Stantec

Technical Memo

To:	Karie Hardie, Project Assessment Officer Environmental Assessment Office 836 Yates St 2nd fl. Victoria, BC V8W 1L8	From:	Joanna Preston, B.Sc., R.P.Bio Stantec Consulting Ltd. 500 4730 Kingsway Burnaby, BC V5H 0C6
Project:	123221953	Date:	March 31, 2022

Reference: Ecosystem Function Scoping Tool – Section 21.0 Summary of Biophysical Factors that Support Ecosystem Function

1 Background

Cedar LNG Partners LP, by its general partner Cedar LNG Partners (GP) Ltd. (Cedar), a Haisla Nation-led partnership with Pembina Pipeline Corporation, is proposing to construct and operate a liquefied natural gas export facility (the Project) within the District of Kitimat, British Columbia. The Project is subject to an environmental assessment under the British Columbia *Environmental Assessment Act* and an impact assessment under the federal *Impact Assessment Act.* An Environmental Assessment Certificate (EAC) Application has been prepared in accordance with the Application Information Requirements and was submitted to the British Columbia Environmental Assessment Office (EAO) on February 4, 2022. On March 9, 2022, the EAO provided the following comments on Section 21.0 *Summary of Biophysical Factors that Support Ecosystem Function* of the EAC Application:

> *The Effects Assessment Policy (EA Policy) states that proponents should identify how the project interacts with biophysical factors that support ecosystem function using the Ecosystem Function Scoping Tool. Appendix 1 contains the tool as well as outlining what the biophysical factors are that support ecosystem function.*
>
> *In the Key Biophysical Factors section of the application, it states that three key biophysical factors were selected to assess project effects on ecosystem function. This doesn't say how these biophysical factors were selected out of the ten categories of biophysical factors that support ecosystem function in the EA Policy and there is no reference to the use of the Scoping Tool.*
>
> *Please demonstrate through the use the Ecosystem Function Scoping Tool to support the rationale for the key biophysical factors that were selected for assessment and adjust your assessment accordingly if there are any other effects identified through this exercise.*

This technical memorandum has been prepare to demonstrate how the Ecosystem Function Scoping Tool was used to select the biophysical factors for the discussion of the overall effect of the Project on ecosystem function in Section 21.0 of the EAC application.

2 Approach

The Ecosystem Function Scoping Tool (Appendix 1 in the EA Policy) is a tool used to identify the biophysical factors, grouped into 10 categories, that may be relevant to the assessment of project effects on ecosystem function. Thus, the biophysical factors can be used as indicators of potential project effects on ecosystem function. Cedar reviewed the EA Policy, the Ecosystem Function Scoping Tool, and the valued components and indicators used in the EAC application to select appropriate biophysical factors for the assessment of potential project effects on ecosystem function.

Table 1 provides the 10 categories of biophysical factors and key considerations from the Ecosystem Function Scoping Tool, and describes potential project interactions, project-specific valued components and indicators, and how the biophysical factors were assessed in the valued component sections. Based on the assessment of project effects on valued components and associated indicators, the Project could potentially interact with the following seven categories of biophysical factors listed in the Ecosystem Function Scoping Tool:

1. Habitats supporting ecosystem function
2. Habitat patches
3. Structural complexity
4. Hydrologic or oceanographic patterns[1]
5. Nutrient cycling
6. Purification services
7. Biotic interactions

Based on project design and scale of effects on valued components and associated indicators, the Project is not expected to interact with the following three categories of biophysical factors listed in the Ecosystem Function Scoping Tool:

8. Natural disturbance regime
9. Population dynamics
10. Genetic diversity

[1] Hydrologic or oceanographic patterns is one of the 10 categories of biophysical factors in the Ecosystem Function Scoping Tool. The Project is predicted to interact with freshwater hydrologic patterns but not oceanographic patterns.

