

Douglas Channel West Land Constraint and Suitability Study

Executive Summary



Land Constraint and Suitability Study (LCSS) focuses on a largely undeveloped portion of the *District of Kitimat* (DOK). Project area extends south from Kitimat LNG's office and work camp site to Miskatla Inlet, and west from Douglas Channel to the municipal boundary covering more than 19,000 hectares. Most area is land; however, tidal waters of Douglas Channel and Miskatla Inlet, and Jesse Lake cover 38% of the project area. Study area encompasses part of the traditional territories of the Haisla and Gitga'at First Nations. See Overview Map on page 9.

Three overview assessment reports have been completed by consultants with expertise in geography, archaeology, and environment. Each assessment included datasets that were imputed into DOK Geographic Information System (GIS) for high-quality analysis of the study area. DOK developed indicators based on information from the assessment reports, which in-turn were used to create maps that will inform future planning processes and decisions. Overview Assessments, maps, and poster boards, are available for viewing at public engagement events, District of Kitimat Office, and project website: www.kitimat.ca/swkap.

Summary of Reports

Through a Request for Proposals, DOK retained consultancy services from Westland Resources Ltd, Kleanza Consulting Ltd and Madrone Environmental Services Ltd, to complete a series of overview assessments. Landscape knowledge will inform the area plan and planning policies.

This LCSS built upon previous reports, including the *West Douglas Channel Corridor Analysis* (WDCCA) completed in 2016 by Ministry of Transportation which assessed existing infrastructure and future needs of potential large industrial projects. LCSS extends the study area used for WDCCA both south and west to boundary of DOK.

A field visit in fall 2017 launched the project and allowed for high level observations of the study area. LiDAR imagery and air photos were used for the balance of field reconnaissance. Data gathered was then used in desktop analysis to identify areas of concern from geotechnical, archaeological, and environmental perspectives.

Outline

Environmental Overview Assessment

- Water, Fish, and Riparian Areas
- Bathymetry
- Vegetation
- Wildlife and Wildlife Habitat
- Wind
- Protected Areas and Other Designations
- Marine
- Socio-economic factors
 - Local Planning
 - Culture and Heritage
 - Recreation and Tourism
 - Visual and Aesthetics
 - Current Land Use and Tenure
 - Access and Infrastructure

Archaeological Overview Assessment

- Archaeological Predictive Modelling
- Habitation Model
- Culturally Modified Tree Model
- Paleo-Landscape Model

Geotechnical and Hydro-technical Overview Assessment

- Geology
- Geomorphology
- Surficial Geology
- Climate
- Hydrology

Each assessment report and its subsections provide a desktop overview of each topic, including potential limitations in the event of development and means for mitigating constraints. In some cases, policies will be determined by provincial standards that assess risk and mitigate development in applicable areas. Province-wide regulations govern development in riparian and designated flood hazard areas. Other restrictions may fall in line with existing DOK OCP policies and guidelines. In all cases, datasets that capture applicable details are inputted into GIS for analysis based on indicators developed by DOK staff with consultant input.

GIS Analysis

GIS is a dynamic analysis tool which can evaluate spatial conditions over multiple subjects. Outcomes are high quality maps that can be used to explain conditions at a particular point in time. Data gathered can be updated as new assessments are conducted. Use of key indicators allows changes to be tracked over time which can inform future policies.

Datasets have been prepared, assembled, referenced and provided to the DOK GIS department by the consultants and planning staff. Analysis was executed using indicators developed from the overview assessment reports. Indicator details are provided in the following section of this report.

An Intersected approach was recommended by the consultant to allow the land to dictate development potential based on existing conditions. GIS layers are generated to identify constraints and measures the suitability of land uses in the study area. Objective is to establish future land use designations and development policies which align with Council's Strategic Plan and, if possible, the current *Official Community Plan (OCP)*.

Indicators

Indicators are used to analyse data to gain knowledge of land and water resource capacity or capability to handle development without adverse negative impacts. Existing DOK and provincial data and new data generated from this study, provided information on local conditions at this time that will inform future planning processes. This is a dynamic process that allows for new data and fresh parameters to be included as they become available. Table 1 is an outline of indicators used, with detail to follow.

