



# Thompson River Watershed Geohazards Advisory Committee: Project Updates and 2021 Planning

Location: Goldpan Provincial Park / Spence's Bridge area.  
Credit: Matthew Lato (BGC)

December 3, 2020  
Kris Holm, M.Sc., P.Geo.

**bgcengineering.com**





# Agenda

Time*	Topic	Who or Format
10:00	Welcome, introductions, review agenda and objectives	Mike Simpson, Fraser Basin Council
10:05	Meeting summary from Feb 25, 2020	Mike Simpson
10:10	What's been done, what's currently underway <ul style="list-style-type: none"> <li>▪ Focus on Thompson Watershed, but also other areas (CSRD, CRD)</li> <li>▪ Questions, discussion</li> </ul>	Kris Holm, BGC Engineering Inc. and others
11:00	Next <a href="#">UBCM funding cycle</a> , Feb 26, 2021 <ul style="list-style-type: none"> <li>▪ Thoughts and ideas for funding applications</li> <li>▪ Concerns about funding this work</li> <li>▪ Process/interest in a coordinated application</li> </ul>	Everyone
11:45	Next steps: <ul style="list-style-type: none"> <li>▪ Future meeting schedule</li> <li>▪ Email correspondence/updates</li> <li>▪ Collaboration opportunities</li> <li>▪ Other?</li> </ul>	Everyone
12:00	Adjourn	

# **The work guided by the TRW Advisory Committee helps address questions common to many communities.**

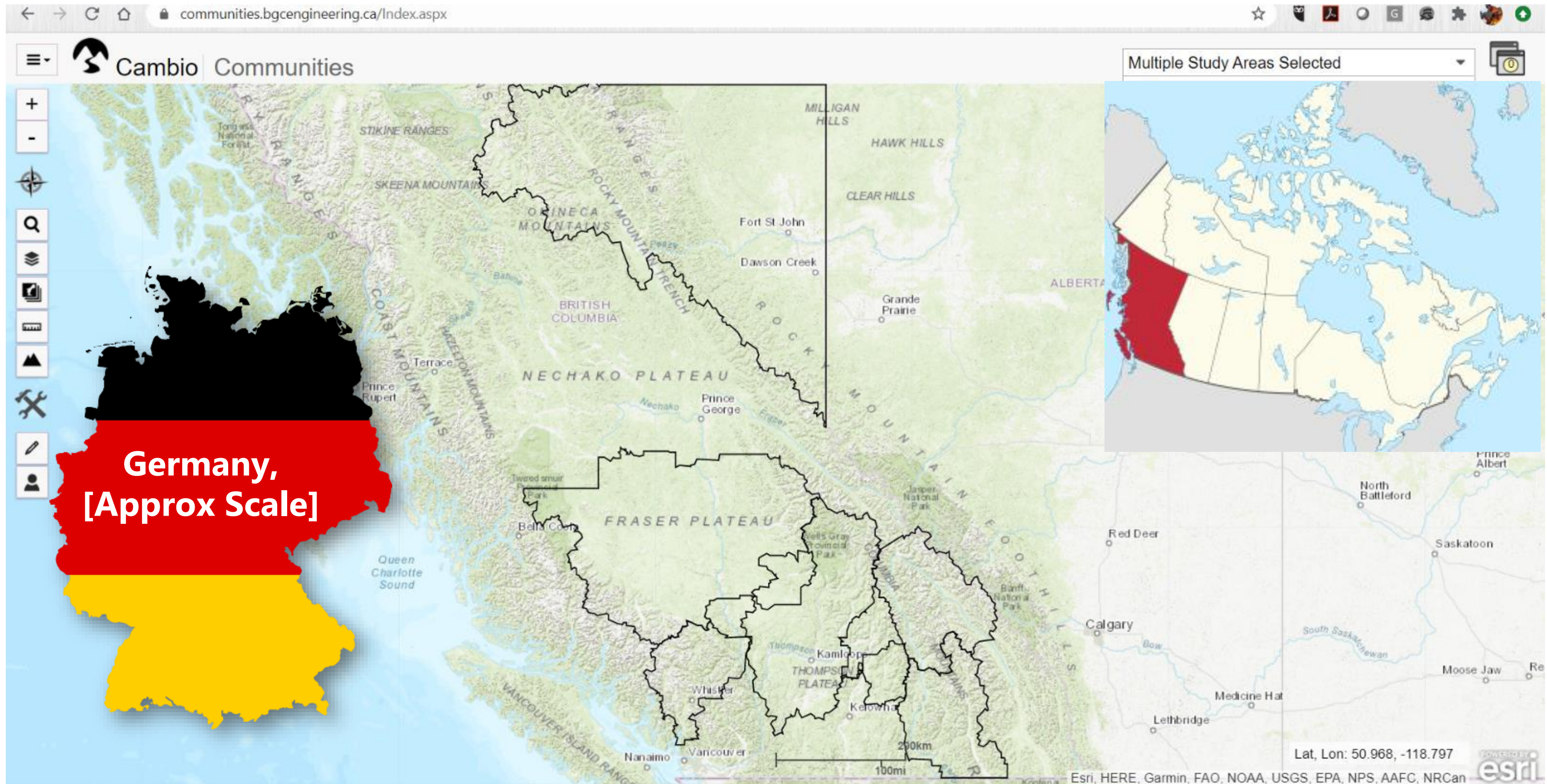
- Is my community safe enough?
- Should we invest in geohazards management or other issues?
- Why, where, & how do we take actions to reduce geohazard risk and measure the benefit?
- How do we best manage roles, responsibilities, and liabilities?
- How do we leverage resources through collaboration?



**May 7, 2017:** Robinson Creek debris flow  
Photo: BGC



**Work guided by the TRW Advisory Committee and surrounding jurisdictions now extends across approximately 300,000 km<sup>2</sup> of BC.**



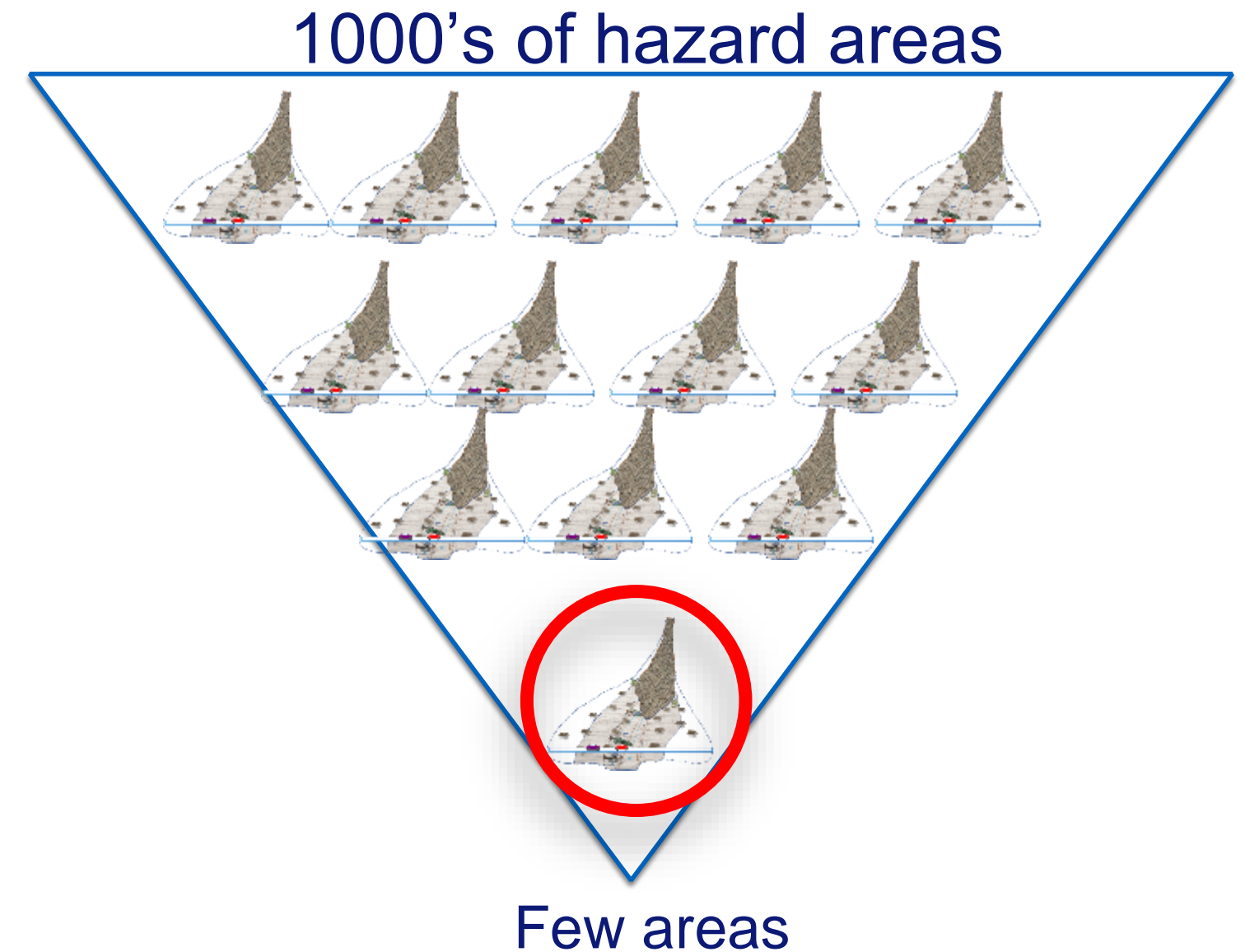


# Project History: 2019-2021

Completion	Completed For	Funding	Project	Status
2019	Fraser Basin Council (FBC), for CRD, CSRD, TNRD, RDNO	NDMP	TRW <sup>3</sup> Geohazard Risk Prioritization	Complete
2020	Columbia-Shuswap Regional District (CSRD)	NDMP	CSRD Geohazard Risk Prioritization	Complete
2020	Cariboo Regional District	UBCM CEPF	CRD Flood Risk Prioritization	Complete
2020	Fraser Basin Council (FBC)	UBCM CEPF	TRW Base Level Floodplain Mapping	Complete
2020	Fraser Basin Council (FBC)	NDMP	TRW LiDAR Acquisition	Complete
2021	Fraser Basin Council (FBC)	UBCM CEPF	Merritt: Detailed flood hazard mapping	Active
			CRD: Flood hazard mapping; exposure analysis	
			TNRD: Flood hazard mapping update; exposure analysis	
2021	Peace River Regional District (PRRD)	UBCM CEPF	Floodplain Identification & Base Level Flood Mapping	Approved
2022	Columbia-Shuswap Regional District (CSRD)	UBCM CEPF	Base Level Flood & Detailed Steep Creek Hazard Mapping	Proposed 2021