Reference: Ecosystem Function Scoping Tool – Section 21.0 Summary of Biophysical Factors that Support Ecosystem Function

Table 1 Scoping of Biophysical Factors, Key Considerations, and Interaction Descriptions for the Assessment of Potential Project Effects on Ecosystem Function

Possible Interaction	Key Considerations	Interaction Description	Valued Components and Indicators
1. Habitats Supporting Ecosystem Function			
☒	Could the project cause impacts to ecosystems that provide unique or critical habitats that support ecosystem function? (e.g., wetlands, old forest)	Loss of 16.8 ha of mature and old forest will result in local loss of forest biodiversity and old forest function (e.g., reduced availability of important structures that have potential support wildlife habitat features such as dens, roosts, platforms for marbled murrelet nests). Local loss (360 m of shoreline vegetation) of beachland and sensory disturbance along the shoreline could result in marine birds and shoreline species avoiding the nearshore and intertidal areas, which would reduce species diversity and interactions that support ecosystem function. Vegetation clearing will change condition of old forest and wetlands through direct loss (e.g., 12.3 ha old forest, 0.6 ha wetland) and edge effects (e.g., 62.7 ha old forest, 6.8 ha wetland). Edge effects are predicted to extend 120 m from the project footprint to account for changes in temperature (air and soil), light conditions, soil moisture and nutrients, plant competition (particularly from invasive plants), and pathogens and/or windthrow (the fall/overthrow of trees due to wind). Project-related increases in SO_2 air concentrations and acid deposition may reduce habitat that supports non-vascular plant and lichen species at risk in 14.2 ha of old forest (e.g., important for species like marbled murrelet). Project-related increases in nitrogen deposition has some potential to cause changes in vegetation types (i.e., more shrubs and less herbaceous plants) in 16.9 ha of susceptible wetland, potentially altering forage availability for species that graze on grasses, sedges, and forbs (e.g., bears); project effects are predicted to be low magnitude but long term.	Vegetation Resources • Ecological communities • Wetland functions: hydrological, biogeochemical, habitat • Old forest • Beachland Wildlife • Grizzly bear • Marbled murrelet • Shorebirds

Reference: Ecosystem Function Scoping Tool – Section 21.0 Summary of Biophysical Factors that Support Ecosystem Function

Table 1 Scoping of Biophysical Factors, Key Considerations, and Interaction Descriptions for the Assessment of Potential Project Effects on Ecosystem Function

Possible Interaction	Key Considerations	Interaction Description	Valued Components and Indicators
☒	Could the project cause impacts to potential or listed ecological communities? (check British Columbia Conservation Data Centre)	Vegetation clearing will change condition of blue-listed ecological communities through direct loss (e.g., 3.8 ha) and edge effects (e.g., 23.6 ha). Edge effects are predicted to extend 120 m from the project footprint to account for changes in temperature (air and soil), light conditions, soil moisture and nutrients, plant competition (particularly from invasive plants), and pathogens and/or windthrow. No listed wetlands, riparian, or flood associated ecological communities will be affected. Effect on conditions of ecological communities at risk is localized and within the context of the existing forestry-based disturbed landscape that has experienced shifts in forest age, composition, and complexity over space and time. The magnitude of project effect is low because the ecological communities will remain comparable to existing conditions.	Vegetation Resources • Ecological communities: 4 blue-listed ecological communities (all upland forest) in Project footprint • Old forest • Wetland functions
☒	Could the project make an ecosystem more susceptible to change?	Air emissions of sulphur dioxide, acid deposition, and nitrogen deposition during the operation phase have potential to affect native vegetation health and diversity and may increase susceptibility of ecosystems to air emissions from other sources or to climate change. An increase in predicted area exceeding critical levels or loads of sulphur dioxide (in bog ecosystems and old forest) and acidity. Nitrogen deposition will bring soils closer to eutrophication calculated critical loads. Project-related increases in nitrogen deposition in the lower Kitimat Valley around Rio Tinto and LNG Canada may make ecosystems, particularly nutrient-poor bogs and fens, more susceptible to change from future air emissions. Edge effects are predicted to extend 120 m from the marine terminal footprint into forest ecosystems. Edge effects include changes in temperature (air and soil), light conditions, soil moisture and nutrients, plant competition (particularly from invasive plants), and pathogens and/or windthrow. These could make the forest ecosystem more susceptible to change.	Vegetation Resources • Native vegetation health and diversity due to air emissions • Soil moisture (through edge effects) • Ecological communities • Wetland functions Freshwater Fish • Water quality

Reference: Ecosystem Function Scoping Tool – Section 21.0 Summary of Biophysical Factors that Support Ecosystem Function

