
<i>Subtotal CWH</i>		<i>14,178.3</i>	<i>84</i>
MH	MHmm1	85.8	<1
	MHmmp1	14.3	<1
	MHwh1	1,948.0	12
	MHwhp1	498.7	3
<i>Subtotal MH</i>		<i>2,546.8</i>	<i>15</i>
<b>TOTAL</b>		<b>16,725.0</b>	<b>100</b>
NOTE: BEC units as mapped in Blackwell and Associates (2018).			

19





- Mooring Anchor
  - ★ Site
  - Project Component
  - ▭ Terrestrial and Marine Project Footprint
  - ▭ Transmission Line Study Area
  - ▭ Vegetation and Wetlands Local Study Area
  - ▭ Vegetation and Wetlands Regional Study Area
  - International Boundary
  - Road
  - Topographic Contour
  - Watercourse
  - Waterbody
- 
- Biogeoclimatic Variant**
- CMA
  - CWHvh2
  - CWHvm1
  - CWHvm2
  - CWHwm
  - MHmm1
  - MHmmp1
  - MHwh1
  - MHwhp1
  - Unmapped USA Land



Project Location: Pearse Island, BC  
 Project Number: 123221820  
 Prepared by AYIU on 20240604  
 Requested by JFRIES on 20240604  
 Checked by EFLORY on 20240604

Client/Project/Report  
 Ksi Lisims LNG  
 Natural Gas Liquefaction and Marine Terminal  
 Technical Data Report - Vegetation and Wetlands

Figure No.  
**3.1-1**

Title  
**BEC Units of the Local, Regional and Transmission Line Study Areas**

**Notes**  
 1. Coordinate System: NAD 1983 UTM Zone 9N  
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada  
 3. Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

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I:\CA0155-FBAGF01\Workgroup\123221820\figures\reports\TDR\Vegetation\fig3\_1-1\_123221820\_500\_BEC\_variant.mxd Revised: 2024-06-04 By: ayiu

# TECHNICAL DATA REPORT—VEGETATION AND WETLANDS KSI LISIMS LNG PROJECT



Review of Existing Data  
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1 Natural Disturbance Types categorize the province into zones based on the frequency and severity of  
2 disturbance events. The CWH and forested MH BEC zones are within Natural Disturbance Type 1, where  
3 ecosystems have rare stand-initiating events such as windfall, fire, floods, and landslides which occur  
4 every 250 years or greater (BC FLNRORD 2022; BC Environment 1995). Because fires occur rarely in  
5 Natural Disturbance Type 1 areas, early seral forest stands (i.e., in early successional state) are  
6 uncommon in areas that have not experienced clearcut logging (Banner et al. 1993). Within the CWHvh2  
7 variant of the Vegetation and Wetlands RSA, forests have typically regenerated in gaps created by the  
8 death of small patches of trees or individual trees or low- and mixed-severity fires, rather than in  
9 stand-initiating events (BC Environment 1995; Daniels and Gray 2006). The alpine zone (CMA) and  
10 parkland subzones (MHwmp, MHmmp) are within Natural Disturbance Type 5, which are unforested.  
11 However, fire can have a dramatic effect, causing long-term shifts in the position of the tree line, and  
12 grazing by wildlife can drive ecosystem change (BC Environment 1995).

13 Climate change is expected to affect the climate of the region; however, climate on the west coast is  
14 moderated by the Pacific Ocean and is predicted to warm less than other parts of BC. The CWH BEC  
15 zone is expected to be one of the least affected of BEC zones in the province. The climate envelopes of  
16 CWH forests are projected to increase in elevation and latitude at the expense of the climate envelopes  
17 for less productive MH, MH parkland, and CMA BEC zones, according to modelling by Wang et. al.  
18 (2012). However, the northwest is predicted to experience warmer summers, reduced depth and duration  
19 of snowpacks, and more intense dry and wet periods (Daust 2013). Climate change is expected to result  
20 in ecosystem changes including changes in soil moisture, wetland types, and vegetation communities  
21 (McRae et al. 2008; Mitsch and Hernandez 2013). As well, sea level is expected to rise by an additional  
22 20 cm to 35 cm by 2050, and by 60 cm or more by 2100 (James et al. 2015; 2021). Note, there is a  
23 low-probability, high-impact scenario (the “Enhanced Scenario”), that considers the effects of  
24 additional melt-water from Antarctica of about 120 cm of sea-level rise by 2100 (James et al. 2021).  
25 This “Enhanced Scenario” would result in increased loss of marine shoreline and marine riparian habitats  
26 due to coastal inundation. These changes could affect biodiversity (including species and ecosystems of  
27 conservation concern), connectivity between ecosystems and species, and ecosystem services  
28 (IPCC 2014; Cui et al. 2021). The Project is located on two fee simple Category A lots owned by  
29 Nisga'a Nation. The Vegetation and Wetlands RSA is located within the Nass Area and  
30 Nass Wildlife Area where Nisga'a Nation citizens exercise their Treaty rights and interests. The RSA is  
31 also located within the traditional territories and/or harvesting areas of four Indigenous groups, including:

- 32 • Lax Kw'alaams Band
- 33 • Metlakatla First Nation
- 34 • Kitsumkalum First Nation
- 35 • Kitselas First Nation

36 The TLSA is located within the traditional territories and/or harvesting areas of the four Indigenous groups  
37 above, as well as the Métis Nation British Columbia.



## 1 3.2 INFORMATION SHARED BY THE NISGA'A NATION

2 The Nisga'a Treaty requires that the Project assess the potential effects on the rights and interests of  
3 Nisga'a Nation with a view to understanding impacts and mitigating adverse effects as appropriate.  
4 To consider the potential Project effects on traditional use vegetation (botanical and cultural forest  
5 products) with respect to Nisga'a treaty rights and interests, the following species have been identified by  
6 the Nisga'a Nation as being required for review; scientific names interpreted based on the  
7 common names):

- 8 • western redcedar
- 9 • yellow-cedar
- 10 • Labrador tea (*Rhododendron groenlandicum*)
- 11 • devil's club (*Oplopanax horridus*)
- 12 • green false-hellebore (*Veratrum viride*)
- 13 • huckleberries or blueberries (*Vaccinium* sp.)
- 14 • soopolallie (*Shepherdia canadensis*)
- 15 • freshwater aquatic plants (e.g., sedges [*Carex* sp.], rushes (*Juncus* sp.), and water-lily (*Nuphar* sp.))
- 16 • pine mushroom (*Tricholoma murrillianum*)
- 17 • marine plants (i.e., seaweed)

18 Soopolallie is not known to occur at the Site and was therefore not addressed in this TDR. Marine plants  
19 (i.e., seaweed) are addressed in the Marine Resources TDR (Appendix 7.9A).

### 20 3.2.1 Methods

21 Indigenous knowledge and information about the Indigenous use of vegetation by Nisga'a Nation was  
22 collected through review of publicly available sources for the RSA and TLSA. Sources reviewed for  
23 relevant information included:

- 24 • Using Plants the Nisga'a Way: Past, Present and Future Use (Burton 1992)
- 25 • A Land Use Plan for Nisga'a Lands (Nisga'a Lisims Government 2002)
- 26 • Grizzly Bears, Black Bears, and Their Habitats in Selected Areas of the Southwest Nass Area  
27 (Demarchi et al. 2017)
- 28 • Consultation with Nisga'a Nation on environmental application materials



1    **3.2.2       Results**

2    The Nisga'a Land Use Plan (Nisga'a Lisims Government 2002) does not cover the area of Pearse Island  
3    or the TLSA; however, it was reviewed for information regarding traditional use of vegetation. Forest land  
4    use encompasses much more than timber production. Other forest resources include botanical forest  
5    products, cultural products, and country foods. The Nisga'a Land Use Plan defines ecologically sensitive  
6    spatial areas including areas of excessive slope, wetlands, riparian areas and rare or under-represented  
7    forest ecosystems, which align well with the vegetation and wetland topics covered in this TDR. Some  
8    areas are also important for wildlife, fish, or other resource values.

9    The Nisga'a Land Use Plan lists other botanical forest products that Nisga'a Nation uses, such as  
10   fiddleheads and several mushroom species including pine mushroom, black morel (*Morchella elata*),  
11   oyster mushroom (*Pleurotus ostreatus*), king boletus (*Boletus edulis*), blue chanterelle (*Polyozellus*  
12   *atrolazulinus*), funnel chanterelle (*Craterellus tubaeformis*), lobster mushroom (*Hypomyces lactifluorum*),  
13   chicken of the woods (*Laetiporus* spp.), hedgehog mushroom (*Hydnum umbilicatum*), and cauliflower  
14   mushroom (*Sparassis radicata*; Nisga'a Lisims Government 2002). The Nisga'a Land Use Plan has  
15   specific policies relating to these species and defines a special management area for pine mushroom,  
16   located outside both the Vegetation and Wetlands RSA and the TLSA.

17   According to Burton (1992), the species identified by the Nisga'a Nation have been traditionally used for a  
18   variety of food, medicinal, spiritual/ceremonial, and technological uses which are described below.  
19   The Nisga'a name for each plant species or group is provided in parentheses next to the English common  
20   name. The presence, abundance and distribution of some of these species within sites in the Nass Valley  
21   is noted where they were recorded by Demarchi et al. (2017), providing regional information on their  
22   availability.

23   Western redcedar (Simgan) is most common along the coast and at low to middle elevations in the  
24   Nass Area. It is a tree that was integral to the Nisga'a way of life in the past and is still used and remains  
25   highly regarded today. It was used in the past for many medicinal, spiritual/ceremonial, and technological  
26   purposes. Today it is collected and used for arts, crafts, and to make clothing for modern-day celebrations  
27   (Burton 1992).

28   Yellow-cedar (Sgwinee'e) is found on wet to mesic (i.e., those with moderate moisture) slopes and bogs  
29   in coastal lowland, montane, and subalpine zones (Pojar and MacKinnon 1994). It has traditionally been  
30   used for technological purposes including for carving, clothing, and crafts (Burton 1992).

31   Labrador tea (Tiim laxlax'u) is found throughout the Nass Area in bogs and poorly drained forest sites  
32   from low to middle elevations. It is still harvested today as a tea and was traditionally used for medicinal  
33   purposes (Burton 1992).



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- 1 Devil's club (Wa'ums) is widely distributed along the northwest coast and interior of British Columbia (BC)  
2 on moist sites, especially on well-drained seeps in mature and old-growth forests, throughout the  
3 Nass Area, from the lowlands to the subalpine. Demarchi et al. (2017) observed it in low to moderate  
4 abundance in all but one of their 12 study sites in the Nass Area. Wa'ums is a medicinal plant also used  
5 for spiritual/ceremonial purposes and is still today important to the Nisga'a. Commercial logging in the  
6 Nass Valley has disrupted many Wa'ums collection sites and there is concern that there is no longer as  
7 much available, particularly of large stems believed to make the best medicine (Burton 1992).
- 8 Green false-hellebore (Ts'iks) is found throughout the Nass Area on moist to wet meadows, along  
9 streambanks, swamps, and in open forests and meadows from low to alpine elevations, especially in the  
10 subalpine zone. It is a poisonous plant not used for food, but with a history of medicinal and  
11 spiritual/ceremonial uses (Burton 1992).
- 12 Several species of huckleberries or blueberries occur throughout the Nass Area. Demarchi et al. (2017)  
13 observed Alaskan blueberry (*Vaccinium alaskense*) in moderate abundance in most of their sites in the  
14 Nass Area and red huckleberry (*Vaccinium parviflorum*) in low to moderate abundance in half their study  
15 sites in the Nass Area. Huckleberries and blueberries are still used as a food source and have traditional  
16 medicinal and technological uses as dyes (Burton 1992).
- 17 Freshwater aquatic plants are found within the Nass Area in ponds, swamps, fens, and marshes.  
18 Graminoids, grasses, sedges, and rushes (Hap'iskw) have technological uses for weaving, basket  
19 making, and stuffing, while yellow pond lily (Gahldaats') has traditional medicinal uses (Burton 1992).
- 20 Pine mushroom is an edible, large, robust, white to pale brown mushroom (Integrated Resources Policy  
21 Branch 1995). Gayda ts'uuts' is the non species-specific Nisga'a name for mushrooms, which would  
22 include pine mushroom. Many edible and non-edible fungi are found throughout the Nass Area. Generally  
23 speaking, in the past, northwestern Indigenous nations did not eat mushrooms. However, today, many  
24 Nisga'a actively harvest a variety of mushroom species (primarily pine mushroom) in the late summer and  
25 fall (Burton 1992). The Nisga'a have longstanding knowledge about where to find prime pine mushrooms  
26 areas, as do experienced harvesters (Forest Practices Board 2004).

### 27 3.3 INDIGENOUS KNOWLEDGE AND INDIGENOUS USE

- 28 Information regarding the Indigenous knowledge and Indigenous use of botanical and cultural forest  
29 products was also gathered to support the assessment for the five Indigenous groups other than the  
30 Nisga'a with traditional territories and/or harvesting areas overlapping the RSA and TLSA. These groups  
31 include Lax Kw'alaams Band, Metlakatla Band, Kitsumkalum Band, Kitselas Nation, in the RSA, and the  
32 Métis Nation British Columbia in the TLSA.



### 1 3.3.1 Methods

2 Indigenous knowledge and information about the Indigenous use of vegetation was collected through  
3 publicly available sources and Project-specific studies for the RSA and TLSA. Indigenous use plant  
4 species lists may not include every plant species with Indigenous uses. Sources of information reviewed  
5 for each Indigenous group included:

- 6 • Lax Kw'alaams Band
  - 7 – Lax Kw'alaams Indigenous Knowledge and Traditional Land Use Study Specific to the
  - 8 Ksi Lisims LNG Project (Lax Kw'alaams Band 2023)
  - 9 – Draft Environmental Effects Evaluation/Application for Environmental Assessment Certificate.
  - 10 Part B Section 5.0: Environmental Effects Evaluation. 5.6: Terrestrial Resources (Vopak 2020)
- 11 • Metlakatla Band
  - 12 – Metlakatla First Nation Traditional Knowledge and Use Study Specific to the Ksi Lisims Project
  - 13 Proposed by the Nisga'a Nation, Rockies LNG Limited Partnership, and Western LNG LLC
  - 14 (Firelight 2022)
  - 15 – Draft Environmental Effects Evaluation/Application for Environmental Assessment Certificate.
  - 16 Part B Section 5.0: Environmental Effects Evaluation. 5.6: Terrestrial Resources (Vopak 2020)
- 17 • Kitsumkalum Band
  - 18 – Kitsumkalum Socio-Economic/Community Well-Being Literature Review: Ksi Lisims LNG Project
  - 19 (Kwusen Research & Media LTD 2022)
  - 20 – Trying to Make a Life: The Historical Political Economy of Kitsumkalum (McDonald 1985)
- 21 • Kitselas Nation
  - 22 – Kitselas First Nation Traditional Use and Occupancy Study for the Ksi Lisims LNG Project,
  - 23 Pearse Island, Portland Inlet (Kitselas Knowledge Holders and Inglis Consulting 2022)
- 24 • Métis Nation British Columbia
  - 25 – Métis Nation British Columbia, website (MNBC 2021)

### 26 3.3.2 Results

27 Lax Kw'alaams Band uses tree species including alder (*Alnus* spp.), balsam fir, birch (*Betula* sp.),  
28 cottonwood (*Populus trichocarpa*), pine (*Pinus* sp.), Sitka spruce, hemlock (*Tsuga* sp.), cedars (including  
29 western redcedar and yellow-cedar), and yew (*Taxus brevifolia*). They harvest blackberries (*Rubus* sp.)  
30 and *Vaccinium* species, devil's club, Labrador tea, highbush cranberry (*Viburnum edule*), crab apple  
31 (*Malus fusca*), raspberry (*Rubus idaea*), salal, salmonberry (*Rubus spectabilis*), willow (*Salix* sp.),  
32 cow-parsnip (*Heracleum maximum*), deer fern, fireweed (*Chamaenerion angustifolium*),  
33 green false-hellebore, licorice fern (*Polypodium glycyrrhiza*), mint (*Mentha* sp.), northern rice-root  
34 (*Fritillaria camschatcensis*), skunk cabbage, and stinging nettle (*Urtica dioica*) (Vopak 2020).  
35 Lax Kw'alaams Band identified areas of importance for terrestrial harvesting which include Pearse Island;



Review of Existing Data  
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1 specifically two medicinal plant harvesting sites were identified within the LSA  
2 (Lax Kw'alaams Band 2023).

3 Metlakatla Band harvests berries including salmonberries, gooseberries (*Ribes* sp.),  
4 elderberries (*Sambucus racemosa*), raspberries, bunchberries (*Cornus* sp.), dwarf blueberries  
5 (*Vaccinium caespitosum*), currants (*Ribes* sp.), soapberries (*Shepherdia canadensis*), and huckleberries  
6 (Vopak 2020). They also use other plant species, including roots and tubers for food, and  
7 medicinal plants (Firelight 2022). Species of note include licorice fern, Hudson Bay tea (also known as  
8 Labrador tea), hemlock (bark), devil's club, and fireweed (Vopak 2020). Plant species are collected in the  
9 late spring and summer, and into the fall. Metlakatla Band avoids harvesting within the RSA due to  
10 perceived or actual contamination of harvested species (Firelight 2022).

11 Kitsumkalum harvests berries, fern roots, hemlock sap, lichen, skunk cabbage, maple wood, crab apples,  
12 cedars, hazelnuts (*Corylus cornuta*), fir, yew, grasses, highbush cranberry, fireweed, and devil's club  
13 (McDonald 1985).

14 Kitselas First Nation uses trees (alder, cottonwood, hemlock, cedar, maple [*Acer* sp.], and birch) for  
15 bark stripping, sap, and traditional carving in the spring (Kitselas Knowledge Holders and  
16 Inglis Consulting 2022). In addition, plant resources are harvested in the spring for medicine and food.  
17 This includes devil's club, the tips of the new growth on spruce trees, thimbleberry (*Rubus parviflorus*)  
18 shoots, cow-parnsnip, fiddleheads, stinging nettle, and fireweed. Salmonberries, blueberries, raspberries,  
19 red huckleberries, stonecrop (*Sedum* sp.), and mushrooms are collected in the summer. Soapberries and  
20 nettle are also collected in the summer for medicinal and manufacturing uses, respectively. In the early  
21 fall, Labrador tea, red huckleberries, crab apples, mushrooms, and highbush cranberries are harvested.  
22 Berry species collected by Kitselas people within the North Coast region of Kitselas territory (including  
23 Chatham Sound, Portland Inlet and Nass Bay) include salmonberries, salal berries, and highbush and  
24 lowbush cranberries (Kitselas Knowledge Holders and Inglis Consulting 2022).

25 Métis Nation British Columbia gather terrestrial plants and earth materials and may engage in these  
26 activities within or near the RSA and TLSA (Métis Nation British Columbia 2021). Publicly available  
27 information about the types of plants gathered by Métis Nation British Columbia was not found during the  
28 literature review.

## 29 3.4 LITERATURE REVIEW

### 30 3.4.1 Methods

31 A desktop review of information regarding vegetation resources in the LSA, RSA, and TLSA was  
32 completed to inform field studies, mapping, and reporting. Existing data on vegetation resources in the  
33 RSA were compiled from published regional and local literature, publicly available online provincial and  
34 federal databases, *North Coast Land and Resource Management Plan* (SRM 2005), E-Flora BC  
35 (Klinkenberg 2022), and technical data reports completed in support of EAs. Information sources included  
36 those with spatial overlap with the RSA and TLSA.



# TECHNICAL DATA REPORT—VEGETATION AND WETLANDS KSI LISIMS LNG PROJECT



Review of Existing Data  
June 2024

- 1 The following information sources were reviewed:
- 2 • BC Species and Ecosystem Explorer (BC CDC 2022)
  - 3 • E-Flora BC (Klinkenberg 2022)
  - 4 • iNaturalist (iNaturalist 2023)
  - 5 • HabitatWizard (Province of British Columbia 2022a)
    - 6 – BC CDC spatial occurrences
    - 7 – Critical habitat polygons
    - 8 – Invasive Alien Plant Program
    - 9 – Terrestrial Ecosystem Information projects
    - 10 – Old growth deferral analysis (priority old forest deferral areas)
  - 11 • Vegetation Resources Inventory (BC FLNRORD 2020)
  - 12 • BC EAO's Project Information Centre (EPIC) (Province of British Columbia 2022b)
  - 13 • Reconnaissance Level Terrestrial Ecosystem Mapping (Blackwell and Associates 2018)

14 The Province of BC is working to defer approximately 2.6 million ha of old growth forest. There are  
15 three approaches to considering old growth deferrals: voluntarily deferring harvest of old forest,  
16 regulation-based deferrals, and directed deferrals related to BC Timber Sales. Voluntary and  
17 regulation-based deferrals have the potential to apply to the Project. Areas of old forest that could be  
18 voluntarily deferred are identified as priority areas through analyses completed by the  
19 Technical Advisory Panel, and regulation-based deferrals are spatially explicit areas established by  
20 Ministerial Orders (Province of British Columbia 2023).

21 A search of the BC CDC *BC Species and Ecosystems Explorer* (BC CDC 2022) was completed prior to  
22 field studies to inform surveys of plant species and ecological communities of conservation concern with  
23 potential to occur in the RSA. A list of plant species and ecological communities of conservation concern  
24 with potential to occur in the RSA was generated by querying for red- and blue-listed plant species with  
25 known distribution in the CWHvh2 or the CWH and the Southern Boundary Ranges, Kitimat Ranges, and  
26 North Coast Fjords Ecosystems. A list of plant species and ecological communities of conservation  
27 concern with potential to occur in the TLSA was generated by querying for red- and blue-listed plant  
28 species with known distribution in the BEC units mapped within the TLSA (CWH, CWHvh2, CWHvm1,  
29 CWHvm2, CWHwm, MH, MHmm1, MHmmp1, MHwh1, MHwhp1, and CMA) and the  
30 Southern Boundary Ranges, Kitimat Ranges, and North Coast Fjords Ecosystems.



### 1 3.4.2 Limitations

2 The following limitations in the availability or quality of data have been identified regarding use of existing  
3 data for description of the TLSA:

- 4 • **Plant Species:** Plant species of conservation concern and invasive plants in the TLSA are limited to  
5 observations in publicly available databases. Due to the remote nature of the TLSA, there has been  
6 little targeted or incidental search for plant species of interest in comparison to other easier to access  
7 areas of the province. A lack of occurrences of these species in publicly available databases does not  
8 necessarily mean they are not present.
- 9 • **Ecosystem mapping:** Terrestrial ecosystem mapping (**TEM**) polygon delineations are created  
10 manually following provincial standards (RIC 1998) and there is human subjectivity and potential error  
11 involved, which is a known limitation of TEM.
- 12 • **Ecosystem mapping:** The reconnaissance-level TEM was created at a 1:20,000 scale and plot  
13 inspection density was targeted at 400 ha/inspection with a 4% minimum polygon inspection rate.  
14 Small patch ecosystems (such as estuarine communities or open water wetlands) may not be visible  
15 when mapped at a 1:20,000 scale or captured in the attributes when they occupy a small portion of a  
16 polygon.
- 17 • **Wetlands:** Two wetland site series are transitional between wetland and upland, with some sites  
18 classified as wetland and some sites classified as upland. Lewis (2007) suggests that western  
19 redcedar – Sitka spruce / skunk cabbage swamp forest (CWHvh2/13, CWHvm1/14 [Ws54]) be  
20 considered poorly drained upland where greater than 50% of the microsites have freely drained  
21 substrate. Western redcedar – yellow-cedar / spleenwort-leaved goldthread bog forest (CWHvh2/11)  
22 occurs on folisols (upland organic soil) or organic soils (wetland organic soil) (Banner et al. 1993).  
23 Because Site-specific soils information is required to differentiate upland from wetland sites, for the  
24 purposes of this report, both of these site series are considered wetlands.
- 25 • **Tidal Water Wetlands:** The reconnaissance-level TEM includes estuarine wetlands according to  
26 Mackenzie and Moran (2004) but does not map tidal water wetlands according to the Canadian  
27 Wetland Classification System (National Wetlands Working Group 1997), or eelgrass beds.

### 28 3.4.3 Results

29 The review of Terrestrial Ecosystem Information projects identified publicly available reconnaissance-level  
30 TEM (Blackwell and Associates 2018) and Vegetation Resources Inventory mapping (FLNRORD 2020)  
31 which both cover the entire extent of the RSA and TLSA. These two data sources were used to inform  
32 field planning and Project-specific TEM mapping for the LSA and RSA and are used to describe existing  
33 conditions in the TLSA for ecological communities of conservation concern, old forest, and wetlands.  
34 No publicly available plant species observations are available within the LSA, RSA, or TLSA from  
35 iNaturalist (iNaturalist 2023).



Review of Existing Data  
June 2024

1 Overall, the condition of vegetation and wetlands in the LSA, RSA, and TLSA is largely undisturbed  
2 except for some minor forestry activities in lower elevation areas. The Mylor Peninsula on the east side of  
3 the TLSA has experienced more logging activity than Pearse Island or the Ashington Range, based on  
4 interpretation of publicly available images.

### 5 3.4.3.1 Local and Regional Study Areas

6 The BC CDC search for plant species of conservation concern yielded 26 listed plant species that could  
7 potentially occur in the RSA, including five blue-listed and one red-listed vascular plants, ten blue-listed  
8 and two red-listed lichens, and eight red-listed bryophytes (Appendix A, Table A.1). The BC CDC search  
9 for ecological communities of conservation concern yielded 27 listed ecological communities that could  
10 potentially occur in the RSA, including 12 red-listed communities and 15 blue-listed communities  
11 (Appendix A, Table A.2).

12 The search of the BC CDC spatial occurrences found no known occurrences of red- or blue-listed plant or  
13 lichen species or ecological communities within the RSA. The closest occurrence is a red-listed arctic  
14 daisy occurrence (*Arctanthemum arcticum* ssp. *arcticum*) and a blue-listed seaside ragwort occurrence  
15 (*Senecio pseudoarnica*) both located approximately 20 km from the RSA.

16 There are no regulation-based old growth deferral areas within the LSA or RSA, but there are non-legal  
17 old growth priority areas identified by the old growth Technical Advisory Panel in the LSA and RSA  
18 (Province of BC 2023).

19 No publicly available occurrences of noxious weeds species from the Invasive Alien Plant Program  
20 database were found within the RSA.

### 21 3.4.3.2 Transmission Line Study Area

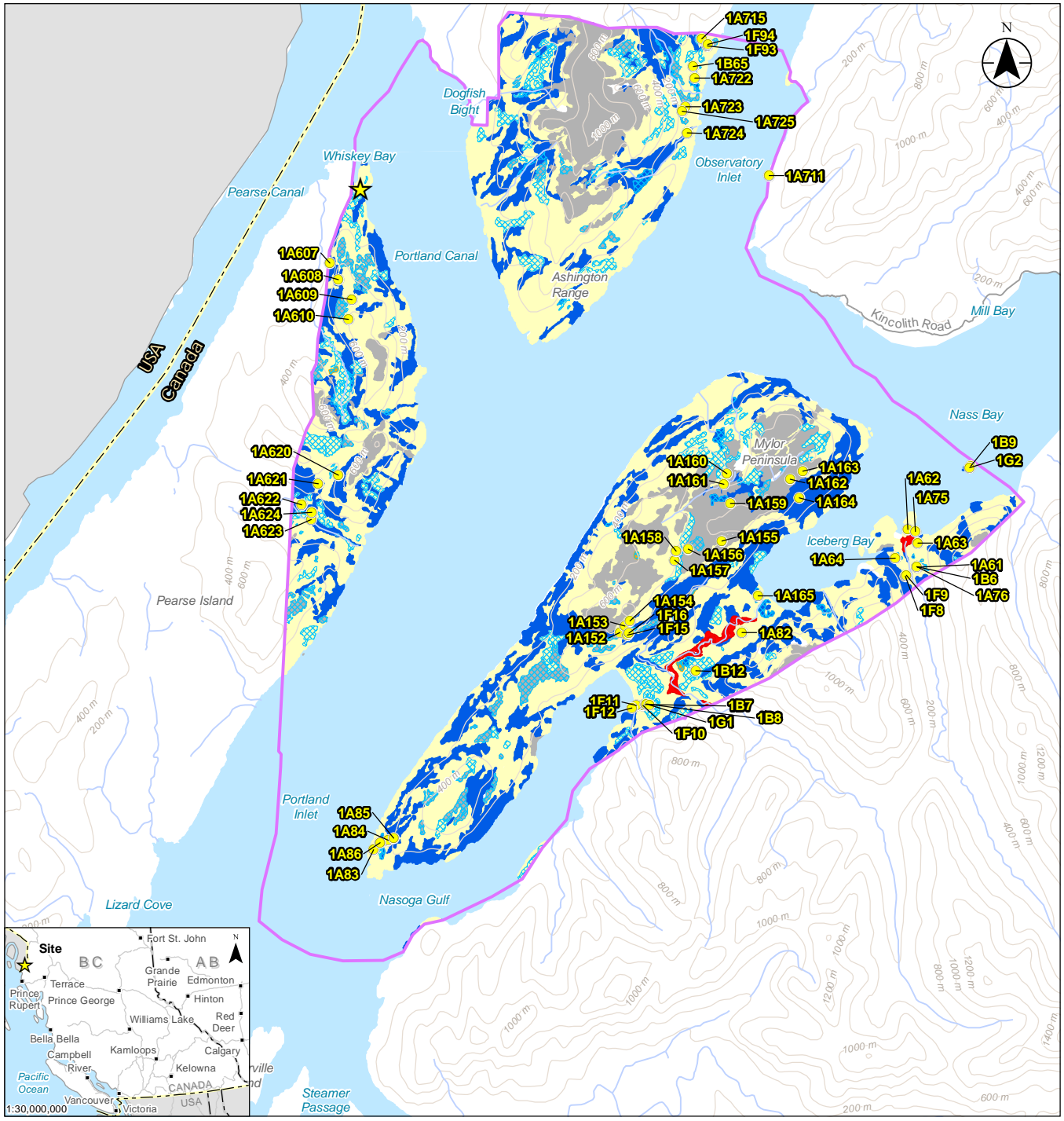
#### 22 TEM Mapping

23 The publicly available reconnaissance-level TEM (Blackwell and Associates 2018) and Vegetation  
24 Resources Inventory mapping (FLNRORD 2020) form the basis for the description of existing conditions  
25 in the TLSA for ecological communities of conservation concern, old forest, and wetlands. The map  
26 legend for the reconnaissance-level TEM is available in Appendix B. No western redcedar / Sitka spruce  
27 – sword fern (05 site series), which is associated with karst topography (Price and McLennan 2001), was  
28 mapped in the TLSA.

29 Ecological communities in the reconnaissance-level TEM were documented in 57 field plots: 40 air calls  
30 (visual plots based on observations from a low elevation helicopter) and 17 ground inspection plots  
31 located within the TLSA (Table 4.2–2). Soil and terrain information was collected in ground inspection  
32 plots. Field plot distribution is displayed in Figure 3.4–1. Details on the plots can be found in Appendix C.

33

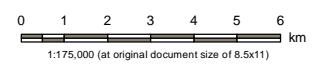




**Notes**  
 1. Coordinate System: NAD 1983 UTM Zone 9N  
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada  
 3.

- Reconnaissance Level TEM Plot
- ★ Site
- Terrestrial and Marine Project Footprint
- Transmission Line Study Area
- International Boundary
- Road
- Topographic Contour
- Watercourse

- Ecological Communities of Conservation Concern**
- Blue
  - Not Ranked
  - Red
  - Various (Red, Blue, and Yellow)
  - Yellow
  - Unmapped USA Land
  - TEM Wetland



Project Location: Pearse Island, BC  
 Project Number: 123221820  
 Prepared by TQUILICHINI on 20230711  
 Requested by MO on 20230707  
 Checked by MO on 20230711

Client/Project/Report  
 Ksi Lisims LNG  
 Natural Gas Liquefaction and Marine Terminal  
 Technical Data Report - Vegetation and Wetlands

Figure No.  
**3.4-1**

Title  
**Ecological Communities of Conservation Concern, Wetlands, and Field Plots in the Transmission Line Study Area**

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Review of Existing Data  
June 2024

## 1 Plant Species of Conservation Concern

2 The BC CDC search for plant species of conservation concern yielded 42 listed plant species that could  
3 potentially occur in the TLSA, including 13 blue-listed and 3 red-listed vascular plants, 16 blue--listed and  
4 2 red-listed lichens, and 8 red-listed bryophytes (Appendix A, Table A.1).

5 The search of the BC CDC spatial occurrences found no known occurrences of red- or blue-listed plant or  
6 lichen species within the TLSA. The closest occurrence is a red-listed arctic daisy occurrence and a  
7 seaside ragwort occurrence both located approximately 1.2 km from the TLSA.

## 8 Botanical and Cultural Forest Products

9 The TLSA supports botanical and cultural forest products used by the Nisga'a Nation and other  
10 Indigenous groups. A qualitative description of abundance and distribution based on the site series in the  
11 reconnaissance-level TEM of the following representative species of botanical and cultural forest products  
12 are described below: western redcedar, yellow-cedar, Labrador tea, devil's club, green false-hellebore,  
13 huckleberries or blueberries, freshwater aquatic plants (e.g., sedges, rushes, and water lily), and pine  
14 mushroom.

15 All representative species (or groups) of botanical and cultural forest products are expected to occur in  
16 the TLSA. Western redcedar is one of the characteristic dominant tree species in many site units of the  
17 CWH BEC zone. Yellow-cedar is a common secondary species in site series of the CWH BEC zone and  
18 is dominant in several site series of the MH BEC zone, and present in krummholz units of the alpine  
19 (i.e., CMA) and subalpine (i.e., MH). Labrador tea is typically present in bogs in the CWH. Devil's club is  
20 the characteristic species of moist, rich site series in the CWH. Green false-hellebore occurs in the  
21 CWH on moist, medium to rich sites and is a characteristic species in the MH zone. Blueberries are a  
22 characteristic species of the zonal site series of both the CWH and MH (Banner et al. 1993). Freshwater  
23 aquatic plants are most abundant in fen and estuarine marsh units but are commonly found in lower  
24 abundance in other wetland types and in uplands (MacKenzie and Moran 2004; Appendix B, Table B.3).

25 Pine mushrooms grow on well-drained podzolic soils, and in the Nass River Valley, are associated with  
26 "pine benches, old-growth western hemlock, mixed hemlock, subalpine fir, spruce and pine forests, and  
27 dry hemlock with pine associations" (Integrated Resources Policy Branch 1995). These site conditions  
28 are present throughout the TLSA, while known pine mushroom harvesting areas mapped by  
29 Integrated Resources Policy Branch (1995) are present on the far east side of the TLSA.

## 30 Invasive Plant Species

31 No publicly available occurrences of noxious weed species from the Invasive Alien Plant Program  
32 database were found within the TLSA. The TLSA has limited anthropogenic disturbances where invasive  
33 plant species are more likely to occur. As the TLSA has little human presence, there are few pathways by  
34 which invasive plant species could be introduced.



Review of Existing Data  
June 2024

**1 Ecological Communities of Conservation Concern**

2 The BC CDC search for ecological communities of conservation concern yielded 39 listed ecological  
3 communities that could potentially occur in the TLSA, including 13 red-listed communities and  
4 26 blue-listed communities (Appendix A, Table A.2). The search of the BC CDC spatial occurrences  
5 found no known occurrences of red- or blue-listed ecological communities within the TLSA.

6 Based on the reconnaissance-level TEM (Blackwell et al. 2018), a total of 16 ecological communities of  
7 conservation concern are mapped in the TLSA, which include upland forest, floodplain, wetland, and  
8 estuarine site series (Table 3.4–1). There are four red-listed and eleven blue-listed ecological  
9 communities mapped in the TLSA, and one sedge fen unit which could include red-listed, blue-listed,  
10 and/or yellow-listed site series. Blue-listed communities are common at lower elevations of the TLSA, with  
11 red-listed communities most abundant on the east side of the TLSA in a large floodplain on the landmass  
12 connecting the Mylor Peninsula to the Coast Mountains (Figure 3.4–1).

