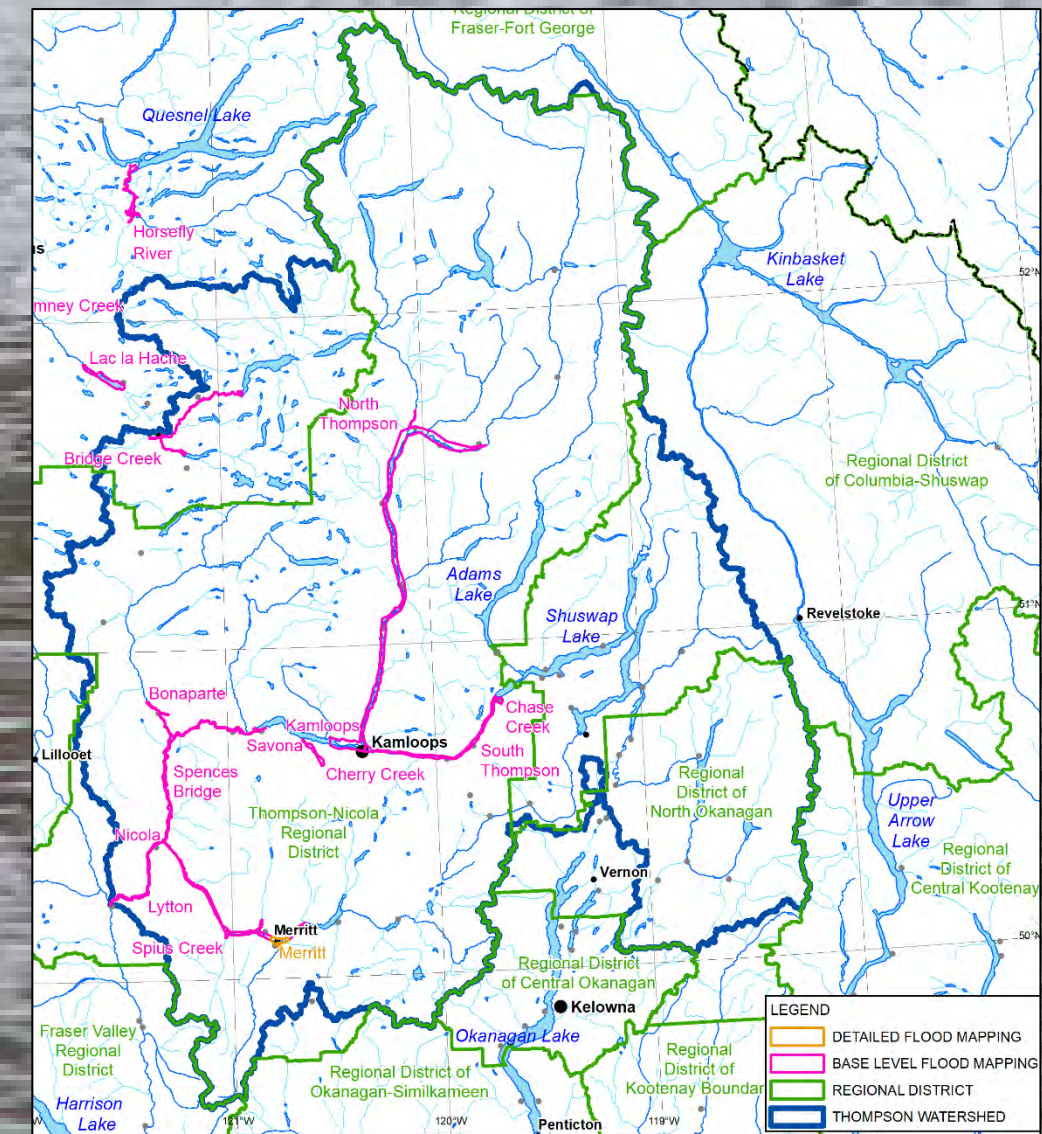


Thompson Flood Initiative Update



Thompson Watershed Advisory Committee - January 24, 2022

Kris Holm, M.Sc., P.Geo.

Elisa Scordo, M.Sc., P.Geo.

bgcengineering.com



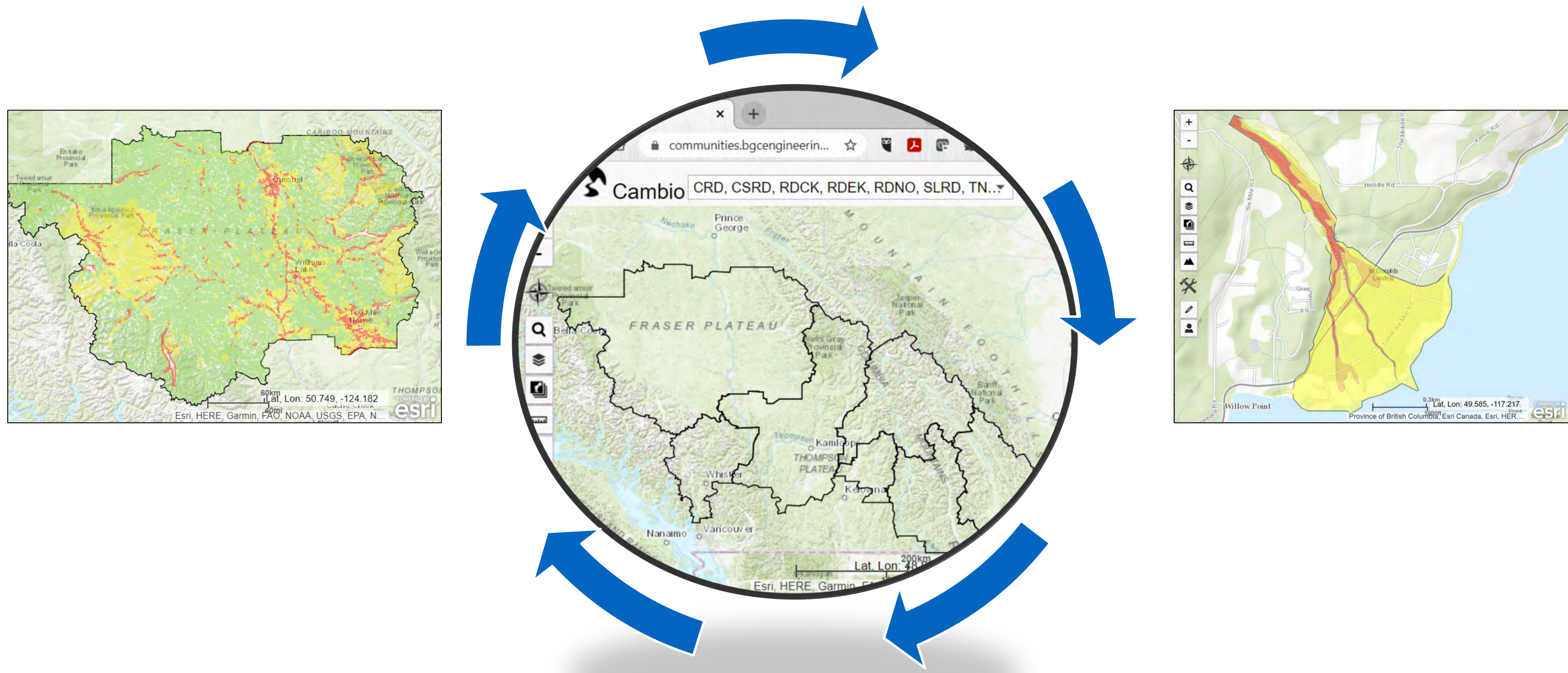
Agenda

Time*	Topic	Who or Format
9:00	Welcome, introductions, review agenda and objectives	Mike Simpson, Fraser Basin Council
9:05	Meeting summary from June 15, 2021 <ul style="list-style-type: none"> Status of action items 	Mike Simpson
9:15	Short overview of what's been done since 2018 <ul style="list-style-type: none"> Risk identification Base level mapping update with lidar data, TNRD, CRD Detailed Flood Mapping, City of Merritt Wildfire and Flood Emergencies – connections Questions, discussion 	Kris Holm, Elisa Scordo, BGC Engineering Inc. and others
9:30	What's currently underway <ul style="list-style-type: none"> Detailed flood mapping, Thompson River Watershed Bridge Creek flood mapping Questions, discussion 	Kris Holm, Elisa Scordo, Mike Simpson
10:30	Break	
10:45	Information sharing from different partners <ul style="list-style-type: none"> Anything relevant to flood mapping, risk assessment 	Everyone
11:30	Next steps: <ul style="list-style-type: none"> What's next? Funding sources, needs Future meeting schedule Email correspondence/updates, webinar/YouTube Collaboration opportunities Other? 	Everyone
12:00	Adjourn	

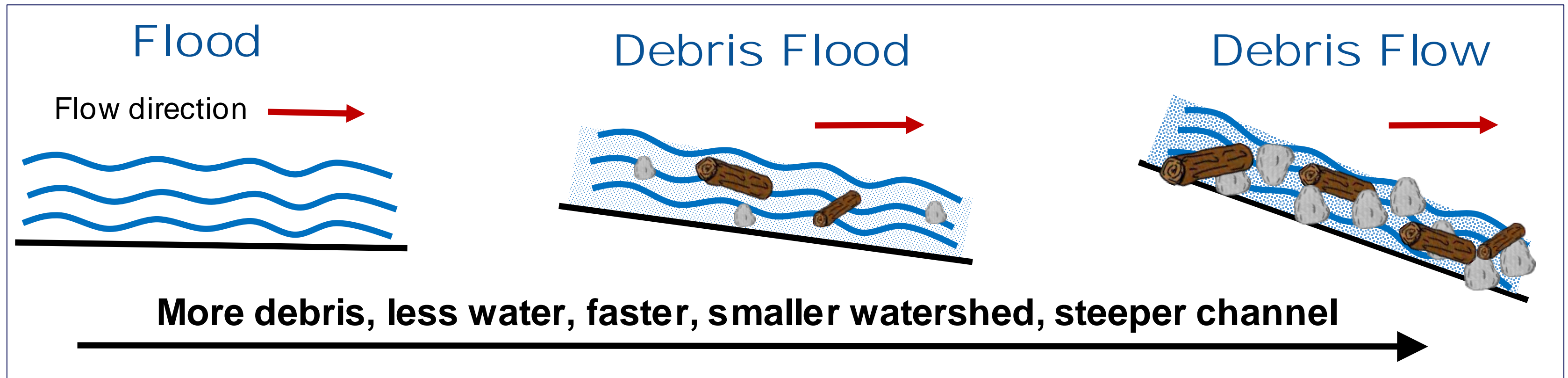
Local governments have been advancing integrated geohazards studies with BGC and Fraser Basin Council across large areas to support risk reduction decisions.



With responsibilities for flood management spread across many parties in BC, a differentiator of this work has been investment to connect many projects, jurisdictions, and funding streams.



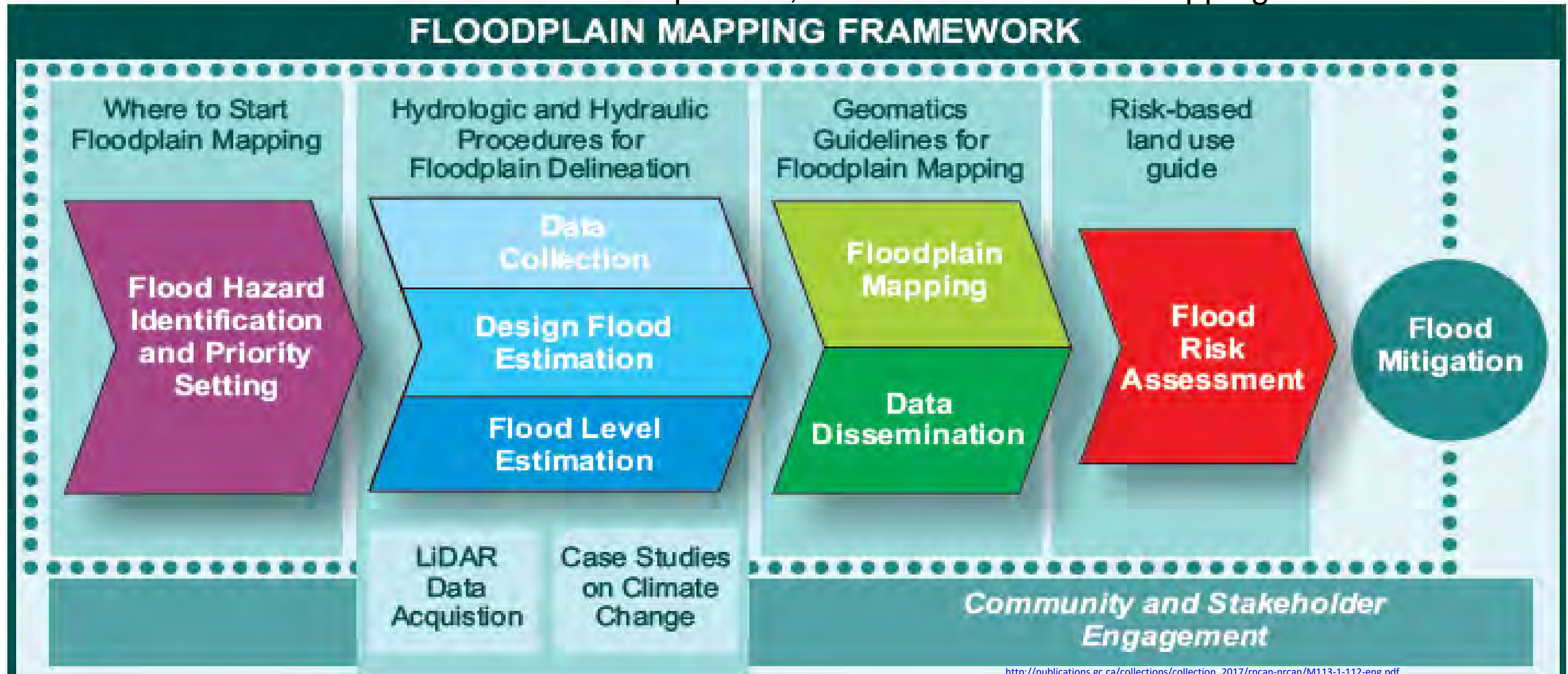
The work includes a spectrum of geohazard types and considers a changing climate.



The Thompson Flood Initiative is entering the fifth year of integrating projects to prioritize and assess flood and steep creek hazards

2019 Risk Prioritization | 2020 hazard mapping (base level)

2020-2022 lidar acquisition; detailed flood hazard mapping



Each project refines past work as a pathway to risk reduction

Low



High

(1)

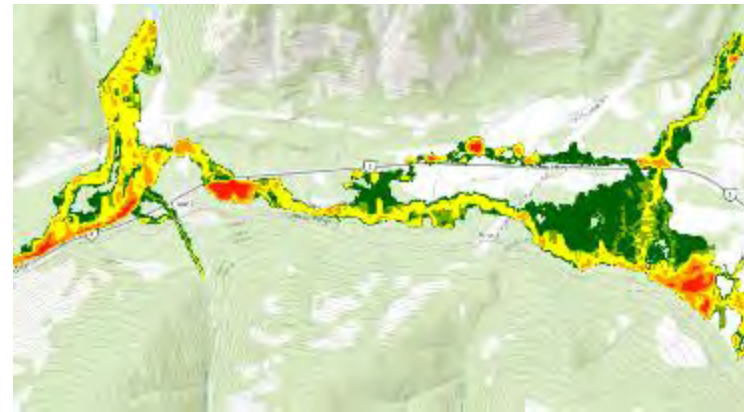
Flood Hazard
Identification



Where are the hazards?