# **The work spans >50,000 geohazard areas, of which a handful will proceed through detailed risk management (which ones?).**

1. Identify priorities
2. Analyze hazards
3. Analyze hazard exposure (elements at risk)
4. Estimate risks
5. Evaluate levels of risk tolerability
6. Develop risk reduction plans
7. Implement and monitor risk reduction plans



**A strategic goal has been to integrate multiple assessments “from the ground up” to support a provincial scale geohazards management strategy.**

**1. Identify priorities**

**2. Analyze hazards**

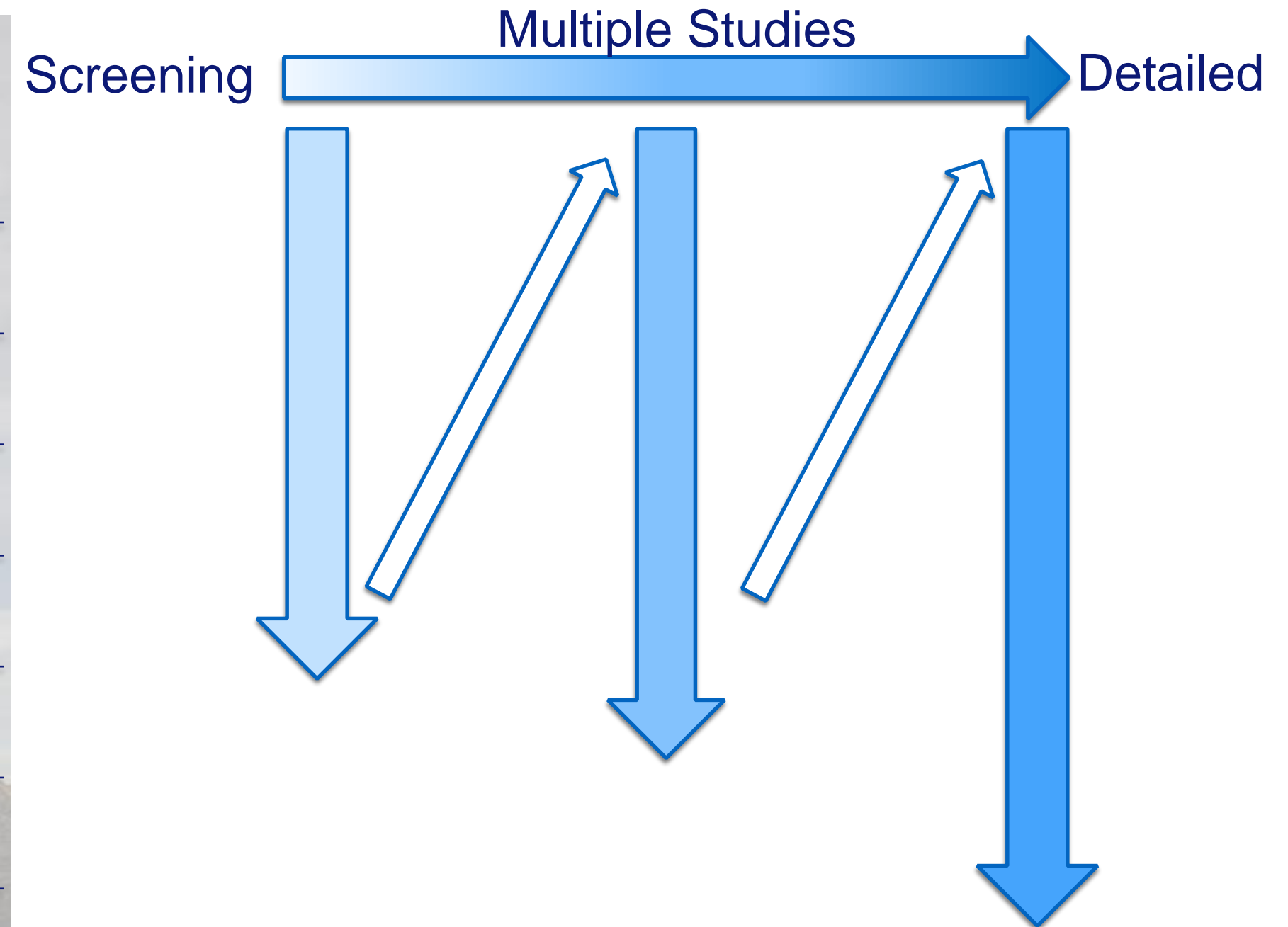
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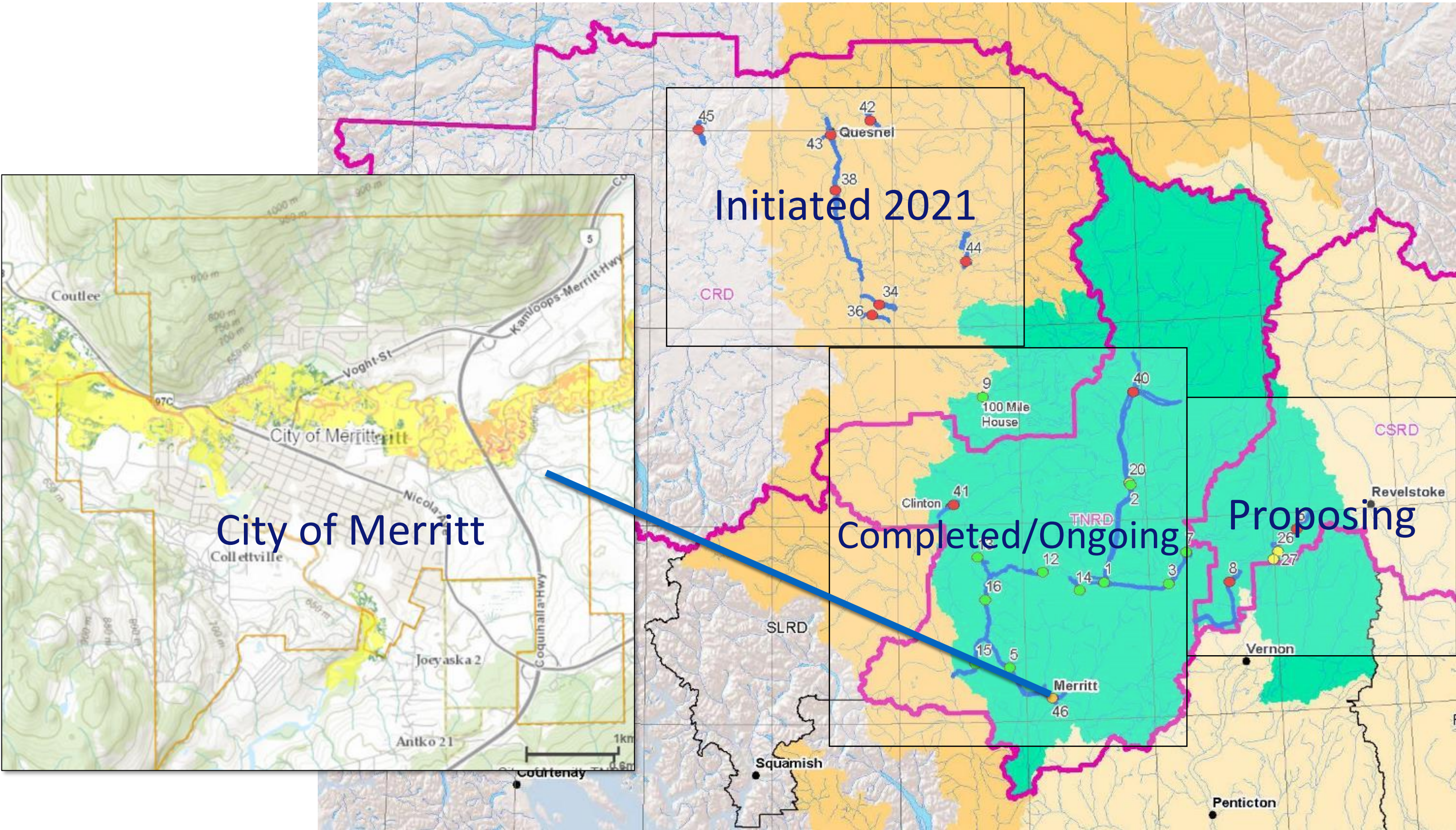
“Assess everywhere and iterate, and refine...”