**Table 3.4–1 Ecological Communities of Conservation Concern in the TLSA**

<b>Ecosystem Type</b>	<b>Site Series Name</b>	<b>Map Code</b>	<b>BEC / Site Series</b>	<b>BC CDC</b>
Upland Forest	amabilis fir / western redcedar – foamflower	AF	CWHvm1/05, CWHvm2/05	Blue
	amabilis fir / Sitka spruce – devil’s club	AD	CWHvm1/08, CWHvm2/08	Blue
	western redcedar / Sitka spruce – devil’s club	SD	CWHvh2/07	Blue
	western hemlock / amabilis fir – deer fern	HD	CWHvm1/06	Blue
	western hemlock / western redcedar – Salal	HS	CWHvm1/03, CWHvm2/03	Blue
	western hemlock / Sitka spruce – Lanky moss	HM	CWHvh2/04	Blue
	Sitka spruce / kindbergia	SK	CWHvh2/15	Blue
	Sitka spruce / reedgrass	SR	CWHvh2/16	Blue
	Sitka spruce / mountain hemlock – Reedgrass	MR	MHwh1/03	Blue
	yellow-cedar / mountain hemlock – twisted stalk	YT	MHwh1/05	Blue
Floodplain	Sitka spruce – lily-of-the-valley	SL	CWHvh2/08	Red
	Sitka spruce – salmonberry (high-bench)	SS	CWHvm1/09	Red
	Sitka spruce – trisetum	ST	CWHvh2/09	Red



**Table 3.4–1 Ecological Communities of Conservation Concern in the TLSA**

Ecosystem Type	Site Series Name	Map Code	BEC / Site Series	BC CDC
Wetland	carex fen <sup>1</sup>	FS	CWHvh2/Wf, CWHvm1/Wf	Various <sup>2</sup>
	western redcedar / Sitka spruce – Skunk cabbage	RC	CWHvh2/13, CWHvm1/14 [Ws54]	Blue
Estuarine	estuarine marsh <sup>1</sup>	AP	CWHvh2/Em	Red <sup>3</sup>
<p>NOTES:</p> <p>Site series present in the first decile of the reconnaissance-level TEM. Site series names as reported in Blackwell and Associates (2018)</p> <p><sup>1</sup> Uncorrelated site unit, denoted by site series 00 in Appendix B, Table B.3.</p> <p><sup>2</sup> The fen site series of the CWHvh2 are the Wf51 (red-listed) and Wf52 (blue-listed). The fen site series of the CWHvm1 are the Wf50 (yellow-listed) and the Wf51 (red-listed; BC CDC 2022).</p> <p><sup>3</sup> All estuarine marsh and meadow site series that occur in the CWH are red-listed (BC CDC 2022).</p>				

1

2 **Old Forest**

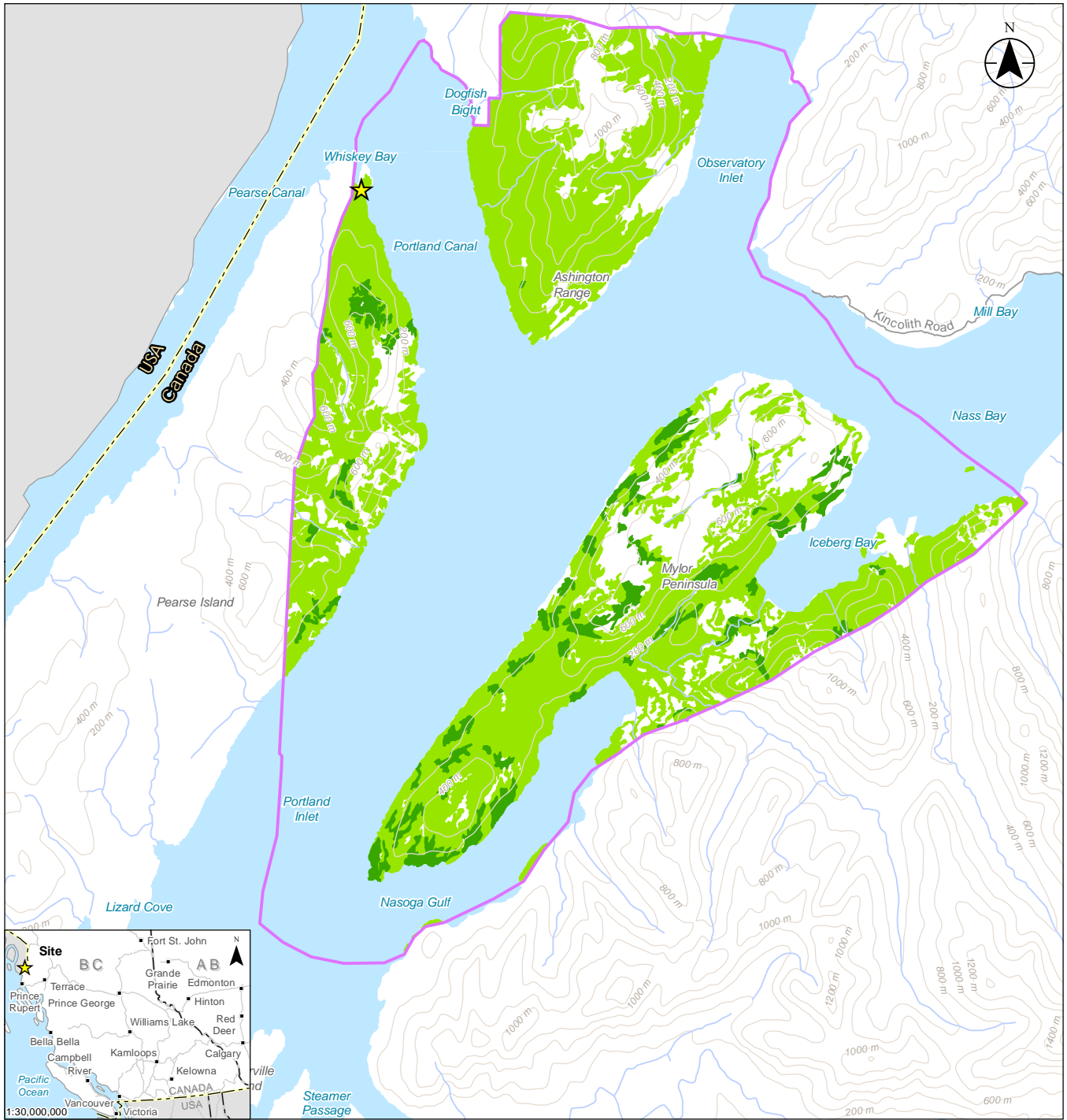
3 Forests of the TLSA are within Natural Disturbance Type 1, which are those with rare stand-initiating  
4 events (BC Environment 1995). No regulation-based old growth deferral areas intersect the TLSA  
5 (Province of BC 2022c). There are non-legal old growth priority areas identified by the old growth  
6 Technical Advisory Panel in the TLSA (Province of BC 2023).

7 Old forest and very old forest cover a majority of the terrestrial portion of the TLSA (Figure 3.4–2).

8 Very old forest occurs in the TLSA in a couple of discrete patches on Pearse Island and is more common  
9 on Mylor Peninsula on the east side of the TLSA, occurring in scattered patches (Figure 3.4–2).

10



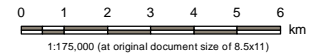


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- Site
- Terrestrial and Marine Project Footprint
- Transmission Line Study Area
- Old Forest (2020 VRI)
- Very Old Forest (2020 VRI)

- International Boundary
- Road
- Topographic Contour
- Watercourse
- Unmapped USA Land



Project Location: Pearse Island, BC  
 Project Number: 123221820  
 Prepared by TQUILICHINI on 20230711  
 Requested by MO on 20230707  
 Checked by MO on 20230711

Client/Project/Report  
**Ksi Lisims LNG**  
 Natural Gas Liquefaction and Marine Terminal  
 Technical Data Report - Vegetation and Wetlands

Figure No.  
**3.4-2**  
 Title  
**Old Forest in the Transmission Line Study Area**

- Notes**
1. Coordinate System: NAD 1983 UTM Zone 9N
  2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada
  3. Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

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Review of Existing Data  
June 2024

1 **Wetlands**

2 Wetland types mapped in the TLSA include freshwater shrubby and treed bogs and swamps; sedge fens,  
3 and estuarine marshes (Table 4.2–7). There are seven wetland site series mapped in the TLSA;  
4 four bogs, one swamp, one fen, and one estuarine marsh. Wetlands are common across the TLSA on  
5 level and sloping terrain (Figure 3.4–1).

6 **Table 3.4–2 Wetland Site Series in the TLSA**

Wetland Realm	Wetland Class	Site Unit Name	Map Code	Site Unit	BC CDC
Wetland (freshwater)	Bog	ericaceous shrub – sphagnum topogenous bog <sup>1</sup>	BG	CWHvh2/Wb, CWHvm1/Wb, MHwh1/Wb	yellow
		tufted clubrush – sphagnum bog	Wb52	CWHvh2/Wb52, CWHvm2/Wb52, MHwh1/Wb52	not ranked
		lodgepole pine / yellow-cedar – sphagnum	LS	CWHvh2/12, CWHvm1/13	yellow
		western redcedar / yellow-cedar – goldthread <sup>2</sup>	YG	CWHvh2/11, CWHvm1/12, CWHvm2/09	yellow
	Swamp	western redcedar / Sitka spruce – skunk cabbage <sup>3</sup>	RC	CWHvh2/13, CWHvm1/14 [Ws54]	blue <sup>4</sup>
	Fen	carex fen <sup>1</sup>	FS	CWHvh2/Wf, CWHvm1/Wf	various <sup>3</sup>
Estuarine	Marsh	estuarine marsh <sup>1</sup>	AP	CWHvh2/Em	red <sup>4</sup>
<p>NOTES:</p> <p>Site series present in the first decile of the reconnaissance-level TEM.</p> <p><sup>1</sup> Uncorrelated site unit, denoted by site series 00 in Appendix B, Table B.3.</p> <p><sup>2</sup> Noted as bog forest in Banner et al. 2004, and as wetland in the Provincial TEI code database (TEIU 2022).</p> <p><sup>3</sup> The fen site series of the CWHvh2 are the Wf51 (red-listed) and Wf52 (blue-listed). The fen site series of the CWHvm1 are the Wf50 (yellow-listed) and the Wf51 (red-listed; BC CDC 2022).</p> <p><sup>4</sup> All estuarine marsh and meadow site series that occur in the CWH are red-listed (BC CDC 2022).</p>					

7

8



## 1 4.0 FIELD STUDIES AND TERRESTRIAL ECOSYSTEM MAPPING

2 Project-specific field studies and TEM were completed to describe the existing conditions of vegetation  
3 and wetlands in the Vegetation and Wetlands LSA and RSA. Methods and results of field studies and  
4 mapping are described in the subsections below.

### 5 4.1 METHODS

#### 6 4.1.1 Terrestrial Ecosystem Mapping and Field Studies

7 Terrestrial Ecosystem Mapping is an approach used to delineate and classify the landscape into map  
8 units according to a combination of ecological features, primarily: climate, physiography, surficial material,  
9 bedrock geology, soil, and vegetation (RIC 1998). A Project-specific TEM was created to show the  
10 distribution and abundance of ecological communities in the RSA. The mapping process consisted of:

- 11 • Review of the reconnaissance-level TEM (Blackwell and Associates 2018) and plot data
- 12 • Field surveys in 2021 to ground-truth the mapping, focused on the vegetation resources in the LSA,  
13 including soils and terrain
- 14 • Aerial imagery and LiDAR (laser imaging, detection, and ranging) collected for the LSA. The 10 cm  
15 imagery was captured by fixed-wing aircraft on June 29, 2021 at a low tide of approximately  
16 1.3 m. Imagery was used to construct 3D models for TEM mapping and for an image classification
- 17 • Preparation of an image classification for marine substrates and ecological communities between the  
18 high tide line and 2 m below mean tide using ExtractX, a tool that combines high-resolution imagery  
19 and detailed elevation datasets that uses object-based image analysis (**OBIA**) for accurate and  
20 efficient mapping. This allowed rapid delineation of the marine shore at a finer scale that could be  
21 done with image interpretation with TEM
- 22 • Revision of the TEM based on field survey results, available desktop data, and the image  
23 classification

24 The TEM for the Project was completed according to the Standard for Terrestrial Ecosystem Mapping in  
25 BC (RIC 1998). Ecosystems were classified according to the Biogeoclimatic Ecosystem Classification  
26 system and *A Field Guide to Site Identification and Interpretation for the Prince Rupert Forest Region*  
27 (Banner et al. 1993). Identification and classification of wetlands, floodplain, and estuarine associations  
28 followed *Wetlands of British Columbia* (MacKenzie and Moran 2004). Tidal water wetlands not described  
29 by *Wetlands of British Columbia* were classified according to the Canadian Wetland Classification System  
30 (NWWG 1997). The TEM map legend used for the Project is provided in Appendix B.

31 Field surveys were completed in July 2021 following the methods contained in Land Management  
32 Handbook 25—Field Manual for Describing Terrestrial Ecosystems—2nd Edition (MOFR and MOE 2010)  
33 and were planned to achieve a 1:5,000 scale survey intensity level (**SIL**) 3 in the LSA and 1:10,000 scale  
34 SIL 5 in the RSA. The *Technical Guidance Document for Evaluating the Health of Wetlands*



# TECHNICAL DATA REPORT—VEGETATION AND WETLANDS KSI LISIMS LNG PROJECT



Field Studies and Terrestrial Ecosystem Mapping  
June 2024

1 (*Wetland Management Routine Effectiveness Evaluation*) (BC Wildlife Federation and  
2 BC FLNRORD 2022) was published in early 2022 and was not available during field surveys for wetlands.

3 The reconnaissance-level TEM mapping was used to target a variety of ecosystem types that occur within  
4 the Vegetation and Wetlands LSA and RSA for field surveys. At each TEM plot, site and vegetation  
5 characteristics were recorded on site visit forms. Data from these plots were used to classify ecosystems.

6 Three types of TEM plots were recorded:

- 7 • Modified ground inspection plots with site information, vegetation, terrain, and soil profiles
- 8 • Ground inspection plots with site information and vegetation
- 9 • Visual plots of abbreviated site information, which always included site series and structural stage

10 At each ground inspection plot and modified ground inspection plot, vegetation information collected  
11 included:

- 12 • Universal Transverse Mercator coordinates
- 13 • Plant species and percent cover of key indicator species and those over 2% cover
- 14 • Total tree, shrub, herb, and moss percent cover
- 15 • Soil nutrient regime and soil moisture regime
- 16 • Site information including slope, aspect, mesoslope position
- 17 • Site series
- 18 • Structural stage

19 At each modified ground inspection plot, soil and terrain information collected included:

- 20 • Drainage
- 21 • Surficial terrain, including texture, material, expression
- 22 • Geomorphological process (if applicable)
- 23 • Soil profile information, including:
  - 24 – Soil horizon depth
  - 25 – Soil texture, moisture, and consistency
  - 26 – Coarse fragment content
- 27 • Presence and depth of gleying, mottling, seepage, humified (Ah) or eluviated (Ae) soil horizons,  
28 root restricting layers



#### 1 4.1.2 Image Classification

2 The imagery dataset was used to classify marine substrate types and ecological communities within the  
3 intertidal zone between the high tide line and 2 m below mean tide. Using remote sensing methodologies,  
4 classification algorithms were tailored to automatically identify and classify pre-determined categories of  
5 substrate types from the red, green, and blue bands of the aerial imagery. Image classification methods  
6 followed the following steps:

- 7 • **Image Segmentation** – An OBIA was applied to the data using the image classification toolset in  
8 ArcGIS Pro. OBIA segments the image into like parts based on user-defined attributes such as size,  
9 shape, color, and texture
- 10 • **Image Classification** – Following image segmentation, the groups of pixels were classified, or  
11 defined into groups. For this dataset, an unsupervised classification technique was used
- 12 • **Class Assignment** – The groups identified through the unsupervised classification were assigned  
13 their ecological classes through a combination of desktop and field data review by a vegetation  
14 ecologist. Classes used included estuarine meadow (**Ed**), estuarine marsh (**Em**), bedrock, and  
15 substrate classes (fines [i.e., sand and mud], gravel, cobble, and boulder-dominated)
- 16 • **Post Processing** – A mean filter was applied and the resulting classes were reviewed, and the data  
17 was manually edited to correct areas with cloud or shadow that may not have been assigned to the  
18 correct class. The resulting classification was converted from raster to a polygon file

#### 19 4.1.3 Plant Species of Conservation Concern

20 The BC Species and Ecosystems Explorer (BC CDC 2022) was queried and reviewed prior to field  
21 studies to inform surveys of plant species of conservation concern and ecological communities of  
22 conservation concern with potential to occur in the RSA (Appendix A – BC CDC Potential Species and  
23 Ecological Communities of Conservation Concern).

24 Surveys for vascular plant species of conservation concern were completed in July 2021. Survey  
25 methods for vascular plant species followed the floristic inventory methods in the Inventory and  
26 Survey Methods for Rare Plants and Lichens (RISC 2018), including use of the intuitive meander survey  
27 technique.

28 The surveys included collection of lichens and non-vascular plants. Lichen and non-vascular plant  
29 surveys used a community-based unbounded plot (i.e., one with no fixed spatial area). The goal of the  
30 lichen and non-vascular plant surveys was to capture the maximum number of species at a site by  
31 sampling the different microhabitat (i.e., substrate) types. Microhabitats associated with potential species  
32 of conservation concern were emphasized. Microhabitat types include wood (green and dead wood at  
33 different decay levels and species), boulder, rock (bedrock, cliff face and crevices), soil, and litter  
34 (deciduous or coniferous litter, hollows, or riparian banks). Collected lichen and non-vascular plant  
35 specimens were subsequently identified by experts. Lichens and vascular plants were identified by  
36 Dr. Trevor Goward (Enrichened Consulting Ltd., University of British Columbia) and Curtis Bjork



1 (Enlivened Consulting Ltd.). Bryophyte specimens (mosses and liverworts) were identified by  
2 Dr. Terry McIntosh (University of British Columbia).

### 3 **4.1.4 Botanical and Cultural Forest Products**

4 To determine areas supporting botanical and cultural forest products, Land Management Handbook 26  
5 (Banner et al. 1993) and Wetlands of British Columbia: A Guide to Identification (MacKenzie and  
6 Moran 2004) were used to determine the typical abundance of indicator species in each site series in the  
7 LSA and RSA, based on the TEM. Each of these guidebooks provides a table of characteristic species  
8 and their relative abundance in each of the site series or wetland associations. Presence of each plant  
9 species (or group of species, for huckleberries and blueberries and freshwater aquatics) was noted for  
10 each site series or wetland association and the area of each in the LSA and RSA was recorded.

11 Pine mushroom potential was determined based on mapping of well drained podzolic soils, which pine  
12 mushrooms are associated with (Integrated Resources Policy Branch 1995).

### 13 **4.1.5 Ecological Communities of Conservation Concern**

14 For the purposes of analysis in this TDR, the areas of blue- or red-listed site series reported in the results  
15 represent sites with the potential to support listed communities. For forested communities, ecological  
16 communities of conservation concern are limited to areas of structural stage 5 to structural stage 7—  
17 corresponding to young forest (50 to 80 years old), mature forest (80 to 250 years old), and old forest  
18 (greater than 250 years old)—because these stages are most likely to be dominated by climax tree  
19 species, with the understory species characteristic of the listed ecological community. Mature and old  
20 forest are likely to have the highest ecological integrity. All instances of non-forested wetland and flood  
21 communities are considered ecological communities of conservation concern in this TDR.

### 22 **4.1.6 Wetlands and Wetland Functions**

23 Wetlands were identified through the TEM and marine imagine classification described in Sections 4.1.1  
24 and 4.1.2.

25 Wetland functions, including hydrological, biogeochemical (including climate), and habitat functions, were  
26 assessed using methods and indicators adapted from Hanson et al. (2008) and Adamus (2012, 2016).  
27 Indicators used to assess wetland functions are provided in Table 4.1–1 along with a rationale.

28 A qualitative rating was assigned indicating whether each wetland class and association present in the  
29 RSA has the potential to provide a specific wetland function. These ratings were based on the presence  
30 of indicators in each wetland community's typical and/or diagnostic attributes in the TEM mapping,  
31 generalizations of the field data, Freshwater Atlas watersheds (Province of BC 2022c), and literature  
32 sources such as *Hydroriparian Ecosystems of the North Coast* (Price and McLennan 2001) and  
33 *Wetland Ecological Functions Assessment: An Overview of Approaches* (Hanson et al. 2008).

34 These methods are consistent with a “Level I Landscape Level Assessment” according to  
35 Hanson et al. (2008).



Field Studies and Terrestrial Ecosystem Mapping  
June 2024

- 1 Note that while potential to provide a function has been simplified into yes/no, provision of functions is
- 2 better understood as occurring along a gradient. Some indicators may increase the potential to provide a
- 3 function, while others may reduce the potential.

**Table 4.1–1 Indicators of Wetland Functions**

Wetland Function	Indicator	Rationale for Indicator
<b>Biogeochemical Functions</b>		
Water quality improvement to downstream waterbodies	Hydrogeomorphic unit	Hydrogeomorphic systems and subsystems are characterized by their landforms, which inherently affect the depth, duration, source, and movement of water transporting sediment. Wetlands that are relatively more dynamic have more opportunity to provide this function than those that are relatively sluggish or stagnant (all other factors being equal).
	Hydrodynamic index	
	Location and size of wetland relative to its contributing area	Wetlands higher in the watershed, that are large relative to their contributing watershed area, have a higher potential to perform this function than those located lower in the watershed or that are small relative to the contributing watershed.
	Presence and density of emergent vegetation	Dense emergent vegetation in flow-through systems reduces water velocity and aids in removal of sediments.
	Presence of organic, or high % clay content texture	The high surface area and colloidal properties of clays and organics have the potential to bind metals and hydrocarbons.
	Presence of an inlet and/or outlet	Basins that have inlets and outlets have the potential to provide this function; basins with only an outlet have some potential to provide this function; basins that are closed do not have the opportunity to improve water quality to downstream waterbodies.
Nutrient cycling / transformation	Hydroperiod; evidence of seasonal drawdown or redox activity	Wetlands with alternating periods of inundation and drying have the potential to create alternating oxic and anoxic soils that contribute to denitrification.
	Total vegetation cover	Cover is used as a surrogate for measures of biomass and productivity. Soluble nutrients can be absorbed and converted into biomass.
Carbon sequestration	Presence of <i>Sphagnum</i> mosses, or peat (at least 29 cm)	Peatlands containing <i>Sphagnum</i> mosses or peat, other wetlands containing high volumes of trees, and estuarine communities have the potential to sequester carbon (Douglas et al. 2022).
	Presence and percent cover of trees	
	Presence of estuarine communities	



Table 4.1–1 Indicators of Wetland Functions

Wetland Function	Indicator	Rationale for Indicator
<b>Hydrological Functions</b>		
Water flow moderation (reduced velocity or dissipation of energy) and/or erosion protection (including coastal shoreline)	Hydrogeomorphic unit	Wetlands higher in the watershed, that are large relative to their contributing watershed area, and/or that are relatively more dynamic have a higher potential to perform this function than those located lower in the watershed or that are small relative to the contributing watershed and are less dynamic.
	Hydrodynamic index	
	Location and size of wetland relative to its contributing area	
	Slope	Flat or depressional wetlands are more capable of slowing the downslope movement of water than those on steep slopes or intersected by channels.
	Presence of dense vegetation in contact with surface water	Dense vegetation in contact with surface water slows down the speed of water flow, protecting shores or stream banks.
	Landscape setting	Wetlands along marine shorelines or lakes, or adjacent to watercourses, have a higher potential to protect against erosion.
	Presence of permanent standing water	Can help indicate seasonal flooding, drawdown, and presence of a basin capable of storing water.
Baseflow augmentation	Wetland class, association	Wetland classes or associations with greater water depth, and presence of soils with greater water-holding capacity, e.g., peat, increase capability to perform this function.
	Location and size of wetland relative to its contributing area	Wetlands higher in the watershed tend to contribute discharge to surface waters.
	Location in active floodplain or riparian area	Wetlands located in this position are likely to contribute to baseflows.
<b>Habitat Functions</b>		
Plant Species and Ecological Communities of Conservation Concern	Documented presence in field or mapping	The presence of species or ecological communities of conservation concern indicate the wetland's current ability to support and maintain habitat functions in support of biodiversity.
Grizzly bear spring foraging	Habitat suitability based on specific wetland attributes. For details, see Wildlife and Wildlife Habitat TDR [Appendix 7.7A].	Key wildlife species or groups which use wetland habitats. These species or groups have habitat suitability modelling available in the Wildlife and Wildlife Habitat TDR [Appendix 7.7A].
Grizzly bear fall foraging		
Moose winter foraging		
Pacific marten year-round living		
Western screech-owl year-round living		
Northern goshawk breeding		
Marbled murrelet breeding		



**Table 4.1–1 Indicators of Wetland Functions**

Wetland Function	Indicator	Rationale for Indicator
Wetland bird community breeding		
Western toad breeding		
Bat roosting or foraging	Observations during field surveys or interpretations based on habitat requirements	Key wildlife species or group identified in the Wildlife and Wildlife Habitat TDR [Appendix 7.7A] which use wetland habitats and for which habitat suitability modelling is not available in the Wildlife and Wildlife Habitat TDR [Appendix 7.7A].
Shorebird breeding, resting and foraging		
Marine bird foraging		
Bald eagle foraging		
Wildlife Species at Risk Habitat	Wildlife species at risk observed to use wetland habitats in the field	Habitat for wildlife species at risk requires special consideration and possibly specific mitigation measures during EAs.

1 **4.1.7 Limitations**

2 The following limitations in the availability or quality of data have been identified for the Vegetation and  
3 Wetlands LSA and RSA:

- 4 • **Plant Species:** Plant species of conservation concern and invasive plants evaluated in this TDR are  
5 limited to the species found during the field surveys. Other species might be present that were not  
6 observed during these surveys. Due to the remote nature of the RSA there has been little targeted or  
7 incidental search for plant species of interest in comparison to other easier to access areas of the  
8 province. A lack of detection of these species does not necessarily mean they are not present.
- 9 • **Indigenous Use Plants:** Information on the presence of these species in the RSA is limited to the  
10 species found during field surveys and assumed present in the TEM polygons based on relationships  
11 between the plant species and individual site series and/or wetland associations; other species may  
12 be present that were not observed.
- 13 • **Botanical and Cultural Forest Products:** The area of botanical and cultural forest products used  
14 typical abundance of indicator species recorded in each site series and/or wetland association to  
15 estimate the area of each species that might occur within the LSA and RSA.
- 16 • **Ecosystem mapping:** TEM polygon delineations are created manually following provincial standards  
17 (RIC 1998) and there is human subjectivity and potential error involved, which is a known limitation of  
18 TEM. However, the project TEM was completed by a Qualified Professional (Meghan O’Neill,  
19 R.P.Bio.) and underwent quality review by another Qualified Professional (Bob Fuller, P. Ag.) to limit  
20 human error and subjectivity.



- 1 • **Ecosystem mapping – complex polygons:** Ecosystem mapping data following BC standards has  
2 an inherent spatial limitation by mapping complex polygons (i.e., more than one map unit per  
3 polygon); therefore, the precise spatial location or distribution of each map unit may not be apparent  
4 in the resulting map product. Aggregated metrics from this dataset are sufficient for characterizing  
5 potential adverse effects; however, additional detailed mapping of spatial boundaries may be required  
6 during construction preparation to apply mitigation measures.
- 7 • **Image classification:** Ideally the near-infrared band would be used instead of the red band;  
8 however, the near-infrared band was not available in the imagery which was captured as part of  
9 engineering studies.
- 10 • **Ecological communities of conservation concern:** At the local (site) level, TEM classifies the  
11 landscape according to site series, which represents the climax community potentially supported by  
12 soils, climate, and landscape position at a given site (site classification) (BC CDC 2022), rather than  
13 specific vegetation species assemblages (plant associations) presently on the ground. The BC CDC  
14 defines ecological communities based on the vegetation classification (plant assemblage) component  
15 of the BEC system rather than based on the site classification used by TEM. Therefore, using TEM to  
16 identify ecological communities of conservation concern, which are defined by plant species  
17 assemblages, has inherent limitations. A TEM polygon can be considered an area with potential to  
18 support a given (climax) ecological community rather than implying that it is necessarily an element  
19 occurrence of an ecological community of conservation concern.
- 20 • **Ecological communities of conservation concern:** The BC CDC states that mid-seral stages of  
21 communities can be considered listed occurrences of ecological communities of conservation  
22 concern (BC CDC 2022). A seral community is composed of early- to mid-successional species that  
23 are replaced, in later stages, by ‘climax’, or late-successional species (MOFR and MOE 2010).  
24 For the purposes of this report, mid-seral stages are considered to correspond with young forest  
25 structural stages (50–80 years old). Recently disturbed, early successional stage examples of some  
26 site series are less likely to have the characteristic plant species assemblage of the provincially-listed  
27 ecological community. These instances might be considered occurrences with low ecological integrity.
- 28 • **Wetlands:** Two wetland site series are transitional between wetland and upland, with some sites  
29 classified as wetland and some sites classified as upland. Lewis (2007) suggests that western  
30 redcedar – Sitka spruce / skunk cabbage swamp forest (CWHvh2/13 [Ws54]) be considered poorly  
31 drained upland where greater than 50% of the microsites have freely drained substrate.  
32 Western redcedar – yellow-cedar / spleenwort-leaved goldthread bog forest (CWHvh2/11) occurs on  
33 folisols (upland organic soil) or organic soils (wetland organic soil) (Banner et al. 1993). Because  
34 site-specific soils information is required to differentiate upland from wetland sites, for the purposes of  
35 this report, both of these site series are considered wetlands.
- 36 • **Eelgrass:** Eelgrass could not be differentiated by the marine image classification. However, eelgrass  
37 beds were documented and mapped in the Vegetation and Wetlands RSA when encountered  
38 incidentally and during marine intertidal surveys. Eelgrass beds were also documented outside of this  
39 area in the subtidal zone, at depths greater than 2 m below mean tide. See the Marine Resources  
40 TDR – Appendix 7.9A for more details.



Field Studies and Terrestrial Ecosystem Mapping  
June 2024

1 **4.2 RESULTS**

2 **4.2.1 TEM Mapping**

3 Ecological communities were documented in 70 field plots from two sources: 63 from the 2021 field  
4 surveys and 7 from the 2017 reconnaissance-level TEM (Table 4.2–1). Thirteen plots from the 2022 field  
5 surveys had soil profiles completed. Field plot distribution is displayed in Figure 4.2–1. Details on the  
6 plots can be found in Appendix C.

7 **Table 4.2–1 TEM Field Survey Plots**

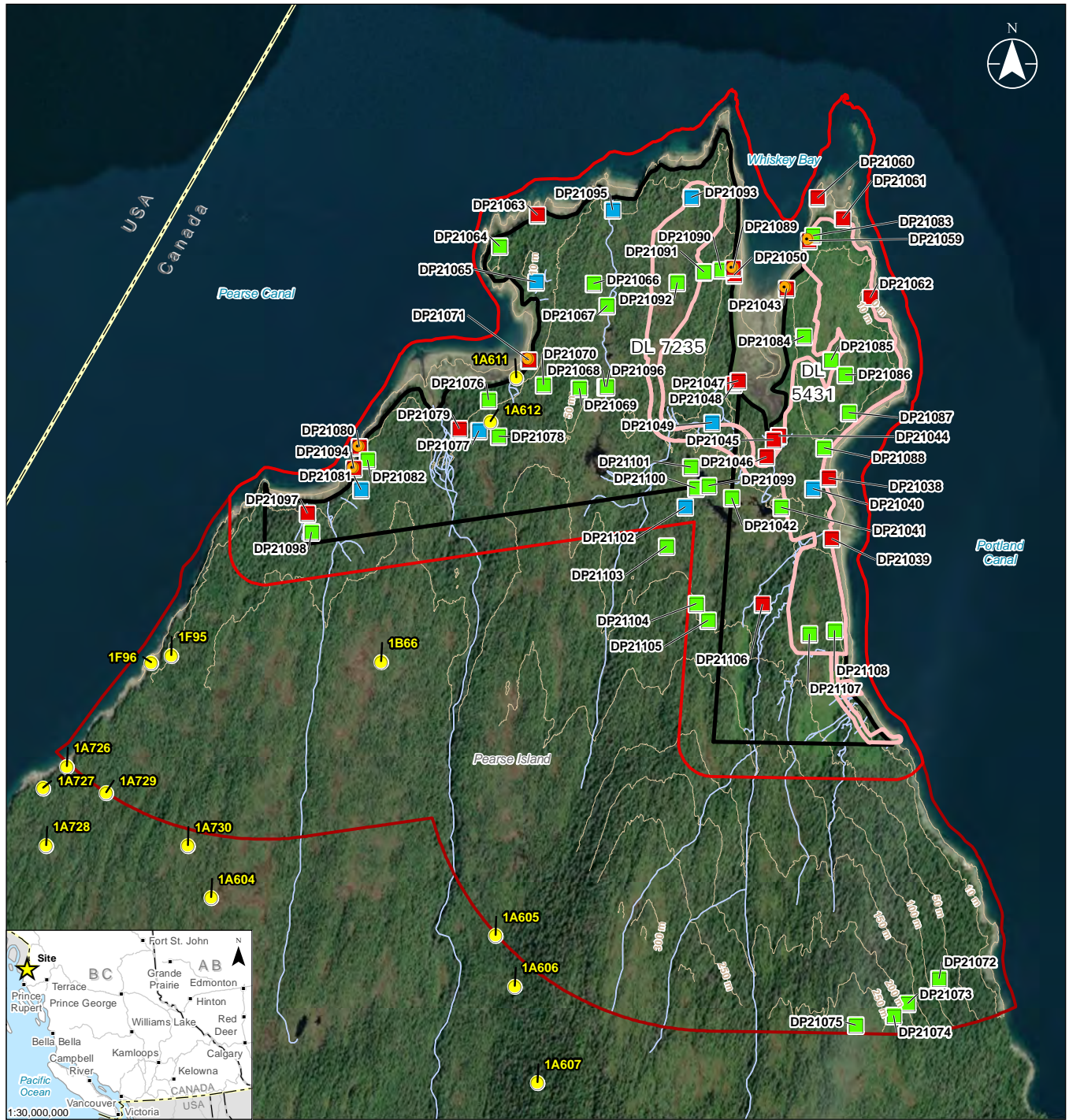
Study Area	Source	Visual	Ground Inspection	Ground Inspection and Soil Profile	Total
Vegetation LSA	Stantec 2022	6 (5)	42 (25)	10	58
Vegetation LSA	R-level TEM	2	0	0	2
<b>Vegetation LSA Total</b>		<b>8 (7)</b>	<b>42 (25)</b>	<b>10</b>	<b>60 (42)</b>
Vegetation RSA	Stantec 2022	6 (5)	44 (27)	13	63
Vegetation RSA	R-level TEM	4	3	0	7
<b>Vegetation RSA Total</b>		<b>10 (9)</b>	<b>47 (30)</b>	<b>13</b>	<b>70 (52)</b>
NOTE: Numbers within brackets ( ) are the total number of plots completed within the terrestrial portion of the LSA or RSA, not including the polygons between the high tide line and 2 m below mean tide, which were mapped using image classification methods.					

8

9 Survey Intensity Level calculations are based on the terrestrial ecosystems mapped using standard TEM  
10 air photo interpretation, as described in Section 4.1.1, and does not include the polygons between the  
11 high tide line and 2 m below mean tide, which were mapped using the image classification. In the LSA,  
12 a total of 60 field plots were recorded (42 in the terrestrial portion), with 8 visual plots, 42 ground  
13 inspection plots, and 10 ground inspection plots with soil profiles. TEM mapping in the LSA meets the  
14 requirements of SIL 3/4 for a 1:5,000 scale product, with a 40% polygon inspection rate and 5.3 ha per  
15 plot (RIC 1998). In the RSA, a total of 70 field plots were recorded (52 in the terrestrial portion), with  
16 10 visual plots, 47 ground inspection plots, and 13 ground inspection plots with soil profiles. This meets  
17 the requirements of SIL 3 for a 1:10,000 product, with a 34% polygon inspection rate and 10.1 ha per plot  
18 (RIC 1998).