(2)

Base Level Floodplain
Mapping

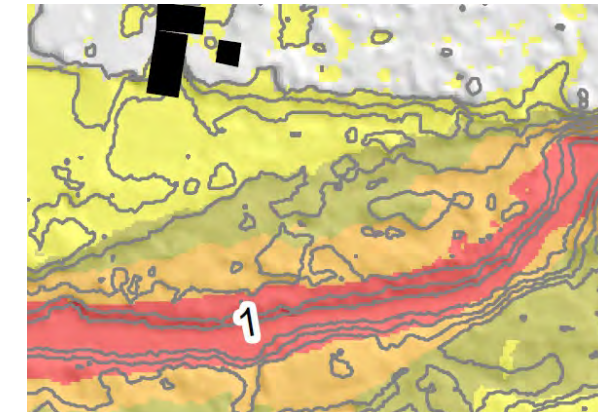


What kind of hazards are they?

\$\$

(3)

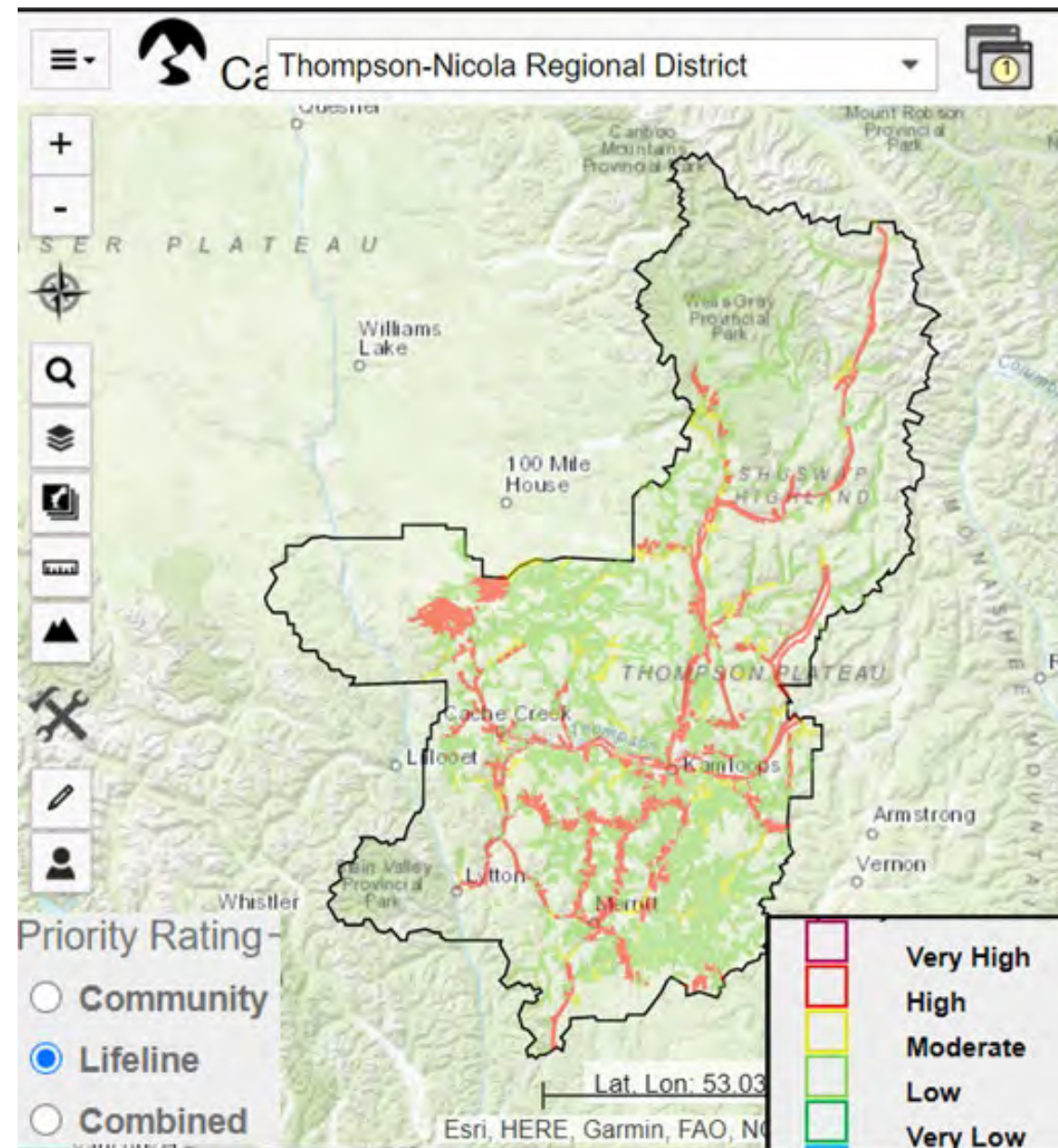
Detailed Floodplain
Mapping



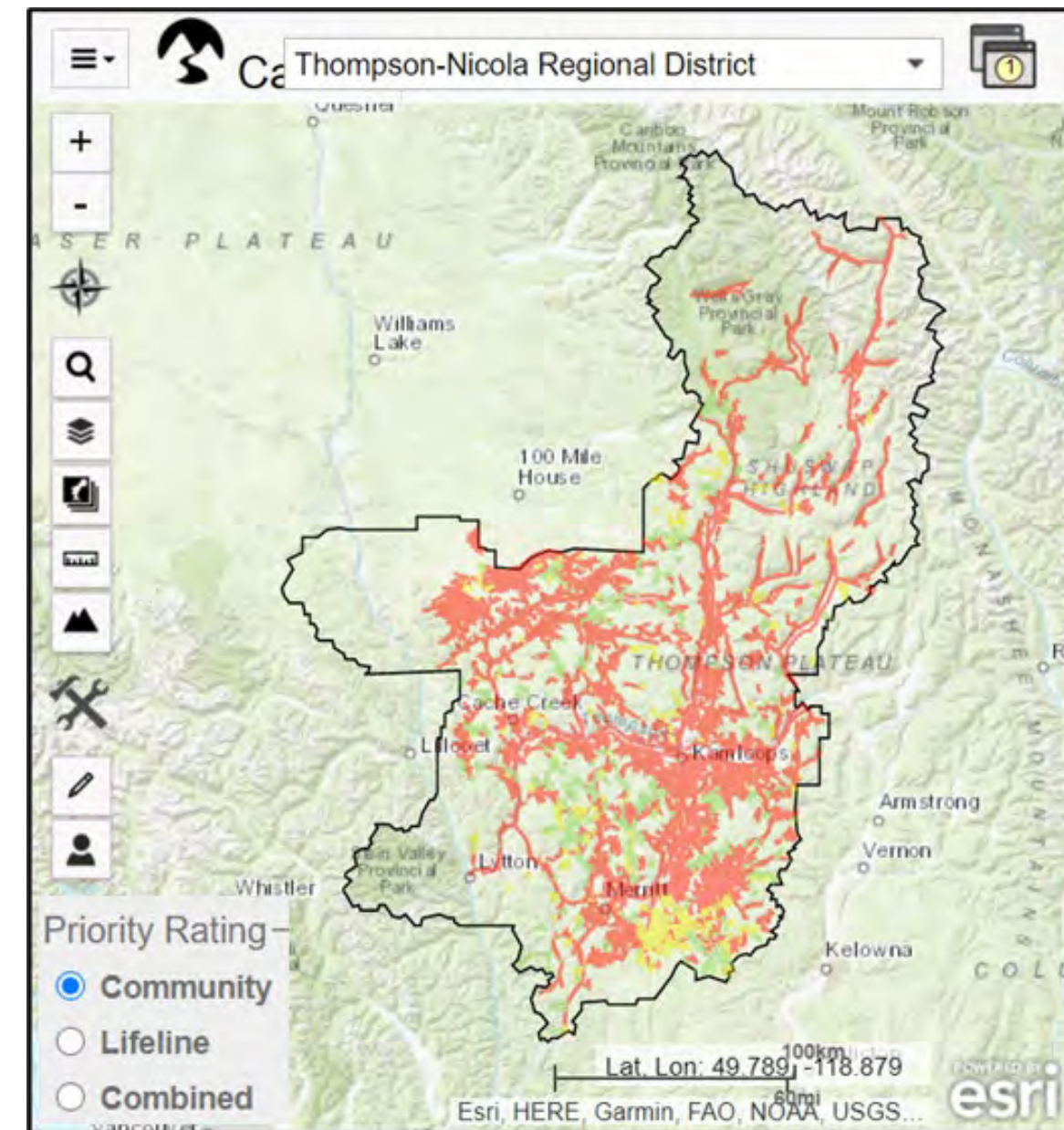
What can I do about it?

\$\$\$\$

The 2019 watershed-scale study included a multi-hazard, multi-asset risk prioritization for thousands of flood and steep hazard areas.



**TNRD
(example)**



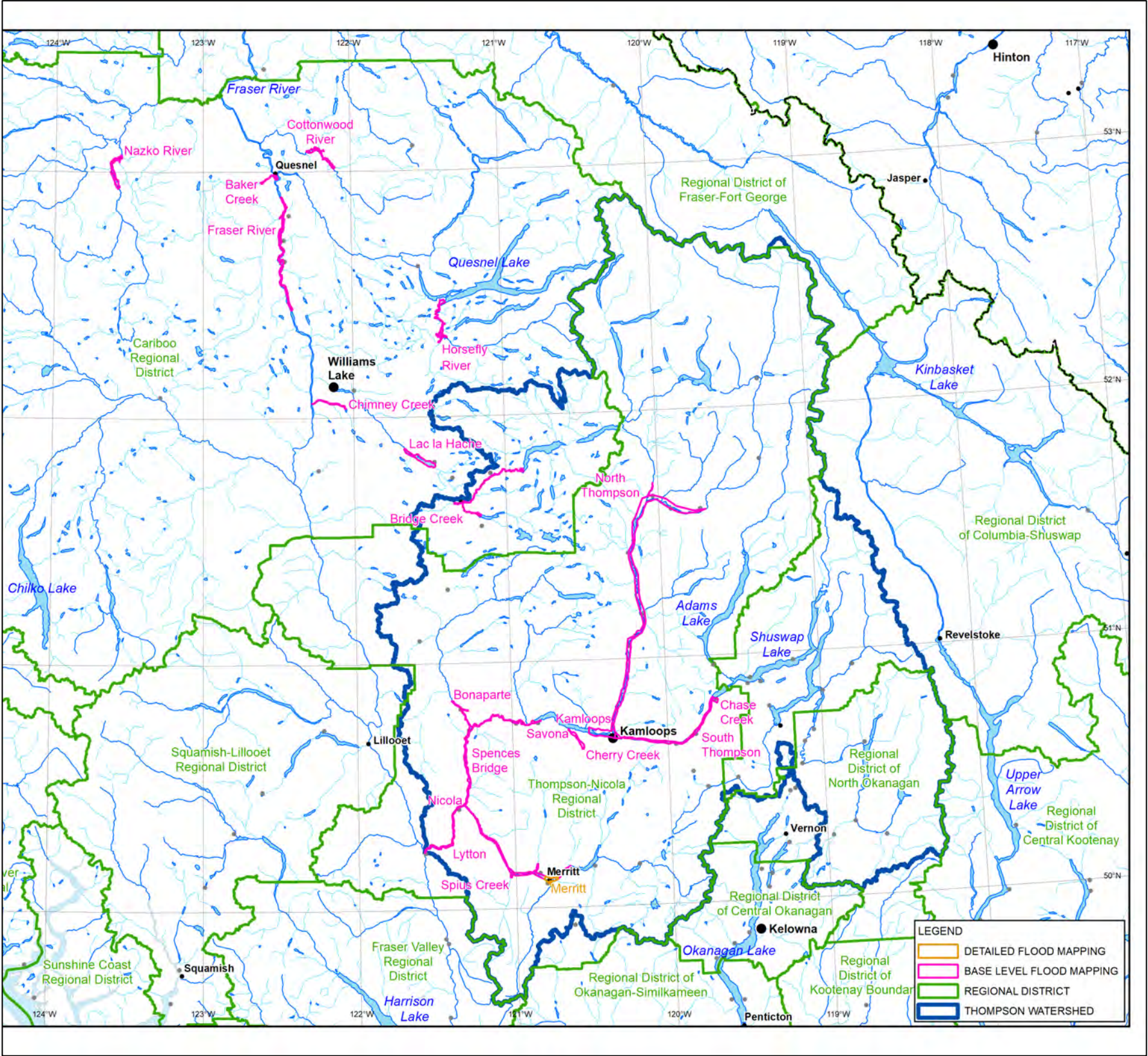
Risk priority - “Lifelines”

Risk priority - “Communities”

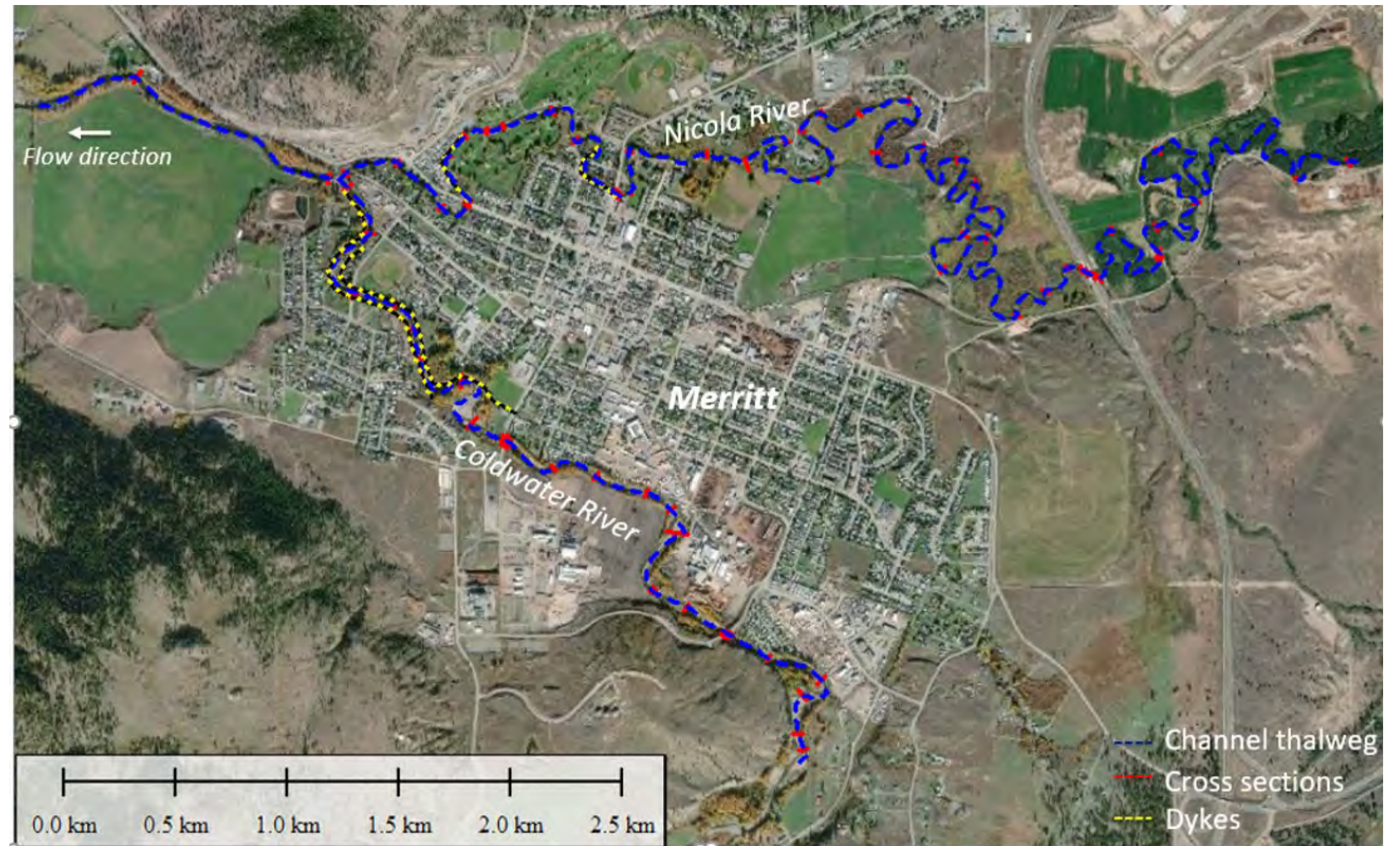
(road, rail, pipelines, power, communications) (buildings, population, critical facilities)

