



Kitimat River Flood Risk Assessment– Summary Report

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Submitted to: District of Kitimat

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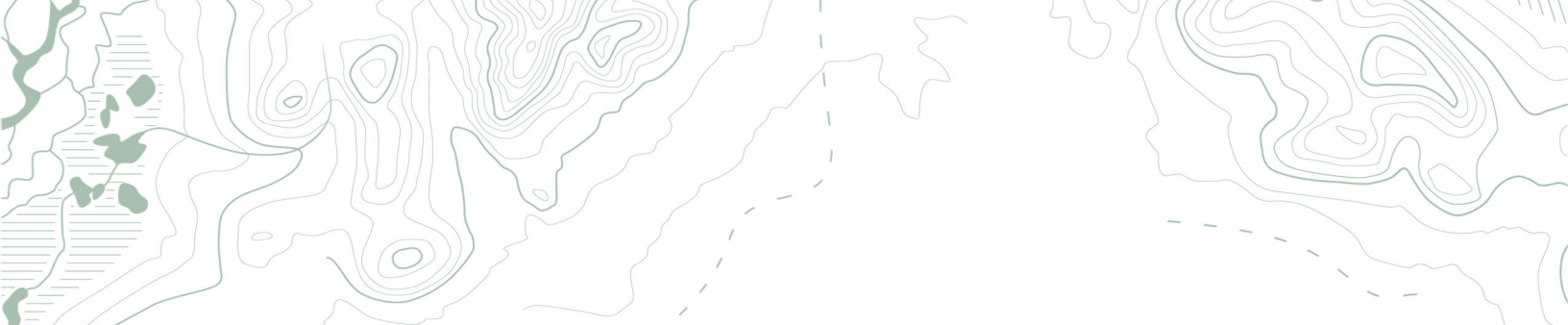
322 – 323 City Centre, Kitimat

BC Canada V8C 1T6

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Our file: 2353-10399-00

A decorative topographic map background with green contour lines and some green shaded areas representing vegetation or water bodies.

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1. Introduction

1.1. PURPOSE OF THE REPORT

This report has been prepared as a summary of the Kitimat River Flood Risk Assessment Report prepared by McElhanney for the District of Kitimat dated 26 April, 2022. This summary is intended to provide an overview of the project scope and findings only, further technical information on methodology and outputs can be found in the aforementioned report.

Flooding in communities has significant consequences to the people who live there. Damage to public and private property and infrastructure results in economic, social, and environmental losses that can take a community years to recover from. However, these damages can be prevented and/or mitigated through proactive flood planning. A primary planning tool for proactive flood planning is current and accurate flood mapping. The existing provincial flood mapping for the area was completed in 1982. Significant changes have occurred over the last forty years to the river, land use, available information, and hydraulic modeling capabilities that necessitate the updating and augmenting of those flood maps to current flood mapping standards. McElhanney was retained by the District of Kitimat (The District) to prepare a flood risk assessment for the Kitimat River and identify options to mitigate against the risk of flooding.

1.2. LOCATION

The study area is the Kitimat River - from downstream of the Little Wedeene River confluence to Douglas Channel, and Hirsch Creek - from the Highway 37 bridge to its confluence with the Kitimat River. The District highlighted five area of interest within the larger study area. These include the Cable Car subdivision, the Kitimat Townsite, the Service Area, and the Kitimaat 1, and Jugwees 5 Indian Reserve lands. A map of the study area is provided in Figure 1-1.