19



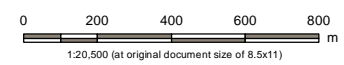


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**Notes**  
 1. Coordinate System: NAD 1983 UTM Zone 9N  
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada, Stantec, Rockies LNG, Maxar

- Rare Plant (Arctic Daisy)
- Reconnaissance Level TEM
- Vegetation Survey Plot
- Vegetation Survey Plot - Blue Listed Ecological Community
- Vegetation Survey Plot - Red Listed Ecological Community
- Watercourse (Project-Mapped)
- Boundaries of District Lots 7235 and 5431
- Project Development Area
- Vegetation and Wetlands Local Study Area
- Vegetation and Wetlands Regional Study Area
- International Boundary
- Topographic Contour



Project Location: Pease Island, BC  
 Project Number: 123221820  
 Prepared by AYIU on 20240604  
 Requested by JFRIES on 20240604  
 Checked by EFLORY on 20240604

Client/Project/Report  
 Ksi Lisims LNG  
 Natural Gas Liquefaction and Marine Terminal  
 Technical Data Report - Vegetation and Wetlands

Figure No.  
**4.2-1**

Title  
**Field Plots and Plant Species of Conservation Concern in the RSA**

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**TECHNICAL DATA REPORT—VEGETATION AND WETLANDS  
KSI LISIMS LNG PROJECT**



Field Studies and Terrestrial Ecosystem Mapping  
June 2024

1 The vegetation within the Vegetation and Wetlands LSA and RSA is primarily upland and wetland  
2 coniferous forest (Table 4.2–2). The topography is undulating with linear ridges running approximately  
3 north/south, interspersed with low lying wetlands. The Vegetation and Wetlands LSA and RSA support a  
4 variety of upland, floodplain, wetland, and sparsely vegetated communities (Table 4.2–2; Figure 4.2–2,  
5 page 1). A total of fifteen site series plus three tidal water wetland types, and one sparsely vegetated  
6 bedrock community were mapped by the TEM within the RSA. Upland forest covers approximately half of  
7 both the LSA and RSA, with the LSA having proportionally less upland forest (133.5 ha; 47%) than the  
8 RSA (328.5 ha; 55%). The western redcedar – western hemlock / salal (01 site series) is the most  
9 common ecological community occupying 47% of the LSA and 55% of the RSA. No western redcedar /  
10 Sitka spruce – sword fern (05 site series), which is associated with karst topography (Price and  
11 McLennan 2001), was mapped in the RSA.

**Table 4.2–2 Ecological Communities Mapped in the LSA and RSA**

Ecosystem Type	Site Series	Map Code	Ecological Community Name	Structural Stage	LSA		RSA		
					Area (ha)	%	Area (ha)	%	
Upland Forest	CWHvh2/01	HS	Western redcedar – western hemlock / salal	3	7.2	3	7.2	1	
				4	6.7	2	6.7	1	
				5	10.2	4	10.2	2	
				6	7.0	2	37.7	6	
				7	89.4	31	232.9	39	
	<i>Subtotal CWHvh2/01</i>					120.5	42	294.7	49
	CWHvh2/03	RS	Western hemlock – yellow-cedar / salal	5	0.0	0	0.9	<1	
				7	<0.1	<1	4.4	1	
	<i>Subtotal CWHvh2/03</i>					<0.1	<1	5.3	1
	CWHvh2/07	SD	Western redcedar – Sitka spruce / devil's club	6	1.9	1	2.4	<1	
				7	7.5	3	21.9	4	
	<i>Subtotal CWHvh2/07</i>					9.4	3	24.3	4
	CWHvh2/00	UN	Unclassified shoreline fringe	5	0.7	<1	0.7	<1	
				6	0.0	<1	0.2	<1	
				7	2.8	1	3.2	1	
<i>Subtotal CWHvh2/00</i>					3.6	1	4.2	1	
<b>Total Upland Forest</b>					<b>133.5</b>	<b>47</b>	<b>328.5</b>	<b>55</b>	
Floodplain	CWHvh2/08	SL	Sitka spruce / false lily-of-the-valley	6	1.3	<1	1.6	<1	
				7	2.6	1	2.6	<1	
	<i>Subtotal CWHvh2/08</i>					3.9	1	4.3	1
<b>Total Floodplain</b>					<b>3.9</b>	<b>1</b>	<b>4.3</b>	<b>1</b>	
<b>Total Upland</b>					<b>137.3</b>	<b>48</b>	<b>332.8</b>	<b>55</b>	





**Table 4.2–2 Ecological Communities Mapped in the LSA and RSA**

Ecosystem Type	Site Series	Map Code	Ecological Community Name	Structural Stage	LSA		RSA		
					Area (ha)	%	Area (ha)	%	
<b>Wetlands</b>									
<b>Freshwater Wetlands</b>									
Bog	CWHvh2/11	YG	Western redcedar – yellow-cedar / spleenwort-leaved goldthread	3	0.0	0	0.2	<1	
				5	2.7	1	6.1	1	
				6	0.9	<1	0.9	<1	
				7	9.3	3	44.6	7	
	<i>Subtotal CWHvh2/11</i>					<i>12.9</i>	<i>5</i>	<i>51.8</i>	<i>9</i>
	CWHvh2/Wb51	BG	Shore pine - Black crowberry – Tough peat-moss	2	7.2	3	23.7	4	
				3	15.1	5	22.6	4	
	<i>Subtotal CWHvh2/Wb51</i>					<i>22.2</i>	<i>8</i>	<i>46.3</i>	<i>8</i>
	CWHvh2/Wb53	LS	Shore pine – yellow-cedar / tufted clubrush	2	5.3	2	6.1	1	
				3	4.9	2	32.4	5	
	<i>Subtotal CWHvh2/Wb53</i>					<i>10.2</i>	<i>4</i>	<i>38.5</i>	<i>6</i>
	<b>Total Bog</b>					<b>45.3</b>	<b>16</b>	<b>136.6</b>	<b>23</b>
Swamp	CWHvh2/Ws00	WS	Swamp wetland	3	0.4	<1	0.4	<1	
	CWHvh2/13 (Ws54)	RC	Western redcedar – Sitka spruce / skunk cabbage	3	0.7	<1	0.7	<1	
				5	1.0	<1	1.0	<1	
				6	0.3	<1	10.2	2	
	7	30.0	11	37.4	6				
<i>Subtotal CWHvh2/13 (Ws54)</i>					<i>32.0</i>	<i>11</i>	<i>49.3</i>	<i>8</i>	
<b>Total Swamp</b>					<b>32.3</b>	<b>11</b>	<b>49.7</b>	<b>8</b>	
Shallow Open Water	CWHvh2/Ww00	OW	Shallow open water wetland	N/A	1.6	1	1.6	<1	
<b>Total Shallow Open Water</b>					<b>1.6</b>	<b>1</b>	<b>1.6</b>	<b>&lt;1</b>	
<b>Total Freshwater Wetlands</b>					<b>79.2</b>	<b>28</b>	<b>187.9</b>	<b>31</b>	
Estuarine	CWHvh2/Ed01	DH	Tufted hairgrass – Meadow barley estuarine meadow	2	4.2	1	4.7	1	
	CWHvh2/Ed03	DR	Arctic rush - Alaska plantain estuarine meadow	2	0.4	<1	0.4	<1	
	CWHvh2/Em05	ML	Lyngbye's sedge estuarine marsh	2	1.6	1	1.6	<1	
	CWHvh2/Et00	EG	Eelgrass	2	0.1	<1	0.1	<1	
<b>Total Estuarine Wetlands</b>					<b>6.3</b>	<b>2</b>	<b>6.7</b>	<b>1</b>	



**Table 4.2–2 Ecological Communities Mapped in the LSA and RSA**

Ecosystem Type	Site Series	Map Code	Ecological Community Name	Structural Stage	LSA		RSA	
					Area (ha)	%	Area (ha)	%
Tidal Water	CWHvh2/la00	IA	Tidal water – inundated	N/A	35.4	12	42.2	7
	CWHvh2/lu00	UC	Tidal water – gravel/cobble/boulder	N/A	19.7	7	22.3	4
	CWHvh2/lu00	Ucf	Tidal water – mudflat/sandflat	N/A	2.4	1	2.4	<1
<b>Total Tidal Water Wetlands</b>					<b>57.5</b>	<b>20</b>	<b>66.9</b>	<b>11</b>
<b>Total Estuarine and Tidal Wetlands</b>					<b>63.8</b>	<b>22</b>	<b>73.6</b>	<b>12</b>
<b>Total Wetlands</b>					<b>143.0</b>	<b>50</b>	<b>261.5</b>	<b>44</b>
<b>Sparsely Vegetated</b>								
Sparsely Vegetated	CWHvh2/Br00	Bebr	Bedrock intertidal	1	5.2	2	6.4	1
<b>Total Sparsely Vegetated</b>					<b>5.2</b>	<b>2</b>	<b>6.4</b>	<b>1</b>
<b>Total</b>					<b>285.5</b>	<b>100</b>	<b>600.7</b>	<b>100</b>
<p>NOTES:</p> <p>Totals may not sum due to rounding.</p> <p>Structural Stages – 1 – sparse/cryptogram, 2 – herb, 3 – shrub/herb, 4 – pole/sapling, 5 – young forest, 6 – mature forest, 7 – old forest.</p> <p>N/A – Indicates that none of the structural stages described in MOFR and MOE (2010) fit this ecosystem type.</p> <p>UN – Treed areas that could not be classified by the marine classification. They were given the structural stage of adjacent polygons.</p> <p>IA – The imagery used for the intertidal classification showed water in this area, so the substrate was unable to be classified.</p> <p>Et00/EG – Eelgrass documented in the field in the Vegetation and Ecosystems RSA. There is eelgrass outside of this area in the subtidal zone, at depths greater than 2 m below mean tide (see Marine Resources TDR – Appendix 7.9A for more details).</p> <p>UC – Some of this area supports macroalgae (see Marine Resources TDR – Appendix 7.9A for more details).</p>								

1  
2



**Ecosystem Label** (e.g. 5SHx7)  
 5 = decile  
 SH = map code  
 X = map code modifier  
 7 = structural stage

<b>Structural Stage</b>	4	Pole / Sapling	
1	Sparse /	5	Young Forest
-	Bryoid	6	Mature Forest
2b	Forb	7a	Old Forest
3	Shrub	7b	Very Old Forest

**Map Code - Ecosystem Name**

Note: polygons are colour coded by dominant ecosystem

**Upland - Forest**

- HS - Western redcedar - Western hemlock / salal
- SD - Western redcedar - Sitka spruce / devil's club
- UN - Unclassified shoreline fringe

**Wetland - Bog**

- LS - Shore pine - yellow-cedar / tufted clubrush
- BG - Shore pine - Black crowberry - Tough peat-moss
- YG - Western redcedar - yellow-cedar / spleenwort-leaved goldthread

**Wetland - Swamp**

- RC - Western redcedar - Sitka spruce / skunk cabbage

**Wetland - Shallow Open Water**

- OW - Shallow open water wetland

**Wetland - Estuarine**

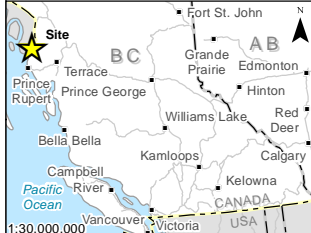
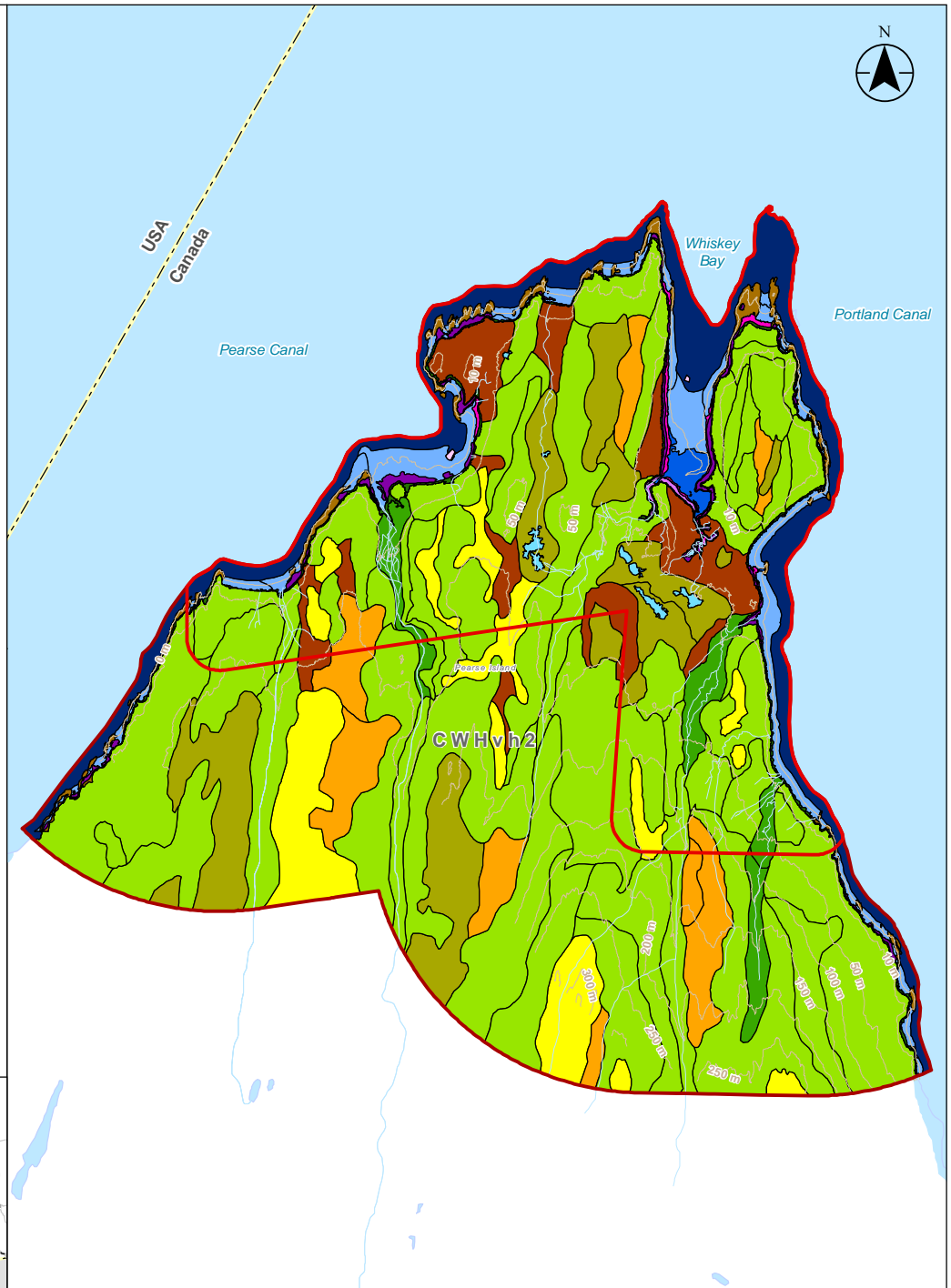
- EG - Eelgrass (tidal flat)
- ML - Lyngbye's sedge estuarine marsh
- DR - Arctic rush - Alaska plantain estuarine meadow
- AR - Arctic rush - Alaska plantain estuarine meadow
- DH - Tufted hairgrass - Meadow barley estuarine meadow

**Wetland - Tidal Water**

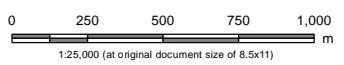
- UC - Tidal water - gravel/cobble/boulder
- UCf - Tidal water - mudflat/sandflat
- IA - Tidal water - inundated

**Sparsely Vegetated**

- BEbr - Bedrock



- Biogeoclimatic Unit
- Vegetation and Wetlands Local Study Area
- Vegetation and Wetlands Regional Study Area
- Topographic Contour
- International Boundary
- Watercourse (Project-Mapped)
- Waterbody



Project Location: Pearse Island, BC  
 Project Number: 123221820  
 Prepared by: TQUILICHINI on 20220610  
 Requested by: MONEIL on 20220605  
 Checked by: EHERTZMAN on 20220610

Client/Project/Report  
 Ksi Lisims LNG  
 Natural Gas Liquefaction and Marine Terminal  
 Technical Data Report - Vegetation and Wetlands

Figure No. **4.2-2** Page: 1 of 7

Title  
**Vegetation Resources Terrestrial Ecosystem Mapping in the RSA**

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**Ecosystem Label (e.g. 5SHx7)**

5 = decile  
SH = map code  
X = map code modifier  
7 = structural stage

Structural Stage		Pole / Sapling	
1	Sparse /	5	Young Forest
-	Bryoid	6	Mature Forest
2b	Forb	7a	Old Forest
3	Shrub	7b	Very Old Forest

**Map Code - Ecosystem Name**

Note: polygons are colour coded by dominant ecosystem

**Upland - Forest**

- HS - Western redcedar - Western hemlock / salal
- SD - Western redcedar - Sitka spruce / devil's club
- UN - Unclassified shoreline fringe

**Wetland - Bog**

- LS - Shore pine - yellow-cedar / tufted clubrush
- BG - Shore pine - Black crowberry - Tough peat-moss
- YG - Western redcedar - yellow-cedar / spleenwort-leaved goldthread

**Wetland - Swamp**

- RC - Western redcedar - Sitka spruce / skunk cabbage

**Wetland - Shallow Open Water**

- OW - Shallow open water wetland

**Wetland - Estuarine**

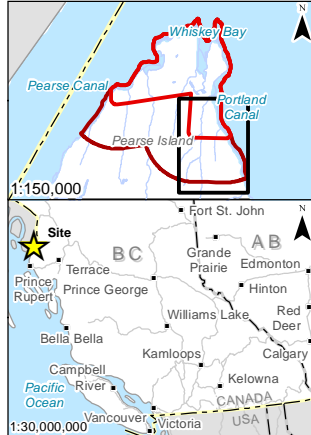
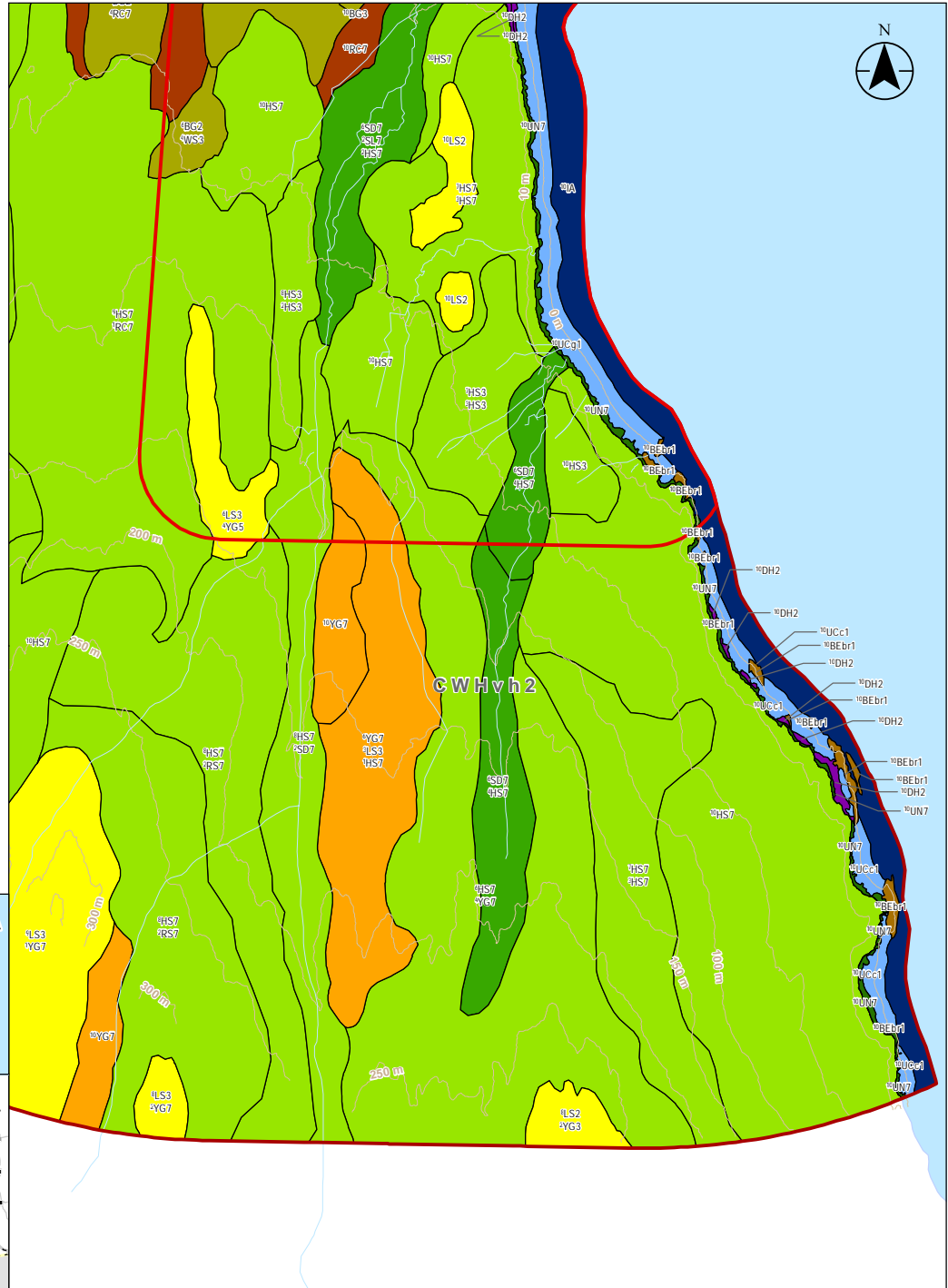
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- DH - Tufted hairgrass - Meadow barley estuarine meadow

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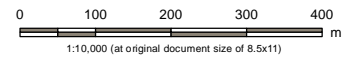
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- IA - Tidal water - inundated

**Sparsely Vegetated**

- BEbr - Bedrock



- Biogeoclimatic Unit
- Vegetation and Wetlands Local Study Area
- Vegetation and Wetlands Regional Study Area
- Topographic Contour
- Watercourse (Project-Mapped)
- Waterbody



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Figure No. **4.2-2** Page: 2 of 7

Title  
**Vegetation Resources Terrestrial  
Ecosystem Mapping in the RSA**

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**Ecosystem Label** (e.g. 5SHx7)

5 = decile  
SH = map code  
X = map code modifier  
7 = structural stage

Structural Stage	4	Pole / Sapling
1	Sparse /	5 Young Forest
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**Wetland - Estuarine**

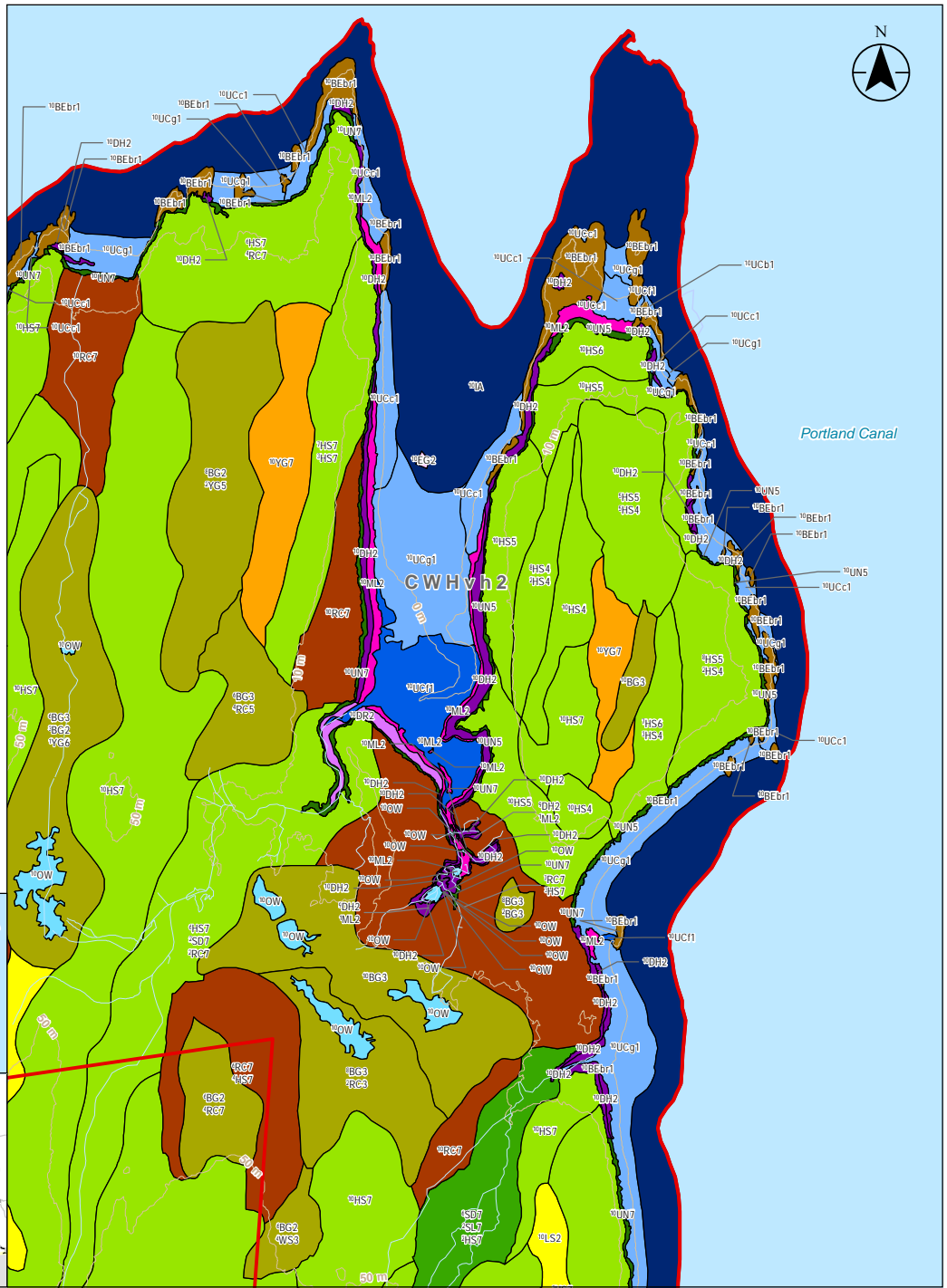
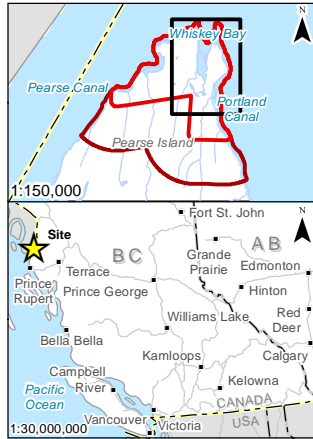
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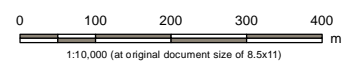
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 Figure No. **4.2-2** Page: **3 of 7**  
 Title  
**Vegetation Resources Terrestrial Ecosystem Mapping in the RSA**

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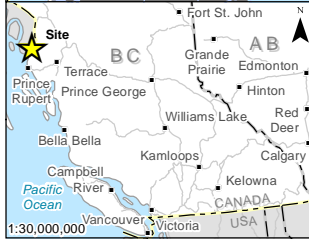
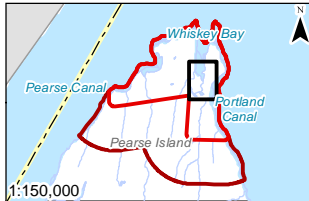
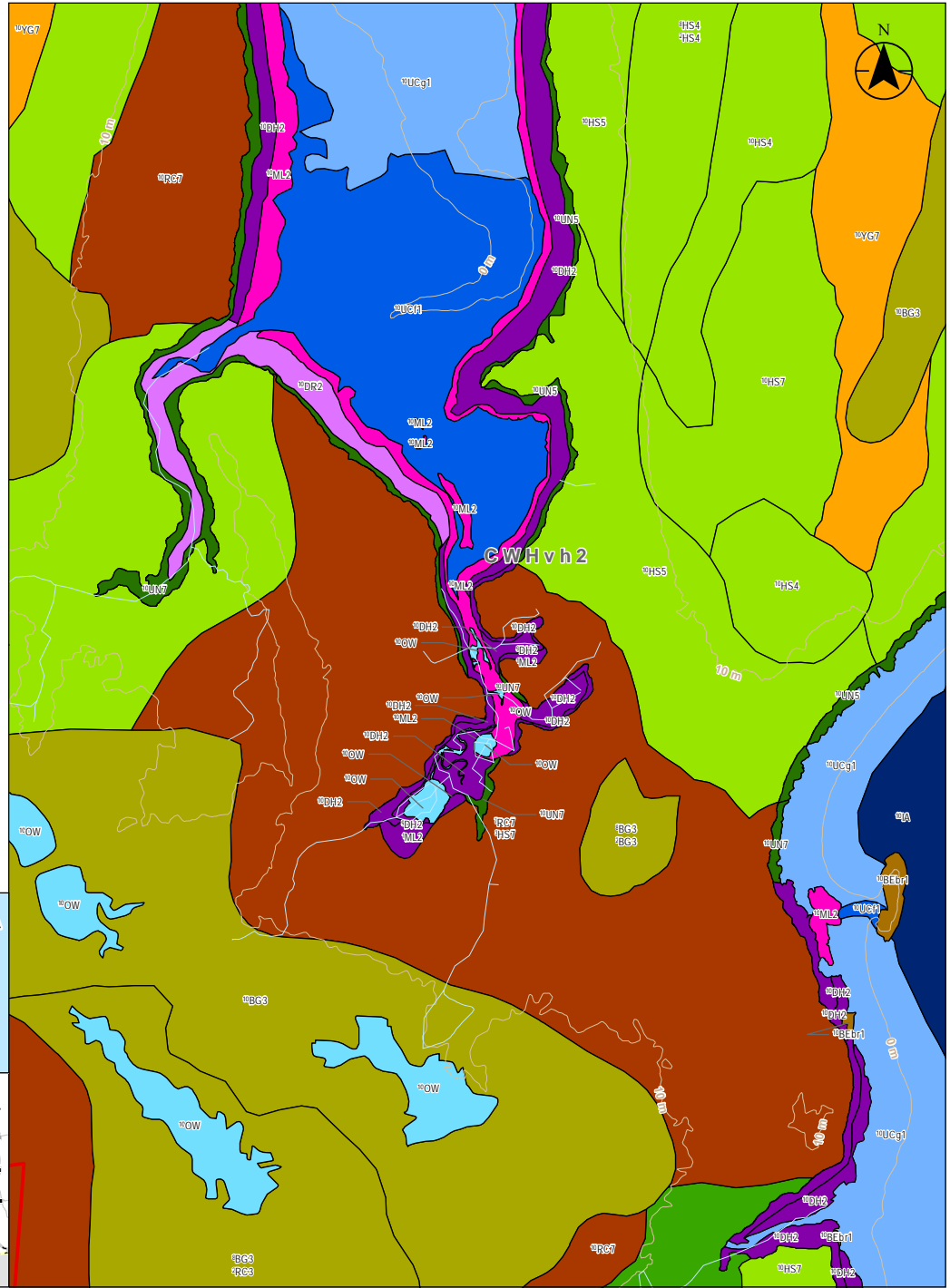
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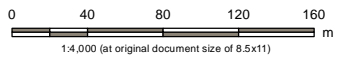
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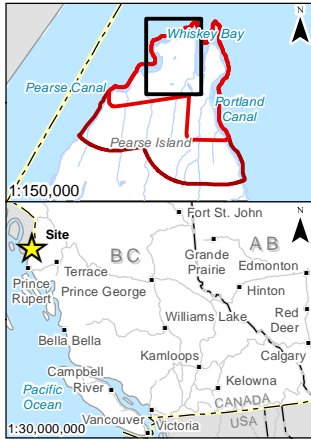
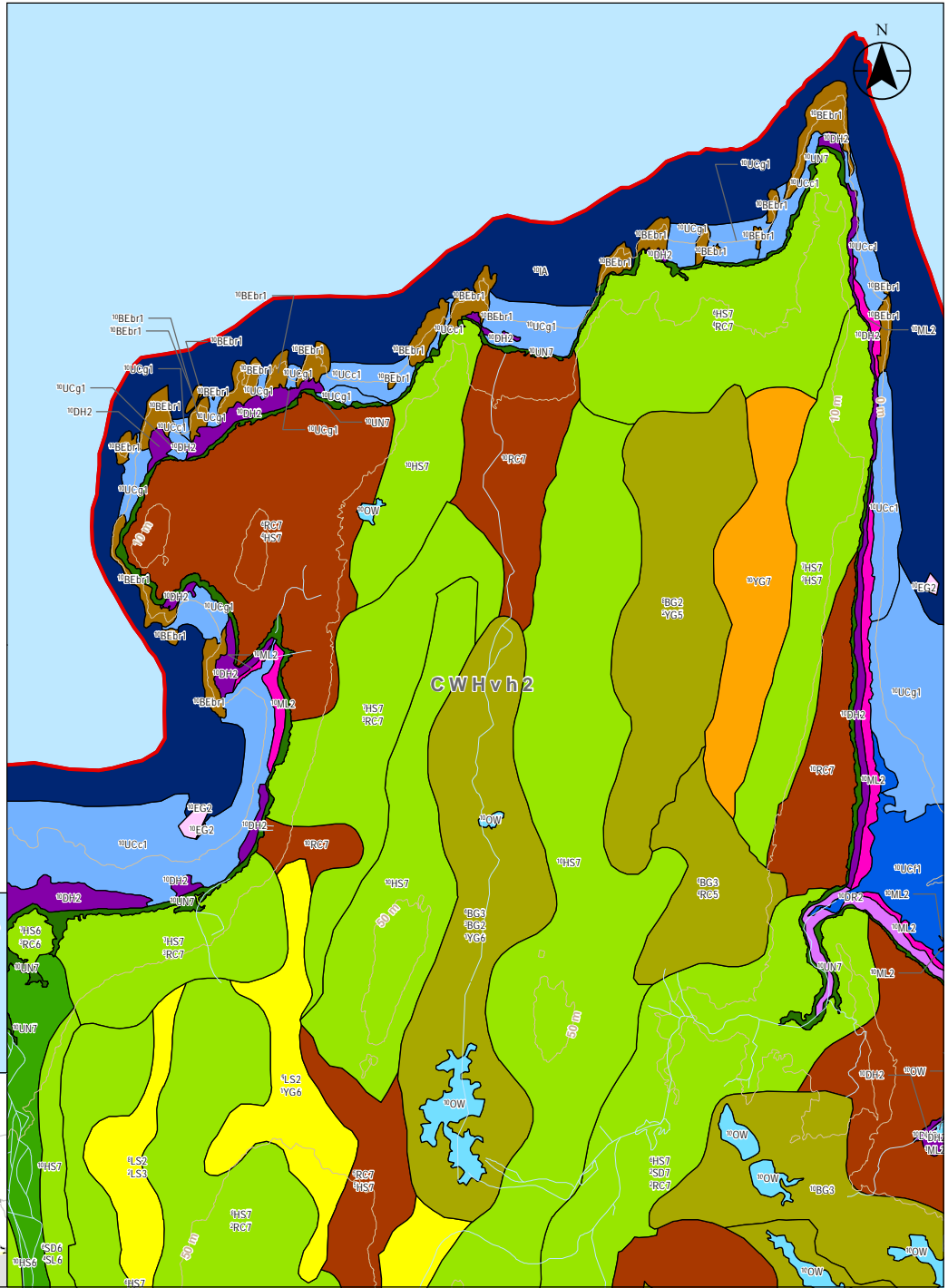
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**Sparsely Vegetated**

- BEbr - Bedrock



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Figure No. **4.2-2** Page: 5 of 7

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**Vegetation Resources Terrestrial Ecosystem Mapping in the RSA**