Table 1: Indicators

<p>a. Slope and Erosion Hazards Slope Stability Landslides Slope Percentage Surface Material Stream Erosion and Avulsion</p> <p>b. Flood Hazards Floodplain Lake Watercourse Sea Level Rise</p> <p>c. Archaeological Considerations Archaeological Sea Level Habitation Model Culturally Modified Trees Model Paleo-Landscape Model</p>	<p>d. Environmental Stewardship Riparian Areas Wildlife Habitat Cedar Trees Visual Quality Objectives</p> <p>e. Development Potential Mining Recreation Points of Interest Access Marine Access Beach Moorage Boat Launch Industry</p>
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a. Slope and Erosion Hazards

Rugged terrain within the study area contains many hazards that will determine development potential and mitigation requirements. Steep slopes are already addressed in the OCP, with areas exceeding 25% gradient identified in Schedule C – Hazardous Areas and policies in place. Study area has considerable slope areas that are prone to a multitude of slope-related hazards.

i. Slope Stability, Landslides, and Slope Percentage

Consultant has provided data on slope stability that is used to measure the likelihood of a mass wasting event. Mass wasting can range from a slow moving land-slump, seen recently near Fort St John and Site C Dam, to a fast mass wasting landslide. Gully erosion, where a landslide occurs in a watercourse and leads to debris flows that affect areas downstream, is also a concern.

Indicators identify areas of high risk for slope hazard events using stability data. Outcomes are map layer(s) showing distribution of risk in the study area.

ii. Surface Material

Surface material influences the hazard conditions of an area, affecting both stability concerns and erosion potential. Ground material within the study area represents much of the geological history of

this area. Hilltop material is mainly till deposited beneath ice sheets during glaciation. Valley floors contain fluvial material that has been eroded elsewhere and transported by water to its current location. Areas within 200 metres of sea level have glaciomarine sediment indicating sea level during glaciation. Glaciomarine soils are made up of thick clays laid down in the marine environment and are exposed where shoreline has rebounded following the retreat of glacial ice. Glaciomarine sediments are subject to rapid destabilization in seismic events and during construction.

iii. Stream Erosion and Avulsion

Overview assessments have identified erosion hazards along the main watercourses that transect the study area (Anderson Creek, Bish Creek, Emsley Creek, and Jesse Creek). Each contains significant fluvial deposits that are prone to erosion during high flow events. Avulsion is a sudden separation of land caused by flooding or a change in the course of a river. Assessment shows that some areas may see bank erosion of several metres.

Bank erosion is not uncommon in Kitimat where erosion and mass wasting are significant concerns for some properties. Planning policies may classify areas of concern, identify no build areas or impose site-specific assessment at time of development application.

b. Flood Hazards

Kitimat experiences some intense precipitation events which have implications for future development. Flood Hazard is a concern in close proximity to major watercourses, Jesse Lake, and the shoreline of Douglas Channel. Risk of flooding is seasonal with highest water flows during rain precipitation events in October and November. Rain-on-snow melt events in the spring are a lesser concern, and typically result in lower water levels than those of the fall season.

i. Floodplain, Lake, Watercourse

Overview assessment reports confirm that floodplains exist in the study area; however, flood extent has not been determined due to limitations in the scope of this project. Mapping could be completed as part of a future district-wide floodplain map update.

Areas of concern are in close proximity to significant watercourses and lakes. *BC Flood Hazard Area Land Use Management Guidelines* are province-wide standards to be used where risk has been determined. Indicators are built on these guidelines, with policy decisions and planning tools to be implemented where necessary.

ii. Sea Level Rise

Overview assessment reports do not specifically address sea level rise for Douglas Channel. Given that the study area is mainly wilderness, with relatively limited built infrastructure, it is prudent to consider sea level rise for future development. BC Flood Hazard Area Land Use Management Guidelines were recently updated to incorporate sea level rise issues. Setbacks and flood level construction levels have been set for coastal areas, using sea level projections of 0.5 metres in 2050 and 1.0 metres in 2100.