Table 1 Scoping of Biophysical Factors, Key Considerations, and Interaction Descriptions for the Assessment of Potential Project Effects on Ecosystem Function

Possible Interaction	Key Considerations	Interaction Description	Valued Components and Indicators
2. Habitat Patches			
☒	Could the project result in barriers to species movement? Or could species be inhibited from moving between habitat patches?	Local loss of beachland and sensory disturbance along the shoreline could result in perceived barriers to movement of species that use both the marine and terrestrial environments (e.g., grizzly bear, marbled murrelet, bald eagle). The Project could result in perceived barriers to western toad movement (e.g., new transmission line corridor may deter movement). Anadromous fish passage within the region is restricted to the lower reaches of Anderson, and Moore creeks and unnamed tributaries to Douglas Channel due to natural barriers (e.g., waterfalls) downstream of the proposed project footprint. The Project is not expected to create a barrier to fish movement. Shipping could disrupt migration or affect foraging patterns of marine fish (e.g., salmon) and mammals (e.g., humpback whale) due to sensory disturbance from underwater noise, light, and transiting vessels. However, marine species within Kitimat Arm already experience shipping traffic (existing levels of underwater noise already periodically exceed the NOAA threshold for sensory disturbance); therefore, movement patterns of marine species are likely already affected. Residual effects on marine fish and mammal behaviour are low to moderate magnitude, respectively.	Wildlife • Grizzly bear • Marine birds • Amphibians Freshwater Fish • Fish habitat • Fish health and mortality risk Marine Resources • Marine mammals • Marine fish
☒	Is there the potential for habitats to be isolated and/or fragmented by the project?	Old forest and wetlands may be fragmented by the transmission line right-of-way or access roads, which may affect their functions as wildlife habitat. Potential habitat fragmentation and loss through clearing and development of transmission line and access roads; effect of reduced habitat connectivity is predicted to be moderate magnitude for amphibians, songbirds, large mammals (e.g., moose, grizzly bear), and marine birds.	Vegetation Resources • Old forest • Wetland functions Wildlife • Amphibians • Large mammals • Marine birds • Songbirds

Reference: Ecosystem Function Scoping Tool – Section 21.0 Summary of Biophysical Factors that Support Ecosystem Function

Table 1 Scoping of Biophysical Factors, Key Considerations, and Interaction Descriptions for the Assessment of Potential Project Effects on Ecosystem Function

Possible Interaction	Key Considerations	Interaction Description	Valued Components and Indicators
☒	Will there be project effects to ecological corridors or key habitats in a migration route?	Riparian areas of Anderson Creek will be avoided and riparian areas for Moore Creek will require only 0.8 ha of clearing for the transmission line, thereby maintaining the integrity of existing wildlife movement corridors in these areas. Cedar intends to use existing access where possible to avoid alteration of riparian and stream corridors. The Project's contribution to change in wildlife habitat connectivity is primarily related to an increase in traffic volume; however, habitat fragmentation and loss and the creation of linear features could also contribute to changes in moose, grizzly bear, and western toad movement between seasonal or foraging areas. Increased presence of marine traffic (up to 50 LNG carriers along the existing shipping route) could result in low and moderate magnitude changes in marine fish and mammal behaviour, respectively, including migration routes. However, marine species within Kitimat Arm already experience shipping traffic (existing levels of underwater noise already periodically exceed the NOAA threshold for sensory disturbance); therefore, movement patterns of marine species are likely already affected. Anadromous fish passage within the region is restricted to the lower reaches of Anderson, and Moore creeks and unnamed tributaries of Douglas Channel due to natural barriers (e.g., waterfalls) downstream of the proposed project footprint. The Project is not expected to affect fish migration routes in freshwater.	Vegetation Resources • Riparian areas Wildlife • Western toad • Grizzly bear • Moose Marine Resources • Marine mammals Freshwater Fish • Fish habitat • Fish health and mortality risk

Reference: Ecosystem Function Scoping Tool – Section 21.0 Summary of Biophysical Factors that Support Ecosystem Function

Table 1 Scoping of Biophysical Factors, Key Considerations, and Interaction Descriptions for the Assessment of Potential Project Effects on Ecosystem Function

