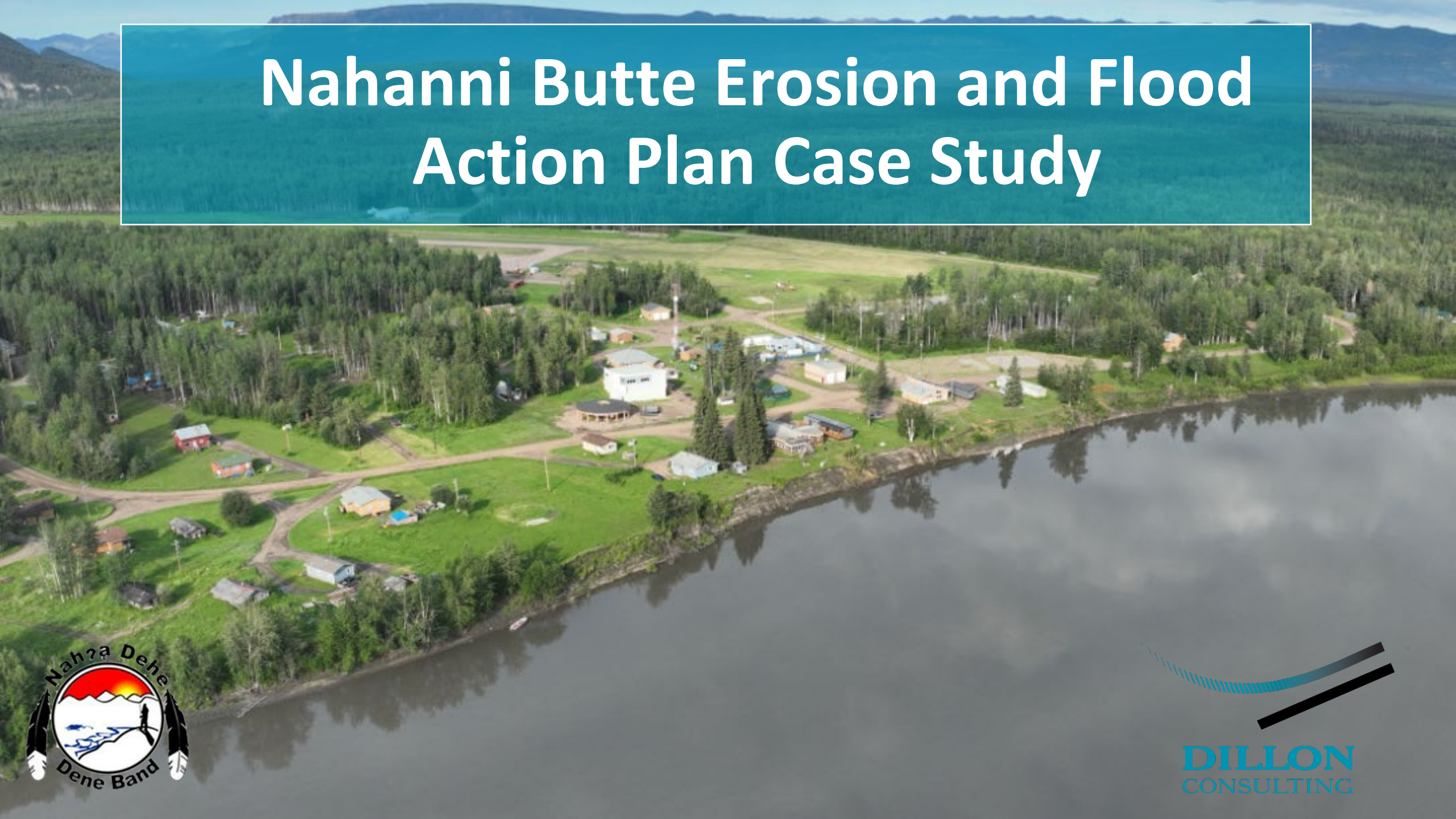
Nahanni Butte Erosion and Flood Action Plan Case Study