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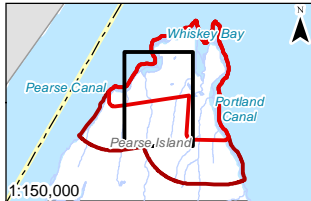
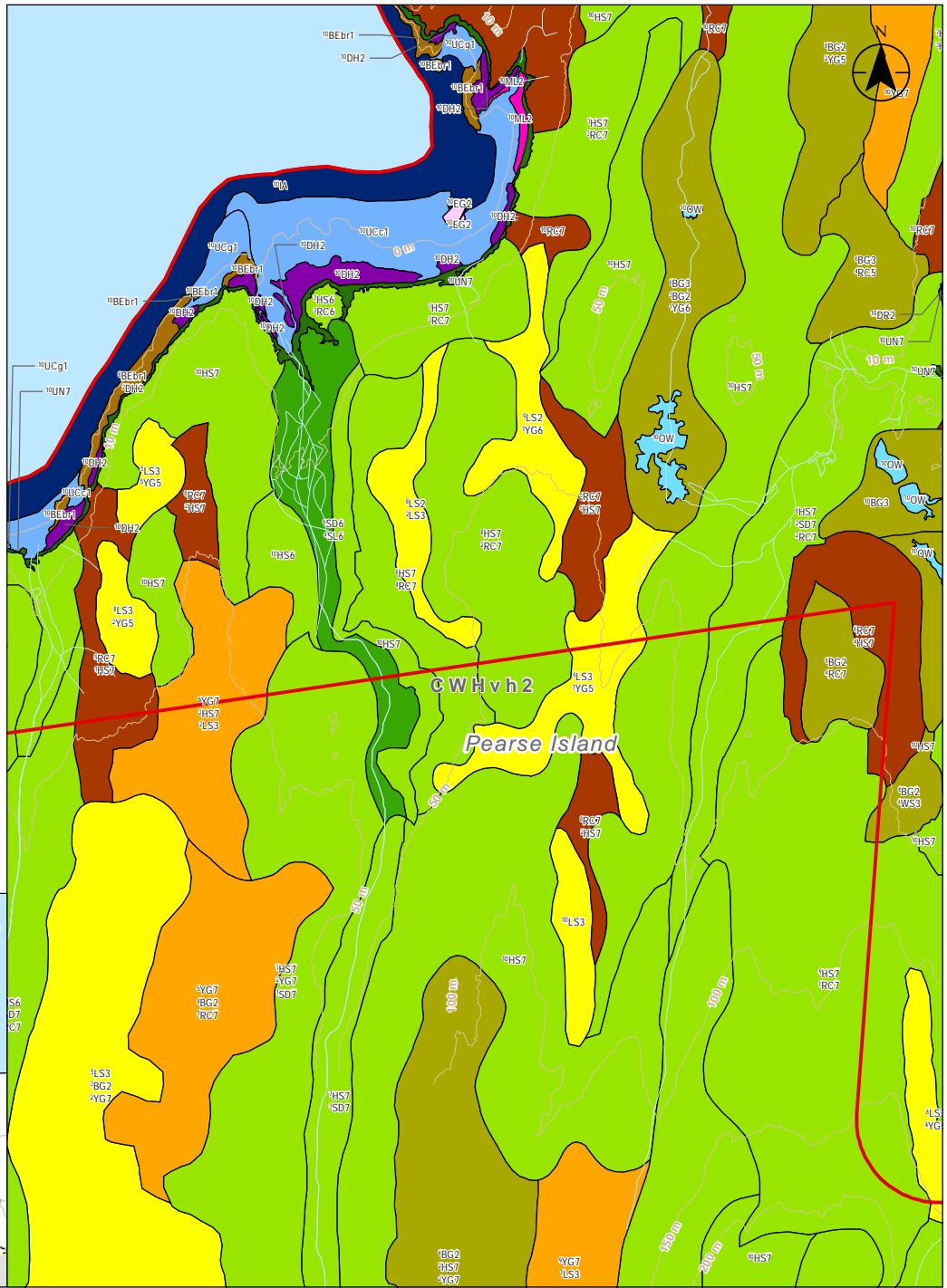
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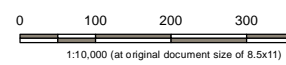
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**Sparingly Vegetated**

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Biogeoclimatic Unit	Topographic Contour
Vegetation and Wetlands Local Study Area	Watercourse (Project-Mapped)
Vegetation and Wetlands Regional Study Area	Waterbody



**Notes**  
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Figure No. **4.2-2** Page: **6 of 7**  
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**Vegetation Resources Terrestrial Ecosystem Mapping in the RSA**

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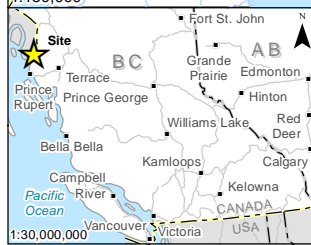
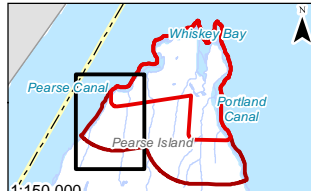
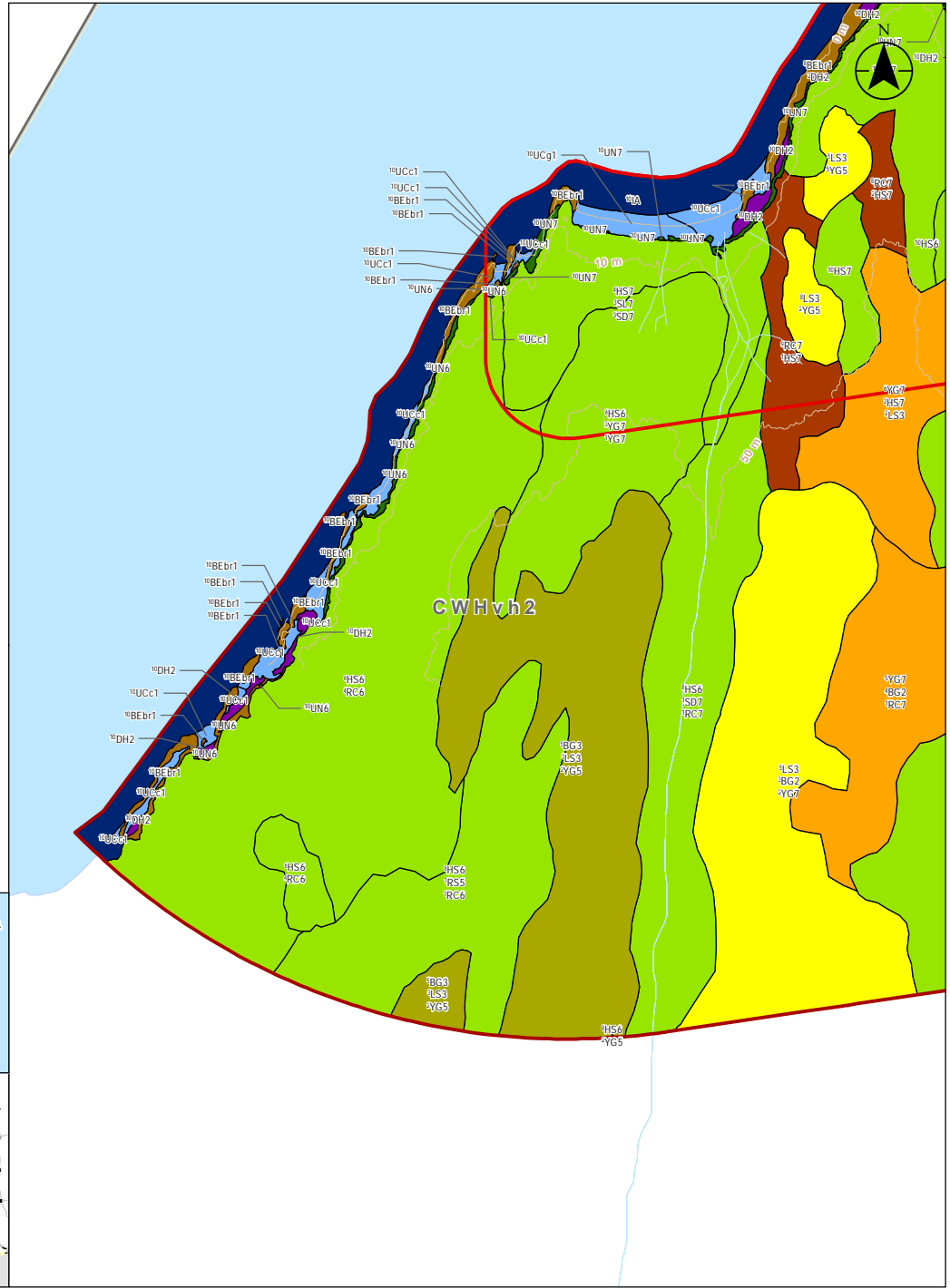
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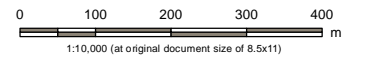
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Figure No. **4.2-2** Page: **7 of 7**

Title  
**Vegetation Resources Terrestrial Ecosystem Mapping in the RSA**

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1 Freshwater wetlands, including bogs, swamps, and shallow open water, are common in both the LSA and  
2 RSA, covering a collective 79.2 ha (28%) of the LSA and 187.9 ha (31%) of the RSA. Freshwater wetland  
3 community diversity is relatively low, covering 5 site series occurring within the Vegetation and  
4 Wetlands LSA and RSA, compared to 19 freshwater wetland site series identified as potentially occurring  
5 in the CWH BEC zone by MacKenzie and Moran (2004). No fen or marsh communities were observed  
6 during field studies or mapped in the Vegetation and Wetlands LSA and RSA. Freshwater wetlands are  
7 distributed throughout the portions of the Vegetation and Wetlands LSA and RSA with low relief between  
8 ridges and on plateaus. Western redcedar – Sitka spruce / skunk cabbage treed swamp (site series  
9 13/Ws54) is the most common wetland community in the LSA covering 32.3 ha (11% of the LSA).  
10 Western redcedar – yellow-cedar / spleenwort-leaved goldthread (site series 11) is the most common  
11 wetland community in the RSA covering 51.8 ha (9% of the RSA).

12 Estuarine and tidal water wetlands occur along the shoreline of the Vegetation and Wetlands LSA and  
13 RSA and cover 63.8 ha (22%) of the LSA and 73.6 ha (12%) of the RSA. Estuarine and tidal water  
14 wetlands include estuarine meadows and marshes, eelgrass tidal flats, and tidal water wetlands  
15 (which include boulder/gravel/cobble substrates, unknown substrates, and mudflat/sandflats).  
16 Estuarine communities occur most frequently where fresh watercourses empty into the sea, but some are  
17 associated with freshwater seepage (Figure 4.2–2, pages 3 through 7). Estuarine communities are  
18 prominent along the edges of Whiskey Bay and within the inlet connecting Whiskey Bay to large wetland  
19 complexes. Tidal water wetlands occur in the areas with unconsolidated sediment (non-bedrock) below  
20 the higher high water tide mark and above the bathymetric contour that is 2 m below mean tide.

21 One floodplain association, the Sitka spruce / false lily-of-the-valley high bench (site series 08) occurs in  
22 3.9 ha (1%) of the LSA and 4.3 ha (1%) of the RSA. Sparsely vegetated communities are uncommon  
23 within the Vegetation and Wetlands LSA and RSA. The only mapped sparsely vegetated community is  
24 bedrock in the intertidal zone covering 5.2 ha (2%) of the LSA and 6.4 ha (1%) of the RSA (Table 4.2–2).

25 Structural stages in the Vegetation and Wetlands LSA and RSA range from sparse/cryptogram to  
26 old forest (Table 4.2–3). Most of both the LSA and RSA are occupied by old forest (age greater than  
27 250 and less than 400 years); 141.6 ha of the LSA (50%) and 347.1 ha of the RSA (58%). The next most  
28 common are land covers that have no applicable structural stage (shallow open water and tidal water  
29 wetlands), which account for 59.1 ha of the LSA (21%) and 68.5 ha of the RSA (11%). The LSA has  
30 experienced some minor human impact due to historical logging as evidenced by tree stumps observed  
31 during field studies throughout the LSA and recent tree clearing on the east side of the LSA. The area of  
32 recent tree clearing is 13.9 ha (5%) of upland forest in shrub/herb and pole/sapling stage (Table 4.2–2).

33 Bogs range from herb stage to old forest; the most abundant structural stages are shrub and herb.  
34 In contrast, swamps have the same structural stage range as bogs, but are primarily old forest.  
35 Estuarine wetlands consist of the herb structural stage (Table 4.2–2).



1 **Table 4.2–3 Structural Stages Mapped in the LSA and RSA**

Structural Stage	LSA		RSA	
	Area (ha)	%	Area (ha)	%
1 - sparse/cryptogram	5.2	2	6.4	1
2 - herb	18.7	7	36.5	6
3 - shrub/herb	28.2	10	63.6	11
4 - pole/sapling	6.7	2	6.7	1
5 - young forest	14.7	5	18.9	3
6 - mature forest	11.4	4	53.1	9
7 - old forest	141.6	50	347.1	58
N/A	59.1	21	68.5	11
<b>Total</b>	<b>285.5</b>	<b>100</b>	<b>600.7</b>	<b>100</b>
NOTES: N/A – Not applicable, used for Ww00 and Tidal water wetlands. Totals may not sum due to rounding.				

2

3 **4.2.2 Plant Species of Conservation Concern**

4 A total of 34 field locations were surveyed for plant species of conservation concern. Details on these  
5 surveys can be found in Appendix C. During field studies, 133 vascular plant species, 40 moss species,  
6 17 lichen species, and 5 liverwort species were identified (Appendix D).

7 One red-listed plant species, arctic daisy was documented at six locations in the LSA during field surveys  
8 (Figure 4.2–1; Appendix E). A voucher specimen was collected and confirmed by a botanist (Curtis Bjork,  
9 Enlivened Consulting Ltd). Arctic daisy was found within the tufted hairgrass – meadow barley estuarine  
10 meadow (Ed01) community. There are two arctic daisy locations on the east side of Whiskey Bay, one on  
11 the western side of Whiskey Bay, and the other locations are on the west coast of the peninsula.  
12 The populations on the east side of Whiskey Bay were estimated at less than 20-50 individuals; on the  
13 west side of Whiskey Bay the population was estimated to be between 50 and 250 individuals. The west  
14 coast of Pearse Island has a larger population with between 250 and 1,000 individuals in one location and  
15 less than 50 in the other. Details on each location supporting arctic daisy are provided in Table 4.2–4.



1 **Table 4.2–4 Arctic Daisy Observations**

Site ID	Location Description	Area Occupied (m <sup>2</sup> )	Percent Cover of the Area Occupied (%)	Number of Individuals <sup>a</sup>
DP21043	Eastern side of Whiskey Bay	160	2	1 – 50
DP21059	Northeast side of Whiskey Bay	32	1	14
DP21071	Northwest coast of the LSA	200	2	1 – 50
DP21080	Western coast of the LSA	800	1	51 – 250
DP21089	Western side of Whiskey Bay	800	2	51 – 250
DP21094	Western coast of the LSA	800	3	251 – 1,000

NOTES:  
<sup>a</sup> Exact number reflects a count rather than an estimated range of individuals within occupied area.

2

3 Arctic daisy is a perennial flower, growing up to 40 centimeters tall (E-Flora BC 2022). Arctic daisy has  
4 creeping rhizomes, hairy stems and leaves, and smaller leaves higher on the stem than at the base.  
5 The flower has both ray and disk flowers; the ray flowers are white and disk flowers are yellow  
6 (E-Flora BC 2022). Arctic daisy is found in salt marshes and gravelly shores and is of conservation  
7 concern in BC. It occurs on both sides of the Bering Strait, in Alaska (BC) and Russia (E-Flora BC 2022).

8 **4.2.3 Botanical and Cultural Forest Products**

9 The Vegetation and Wetlands LSA and RSA support botanical and cultural forest products used by the  
10 Nisga'a Nation and other Indigenous groups. The abundance and distribution of the following  
11 representative species of botanical and cultural forest products are described below:

- 12 • western redcedar
- 13 • yellow-cedar
- 14 • Labrador tea
- 15 • devil's club
- 16 • green false-hellebore
- 17 • huckleberries or blueberries
- 18 • freshwater aquatic plants (e.g., sedges, rushes, and water lily)
- 19 • pine mushroom



Field Studies and Terrestrial Ecosystem Mapping  
June 2024

1 Nearly all representative species of botanical and cultural forest products were observed during field  
2 studies, except for pine mushroom (Appendix D). Western redcedar was observed in 37 plots (59%),  
3 yellow-cedar was observed in 21 plots (33% of plots), and Labrador tea was observed in 14 plots (22%).  
4 Devil's club and green false-hellebore were observed in 7 plots (11%) and 4 plots (6%), respectively.  
5 Black huckleberry (*Vaccinium membranaceum*) was not observed during field studies, though several  
6 other blueberry and huckleberry species were observed in 38 plots (60% of plots). Freshwater aquatic  
7 plants are common in wetlands in the LSA; sedges, rushes, and water-lily were found in 60 of 63 plots  
8 (though many of these plots were upland plots with low abundance of these species). Pine mushrooms  
9 were not observed during field studies; however, field work took place outside the mushroom season of  
10 late summer/early fall.

11 Table 4.2–5 provides areas supporting each representative botanical and cultural forest product species  
12 based on the sum of each site series where a species is noted as characteristic of a site series in the  
13 guidebooks. Appendix F provides further detail, including the relative abundance of each of the species in  
14 each site series or wetland association. For the purposes of this summary, huckleberry and blueberry  
15 species that were recorded during field surveys (red huckleberry, Alaskan blueberry [*Vaccinium*  
16 *alaskaense*] and oval-leaved blueberry [*Vaccinium ovalifolium*]) were included together. Freshwater  
17 aquatic species include sedges, rushes, and water-lily. Relative abundance of the freshwater aquatic  
18 category is not included in Appendix F, as specific species of interest in this category were not known at  
19 the time this report was prepared. Habitat with potential to support pine mushrooms is based on the area  
20 with well-drained podzolic soils (Integrated Resources Policy Branch 1995). However, known  
21 pine mushroom harvesting areas mapped by Integrated Resources Policy Branch (1995) do not coincide  
22 with the Vegetation and Wetlands RSA on Pearse Island.

23 All vegetated areas of the Vegetation and Wetlands LSA and RSA support botanical and cultural forest  
24 products (Figure 4.2–3). Western redcedar and huckleberries and blueberries are characteristic species  
25 in 178.6 ha (63%) of the LSA, while yellow-cedar is characteristic in 165.4 ha (58%) of the LSA.  
26 Labrador tea and green false-hellebore are less common; there are 12.9 ha (5%) of the LSA capable of  
27 supporting these species. Devil's club is a characteristic species in 9.4 ha (3%) of the LSA, and habitats  
28 with potential to support freshwater aquatic species occur in 40.2 ha (14%) of the LSA. Potential  
29 pine mushroom habitat (i.e., well drained podzolic soil) covers 0.5 ha (<1%) of the LSA (Table 4.2–5).  
30 Well drained podzolic soils in the LSA and RSA are associated with steep slopes (46-70%).



Field Studies and Terrestrial Ecosystem Mapping  
June 2024

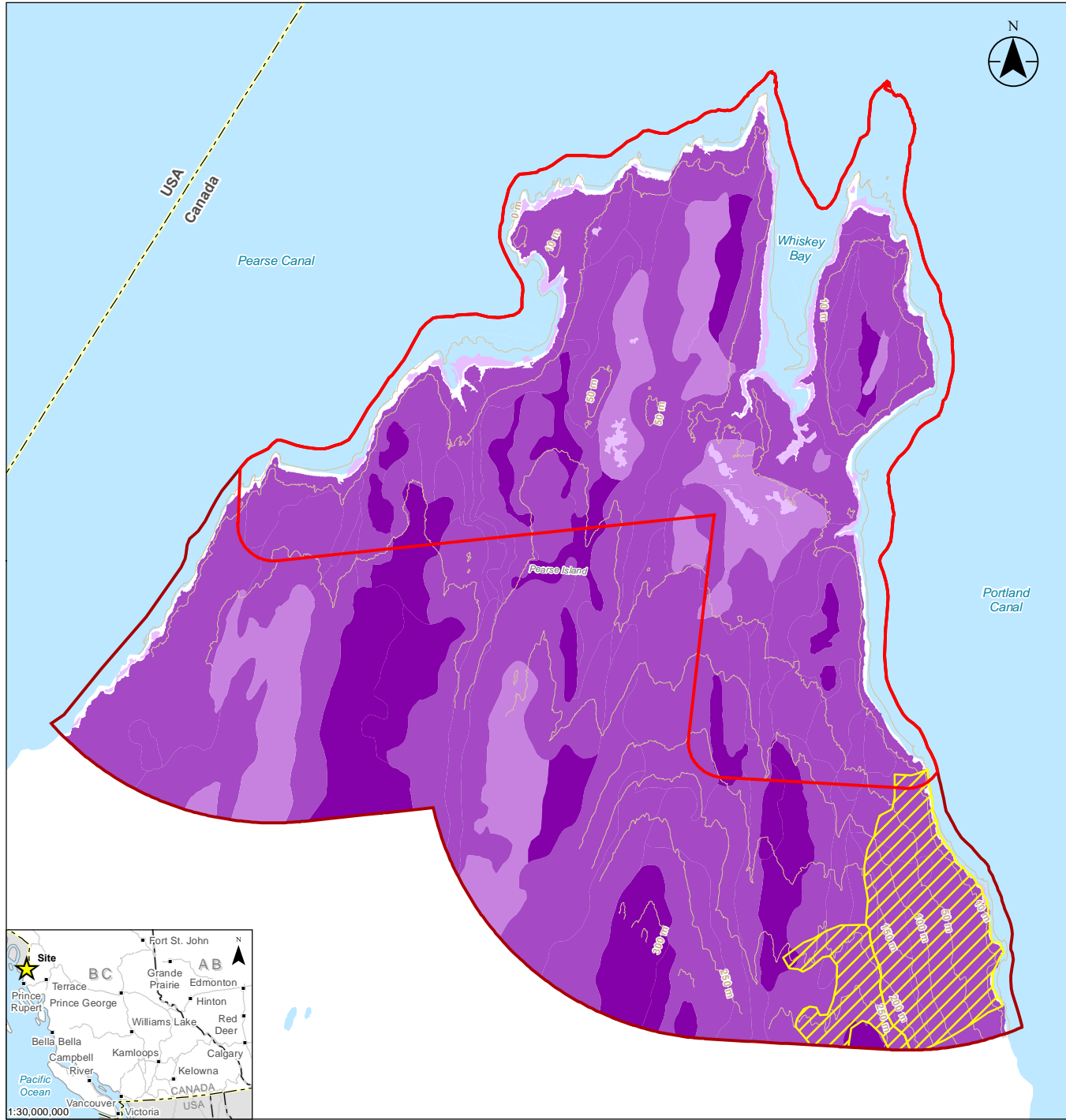
1 **Table 4.2–5 Area Supporting Nisga'a Botanical and Cultural Forest Products in the LSA**  
2 **and RSA**

Species of Interest to the Nisga'a	LSA		RSA	
	Area (ha)	%	Area (ha)	%
western redcedar	178.6	63	429.7	72
yellow-cedar	165.4	58	401.1	67
Labrador tea	12.9	5	51.8	9
devil's club	9.4	3	24.3	4
green false-hellebore	12.9	5	51.8	9
huckleberries and blueberries	178.6	63	429.7	72
freshwater aquatics	40.2	14	91.4	15
pine mushroom	0.5	<1	35.9	6

NOTES:  
Totals may not sum due to rounding.  
Areas do not sum up to total LSA or RSA areas because there are typically several site series supporting multiple species.  
Full detail of how these numbers were derived can be found in Appendix F.

3

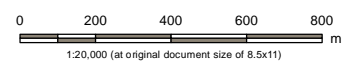




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- |   |   |
|---|---|
| <b>Nisg'aa-Used Plant Species Count</b><br> | Vegetation and Wetlands Local Study Area    |
|   | Vegetation and Wetlands Regional Study Area |
|   | Topographic Contour                         |
|   | Waterbody                                   |
|   | Potential Pine Mushroom Habitat             |



Project Location: Pearse Island, BC  
 Project Number: 12321820  
 Prepared by SMOSS on 20220629  
 Requested by CLION on 20220623  
 Checked by TQUILICHINI on 20220629

Client/Project/Report  
**Ksi Lisims LNG**  
 Natural Gas Liquefaction and Marine Terminal  
 Technical Data Report - Vegetation and Wetlands

Figure No.  
**4.2-3**

Title  
**Area Supporting Species of Interest to the Nisga'a in the RSA**

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#### 1 4.2.4 Invasive Plant Species

2 No noxious weeds or regionally categorized invasive plant species (NWIPC 2020) were observed during  
3 field studies. The LSA and RSA have limited anthropogenic disturbances where invasive plant species  
4 are more likely to occur. As the LSA and RSA are located on an island with little human presence, there  
5 are few pathways by which invasive plant species could be introduced.

#### 6 4.2.5 Ecological Communities of Conservation Concern

7 Four red- and two blue-listed ecological communities have been documented in the LSA, including upland  
8 forest, floodplain forest, swamp forest, and estuarine marsh and meadow communities (Table 4.2–6;  
9 Appendix E). Ecological communities of conservation concern make up 50.7 ha of the LSA (17%) and  
10 83.8 ha of the RSA (14%). See Figure 4.2–4.

11 The most common ecological community of conservation concern in the LSA and RSA is the blue-listed  
12 western redcedar – Sitka spruce / skunk cabbage swamp forest (site series 13/Ws54), which covers  
13 31.2 ha (11%) of the LSA and 48.6 ha (8%) of the RSA. The Ws54 is distributed throughout the  
14 Vegetation and Wetlands LSA and RSA on gradual lower slopes or level to depressional areas and  
15 adjacent to watercourses. See Appendix E for a representative photo of each community.

16 The second most abundant ecological community of conservation concern in the LSA and RSA is the  
17 red-listed tufted hairgrass – meadow barley estuarine meadow (site series Ed01), which covers 4.2 ha  
18 (1%) of the LSA and 4.7 ha (1%) of the RSA. The Ed01 is generally located at higher elevations than the  
19 Lyngbye's sedge estuarine marsh (site series Em05), which occurs in 1.6 ha in the LSA (1%). The arctic  
20 rush – Alaska plantain estuarine meadow (site series Ed03) was documented in only one location in the  
21 LSA, on the western shore of Whiskey Bay. All red-listed estuarine communities are located along the  
22 shoreline of the LSA and RSA, and in particular along the edges of Whiskey Bay, and within an inlet of  
23 Whiskey Bay connecting the large central wetland complex to the sea.

24 The Sitka spruce / false lily-of-the-valley high bench floodplain forest (site series 08) occurs on 3.9 ha  
25 (1%) of the LSA and 4.3 ha (<1%) of the RSA (Appendix E). The blue listed western redcedar –  
26 Sitka spruce / devil's club upland forest (site series 07) was mapped on 9.4 ha (3%) of the LSA and  
27 24.3 ha (4%) of the RSA. The 07 is a productive forest found on seepage sites at lower and toe slopes of  
28 gullies within the Vegetation and Wetlands LSA and RSA (Appendix E).



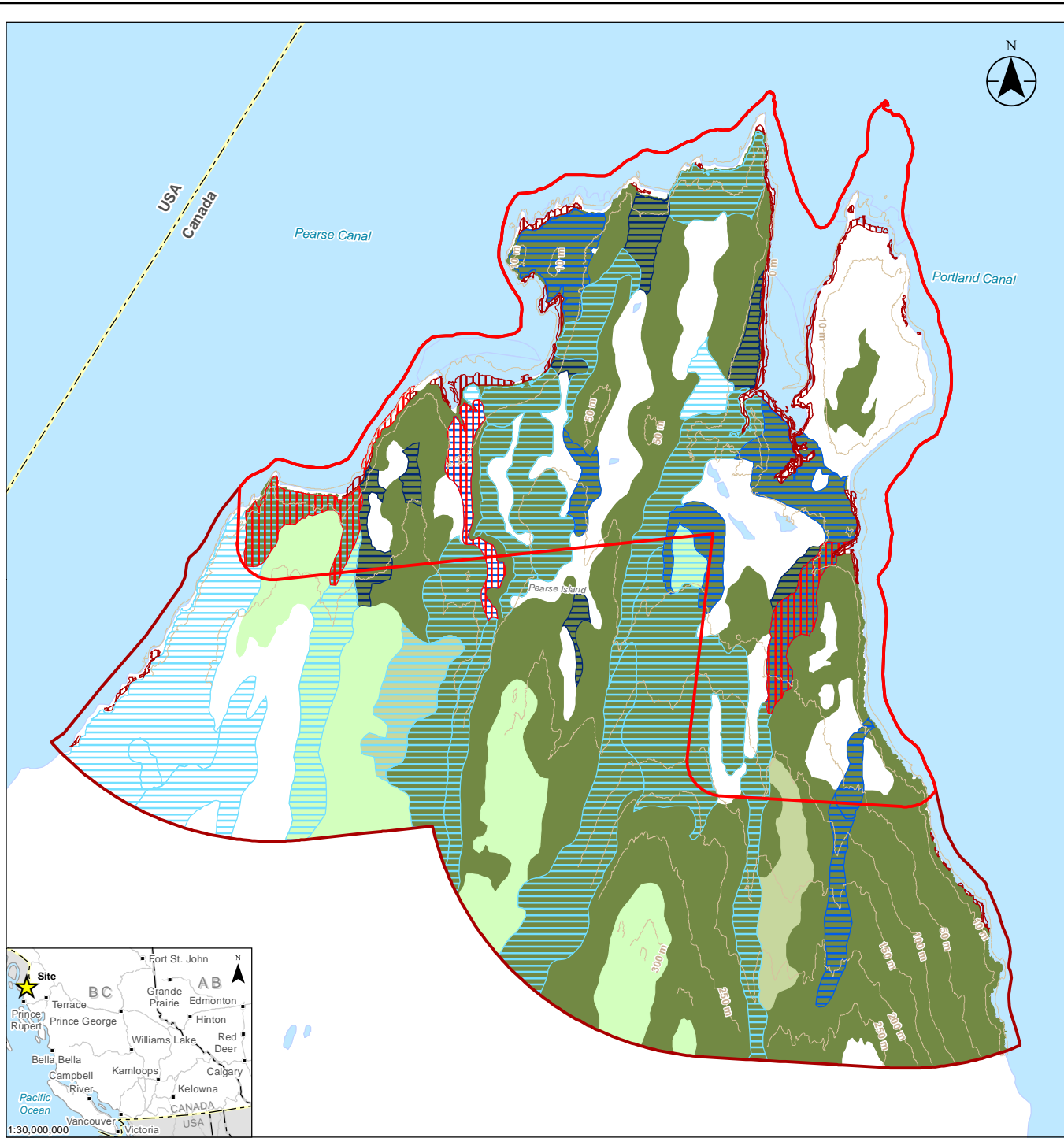


Field Studies and Terrestrial Ecosystem Mapping  
June 2024

**Table 4.2–6 Ecological Communities of Conservation Concern in the LSA and RSA**

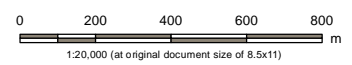
Ecosystem Type	Site Series	Map Code	Ecological Community	Structural Stage	BC CDC Status	LSA		RSA	
						Area (ha)	%	Area (ha)	%
<b>Upland</b>									
Upland Forest	CWHvh2/07	SD	Western redcedar - Sitka spruce / devil's club	6	Blue	1.9	1	2.4	<1
				7		7.5	3	21.9	4
	<i>Subtotal CWHvh2/07</i>					9.4	3	24.3	4
<b>Upland Forest Total</b>						<b>9.4</b>	<b>3</b>	<b>24.3</b>	<b>4</b>
<b>Floodplain</b>									
Floodplain	CWHvh2/08	SL	Sitka spruce / false lily-of-the-valley	6	Red	1.3	<1	1.6	<1
				7		2.6	1	2.6	<1
	<i>Subtotal CWHvh2/08</i>					3.9	1	4.3	<1
<b>Floodplain total</b>						<b>3.9</b>	<b>1</b>	<b>4.3</b>	<b>&lt;1</b>
<b>Wetland</b>									
<b>Freshwater Wetland</b>									
Swamp	CWHvh2/13 (Ws54)	RC	Western redcedar – Sitka spruce / skunk cabbage	5	Blue	1.0	<1	1.0	<1
				6		0.3	<1	10.2	2
				7		30.0	11	37.4	6
	<i>Subtotal CWHvh2/13 (Ws54)</i>					31.2	11	48.6	8
<b>Freshwater Wetland Total</b>						<b>31.2</b>	<b>11</b>	<b>48.6</b>	<b>8</b>
<b>Estuarine Wetland</b>									
Estuarine Wetland	CWHvh2/Ed01	DH	Tufted hairgrass – Meadow barley estuarine meadow	2	Red	4.2	1	4.7	1
	CWHvh2/Ed03	DR	Arctic rush – Alaska plantain estuarine meadow	2	Red	0.4	<1	0.4	<1
	CWHvh2/Em05	ML	Lyngbye's sedge estuarine marsh	2	Red	1.6	1	1.6	<1
<b>Estuarine Wetland Total</b>						<b>6.2</b>	<b>2</b>	<b>6.6</b>	<b>1</b>
<b>Total</b>						<b>50.7</b>	<b>17</b>	<b>83.8</b>	<b>14</b>
NOTES:									
Totals may not sum due to rounding.									
Forested ecological communities of conservation concern are limited to areas of structural stage 5 or greater.									
Red - ecological communities that have, or are candidates for, Extirpated, Endangered, or Threatened status in BC.									
Blue - ecological communities considered to be of Special Concern (formerly Vulnerable) in BC.									





**Notes**  
 1. Coordinate System: NAD 1983 BC Environment  
 2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada, Stantec, Rockies LNG, Maxar

<b>Red-listed Percentage of Ecosystem</b>	Vegetation and Wetlands Local Study Area
≤ 50	Vegetation and Wetlands Regional Study Area
81 - 100	International Boundary
<b>Blue-listed Percentage of Ecosystem</b>	Topographic Contour
≤ 50	Waterbody
51 - 80	
81 - 100	
<b>Old Forest Percentage of Ecosystem</b>	
≤ 50	
51 - 80	
81 - 100	



Project Location: Pearse Island, BC  
 Project Number: 123221820  
 Prepared by TQUILICHINI on 20220610  
 Requested by MONEIL on 20220605  
 Checked by SMOSS on 20220610

Client/Project/Report  
 Ksi Lisims LNG  
 Natural Gas Liquefaction and Marine Terminal  
 Technical Data Report - Vegetation and Wetlands

Figure No.  
**4.2-4**

Title  
**Ecological Communities of Conservation Concern and Old Forest in the RSA**

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1 **4.2.6 Old Forest**

2 Forests of the Vegetation and Wetlands LSA and RSA are within Natural Disturbance Type 1, which are  
3 those with rare stand-initiating events (BC Environment 1995).

4 Old forest (> 250 and < 400 years old) covers 141.6 ha (50%) of the LSA and 347.1 ha (58%) of the RSA  
5 (Table 4.2–7). Very old forest was not detected during field studies and not mapped within the RSA.  
6 The old forest in the RSA is lower productivity forest (site index less than or equal to 25 according to VRI),  
7 which remains in abundance on the outer coast of the province and is less at risk compared to higher  
8 productivity forests (Gorley and Merkel 2020). Old forest occurs in forested communities throughout the  
9 Vegetation and Wetlands LSA and RSA with the exception of the east side of Whiskey Bay and the  
10 south-west corner of the RSA (Appendix E). Old forest occurs in six ecological communities within the  
11 Vegetation and Wetlands LSA and RSA, including three upland forest communities, one high bench  
12 floodplain association, and one wetland association. Old forest also occurs in the unclassified shoreline  
13 fringe along the marine boundary. The western redcedar – western hemlock/salal (site series 01) is the  
14 community that supports the most abundant old forest, covering 89.4 ha (31%) of the LSA and 232.9 ha  
15 (39%) of the RSA. The provincially blue-listed western redcedar – Sitka spruce / skunk cabbage forested  
16 swamp (site series 13/Ws54) supports the next most abundant old forest, covering 30 ha (11%) of the  
17 LSA and 37.4 ha (6%) of the RSA. See Figure 4.2–4.