Possible Interaction	Key Considerations	Interaction Description	Valued Components and Indicators
3. Natural Disturbance Regime			
☐	Could natural disturbance regimes be altered as a result of the Project (for example, fire suppression, flood control, forest clearing)?	The natural disturbance regime for forest ecosystem in the Project Area is Natural Disturbance Type 1, which has stand-replacing disturbance every 80 to 250 years. The Project is not expected to alter this disturbance regime. Large spans will be used between transmission line structures across Moore Creek and Anderson Creek to reduce disturbance to riparian areas, hydrologic patterns or flow, and unstable steep slopes. The Project is not expected to alter wetland functions, hydrology, or slope stability such that it would alter natural disturbance regimes such as flooding, erosion, or landslides.	Vegetation Resources • Old forest • Wetland functions (hydrology; biogeochemical function; habitat function)[2]
☐	Could there be a change in project effects in the future due to natural disturbance regimes changing as a result of future climate?	Coastal British Columbia is predicted to warm less than other parts of the province as climate change progresses because climate near the coast is moderated by the ocean; however, the region is still predicted to experience warmer summers, reductions in depth and duration of snowpacks, and more intense dry and wet periods which could potentially increase intensity and frequency of forest fires, frequency of slope failure, or increase outbreaks of forest pests. However, climate change is not expected to alter natural disturbance regimes in the Project Area such that it would result in a change in prediction of project effects in the future. The Project has a Net Zero Emissions Plan.	Vegetation Resources Greenhouse Gases • Direct emissions • Indirect emissions • Upstream emissions Air Quality[3] See also Section 10.0 (Effects of the Environment on the Project) • Climate change • Extreme weather • Seismic events and tsunamis • Geohazards • Forest fires

[2] As applicable to biophysical factors and key interactions, the wetland functions indicator and characterization criteria include soil acidification and eutrophication
[3] Effects of climate change on project effects for air quality are likely not to be meaningful and therefore were not assessed (Section 7.2.5.2)

Reference: Ecosystem Function Scoping Tool – Section 21.0 Summary of Biophysical Factors that Support Ecosystem Function

Table 1 Scoping of Biophysical Factors, Key Considerations, and Interaction Descriptions for the Assessment of Potential Project Effects on Ecosystem Function

Possible Interaction	Key Considerations	Interaction Description	Valued Components and Indicators
4. Structural Complexity			
☒	Are there potential project effects to specific features within an ecosystem that are important for the life stage of a species?	Loss of 16.8 ha of mature and old forest will result in reduced availability of important structures that support wildlife habitat features (e.g., mammal den sites, bat roost sites, tree cavities for western screech-owl nests, mossy branches for marbled murrelet nests, structure for northern goshawk nests, large trees that support bald eagle nests).	Vegetation Resources • Old forest Wildlife • Habitat features
☒	Could the project cause a reduction in the structural complexity of an ecosystem?	Loss of 16.8 ha of mature and old forest will result in reduced structural complexity. Edge effects could result in changes in forest conditions (e.g., windthrow of old trees and snags, competition with invasive plants) along the right-of-way, which could reduce structural complexity along edges of standing forests.	Vegetation Resources • Old forest
☒	As a result of the project, will an ecosystem be managed to a certain seral stage (e.g., transmission line corridor)?	The area of mature and old forest that will be removed will be replaced by infrastructure (e.g., terminal) and right-of-way. In the transmission line right-of-way, trees and tall shrubs will be removed and the area will be maintained in a low shrub and herb seral stage.	Vegetation Resources • Ecological communities • Old forest

Reference: Ecosystem Function Scoping Tool – Section 21.0 Summary of Biophysical Factors that Support Ecosystem Function

Table 1 Scoping of Biophysical Factors, Key Considerations, and Interaction Descriptions for the Assessment of Potential Project Effects on Ecosystem Function