Nahʔą Dehé Dene Band

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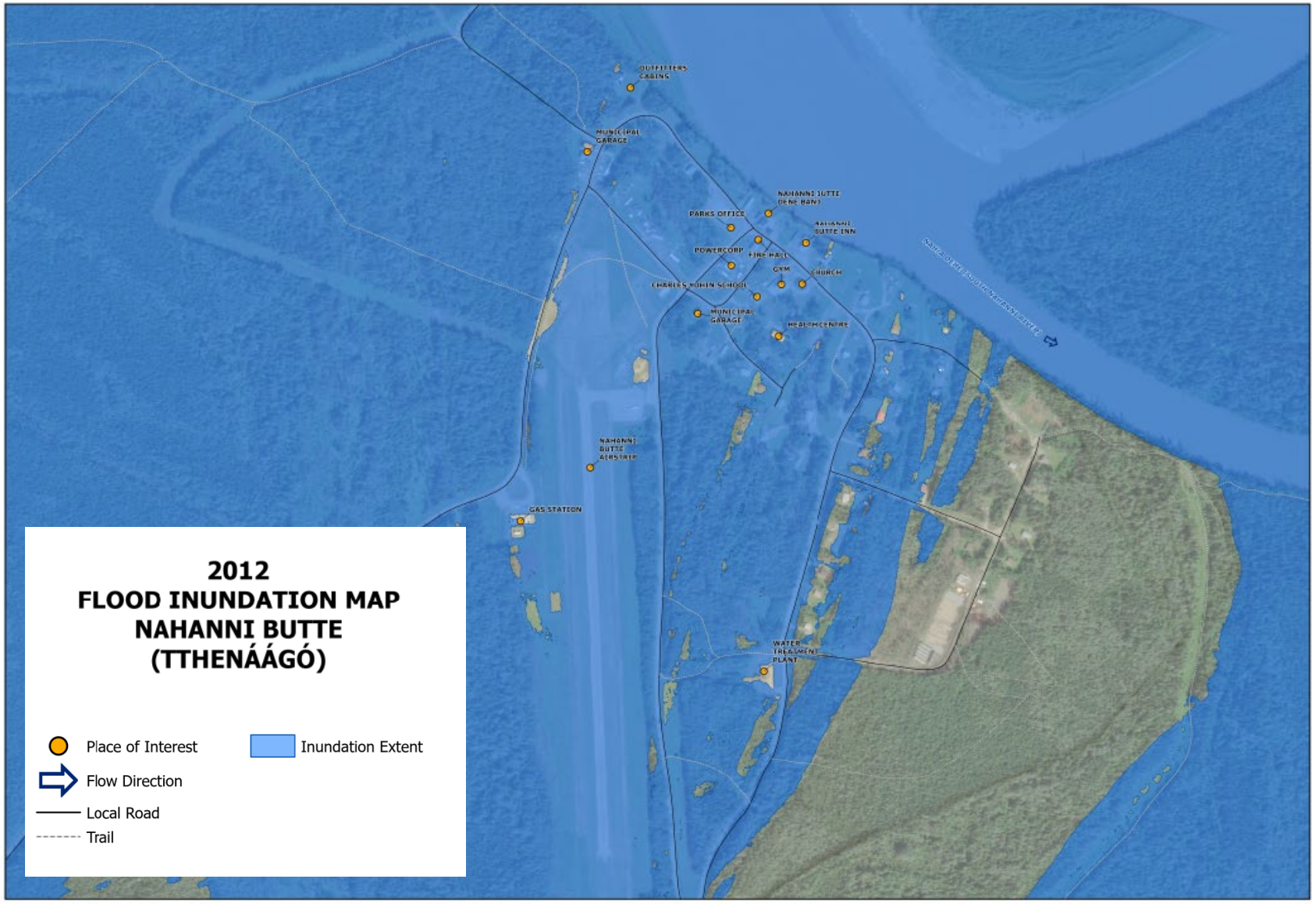
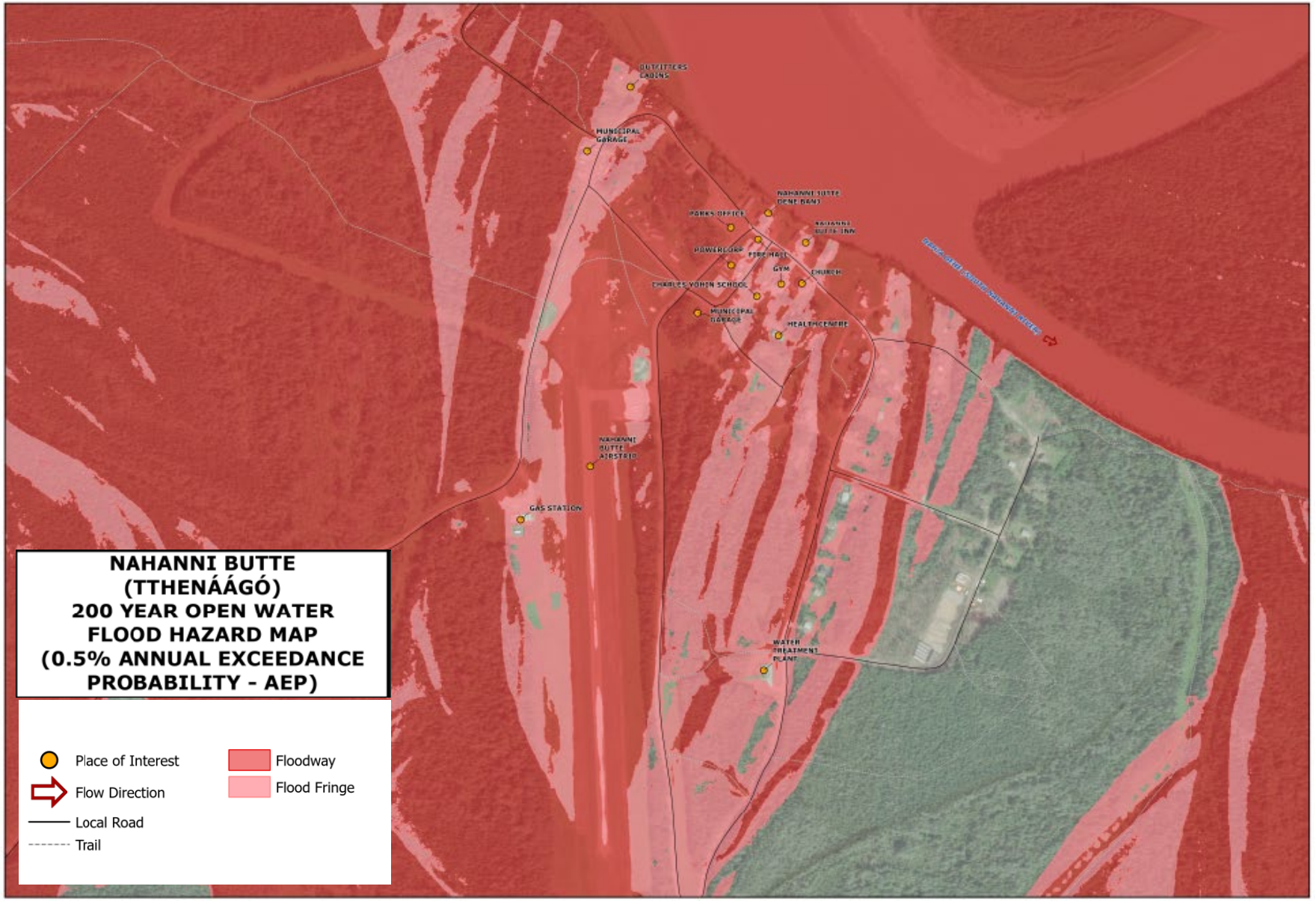
Objectives