The risk prioritization study informed areas for Base Level (desktop) flood hazard mapping conducted in 2020 for eight areas in the CRD and nine areas in the TNRD

	#	Watercourse (Area)
TNRD	1	Thompson River (Kamloops Area)
	2	North Thompson (Vavenby to Kamloops)
	3	South Thompson River (Kamloops to Chase)
	7	Chase Creek (Chase)
	12	Thompson River / Kamloops Lake (Savona to Ashcroft)
	13	Bonaparte River (Cache Creek)
	14	Cherry Creek
	15	Thompson River (Spences Bridge to Lytton)
	16	Thompson River (Ashcroft to Spences Bridge)
CRD	36	Chimney Creek
	38	Fraser River (Quesnel to MacAlister)
	42	Cottonwood River
	43	Baker Creek
	44	Horsefly River
	45	Nazko River
	47	Lac la Hache (waterbody)
	9	Bridge Creek (Camin Lake to 100 Mile House)

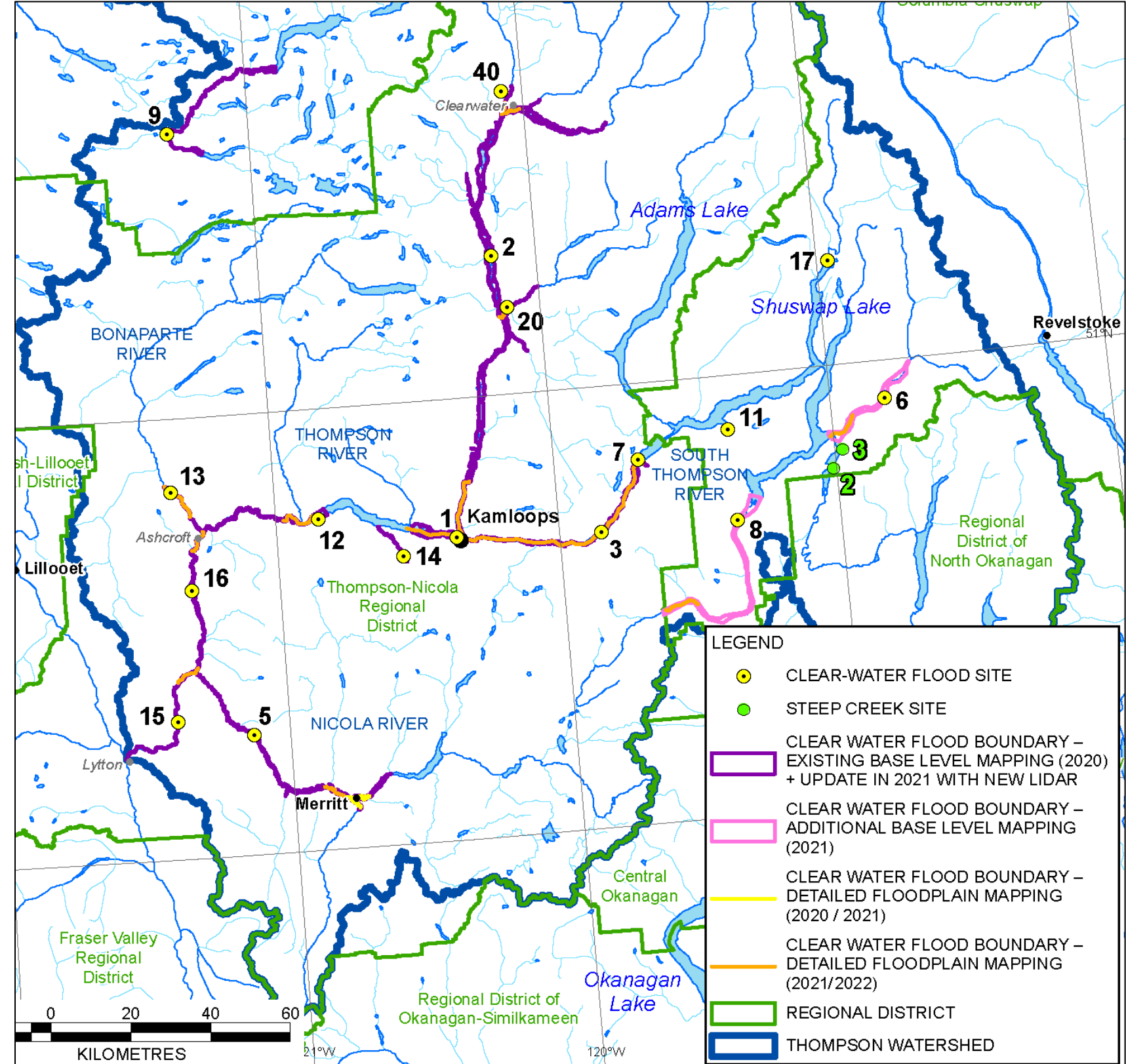


UBCM-funded detailed flood hazard mapping was completed for Nicola and Coldwater Rivers within the City of Merritt limits in June 2021

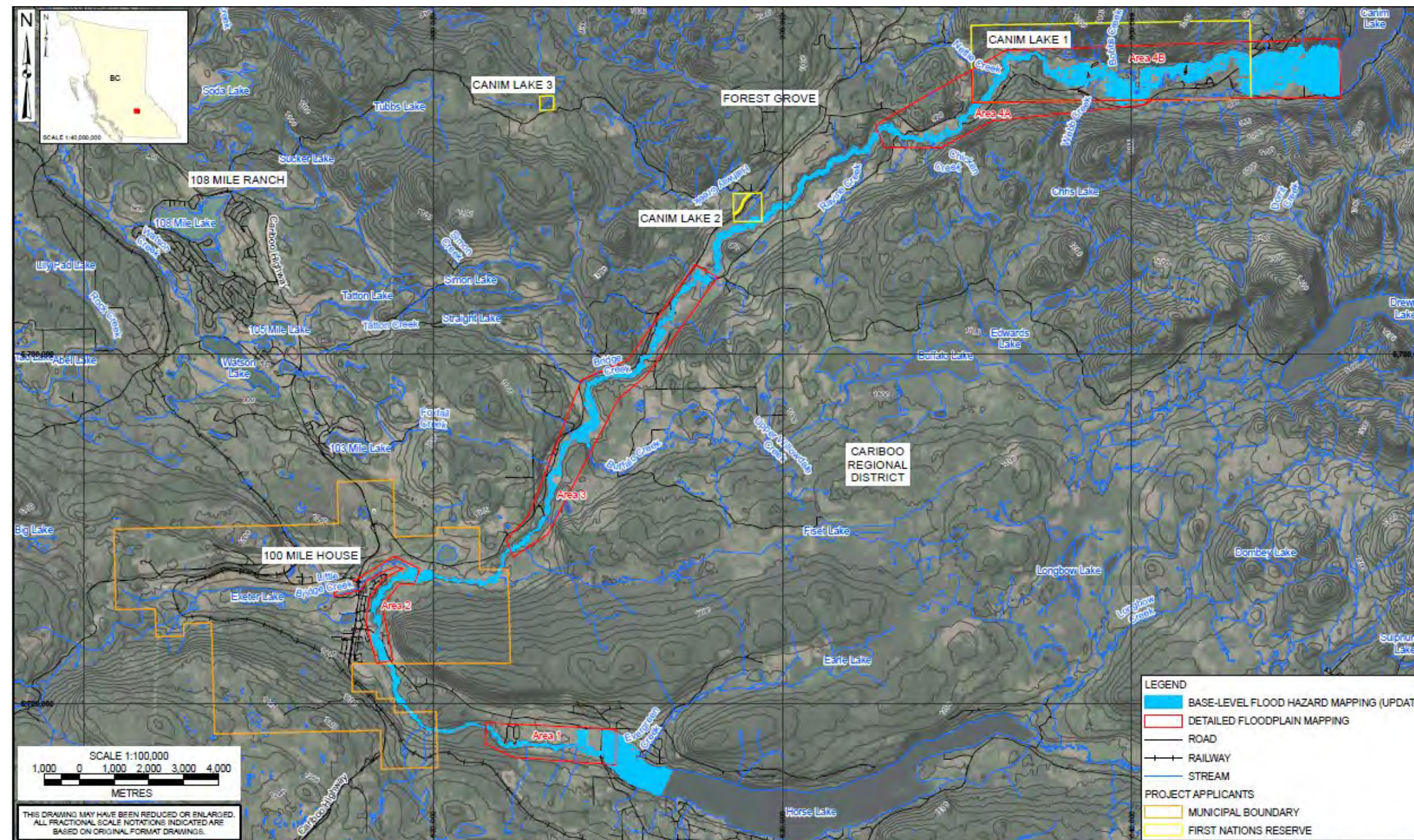


2021-2022 NDMP-funded projects include thirteen detailed flood hazard assessments and two detailed steep creek hazard assessments. All survey work was completed by Ecoscape Environmental in November 2021.

#	Watercourse (Area)
1	Thompson River at Kamloops
2	North Thompson River (Kamloops to Hefley)
3	South Thompson River (Kamloops to Chase)
5	Nicola River (Merritt to Lower Nicola)
6	Eagle River (Malakwa to Sicamous)
7	Chase Creek (Chase)
8	Salmon River (Falkland to Salmon Arm)
9	Bridge Creek (separate UBCM-funded study)
12	Thompson River at Savona
13	Bonaparte River (Bonaparte 3 FN to Thompson River)
15	Thompson and Nicola Rivers at Spences Bridge
16	Thompson River at Ashcroft
20	Barriere River at Barriere
40	Clearwater River and North Thompson River at Clearwater
2	Hummingbird Creek
3	Sicamous Creek