**Table 4.2–7 Old Forest Communities in the LSA and RSA**

Ecosystem Type	Site Series	Map Code	Ecological Community	LSA		RSA	
				Area (ha)	%	Area (ha)	%
<b>Upland</b>							
Upland Forest	CWHvh2/01	HS	Western redcedar – western hemlock / salal	89.4	31	232.9	39
	CWHvh2/03	RS	Western hemlock – yellow-cedar / salal	<0.1	<1	4.4	1
	CWHvh2/07	SD	Western redcedar – Sitka spruce / devil's club	7.5	3	21.9	4
	CWHvh2/00	UN <sup>1</sup>	Unclassified shoreline fringe	2.8	1	3.2	1
<b>Total Upland Forest</b>				<b>99.7</b>	<b>35</b>	<b>262.4</b>	<b>44</b>
Floodplain	CWHvh2/08	SL	Sitka spruce / false lily-of-the-valley	2.6	1	2.6	<1
<b>Total Floodplain</b>				<b>2.6</b>	<b>1</b>	<b>2.6</b>	<b>&lt;1</b>
<b>Total Upland</b>				<b>102.3</b>	<b>36</b>	<b>265.0</b>	<b>44</b>



**Table 4.2–7 Old Forest Communities in the LSA and RSA**

Freshwater Wetland							
Bog	CWHvh2/11	YG	Western redcedar – yellow-cedar / spleenwort-leaved goldthread	9.3	3	44.6	7
Swamp	CWHvh2/13 (Ws54)	RC	Western redcedar – Sitka spruce / skunk cabbage	30.0	11	37.4	6
<b>Total Freshwater Wetland</b>				<b>39.2</b>	<b>14</b>	<b>82.0</b>	<b>14</b>
<b>Total Old Forest</b>				<b>141.6</b>	<b>50</b>	<b>347</b>	<b>58</b>
NOTES:							
Totals may not sum due to rounding.							
These old forest ecosystems are all structural stage 7a, which is >250 years old and <400 years old (MOFR and MOE 2010).							
<sup>1</sup> Treed areas that could not be classified by the marine classification described in Section 4.1.2. They were given the structural stage of adjacent polygons.							

1 **4.2.7 Wetlands and Wetland Functions**

2 Wetland types observed in the Vegetation and Wetlands LSA and RSA include freshwater shrubby and  
3 treed bogs and swamps, shallow open water; estuarine meadows, estuarine marshes; marine  
4 (i.e., intertidal) eelgrass beds, and marine tidal shallow water wetlands (Table 4.2–8). Most of the  
5 wetlands of the LSA and RSA are complexes of palustrine overflow hollows and overflow basins. A total  
6 of twelve wetland site series representing three realms and six realm/class combinations, occur in the  
7 Vegetation and Wetlands LSA and RSA (Table 4.2–8; Figure 4.2–5). Estuarine marshes and meadows  
8 are classified under the marsh class in the Canadian Wetland Classification System and marine wetlands  
9 are classified under the shallow water class (NWWG 1997). Wetlands cover half or nearly-half of the LSA  
10 and RSA; 143.0 ha (50%) of the LSA and 261.5 ha (44%) of the RSA (Figure 4.2–5). This is typical of the  
11 hypermaritime conditions of the CWHvh subzone where blanket bogs on level and sloping terrain are a  
12 characteristic feature of the outer coastal lowlands (Banner et al. 1993) due to moderate annual  
13 temperatures, high precipitation, and high ambient humidity combined with mineral-poor bedrock  
14 (Mackenzie and Moran 2004). The large wetlands of the LSA and RSA are often complexes of bogs and  
15 swamps which are drained by small, low-gradient streams.

16 Water flow in the Vegetation and Wetlands LSA and RSA is generally from south to north, with  
17 some variation around Whiskey Bay. The location of the LSA at the farthest north end of Pearse Island  
18 is therefore at the lower end of the LSA’s larger watersheds, most of which empty into the sea  
19 (Figure 4.2–5). The 20 watersheds that intersect the LSA are small, ranging in size from 1.3 ha to  
20 367.1 ha, with a median size of 30.6 ha. Watersheds were defined using the Freshwater Atlas at a scale  
21 of 1:20,000 (Province of BC 2022d). Several of the wetland complexes are quite large in comparison to  
22 the size of their contributing watershed. The watersheds of the south-east corner of the RSA are more  
23 heavily sloping than those in the rest of the LSA and RSA.



**TECHNICAL DATA REPORT—VEGETATION AND WETLANDS  
KSI LISIMS LNG PROJECT**

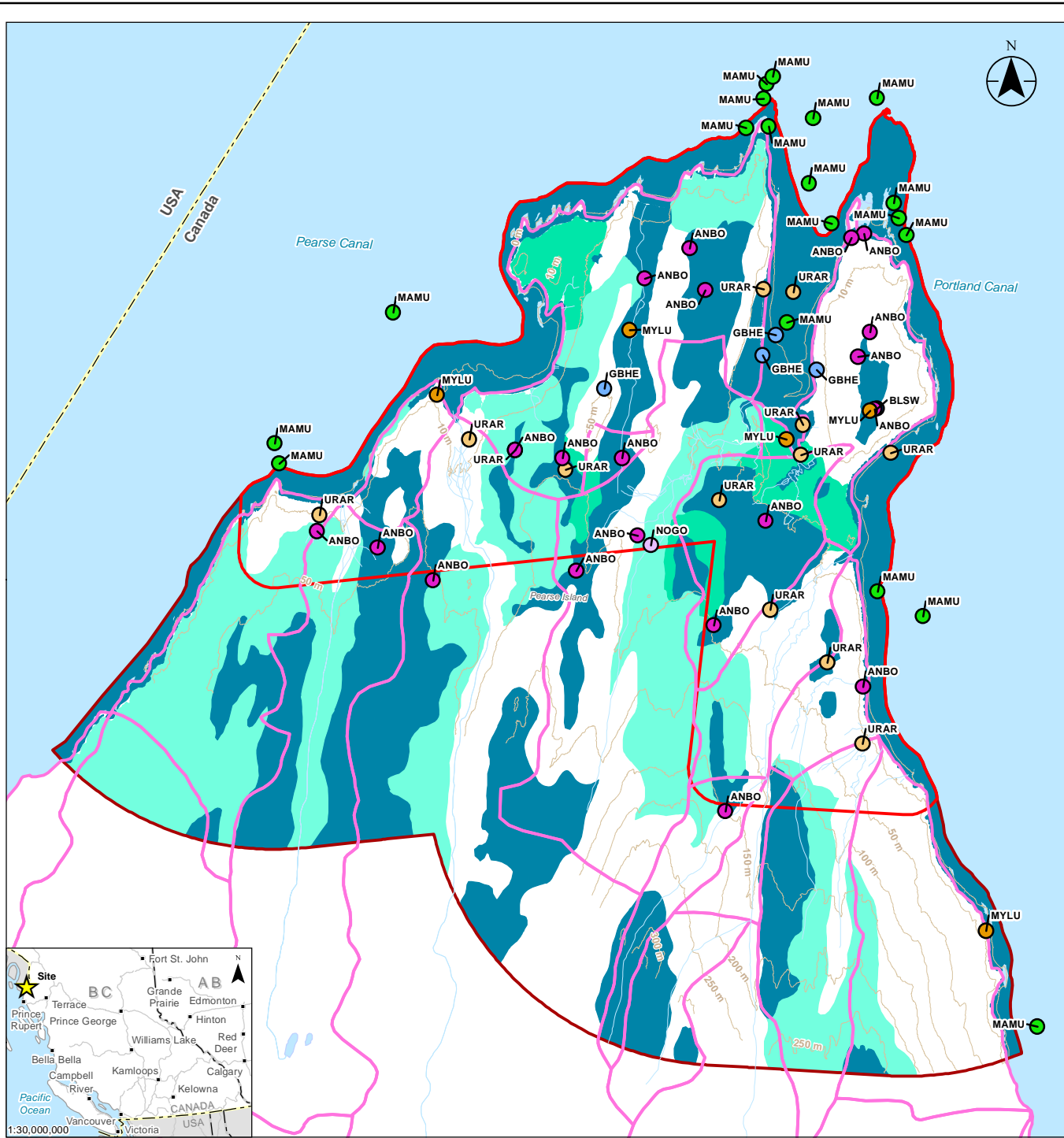


Field Studies and Terrestrial Ecosystem Mapping  
June 2024

1 The existing condition of the wetlands in the LSA and RSA is intact, as is the vegetation in the  
2 contributing areas of the wetlands (Figure 4.2–5), except for four small areas of clearcuts (shrub or  
3 pole/sapling stage) in the LSA within western redcedar – western hemlock / salal (site series 01)  
4 upland forest totalling 13.9 ha (5% of upland forest in the LSA) (Table 4.2–2). Of these four small  
5 clearcuts, only one 2 ha clearcut is upslope from a wetland area. There are no anthropogenic units  
6 mapped in the TEM or present in the LSA or RSA (Table 4.2–2).

7





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**Notes**

1. Coordinate System: NAD 1983 BC Environment Alberta
2. Data Sources: DataBC, Government of British Columbia; Natural Resources Canada, Stantec, Rockies LNG, Maxar

**Wetland Wildlife Species at Risk Observations**

- Black Swift (BLSW)
- Great Blue Heron (GBHE)
- Grizzly Bear (URAR)
- Little Brown Myotis (MYLU)
- Marbled Murrelet (MAMU)
- Northern Goshawk (NOGO)
- Western Toad (ANBO)

**Wetland Percentage of Ecosystem**

- <= 50
- 51 - 80
- 81 - 100

— Watercourse (Project-Mapped)

Vegetation and Wetlands Local Study Area

Vegetation and Wetlands Regional Study Area


Watershed

International Boundary

Topographic Contour

Waterbody

0 200 400 600 800 m  
1:20,000 (at original document size of 8.5x11)



Project Location: Pearse Island, BC

Project Number: 123221820  
Prepared by TQUILICHINI on 20220611  
Requested by MONEIL on 20220605  
Checked by SMOSS on 20220613

Client/Project/Report  
Ksi Lisims LNG  
Natural Gas Liquefaction and Marine Terminal  
Technical Data Report - Vegetation and Wetlands

Figure No.  
**4.2-5**

Title  
**Wetlands and Wetland Wildlife Species at Risk Observations in the RSA**

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Field Studies and Terrestrial Ecosystem Mapping  
June 2024

**Table 4.2–8 Wetland Communities in the LSA and RSA**

Ecosystem Type	Site Series	Map Code	Ecological Community	Structural Stage	BC CDC Status	LSA		RSA		
						Area (ha)	%	Area (ha)	%	
<b>Wetland (Freshwater) Realm</b>										
Bog	CWHvh2/11	YG	western redcedar - yellow-cedar / spleenwort-leaved goldthread	3	Yellow	0.0	0	0.2	<1	
				5		2.7	1	6.1	1	
				6		0.9	<1	0.9	<1	
				7		9.3	3	44.6	7	
	<i>Subtotal CWHvh2/11</i>						12.9	5	51.8	9
	CWHvh2/Wb51	BG	shore pine - black crowberry - tough peat-moss	2	Yellow	7.2	3	23.7	4	
				3		15.1	5	22.6	4	
	<i>Subtotal CWHvh2/Wb51</i>						22.2	8	46.3	8
	CWHvh2/Wb53	LS	shore pine - yellow-cedar / tufted clubrush	2	Yellow	5.3	2	6.1	1	
				3		4.9	2	32.4	5	
<i>Subtotal CWHvh2/Wb53</i>						10.2	4	38.5	6	
<b>Total Bog</b>						<b>45.3</b>	<b>16</b>	<b>136.6</b>	<b>23</b>	
Swamp	CWHvh2/Ws00	WS	swamp wetland	3	N/A <sup>1</sup>	0.4	<1	0.4	<1	
	CWHvh2/13 (Ws54)	RC	western redcedar - Sitka spruce / skunk cabbage	3	N/A <sup>2</sup>	0.7	<1	0.7	<1	
				5	Blue	1.0	<1	1.0	<1	
				6		0.3	<1	10.2	2	
				7		30.0	11	37.4	6	
<i>Subtotal CWHvh2/13 (Ws54)</i>						32.0	11	49.3	8	
<b>Total Swamp</b>						<b>32.3</b>	<b>11</b>	<b>49.7</b>	<b>8</b>	



Field Studies and Terrestrial Ecosystem Mapping  
June 2024

**Table 4.2–8 Wetland Communities in the LSA and RSA**

Ecosystem Type	Site Series	Map Code	Ecological Community	Structural Stage	BC CDC Status	LSA		RSA	
						Area (ha)	%	Area (ha)	%
Shallow Open Water	CWHvh2/Ww00	OW	shallow open water wetland	N/A	N/A <sup>1</sup>	1.6	1	1.6	<1
<b>Total Shallow Open Water</b>						<b>1.6</b>	<b>1</b>	<b>1.6</b>	<b>&lt;1</b>
<b>Total Wetlands (Freshwater) Realm</b>						<b>79.2</b>	<b>28</b>	<b>187.9</b>	<b>31</b>
<b>Estuarine Realm Wetlands</b>									
Estuarine Meadow	CWHvh2/Ed01	DH	tufted hairgrass – meadow barley estuarine meadow	2	Red	4.2	1	4.7	1
	CWHvh2/Ed03	DR	Arctic rush – Alaska plantain estuarine meadow	2	Red	0.4	<1	0.4	<1
<b>Total Estuarine Meadow Wetlands</b>						<b>4.6</b>	<b>1.0</b>	<b>5.1</b>	<b>1.0</b>
Estuarine Marsh	CWHvh2/Em05	ML	Lyngbye’s sedge estuarine marsh	2	Red	1.6	1	1.6	<1
	CWHvh2/Et00	EG	Intertidal eelgrass beds	2	N/A <sup>1</sup>	0.1	<1	0.1	<1
<b>Total Estuarine Marsh Wetlands</b>						<b>1.7</b>	<b>1.0</b>	<b>1.7</b>	<b>&lt;1</b>
<b>Estuarine Realm Wetlands Total</b>						<b>6.3</b>	<b>2</b>	<b>6.7</b>	<b>1</b>
<b>Marine Realm Wetlands</b>									
Tidal Water	CWHvh2/Ia00	IA	inundated tidal area	N/A	N/A <sup>1</sup>	35.4	12	42.2	7
	CWHvh2/Iu00	UC	tidal water – gravel/cobble/boulder	N/A	N/A <sup>1</sup>	19.7	7	22.3	4
	CWHvh2/Iu00	uCf	tidal water – mudflat/sandflat	N/A	N/A <sup>1</sup>	2.4	1	2.4	<1
<b>Marine Realm Wetlands Total</b>						<b>57.5</b>	<b>20</b>	<b>66.9</b>	<b>11</b>
<b>Total Wetlands</b>						<b>143.0</b>	<b>50</b>	<b>261.5</b>	<b>44</b>
NOTES:									
N/A – Not applicable									
Totals may not sum due to rounding.									
<sup>1</sup> The conservation status of these ecological communities are not tracked by the BC CDC.									
<sup>2</sup> These areas are unlikely to support the plant assemblage of the listed community.									



## TECHNICAL DATA REPORT—VEGETATION AND WETLANDS KSI LISIMS LNG PROJECT



Field Studies and Terrestrial Ecosystem Mapping  
June 2024

1 Bogs are wetlands characterized by the accumulation of peat, most frequently dominated by  
2 *Sphagnum* mosses with tree, shrub, or treeless vegetation cover (NWWG 1997). They receive water  
3 almost exclusively from precipitation, leading to poor nutrient conditions. Blanket bogs are a  
4 common wetland form on the north coast of BC (Banner. et al. 1993 due to high rainfall on sloping terrain  
5 (NWWG 1997). Bog complexes in the LSA and RSA are composed of a combination of open/herbaceous,  
6 shrubby, and treed structural stages. Bogs cover 45.3 ha of the LSA (16%) and 136.6 ha of the RSA  
7 (23%). Bog communities observed in the LSA and RSA include the western redcedar - yellow-cedar /  
8 spleenwort-leaved goldthread bog woodland (site series 11), shore pine - black crowberry –  
9 tough peat-moss (Wb51), and the shore pine - yellow-cedar / tufted clubrush (Wb53). Shore pine –  
10 black crowberry - tough peat-moss bog (Wb51) is the most common bog community in the LSA with  
11 22.2 ha (8%). Western redcedar - yellow-cedar / spleenwort-leaved goldthread (site series 11) is the most  
12 common wetland and bog community in the RSA with 51.8 ha (9%).

13 Swamps are forested or wooded wetlands that are characterized by trees or tall shrubs and are  
14 influenced by nutrient rich groundwater and either mineral or organic soils (NWWG 1997). Swamps  
15 comprise 32.3 ha (11%) of the LSA and 49.7 ha (8%) of the RSA. The western redcedar – Sitka spruce /  
16 skunk cabbage treed swamp (site series 13/Ws54) is the most common wetland community in the LSA.  
17 Uncorrelated shrubby swamp wetland occupies 0.4 ha (<1%) of both the LSA and RSA.

18 Shallow open water (freshwater) wetlands are transitional between those “that are saturated or  
19 seasonally wet (i.e., bog, fen, marsh and swamp) and permanent, deep water bodies” (e.g., lakes)  
20 (NWWG 1997). They have standing or flowing water less than 2 m deep in mid-summer. Open water  
21 occupies more than 75% of the surface area. Shallow open water communities cover 1.6 ha (1%) of the  
22 LSA and 1.6 ha (<1%) of the RSA. They are localized to open pools within two of the largest bog  
23 complexes in the LSA (Figure 4.2–2, page 5 and 6). While field plots observed these communities to have  
24 some sparse aquatic vegetation at the fringes, most of the area is unvegetated.

25 Estuarine ecosystems are intertidal communities that occur at the confluence of a freshwater source and  
26 the marine environment and are regularly flooded by brackish tidal waters (MacKenzie and Moran 2004).  
27 Estuarine wetlands occur in small patches along the shoreline of the LSA and RSA and cover 6.3 ha (2%)  
28 of the LSA and 6.7 ha (1%) of the RSA. Estuarine wetlands include three red-listed estuarine meadow  
29 and marsh communities, as well as intertidal eelgrass beds. These estuarine communities are noted by  
30 Mackenzie and Moran (2004) as occurring in brackish conditions. Estuarine communities occur most  
31 frequently where watercourses empty into the sea, but some are associated with freshwater seepage  
32 (Figure 4.2–2, pages 3 through 7). Estuarine communities occur all along the edges of Whiskey Bay and  
33 within inlets connecting to large wetland complexes. Small intertidal eelgrass beds were mapped in  
34 Whiskey Bay and the west side of Pearse Island, but not on the east side of Pearse Island (Figure 4.2–2  
35 page 5; see also Marine Resources TDR, Appendix 7.9A). Intertidal eelgrass beds occur at two locations  
36 in the LSA and comprise 0.1 ha (<1%) of both the LSA and RSA.



**TECHNICAL DATA REPORT—VEGETATION AND WETLANDS  
KSI LISIMS LNG PROJECT**



Field Studies and Terrestrial Ecosystem Mapping  
June 2024

- 1 Tidal water wetlands occur in the intertidal zone of the sea coast (NWWG 1997). These wetlands are
- 2 saline or brackish and occur within coastal zones where the mean tide water level is less than 2 m deep
- 3 (NWWG 1997). Tidal water wetlands occupy 57.5 ha (20%) of the LSA and 67.0 ha (11%) of the RSA.
- 4 Tidal water wetland occurs in the area with unconsolidated sediment (non-bedrock) below the higher high
- 5 water tide mark and above 2 m below mean tide. These include wetlands with boulder/gravel/cobble
- 6 substrates, unknown substrates, and mudflat/sandflats. Mudflats/sand flats occur exclusively in
- 7 Whiskey Bay and cover 2.4 ha (1%) of the LSA and 2.4% (<1%) of the RSA.
  
- 8 Wetlands in the Vegetation and Wetlands LSA and RSA have the potential to provide wetland functions
- 9 including hydrological, biogeochemical, and habitat functions (Hanson et al. 2008). Wetlands that are
- 10 intact (i.e., not disturbed) and have intact contributing areas, generally provide more functions than
- 11 disturbed wetlands or wetlands located in a disturbed context. Wetland functions provided by each
- 12 wetland class and association mapped in the LSA and RSA are summarized in Table 4.2–9. Additional
- 13 information regarding wildlife habitat suitability ratings for wetland associated wildlife species or faunal
- 14 groups is available in the Wildlife and Wildlife Habitat TDR (Appendix 7.07A).
  
- 15



**Table 4.2–9 Wetland Functions Provided by Each Class and Site Association**

Wetland Functions		Wetland Realm/Class and Association												
		Wetland (Freshwater) Realm						Estuarine Realm				Marine Realm (Tidal Water)		
		Bog			Swamp		Shallow Open Water	Meadow		Marsh		Shallow Open Water		
		11	Wb51	Wb53	Ws00	13 (Ws54)	Ww00	Ed01	Ed03	Em05	Et00 - eelgrass	la00 - inundated	lu00 – gravel / cobble / boulder	lu00 – mudflat / sandflat
Field Plots (Prefix DP21)		074, 085, 091	041, 042, 067, 068, 086, 092, 096, 100, 103, 104	070, 075, 078, 107	-	040, 049, 065, 077, 081, 093, 095, 102	099, 101	039,043, 044, 046, 050, 059, 060, 062, 063, 071, 080, 089, 094	048	038, 045, 047, 061	-	-	-	-
Biogeochemical	Water Quality Improvement to Downstream Waterbodies	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N	N
	Nutrient Cycling/ Transformation	N	N	N	Y	Y	N	Y	Y	Y	Y	Y	Y	Y
	Carbon Sequestration (Climate)	Y	Y	Y	Y	Y	N	Y	Y	Y	N	N	N	N
Hydrological	Water Flow Moderation (reduced velocity or dissipation of energy) and/or Erosion Protection (including coastal shoreline)	N	N	N	Y	Y	Y	Y	Y	Y	Y	N	N	N
	Baseflow Augmentation	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N	N
Habitat	Plant Species and Ecological Communities of Conservation Concern	N	N	N	N	Y	N	Y	Y	Y	N	N	N	N
	Grizzly bear spring foraging <sup>1</sup>	Y (3)	Y (2)	Y (2)	Y (2)	Y (1)	N (6)	Y (3)	Y (3)	Y (1)	Y (3)	Y (3)	N (6)	Y (3)
	Grizzly bear fall foraging <sup>1</sup>	Y (2)	N (4)	N (5)	Y (3)	Y (1)	N (6)	N (5)	N (5)	N (4)	Y (3)	Y (3)	N (6)	Y (3)
	Moose winter foraging <sup>1</sup>	N (4)	N (4)	N (6)	N (4)	Y (2)	N (6)	N (6)	N (6)	N (6)	N (6)	N (6)	N (6)	N (6)
	Pacific marten year-round living <sup>2</sup>	N (3)	N (4)	N (4)	N (4)	N (3)	N (4)	N (4)	N (4)	N (4)	N (4)	N (4)	N (4)	N (4)
	Western screech-owl breeding <sup>2</sup>	Y (2)	N (4)	N (4)	N (4)	Y (2)	N (4)	N (4)	N (4)	N (4)	N (4)	N (4)	N (4)	N (4)
	Northern goshawk breeding <sup>3</sup>	M	M	M	N	M	N	N	N	N	N	N	N	N
Marbled murrelet breeding <sup>2</sup>	Y (3)	N (4)	N (4)	N (4)	Y (3)	N (4)	N (4)	N (4)	N (4)	N (4)	N (4)	N (4)	N (4)	



Table 4.2–9 Wetland Functions Provided by Each Class and Site Association

Wetland Functions		Wetland Realm/Class and Association												
		Wetland (Freshwater) Realm					Estuarine Realm				Marine Realm (Tidal Water)			
		Bog		Swamp		Shallow Open Water	Meadow		Marsh		Shallow Open Water			
		11	Wb51	Wb53	Ws00	13 (Ws54)	Ww00	Ed01	Ed03	Em05	Et00 - eelgrass	la00 - inundated	lu00 – gravel / cobble / boulder	lu00 – mudflat / sandflat
Habitat (cont'd)	Wetland bird community breeding <sup>2</sup>	Y (2)	Y (2)	Y (2)	Y (2)	Y (2)	N (3)	Y (1)	Y (1)	Y (1)	N (4)	N (4)	N (4)	N (4)
	Western toad breeding <sup>2</sup>	N (3)	N (3)	N (3)	Y (2)	N (3)	Y (1)	N (4)	N (4)	N (4)	N (4)	N (4)	N (4)	N (4)
	Bat roosting or foraging*	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Shorebird breeding, resting and foraging*	N	N	N	N	N	N	N	N	N	N	Y	Y	Y
	Marine bird foraging*	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y
	Bald eagle foraging*	N	N	N	N	N	N	N	N	N	N	Y	Y	Y
	Wildlife Species at Risk Habitat*	URAR GBHE* WSOW ANBO*	URAR ANBO* URAR* MYLU*	URAR ANBO*	URAR ANBO	URAR WSOW MYLU* ANBO*	ANBO	URAR GBHE* MYLU*	URAR	URAR ANBO*	URAR	URAR MAMU*	GBHE* MAMU*	URAR

NOTES:  
<sup>1</sup> - 4-class rating system: 1 – high; 4– nil. Ratings of 1 or 2 are considered effective habitat.  
<sup>2</sup> - 6-class rating system: 1 – high; 6 – nil. Ratings of 1, 2, or 3 are considered effective habitat.  
<sup>3</sup> - Northern goshawk *laingi* – M – moderate; N – nil.  
Wildlife habitat suitability ratings are the highest potential for each wetland association, compared to the best habitat in the province and may not reflect final ratings once additional rules (e.g., distance from edges) are applied. A low suitability rating for a wetland association does not mean that a species will not use the habitat.  
Species Codes: GBHE – great blue heron; URAR – grizzly bear; WSOW – western screech-owl, *kennicotti* subspecies; MYLU – little brown myotis; ANBO - western toad.  
\* Indicates that the species or group was observed in the field and interpretation of the habitat it was using have been made.



#### 1 4.2.7.1 Biogeochemical Functions

2 Wetlands of the LSA have the potential to provide several biogeochemical functions (Table 4.2–9).  
3 Biogeochemical wetland functions include improvement of water quality to downstream waterbodies by  
4 removing nutrients and contaminants, nutrient cycling or transformation, and the capture and storage of  
5 atmospheric carbon (climate functions) (Hanson et al. 2008).

6 Most of the bog, swamp, and freshwater open water wetlands of the LSA are palustrine overflow hollows  
7 and overflow basins with outlets but no inlets and therefore have some potential to improve water quality  
8 to downstream waterbodies due to their hydrological connection (Table 4.2–9). Three bogs on the east  
9 side of the LSA have no inlets or outlets, and therefore cannot provide this function (Figure 4.2–5).  
10 The stagnant to sluggish lateral surface water movement (i.e., hydrodynamic index) and lack of  
11 surface water of bogs reduces the potential for bogs to improve water quality for downstream  
12 waterbodies. The moderate to very dynamic lateral surface water movement (i.e., hydrodynamic index)  
13 and presence of dense woody or herbaceous emergent vegetation typical of swamps and estuarine  
14 marshes/meadows contributes to the potential to provide this function. The presence of organic soils in  
15 bogs and swamps increases the potential for wetlands to improve water quality to downstream  
16 waterbodies. Shallow open water wetlands also have the potential to provide water quality treatment,  
17 due to settling of sediment in basins. The location of many wetlands relatively low in the watersheds of  
18 the LSA, particularly estuarine and tidal water wetlands (Figure 4.2–5), limits the opportunity for many  
19 wetlands of the LSA to improve water quality of downstream waterbodies because the only downstream  
20 waterbody is the sea.

21 Nutrient cycling and transformation functions are potentially provided by swamps, estuarine  
22 marshes/meadows, and tidal water wetlands of the LSA due to alternating periods of inundation and  
23 drying which can create alternating oxic and anoxic soils that contribute to denitrification (Table 4.2–9).  
24 In swamps this occurs through seasonal drawdown, and in estuarine wetlands and marine tidal water  
25 wetlands this occurs through tidal cycles. The high total vegetation cover in the tree, shrub, and  
26 herbaceous layers of the swamps in the LSA also contribute to the potential to provide nutrient cycling  
27 through conversion of nutrients to biomass. The bogs of the LSA and the open water wetlands embedded  
28 within them have a more stable hydroperiod and low total vegetation cover and productivity, and therefore  
29 low potential to cycle and transform nutrients.

30 Carbon sequestration functions are potentially provided by the bogs, swamps, and estuarine wetlands of  
31 the LSA (Table 4.2–9). Bogs store large amounts of carbon in their peat layers. Peat sampled in bogs  
32 during field work ranged from 64 cm to 161 cm deep and were likely deeper in some locations. Swamps  
33 in the LSA sequester carbon in trees (particularly mature or old forest). Nearly all the swamps in the LSA  
34 are old forest structural stage (Table 4.2–8). Estuarine wetlands in the Pacific Northwest are effective at  
35 sequestering carbon, however temperate eelgrass beds are less so (Douglas et al. 2022;  
36 Prentice et al. 2020). Open water wetlands and tidal water wetlands have neither peat nor woody  
37 biomass, and therefore have limited potential to sequester carbon.



#### 1 4.2.7.2 Hydrological Functions

2 Wetlands of the LSA have the potential to provide hydrological functions (Table 4.2–8), which include  
3 water flow moderation to downstream waterbodies and/or erosion protection, as well as baseflow  
4 augmentation (i.e., ability to prolong surface water flow in headwater streams during seasonally dry  
5 periods) (Hanson et al. 2008; Adamus 2016). Erosion protection is provided both by capturing and storing  
6 excess water during storms or during floods, reducing the velocity of surface water, and dissipating the  
7 energy in moving water, including along coastal shorelines (Hanson et al. 2008).

8 Water flow moderation to downstream waterbodies and/or erosion protection functions are potentially  
9 provided by swamps, shallow open water wetlands, and estuarine communities (Table 4.2–8). Wetlands  
10 higher in the watershed that are large relative to their contributing watershed area and more dynamic,  
11 have a higher potential to perform this function than those located lower in the watershed or that are small  
12 relative to the contributing watershed and are less dynamic. Several wetland complexes in the LSA are  
13 large in size relative to watershed size; in particular, the central wetland complex that empties into  
14 Whiskey Bay is nearly the same size as the watershed (Figure 4.2–5), while the isolated bog wetlands on  
15 the east shore of Pearse Island are small in comparison to watershed size, reducing their potential to  
16 perform this function. Additionally, the location of wetlands relatively low in the larger watersheds of the  
17 LSA and the location of watersheds next to the sea (Figure 4.2–5) limits the opportunity for wetlands to  
18 moderate flows to downstream waterbodies. Swamps in the LSA have a moderate to very dynamic  
19 hydrodynamic index and dense woody and herbaceous emergent vegetation, which contributes to their  
20 potential to moderate flows, while the open water wetlands have little emergent vegetation to slow waters  
21 but store permanent standing water in basins which contributes to their ability to moderate flows.  
22 The swamps in the LSA that are located in flat areas have greater potential to moderate flows than those  
23 located on slopes. Bogs have little potential to moderate water flows, as they typically do not receive  
24 surface water flows.

25 Estuarine wetlands in the LSA that are shallow or have rough texture have the potential to protect the  
26 coastal shoreline from erosion by absorbing the erosive forces of storm surges along marine shorelines,  
27 given their location in the landscape and plant species/structure (i.e., primarily dense graminoid species  
28 that dissipate the energy and stabilize sediment). However, the small size of estuarine wetlands in the  
29 LSA limit the opportunity for wetlands to perform this service. Tidal water wetlands have little potential to  
30 moderate flows to downstream waterbodies or protect the coastal shoreline from erosion as they are  
31 unvegetated.

32 Baseflow augmentation is potentially provided by bog, swamp, and shallow open water wetlands in the  
33 LSA (Table 4.2–8). The location of wetlands in the watershed and size of wetlands in comparison to  
34 watershed size are described above for water flow moderation. Most of the bog, swamp, and shallow  
35 open water wetlands of the LSA are palustrine overflow hollows and overflow basins with outlets, and  
36 therefore have some potential to augment baseflows of the watercourses they are connected to.  
37 The blanket bogs of the LSA have the capacity to hold water in their peat layers, while shallow open  
38 water wetlands hold water in their basins and discharge it slowly. Estuarine and tidal water wetlands store  
39 water for (at most) a few hours and thus are unlikely to have measurable effects on the amount of  
40 marine water (Adamus 2012).



### 1 4.2.7.3 Habitat Functions

2 Habitat functions include the capacity of wetlands to support the biodiversity of the LSA and RSA by  
3 providing specific life history requisites for certain plant or animal species or faunal groups  
4 (Hanson et al. 2008). Habitat functions include foraging and year-round living habitat for wetland  
5 associated mammals; roosting and foraging for bat species; breeding and foraging habitat for birds;  
6 breeding, foraging, and dispersal for amphibians; habitat supporting wildlife species at risk<sup>1</sup>; as well as  
7 freshwater fish, marine fish, and invertebrates. Habitat for freshwater fish, marine fish, and invertebrates  
8 are discussed in their respective TDRs (Freshwater Fish and Fish Habitat TDR - Appendix 7.8A,  
9 Marine Resources TDR – Appendix 7.9A). Subtidal eelgrass beds (deeper than 2 m below mean tide) are  
10 discussed in the Marine Resources TDR - Appendix 7.9A. The capacity of a wetland to support a given  
11 wildlife species, faunal group, or plant species depends on such attributes as the presence/absence,  
12 depth, and duration of surface water; vegetation structure and cover; surface water pH or salinity; and  
13 adjacent habitat and/or wetland buffers. Wetland habitat functions include the ability to support red- or  
14 blue-listed ecological communities and plant species; wildlife species, including provincially- and/or  
15 federally-listed wildlife species; and Indigenous use species. Information regarding wetland habitat and  
16 habitat functions for wildlife was collected from the Wildlife and Wildlife Habitat TDR (Appendix 7.7A).

### 17 Plant Species and Ecological Communities of Conservation Concern

18 There are three red-listed and one blue-listed wetland communities present in the LSA (Table 4.2–8).  
19 The red-listed arctic daisy was associated with red-listed tufted hairgrass - meadow barley estuarine  
20 meadows (CWHvh2/Ed01). Wetlands provide habitat for several of the species of interest to the  
21 Nisga'a Nation and other Indigenous groups including western redcedar, yellow-cedar, Labrador tea,  
22 green false-hellebore, several blueberry species, as well as freshwater aquatic species. Intertidal  
23 eelgrass beds are of conservation concern and occur in two locations in the LSA.

### 24 Mammals

25 Wetlands in the Vegetation and Wetlands LSA and RSA provide habitat for mammals. Key species and  
26 species groups of mammals that use wetland habitats (as defined in the Wildlife and Wildlife Habitat TDR;  
27 Appendix 7.7A) include grizzly bear (*Ursus arctos*), black bear (*Ursus americanus*), grey wolf  
28 (*Canis lupus*), Pacific marten (*Martes caurina*), moose (*Alces alces*), black-tailed deer (*Odocoileus*  
29 *hemionus*), and bats. Surveys and incidental sightings or sign of these key species were observed during  
30 field studies. Beaver (*Castor canadensis*) dams were noted in shore pine / black crowberry /  
31 tough peat-moss bogs (Wb51) and shallow open water wetlands (Ww00) during fieldwork  
32 (Appendix 7.7A). North American river otter (*Lontra canadensis*) were also detected incidentally from  
33 marine vessels; they use marine and freshwater wetland habitats. A desktop review identified several  
34 other mammal species that potentially use wetland habitats in the Vegetation and Wetlands LSA and  
35 RSA (Appendix 7.7A).

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<sup>1</sup> Designated endangered, threatened, or special concern by the Committee of the Status of Endangered Wildlife in Canada (COSEWIC) or designated under Schedule 1 of the federal *Species at Risk Act* (SARA).