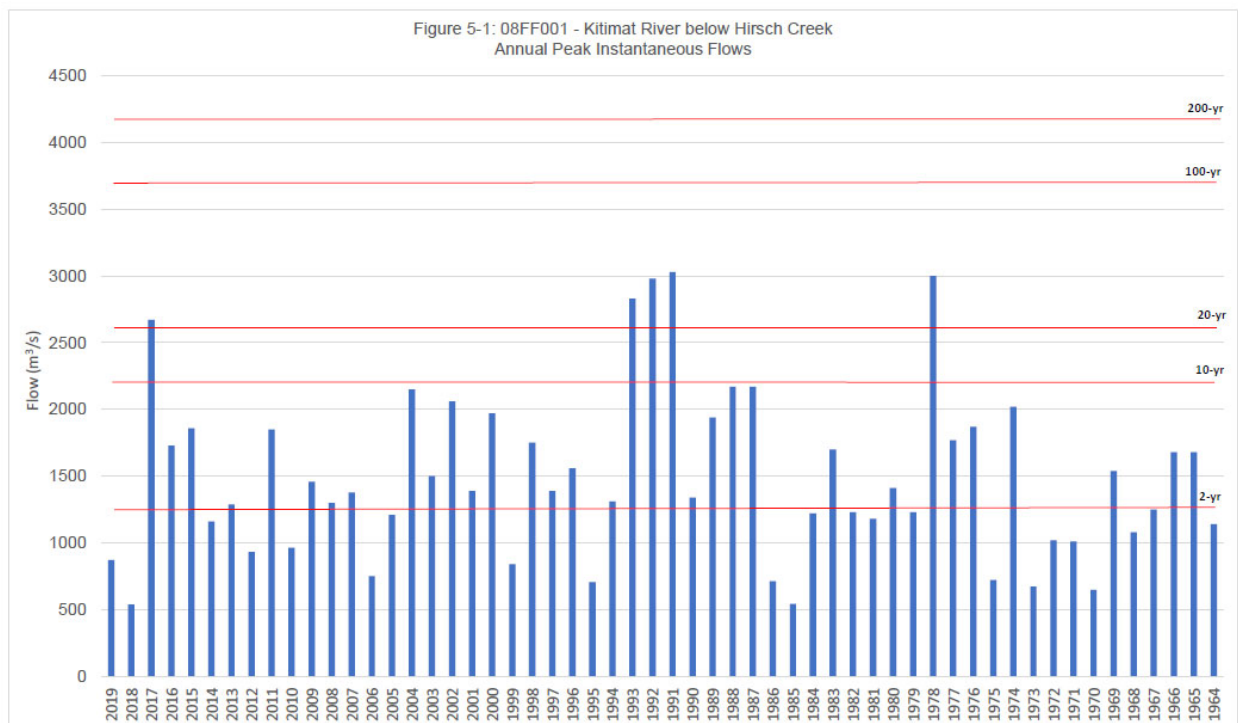


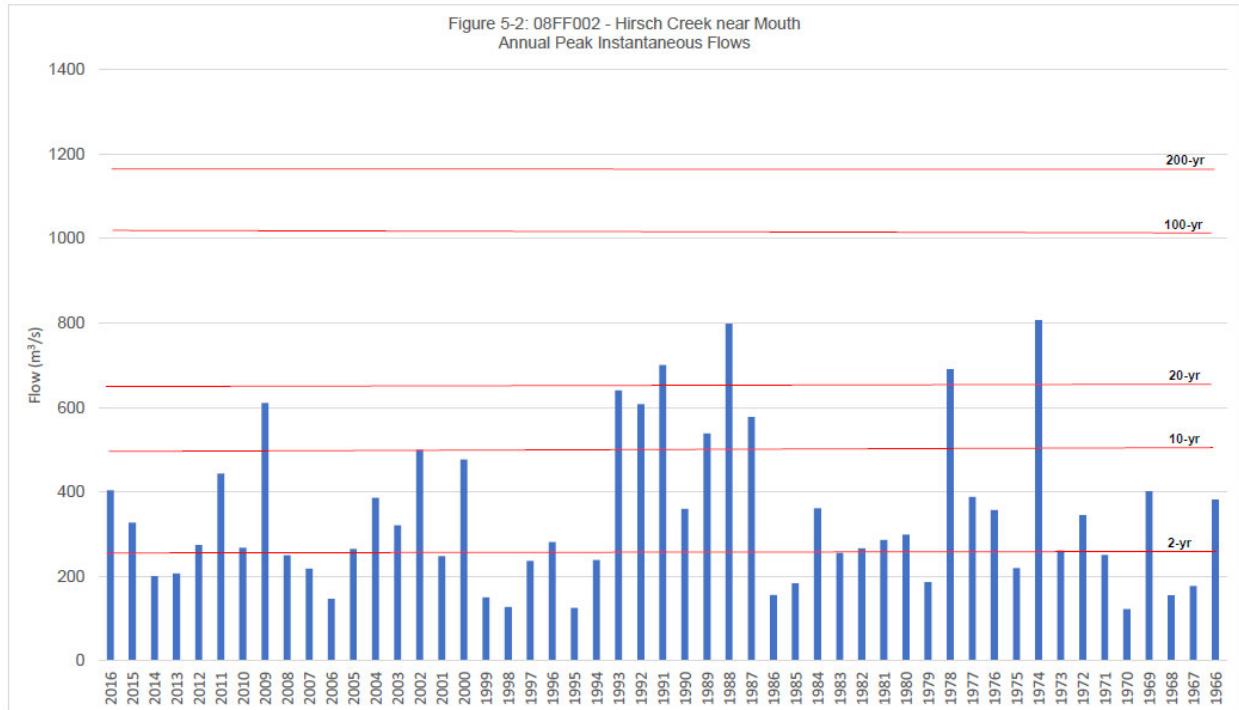
 KITIMAT A Marvel of Nature and Industry  McElhanney	Scale=1:45,000 Projection: BC Albers Datum: NAD83 <table><tr><td>Project No.</td><td>Date</td></tr><tr><td>2353-10399-00</td><td>June 1 2021</td></tr></table> All rights reserved. All contents (texts, trademarks, illustrations, photos, graphics, files, designs, arrangements etc.) on this document are copyright of McElhanney Ltd. (McElhanney). No part of this publication may be reproduced, distributed, or transmitted in any form or by any means, including photocopying, recording, or other electronic or mechanical methods, without the prior written permission of	Project No.	Date	2353-10399-00	June 1 2021	LEGEND  Study Area  WSC Station Locations	Figure 1-1 Study Area Kitimat River Flood Mapping Study
Project No.	Date						
2353-10399-00	June 1 2021						