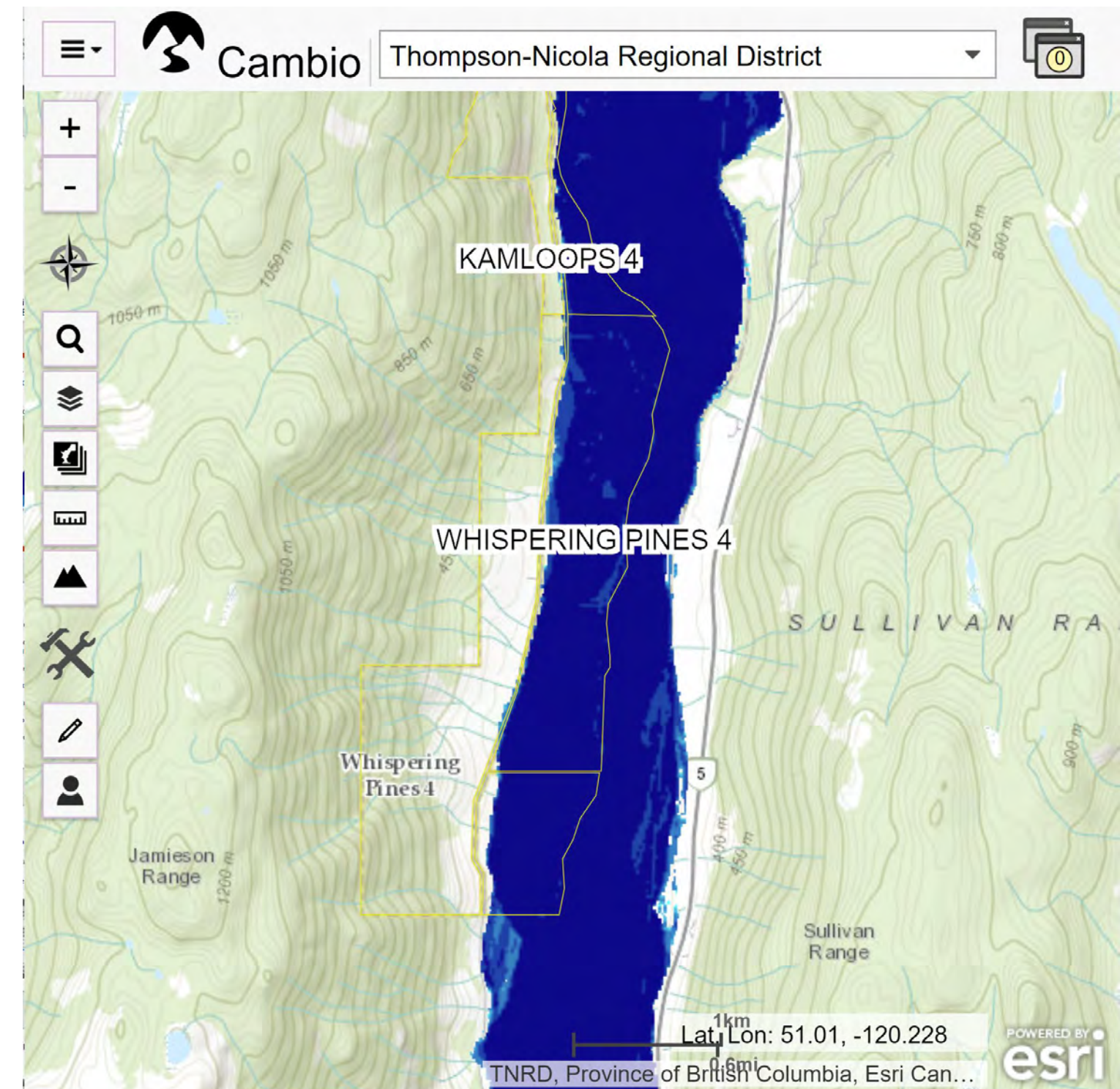
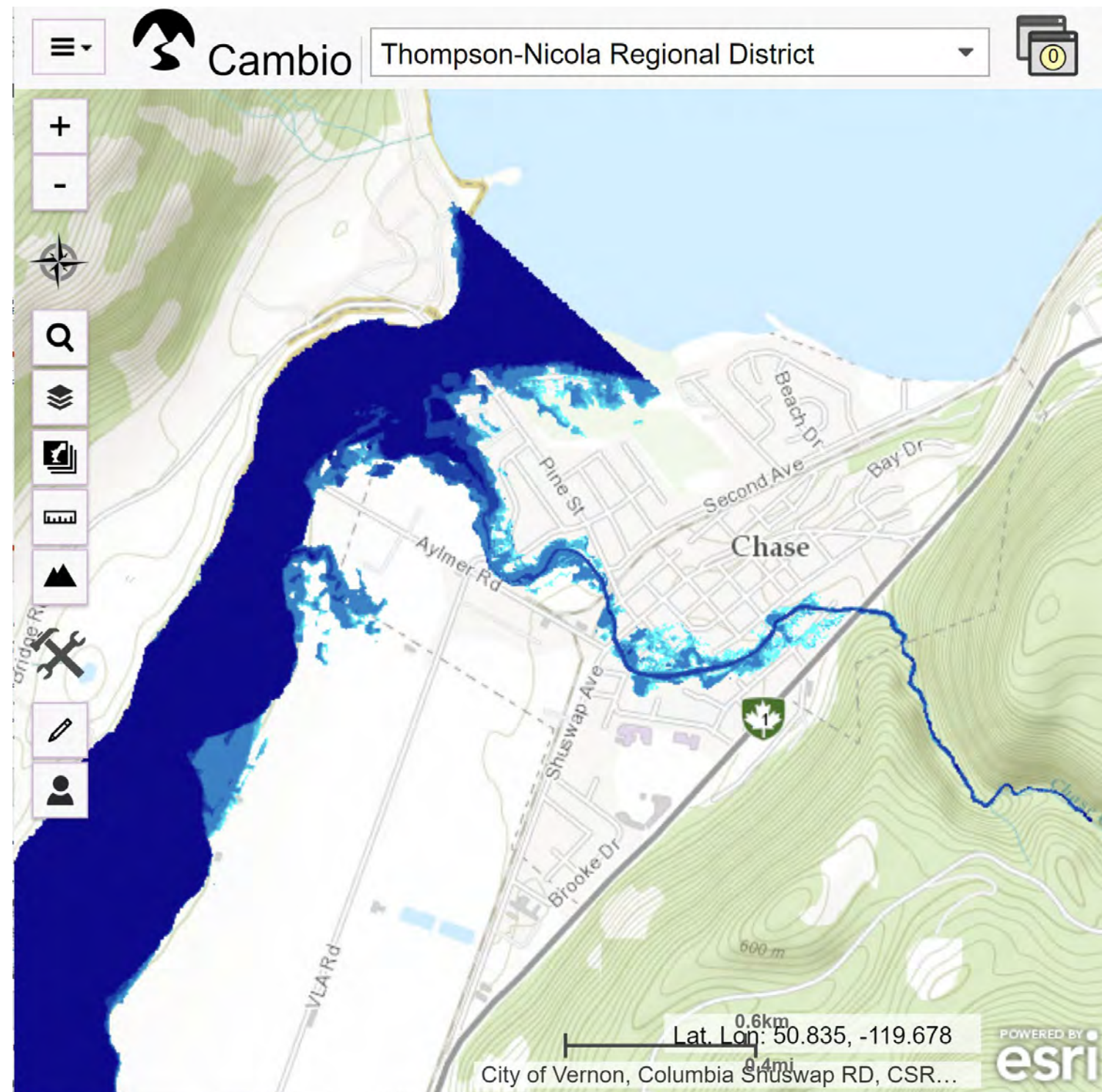


UBCM-funded detailed flood mapping for Bridge Creek at 100 Mile House was started in September 2021.



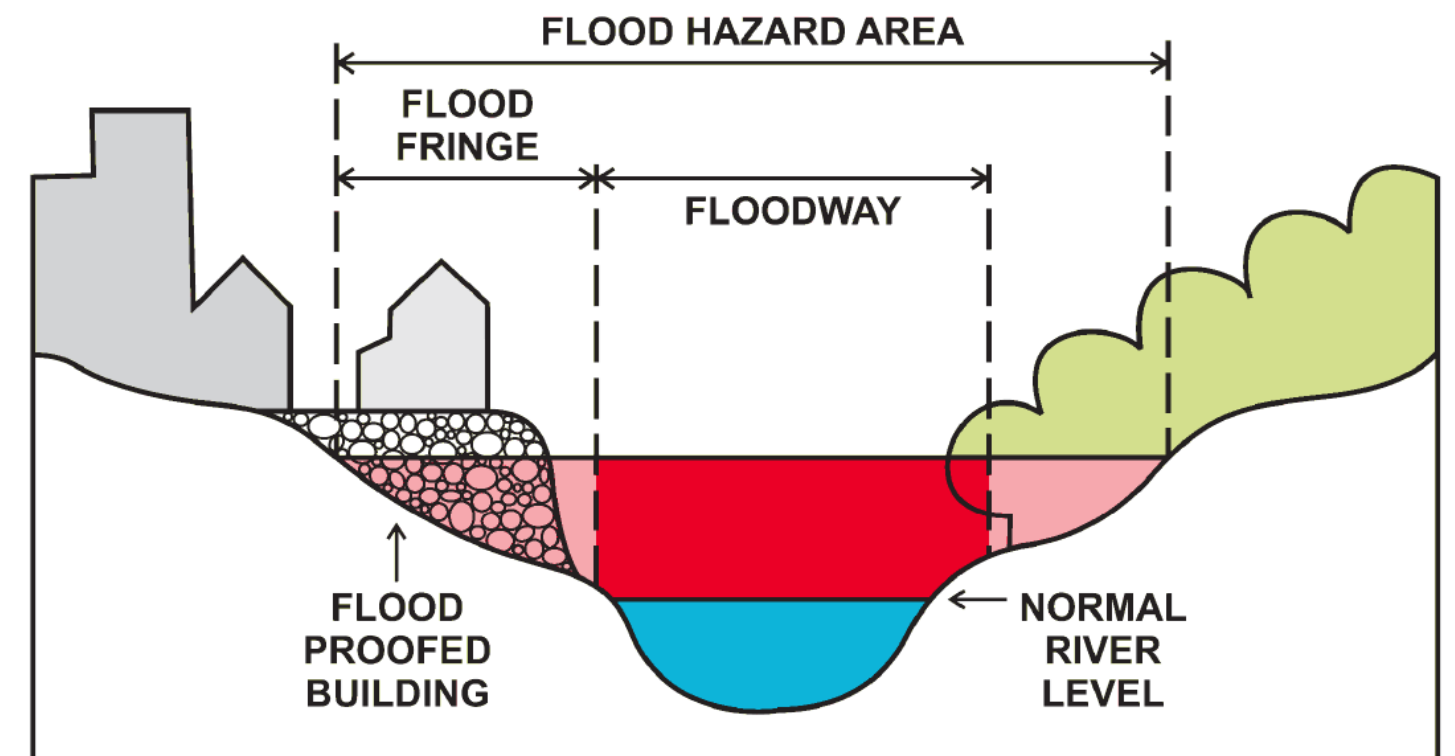
BGC retained TRUE Engineering to complete surveys and is collaborating with TRUE for Bridge Creek mapping at Canim Lake Band Reserve

Fraser Basin Council and BGC's larger NDMP-funded flood mapping project has enabled collaboration with TRUE Engineering at Chase Creek and Bridge River, and Urban Systems at Whispering Pines Indian Band Reserve.



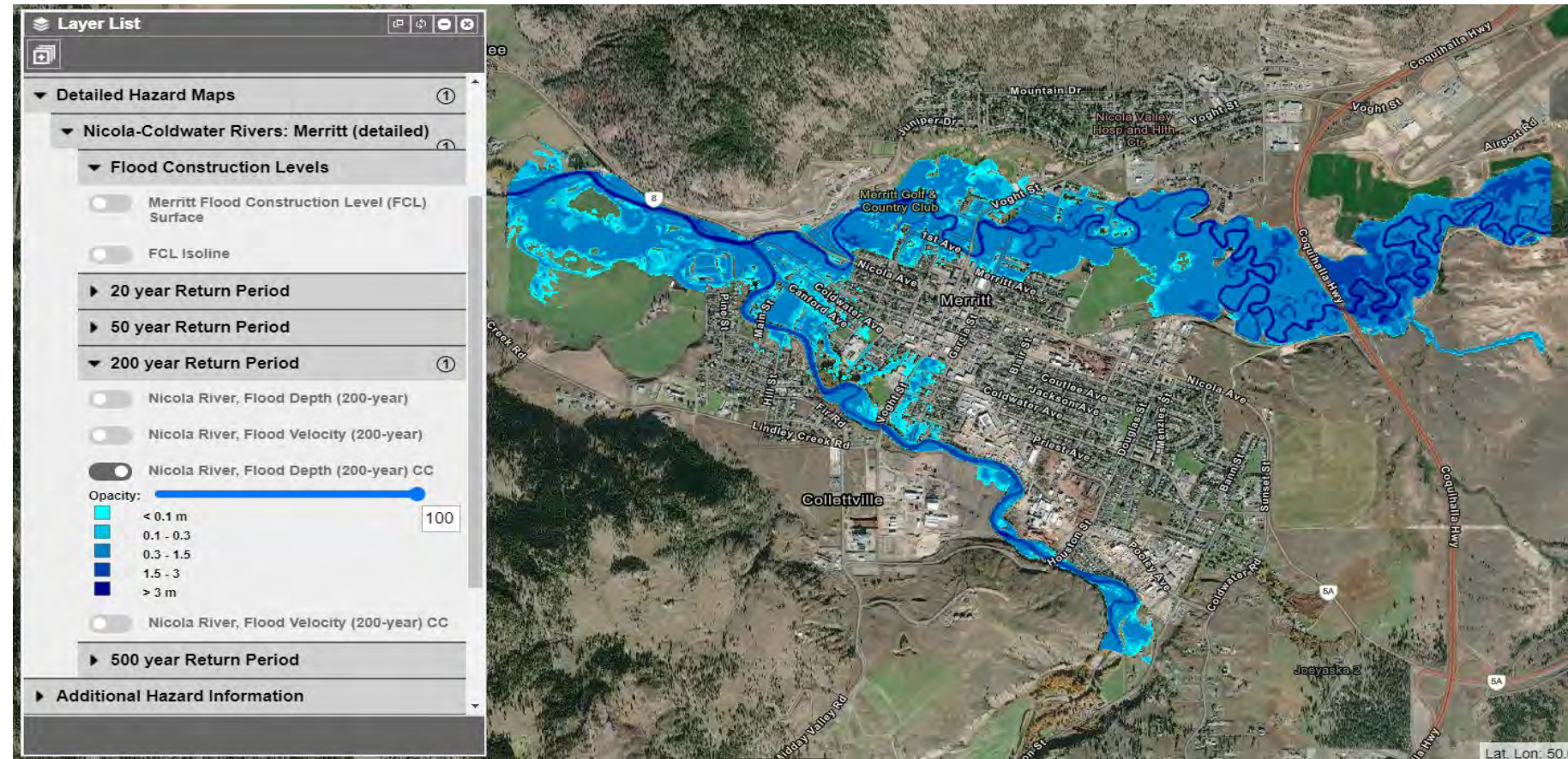
Detailed flood hazard assessments include:

- Hydrological inputs (flood quantiles, climate change scenarios)
- Topographic survey data collection (bathymetry, sections, bridges, high-water marks if available)
- Channel change desktop assessment for select watercourses
- Field work (e.g., grain size)
- Hydraulic modelling
- Floodplain inundation mapping
- Reporting & deliverables