- 1 Forested wetlands provide low (ineffective) to moderate (effective) suitability year-round living habitat for  
2 Pacific marten depending on structural stage (Appendix 7.7A), with old forest with complex physical  
3 structure providing higher value habitat (Buskirk and Zielinski 1997; USFWS 2018).
- 4 Wetlands in the Vegetation and Wetlands LSA and RSA provide spring and fall foraging habitat for  
5 grizzly bear, designated as special concern under the *Species at Risk Act* (**SARA**) and designated as a  
6 species under the Nisga'a Treaty for which there are specific Nisga'a allocations for harvesting  
7 (NLG 2015; Appendix 7.7A). Spring forage preferred species (e.g., sedges, skunk cabbage, shrub roots,  
8 and horsetails [*Equisetum* spp.]) and fall forage species (e.g., cow parsnip, horsetail, nettle, and a variety  
9 of berry-producing species; BC MWLAP 2004) are common in wetlands of the Vegetation and Wetlands  
10 LSA and RSA.
- 11 Wetlands in the Vegetation and Wetlands LSA and RSA provide foraging and/or roosting habitat for bats  
12 (Appendix 7.7A). Bats use forested habitat with larger trees (mature and older forests) for summer  
13 roosting. Foraging habitat is typically open areas where swarms of flying insects congregate, including  
14 over water bodies and meadows. Several species, including little brown myotis (*Myotis lucifugus*;  
15 designated as endangered on Schedule 1 of SARA) hibernate over the winter and may occur year-round  
16 in the Vegetation and Wetlands LSA and RSA (Appendix 7.7A; Kaleigh et al. 2013).
- 17 Bat acoustic recorder surveys detected little brown myotis in estuarine wetland habitat, open water  
18 wetland, and bog wetland (Appendix 7.7A). Other bat species, including hoary bat (*Lasiurus cinereus*),  
19 silver-haired bat (*Lasionycteris noctivagans*), big brown bat (*Eptesicus fuscus*), long-eared myotis  
20 (*Myotis evotis*), long-legged myotis (*Myotis volans*), California myotis (*Myotis californicus*), and  
21 Yuma myotis (*Myotis yumanensis*) were also recorded using the same wetland habitat types  
22 (Appendix 7.7A). No maternity roosts or hibernacula have been documented in the Vegetation and  
23 Wetlands LSA and RSA.
- 24 Northern myotis (*Myotis septentrionalis*; designated as endangered on Schedule 1 of SARA) is known to  
25 use wetland habitats and its range overlaps with the Vegetation and Wetlands LSA and RSA, and it is  
26 likely to be present despite not being documented during field studies (Appendix B of the Wildlife and  
27 Wildlife Habitat TDR; Appendix 7.7A).

## 28 **Birds**

- 29 Wetlands in the Vegetation and Wetlands LSA and RSA provide breeding and roosting, and foraging  
30 habitat for birds, including migratory songbirds, raptors, shorebirds, and gulls. Twenty-six species of birds  
31 were recorded during breeding bird surveys in freshwater wetlands, including grouse, shorebirds, hawks,  
32 songbirds, and woodpeckers (Appendix 7.7A). No species of conservation concern were detected during  
33 breeding bird surveys.



1 Marine and estuarine wetlands provide important breeding and foraging habitats for marine birds and  
2 shorebirds. Shore-based surveys undertaken within a 300 m radius from the observation point  
3 (Appendix 7.7A) recorded 33 bird species (some of which were also observed during breeding bird  
4 surveys). Species observed include two species at risk: marbled murrelet (*Brachyramphus marmoratus*,  
5 SARA-listed as threatened), and great blue heron *fannini* subspecies (*Ardea herodias fannini*;  
6 SARA-listed as special concern). Three shorebird species (western sandpiper [*Calidris mauri*], greater  
7 yellowlegs [*Tringa melanoleuca*], least sandpiper [*Calidris minutilla*]) were detected, as well as bald eagle  
8 (*Haliaeetus leucocephalus*), gulls, loons, and songbirds (Appendix 7.7A). Given that the survey included  
9 up to 300 m away from shore, some of these birds, particularly seabirds, were likely using deeper marine  
10 habitat outside of the estuarine and tidal water wetlands mapped in the RSA (i.e., beyond 2 m below  
11 mean tide). Bird species most likely to be using tidal water and estuarine wetland habitats include  
12 shorebirds, great blue heron, and gulls. The sand, mud, and gravel flats of Whiskey Bay are tidal water  
13 wetlands that provide important habitats for shorebirds.

14 Marine and estuarine habitats provide important foraging habitats during migration. Fall migration surveys  
15 detected 20 species of birds in the nearshore environment (59 to 291 m from shore), which includes  
16 marine wetlands (Appendix 7.7A). Intertidal eelgrass beds support birds by providing a direct food source,  
17 where eelgrass shoots are directly consumed. Eelgrass beds are also known to increase both the  
18 abundance and diversity of benthic invertebrates, which also provides an indirect food source for marine  
19 birds (Unsworth et al., 2021; see also the Marine Resources TDR – Appendix 7.9A). No field data was  
20 collected regarding wildlife use of eelgrass beds, however brant (*Branta bernicla*) depend on eelgrass  
21 and were confirmed present in the Wildlife and Wildlife Habitat Marine Terminal RSA (Appendix 7.7A).

22 Wetlands in the Vegetation and Wetlands LSA and RSA provide habitat for several bird species, including  
23 species at risk. Wildlife habitat suitability models were completed for several bird species or groups that  
24 use wetland habitats (Appendix 7.9A). Models were run for western screech-owl (*Megascops kennicottii*  
25 *kennicottii*), northern goshawk (*Accipiter gentilis laingi*), marbled murrelet, and the wetland bird  
26 community (breeding) comprised of 19 bird species including 2 species at risk: olive-sided flycatcher  
27 (*Contopus cooperi*) and barn swallow (*Hirundo rustica*).

28 Western screech-owl, *kennicottii* subspecies, designated as threatened on Schedule 1 of SARA, breeding  
29 (and roosting) habitat is primarily located in low-elevation mature-to-old coniferous or mixed forest  
30 (i.e., structural stages 5 to 7), and typically near a riparian area (COSEWIC 2012b; BC MOE 2013)..  
31 Western screech-owl was not detected during nocturnal raptor call-playback surveys or incidentally.  
32 Mature and old forest bogs and swamps in the Vegetation and Wetlands LSA and RSA provide effective  
33 (i.e., moderate) suitability breeding habitat for western screech-owl (Appendix 7.7A).

34 Northern goshawk, designated as threatened on Schedule 1 of SARA, forage and nest in mature to  
35 old coniferous forest, with complex canopy structure (Mahon et al. 2019). They prefer to nest away from  
36 canopy edges (COSEWIC 2013). Based on habitat suitability modelling, mature and old forest wetlands in  
37 the Vegetation and Wetlands LSA and RSA provide some effective (i.e., moderate) nesting and foraging  
38 habitat dependent on other structural characteristics. Northern goshawk was detected in one forested  
39 upland location in the Vegetation and Wetlands LSA and RSA during call-playback surveys  
40 (Appendix 7.7A).



Field Studies and Terrestrial Ecosystem Mapping  
June 2024

1 The Terrestrial Wildlife LSA overlaps with 202 ha of geographic location polygons which identify area that  
2 may contain terrestrial (nesting) critical habitat for marbled murrelet (ECCC 2021). Old forest wetlands in  
3 the Vegetation and Wetlands LSA and RSA provide effective (i.e., moderate) suitability nesting habitat for  
4 marbled murrelet in some treed swamps and bogs according to habitat suitability modelling  
5 (Appendix 7.7A). Some treed wetlands, particularly in the bogs of the LSA, do not have trees with large  
6 enough limbs (15-74 cm in diameter with thick epiphytic cover) to support nesting (ECCC 2021).

7 The wetland bird community requires aquatic environments for some, or all, of their life requisites  
8 (e.g., nesting, foraging, migration staging/stop-over). Great blue heron, *fannini* subspecies, forage in  
9 freshwater and brackish marshes and along marine shorelines (COSEWIC 2008), both of which exist in  
10 the Projects' LSA and RSA. Olive-sided flycatcher, designated as special concern on Schedule 1 of  
11 SARA, breeds in forest edges adjacent to bogs and marshes, particularly in old forest (Altman and  
12 Sallabanks 2020). Barn swallow, designated as threatened on Schedule 1 of SARA, forage in open  
13 areas, frequently wetlands, where insect prey is abundant (COSEWIC 2011) and require a source of mud  
14 provided by wet areas, like wetlands, for nest-building (COSEWIC 2011). Great blue heron, *fannini*  
15 subspecies was observed during shore-based surveys using tidal water and estuarine wetlands.  
16 Olive-sided flycatcher and barn swallow were not observed during field studies. Overall wetland bird  
17 community breeding habitat suitability was rated high for estuarine wetlands, and high to moderate for  
18 permanent shallow open water wetlands. Marshes, and shallow open water were rated higher than bogs.  
19 A total of 0.1 ha of the effective habitat in the Terrestrial Wildlife LSA was rated as high suitability, and  
20 161.6 ha was rated as moderate suitability. Together this represents 31.3% of the Terrestrial Wildlife LSA  
21 (approximately equal to the Vegetation and Wetlands RSA; Appendix 7.7A).

22 Black swift (*Cypseloides niger*), designated as endangered on Schedule 1 of SARA, was detected once,  
23 incidentally, on the eastern side of Pearse Island (Appendix 7.7A). Black swift forage over forested, open,  
24 and marine habitat (Gunn et al. 2021) and the Vegetation and Wetlands LSA and RSA support wetland  
25 foraging habitat for this species.

26 A further three wildlife species at risk which are known to use wetland habitats and have ranges  
27 overlapping with the Vegetation and Wetlands LSA and RSA are identified by Appendix B of the  
28 Wildlife and Wildlife Habitat TDR (Appendix 7.7A). These include lesser yellowlegs (*Tringa flavipes*),  
29 band-tailed pigeon (*Patagioenas fasciata*), and peregrine falcon, *pealei* subspecies (*Falco peregrinus*  
30 *pealei*). Lesser yellowlegs is a shorebird that uses wetland and marine shorelines for foraging, resting,  
31 and breeding. Band-tailed pigeon, designated as Special Concern on Schedule 1 of SARA, uses intertidal  
32 areas for salts and grit (COSEWIC 2021). Peregrine falcon, *pealei* subspecies, designated as  
33 endangered on Schedule 1 of SARA, typically forages in open habitat which can include wetlands  
34 (White et al. 2020).

### 35 **Amphibians**

36 Wetlands in the Vegetation and Wetlands LSA and RSA provide breeding habitat for amphibians, as well  
37 as habitat for other functions including dispersal, living, and hibernating. Western toad (*Anaxyrus boreas*;  
38 designated as special concern on Schedule 1 of SARA) adults and juveniles and northwestern  
39 salamander (*Ambystoma gracile*) larvae and eggs were detected in 10 open water wetlands and bogs



1 during amphibian surveys (Appendix 7.7A). For breeding, western toad requires open, standing water that  
2 persists for the duration of the aquatic development period (COSEWIC 2012). Dispersal, living, and  
3 hibernating habitat is also assumed to be present based on the intact nature of the wetlands and  
4 surrounding upland forests in the Vegetation and Wetlands LSA and RSA. Habitat suitability modelling  
5 identified a total of 2.5 ha of effective western toad breeding habitat in shallow open water wetlands, and  
6 swamps in the Vegetation and Wetlands RSA (Appendix 7.7A).

## 7 **Wildlife Species at Risk**

8 Wetlands in the Vegetation and Wetlands LSA and RSA provide habitat for seven SARA-listed wildlife  
9 species at risk documented during field studies (Appendix 7.7A) including:

- 10 • grizzly bear (Appendix 7.7A modelled habitat suitability)
- 11 • little brown myotis
- 12 • northern goshawk (Appendix 7.7A modelled habitat suitability)
- 13 • marbled murrelet (Appendix 7.7A modelled habitat suitability)
- 14 • great blue heron, *fannini* subspecies (Appendix 7.7A modelled habitat suitability in the wetland bird  
15 community model)
- 16 • black swift
- 17 • western toad (Appendix 7.7A modelled habitat suitability)

18 Figure 4.2–5 displays the spatial locations of wildlife species at risk which use wetland habitats that were  
19 documented during field studies overlaid with mapped wetlands in the Vegetation and Wetlands LSA and  
20 RSA. Spatial locations were collected during wildlife and wildlife habitat field studies, as well as incidental  
21 observations from other discipline field studies.

22 Habitat suitability models rate wetlands in the Vegetation and Wetlands LSA and RSA as effective habitat  
23 for an additional three SARA-listed wildlife species at risk (Appendix 7.7A) including:

- 24 • western screech-owl, *kennicottii* subspecies
- 25 • olive-sided flycatcher (included in wetland bird community model)
- 26 • barn swallow (included in wetland bird community model)

27 A further four wildlife species at risk with ranges that overlap with wetlands and patterns of habitat use  
28 that can include wetlands in the Vegetation and Wetlands LSA and RSA:

- 29 • northern myotis
- 30 • lesser yellowlegs
- 31 • band-tailed pigeon
- 32 • peregrine falcon, *pealei* subspecies

33



## 1 5.0 KEY RESULTS AND FINDINGS

2 The existing conditions of vegetation and wetlands in the LSA, RSA, and TLSA were described in support  
3 of the Application. Information from existing publicly available data and reports, information from the  
4 Nisga'a Nation, and information from other Indigenous groups was gathered. This information and data  
5 were used to characterize the ecological communities of the study areas, plant species of conservation  
6 concern, botanical and cultural forest products, invasive plant species, ecological communities of  
7 conservation concern, old forest, and wetlands and wetland functions. There are limitations to these data,  
8 as noted in Section 4.1.7.

9 Key results are presented for the LSA as this is the area where direct and indirect effects of the Project on  
10 vegetation and wetland resources are likely to occur. Key findings include:

- 11 • One red-listed plant species (arctic daisy) was recorded in six locations in the LSA during field studies  
12 (Section 4.2.2)
- 13 • No noxious weeds or regionally categorized invasive plant species were observed during field studies  
14 or identified from desktop data sources
- 15 • Habitat supporting botanical and cultural forest products used by the Nisga'a Nation and other  
16 Indigenous groups exists throughout the LSA, including western redcedar, yellow-cedar,  
17 Labrador tea, devil's club, green false-hellebore, huckleberries and blueberries, freshwater aquatic  
18 plants (e.g., sedges, rushes and water lily), and pine mushroom. All of these species were observed  
19 during field studies, except pine mushroom. An estimated 6% of the LSA has well drained podzolic  
20 soils that could potentially support pine mushroom.
- 21 • Site series potentially supporting four red-listed ecological communities and two blue-listed ecological  
22 communities comprise 50.7 ha (17%) of the LSA (Table 4.2–6). The red-listed ecological communities  
23 are floodplain (3.9 ha; 1% of the LSA) and three estuarine wetlands (6.2 ha; 2% of the LSA); the  
24 blue-listed ecological communities are upland forest (9.4 ha; 3% of the LSA) and forested swamp  
25 (31.2 ha; 11% of the LSA).
- 26 • Old forest within six ecological communities occurs in the LSA, covering 141.6 ha (50% of the LSA).  
27 No regulation-based old growth deferral areas occur within the LSA, but non-legal old growth priority  
28 areas are present.
- 29 • Wetlands cover half of the LSA; 143.0 ha (50%). Freshwater wetlands account for 79.2 ha (28%) of  
30 the LSA and estuarine and tidal wetlands covering 63.8 ha (22%) of the LSA (Table 4.2–8).  
31 Three bog, two swamp, and one shallow open water freshwater wetland associations occur in the  
32 LSA. Bogs are the most abundant, covering 45.3 ha (16%) of the LSA (Table 4.2–8). Swamps cover  
33 32.3 ha (11%) of the LSA, and shallow open water (freshwater) accounts for 1.6 ha (1%) of the LSA.  
34 Tidal water wetlands cover 57.5 ha (20%) of the LSA, and estuarine wetlands cover 6.3 ha (2%) of  
35 the LSA.



Key Results and Findings  
June 2024

- 1 • Wetlands in the LSA support a variety of hydrological, biogeochemical, and the following habitat  
2 functions, including:
- 3 – Habitat for the red-listed arctic daisy, recorded in six locations in the LSA
  - 4 – Habitat for three red-listed (6.2 ha) and one blue-listed (31.2 ha) wetland communities  
5 (Table 4.2–8)
  - 6 – Habitat for eelgrass, recorded in two locations in the LSA
  - 7 – Habitat for algae, seaweeds, kelp and eelgrass which may be traditional use species or provide  
8 habitat for species that are harvested/fished
  - 9 – Habitat for mammals, including grizzly bear, which is SARA-listed as special concern; black bear,  
10 grey wolf, Pacific marten, moose, black-tailed deer, and beaver
  - 11 – Foraging and/or roosting habitat for eight known bat species, including the little brown myotis,  
12 which is SARA-listed as endangered
  - 13 – Breeding and/or foraging habitat for migratory birds, including songbirds, raptors (including  
14 bald eagle), shorebirds, and gulls, and habitat for ten SARA-listed migratory bird species.
  - 15 – Breeding and dispersal habitat for amphibians, including western toad, which is SARA-listed as  
16 special concern
  - 17 – Habitat for SARA-listed wildlife species at risk, specifically:
    - 18 o Seven wildlife species at risk documented in wetlands in the LSA during field studies;  
19 northern goshawk, marbled murrelet, great blue heron *fannini* subspecies, black swift,  
20 western toad, little brown myotis, and grizzly bear
    - 21 o Three wildlife species at risk with effective habitat modelled in the LSA; western screech-owl,  
22 olive-sided flycatcher, and barn swallow
    - 23 o Four wildlife species at risk with ranges and habitat types that overlap with the wetlands of  
24 the LSA; lesser yellowlegs, band-tailed pigeon, peregrine falcon *pealei* subspecies, and  
25 northern myotis

26 Key findings for the TLSA, based on a review of existing desktop data include:

- 27 • No known occurrences of red- or blue-listed plant or lichen species
- 28 • Habitat supporting all representative botanical and cultural forest product species used by the  
29 Nisga'a Nation and other Indigenous groups is present throughout the TLSA. The ecosystems  
30 mapped in the TLSA support western redcedar, yellow-cedar, Labrador tea, devil's club,  
31 green false-hellebore, huckleberries and blueberries, and freshwater aquatic plants (e.g., sedges).  
32 Known pine mushroom harvesting areas mapped by the Integrated Resources Policy Branch (1995)  
33 are located on the east side of the TLSA, across Portland Canal from Pearse Island.
- 34 • No noxious weeds or regionally categorized invasive plant species were identified from desktop data  
35 sources
- 36 • Site series potentially supporting four red-listed ecological communities and eleven blue-listed  
37 ecological communities are mapped in the TLSA



**TECHNICAL DATA REPORT—VEGETATION AND WETLANDS  
KSI LISIMS LNG PROJECT**



Key Results and Findings  
June 2024

- 1 • The TLSA is predominantly covered by old forest (or very old forest); no regulation-based old growth  
2 deferral areas are present in the TLSA, but there are non-legal old growth priority areas within the  
3 TLSA.
- 4 • Wetland types mapped in the TLSA include freshwater shrubby and treed bogs and swamps;  
5 sedge fens, and estuarine marshes
- 6



Closure  
June 2024

1 **6.0 CLOSURE**

2 This TDR was prepared for the sole benefit of the Proponents for the Ksi Lisims LNG Project to describe  
3 the existing conditions within the LSA and RSA for the Vegetation and Wetlands VC.

4 Respectfully submitted,

5 **Stantec Consulting Ltd.**

6 Prepared by:

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**Christine Lion** B.Sc., R.P.Bio.  
Report Author

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**Meghan O'Neill** B.Sc., R.P.Bio  
Report Author, TEM Mapper

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**Matthew Ramsay** M.Sc., R.P.Bio  
Report Quality Reviewer

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Signed on behalf of **Bob Fuller** B.Sc., P.Ag.  
TEM Mapping Quality Reviewer



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1 **Appendix A BC CDC POTENTIAL SPECIES AND ECOLOGICAL COMMUNITIES OF**  
2 **CONSERVATION CONCERN**

**Table A.1 Plant Species of Conservation Concern with Potential to Occur in the RSA and TLSA**

Scientific Name	English Name	B.C. Status	COSEWIC Status	SARA Status	Lifeform	Study Area(s)
<i>Abronia latifolia</i>	yellow sand-verbena	Blue			Vascular Plant	TLSA
<i>Arctanthemum arcticum</i> ssp. <i>arcticum</i>	arctic daisy	Red			Vascular Plant	TLSA
<i>Arctopoa eminentis</i>	eminent bluegrass	Blue			Vascular Plant	TLSA
<i>Calystegia soldanella</i>	beach bindweed	Blue			Vascular Plant	RSA, TLSA
<i>Carex mackenziei</i>	Mackenzie's sedge	Blue			Vascular Plant	TLSA
<i>Draba ventosa</i>	Wind River draba	Blue			Vascular Plant	TLSA
<i>Erythronium montanum</i>	white glacier lily	Blue			Vascular Plant	RSA, TLSA
<i>Glehnia littoralis</i> ssp. <i>leiocarpa</i>	American glehnia	Blue			Vascular Plant	RSA, TLSA
<i>Lathyrus littoralis</i>	silky beach pea	Red	Threatened	Threatened	Vascular Plant	RSA, TLSA
<i>Nymphaea tetragona</i>	pygmy waterlily	Blue			Vascular Plant	RSA, TLSA
<i>Oxypolis occidentalis</i>	western cowbane	Blue			Vascular Plant	TLSA
<i>Parrya nudicaulis</i>	northern parrya	Red			Vascular Plant	TLSA
<i>Pinus albicaulis</i>	whitebark pine	Blue	Endangered	Endangered	Vascular Plant	TLSA
<i>Platanthera ephemerantha</i>	white-lip rein orchid	Blue			Vascular Plant	RSA, TLSA
<i>Polemonium boreale</i>	northern Jacob's-ladder	Blue			Vascular Plant	TLSA
<i>Polystichum setigerum</i>	Alaska holly fern	Blue			Vascular Plant	TLSA
<i>Bartramia aprica</i>	rigid apple moss	Red	Endangered	Endangered	Bryophyte	RSA, TLSA
<i>Brotherella roellii</i>	Roell's brotherella	Red	Endangered	Endangered	Bryophyte	RSA, TLSA





**Table A.1 Plant Species of Conservation Concern with Potential to Occur in the RSA and TLSA**

Scientific Name	English Name	B.C. Status	COSEWIC Status	SARA Status	Lifeform	Study Area(s)
<i>Daltonia splachnoides</i>	Dalton's moss	Red	Endangered	Endangered	Bryophyte	RSA, TLSA
<i>Fissidens pauperculus</i>	poor pocket moss	Red	Endangered	Endangered	Bryophyte	RSA, TLSA
<i>Oxystegus recurvifolius</i>	drooping-leaved beard-moss	Red	Endangered	Endangered	Bryophyte	RSA, TLSA
<i>Seligeria acutifolia</i>	acuteleaf small limestone moss	Red	Endangered	Endangered	Bryophyte	RSA, TLSA
<i>Seligeria careyana</i>	Carey's small limestone moss	Red	Endangered	Endangered	Bryophyte	RSA, TLSA
<i>Zygodon gracilis</i>	slender yoke-moss	Red	Endangered		Bryophyte	RSA, TLSA
<i>Bryocaulon pseudosatoanum</i>	pacific pretzel	Blue			Lichen	RSA, TLSA
<i>Bryoria carlottae</i>	languid horsehair	Blue			Lichen	RSA, TLSA
<i>Bryoria cervinula</i>	spiny horsehair	Blue			Lichen	RSA, TLSA
<i>Catolechia wahlenbergii</i>	tundra lemon	Blue			Lichen	TLSA
<i>Collema bachmanianum</i>	Caesar's tarpaper	Blue			Lichen	TLSA
<i>Dermatocarpon intestiniforme</i>	quilted stippleback	Blue			Lichen	RSA, TLSA
<i>Erioderma solediatum</i>	vole felt	Blue			Lichen	RSA, TLSA
<i>Fuscopannaria ahlneri</i>	corrugated crackers	Blue			Lichen	TLSA
<i>Hypotrachyna revoluta</i>	granulating loop	Blue			Lichen	RSA, TLSA
<i>Leptogium cyanescens</i>	blue-blue vinyl	Red			Lichen	RSA, TLSA
<i>Lobaria retigera</i>	smoker's lung	Blue	Threatened	Threatened	Lichen	TLSA
<i>Nephroma isidiosum</i>	pebbled paw	Blue			Lichen	TLSA
<i>Nephroma occultum</i>	cryptic paw	Blue	Threatened	Special Concern	Lichen	TLSA
<i>Pannaria rubiginosa</i>	considerable gingerbread	Red			Lichen	RSA, TLSA



**Table A.1 Plant Species of Conservation Concern with Potential to Occur in the RSA and TLSA**

Scientific Name	English Name	B.C. Status	COSEWIC Status	SARA Status	Lifeform	Study Area(s)
<i>Parmotrema crinitum</i>	snuff ruffle	Blue			Lichen	RSA, TLSA
<i>Pilophorus robustus</i>	octopus' matchstick	Blue			Lichen	RSA, TLSA
<i>Pseudocyphellaria rainierensis</i>	oldgrowth specklebelly	Blue	Special Concern	Special Concern	Lichen	RSA, TLSA
<i>Scytinium californicum</i>	midlife vinyl	Blue			Lichen	RSA, TLSA
<p><u>Search Criteria:</u></p> <ul style="list-style-type: none"> <li>Plants OR Lichens OR Macrofungi: All</li> <li>AND BC Conservation Status: Red (Extirpated, Endangered, or Threatened) OR Blue (Special Concern) OR SARA Schedule 1 Status: True OR COSEWIC Status: Endangered OR Threatened OR Special Concern</li> <li>AND 'Ecoregions': North Coast Fjords OR Southern Boundary Ranges OR Kitimat Ranges</li> <li>AND CWH, CWHvh, CWHvm, CWHvm, CWHwm, MH, MHmm, MHmp, MHwh1, MHwhp, and CMA BEC units</li> </ul>						

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**Table A.2 Ecological Communities of Conservation Concern with Potential to Occur in the RSA and TLSA**

Scientific Name	English Name	B.C. Status	Ecosystem Code <sup>a</sup>	Study Area(s)
<b>Upland</b>				
<i>Abies amabilis</i> - <i>Picea sitchensis</i> / <i>Oplopanax horridus</i>	amabilis fir - Sitka spruce / devil's club	Blue	CWHvm1/08; CWHvm2/08	TLSA
<i>Abies amabilis</i> - <i>Thuja plicata</i> / <i>Rubus spectabilis</i> Very Wet Maritime	amabilis fir - western redcedar / salmonberry Very Wet Maritime	Blue	CWHvm1/07; CWHvm2/07	TLSA
<i>Alnus incana</i> / <i>Equisetum arvense</i>	mountain alder / common horsetail	Blue	CWHwm/FI01	TLSA
<i>Alnus rubra</i> / <i>Rubus spectabilis</i> / <i>Equisetum arvense</i>	red alder / salmonberry / common horsetail	Blue	CWHvh2/10 (FI51)	RSA, TLSA
<i>Leymus mollis</i> ssp. <i>mollis</i> – <i>Lathyrus japonicus</i>	dune wildrye - beach pea	Red	CWHvh2 uncorrelated; CWHvm1 uncorrelated; CWHwm uncorrelated	RSA, TLSA
<i>Picea sitchensis</i> / <i>Calamagrostis nutkaensis</i>	Sitka spruce / Pacific reedgrass	Blue	CWHvh2/16	RSA, TLSA
<i>Picea sitchensis</i> / <i>Carex obnupta</i>	Sitka spruce / slough sedge	Blue	CWHvh2/18	RSA, TLSA
<i>Picea sitchensis</i> / <i>Gaultheria shallon</i>	Sitka spruce / salal	Blue	CWHvh2/14	RSA, TLSA
<i>Picea sitchensis</i> / <i>Kindbergia oregana</i>	Sitka spruce / Oregon beaked-moss	Blue	CWHvh2/15	RSA, TLSA
<i>Picea sitchensis</i> / <i>Lysichiton americanus</i>	Sitka spruce / skunk cabbage	Blue	CWHwm/09	TLSA
<i>Picea sitchensis</i> / <i>Maianthemum dilatatum</i> Wet Hypermaritime 1	Sitka spruce / false lily-of-the-valley Wet Hypermaritime 1	Red	CWHvh2/08	RSA, TLSA
<i>Picea sitchensis</i> / <i>Malus fusca</i>	Sitka spruce / Pacific crab apple	Blue	CWHvh2/19	RSA, TLSA
<i>Picea sitchensis</i> / <i>Polystichum munitum</i>	Sitka spruce / sword fern	Blue	CWHvh2/17	RSA, TLSA
<i>Picea sitchensis</i> / <i>Rubus spectabilis</i> Very Wet Maritime	Sitka spruce / salmonberry Very Wet Maritime	Red	CWHvm1/09	TLSA
<i>Picea sitchensis</i> / <i>Rubus spectabilis</i> Wet Maritime	Sitka spruce / salmonberry Wet Maritime	Blue	CWHwm/05	TLSA





**Table A.2 Ecological Communities of Conservation Concern with Potential to Occur in the RSA and TLSA**

Scientific Name	English Name	B.C. Status	Ecosystem Code <sup>a</sup>	Study Area(s)
<i>Picea sitchensis</i> / <i>Trisetum canescens</i>	Sitka spruce / tall trisetum	Red	CWHvh2/09	RSA, TLSA
<i>Populus trichocarpa</i> - <i>Alnus rubra</i> / <i>Rubus spectabilis</i>	black cottonwood - red alder / salmonberry	Blue	CWHvm1/10; CWHwm/06	TLSA
<i>Thuja plicata</i> - <i>Picea sitchensis</i> / <i>Lysichiton americanus</i>	western redcedar - Sitka spruce / skunk cabbage	Blue	CWHvh2/13(Ws54); CWHvm1/14 (Ws54); CWHvm2/Ws54	RSA, TLSA
<i>Thuja plicata</i> - <i>Picea sitchensis</i> / <i>Oplopanax horridus</i> Very Wet Hypermaritime 2	western redcedar - Sitka spruce / devil's club Very Wet Hypermaritime 2	Blue	CWHvh2/07	RSA, TLSA
<i>Thuja plicata</i> - <i>Picea sitchensis</i> / <i>Polystichum munitum</i>	western redcedar - Sitka spruce / sword fern	Blue	CWHvh2/05	RSA, TLSA
<i>Thuja plicata</i> - <i>Tsuga heterophylla</i> / <i>Polystichum munitum</i>	western redcedar - western hemlock / sword fern	Blue	CWHvm1/04; CWHvm2/04	TLSA
<i>Tsuga heterophylla</i> - <i>Abies amabilis</i> / <i>Struthiopteris spicant</i>	western hemlock - amabilis fir / deer fern	Blue	CWHvm1/06; CWHvm2/06	TLSA
<i>Tsuga heterophylla</i> - <i>Picea sitchensis</i> / <i>Rhytidiadelphus loreus</i>	western hemlock - Sitka spruce / lanky moss	Blue	CWHvh2/04	RSA, TLSA
<i>Tsuga heterophylla</i> - <i>Thuja plicata</i> / <i>Gaultheria shallon</i> Very Wet Maritime	western hemlock - western redcedar / salal Very Wet Maritime	Blue	CWHvm1/03; CWHvm2/03	TLSA
<b>Wetland</b>				
<i>Carex sitchensis</i> - <i>Oenanthe sarmentosa</i>	Sitka sedge - Pacific water-parsley	Blue	CWHvh2/Wm50; CWHwm/Wm50	RSA, TLSA
<i>Carex sitchensis</i> / <i>Sphagnum spp.</i>	Sitka sedge / peat-mosses	Red	CWHvh2/Wf51; CWHvm1/Wf51; CWHvm2/Wf51; CWHwm/Wf51	RSA, TLSA
<i>Eleocharis palustris</i> Herbaceous Vegetation	common spike-rush Herbaceous Vegetation	Blue	CWH/Wm04	RSA, TLSA
<i>Glyceria borealis</i> Fen	northern mannagrass Fen	Red	CWHvh2 uncorrelated	RSA, TLSA



**Table A.2 Ecological Communities of Conservation Concern with Potential to Occur in the RSA and TLSA**

Scientific Name	English Name	B.C. Status	Ecosystem Code <sup>a</sup>	Study Area(s)
<i>Myrica gale</i> / <i>Carex sitchensis</i>	sweet gale / Sitka sedge	Blue	CWHvh2/Wf52; CWHwm/Wf52	RSA, TLSA
<i>Rhododendron groenlandicum</i> / <i>Kalmia microphylla</i> / <i>Sphagnum</i> spp.	Labrador-tea / western bog-laurel / peat-mosses	Blue	CWHvm1/Wb50	TLSA
<i>Salix sitchensis</i> - <i>Salix lasiandra</i> var. <i>lasiandra</i> / <i>Lysichiton americanus</i>	Sitka willow - Pacific willow / skunk cabbage	Blue	CWH/Ws51	RSA, TLSA
<i>Salix sitchensis</i> / <i>Carex sitchensis</i>	Sitka willow / Sitka sedge	Blue	CWHvm1/Ws06; CWHvm2/Ws06	TLSA
<b>Estuarine</b>				
<i>Carex lyngbyei</i> - <i>Cicuta douglasii</i>	Lyngbye's sedge - Douglas' water-hemlock	Red	CWH/Em06	RSA, TLSA
<i>Carex lyngbyei</i> Herbaceous Vegetation	Lyngbye's sedge herbaceous vegetation	Red	CWH/Em05	RSA, TLSA
<i>Deschampsia cespitosa</i> ssp. <i>beringensis</i> - <i>Hordeum brachyantherum</i>	tufted hairgrass - meadow barley	Red	CWH/Ed01	RSA, TLSA
<i>Deschampsia cespitosa</i> ssp. <i>beringensis</i> - <i>Symphyotrichum subspicatum</i>	tufted hairgrass - Douglas' aster	Red	CWH/Ed02	RSA, TLSA
<i>Plantago maritima</i> - <i>Puccinellia pumila</i>	sea plantain - dwarf alkaligrass	Red	CWH/Em04	RSA, TLSA
<i>Ruppia maritima</i> Herbaceous Vegetation	beaked ditch-grass Herbaceous Vegetation	Red	CWH/Em01	RSA, TLSA
<i>Sarcocornia pacifica</i> - <i>Lysimachia maritima</i>	American glasswort - sea-milkwort	Red	CWH/Em02	RSA, TLSA
<p><u>Search Criteria:</u></p> <ul style="list-style-type: none"> <li>• Ecosystem Realm-Groups: All</li> <li>• AND BC Conservation Status: Red (Extirpated, Endangered, or Threatened) OR Blue (Special Concern)</li> <li>• AND 'Ecosections': North Coast Fjords OR Southern Boundary Ranges OR Kitimat Ranges</li> <li>• AND CWH, CWHvh1, CWHvm1, CWHvm2, CWHwm, MH, MHmm1, MHmp1, MHwh1, MHwhp1, and CMA BEC Zones</li> </ul>				
<p>NOTE:</p> <p><sup>a</sup> Following Banner et al. (1993) for site series and MacKenzie and Moran (2004) for wetland codes</p>				



1 **Appendix B MAP LEGENDS**

**Table B.1 Project LSA and RSA Map Legend for CWHvh2**

Map Code	Site Series / Association	English Name	BC CDC Listing	Landscape Position	Surficial Material	Soils (depth, texture, drainage)	Structural Stage	Moisture Regime / (Hydrodynamic Index)
HS	01	CwHw – Salal	Yellow	all	moraine	Podzols and Folisols; imperfectly drained; deep organic surface horizon; peaty soils on outer coastal lowlands	3, 4, 5, 6, 7	subhygric – mesic
RS	03	CwYc – Salal	Yellow	upper – crests	bedrock, colluvium	High coarse fragment content; redder mineral soil horizon; thin humus layer	3, 4, 5, 6, 7	xeric – subxeric
SD	07	CwSs – Devil's club	Blue	low – toe	colluvium	Imperfectly to poorly drained; moderately deep	3, 4, 5, 6, 7	mesic – hygric
SL	08	Ss – Lily-of-the-valley	Red	lower – level	fluvial	Loamy to sandy skeletal Brunisols or Podzols	3, 4, 5, 6, 7	mesic – hygric
YG	11	CwYc – Goldthread	Yellow	crest – mid	variable	Humisols or Organic soils	3, 4, 5, 6, 7	subhygric – hygric (SI)
LS	12 (Wb53)	PIYc – Sphagnum (Shore pine – Yellow-cedar – Tufted clubrush)	Yellow	all (often on gentle slopes)	variable	Variable, deep fibric sedge and wood peat deposits (> 2 m) to thin peat veneers over granitic bedrock.	3, 4, 5, 6, 7	hygric – subhydric (SI)
RC	13 (Ws54)	CwSs - Skunk cabbage	Blue	lower - depressions	variable	Terric Humisols / Mesisols or Humic Gleysols with peaty humus forms most common, also gleyed Podzols.	3, 4, 5, 6, 7	hygric – subhydric (Mo-VD)
BG	31 (Wb51)	Shore pine - Black crowberry – Tough peat-moss	No Status	level, depressions	organics	Mesisols of Sphagnum peat, fibric at the surface and mesic or humic at depth.	3, 4, 5, 6, 7	subhydric (St-SI)
WS	Ws00	western redcedar – sedge (generic)	Not Ranked	level, depressions	organics	Variable	3, 4, 5, 6, 7	subhydric (St-SI)
OW	Ww00	Shallow open water wetland	Yellow	depressions	multiple	Variable	2c	hygric – subhydric (Mo-VD)
ML	Em05	Lyngbye's sedge estuarine marsh	Red	tidal zone	fluvial / marine	Silty or fine-sandy Gleysols or Humic Gleysols. Middle tidal zone, meso- to poly-saline.	2b	hygric - subhydric
EG	Et00	Eelgrass (estuarine)	Red	tidal zone	marine	Fine-textured sediments in protected areas where sedimentation is not excessive. Upper subtidal.	2b	N/A
DH	Ed01	Tufted hairgrass – Meadow barley estuarine meadow	Red	tidal zone	fluvial / marine	Sandy or loamy-textured Gleysols and Regosols with little or no humus development. Upper tidal zone, meso- to poly-saline.	2b	subhygric – hygric
DR	Ed03	Arctic rush – Alaska plantain estuarine meadow	Red	tidal zone	fluvial / marine	Silty-textured Gleysols with a humic enriched surface horizon. Or minerally enriched Fibrisols. Upper to Upper-Middle tidal zone, oligo-saline.	2a, 2b	subhygric – hygric
IA	Ia00	Tidal water - inundated	Not Ranked	tidal zone	marine	Unknown unconsolidated sediments less than 2 m below mean tide. Upper to Lower tidal zone.	N/A	N/A
UC	Iu00	Tidal water - gravel/cobble/boulder	Not Ranked	tidal zone	marine	Gravel, cobble, and boulder sediments less than 2 m below mean tide. Upper to Lower tidal zone.	N/A	N/A
UCf	Iu00	Tidal water - mudflat/sandflat	Not Ranked	tidal zone	marine	Fine to coarse sediments (i.e., mud or sand) with few coarse fragments, less than 2 m below mean tide. Upper to Lower tidal zone.	N/A	N/A
UN	00	Unclassified shoreline fringe	Not Ranked	immediately above tidal zone	variable	Variable soils/sediments below higher high water tide line. Unclassifiable by image classification due to overhanging canopy	6, 7a	variable

NOTES:

N/A – Not applicable

See Land Management Handbook 26 (Banner et al. 1993) and Wetlands of British Columbia (MacKenzie and Moran 2004) for an explanation of codes and terms.