c. Archaeological Considerations

Archaeological values are intangible assets that are difficult to quantify after loss. Much of this area has been inhabited for thousands of years, with identified archaeological sites dating back some 9,000 years. The overview assessment used models to predict the likelihood of archaeological sites impacting future development. Value of sites cannot be measured in an empirical system; they can only be evaluated as loss to the community to which they belong. In all cases where models show high potential for archaeological sites, development must proceed collaboratively and in partnership with local First Nations. As mentioned previously, land in this region includes traditional territory of the Haisla and Gitga'at Nations.

i. Habitation Model

This model measures the likelihood of archaeological sites using a range of predictor variables. Model considered vertical distance to fresh water, walk time to ocean, coastline complexity, and wind effects, among others. High potential habitation model accurately predicted 98% of known archaeological sites within the study area.

ii. Culturally Modified Trees Model

Culturally Modified Trees (CMTs) are indications of traditional activities within a first nation territory. For example, cedar bark harvested from living trees can be used to make baskets, clothing and other items. To predict the presence of archaeological sites, the predictive model evaluates tree species and common characteristics. Parameters include tree height, cedar percentage and the absence of deciduous trees (as they indicate relatively young tree canopies). Eighty-five percent of known CMT sites within DOK were in areas predicted using this model. Of the 15% of CMT sites missed by this model, all but one has been harvested since their initial recording.

iii. Paleo-Landscape Model

Final model looks for paleo features that may have been valuable land under previous circumstances. Glacio-terraces, eroded sedimentary deposits, and edge of former lakes or watercourses are examples of this kind of landscape.

iv. Paleo Sea Level

Sea level was not part of the model that identified the likelihood of archaeological sites. Geotechnical assessment gives the extent of glaciomarine sediment on the landscape up to 200m above current sea levels, which indicates the location of paleo shoreline. Two previously-identified archaeological sites are located as high as 45 m above sea level and estimated to be 9,000 years old. It would be appropriate to consider that unidentified sites are possible up to known limits of the paleo shoreline at 200m.

d. Environmental Stewardship

The study area currently includes approximately 6,584 hectares (38%) of wilderness, defined as land that is more than 1 km from any road. Several environmental features require protection and conservation.

i. Riparian Areas

Riparian areas are influenced by the presence of an active watercourse, within the ecosystem, and are essential for the wellbeing of local vegetation and wildlife species. Tributaries and wetlands provide protection and food for fish, birds, and larger land-based animals. Area can extend up to several metres from the stream channel. Provincial Riparian Areas Regulation protect features, functions, and conditions that are vital for stream health and productivity.

Similar to considerations for stream erosion, setbacks and restrictions will be implemented to limit development in sensitive areas. Provincial regulations will be used to guide decisions.

ii. Wildlife Habitat

There are a number of areas that have been identified as key habitat for various species within the study area. Kalum Land and Resource Management Plan (KRMP), and Kalum Sustainable Resource Management Plan (SRMP), outline objectives regarding wildlife and wildlife habitat. Since the KRMP and SRMP were completed in 2006, a Moose Ungulate Winter Range and several Grizzly Bear Wildlife Habitat Areas have been established within the study area. Other species have been studied as part of work for proposed Kitimat LNG project at Bish Cove; however, no formal regulation exists beyond moose and grizzlies.

Planning policies must respect identified habitat areas, with appropriate buffers from any proposed development. Additional protected areas may be established for specific species or conservation efforts.

iii. Cedar Trees

Cedar trees carry particular interest for local first nations as discussed above [see (c) (ii)]. As an indicator, GIS can measure percentage of cedar trees. Staff has recommended that areas with more than 25% cedar require assessment for CMTs and possibly requirements to preserve significant stands. Areas of old-growth forest are identified within existing data. Policies may call for further assessment prior to development approval.

iv. Visual Quality Objectives

Ministry of Forests, Lands, Natural Resources Operations and Rural Development (FLNRORD) imposes visual standards to manage cut blocks. This is done to preserve and highlight scenic values that compete with forest harvesting. Buffering along a highway, for example, guards the view and hides blocks of harvested forest. Objectives are established that limit the amount of disturbance based on what can be seen from key points like a highway, beach, or moorage. Allowed disturbance can range from preservation to maximum modification depending on context.