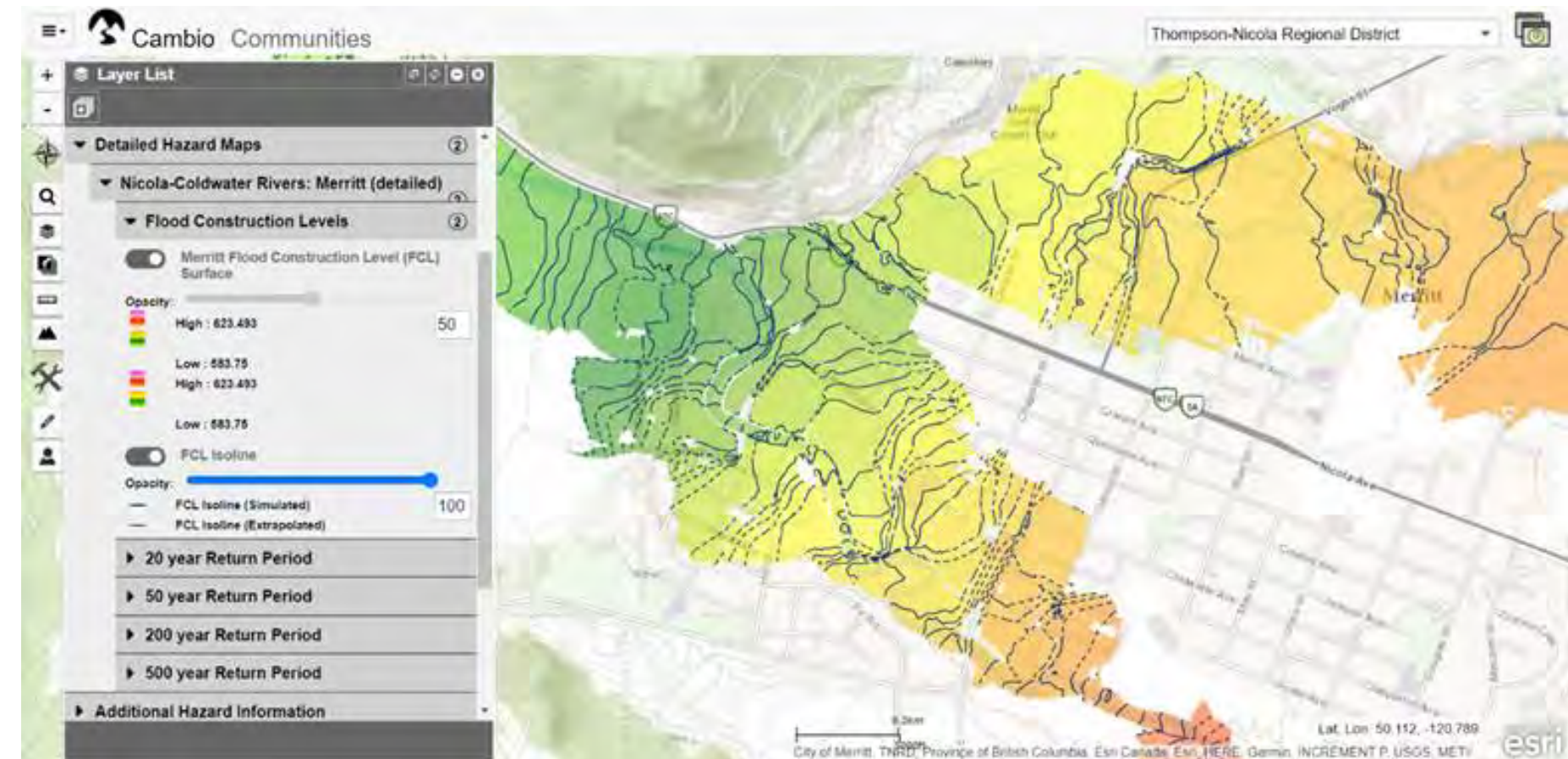
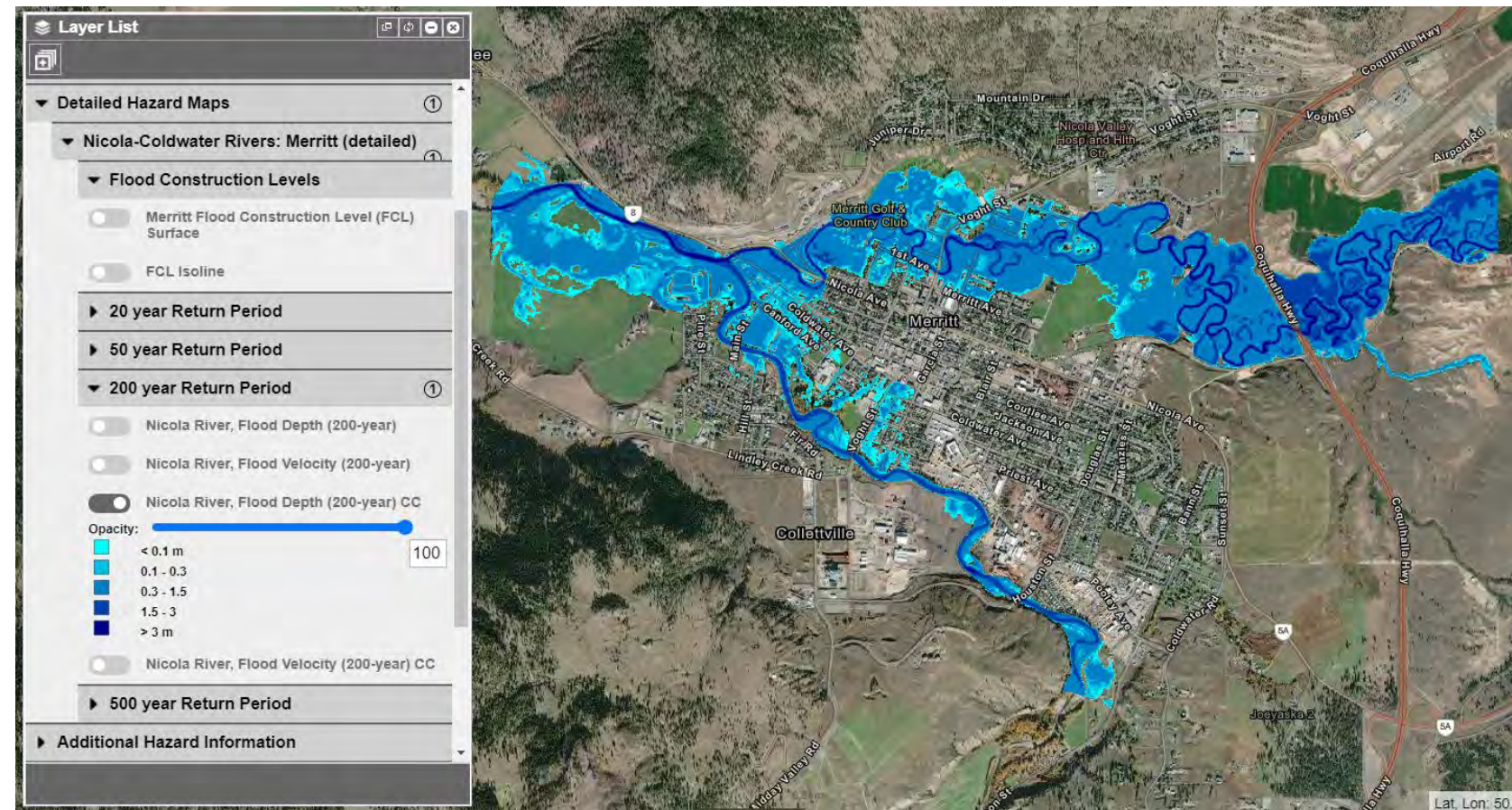


Deliverables include reports, maps, and data

- Individual reports and maps for each study area funded via separate studies.
- Geospatial data delivered separately to local governments & the Province for each project.
- Integrated source of data available via Cambio web application.



Detailed flood hazard mapping includes flood scenario modelling and the preparation of Flood Construction Levels

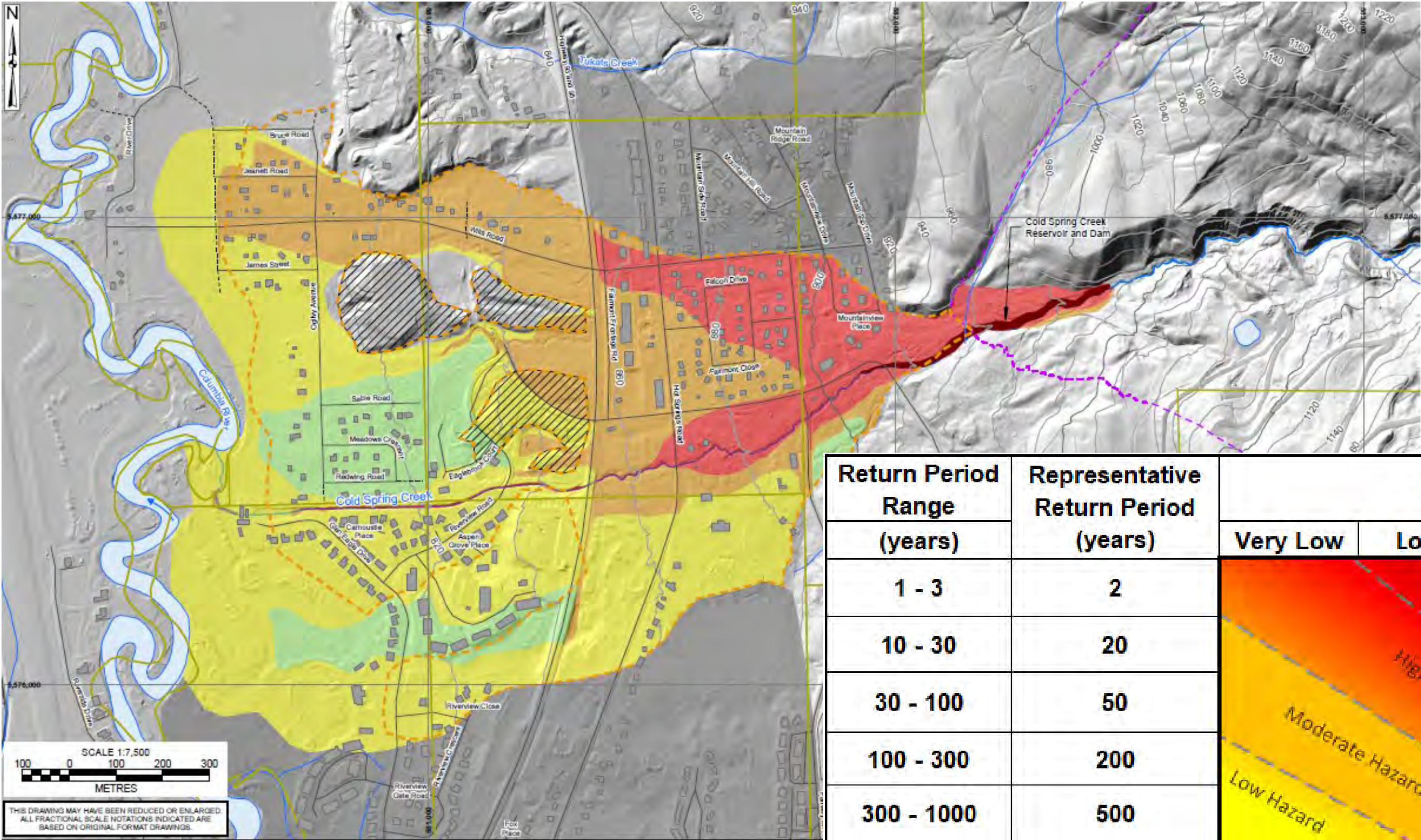


Flood Hazard Scenarios:

- 20-, 50-, 200- and 500-year return periods
- 200- + Climate Change
- (5%, 2%, 0.5%, 0.2% AEP)

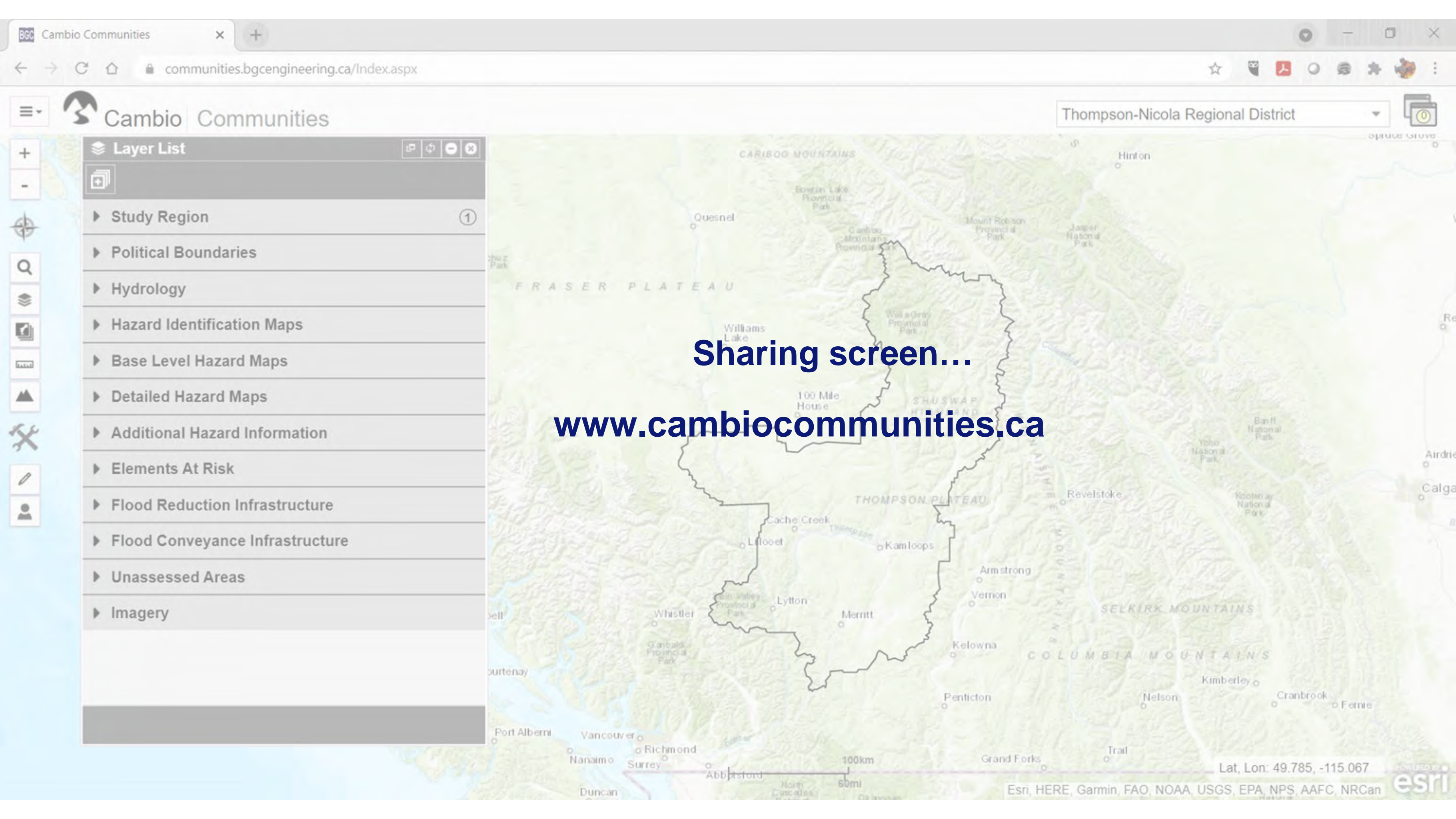
Flood Construction Levels (200-year)

Deliverables for steep creeks includes a composite hazard map



Return Period Range (years)	Representative Return Period (years)	Geohazard Intensity				
		Very Low	Low	Moderate	High	Very High
1 - 3	2					
10 - 30	20					
30 - 100	50					
100 - 300	200					
300 - 1000	500					

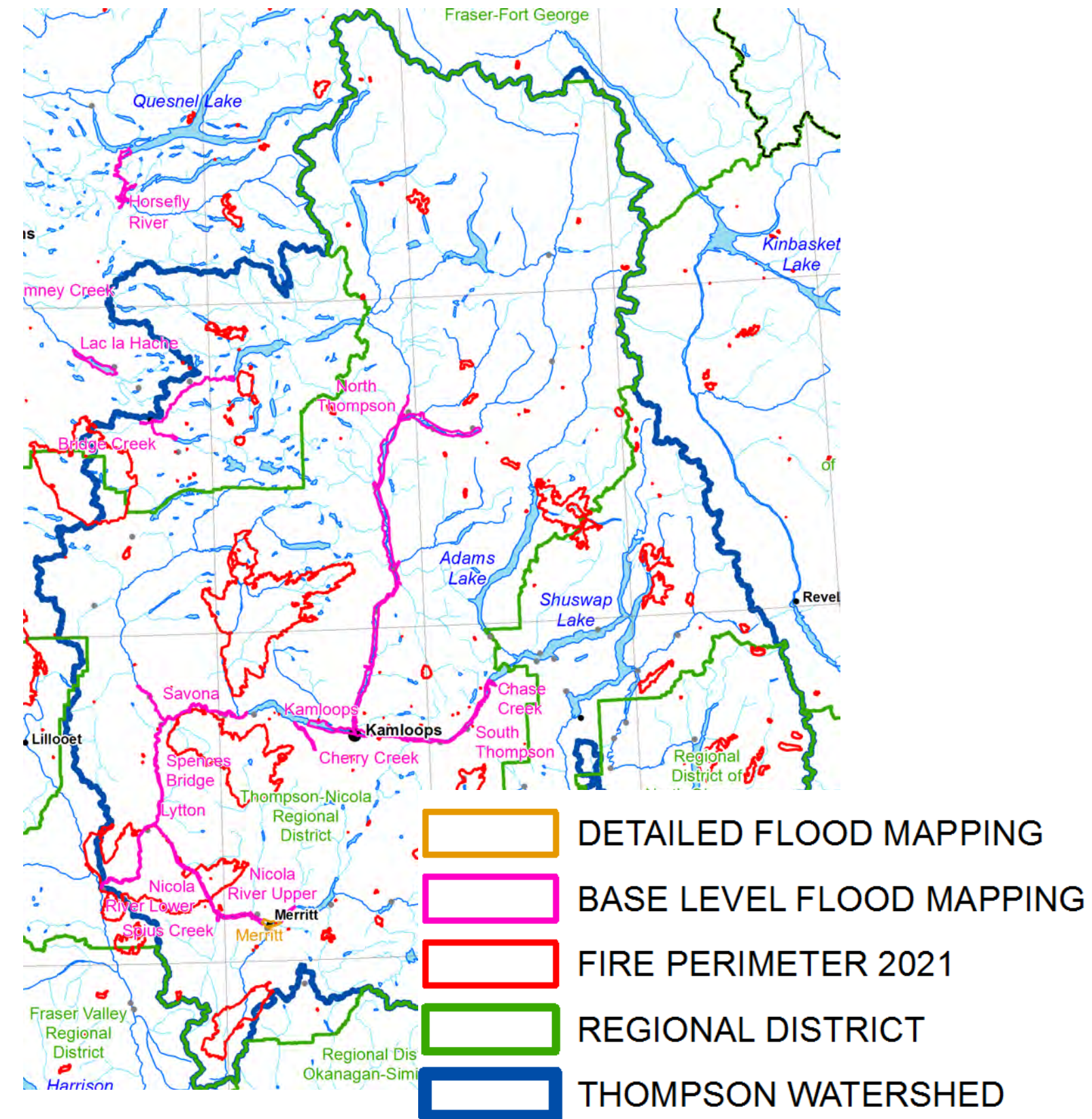
Example (Cold Springs Creek, RDEK)