1 **Table B.2 Project LSA and RSA Map Legend for Sparsely Vegetated Units and Anthropogenic**

Map Code	Name	Description
BEbr	Bedrock intertidal	Intertidal bedrock (not classified as wetland due to lack of soil)
NOTE: No other sparsely vegetated or anthropogenic units are used in the Project mapping.		

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3



**Table B.3** Reconnaissance-level TLSA Map Legend

BEC Unit	Map Code	Site Series / Association	Realm/Class	English Site Unit Name	Site Unit Description	BC CDC Listing	Wetland
CMA	MR	00	As	Mountain heather – Rhacomitrium scrub	Complex of alpine scrub and rock	Not ranked	-
CMA	AK	00	Sk	HmYc - Alpine krummholz	Scattered patches of scrubby dwarf trees with heather matrix	Not ranked	-
CWHvh2	AP	00	Em	Estuarine marsh	Non-forested estuary meadow	Red	Wetland
CWHvh2	MS	00	Sk	mountain hemlock scrub	Mountain hemlock scrub	Not ranked	-
CWHvh2	SA	00	Vs	Sitka alder avalanche	Shrub-dominated avalanche tracks	Not ranked	-
CWHvh2	AC	00	Vt	Ba – Copperbush avalanche	Young conifer-dominated avalanche tracks in MH	Not ranked	-
CWHvh2	RD	00	T	CwHw – Deer fern	Relative SMR 5-6 / SNR medium sites	Yellow	-
CWHvh2	RM	00	T	Cw – Fern bluffs	Relative SMR 1-5 / SNR poor to medium sites on forested bluffs and cliffs (extreme microsite variation)	Not ranked	-
CWHvh2	BG	00	Wb	Ericaceous shrub-Sphagnum topogenous bog	Non-forested Sphagnum-dominated topogenous bog	Yellow	Wetland
CWHvh2	FS	00	Wf	Carex fen	Non-forested Carex-dominated fen	Various	Wetland
CWHvh2	Wb52	00	Wb	Tufted clubrush – Sphagnum bog	Non-forested Sphagnum-dominated slope/blanket bog	Not ranked	Wetland
CWHvh2	HS	01	T	CwHw - Salal	Relative SMR 4-5 / SNR poor to medium sites (zonal)	Yellow	-
CWHvh2	LR	02	T	PIYc - Rhacomitrium	Relative SMR 0 / SNR poor sites on bedrock or very thin soils	Yellow	-
CWHvh2	RS	03	T	CwYc - Salal	Relative SMR 1-2 / SNR poor to medium sites on shallow soils	Yellow	-
CWHvh2	HM	04	T	HwSs - Lanky moss	Relative SMR 3-4 / SNR (poor) to medium sites on freely drained slopes	Blue	-
CWHvh2	SF	06	T	CwSs - Foamflower	Relative SMR 3-4 / SNR rich sites	Yellow	-
CWHvh2	SD	07	T	CwSs - Devil's club	Relative SMR 5-6 / SNR rich sites	Blue	-
CWHvh2	SL	08	Fh	Ss - Lily-of-the-valley	High bench floodplain sites	Red	-
CWHvh2	ST	09	Fm	Ss - Trisetum	Medium bench floodplain sites	Red	-
CWHvh2	AL	10	Fl	Dr - Lily-of-the-valley	Low bench floodplain sites	Blue	-
CWHvh2	YG	11	T	CwYc - Goldthread	Relative SMR 5-6 / SNR poor sites	Yellow	Wetland
CWHvh2	LS	12	Wb	PIYc - Sphagnum	Relative SMR 6-7 / SNR poor sparsely forested bog	Yellow	Wetland
CWHvh2	RC	13	Ws	CwSs - Skunk cabbage	Relative SMR 6-7 / SNR medium to rich sites	Blue	Wetland
CWHvh2	SK	15	T	Ss - Kindbergia	Relative SMR 3-4 / SNR poor to medium old beachplain sites	Blue	-
CWHvh2	SR	16	T	Ss - Reedgrass	Relative SMR 1-2 / SNR rich rocky headland sites	Blue	-
CWHvm1	SA	00	Vs	Sitka alder avalanche	Shrub-dominated avalanche tracks	Not ranked	-
CWHvm1	RM	00	T	Cw – Fern bluffs	Relative SMR 1-5 / SNR poor to medium sites on forested bluffs and cliffs (extreme microsite variation)	Not ranked	-
CWHvm1	BG	00	Wb	Ericaceous shrub-Sphagnum topogenous bog	Non-forested Sphagnum-dominated topogenous bog	Yellow	Wetland
CWHvm1	FS	00	Wf	Carex fen	Non-forested Carex-dominated fen	Various	Wetland
CWHvm1	AB	01	T	HwBa - Blueberry	Gentle slope, middle slope position; deep medium- textured soils (use RG for Salal phase - CS is listed in provincial codes for Salal phase)	Yellow	-
CWHvm1	HS	03	T	HwCw - Salal	Upper slope position; gentle slope on medium textured shallow soils	Blue	-
CWHvm1	AF	05	T	BaCw - Foamflower	Significant slope, middle slope position; deep medium-textured soils; richer nutrient regime (use aspect modifiers)	Blue	-



**Table B.3 Reconnaissance-level TLSA Map Legend**

BEC Unit	Map Code	Site Series / Association	Realm/Class	English Site Unit Name	Site Unit Description	BC CDC Listing	Wetland
CWHvm1	HD	06	T	HwBa - Deer fern	Significant slope, lower slope position; deep medium - textured soils, seepage (use aspect modifiers)	Blue	-
CWHvm1	AD	08	T	BaSs - Devil's club	Gentle receiving slopes; deep, medium - textured soil; seepage	Blue	-
CWHvm1	SS	09	Fh	Ss - Salmonberry (high-bench)	Active floodplain, high-bench , deep medium - textured soil	Red	-
CWHvm1	YG	12	T	CwYc - Goldthread	Organic bog forest; depression to lower slope	Yellow	Wetland
CWHvm1	LS	13	Wb	PI - Sphagnum	Bog woodland, organic bog forest, depression to lower slope. Scrubby woodlands with component of PI.	Yellow	Wetland
CWHvm1	RC	14	Ws	CwSs - Skunk cabbage	Swamp forest; level to depression, deep, medium - textured soil; poorly drained	Blue	Wetland
CWHvm2	MS	00	Sk	Mountain hemlock scrub	Scrub forest	Not ranked	-
CWHvm2	AC	00	Vt	Ba – Copperbush avalanche	Subalpine fir - copperbush	Not ranked	-
CWHvm2	Wb52	00	Wb	Tufted clubrush – Sphagnum bog	Non-forested Sphagnum-dominated slope/blanket bog	Yellow	Wetland
CWHvm2	AB	01	T	HwBa - Blueberry	Relative SMR 3-4 / SNR poor to medium sites (zonal)	Yellow	-
CWHvm2	LC	02	T	HwPI – Cladina	Relative SMR 0 / SNR poor sites on bedrock or very thin soils	Yellow	-
CWHvm2	HS	03	T	HwCw - Salal	Relative SMR 1-2 / SNR poor to medium sites on shallow and/or very coarse soils	Blue	-
CWHvm2	AF	05	T	BaCw - Foamflower	Relative SMR 3-4 / SNR rich sites	Blue	-
CWHvm2	AD	08	T	BaSs - Devil's club	Relative SMR 5-6 / SNR rich sites	Blue	-
CWHvm2	YG	09	T	CwYc - Goldthread	Relative SMR 6(-7) / SNR poor sites	Yellow	Wetland
CWHwm	HB	01	T	HwSs - Blueberry	Relative SMR 3-4 / SNR poor to medium sites (zonal)	Yellow	-
CWHwm	HM	02	T	PIYc – Racomitrium	Relative SMR 0 / SNR poor sites on bedrock or very thin soils	Yellow	-
CWHwm	HS	08	T	Hw - Sphagnum	Relative SMR 5-6 / SNR poor sites	Yellow	-
MHmm1	MS	00	Sk	Mountain hemlock scrub	Scrub forest	Not ranked	-
MHmm1	MB	01	T	HmBa - Blueberry	Relative SMR 2-4 / SNR poor to medium sites (zonal)	Yellow	-
MHmm1	MM	02	T	HmBa - Mountain-heather	Relative SMR 0-2 / SNR poor to medium sites on shallow soils	Yellow	-
MHmm1	MD	06	T	HmYc – Deer cabbage	Relative SMR 6 / SNR poor to medium sites with open canopy forests	Yellow	-
MHmmp1	AK	00	Sk	Alpine krummholz	Scattered patches of scrubby dwarf trees with heather matrix	Not ranked	-
MHmmp1	LM	00	T	Lichen - Hm parkland	Mosaic of rocky sites with tree islands	Not ranked	-
MHmmp1	MH	00	T	Hm – Mountain heather parkland	Mosaic of heather and tree islands	Not ranked	-
MHwh1	MS	00	Sk	Mountain hemlock scrub	Scrub forest	Not ranked	-
MHwh1	SA	00	Vs	Sitka alder avalanche	Shrub-dominated avalanche tracks	Not ranked	-
MHwh1	AC	00	Vt	Ba – Copperbush avalanche	Young conifer-dominated avalanche tracks in MH	Not ranked	-
MHwh1	YB	00	T	HmYc – Blueberry – Mountain heather	Fresh/poor to medium, late snow-lie sites with open canopy forests	Yellow	-
MHwh1	BG	00	Wb	Ericaceous shrub-Sphagnum topogenous bog	Non-forested Sphagnum-dominated topogenous bog	Not ranked	Wetland
MHwh1	Wb52	00	Wb	Tufted clubrush – Sphagnum bog	Non-forested Sphagnum-dominated slope/blanket bog	Not ranked	Wetland
MHwh1	MB	01	T	HmSs - Blueberry	Relative SMR 2-4 / SNR poor to medium sites (zonal)	Yellow	-
MHwh1	MM	02	T	HmYc - Mountain-heather	Relative SMR 0-2 / SNR poor to medium sites on shallow soils	Yellow	-



**Table B.3 Reconnaissance-level TLSA Map Legend**

BEC Unit	Map Code	Site Series / Association	Realm/Class	English Site Unit Name	Site Unit Description	BC CDC Listing	Wetland
MHwh1	MR	03	T	SsHm – Reedgrass	Relative SMR 2-4 / SNR rich sites	Blue	-
MHwh1	YT	05	T	YcHm - Twisted stalk	Relative SMR 5 / SNR rich sites	Blue	-
MHwh1	MD	06	T	HmYc – Deer cabbage	Relative SMR 6 / SNR poor to medium sites with open canopy forests	Yellow	-
MHwh1	YH	07	T	YcHm - Hellebore	Relative SMR 6 / SNR medium to rich sites with open canopy forests	Yellow	-
MHwhp1	SA	00	Vs	Sitka alder avalanche	Shrub-dominated avalanche tracks	Not ranked	-
MHwhp1	HM	00	Ah	Heather meadow	Heather dominated meadow	Not ranked	-
MHwhp1	AK	00	Sk	Alpine krummholz	Scattered patches of scrubby dwarf trees with heather matrix	Not ranked	-
MHwhp1	LM	00	T	Lichen - Hm parkland	Mosaic of rocky sites with tree islands	Not ranked	-
MHwhp1	MH	00	T	Hm – Mountain heather parkland	Mosaic of heather and tree islands	Not ranked	-
NOTE: See Blackwell and Associates 2018 for a description of codes.							

1 **Table B.4**      **Reconnaissance-level TLSA Map Legend for Anthropogenic, Non-forested, and Sparsely Vegetated Units**

Map Code	Name	Description
LA	Lake	A naturally occurring static body of water, 10 ha or greater in size and at least 2 m deep in some portion.
PD	Pond	A small naturally occurring static body of water, less than 10 ha in size and at least 2 m deep in some portion. Not large enough to be classified as a lake but typically larger/ deeper than shallow water wetlands and are non-vegetated.
RI	River	A watercourse formed when water flows between continuous, definable banks. The low may be intermittent or perennial.
Ro	Bedrock / Rock Outcrop	Rock outcrop ecosystems are bluffs and knobs of bedrock with limited soil development and high cover of exposed rock. Drought-tolerant cryptogams are often prominent and vascular plants are limited.
Rt	Talus	Talus ecosystems are active and inactive talus (large rocks) and scree (smaller rocks and more soil). These ecosystems typically have a low herb layer cover because of mobile substrates or lack of soil. Stable talus may have high bryophyte cover, particularly on cool aspects with stable substrates, or vegetation similar to adjacent rock outcrop communities.

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1 Appendix C TEM FIELD PLOTS

Table C.1 2021 Project Field Plot Environment Information

Plot # <sup>a</sup>	Date	UTM E <sup>b</sup>	UTM N <sup>b</sup>	Site series / Site Association <sup>b</sup>	B.C. Status	Plot Detail	Soil Moisture Regime	Soil Nutrient Regime	Slope (%)	Aspect <sup>c</sup>	Mesoslope Position	Soil [Organic] Depth, cm	Mineral / Organic	Structural stage	Tree Cover (%)	Shrub Cover (%)	Herb Cover (%)	Moss Cover (%)
DP21038	7/11/2021	424349	6097952	Em05 (estuarine marsh)	Red	Ground Inspection	Subhydryc	Very rich	12	23	Toe	n/a	n/a	2b	0	0	90	0
DP21039	7/11/2021	424359	6097743	Ed01 (estuarine meadow)	Red	Ground Inspection	Hygric	Very rich	12	54	Toe	n/a	n/a	2b	0	0	90	0
DP21040	7/11/2021	424296	6097917	13/Ws54 (swamp forest)	Blue	Ground Inspection	Subhydryc	Rich	0	999	Level	n/a	n/a	6	70	90	60	90
DP21041	7/11/2021	424185	6097851	Wb51 (bog)	No Status	Ground Inspection	Subhydryc	Medium	0	999	Level	n/a	n/a	3a	0	60	70	90
DP21042	7/11/2021	424015	6097885	Wb51 (bog)	No Status	Ground Inspection	Subhydryc	Medium	0	999	Level	n/a	n/a	3a	0	60	60	90
DP21043	7/12/2021	424204	6098605	Ed01 (estuarine meadow)	Red	Ground Inspection	Subhydryc	Rich	14	254	Toe	n/a	n/a	2b	0	0	50	2
DP21044	7/12/2021	424177	6098099	Ed01 (estuarine meadow)	Red	Ground Inspection	Subhydryc	Rich	3	215	Gully	n/a	n/a	2b	0	10	100	0
DP21045	7/12/2021	424159	6098084	Em05 (estuarine marsh)	Red	Ground Inspection	Subhydryc	Very rich	0	999	Gully	n/a	n/a	2b	0	0	80	0
DP21046	7/12/2021	424135	6098025	Ed01 (estuarine meadow)	Red	Ground Inspection	Subhydryc	Rich	0	999	Depression	n/a	n/a	2b	0	0	100	0
DP21047	7/12/2021	424038	6098287	Em05 (estuarine marsh)	Red	Ground Inspection	Subhydryc	Very rich	8	14	Lower slope	n/a	n/a	2b	0	0	90	0
DP21048	7/12/2021	424022	6098275	Ed03 (estuarine meadow)	Red	Ground Inspection	Hygric	Rich	11	3	Toe	n/a	n/a	2b	0	0	70	10
DP21049	7/12/2021	423948	6098143	13/Ws54 (swamp forest)	Blue	Ground Inspection	Hygric	Rich	0	999	Gully	n/a	n/a	6	60	80	60	80
DP21050	7/12/2021	424025	6098652	Ed01 (estuarine meadow)	Red	Ground Inspection	Hygric	Rich	7	73	Toe	n/a	n/a	2b	0	0	70	3
DP21059	7/13/2021	424281	6098771	Ed01 (estuarine meadow)	Red	Ground Inspection	Hygric	Rich	9	278	Toe	n/a	n/a	2b	0	0	80	0
DP21060	7/13/2021	424310	6098918	Ed01 (estuarine meadow)	Red	Ground Inspection	Hygric	Rich	0	999	Crest	n/a	n/a	2b	0	0	100	0
DP21061	7/13/2021	424398	6098847	Em05 (estuarine marsh)	Red	Ground Inspection	Subhydryc	Very rich	5	20	Toe	n/a	n/a	2b	0	0	95	0
DP21062	7/13/2021	424493	6098574	Ed01 (estuarine meadow)	Red	Ground Inspection	Hygric	Rich	8	77	Toe	n/a	n/a	2b	0	0	50	0
DP21063	7/13/2021	423348	6098858	Ed01 (estuarine meadow)	Red	Ground Inspection	Hygric	Rich	6	306	Toe	n/a	n/a	2b	0	0	60	0
DP21064	7/13/2021	423217	6098751	01 (zonal forest)	Yellow	Ground Inspection	Subhydryc	Rich	9	338	Lower slope	n/a	n/a	6	40	80	10	60
DP21065	7/14/2021	423343	6098628	13/Ws54 (swamp forest)	Blue	Ground Inspection	Subhydryc	Rich	5	197	Gully	n/a	n/a	6	70	60	50	70
DP21066	7/14/2021	423540	6098622	01 (zonal forest)	Yellow	Ground Inspection	Mesic	Medium	0	999	Crest	n/a	n/a	5	40	90	40	80
DP21067	7/14/2021	423586	6098546	Wb51 (bog)	No Status	Ground Inspection	Subhydryc	Poor	0	999	Depression	n/a	n/a	3a	0	60	70	90
DP21068	7/14/2021	423580	6098266	Wb51 (bog)	No Status	Ground Inspection	Subhydryc	Poor	0	999	Depression	n/a	n/a	2a	0	40	70	90
DP21069	7/14/2021	423490	6098261	01 (zonal forest)	Yellow	Ground Inspection	Mesic	Medium	0	999	Crest	n/a	n/a	6	60	90	30	50
DP21070	7/14/2021	423367	6098273	Wb53 (bog)	Yellow	Visual Ground	Subhydryc	Poor	12	335	Mid slope	n/a	n/a	25	0	30	80	90
DP21071	7/14/2021	423318	6098359	Ed01 (estuarine meadow)	Red	Ground Inspection	Hygric	Rich	9	278	Toe	n/a	n/a	2b	0	0	70	0
DP21072	7/15/2021	424730	6096228	01 (zonal forest)	Yellow	Modified Ground	Subhydryc	Medium	54	42	Mid slope	45	Organic	6	70	60	50	80
DP21073	7/15/2021	424620	6096143	01 (zonal forest)	Yellow	Modified Ground	Mesic	Medium	88	40	Upper slope	43	Mineral	7	90	40	20	60
DP21074	7/15/2021	424573	6096101	11 (bog forest)	Yellow	Modified Ground	Subhydryc	Rich	9	2	Gully	120 [120]	Organic	6	40	70	60	70
DP21075	7/15/2021	424442	6096068	Wb53 (bog)	Yellow	Modified Ground	Hygric	Medium	4	3	Crest	64 [64]	Organic	2b	0	20	80	90



Table C.1 2021 Project Field Plot Environment Information

Plot # <sup>a</sup>	Date	UTM E <sup>b</sup>	UTM N <sup>b</sup>	Site series / Site Association <sup>b</sup>	B.C. Status	Plot Detail	Soil Moisture Regime	Soil Nutrient Regime	Slope (%)	Aspect <sup>c</sup>	Mesoslope Position	Soil [Organic] Depth, cm	Mineral / Organic	Structural stage	Tree Cover (%)	Shrub Cover (%)	Herb Cover (%)	Moss Cover (%)
DP21076	7/16/2021	423179	6098222	01 (zonal forest)	Yellow	Modified Ground	Subhygric	Medium	0	999	Toe	50	Organic	6	70	60	30	80
DP21077	7/16/2021	423146	6098115	13/Ws54 (swamp forest)	NA <sup>d</sup>	Modified Ground	Hygric	Rich	6	316	Lower slope	120 [120]	Organic	3b	20	95	70	80
DP21078	7/16/2021	423212	6098096	Wb53 (bog)	Yellow	Modified Ground	Subhygric	Medium	8	340	Lower slope	161 [161]	Organic	2a	0	10	80	90
DP21079	7/16/2021	423078	6098122	08 (floodplain forest)	Red	Modified Ground	Subhygric	Rich	8	344	Gully	70	Organic	6	80	90	50	60
DP21080	7/16/2021	422734	6098059	Ed01 (estuarine meadow)	Red	Visual Ground	Hygric	Rich	8	266	Toe	n/a	n/a	2b	0	0	60	0
DP21081	7/16/2021	422740	6097913	13/Ws54 (swamp forest)	Blue	Modified Ground	Hygric	Rich	11	264	Mid slope	70 [65]	Organic	6	50	90	80	60
DP21082	7/16/2021	422762	6098016	01 (zonal forest)	Yellow	Modified Ground	Mesic	Medium	34	248	Mid slope	41	Organic	6	50	90	15	40
DP21083	7/17/2021	424295	6098788	01 (zonal forest)	Yellow	Modified Ground	Mesic	Medium	10	4	Lower slope	55	Organic	6	95	60	10	60
DP21084	7/17/2021	424263	6098439	01 (zonal forest)	Yellow	Modified Ground	Mesic	Medium	38	251	Mid slope	60	Mineral	4	60	95	10	70
DP21085	7/17/2021	424358	6098359	11 (bog forest)	Yellow	Modified Ground	Hygric	Medium	0	999	Crest	57 [57]	Organic	6	30	90	40	90
DP21086	7/17/2021	424406	6098309	Wb51 (bog)	No Status	Modified Ground	Subhygric	Poor	0	999	Toe	161 [161]	Organic	3b	0	60	70	90
DP21087	7/17/2021	424418	6098178	01 (zonal forest)	Yellow	Modified Ground	Mesic	Medium	55	122	n/a	39	Organic	6	80	60	10	80
DP21088	7/17/2021	424333	6098056	01 (zonal forest)	Yellow	Modified Ground	Mesic	Medium	10	91	Lower slope	64	Organic	5	90	60	3	80
DP21089	7/18/2021	424021	6098675	Ed01 (estuarine meadow)	Red	Ground Inspection	Hygric	Rich	10	86	Toe	n/a	n/a	2b	0	1	80	0
DP21090	7/18/2021	423980	6098670	01 (zonal forest)	Yellow	Ground Inspection	Mesic	Medium	70	46	Lower slope	n/a	n/a	6	80	70	20	70
DP21091	7/18/2021	423920	6098662	11 (bog forest)	Yellow	Ground Inspection	Subhygric	Medium	8	263	Upper slope	n/a	n/a	6	40	90	50	60
DP21092	7/18/2021	423827	6098626	Wb51 (bog)	No Status	Ground Inspection	Subhygric	Medium	5	344	Depression	n/a	n/a	2b	1	30	90	80
DP21093	7/19/2021	423877	6098920	13/Ws54 (swamp forest)	Blue	Ground Inspection	Subhygric	Rich	10	334	Depression	n/a	n/a	6	40	90	60	80
DP21094	7/19/2021	422715	6097985	Ed01 (estuarine meadow)	Red	Ground Inspection	Hygric	Rich	8	288	Toe	n/a	n/a	2a	0	0	70	0
DP21095	7/19/2021	423605	6098876	13/Ws54 (swamp forest)	Blue	Ground Inspection	Hygric	Rich	9	12	Gully	n/a	n/a	6	60	70	70	80
DP21096	7/19/2021	423585	6098267	Wb51 (bog)	No Status	Visual Ground	Subhygric	Poor	0	999	Depression	n/a	n/a	2a	0	40	70	90
DP21097	7/19/2021	422556	6097830	08 (floodplain forest)	Red	Ground Inspection	Subhygric	Rich	8	3	Toe	n/a	n/a	6	80	60	40	80
DP21098	7/19/2021	422569	6097766	01 (zonal forest)	Yellow	Ground Inspection	Mesic	Medium	9	321	Lower slope	n/a	n/a	6	40	90	60	70
DP21099	7/20/2021	423935	6097926	Ww00 (shallow water)	Yellow	Visual Ground	Hydric	Medium	0	999	Level	n/a	n/a	2c	0	0	5	0
DP21100	7/20/2021	423892	6097919	Wb51 (bog)	No Status	Ground Inspection	Subhygric	Medium	0	999	Level	n/a	n/a	3a	0	50	70	90
DP21101	7/20/2021	423875	6097990	Ww00 (shallow water)	Yellow	Visual Ground	Hydric	Medium	0	999	Level	n/a	n/a	2c	0	0	20	0
DP21102	7/20/2021	423855	6097853	13/Ws54 (swamp forest)	Blue	Ground Inspection	Hygric	Rich	19	355	Lower slope	n/a	n/a	6	40	70	80	70
DP21103	7/20/2021	423791	6097718	Wb51 (bog)	No Status	Ground Inspection	Subhygric	Medium	9	301	Level	n/a	n/a	2b	2	30	90	90
DP21104	7/20/2021	423894	6097520	Wb51 (bog)	No Status	Visual Ground	Subhygric	Medium	0	999	Toe	n/a	n/a	2b	0	30	50	70
DP21105	7/20/2021	423933	6097463	01 (zonal forest)	Yellow	Ground Inspection	Mesic	Medium	12	342	Lower slope	n/a	n/a	6	60	80	40	90
DP21106	7/20/2021	424121	6097518	08 (floodplain forest)	Red	Ground Inspection	Subhygric	Rich	10	350	Gully	n/a	n/a	7	90	50	30	60



**Table C.1 2021 Project Field Plot Environment Information**

Plot # <sup>a</sup>	Date	UTM E <sup>b</sup>	UTM N <sup>b</sup>	Site series / Site Association <sup>b</sup>	B.C. Status	Plot Detail	Soil Moisture Regime	Soil Nutrient Regime	Slope (%)	Aspect <sup>c</sup>	Mesoslope Position	Soil [Organic] Depth, cm	Mineral / Organic	Structural stage	Tree Cover (%)	Shrub Cover (%)	Herb Cover (%)	Moss Cover (%)
DP21107	7/20/2021	424282	6097416	Wb53 (bog)	Yellow	Ground Inspection	Subhydric	Medium	9	1	Crest	n/a	n/a	2b	0	30	90	90
DP21108	7/20/2021	424370	6097428	01 (zonal forest)	Yellow	Ground Inspection	Mesic	Medium	53	67	Mid slope	n/a	n/a	6	50	80	50	60

NOTES:  
 All plots are in the CWHvh2 BEC unit.  
 See Land Management Handbook 25 (MOFR and MOE 2010) for definition of the terms in table.  
<sup>a</sup> All plots are in the UTM zone 9.  
<sup>b</sup> Following Banner et al. (1993) for site series and MacKenzie and Moran (2004) for wetland codes.  
<sup>c</sup> Aspect 999 refers to level ground  
<sup>d</sup> These areas do not have the plant assemblage resembling the listed community but has potential to develop into the listed community.

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1 **Table C.2 2021 Project Field Plot Terrain Data**

Plot #	Date	UTM E <sup>a</sup>	UTM N <sup>a</sup>	Geomorphological Drainage	Geomorphological Slope	Surficial Texture 1	Surficial Texture 2	Parent Material	Surface Expression	Geomorphological Process 1	Geomorphological Process 2
DP21072	7/15/2021	424742	6096225	Imperfect	50-70%	Blocks	-	Colluvium	Moderately Steep Slope (50-70%)	-	-
DP21073	7/15/2021	424628	6096163	Moderately Well	>70%	Blocks	Angular Fragments	Colluvium	Steep Slope (>70%)	-	-
DP21074	7/15/2021	424571	6096136	Very Poor	6-26%	Humic	-	Organic	Gentle Slope (6-26%)	Gully Erosion	Inundation
DP21075	7/15/2021	424450	6096065	Very Poor	0-5%	Mesic	-	Organic	Plain/Level (0-5%)	Surface Seepage	-
DP21076	7/16/2021	423187	6098218	Well	-	Gravel	Cobble	Marine	Gentle Slope (6-26%)	-	-
DP21078	7/16/2021	423203	6098091	Very Poor	6-26%	Fibric	-	Organic	Plain/Level (0-5%)	-	-
DP21079	7/16/2021	423083	6098085	Moderately Well	6-26%	Humic	Cobble	Marine	Gentle Slope (6-26%)	-	-
DP21081	7/16/2021	422734	6097921	Imperfect	6-26%	Blocks	-	Organic	-	-	-
DP21082	7/16/2021	422759	6098008	Moderately Well	6-26%	Mesic	-	Organic	Gentle Slope (6-26%)	-	-
DP21083	7/17/2021	424295	6098778	Moderately Well	6-26%	-	-	Organic	Gentle Slope (6-26%)	-	-
DP21084	7/17/2021	424261	6098439	Moderately Well	6-26%	N/A	N/A	Bedrock	N/A	N/A	N/A
DP21085	7/17/2021	424358	6098352	Imperfect	6-26%	N/A	N/A	Bedrock	N/A	N/A	N/A
DP21086	7/17/2021	424404	6098315	Very Poor	0-5%	Fibric	-	Organic	-	-	-
DP21087	7/17/2021	424416	6098166	Moderately Well	50-70%	N/A	N/A	Bedrock	N/A	N/A	N/A
DP21088	7/17/2021	424338	6098057	Moderately Well	6-26%	N/A	N/A	Bedrock	N/A	N/A	N/A

NOTES:  
See Land Management Handbook 25 (MOFR and MOE 2010) for definition of the terms in table.  
N/A - Not applicable  
- Information not collected  
<sup>a</sup> All plots are in the UTM zone 9.

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1 Table C.3 2021 Project Field Plot Soil Data

Plot #	Date	UTM E <sup>a</sup>	UTM N <sup>a</sup>	Soil Classification	Soil Horizon	Upper Depth (cm)	Lower Depth (cm)	Horizon Thickness (cm)	Mineral Soil Texture	Mineral Soil Moisture	Mineral Soil Consistency	Coarse Fragment Content (%)	Mottling Abundance	Mottling Size	Seepage Depth (cm)	Humified (Ah) Horizon)	Eluviated (Ae) Horizon	Effective Rooting Depth (cm)		
DP21072	7/15/2021	424742	6096225	Humic Folisol	F	0	29	29	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	25		
				Humic Folisol	H	29	40	11	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	25	
				Humic Folisol	Oh	40	45	5	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	25
				Humic Folisol	R	45	45	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	25
DP21073	7/15/2021	424628	6096163	Orthic Humo-Ferric Podzol	FH	45	0	45	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-		
				Orthic Humo-Ferric Podzol	Bf	0	43	43	Silty Clay Loam	Moist	Friable	15	None	None	None	No	No	-		
				Orthic Humo-Ferric Podzol	R	43	43	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-	
DP21074	7/15/2021	424571	6096136	Terric Humisol	F	0	28	28	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-		
				Terric Humisol	H	28	39	11	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-	
				Terric Humisol	Oh	39	120	81	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-	
DP21075	7/15/2021	424450	6096065	Terric Mesisol	Of	0	40	40	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-		
				Terric Mesisol	Om	40	64	25	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-	
				Terric Mesisol	R	64	64	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-	
DP21076	7/16/2021	423187	6098218	Humic Folisol	F	0	14	14	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-		
				Humic Folisol	H	14	64	50	N/A	N/A	N/A	50	N/A	N/A	N/A	N/A	N/A	N/A	-	
DP21078	7/16/2021	423203	6098091	Typic Fibrisol	Of	45	161	116	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-		
DP21079	7/16/2021	423083	6098085	Humic Folisol	F	0	18	18	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-	
				Humic Folisol	H	18	65	47	N/A	N/A	N/A	20	N/A	N/A	N/A	N/A	N/A	N/A	-	
				Humic Folisol	C	65	70	5	Clay Loam	N/A	Slightly Sticky	80	None	None	None	No	No	-		
DP21081	7/16/2021	422734	6097921	Humic Folisol	F	0	18	18	N/A	N/A	N/A	N/A	N/A	N/A	70	N/A	N/A	18		
				Humic Folisol	H	18	65	47	N/A	N/A	N/A	N/A	N/A	N/A	70	N/A	N/A	18		
				Humic Folisol	C	65	70	5	Silty Clay Loam	Moist	Firm	30	Few	Medium	70	No	No	18		
				Humic Folisol	R	70	70	0	N/A	N/A	N/A	N/A	N/A	N/A	70	N/A	N/A	18		
DP21082	7/16/2021	422759	6098008	Hemic Folisol	F	0	25	25	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-		
				Hemic Folisol	H	25	41	16	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-		
				Hemic Folisol	R	41	41	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	-		
DP21083	7/17/2021	424295	6098778	Hemic Folisol	F	0	35	35	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	35		
				Hemic Folisol	H	35	55	20	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	35		
				Hemic Folisol	R	55	55	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	35		



Plot #	Date	UTM E <sup>a</sup>	UTM N <sup>a</sup>	Soil Classification	Soil Horizon	Upper Depth (cm)	Lower Depth (cm)	Horizon Thickness (cm)	Mineral Soil Texture	Mineral Soil Moisture	Mineral Soil Consistency	Coarse Fragment Content (%)	Mottling Abundance	Mottling Size	Seepage Depth (cm)	Humified (Ah) Horizon	Eluviated (Ae) Horizon	Effective Rooting Depth (cm)
DP21084	7/17/2021	424261	6098439	Luvisolic Ferro-Humic Podzol	FH	-13	0	13	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	30
				Luvisolic Ferro-Humic Podzol	Ae	0	8	8	Sandy Loam	Moist	Friable	5	None	None	None	No	Yes	30
				Luvisolic Ferro-Humic Podzol	Bhf	8	60	52	Clay Loam	Moist	Firm	20	Few	Fine	None	No	No	30
				Luvisolic Ferro-Humic Podzol	R	60	60	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	30
DP21085	7/17/2021	424358	6098352	Hemic Folisol	F	0	40	40	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	30
				Hemic Folisol	H	40	57	17	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	30
				Hemic Folisol	R	57	57	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	30
DP21086	7/17/2021	424404	6098315	Typic Fibrisol	Of	0	161	161	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	10
DP21087	7/17/2021	424416	6098166	Hemic Folisol	F	0	39	39	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	20
				Hemic Folisol	R	39	39	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	20
DP21088	7/17/2021	424338	6098057	Hemic Folisol	F	0	64	64	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	25
				Hemic Folisol	R	64	64	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	25

NOTES:

See Land Management Handbook 25 (MOFR and MOE 2010) for definition of the terms in table.