Possible Interaction	Key Considerations	Interaction Description	Valued Components and Indicators
5. Hydrologic or Oceanographic Patterns			
☒	Could hydrologic patterns and/or flow be altered by the project	Disturbance of wetlands and streams will be minimized by realignment of access roads to the transmission line, Cedar is limiting water withdrawal, and large spans will be used between transmission line structures across Moore Creek and Anderson Creek to reduce the need for riparian clearing that could affect hydrologic patterns or flow. Less than 0.1 ha swamp will be disturbed by the marine terminal footprint; the swamp provides minor flow moderation with limited capacity to capture and store stormwater. Of the wetlands in the transmission line footprint, the shallow open water provides limited water flow moderation given its extent (less than 0.1 ha), while the fen contributes to moderate levels of water flow moderation. However, given the small area of fen in the footprint (0.1 ha), lost hydrological wetland functions are considered minimal.	Vegetation Resources • Wetland functions (hydrology; biogeochemical function; habitat function) Freshwater Fish • Water quality
☐	Could oceanographic patterns be altered by the Project?	Project effects on marine resources are predicted at a local scale and to be low magnitude; therefore, the Project is not predicted to alter oceanographic patterns.	Marine Resources • Water quality

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Table 1 Scoping of Biophysical Factors, Key Considerations, and Interaction Descriptions for the Assessment of Potential Project Effects on Ecosystem Function

Possible Interaction	Key Considerations	Interaction Description	Valued Components and Indicators
6. Nutrient Cycling			
☒	Will the project result in an input of nutrients into the ecosystem (for example, waste discharges)?	The Project will have inputs affecting total suspended solids, nutrients, and/or deleterious substances during construction which could affect water quality, freshwater and marine aquatic life, and vegetation communities. The effect is predicted to be localized and of short duration in freshwater environments. The Project is predicted to change local soil moisture and nutrients (change in nutrient concentrations) due to clearing and grubbing and emissions that will result in acidic and nitrogen deposition. The effect on water is predicted to be small and localized, and in context of existing development and emissions, and is not expected to result in adverse effects on ecosystem function. Although no additional ecological communities will be affected by eutrophication exceedances due to project emissions, the Project will bring soils in the region closer to eutrophication critical loads. Project-related increases in nitrogen deposition in exceedance of empirical critical loads may cause some changes in nutrient cycling in 171.4 ha of vegetated area. Project-related soil acidification, SO_2, and NO_2 (air emissions) on vegetation health and diversity is predicted to be low magnitude and long-term. Low magnitude, short-term increase in total suspended solids in marine environment due to in-water construction and decommissioning, and waste management/water discharge during operation.	Vegetation Resources • Wetland functions (hydrology; biogeochemical function; habitat function) • Vegetation health and diversity (SO_2 and NO_2 from air emissions) Freshwater Fish • Surface water quality (acidification, eutrophication, temperature, total suspended solids, pH) Marine Resources • Water quality

Reference: Ecosystem Function Scoping Tool – Section 21.0 Summary of Biophysical Factors that Support Ecosystem Function

Table 1 Scoping of Biophysical Factors, Key Considerations, and Interaction Descriptions for the Assessment of Potential Project Effects on Ecosystem Function

Possible Interaction	Key Considerations	Interaction Description	Valued Components and Indicators
☒	Will the Project cause a change in the flow of nutrients through an ecosystem (e.g., land clearing, erosion or scouring, changes to water flow)?	Erosion and sediment controls implemented through the CEMP will help to keep harmful sediments out of surface freshwater and out of sensitive water-receiving ecosystems (e.g., wetlands). Works that have potential to affect water flow in freshwater environments will be completed following relevant regulatory requirements (e.g., review by DFO, approvals and/or licences under the *Water Sustainability Act*). Although no additional ecological communities will be affected by soil eutrophication exceedances due to project emissions, the Project will bring soils in the region closer to the eutrophication critical load. Project-related increases in nitrogen deposition in exceedance of empirical critical loads may cause some changes in nutrient flows in 171.4 ha of vegetated area. The effect on ecological communities is predicted to be small and localized in the context of existing development and emissions and is not expected to result in adverse effects on nutrient flow.	Vegetation Resources • Wetland functions (hydrology; biogeochemical function; habitat function)
7. Purification Services			
☒	Could project discharges lead to accumulation of waste or chemicals in an ecosystem?	Regional air quality includes elevated levels of criteria air contaminants such as nitrogen dioxide, sulfur dioxide, and fine particulate matter ($PM_{2.5}$), primarily from the Rio Tinto Aluminum Smelter and associated marine traffic. The Project's contribution to change in air quality is not expected to affect productivity (e.g., vegetation health) or ecosystem services (e.g., air purification) from existing conditions. Potential change in surface water quality caused by increased acidification and total suspended solids, nutrients, and/or deleterious substances during construction of land-based infrastructure. The effect on water is predicted to be small and localized, and of short duration and in context of existing development and emissions; it is not expected to result in adverse effects on ecosystem function. Effects are not expected to change fish health and mortality risk.	Air Quality • Criteria air contaminants Freshwater Fish • Water quality (acidification, eutrophication, total suspended solids) • Fish health and mortality risk Vegetation Resources • Vegetation health and diversity (SO_2 and NO_2 from air emissions inclusive of consideration of soil acidification and eutrophication