Kitimat Official Community Plan already highlights the importance of forested vistas in the project area, indicating that these areas should be managed through collaboration with forest tenure holders. Visual Quality Objectives (VCQs) are tools to manage what is seen from key points and should be maintained or expanded within a local area plan. Community engagement can help identify points of interest from which future VCQs are measured, and the level of disturbance that should be allowed by provincial authorities.

e. Development Potential

A land constraint and suitability study considers conditions in the landscape that may limit or provide opportunity for human activity. *District of Kitimat* tagline is *A Marvel of Nature and Industry*. This study recognizes values to preserve natural assets, improve community access to the waterfront, and manage industrial (and economic) interests. Development potential analysis evaluates the suitability of identified activities within the study area. Distribution of suitable activities will inform planning policies by defining locations for public access and providing sufficient buffers to activities that may not be compatible with general public use and commercial tourism activities.

Much of the study area is forested land with licensed tenures. This project does not imply that changes will be made; however, opportunity exists to remove land from tenure areas should other higher-value land uses be identified. Such decision will require Ministry of Forest, Lands, Natural Resource Operations and Rural Development agreement.

Background research for this project included consulting the *West Douglas Channel Corridor Analysis* (2016) and other studies, which evaluated potential access and terminal locations for major industrial projects that have been proposed at various times. Kitimat LNG is currently the only industrial project that has had recent construction activity in the study area. Other projects (Pacific Traverse Energy, Cedar LNG) have been proposed and are at various stages of the environmental assessment process. This section evaluates potential activities for the study area to guide future land use and related policy decisions.

i. Mining

Geological survey of the study area shows a very small portion that has potential mining value. While this area is identified for information, there are no known plans for exploration.

ii. Recreation – Points of Interest, Activities, Access

Recreation values are difficult to measure in a scientific study. Much of the study area is wilderness backcountry with few recognized recreation sites. Most activities require local knowledge of the terrain and how to access points of interest for camping, hiking, ATV riding, and other uses. Intention is not to limit existing ad hoc use, but perhaps enhance existing trails and identify important “no-go” sites to minimize impacts on sensitive areas and ecosystems. Data for this analysis will be gathered through the public engagement process.

iii. Marine Access – Beach, Moorage

Mandate for this project includes improving community access to the ocean along Douglas Channel. Access is today limited to a private site at Hospital Beach which includes a boat launch. Indicators will identify the best locations for beach access with considerations for places to launch boats and kayaks. Buffers will be used to ensure public areas for swimming and other water activities are not in conflict with industrial projects.

Guidelines may be drawn from BC Parks Branch to select ideal locations for public wharfs and moorage. Consultation with nearby marina and boat operators will confirm points of interest that may be reachable with improved water access.

Summary

This *Land Constraint and Suitability Study* identified characteristics displayed by the land, water, and vegetation in a largely uninhabited area within DOK. Some human activities are ongoing, including industrial projects, forestry, and backcountry recreation. This study used an intersected approach to analysis which allowed constraints to be determined by the natural environment, prior to consideration of human-based activities. Policies to be included in the area plan will reflect the findings and constraints identified by this LCSS as well as findings made during engagement with Haisla Nation, Gitga'at Nation, other stakeholders, and the public.

Outcome of this study is a baseline understanding of the limitations or possibilities for development in this area. While maps displayed are finished images from this portion of the study, GIS allows the data to live and evolve as more information becomes available. This is a dynamic dataset that will be refined as new projects are proposed and more detailed, site-specific studies are completed.

Some pieces of this project are incomplete. Data regarding recreation and future industrial activity will be gathered throughout the public engagement process to come. Recreation is mostly marine and backcountry with few organized activities. Public engagement will generate information on activities that are occurring in the area and how people are accessing locations for their activities. Data and maps will inform goals, objectives, and policies in a new *Local Area Plan*; and future *Official Community Plan*.