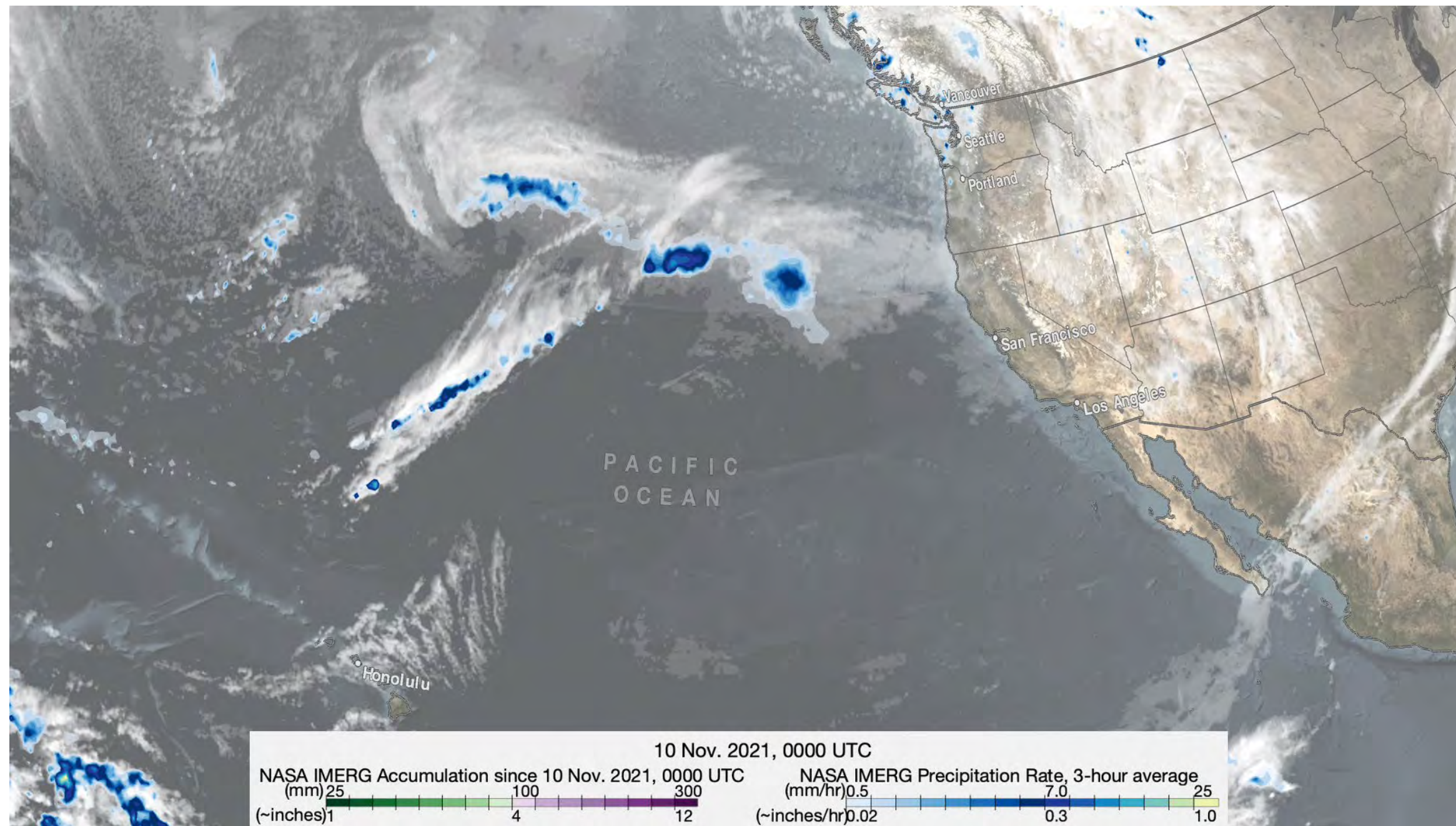
Sharing screen...

www.cambiocommunities.ca

The 2021 wildfires burned watersheds above many communities. BGC and others assessed geohazards that could result from a major precipitation event...



Southern British Columbia and Northwestern Washington experienced a significant atmospheric river event from November 13 to 15, 2021



<https://gpm.nasa.gov/applications/atmospheric-river-brings-severe-flooding-and-landslides-british-columbia>

Geomorphic contributors caused more damage than flood inundation could have alone: vast bedload transport, bank erosion, scour, avulsions and channel changes.



PHOTO: BGC ENGINEERING (November 20, 2021)



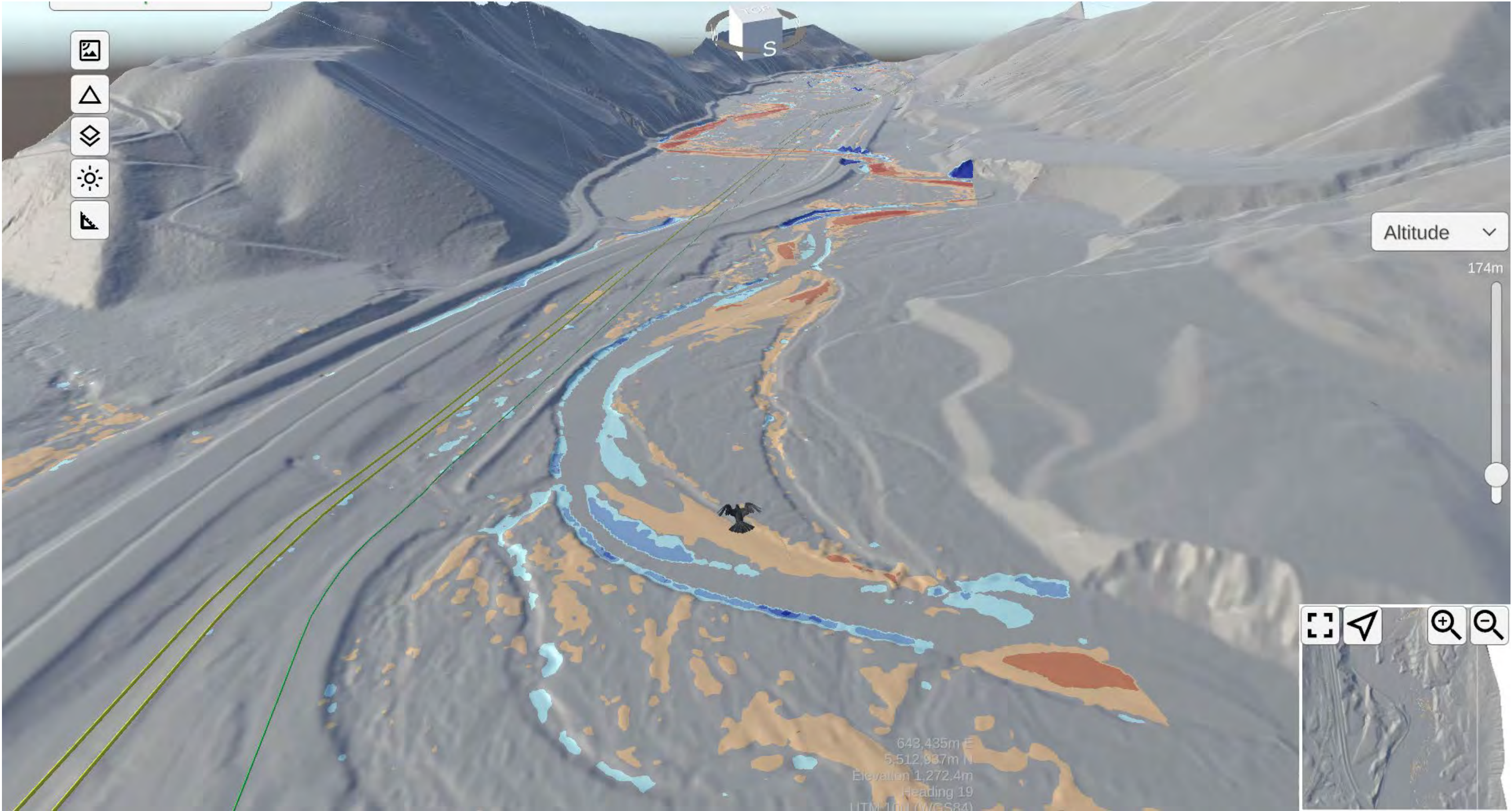
<https://www.flickr.com/photos/tranbc/51696731994/in/album-72157720143417483/>

Post-wildfire effects amplified flooding and bank erosion.

Nicoamen River west of Lytton



<https://www.flickr.com/photos/tranbc/51693303851/in/album-72157720143417483/>



Altitude ▾

174m



643,435m E
5,512,937m N
Elevation 1,272.4m
Heading 19
UTM 10Q (WGS84)

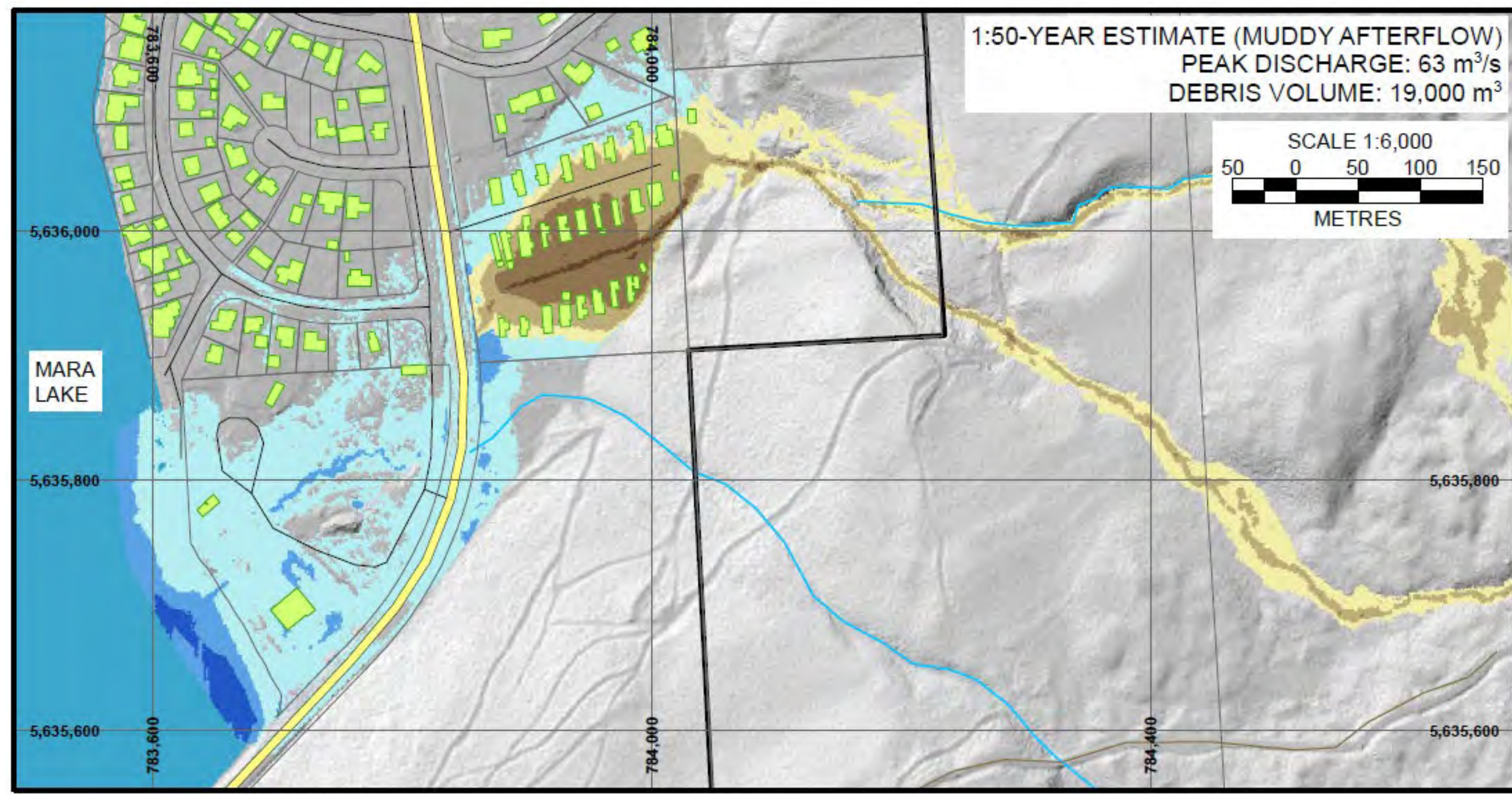
First Nations Emergency Services Society (FNESS) with BGC are undertaking flood impact assessments in Interior First Nations:

- Coldwater
- Nooaitch
- Cook's Ferry
- Shackan
- Nicomen
- Boston Bar
- Spuzzum

Additional First Nations may be added to this list as BGC progresses through the initial assessments.