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Table 1 Scoping of Biophysical Factors, Key Considerations, and Interaction Descriptions for the Assessment of Potential Project Effects on Ecosystem Function

Possible Interaction	Key Considerations	Interaction Description	Valued Components and Indicators
8. Biotic Interactions			
☒	Could the project have effects to keystone or foundation species that have the potential to alter ecosystems?	Western redcedar and western hemlock are the characteristic tree species that define the Coastal Western Hemlock BEC zone that the project is located within. However, the Cedar's removal of trees for the Project will not alter the climate, soil conditions, and physiography that largely determine ecosystem potential. Anadromous fish passage within the region is restricted to the lower reaches of Anderson, and Moore creeks and unnamed tributaries of Douglas Channel due to natural barriers (e.g., waterfalls) downstream of the proposed project footprint. Therefore, biotic interactions between the marine and terrestrial environment via the salmon cycle (e.g., bears and wolves feeding on salmon carcasses) is limited to areas within these lower reaches of the creeks. The Project is not expected to affect biotic interactions via the salmon cycle. Beavers are keystone species in wetland and riparian ecosystems. Beavers and sign of beavers (lodges, dams, tree chewings) were not detected within the area during surveys; however, wetlands and Beaver Creek may support beavers. Other streams that interact with the Project are not expected to be suitable for beavers (due to steep slopes, rocky substrates, and closed canopy coniferous forest). The Project is not expected to affect beaver activity that could alter ecosystems.	Vegetation Resources • Plant species Freshwater Fish • Fish habitat • Fish health and mortality risk Wildlife • Grizzly bear
☐	Could project effects allow for invasive species to change ecosystem function?	Invasive plants occur in the region in low abundance in association with existing disturbances (road); the Project could increase the spread of invasive species from vegetation clearing and grubbing (vehicle and equipment movement) and the creation of edge habitats; however, this is not expected to affect ecosystem function. Cedar will implement standard best practices to prevent and control the spread of invasive plants and use natural regeneration or active reclamation to restore temporary workspace.	Vegetation Resources • Invasive plants • Ecological communities • Wetland functions (hydrology; biogeochemical function; habitat function)

Reference: Ecosystem Function Scoping Tool – Section 21.0 Summary of Biophysical Factors that Support Ecosystem Function

Table 1 Scoping of Biophysical Factors, Key Considerations, and Interaction Descriptions for the Assessment of Potential Project Effects on Ecosystem Function

Possible Interaction	Key Considerations	Interaction Description	Valued Components and Indicators
☒	Will there be species impacts that could change predator prey dynamics?	Changes in fish behaviour may include attraction to lit areas around the marine terminal, which could increase predator-prey interactions at the terminal as prey are easier for marine mammals (e.g., seals, sea lions) to see at night under artificial light. A change in grizzly bear or moose seasonal ranges could result in local changes to plant communities, which in turn could affect other interspecies relationships (e.g., plant-pollinators, other predators and ungulates) and overall ecosystem function. Project effects on distribution, abundance, and behaviour of predators and prey are local and at a scale much smaller than the ranges of the species affected (e.g., grizzly bear, moose, marine mammals, marine fish); therefore, local change in predator-prey dynamics is not likely to alter ecosystem function.	Marine Resources • Marine mammals • Marine fish Wildlife • Grizzly bear • Moose
9. Population Dynamics			
☐	Could the project impact wildlife species at a population level?	Project effects on distribution, abundance, health, and behaviour of grizzly bear, moose, birds, bats, amphibians, marine mammals, freshwater fish, and marine fish are local and regional, and at a scale much smaller than the ranges of the species affected. The Project is not expected to impact wildlife species at the population level.	Marine Resources • Marine mammals Freshwater Fish • Fish health or mortality risk Wildlife • Grizzly bear • Moose • Shore birds, marine birds • Songbirds • Bats • Amphibians