**Guided by the Thompson Advisory Committee, BGC has applied five principles to advance collaborative geohazards management strategy:**

1. Assess at watershed scale through collaboration
2. Refine regional studies to greater detail (always build on past work)
3. Increase the range of geohazard types considered
4. Progress further through the steps of risk management
5. Share results across governments for implementation in decision making
6. Introduce the concept of change (real-time)

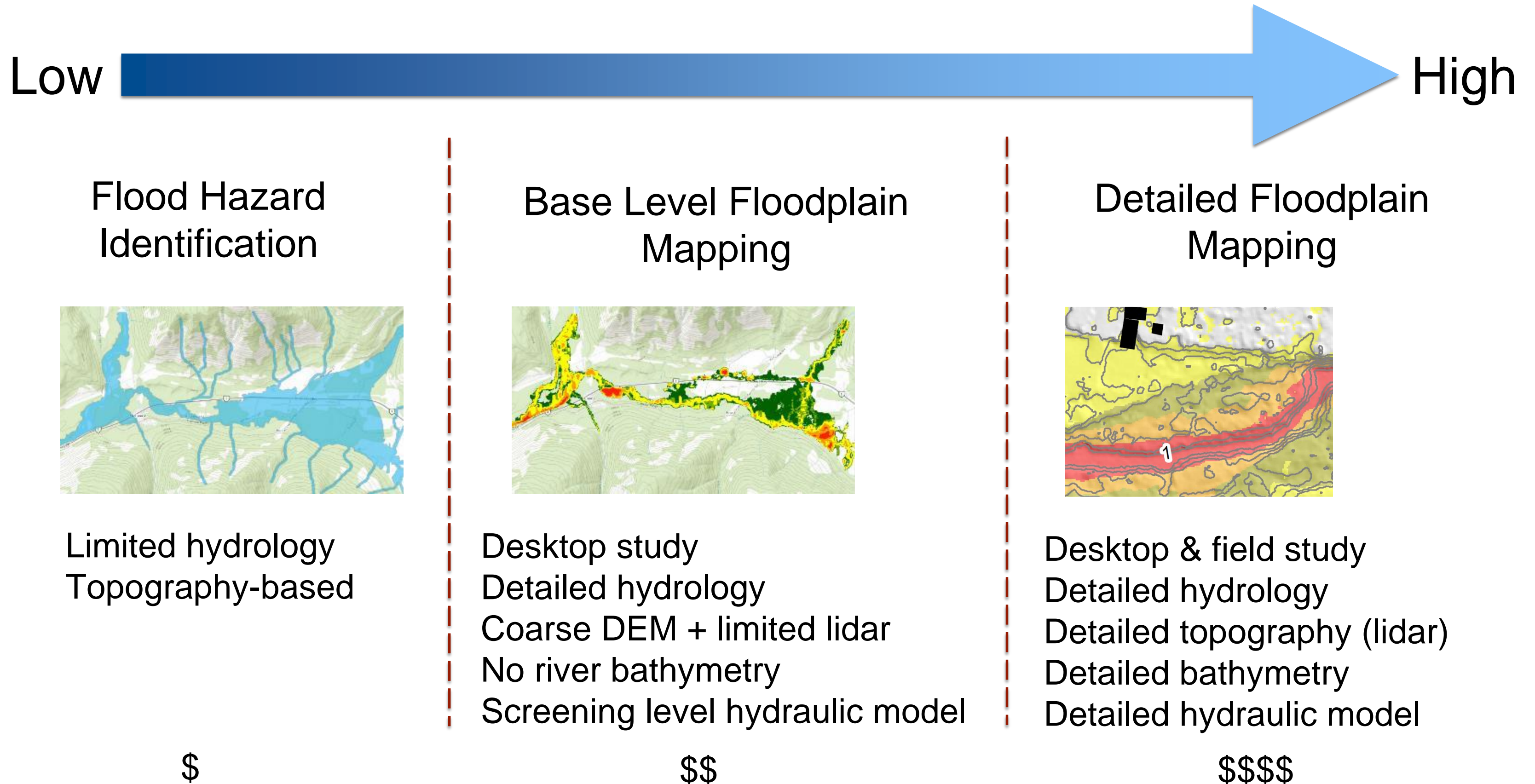


**In 2020, BGC refined flood hazard mapping to “base level” in higher priority areas within the TNRD and CRD.**



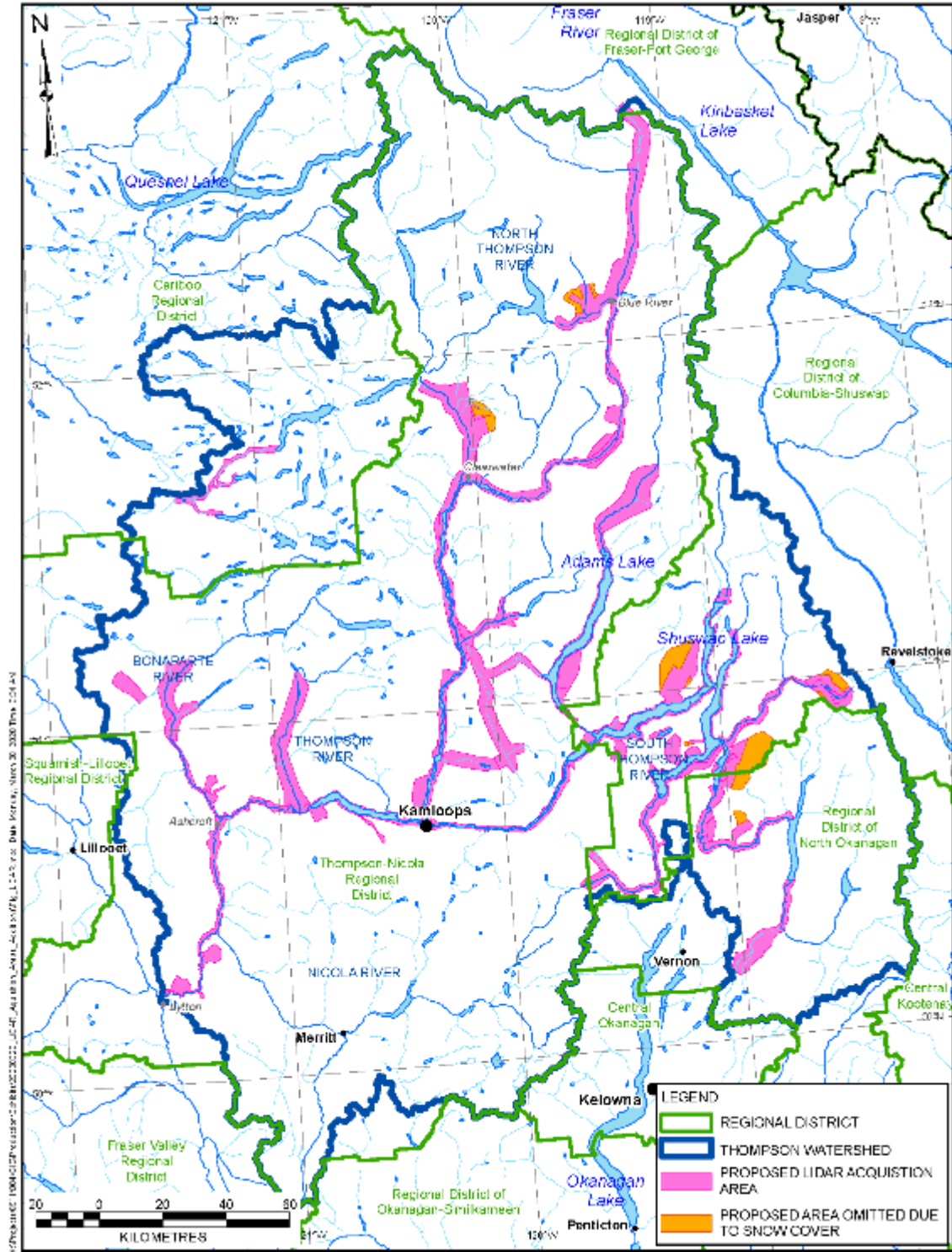


# Three levels of detail of hazard mapping build on each other





**Terra-Remote Sensing, coordinated by FBC with technical input from BGC, delivered 2019 lidar, imagery, and derivative layers in the TRW.**