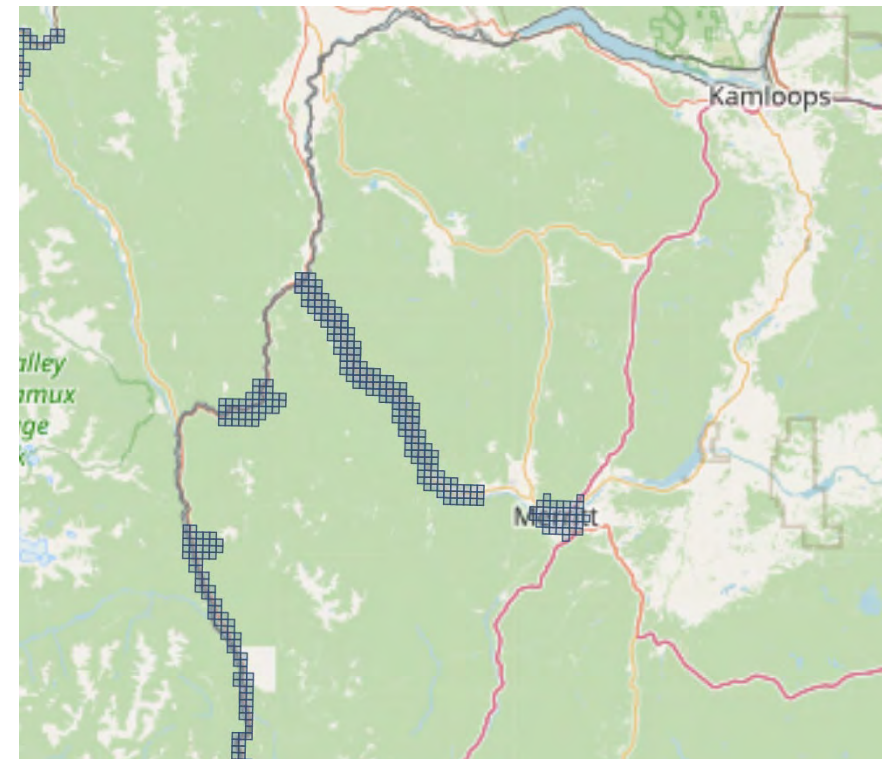
BGC with CSRD are completing post-wildfire geohazard and mitigation assessment for Wiseman Creek at Sicamous Creek Fan – changed conditions carried into detailed hazard mapping at Sicamous and Hummingbird Creeks for Fraser Basin Council.



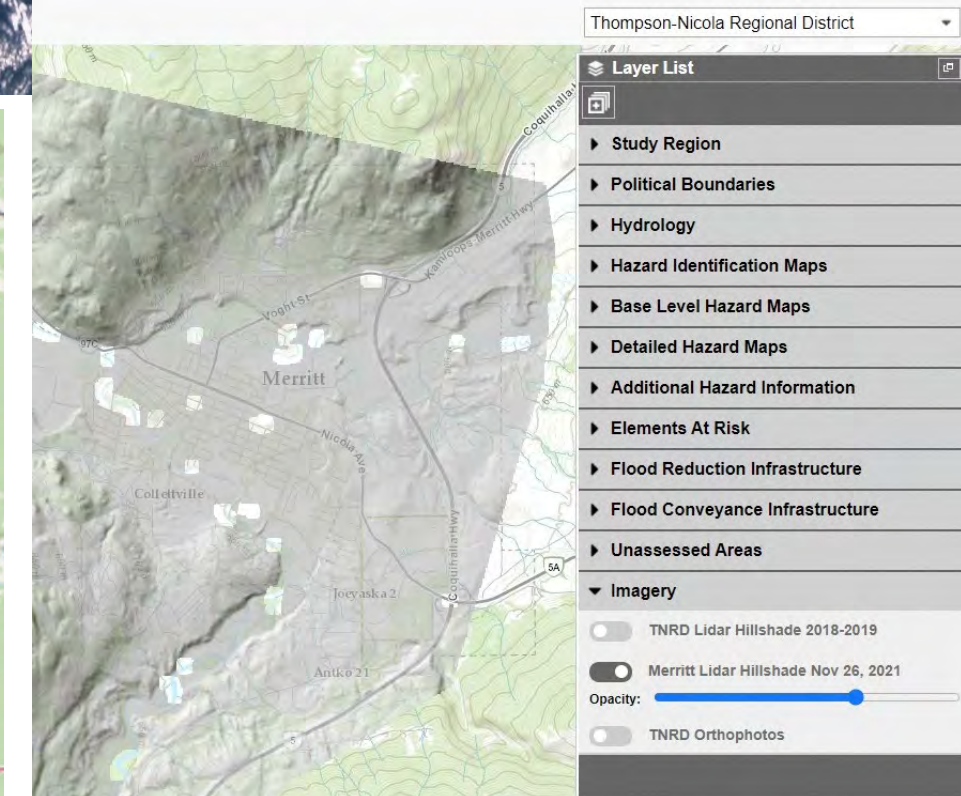
- CSRD and the District of Sicamous briefed and results presented at a public Town Hall

Fraser Basin Council with BGC are adapting the current flood hazard mapping project at Merritt to reflect changed conditions, with hydrotechnical support to. Merritt for the Middlesbrough Bridge Replacement.

- **Baseline Data:** post-November 2021 lidar
- **Hydrology:** Coldwater River hydrology update
- **Flood Mapping:** Nicola River to Spences Bridge (post- Nov. lidar)
- **Merritt Hydrotechnical Support:** Middlesbrough Bridge Replacement
- **Connection:** Downstream support, Lower Nicola Communities (FNESS), Indigenous Services Canada).



Post-November flood lidar acquisition,
McElhanney (for MOTI)



Processed lidar in Cambio

River Forecast Centre with BGC are creating improved visual tools for flood forecasting.

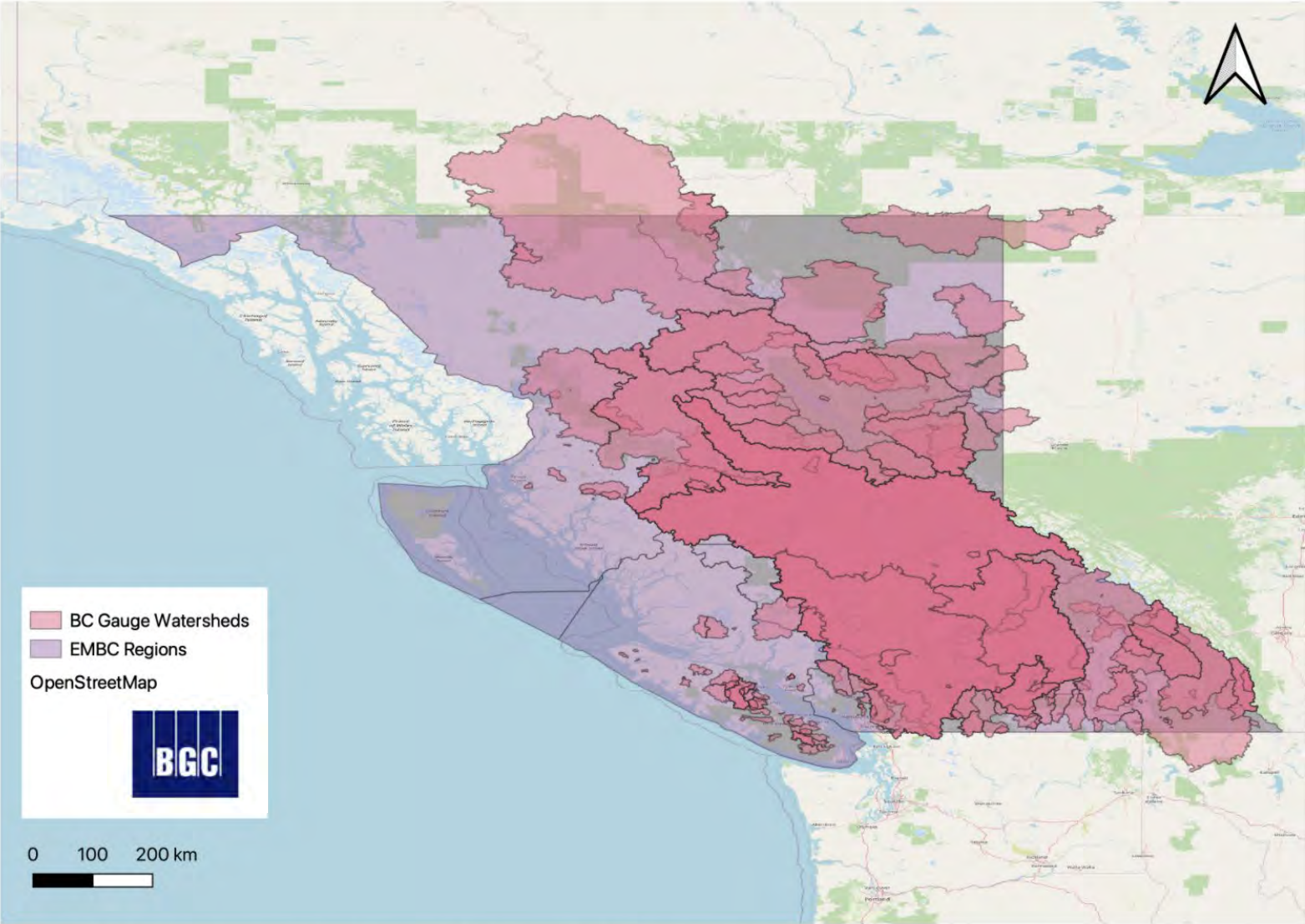


RFC Gridded Data Bulletin

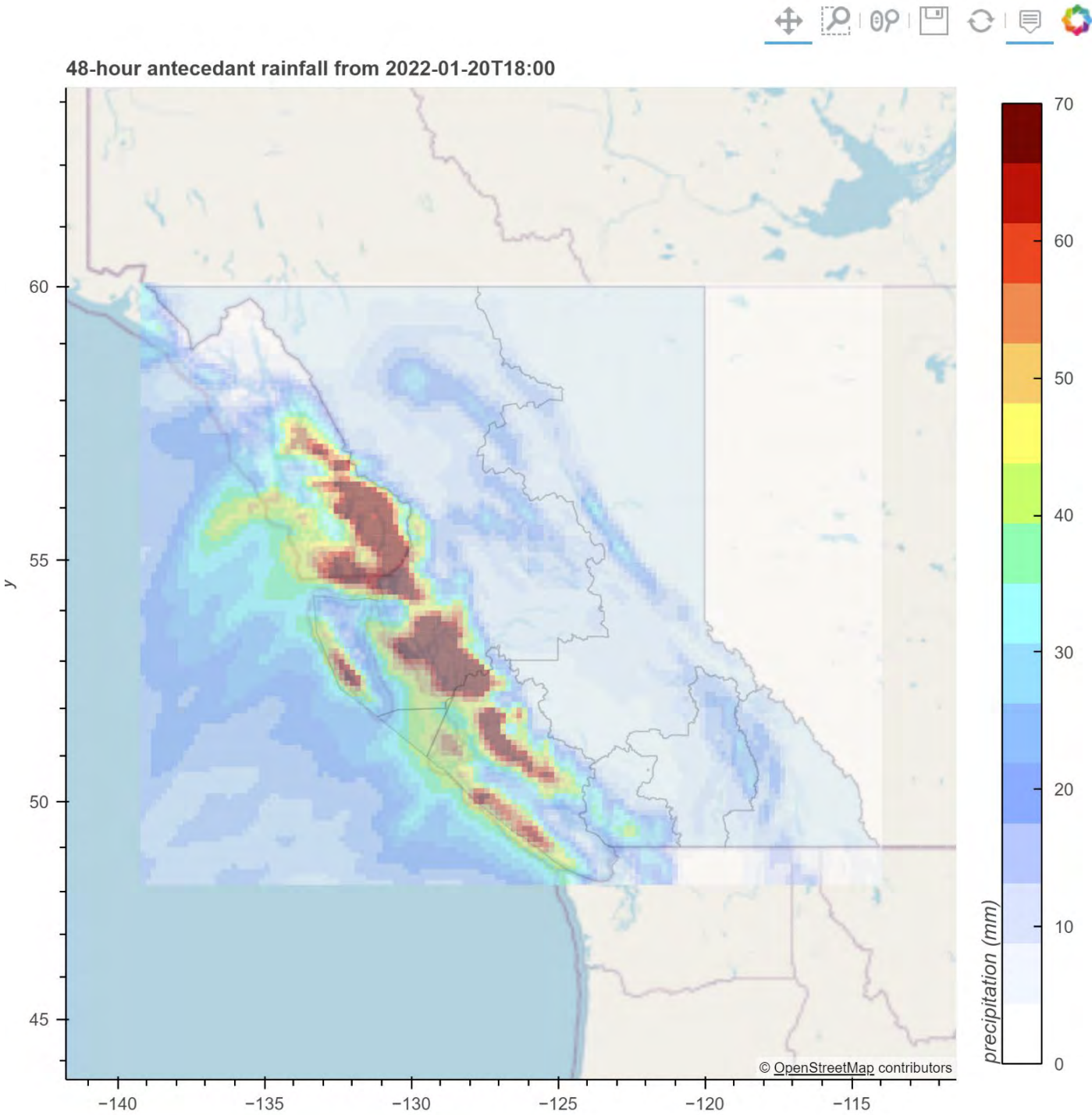
This is an operational bulletin providing an overview of antecedant and forecasted precipitation across British Columbia. It pulls from the following data sources and provides interactive maps:

- Regional Deterministic Precipitation Analysis (RDPA - CaPA) https://weather.gc.ca/grib/grib2_RDPA_ps10km_e.html
- Global Deterministic Prediction System https://weather.gc.ca/model_forecast/global_e.html

It also extracts watershed level analysis of this precipitation data for ~1900 streamflow gauges in the United States and Canada, shown below. As of Dec 2021, the system only runs for realtime gauges in BC.



Produced by BGC Engineering, currently in development, not approved, not binding, not for production, not for engineering purposes.



Many parties affected by and responding to 2021 wildfires and floods have distinct responsibilities but shared needs to understand risk.