1.3. HISTORICAL CONTEXT

Kitimat is no stranger to flooding. As part of the project, a review was undertaken of the records of historical flooding, dating back to 1913. A detailed list of all flooding records is provided in the main report and common areas of flooding are Radley Park, Hirsch Creek Park, the Service Centre, the Kildala area of town and the sewage treatment facility. Many of the flooding events that have occurred are as a result of rain on snow and debris slides. The impacts of these floods have included washing out of power lines and roads, property damage, and vehicles washed into the river, as well as initiating rescue efforts for residents and visitors to the town.

A flood frequency analysis was undertaken and compared to historical records. Results of this are provided in Figure 5-1 and 5-2 of the main report and are included below. It is worth noting that neither the Kitimat River nor Hirsch Creek have experienced 100-year flood events based on the available Water Survey of Canada records. The Kitimat River has experienced five 20-year flood events since 1964. Hirsch Creek has experienced four 20-year flood events since 1966. In the flow records the Kitimat River and Hirsch Creek have both experienced a 20-year event in the same year twice (1978 and 1991).





2. Overview of Methodology

A detailed methodology is provided in the main report, but Figure 2-1 provides an overview of the methodology used to undertake the Flood Risk Assessment.

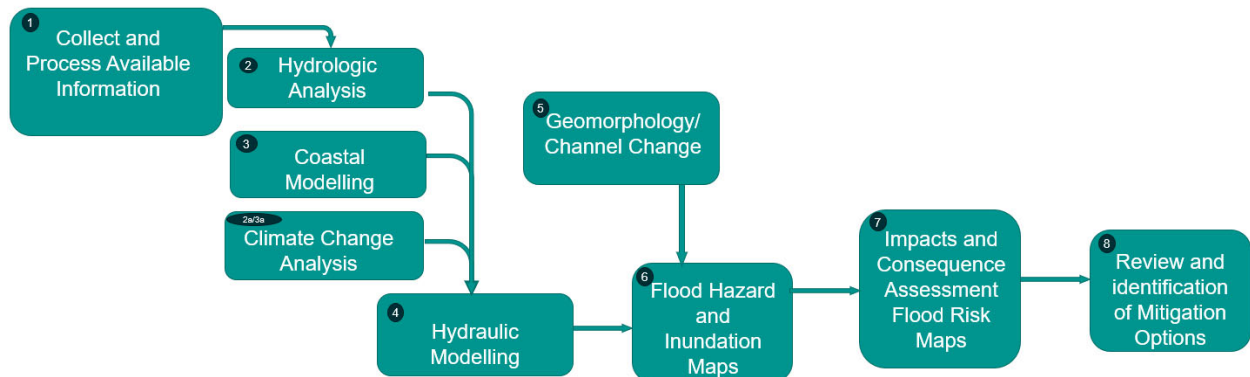


Figure 2-1 Methodology Overview

3. Mapping

Standard practise is for classic flood maps to examine the 200-year and 20-year flows. We have recommended that a 200-year return period event with consideration for climate change, be adopted as the design flood flow for the study. This is the scenario that mitigation measures will be measured against. A 200-year return period is a flood that has a 1 in 200 (0.5%) chance of occurring in any year. It should be noted that this does not mean that if a flood with such a return period occurs, then the next will occur in about two hundred years' time - instead, it means that, in any given year, there is a 0.5% chance that it will happen, regardless of when the last similar event was. Or, put differently, it is 10 times less likely to occur than a flood with a return period of 20 years (or a probability of 5%).