# Lidar Acquisition Areas





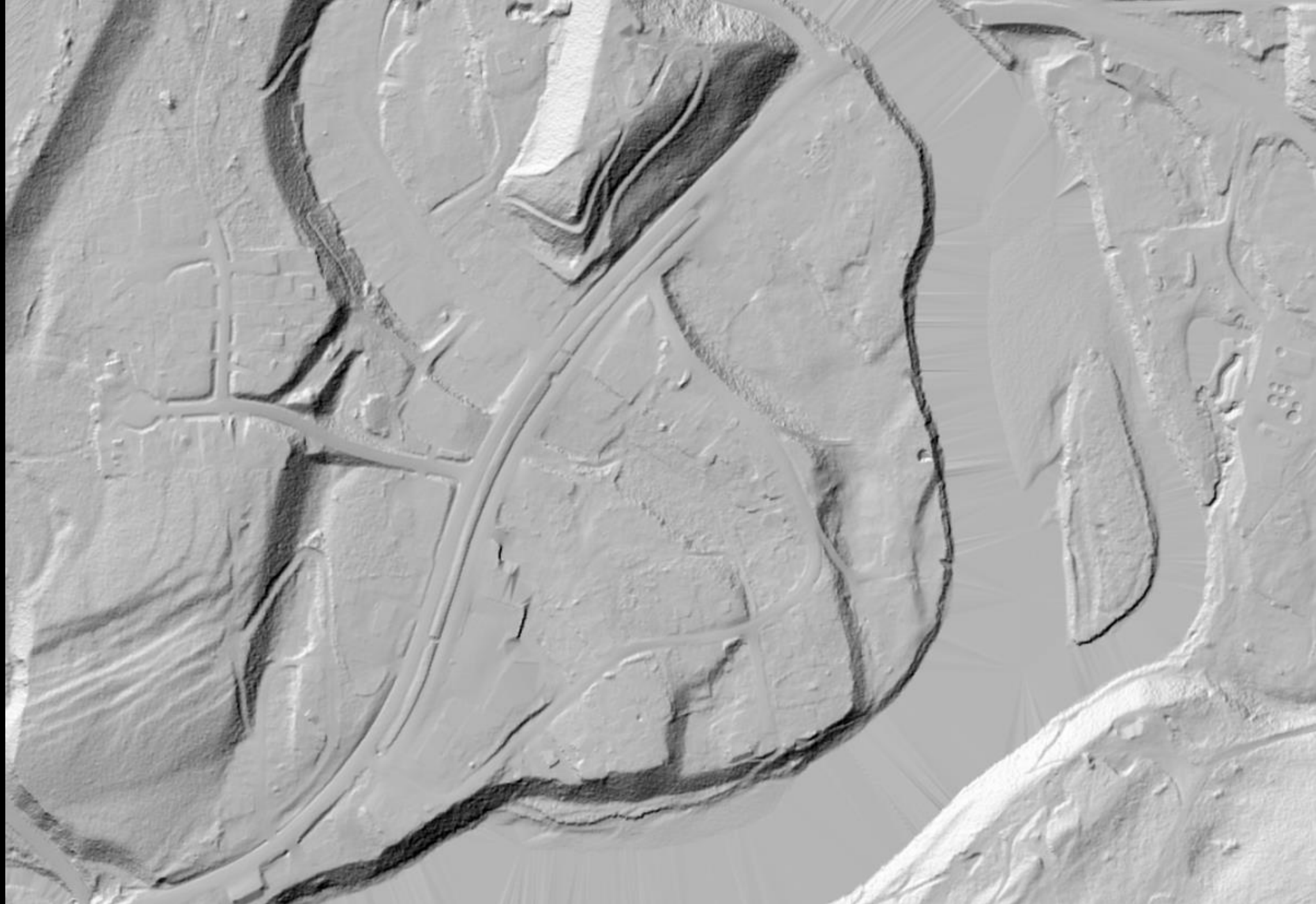
Example imagery - west side of Clearwater near Dutch Lake



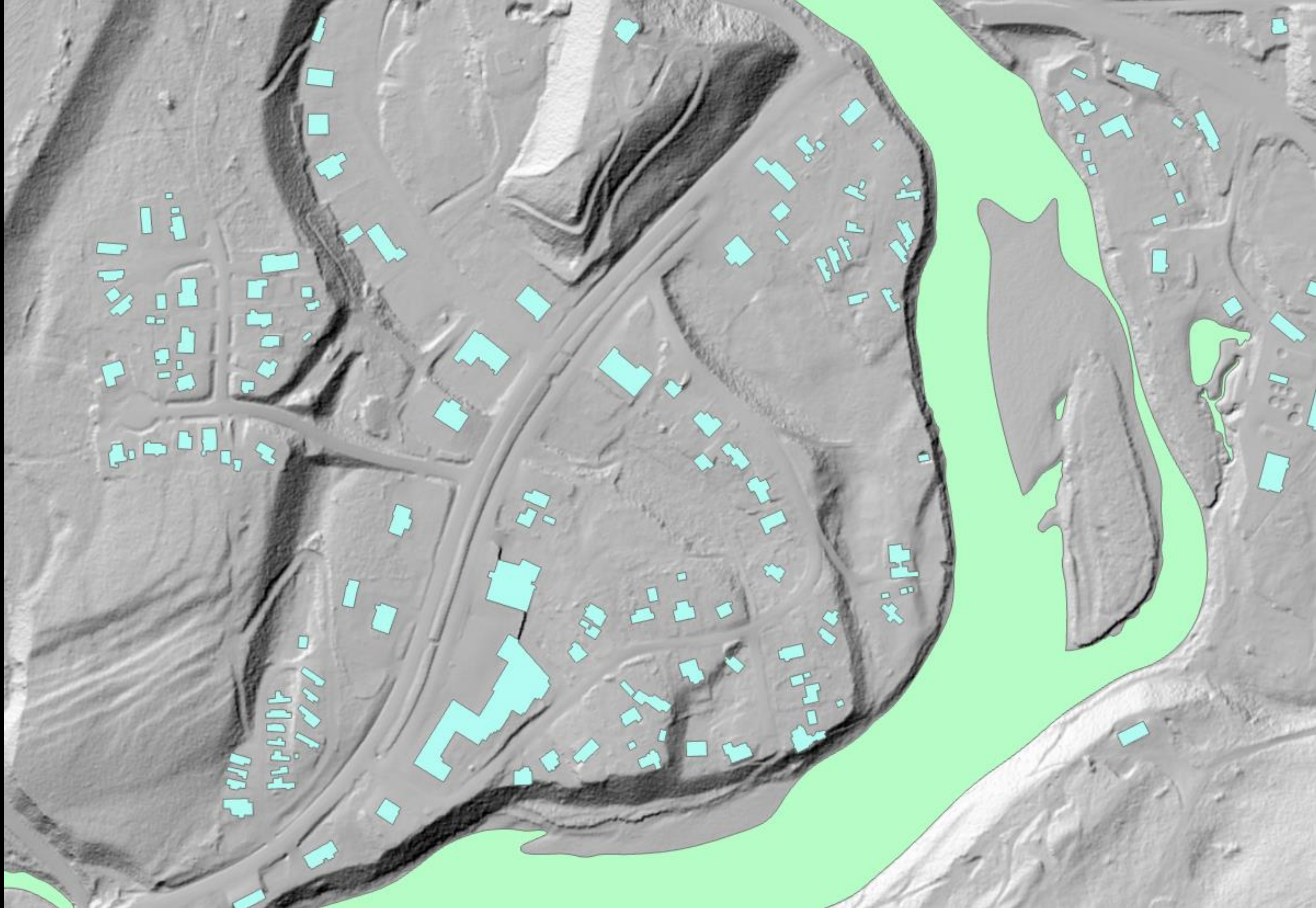


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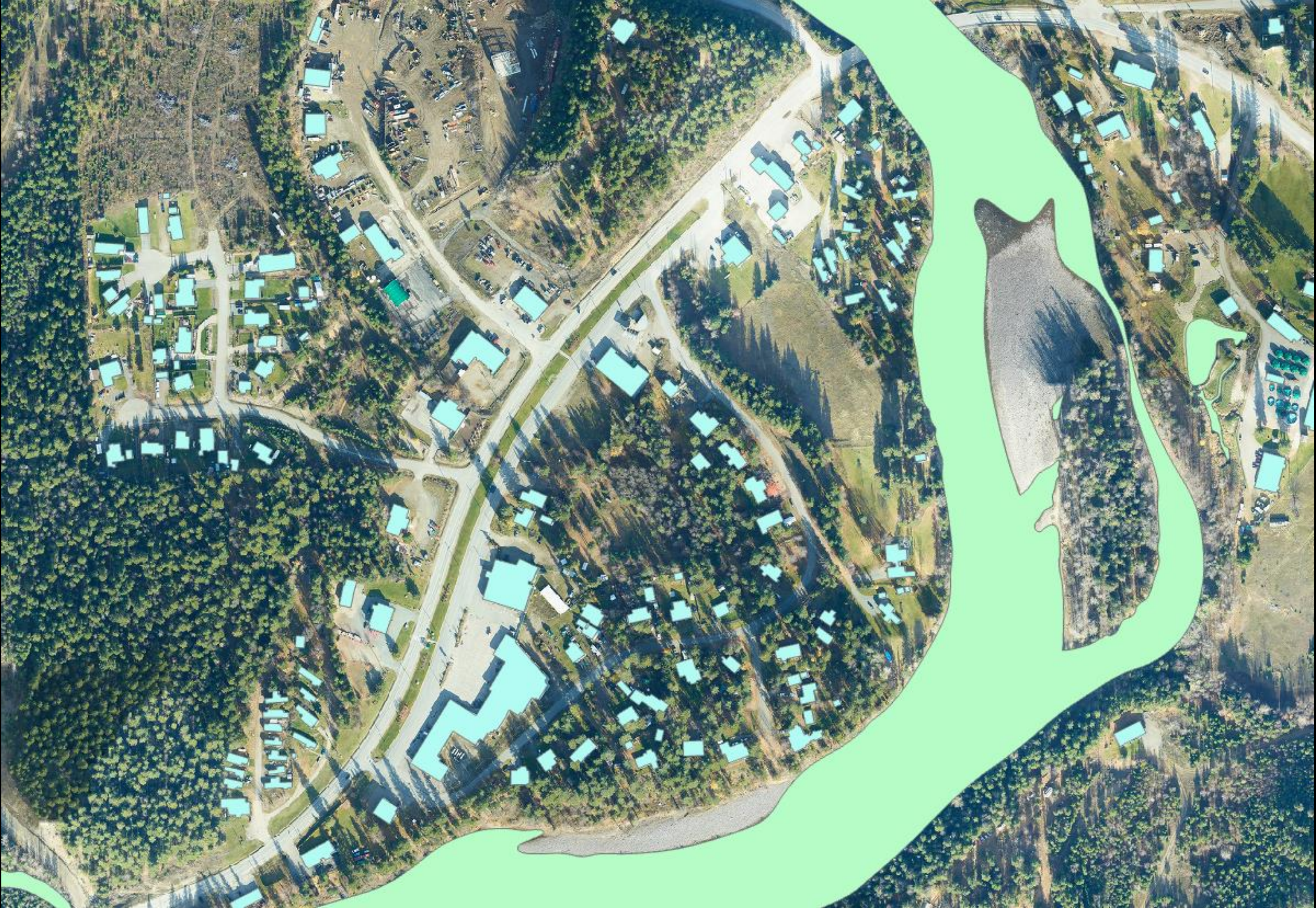