	FLOOD AND EROSION MITIGATION PROJECT	FLOOD HAZARD MAPPING
Funding Partner	Climate Change Preparedness in the North (CCPN)	Flood Hazard Identification and Mapping Program (FHIMP)
Timeline	Fall 2023-Summer 2025	Fall 2024-Summer 2025
Community Engagement	Community-Led Monitoring High Water Marks Review of Flood and Erosion Management Initiatives	Commentary on Flood Mapping Flood Experiences
Site Observations	High Water Marks and Bathymetry	
Hydrology *(Flows)*	Estimated from Water Survey of Canada measured data	Modeled using Raven
Hydraulics *(Water Level)*	Modelled using 2D modelling software	Modelled using 2D modelling software
Flood Maps	Inundation only	Hazard Mapping: Historical and Climate Change
Overall Goal	Solution Oriented Flooding and Erosion Mitigation Action Plan	Flood Hazard Maps for two scenarios Interim Technical Memo and Flood Chronology Memo Draft Reporting Final Reporting

2012 Flood Inundation Map



1:200-Year Flood Hazard Map



FLOOD AND EROSION MANAGEMENT INITIATIVES

- **MITIGATION**
  - Structural Solution
  - Non- Structural Solution
- **PREPAREDNESS**
- *RESPONSE*
- *RECOVERY*

Action Plan

ACTIONS
1 Emergency Planning
Maintain a proactive emergency management plan with specific actions for flood and wildfire response, incorporating lessons learned from past events.
2 Advocate for Support from External Agencies
Engage with territorial and federal agencies to demonstrate the importance of accurate flood forecasting models and remote sensing technology in enhancing emergency alert accuracy.

3 | Land Use and Structure Planning

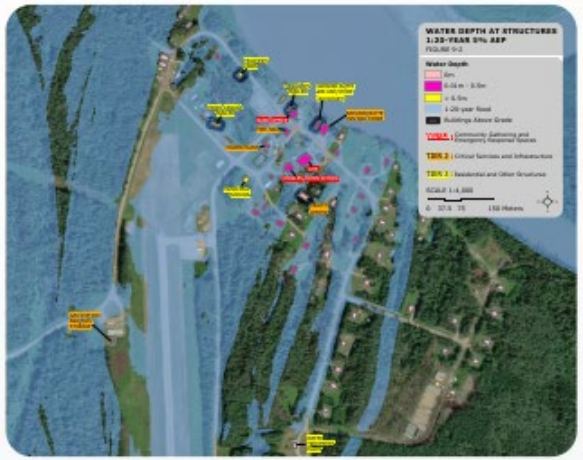
The flood maps show that much of the community will be inundated with flood water during extreme events. It is critical that the community make effective use of the areas that will remain safe from flooding by continuously updating their land use plans. The focus should be on optimizing land use on the eastern hilltop, which is outside the flood zone, and developing a structure plan to guide appropriate development within the limited space available.

1% AEP flood inundation map ↓

Action Plan

4 | Identify and Prioritize At-Risk Structures

Some of the structures in the community are more at-risk from flooding than others, such as the Nahanni Butte Store, which uses a basement for storage. The maps included here show the expected depth of flooding at each structure for events with a 5% annual exceedance probability (AEP), and a 1% AEP. A 1% annual exceedance probability (AEP) means there is a 1% chance of the flood occurring in any given year, and is often referred to as a 1-in-100-year flood. Similarly, flood with a 5% AEP has a 5 in 100 (or 1 in 20) chance of happening in any given year. It is important to remember that a major flood can happen in any year, regardless of when the last one occurred.



Flood depth at structures, 5% Annual Exceedance Probability

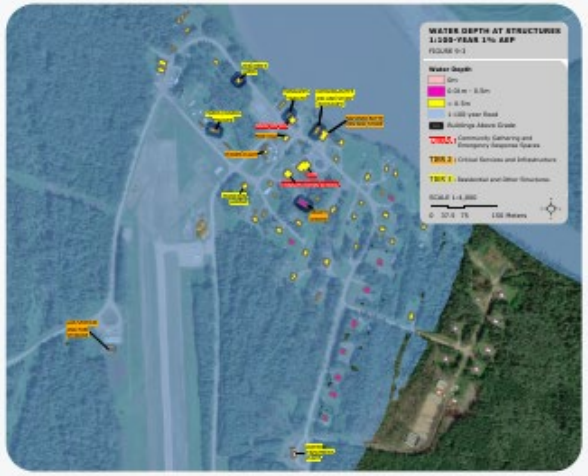
The recommended framework for prioritizing mitigation follows three tiers:

Tier 1: Community Gathering and Emergency Response Spaces

Tier 2: Critical Services and Infrastructure

Tier 3: Residential and Other Structures

This tiered framework allows the community to strategically deploy mitigation efforts to protect people in an emergency first, and minimize service disruption second. For example, the first priority should be emergency shelter on the eastern hilltop.