Reference: Ecosystem Function Scoping Tool – Section 21.0 Summary of Biophysical Factors that Support Ecosystem Function

Table 1 Scoping of Biophysical Factors, Key Considerations, and Interaction Descriptions for the Assessment of Potential Project Effects on Ecosystem Function

Possible Interaction	Key Considerations	Interaction Description	Valued Components and Indicators
10. Genetic Diversity			
☐	Will there be the possibility of reducing the genetic diversity of wildlife populations?	Project effects on distribution, abundance, health, and behaviour of grizzly bear, moose, birds, bats, amphibians, marine mammals, freshwater fish, marine fish are local and regional and at a scale much smaller than the ranges of the species affected at the population level; therefore, the Project is not expected to reduce the genetic diversity of wildlife populations.	Marine Resources • Marine mammals • Marine fish Freshwater Fish • Fish health or mortality risk Wildlife • Grizzly bear • Moose • Shorebirds, marine birds • Songbirds • Bats • Amphibians

Reference: Ecosystem Function Scoping Tool – Section 21.0 Summary of Biophysical Factors that Support Ecosystem Function

The information in Table 1 was used to select "key biophysical factors" to assess project effects on ecosystem function in Section 21.0 of the EAC application. Each of the key biophysical factors represent a collection of biophysical factors identified as likely to interact with the Project. These key biophysical factors were used to describe the overall effect on ecosystem function at the scale that coincides with a potential effect at the watershed, ecosystem, or ecological community level. The rationale for the selection of the three key biophysical factors is described below.

Habitat Diversity and Structural Complexity

The positive relationship between habitat diversity and structural complexity and ecosystem function is well known and supported in political decision-making on conservation and ecosystem management. Habitat diversity and structural complexity supports ecosystem resilience and the ability to adapt to changes (e.g., climate change or anthropogenic disturbance). The effects of loss of diversity can be important at both small and large temporal and spatial scales. Habitat diversity and structural complexity was selected as a key biophysical factor because there are predicted to be potential project effects on valued component indicators of habitat diversity and structural complexity (e.g., old forest, ecological communities at risk, vegetation species health and diversity, marbled murrelet, grizzly bear) and it encompasses several categories in the Ecosystem Function Scoping Tool, specifically:

- Habitats supporting ecosystem function
- Habitat patches
- Structural complexity
- Biotic interactions

Habitat Connectivity

Habitat connectivity is an important driver of ecosystem function at the regional scale (e.g., watershed, species population range) and is what maintains the interrelationship between the marine and terrestrial environments on British Columbia's coast. Habitat connectivity was selected as a key biophysical factor because there is predicted to be potential project effects on valued component indicators of habitat connectivity (e.g., grizzly bear, marbled murrelet, wetland functions) and it encompasses several categories in the Ecosystem Function Scoping Tool, specifically:

- Habitat patches
- Hydrologic or oceanographic patterns
- Nutrient cycling
- Biotic interactions

Water

Water was selected as a key biophysical factor because there is predicted to be potential project effects on valued component indicators of water (e.g., wetland functions, acidification, and total suspended soils in freshwater and marine environments) and it encompasses several categories in the Ecosystem Function Scoping Tool, specifically:

- Hydrologic or oceanographic patterns
- Nutrient cycling
- Purification services

Reference: Ecosystem Function Scoping Tool – Section 21.0 Summary of Biophysical Factors that Supported Ecosystem Function

CLOSURE

This memo demonstrates that Cedar has considered the ten categories of biophysical factors and key considerations from the Ecosystem Function Scoping Tool in the assessment of project effects. Cedar used three “key biophysical factors” to collectively assess potential project effects on the biophysical factors that were identified as potentially interacting with the Project through use of the Ecosystem Function Scoping Tool. The Project is not expected to interact with 3 of the 10 categories (i.e., natural disturbance regimes, population dynamics, and genetic diversity) but is predicted to interact with 7 of the 10 categories (i.e., habitats supporting ecosystem function, habitat patches, structural complexity, hydrologic or oceanographic patterns, nutrient cycling, purification services, and biotic interactions). These were considered through the assessment of valued components and indicators in the Application. The effects assessment conclusions provided in Section 21.0 are maintained and considered appropriate.

Regards,

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