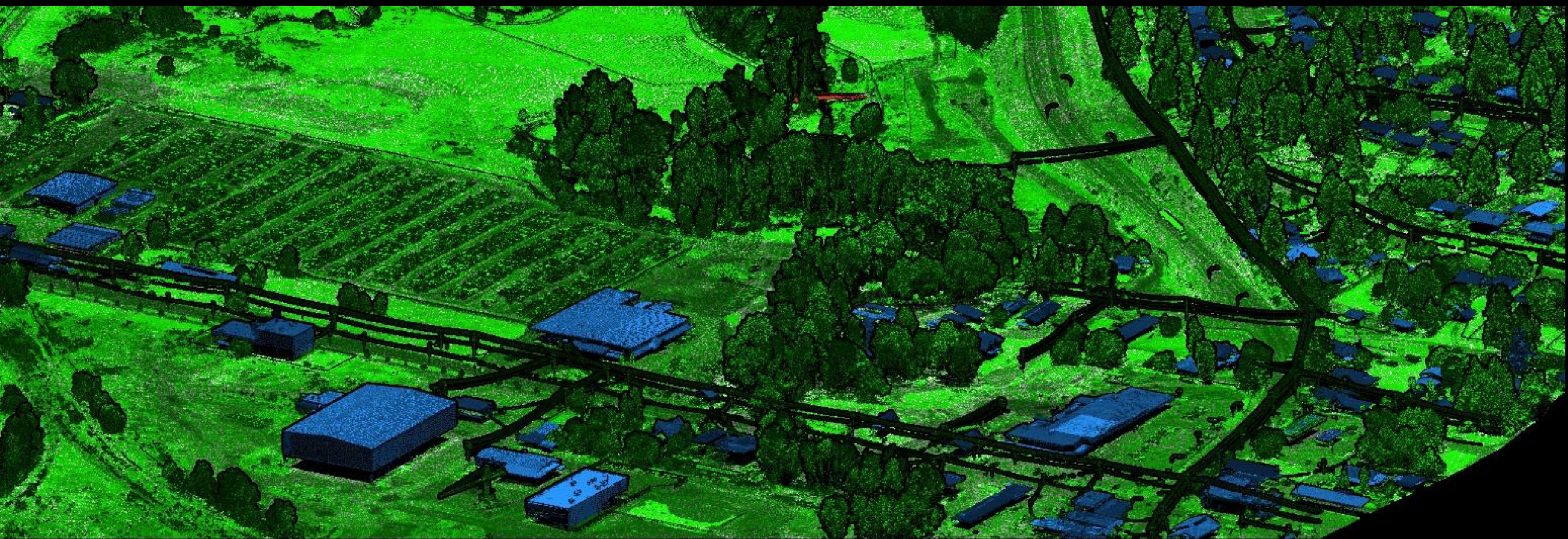




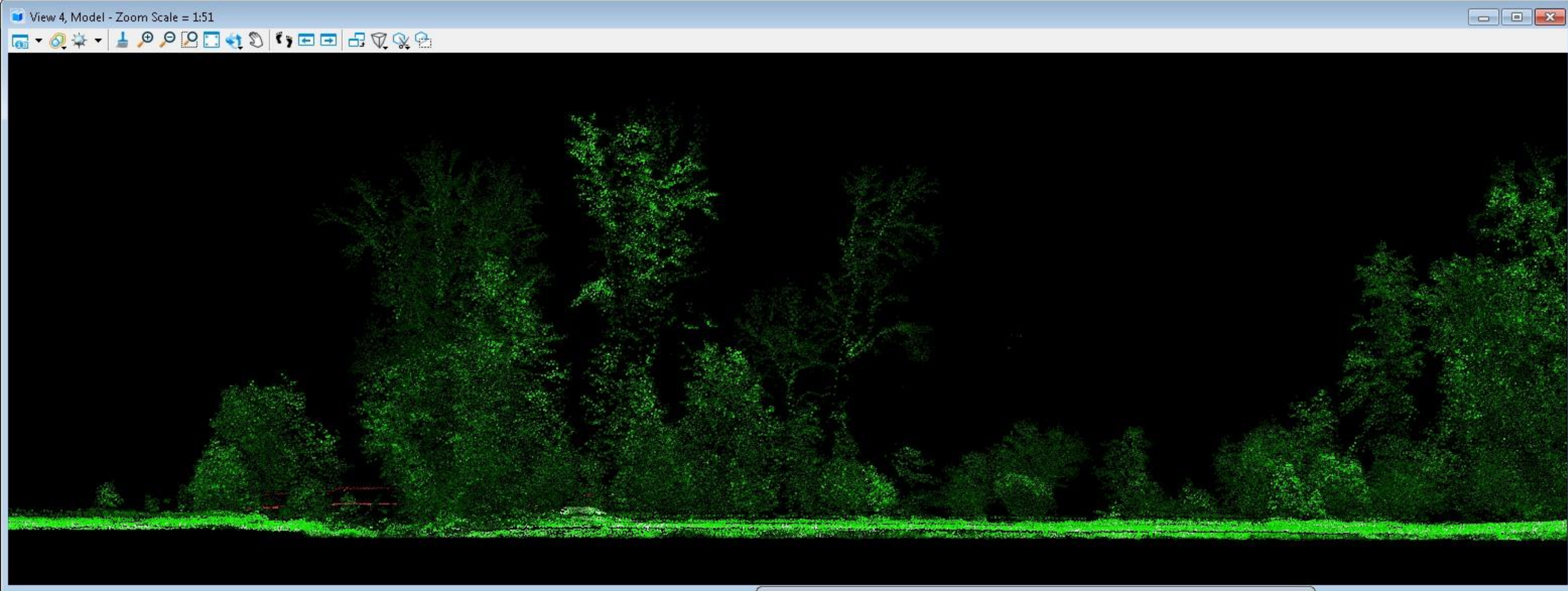




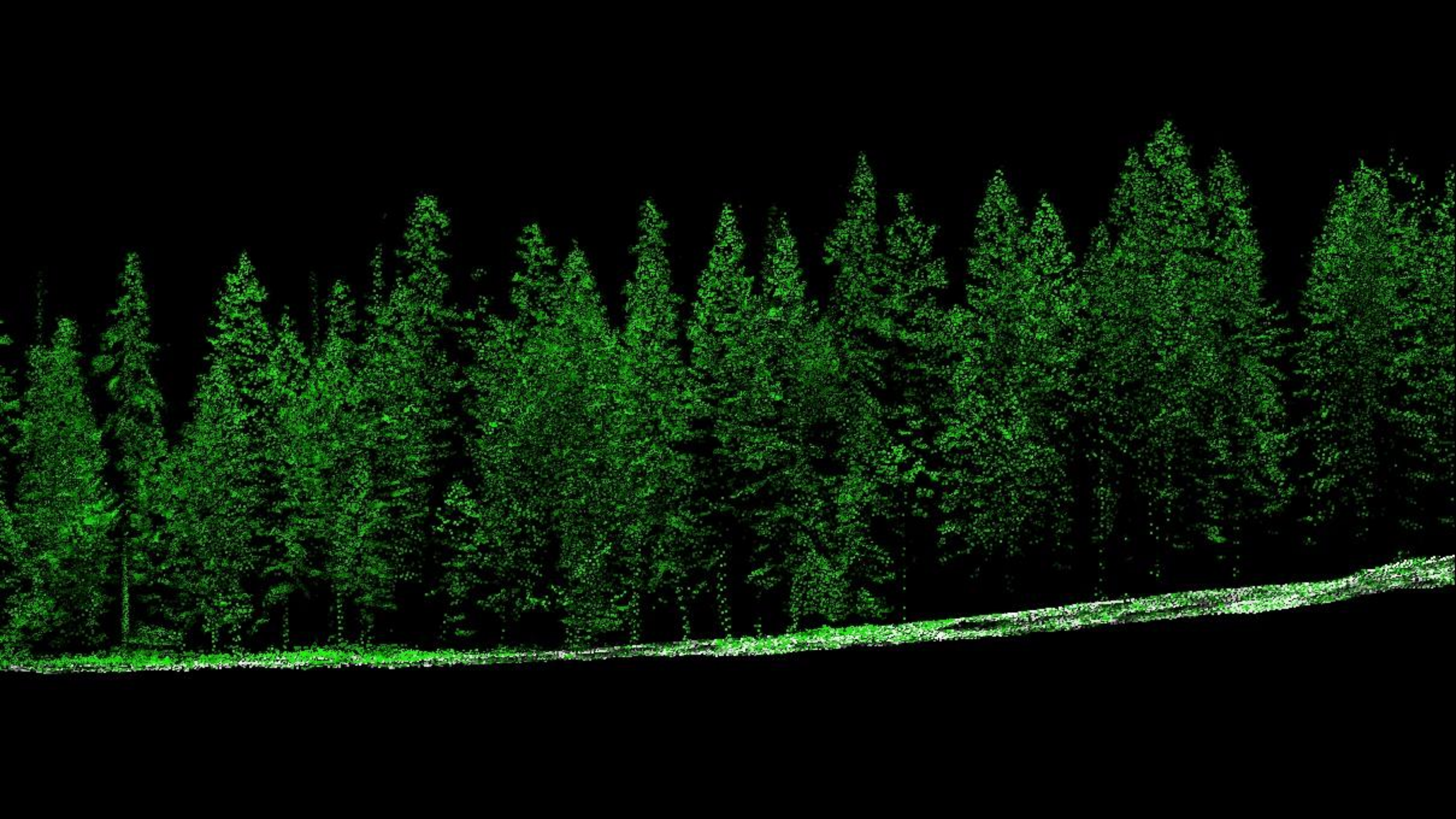










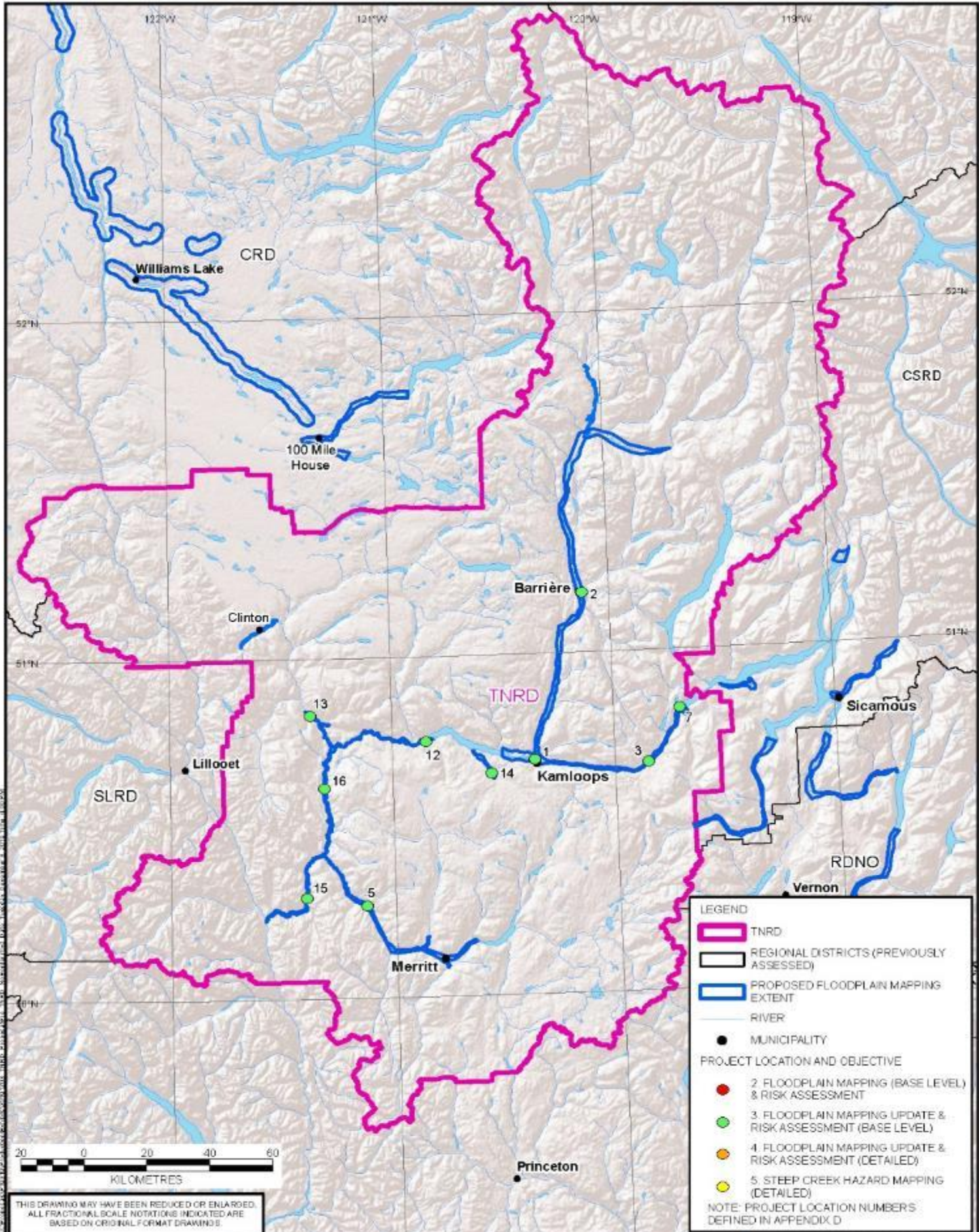




# Current work: Thompson Nicola Regional District

- 1. Flood hazard maps: modelling update (lidar)
- 2. Floodplain identification maps: modelling update
- 3. Hazard exposure update: assets at risk

#	Watercourse (Area)
1	Thompson River (Kamloops Area)
2	North Thompson (Vavenby to Kamloops)
3	South Thompson River (Kamloops to Chase)
5	Nicola/Coldwater Rivers (Nicola Lake to Spences Bridge) (completed)
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)