Flood inundation maps and Flood Hazard Maps were produced following the modelling. Inundation maps are what are often referred to as classic flood maps, and they show the depth of the water at the locations where it floods. However, this doesn't tell the whole story. The danger of flooding does not come from the depth of water alone, it is also a function of the velocity of the water and the potential for debris. It only takes 20cm of fast-flowing water to move a vehicle, and while that doesn't sound very deep, the crucial aspect is the speed it is flowing. Hazard maps therefore go beyond inundation maps and show the hazard, which is a function of the depth and velocity of the water plus debris.

The impacts to the study area are then discussed for five impact categories: People and Societal; Environmental; Local Economic; Local Infrastructure; and Public Sensitivity Impacts. A review of the impact on buildings and infrastructure within the study area was then completed. The results of this assessment are presented on the Flood Risk Maps.

4. Findings

The flood maps were reviewed for each of the five areas of interest and the following is a summary of the flooding in each are for a 200 year plus climate change flood event.

4.1. CABLE CAR

Cable Car is located on a bench on the broader floodplain and water levels are not able to reach the elevated area. No flooding was observed in the Cable Car area.

4.2. SERVICE AREA

The model took into account the District flood operational plan which involves infilling the forest service road leading north from the Service Area and rail line through the dike. Under this condition the majority of the Service Area does not flood with the exception of minor inundation of low-lying pockets of ground at the southern terminus of the dike. Although the model covers the geographical area of Goose Creek, it should be noted that the study did not include the modelling of the creek itself, rather the impacts of the Kitimat River on the creek.

4.3. KITIMAT TOWNSITE

All water enters the townsite around the southern end of the dike via Sumgas Creek. The flood hazard is considered low in this area meaning the water is forming shallow pools or flowing at a slow velocity. Higher hazard areas exist in depressions or channels where water will be deepest and fastest.

4.4. KITIMAAT 1

The majority of the area is located on the floodplain. The hazard is considered extreme for this area.

4.5. JUGWEES 5

The hazard is directly related to water depth and increases as the ground gets lower toward the waterline. The flooding extents will better inform development activities.

5. Mitigation Option Review

Floodplain mapping is the first stage in the process of managing and mitigating against flood risk. Pro-active flood planning does not involve a single project. Rather, it is a detailed, staged plan that identifies the components necessary and completes them in a logical sequence, with each stage building on the previous stage. The work undertaken for this project forms the tools upon which to build further stages.

The project team identified ten potential options that could be implemented to mitigate against the risk of flooding in the District. A workshop was held with DoK staff to review each of the options against the following criteria:

- Cost
- Economic Impact
- Schedule duration
- Effectiveness
- Safety Impacts
- Environmental Impacts
- Societal Impacts
- Operational Impacts
- Resources Required
- Permitting and Approvals

Based on this review, three options were identified as the preferred options to develop into the next stages:

Extend the lower dike – this would include extending the existing dike beyond its current endpoint to provide protection against the flows that are currently predicted around the current endpoint of the dike. There are several routes this extension could take. Note that potential options for the extension include construction within Kitimaat 1 and collaboration will be required with Haisla Nation. This is likely to be a lengthy process and will include time associated with feasibility studies, engineering design, ongoing communication between all project partners and environmental permitting prior to any construction.

Flood Awareness Campaign – this is a targeted campaign to increase the awareness of the risks associated with flooding as well as steps that residents and local industrial stakeholders can take to protect themselves.

Planning – This includes a review of existing planning documentation and updates as required to reflect the identified risk. Consideration should be given to development planning, emergency response planning, and operational and maintenance procedures.

6. Next steps

The main report sets out a potential road map for implementation of each of the preferred options:

Extend the lower dike –2022-2026

- Establish a working group of representatives from the DoK and Haisla Nation to identify options for a dike extension that are mutually beneficial to both parties
- Undertake a feasibility study to design the preferred route and secure external funding for extending the lower dike
- Complete detailed design and construction of the preferred alignment

Flood Awareness Campaign – 2022-2023

- Identify key stakeholders and secure funding from Council to design and implement a flood awareness campaign

Planning – Ongoing

- Identify and update planning documentation (e.g., existing bylaws, operational plans, emergency response plans, etc.) in consideration of the findings of the study

In addition to the preferred options, several “quick wins” have been identified:

- Review evacuation procedures for the campgrounds, including installation of signage to educate campers on the flood risk
- Prepare and implement plans for the fish hatchery to ensure continued operation in the event of loss of access during a flood event
- Public consultation to present the findings of this study and future stages. It will be used to obtain feedback and input into the preferred mitigation options.
- Review the cultural impacts of flooding (note that this must be undertaken in collaboration with the Haisla Nation)

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2022-07-20

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