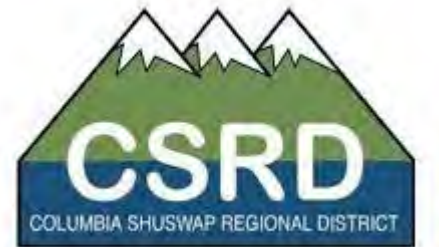


THOMPSON-NICOLA
REGIONAL DISTRICT

**CANADIAN
PACIFIC**



Ministry of
Forests, Lands, Natural
Resource Operations
and Rural Development



Ministry of
Transportation
and Infrastructure



Merritt
FLOURISH UNDER THE SUN



GeoBC



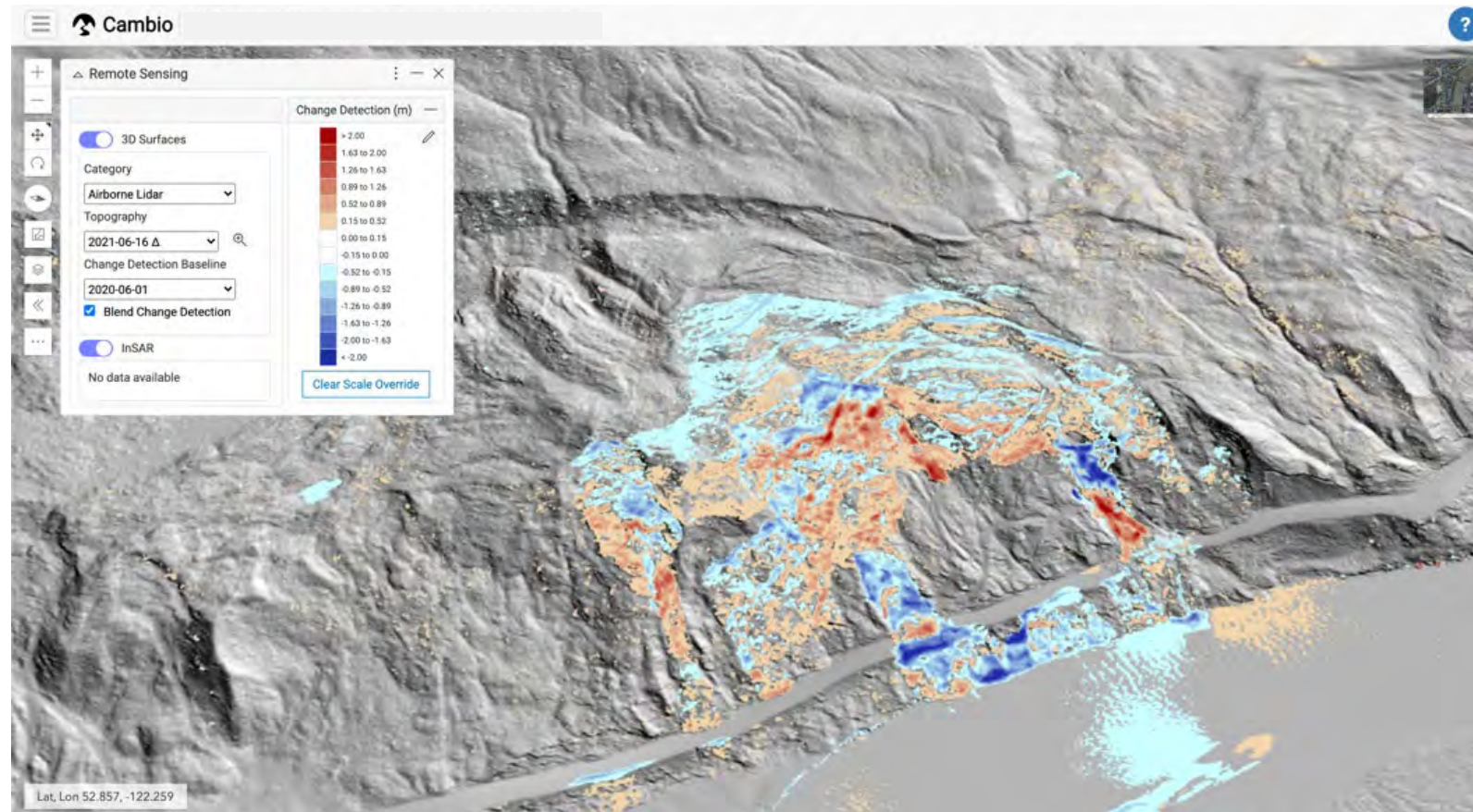
Village of
Lytton



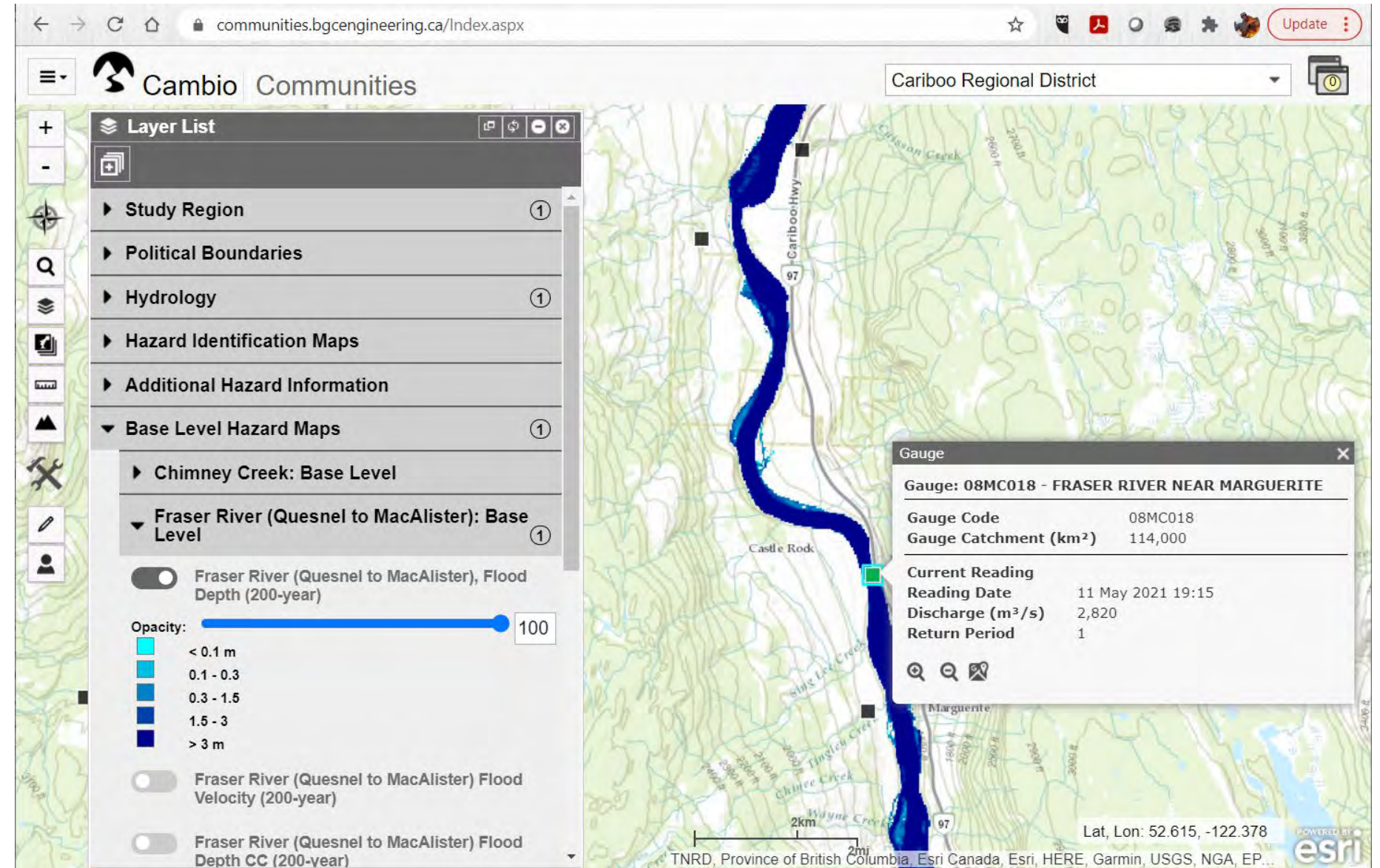
FIRST NATIONS'
Emergency Services



Innovations in knowledge delivery are making it easier to understand geohazard risk in a changing climate, and at scale.

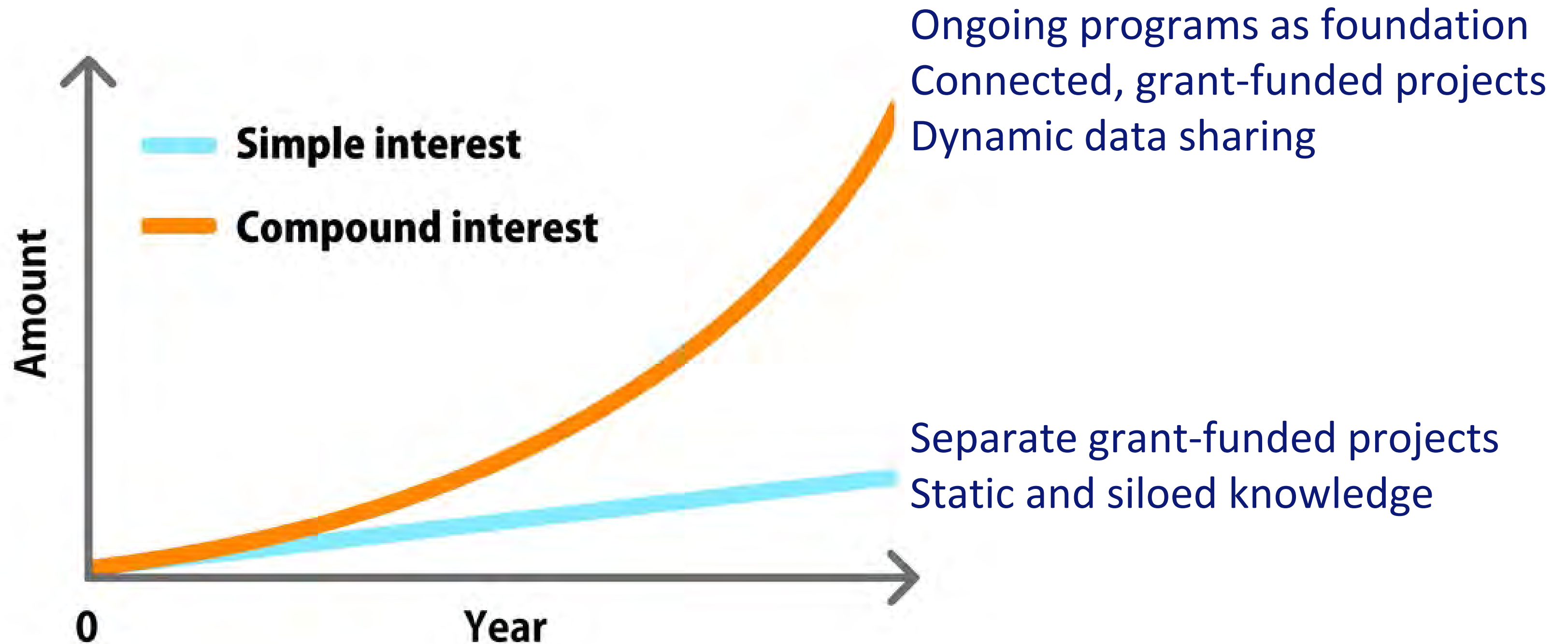


Lidar Change-Detection



Software-driven web maps; real-time monitoring.

Connecting projects and knowledge is creating a compounding effect, but only if organizations are able to take advantage of it.



Provincial risk management in a changing climate requires “all hands on deck” – shared public & private resources, and project procurement able to manage dynamic, changing conditions.



At 2022 project completion, many options exist to leverage and grow knowledge generated via the Thompson Flood Initiative.

Policy Implementation

Information Technology integration

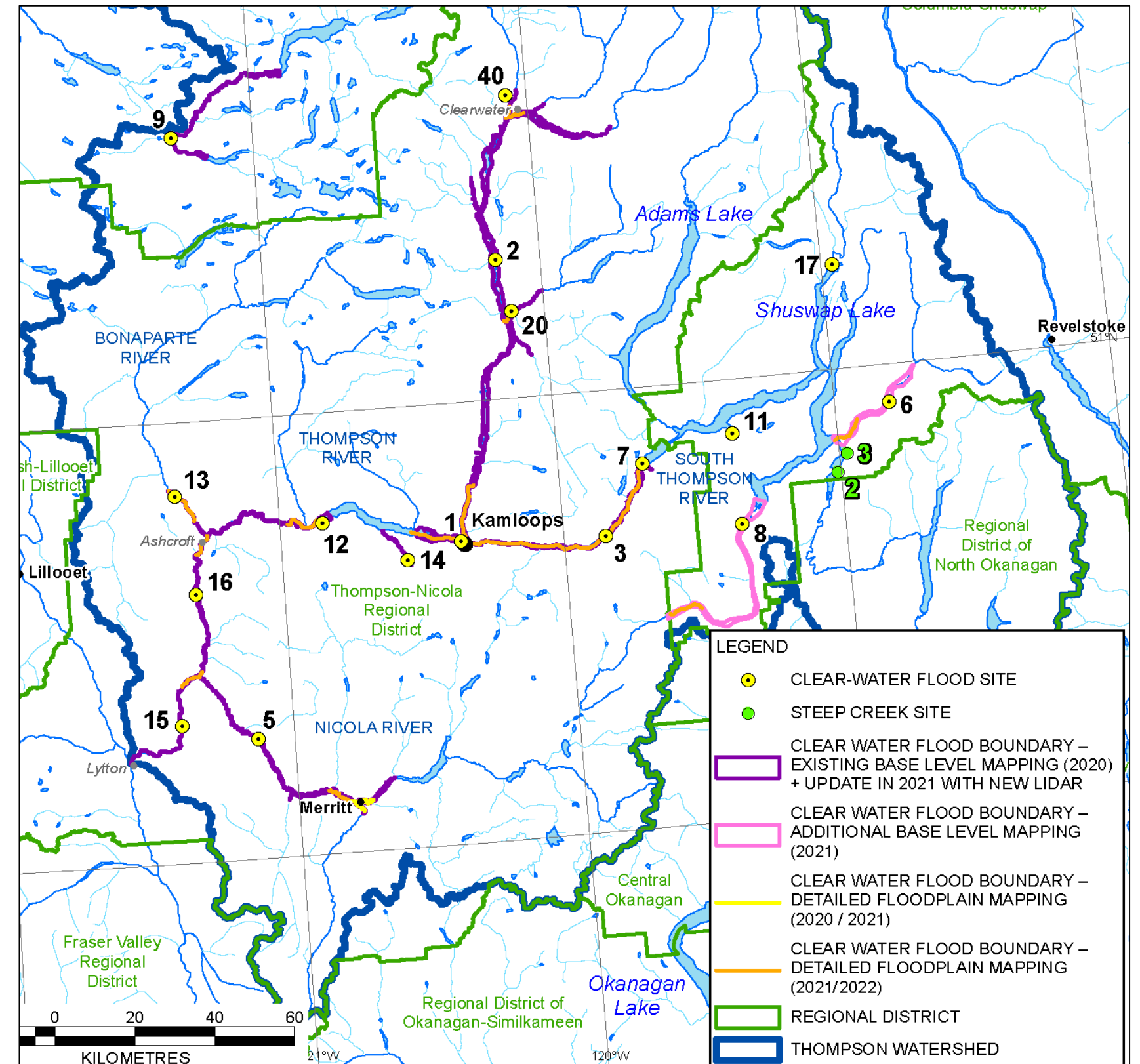
Mitigation Planning

Emergency Management

Knowledge sharing

Collaboration with practitioners

Additional geohazards (landslides)



Discussion

- **Existing Projects (Fraser Basin Council)**
 - Fraser Basin Council (NDMP Stream 2) flood and steep creek mapping
 - Connections: Merritt, CSRD, FNESS, FLNRORD, MOTI, FLNRORD, MOTI
- **Priorities - leveraging tools, data, learnings**
 - Lidar change-detection
 - Hazard mapping and modelling
 - Knowledge sharing (digital)
- **Project Priorities - 2022-2023**
 - Recovery (wildfire, floods, post-wildfire)
 - Further assessment and mitigation planning
 - Policy integration, information technology, knowledge sharing

Closure

This presentation required a number of complex issues to be reduced to general concepts in a series of concise bullet points, photographs and/or diagrams. The content of this presentation is not intended for design decisions or construction. This presentation is for general informational purposes only. BGC's report(s) may contain more specific details concerning the issues identified in this presentation.

Please consult BGC for further clarification if you have any questions or concerns.

Prepared by: Kris Holm, Elisa Scordo
Reviewed by: Carie-Ann Lau
Client: Fraser Basin Council
Date: January 24, 2022