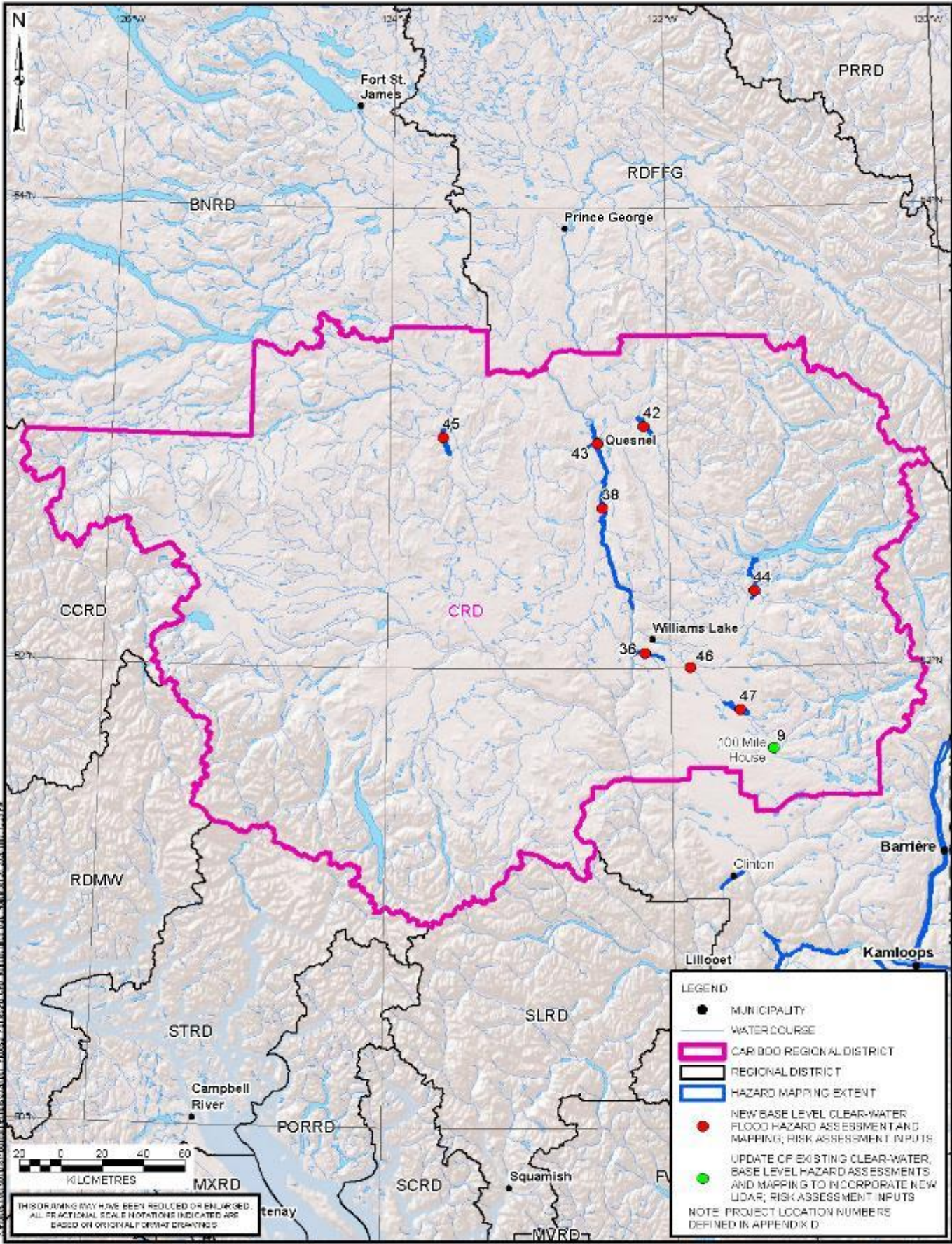




# Current work: Cariboo Regional District

1. Flood hazard mapping (new)
2. Hazard exposure update: elements at risk
3. Ebbwater collaboration: Southern Dakeh Nation Alliance (SDNA)

#	Study Area
38	Fraser River (Quesnel to MacAlister)
36	Chimney Creek
42	Cottonwood River
43	Baker Creek
44	Horsefly River
45	Nazko River
47	Lac la Hache (waterbody)
9	Bridge Creek (Camin Lake - 100 Mile House)





# Exposure Modelling, CRD & TNRD

## Objectives:

- BGC-CRD-TNRD collaboration – builds on previous work.
- Detailed asset data organized for risk management.
- Identify assets exposed to hazard.