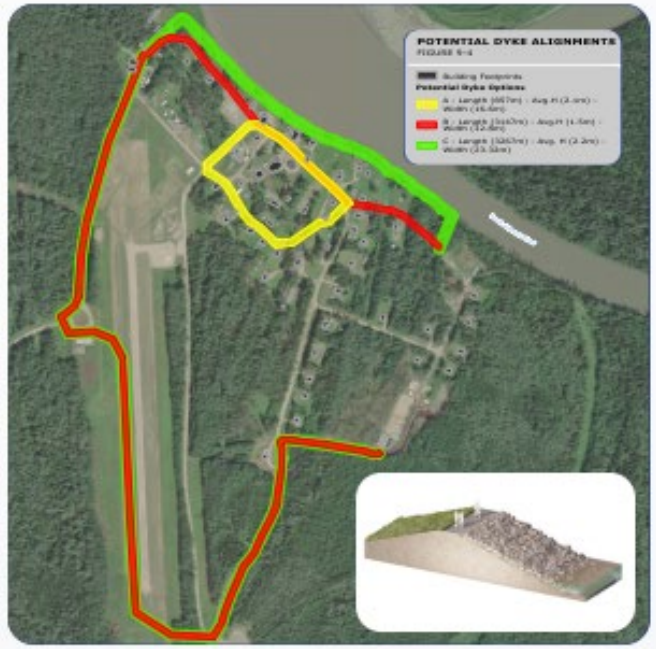
Flood depth at structures, 1% Annual Exceedance Probability

Action Plan

Action Plan

5 | Consider Flooding and Erosion Protection

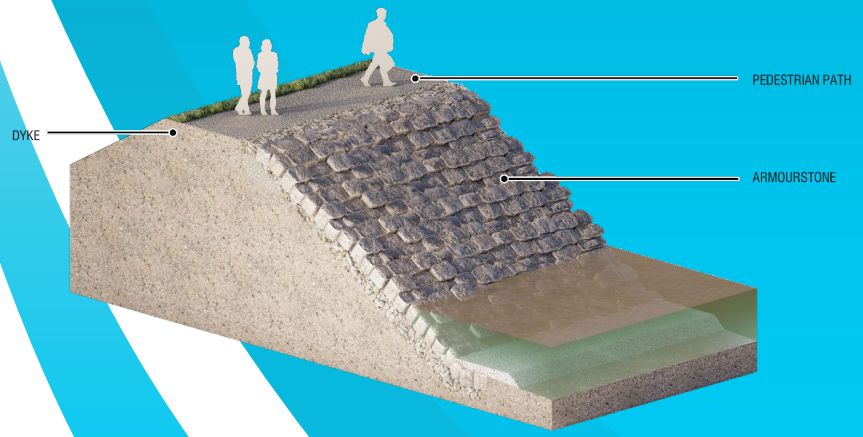
Explore the feasibility of implementing flood protection systems, such as dykes and floodgates, and erosion protection measures like riprap aprons along the shoreline. A dyke is a structure that is built to keep water out. It requires appropriate drainage so that water does not become trapped behind the dyke, can take up a large amount of area, and are very costly. The higher the dyke must be, the wider it must be at the base. Three potential dyke alignments are presented within the report.



Flood depth at structures, 5% Annual Exceedance Probability →

6 | Implement Best Practices for Local Drainage

Improve how rainwater and meltwater drain off the land by improving grading, ditching, culvert replacement, and by raising roads to enhance stormwater management. Regular reviews of the Nahanni Butte drainage plan as land use changes will keep the drainage current. Designing for adequate drainage will help with recovery after a flood.



Mahsi Cho!

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