N/A – Not applicable (some fields apply only to mineral or organic layers)

- Information not collected

a All plots are in the UTM zone 9.



1 **Table C.4** Reconnaissance-Level TEM Plots in the Vegetation and Wetland TDR RSA (Blackwell 2018)

Plot # <sup>a</sup>	Date	UTM E <sup>b</sup>	UTM N <sup>b</sup>	Site Series / Site Association <sup>c</sup>	B.C. Status	Plot Detail	Study Area	Soil Moisture Regime	Soil Nutrient Regime	Slope, %	Aspect	Depth to rock, cm	Mineral / Organic	Structural Stage	Tree Cover (%)	Shrub Cover (%)	Herb Cover (%)	Moss Cover (%)
1F95	6/25/2017	422086	6097344	11 (bog forest)	Yellow	Ground Inspection	RSA	6	C	10	999	N/A	N/A	7	40	70	40	80
1F96	6/25/2017	422018	6097319	35 (estuarine marsh)	Red	Ground Inspection	RSA	6	C	0	999	N/A	N/A	2	0	-	80	-
1B66	6/25/2017	422810	6097322	12/Wb53 (bog forest)	Yellow	Ground Inspection	RSA	6	AB	0	999	N/A	N/A	6	20	70	20	70
652	6/25/2017	421863	6096872	13/Ws54 (swamp forest)	Blue	Air call	RSA	-	-	-	-	-	-	-	-	-	-	-
655	6/25/2017	423203	6096380	11 (bog forest)	Yellow	Air call	RSA	-	-	-	-	-	-	-	-	-	-	-
661	6/25/2017	423274	6098300	01 (zonal forest)	Yellow	Air call	LSA	-	-	-	-	-	-	-	-	-	-	-
662	6/25/2017	423186	6098149	13/Ws54 (swamp forest)	Blue	Air call	LSA	-	-	-	-	-	-	-	-	-	-	-

NOTES:  
 See Blackwell and Associates 2018 for a description of codes.  
 All plots occur in the CWHvh2  
 N/A – Not applicable (some fields apply only to mineral or organic layers)  
 - Information not collected  
 Site Series 35 is a working unit for 00 site series, later resolved by map code

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1 **Table C.5 Reconnaissance-Level Ground Inspection TEM Plots in the TLSA (Blackwell 2018)**

Plot # <sup>a</sup>	Date	UTM E <sup>b</sup>	UTM N <sup>b</sup>	BEC Unit	Site series / Site Association <sup>c</sup>	B.C. Status	Plot Detail	Study Area	Soil Moisture Regime	Soil Nutrient Regime	Slope, %	Aspect	Mineral / Organic	Structural Stage	Tree Cover (%)	Shrub Cover (%)	Herb Cover (%)	Moss Cover (%)
1B12	6/20/2017	434134	6083852	CWHvh2	11 (bog forest)	Yellow	Ground Inspection	TLSA	6-7	BC	2	999	Mineral	7	20	60	30	40
1B6	6/20/2017	440650	6086929	CWHvm2	11 (swamp forest)	Blue	Ground Inspection	TLSA	6-7	BC	10	999	Mineral	7	30	60	40	80
1B65	6/25/2017	434060	6101670	CWHvh2	11 (bog forest)	Yellow	Ground Inspection	TLSA	5-6	BC	20	80	Mineral	7	30	70	25	60
1B7	6/20/2017	432654	6082869	CWHvh2	12/Wb53 (bog forest)	Yellow	Ground Inspection	TLSA	7	B	10	999	Mineral	6	20	40	40	50
1B8	6/20/2017	432686	6082885	CWHvh2	31 (topogenous bog)	Yellow	Ground Inspection	TLSA	8	AB	0	999	Organic	3	0	2	40	70
1B9	6/20/2017	442230	6089892	CWHvh2	06 (fresh to very moist forest)	Yellow	Ground Inspection	TLSA	3	D	20	300	Mineral	6	60	25	50	20
1F10	6/20/2017	432573	6082842	CWHvh2	01 (zonal forest)	Yellow	Ground Inspection	TLSA	4	C	40	260	Mineral	5	70	10	10	80
1F11	6/20/2017	432387	6082836	CWHvh2	06 (fresh to very moist forest)	Yellow	Ground Inspection	TLSA	4-5	D	10	260	Mineral	5	70	20	60	20
1F12	6/20/2017	432244	6082757	CWHvh2	35 (estuarine marsh)	Red	Ground Inspection	TLSA	6	C	0	999	Mineral	2	0	0	60	0
1F15	6/20/2017	432116	6084909	CWHvh2	01 (zonal forest)	Yellow	Ground Inspection	TLSA	4	C	0	999	Mineral	7	40	80	30	70
1F16	6/20/2017	432156	6084974	CWHvh2	32 (blanket bog)	N/A	Ground Inspection	TLSA	8	AB	0	999	Mineral	2	0	0	60	60
1F8	6/20/2017	440304	6086645	CWHvm1	14 (very wet to moist forest)	Blue	Ground Inspection	TLSA	7	CD	0	999	Mineral	7	30	40	80	70
1F9	6/20/2017	440344	6086667	CWHvm1	32 (fen/marsh)	N/A	Ground Inspection	TLSA	8	D	10	999	Mineral	2	0	0	100	90
1F93	6/25/2017	434466	6102279	CWHvh2	11 (bog forest)	Yellow	Ground Inspection	TLSA	6	B	0	999	Mineral	7	30	60	50	70
1F94	6/25/2017	434484	6102326	CWHvh2	34 (togogenous bog)	Yellow	Ground Inspection	TLSA	8	AB	10	999	Organic	2	0	0	60	90
1G1	6/20/2017	432774	6082850	CWHvh2	12/Wb53 (bog forest)	Yellow	Ground Inspection	TLSA	7	B	10	999	Organic	7	20	70	30	80
1G2	6/20/2017	442202	6089849	CWHvh2	00 (uncorrelated upland forest)	N/A	Ground Inspection	TLSA	1-2	C	10	999	Mineral	6	50	10	60	10

NOTES:

See Blackwell and Associates 2018 for a description of codes.

Site Series 00, 31, 32, 34, and 35, are working units for 00 site series, later resolved by map code.

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**Table C.6 Reconnaissance-Level Air Call TEM Plots in the TLSA (Blackwell 2018)**

Plot # <sup>a</sup>	Date	UTM E <sup>b</sup>	UTM N <sup>b</sup>	Study Area	BEC Unit	Structural Stage	Species	Site Series 1 / Site Association <sup>c</sup>	Site Series 1 Percent of Polygon	B.C. Status	Site Series 2 / Site Association <sup>c</sup>	Site Series 2 Percent of Polygon	B.C. Status	Site Series 3 / Site Association <sup>c</sup>	Site Series 3 Percent of Polygon	B.C. Status
1A61	6/20/2017	440667	6086914	TLSA	CWHvm1	-	-	31	100	Blue	-	0	-	-	0	-
1A62	6/20/2017	440378	6088024	TLSA	CWHvh2(vm1)	Young Forest	YcHwCw(Ss)	03	100	Yellow	-	0	-	-	0	-
1A63	6/20/2017	440684	6087626	TLSA	CWHvh2(vm1)	Mature Forest	YcHwCw	01	100	Yellow	-	0	-	-	0	-
1A64	6/20/2017	440008	6087180	TLSA	CWHvh2	-	YcHwCw	11	100	Yellow	-	0	-	-	0	-
1A75	6/20/2017	440609	6087967	TLSA	CWHvm1	-	-	00	0	N/A	-	0	-	-	0	-
1A152	6/20/2017	431894	6084980	TLSA	CWHvh2	Old Forest	HwBa	04	100	Blue	-	0	-	-	0	-
1A153	6/20/2017	432040	6085180	TLSA	CWHvh2	Old Forest	YcHmHw	03	100	Yellow	-	0	-	-	0	-
1A154	6/20/2017	432193	6085327	TLSA	MHwh	Old Forest	HmYcHw(BaSs)	01	0	Yellow	02	0	Yellow	-	0	-
1A155	6/20/2017	434899	6087686	TLSA	CWHvh2	-	YcHm	36	0	N/A	34	0	N/A	-	0	-
1A156	6/20/2017	433906	6087441	TLSA	CWHvh2	-	-	36	40	N/A	34	30	N/A	02	30	Yellow
1A157	6/20/2017	433508	6087116	TLSA	MHwh	Mature Forest	YcHm(Hw)	06	0	Yellow	34	0	N/A	09	0	Yellow
1A158	6/20/2017	433556	6087384	TLSA	MH	Old Forest	HwHm	01	100	No Status	-	0	-	-	0	-
1A159	6/20/2017	435147	6088794	TLSA	MHwh	-	HwHmYc	02	40	Yellow	36	30	N/A	34	30	N/A
1A160	6/20/2017	435049	6089662	TLSA	CWHvh2	Old Forest	PIYc	11	100	Yellow	-	0	-	-	0	-
1A161	6/20/2017	434967	6089354	TLSA	CWHvh2	Mature Forest	HwSs(Hm)	07	100	Blue	-	0	-	-	0	-
1A162	6/20/2017	436920	6089509	TLSA	MHwh	-	-	36	40	N/A	02	40	Yellow	34	20	N/A
1A163	6/20/2017	437286	6089741	TLSA	MHwh	Mature Forest	HmYcHw	01	100	Yellow	-	0	-	-	0	-
1A164	6/20/2017	437183	6088947	TLSA	CWHvh2	Mature Forest	YcHwBa(HmSs)	04	100	Blue	-	0	-	-	0	-
1A165	6/20/2017	435964	6086068	TLSA	CWHvh2	Mature Forest	YcHw(Hm)	13	100	Blue	-	0	-	-	0	-
1A82	6/20/2017	435497	6084984	TLSA	CWHvh2(vm1)	Old Forest	HwBaCw(Yc)	01	100	Yellow	-	0	-	-	0	-
1A83	6/20/2017	424634	6078580	TLSA	CWHvh2	Mature Forest	YcHw(CwHm)	03	100	Yellow	-	0	-	-	0	-
1A84	6/20/2017	425067	6078865	TLSA	CWHvh2(vm1)	Mature Forest	CwHw(Yc)	66	100	N/A	-	0	-	-	0	-
1A85	6/20/2017	425231	6078917	TLSA	CWHvh2(vm1)	Old Forest	HwBa(Ss)	04	60	Blue	07	40	Blue	-	0	-
1A86	6/20/2017	424832	6078790	TLSA	CWHvh2(vm1)	Mature Forest	CwHw(YcSs)	13	70	Blue	66	30	Not Ranked	-	0	-
1A715	6/25/2017	434312	6102475	TLSA	CWHvh2	Old Forest	YcHwCw	01	100	Yellow	-	0	-	-	0	-
1A722	6/25/2017	434108	6101328	TLSA	CWHvh2(wm1)	Old Forest	HwYc(PI)	01	60	Yellow	13	40	Blue	-	0	-
1A723	6/25/2017	433840	6100484	TLSA	CWHvh2(wm1)	Mature Forest	HwYc	01	100	Yellow	-	0	-	-	0	-
1A724	6/25/2017	433881	6099708	TLSA	CWHvh2	Young Forest	Hw(CwYcSs)	04	0	Blue	01	0	Yellow	-	0	-
1A725	6/25/2017	433736	6100348	TLSA	CWHvh2(wm1)	-	-	34	100	N/A	-	0	-	-	0	-
1A607	6/25/2017	423348	6095872	TLSA	CWHvh2	Old Forest	Hw(Cw)	04	70	Blue	07	30	Blue	-	0	-
1A608	6/25/2017	423596	6095391	TLSA	CWHvh2	Old Forest	Hw(SsYcCw)	04	100	Blue	-	0	-	-	0	-



**Table C.6 Reconnaissance-Level Air Call TEM Plots in the TLSA (Blackwell 2018)**

Plot # <sup>a</sup>	Date	UTM E <sup>b</sup>	UTM N <sup>b</sup>	Study Area	BEC Unit	Structural Stage	Species	Site Series 1 / Site Association <sup>c</sup>	Site Series 1 Percent of Polygon	B.C. Status	Site Series 2 / Site Association <sup>c</sup>	Site Series 2 Percent of Polygon	B.C. Status	Site Series 3 / Site Association <sup>c</sup>	Site Series 3 Percent of Polygon	B.C. Status
1A609	6/25/2017	423992	6094791	TLSA	MHwh	-	YcHm	27	80	N/A	06	20	Yellow	-	0	-
1A610	6/25/2017	423889	6094222	TLSA	MHwh	Old Forest	YcHm(HwSs)	01	100	Yellow	-	0	-	-	0	-
1A620	6/25/2017	423594	6089625	TLSA	CWHvh2	Old Forest	BaHw	04	70	Blue	06	30	Yellow	-	0	-
1A621	6/25/2017	423000	6089375	TLSA	CWHvh2	Old Forest	YcHw(Cw)	01	80	Yellow	13	20	Blue	-	0	-
1A622	6/25/2017	422508	6088746	TLSA	CWHvh2	Old Forest	CwHw	04	80	Blue	07	20	Blue	-	0	-
1A623	6/25/2017	422796	6088322	TLSA	CWHvh2	Old Forest	SsHwBaDr	07	100	Blue	-	0	-	-	0	-
1A624	6/25/2017	422817	6088525	TLSA	CWHvh2	Old Forest	CwSsHw	07	100	Blue	-	0	-	-	0	-

NOTES:

See Blackwell and Associates 2018 for a description of codes.

Site Series 00, 31, 34, 36, 27, and 66 are working units for 00 site series, later resolved by map code.

BEC units with variants in brackets occur near a BEC unit transition.

N/A – Not applicable (some fields apply only to mineral or organic layers)

- Information not collected



1 Appendix D VEGETATION SPECIES LIST

Table D.1 Vascular Plants Identified in the RSA

Scientific Name	Common Name	Lifeform	Comments
<i>Achillea millefolium</i>	yarrow	forb	
<i>Alnus rubra</i>	red alder	tree/shrub	
<i>Andromeda polifolia</i>	bog-rosemary	shrub	
<i>Anthoxanthum hirtum</i>	hairy sweetgrass	graminoid	
<i>Arctanthemum arcticum</i> ssp. <i>arcticum</i> (syn. <i>Chrysanthemum arcticum</i> )	arctic daisy	forb	Red-listed plant in British Columbia
<i>Argentina egedii</i> ssp. <i>egedii</i> (syn. <i>Potentilla anserina</i> p.p., <i>P. egedii</i> )	coast silverweed	forb	One of the main dominant species of estuarine meadows
<i>Arnica latifolia</i>	mountain arnica	forb	
<i>Aruncus dioicus</i>	goatsbeard	forb	
<i>Athyrium filix-femina</i>	lady fern	fern	
<i>Blechnum spicant</i> (syn. <i>Struthiopteris spicant</i> )	deer fern	fern	
<i>Bromus</i> sp.	brome	graminoid	
<i>Carex disperma</i>	soft-leaved sedge	graminoid	
<i>Carex glareosa</i>	lesser saltmarsh sedge	graminoid	
<i>Carex lyngbyei</i>	Lyngbye's sedge	graminoid	Dominant species of Em05 estuarine marsh
<i>Carex obnupta</i>	slough sedge	graminoid	
<i>Carex pauciflora</i>	few-flowered sedge	graminoid	
<i>Carex pluriflora</i>	many-flowered sedge	graminoid	
<i>Carex sitchensis</i>	Sitka sedge	graminoid	
<i>Carex</i> sp.	sedge	graminoid	
<i>Carex stipata</i>	awl-fruited sedge	graminoid	
<i>Carex utriculata</i>	beaked sedge	graminoid	
<i>Carex vesicaria</i>	lesser bladder sedge	graminoid	
<i>Castilleja miniata</i>	scarlet paintbrush	forb	
<i>Chamaecyparis nootkatensis</i> (syn. <i>Callitropsis nootkatensis</i> )	yellow-cedar	tree/shrub	Dominant species in the tree layer of bog forests (CWHvh2/11) in the Project Area
<i>Clintonia uniflora</i>	queen's cup	forb	
<i>Conioselinum gmelinii</i>	Pacific hemlock-parsley	forb	
<i>Coptis aspleniifolia</i>	spleenwort-leaved goldthread	forb	
<i>Coptis trifolia</i>	three-leaved goldthread	forb	
<i>Cornus canadensis</i>	bunchberry	forb	
<i>Cornus unalaschensis</i>	Alaskan bunchberry	forb	
<i>Deschampsia cespitosa</i>	tufted hairgrass	graminoid	Dominant species of Ed01 and Ed02 estuarine meadows
<i>Drosera rotundifolia</i>	round-leaved sundew	forb	
<i>Dryopteris expansa</i>	spiny wood fern	fern	
<i>Eleocharis kamtschatica</i>	Kamchatka spike-rush	graminoid	
<i>Eleocharis palustris</i>	common spike-rush	graminoid	
<i>Eleocharis</i> sp.	spike-rush	graminoid	
<i>Elliottia pyroliflora</i> (syn. <i>Cladanthus pyroliflorus</i> )	copperbush	shrub	
<i>Empetrum nigrum</i>	crowberry	dwarf shrub	
<i>Equisetum arvense</i>	common horsetail	fern-ally	
<i>Erigeron peregrinus</i>	subalpine daisy	forb	
<i>Eriophorum angustifolium</i>	narrow-leaved cotton-grass	graminoid	
<i>Fauria crista-galli</i>	deer-cabbage	forb	
<i>Festuca rubra</i>	red fescue	graminoid	
<i>Festuca rubra</i> ssp. <i>pruinosa</i>	rock red fescue	graminoid	
<i>Galium triflorum</i>	sweet-scented bedstraw	forb	
<i>Gaultheria shallon</i>	salal	shrub	Dominant species in the shrub layer of site series CWHvh2/01 and /03
<i>Gentiana douglasiana</i>	swamp gentian	forb	
<i>Geocaulon lividum</i>	false toad-flax	forb	
<i>Geum calthifolium</i>	caltha-leaved avens	forb	
<i>Glaux maritima</i> (syn. <i>Lysimachia maritima</i> )	sea-milkwort	forb	
<i>Glyceria</i> sp.	mannagrass	graminoid	
<i>Gymnocarpium dryopteris</i>	oak fern	fern	
<i>Honckenya peploides</i>	seabeach sandwort	forb	
<i>Hordeum brachyantherum</i>	meadow barley	graminoid	Dominant species of Ed01 estuarine meadow





**Table D.1 Vascular Plants Identified in the RSA**

Scientific Name	Common Name	Lifeform	Comments
<i>Juncus arcticus</i>	arctic rush	graminoid	
<i>Juncus articulatus</i>	jointed rush	graminoid	
<i>Juncus ensifolius</i>	dagger-leaf rush	graminoid	
<i>Kalmia microphylla</i>	western bog-laurel	dwarf shrub	
<i>Ledum groenlandicum</i> (syn. <i>Rhododendron groenlandicum</i> )	Labrador tea	shrub	
<i>Leymus mollis</i>	dune wildrye	graminoid	
<i>Ligusticum scoticum</i>	beach lovage	forb	
<i>Linnaea borealis</i>	twinline	forb	
<i>Listera borealis</i> (syn. <i>Neottia borealis</i> )	northern twayblade	forb	
<i>Listera</i> sp.	twayblade	forb	
<i>Lonicera involucrata</i>	black twinberry	shrub	
<i>Lycopodium annotinum</i>	stiff club-moss	fern-ally	
<i>Lycopodium dendroideum</i>	ground-pine	fern-ally	
<i>Lysichiton americanus</i>	skunk cabbage	forb	One of the main dominant species in the herb layer of swamp forests (CWHvh2/13 = Ws54) in the Project Area
<i>Maianthemum dilatatum</i>	false lily-of-the-valley	forb	
<i>Maianthemum stellatum</i>	star-flowered false Solomon's-seal	forb	
<i>Menyanthes trifoliata</i>	buckbean	forb	
<i>Menziesia ferruginea</i> ssp. <i>glabella</i>	false azalea	shrub	One of the main dominant species in the shrub layer of most upland forests in the Project Area
<i>Mitella nuda</i>	common mitrewort	forb	
<i>Moneses uniflora</i>	single delight	forb	
<i>Myrica gale</i>	sweet gale	shrub	
<i>Nuphar polysepalum</i>	Rocky Mountain pond-lily	forb	
<i>Oenanthe sarmentosa</i>	Pacific water-parsley	forb	
<i>Oplopanax horridus</i>	devil's club	shrub	
<i>Orthilia secunda</i>	one-sided wintergreen	forb	
<i>Oxycoccus oxycoccus</i> (syn. <i>Vaccinium oxycoccus</i> )	bog cranberry	dwarf shrub	
<i>Phegopteris connectilis</i>	narrow beech fern	fern	
<i>Picea sitchensis</i>	Sitka spruce	tree/shrub	Dominant species in the tree layer of most floodplain forests in the Project Area
<i>Pinus contorta</i>	lodgepole pine	tree/shrub	
<i>Plantago macrocarpa</i>	Alaska plantain	forb	
<i>Plantago maritima</i>	sea plantain	forb	
<i>Platanthera dilatata</i>	fragrant white rein orchid	forb	
<i>Platanthera huronensis</i>	Great Lakes rein orchid	forb	
<i>Poa palustris</i>	fowl bluegrass	graminoid	
<i>Poa</i> sp.	bluegrass	graminoid	
<i>Podagrostis aequivalvis</i> (syn. <i>Agrostis aequivalvis</i> )	Arctic bentgrass	graminoid	
<i>Polygonum fowleri</i> ssp. <i>fowleri</i>	Fowler's knotweed	forb	
<i>Polypodium glycyrrhiza</i>	licorice fern	fern	
<i>Potentilla</i> sp.	cinquefoil	forb	
<i>Primula jeffreyi</i> (syn. <i>Dodecatheon jeffreyi</i> )	Jeffrey's shootingstar	forb	
<i>Pteridium aquilinum</i>	bracken fern	fern	
<i>Puccinellia nutkaensis</i>	Nootka alkaligrass	graminoid	
<i>Puccinellia pumila</i>	dwarf alkaligrass	graminoid	
<i>Ranunculus cymbalaria</i> (syn. <i>Halerpestes cymbalaria</i> )	shore buttercup	forb	
<i>Rhynchospora alba</i>	white beak-rush	graminoid	
<i>Rubus chamaemorus</i>	cloudberry	dwarf shrub	
<i>Rubus pedatus</i>	five-leaved bramble	forb	
<i>Rubus spectabilis</i>	salmonberry	shrub	Dominant species in the shrub layer of most floodplain forests in the Project Area
<i>Sagina maxima</i> ssp. <i>crassicaulis</i>	coastal pearlwort	forb	
<i>Sambucus racemosa</i>	red elderberry	shrub	
<i>Sanguisorba sitchensis</i> (syn. <i>S. stipulata</i> )	Sitka burnet	forb	
<i>Scheuchzeria palustris</i>	scheuchzeria	graminoid	
<i>Sorbus sitchensis</i>	Sitka mountain-ash	tree/shrub	
<i>Sparganium angustifolium</i>	narrow-leaved bur-reed	graminoid	
<i>Stellaria media</i>	common chickweed	forb	
<i>Stellaria</i> sp.	starwort	forb	
<i>Streptopus amplexifolius</i>	clasping twistedstalk	forb	



**Table D.1 Vascular Plants Identified in the RSA**

Scientific Name	Common Name	Lifeform	Comments
<i>Streptopus lanceolatus</i>	rosy twistedstalk	forb	
<i>Streptopus streptopoides</i>	small twistedstalk	forb	
<i>Swertia perennis</i>	alpine bog swertia	forb	
<i>Thuja plicata</i>	western redcedar	tree/shrub	Dominant species in the tree layer of most forests in the Project Area
<i>Tiarella trifoliata</i>	three-leaved foamflower	forb	
<i>Triantha glutinosa</i>	sticky false asphodel	forb	
<i>Trichophorum cespitosum</i>	tufted clubrush	graminoid	
<i>Trientalis europaea</i> ssp. <i>arctica</i>	northern starflower	forb	
<i>Triglochin maritima</i>	seaside arrow-grass	forb	
<i>Trisetum cernuum</i> var. <i>cernuum</i>	nodding trisetum	graminoid	
<i>Tsuga heterophylla</i>	western hemlock	tree/shrub	Dominant species in the tree layer of most forests in the Project Area
<i>Tsuga mertensiana</i>	mountain hemlock	tree/shrub	
<i>Vaccinium alaskaense</i>	Alaskan blueberry	shrub	
<i>Vaccinium ovalifolium</i>	oval-leaved blueberry	shrub	One of the main dominant species in the shrub layer of most upland forests in the Project Area
<i>Vaccinium parvifolium</i>	red huckleberry	shrub	
<i>Vaccinium uliginosum</i>	bog blueberry	shrub	
<i>Veratrum viride</i>	green false-hellebore	forb	
<i>Viburnum edule</i>	highbush-cranberry	shrub	
<i>Vicia nigricans</i> var. <i>gigantea</i>	giant vetch	forb	
<i>Viola palustris</i>	marsh violet	forb	
<i>Viola</i> sp.	violet	forb	

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**Table D.2 Non-Vascular Plants and Lichens Identified in the RSA**

Scientific Name	Common Name
<b>BRYOPHYTES (BRYOPHYTA)</b>	
<i>Aulacomnium palustre</i>	glow moss
<i>Brachythecium frigidum</i>	-
<i>Brachythecium sp.</i>	ragged moss
<i>Bryum sp.</i>	bryum
<i>Buckiella undulata</i>	-
<i>Campyliadelphus chrysophyllus</i>	golden feather-moss
<i>Dicranum fuscescens</i>	curly heron's-bill moss
<i>Dicranum scoparium</i>	broom forkmoss
<i>Dicranum tauricum</i>	broken-leaf moss
<i>Eurhynchium praelongum</i>	slender beaked-moss
<i>Heterocladium procurrans</i>	-
<i>Hookeria lucens</i>	shining hookeria
<i>Hylocomiastrum sp.</i>	wood-moss
<i>Hylocomium splendens</i>	step moss
<i>Hypnum sp.</i>	claw moss
<i>Hypnum subimponens</i>	-
<i>Isothecium myosuroides</i>	variable moss
<i>Mnium sp.</i>	leafy moss
<i>Niphotrichum elongatum</i>	-
<i>Plagiothecium sp.</i>	silk-moss
<i>Plagiomnium undulatum</i>	hart's-tongue leafy moss
<i>Pleurozium schreberi</i>	red-stemmed feathermoss
<i>Pleuridium subulatum</i>	-
<i>Pohlia nutans</i>	nodding thread-moss
<i>Polytrichum sp.</i>	haircap moss
<i>Polytrichastrum alpinum</i>	stiff-leaved haircap moss
<i>Rhizomnium glabrescens</i>	large leafy moss
<i>Rhytidiadelphus loreus</i>	lanky moss
<i>Sanionia uncinata</i>	sickle-leaved hook-moss
<i>Sphagnum sp.</i>	peat-moss
<i>Sphagnum divinum</i>	-
<i>Sphagnum fuscum</i>	rusty peat-moss
<i>Sphagnum girgensohnii</i>	common green peat-moss
<i>Sphagnum lindbergii</i>	Lindberg's peat-moss
<i>Sphagnum pacificum</i>	Pacific peat-moss
<i>Sphagnum palustre</i>	blunt-leaved peat-moss
<i>Sphagnum papillosum</i>	papillose peat-moss
<i>Sphagnum rubiginosum</i>	-
<i>Sphagnum warnstorffii</i>	Warnstorf's peat-moss
<i>Tetraphis pellucida</i>	common four-tooth moss
<b>LIVERWORTS (MARCHANTIOPHYTA)</b>	
<i>Bazzania denudata</i>	-
<i>Blepharostoma trichophylla</i>	-
<i>Pellia neesiana</i>	-
<i>Scapania bolanderi</i>	-
<i>Scapania sp.</i>	-
<b>LICHENS (LICHENES)</b>	
<i>Alectoria sarmentosa</i>	common witch's-hair
<i>Bryoria americana</i>	-
<i>Cladina sp.</i>	reindeer lichens
<i>Cladonia sp.</i>	clad lichens
<i>Cladonia aff. cornuta</i>	-
<i>Cladonia bellidiflora</i>	-
<i>Cladonia portentosa</i>	maritime reindeer
<i>Cladonia rangiferina</i>	grey reindeer lichen
<i>Cladonia scabriuscula</i>	card-carrying pixie
<i>Cladonia transcendens</i>	-
<i>Cladonia umbricola s.l.</i>	imponderable pixie
<i>Cladonia uncialis</i>	-
<i>Cladonia wainioi</i>	Wainio's reindeer
<i>Hypogymnia inactiva</i>	-



**Table D.2 Non-Vascular Plants and Lichens Identified in the RSA**

Scientific Name	Common Name
<i>Ichmadophila ericetorum</i>	-
<i>Lepraria torii</i>	-
<i>Parmelia saxatilis</i>	-

NOTE:  
Not all non-vascular plants have common names. Those without common names marked with (-).

1



1 **Appendix E PHOTOS OF REPRESENTATIVE RED- AND BLUE-LISTED VEGETATION**  
2 **SPECIES and ECOLOGICAL COMMUNITIES**



3  
4 **Photo E.1 Arctic Daisy (red-listed) from Plot DP21089**



5  
6 **Photo E.2 CWHvh2/Em05 (red-listed) from Plot DP21038**



7  
8 **Photo E.3 CWHvh2/Ed01 (red-listed) from Plot DP21059**





1

2 **Photo E.4** CWHvh2/Ed03 (red-listed) from Plot DP14048



3

4 **Photo E.5** CWHvh2/13 (Ws54) (blue-listed) from Plot DP21040



5

6 **Photo E.6** CWHvh2/08 (blue-listed) from Plot DP21106

7



1 Appendix F NISGA'A NATION BOTANICAL AND CULTURAL FOREST PRODUCTS

Table F.1 Assumed Presence of Botanical and Cultural Forest Products in the LSA and RSA

Ecosystem Type	Site Series	Map Code	Ecological Community Name	Assumed Presence							LSA		RSA	
				Western Redcedar	Yellow-Cedar	Labrador Tea	Devil's Club	Green False-hellebore	Vaccinium sp. 1	Freshwater Aquatics 2	Area (ha)	%	Area (ha)	%
Upland Forest	CWHvh2/01	HS	western redcedar - western hemlock / salal	*****	***				* - ***		120.5	42	294.7	49
	CWHvh2/03	RS	western hemlock - yellow-cedar / salal	*****	***				* - **		<0.1	<1	5.3	1
	CWHvh2/07	SD	western redcedar - Sitka spruce / devil's club	***			****		** - ***		9.4	3	24.3	4
	CWHvh2/00	UN	unclassified shoreline fringe								3.6	1	4.2	1
<b>Total Upland Forest</b>											<b>133.5</b>	<b>47</b>	<b>328.5</b>	<b>55</b>
Floodplain	CWHvh2/08	SL	Sitka spruce / false lily-of-the-valley	**					*		3.9	1	4.3	1
<b>Total Floodplain</b>											<b>3.9</b>	<b>1</b>	<b>4.3</b>	<b>1</b>
<b>Wetlands</b>														
<b>Freshwater Wetlands</b>														
Bog	CWHvh2/11	YG	western redcedar - yellow-cedar / spleenwort-leaved goldthread	***	***	*		**	* - **		12.9	5	51.8	9
	CWHvh2/Wb51	BG	shore pine - black crowberry - Tough peat-moss							√	22.2	8	46.3	8
	CWHvh2/Wb53	LS	shore pine - yellow-cedar / tufted clubrush							√	10.2	4	38.5	6
<b>Total Bog</b>											<b>45.3</b>	<b>16</b>	<b>136.6</b>	<b>23</b>
Swamp	CWHvh2/Ws00	WS	swamp wetland								0.4	<1	0.4	<1
	CWHvh2/13 (Ws54)	RC	western redcedar - Sitka spruce / skunk cabbage	****	***				** - ***		32.0	11	49.3	8
<b>Total Swamp</b>											<b>32.3</b>	<b>11</b>	<b>49.7</b>	<b>8</b>
Shallow Open Water	CWHvh2/Ww00	OW	shallow open water wetland							√	1.6	1	1.6	<1
<b>Total Shallow Open Water</b>											<b>1.6</b>	<b>1</b>	<b>1.6</b>	<b>&lt;1</b>
<b>Total Freshwater Wetlands</b>											<b>79.2</b>	<b>28</b>	<b>187.9</b>	<b>31</b>
Estuarine	CWHvh2/Ed01	DH	tufted hairgrass - meadow barley estuarine meadow							√	4.2	1	4.7	1
	CWHvh2/Ed03	DR	Arctic rush - Alaska plantain estuarine meadow							√	0.4	<1	0.4	<1
	CWHvh2/Em05	ML	Lyngbye's sedge estuarine marsh							√	1.6	1	1.6	<1
	CWHvh2/Et00	EG	eelgrass (tidal flat)								0.1	<1	0.1	<1
<b>Total Estuarine Wetlands</b>											<b>6.3</b>	<b>2</b>	<b>6.7</b>	<b>1</b>



**Table F.1 Assumed Presence of Botanical and Cultural Forest Products in the LSA and RSA**

Ecosystem Type	Site Series	Map Code	Ecological Community Name	Assumed Presence						LSA		RSA		
				Western Redcedar	Yellow-Cedar	Labrador Tea	Devil's Club	Green False-hellebore	Vaccinium sp. 1	Freshwater Aquatics 2	Area (ha)	%	Area (ha)	%
Tidal Water	CWHvh2/Ia00	IA	tidal water - inundated								35.4	12	42.2	7
	CWHvh2/Iu00	UC	tidal water - gravel/cobble/boulder								19.7	7	22.3	4
	CWHvh2/Iu00	UCf	tidal water - mudflat/sandflat								2.4	1	2.4	<1
<b>Total Tidal Water Wetlands</b>											<b>57.5</b>	<b>20</b>	<b>67.0</b>	<b>11</b>
<b>Total Wetlands</b>											<b>143.0</b>	<b>50</b>	<b>261.5</b>	<b>44</b>
<b>Sparsely Vegetated</b>														
Sparsely Vegetated	CWHvh2/Br00	BEbr	bedrock intertidal								5.2	2	6.4	1
<b>Total Sparsely Vegetated</b>											<b>5.2</b>	<b>2</b>	<b>6.4</b>	<b>1</b>
<b>Total</b>											<b>285.5</b>	<b>100</b>	<b>600.7</b>	<b>100</b>
<b>Total area (ha) of ecosystems capable of supporting the species in the LSA</b>				<b>178.6</b>	<b>165.4</b>	<b>12.9</b>	<b>9.4</b>	<b>12.9</b>	<b>178.6</b>	<b>40.2</b>				
<b>Total percentage (%) of ecosystems capable of supporting the species in the LSA</b>				<b>63%</b>	<b>58%</b>	<b>5%</b>	<b>3%</b>	<b>5%</b>	<b>63%</b>	<b>14%</b>				
<b>Total area (ha) of ecosystems capable of supporting the species in the RSA</b>				<b>429.7</b>	<b>401.1</b>	<b>51.8</b>	<b>24.3</b>	<b>51.8</b>	<b>429.7</b>	<b>91.4</b>				
<b>Total percentage (% of RSA) of ecosystems capable of supporting the species in the RSA</b>				<b>72%</b>	<b>67%</b>	<b>9%</b>	<b>4%</b>	<b>9%</b>	<b>72%</b>	<b>15%</b>				
NOTES:														
1 -Vaccinium sp. includes red huckleberry ( <i>V. parvifolium</i> ), Alaskan blueberry ( <i>V. alaskaense</i> ) and oval-leaved blueberry ( <i>V. ovalifolium</i> ), which were all observed during fieldwork.														
2 - The √ in this column are a placeholder for when Project-specific Indigenous studies are completed and available for review.														
Vegetation information is not available for site series / map codes with blank species presence.														
The relative prominence is based on Land Management Handbook 26 (Banner et al. 1993) and MacKenzie and Moran (2004). This is a measure of frequency of occurrence and plant cover for each species.														
***** - widespread														
**** - abundant														
*** - common														
** - uncommon														
* - rare														