## Tasks:

1. Review data architecture and existing information
2. Review best-practices standards
3. Gap assessment & collaboration to resolve gaps (critical facilities)
4. Exposure model update (organized data)
5. Exposure analysis update (understand what's at risk)





# Current work: City of Merritt

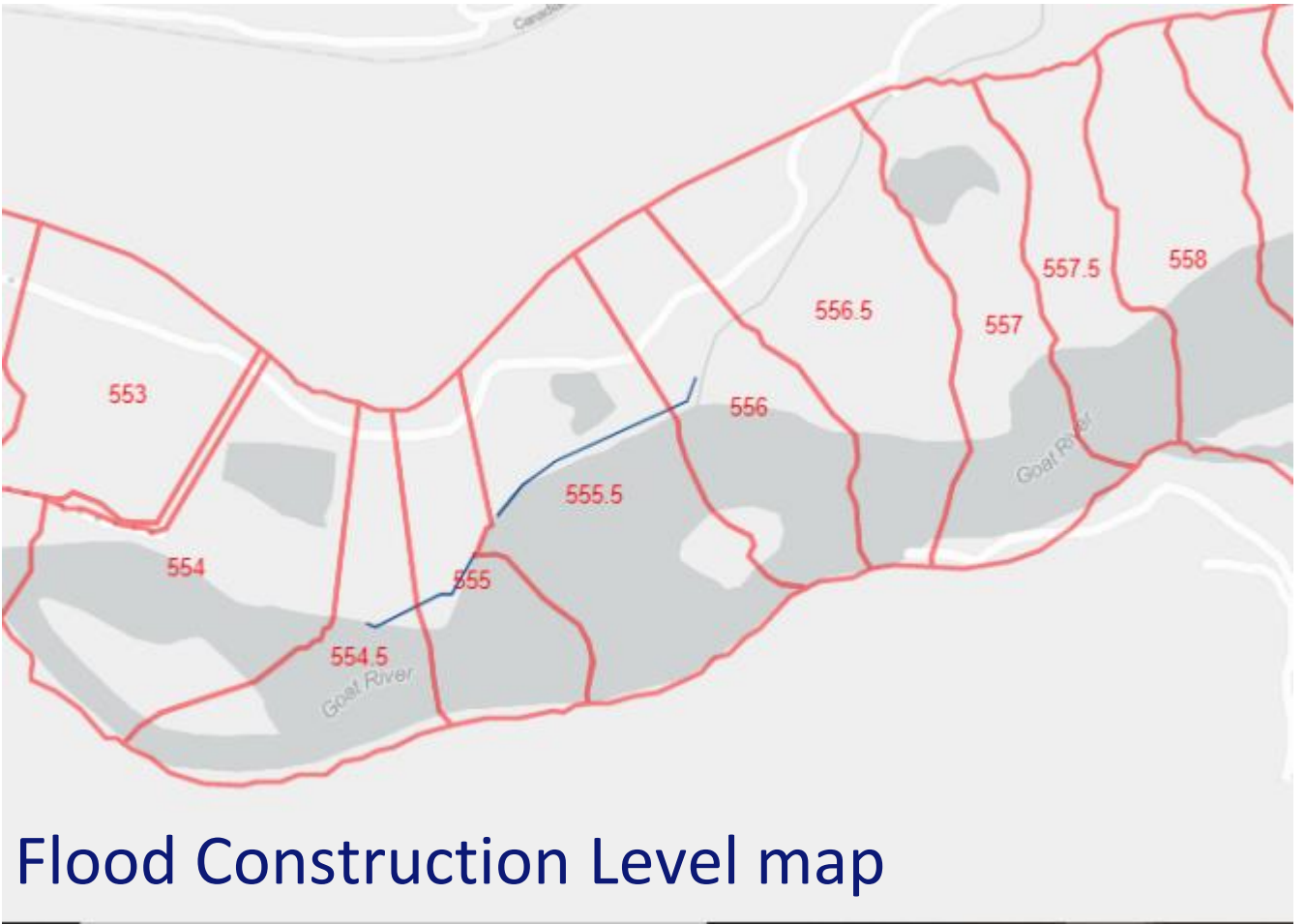
- 1. Detailed floodplain mapping
- 2. Reporting (considerations for flood management planning)

Return Period (years)	Annual Exceedance Probability	Map Type
20	0.05	Flood Hazard Map
50	0.02	Flood Hazard Map
200	0.005	Flood Hazard & Flood Construction Level Maps
500	0.002	Flood Hazard Map

Examples (Goat River, Creston)



Flood Scenario maps



Flood Construction Level map

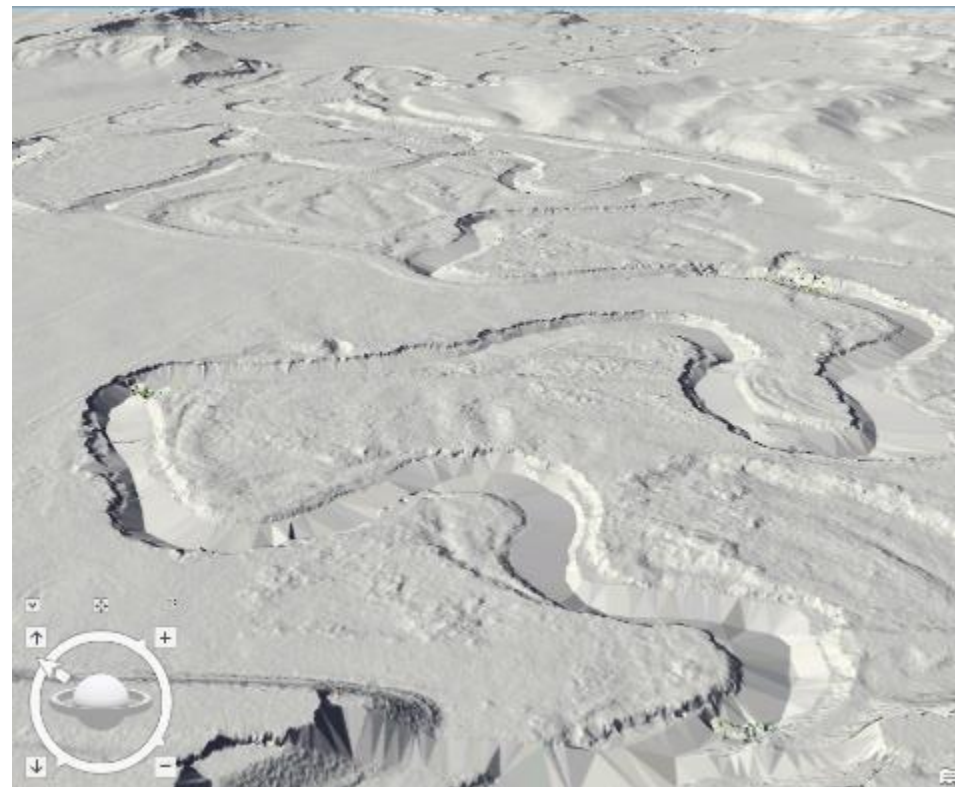
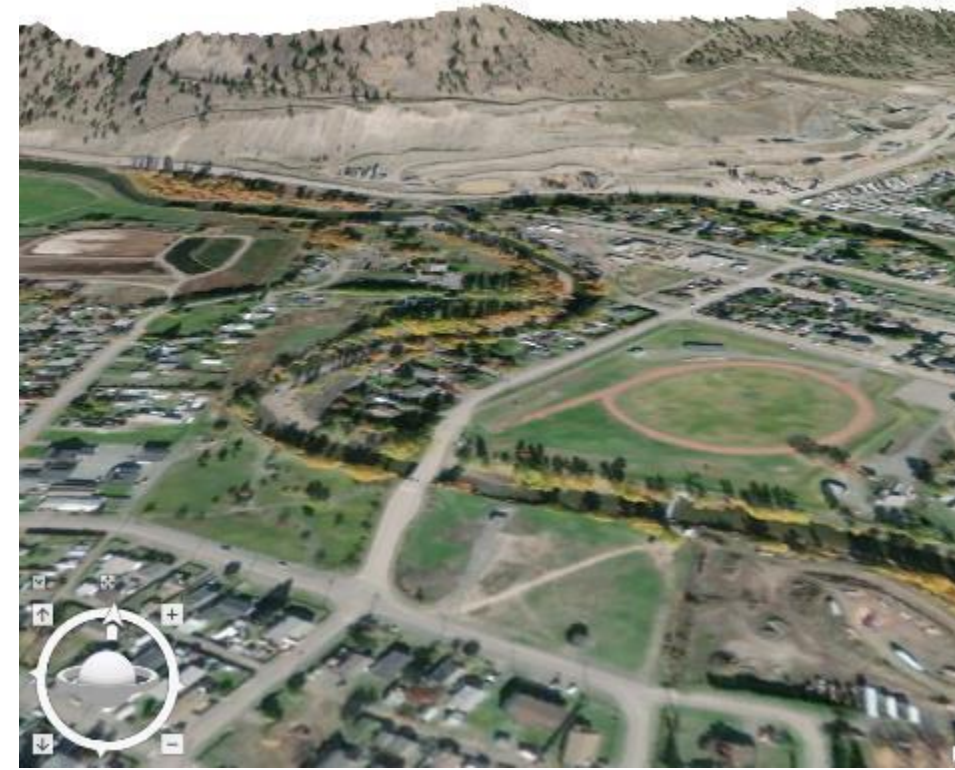


**Ecoscape Environmental Consultants completed bathymetric surveys for the Nicola and Coldwater Rivers in September 2020.**





**Bathymetric surveys were merged with the DEM for flood modelling.  
Next steps include hydrologic analysis & hydraulic modelling.**





# Considerations for 2021 Planning

**1. Identify priorities**

**2. Analyze hazards**

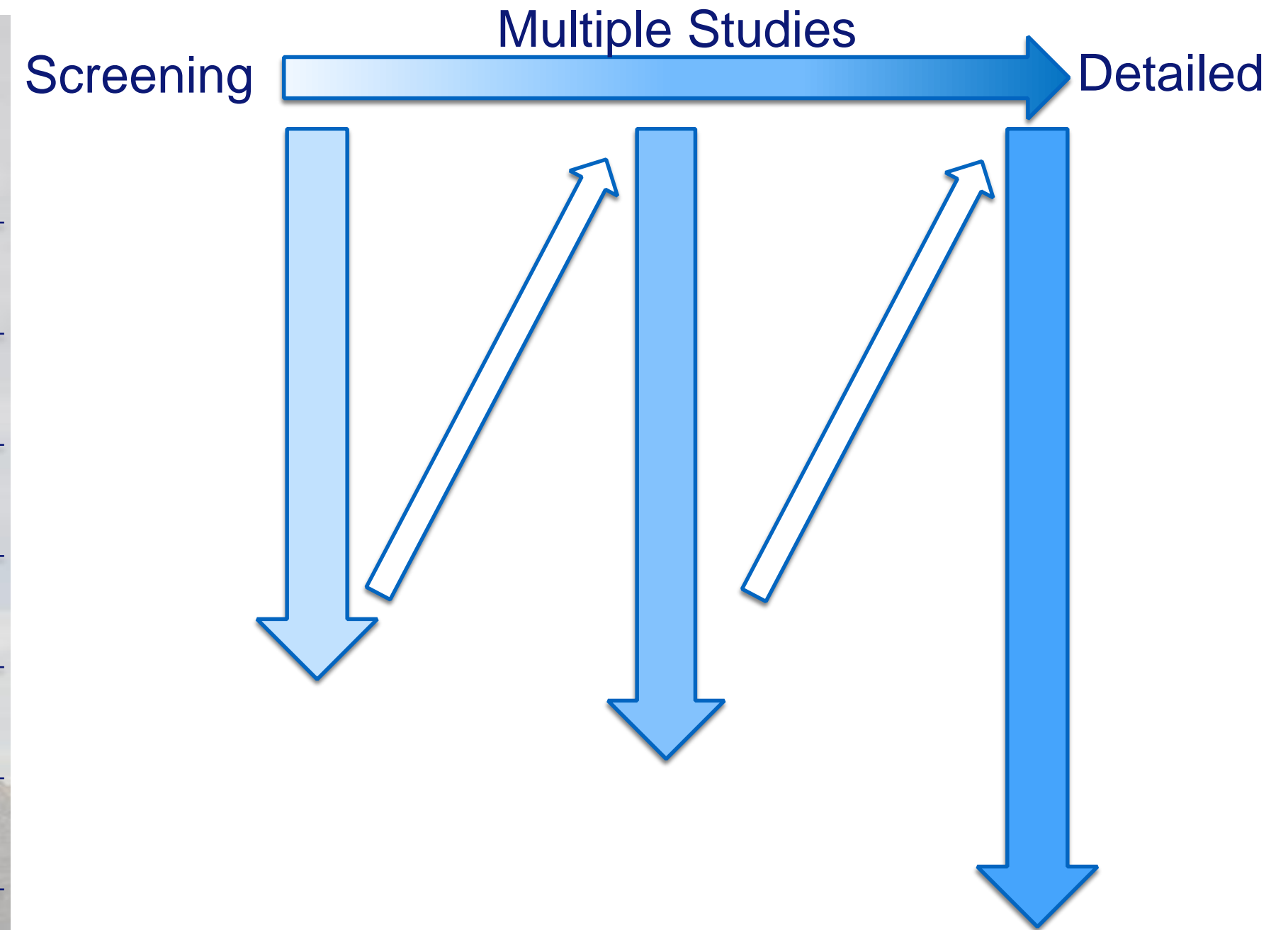
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“Assess everywhere and iterate, and refine...”



## **Options to advance may include:**

1. Flood hazard assessments and mapping
2. Flood risk assessments
3. Flood assessment inputs: ground elevation data, bathymetry, exposure (assets)
4. Flood mitigation plans
5. Flood-related plans, bylaws and policies amendment
6. Training (e.g. government staff and Board workshop)



# 2021 Planning: Funding Options

1. UBCM CEPF (February 2021)
2. National Disaster Mitigation Program (NDMP)  
– excess funds for projects completed after March 31, 2020
3. NDMP extension through 2022 (intake TBD)
4. Investing in Canada Plan  
Adaptation, Resilience & Disaster Mitigation (ARDM) Program (within ICIP)  
Disaster Mitigation and Adaptation Fund
5. COVID-19 relief funds?
6. ??



# Possible UBCM CEPF Application Options

Jurisdiction	Eligible Type	Area
CSRD	Flood Assessment & Mapping	Hummingbird Creek (steep creek), Eagle River, Salmon River (re-submission)
Barriere		Barriere River (re-submission)
Clinton		Clinton Creek (re-submission)
Clearwater		Clearwater River (re-submission)
Kamloops		Detailed floodplain mapping
CRD		Green Lake
TNRD		Multiple options
CRD	Flood Risk Assessment	Lac La Hache
Merritt	Mitigation Planning	Integrated flood management plan, Nicola and Coldwater Rivers
TNRD	Policy, planning, regulation, training	Risk tolerance policy development (multi-hazard)
CSRD		Board and Staff Workshop (one-day)



## Other potential points of advancement:

Hazard	<ul style="list-style-type: none"> <li>• Real-time geohazard monitoring, forecasting, &amp; warning systems and tools</li> <li>• Storm classification and real-time monitoring for emergency management.</li> <li>• Post-wildfire hazard scenario modelling (in advance of wildfires). FireSmart funded?</li> </ul>
Hazard Exposure	<ul style="list-style-type: none"> <li>• First Nations communities – address gaps in asset data</li> <li>• Consider evacuation route planning</li> </ul>
Risk & Resilience	<ul style="list-style-type: none"> <li>• Risk assessment for completed hazard mapping areas</li> <li>• Scenario planning for resilience – geohazards ‘shake-out’</li> </ul>
Risk evaluation	<ul style="list-style-type: none"> <li>• Risk tolerance policy</li> </ul>
Communication	<ul style="list-style-type: none"> <li>• Augmented reality (Hololens) for communication</li> <li>• Public facing version of Cambio for community awareness</li> <li>• Board and Staff training and policy development workshop</li> </ul>
Baseline Data	<ul style="list-style-type: none"> <li>• Bathymetric surveys</li> </ul>
Collaboration	<ul style="list-style-type: none"> <li>• Additional local governments?</li> <li>• First Nations communities, i.e. Nicola Governance Watershed Project</li> <li>• Forestry operators; Community watershed associations; MoTI</li> <li>• Academic research (Dave Reid – Post Doc. – Bonaparte &amp; Nicola Rivers)</li> </ul>



## **Points of discussion: advocacy**

1. Data sharing and collaboration
2. Disclosure and liability
3. Roles & Responsibilities
4. Funding models (alternatives to grants)



## **Additional Material for Discussion as time permits:**

**Our work so far has focused on stream hazards. Gaps also exist in classifying slope hazards for land regulation.**

- Official Community plans typically define slope DPAs with simple slope gradient thresholds and setbacks. Limitations include:
  - Unstable slopes can be gentler than defined thresholds (hazards may not be identified).
  - Landslide runout areas can extend well beyond steep slopes (hazards may not be identified).
  - Steep but stable areas will be included in DPAs (onerous restrictions imposed).
  - Fixed setbacks that do not consider site conditions may not accurately represent hazards.



# **BGC suggests considering a funding application submission for slope hazard identification for land regulation (e.g. for DPAs or equivalent).**

- Review existing reality for define slope hazard DPAs; identify gaps and limitations
- Review standard of care for slope hazard identification for land regulation, with external input from subject-matter specialists.
- Review best-practices for regional slope hazard identification for DPAs.
- Recommend standardized approach to slope hazard mapping for the purpose of land regulation.
- Complete preliminary slope hazard mapping for the purpose of DPA.



**BGC**