

## **Appendix B: Floodplain and Channel Migration Zone Maps**

- B.1 Index Map Sheet
- B.2 Floodplain Maps (x2)
- B.3 Flood Depth Map
- B.2 Channel Migration Zone Maps (x2)





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— CROSS SECTION

MAPSHEET

**General Notes:**

1. The Floodplain maps and Channel Migration Zone maps were prepared under the Cowichan Valley Regional District's "Cowichan River - Riverbottom Road Area Flood and Erosion Hazard Mapping Project" by Northwest Hydraulic Consultants Ltd (NHC) in 2020. This study's final report should be consulted prior to use of these maps.
2. Future climate change flows depicted on the maps represent plausible conditions in the year 2100. However, the actual time frame for the changes is uncertain.
3. Erosion hazard area depicted on the maps represent plausible conditions over a 50-year planning time horizon. However, the actual time frame for channel erosion is uncertain.

Data Sources:

1. Floodplain topography is based on Lidar flown by Quantum Spatial between June 15th and July 25th, 2019 and was provided to NHC by the CVRD.
2. River channel bathymetry was surveyed by NHC in February 2020.
3. Municipal boundaries and cadastral information were provided by the CVRD and DataBC.
4. The background orthophoto was flown in 2019 and was supplied by the CVRD.
5. Background basemaps are provided by Esri and Google Earth.

Use and Limitations of Floodplain and Channel Migration Zone

1. Floodplain maps are an administrative tool that depict the potential flood extent and minimum recommended Flood Construction Levels for the adopted designated flood. A professional must be consulted for a site-specific engineering analysis.

2. The Floodplain maps depict Flood Construction Levels at the time of surveys. Future changes to the river channel, floodplain, and future erosion and/or remapping may cause the Flood Construction Levels. The information on the maps should be assessed regularly (5 to 10 year intervals) or after any extreme flood occurrence.

3. The Floodplain maps are not a design tool that depict the potential extent of active Cowichan River channel processes, and future erosion potential for a 50-year planning time horizon. A professional must be consulted for a site-specific engineering or geotechnical analysis.

4. The Channel Migration Zone maps depict the potential extent of active channel processes and future erosion potential at the time of the assessment. Future changes to the river channels or floodplain, erosion, landslides, debris, and/or other instabilities at the site or further upstream, or a channel avulsion or other event that substantially alters the supply of sediment and logs to the river will cause the Channel Migration Zone maps to change. The information on the maps should be assessed regularly (5 to 10 year intervals) or after any extreme flood occurrence.

5. The Channel Migration Zone maps may limit the use of the maps if not been established on the ground by legal survey. The accuracy of these boundaries is limited by the Lidar base mapping and the accuracy of the survey.

6. The Floodplain maps do not represent flooding from local stormwater runoff, ponding from rainwater on the floodplain, groundwater seepage, local drainage courses, or geotechnical instabilities. Local flooding may occur outside of the designated boundaries.

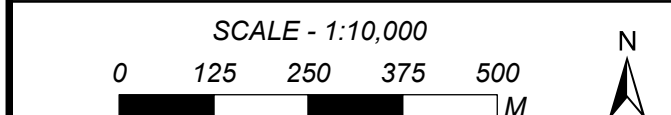
7. The Channel Migration Zone maps do not represent channel processes or erosion from local stormwater runoff, tributaries, local stormwater runoff, ponding from rainwater, groundwater seepage, local drainage courses, or geotechnical instabilities. Channel migration and erosion processes may occur outside of the designated boundaries.

8. Roads, railways, bridges, new dikes and future developments on the floodplain can alter channel processes, increase local erosion rates, alter channel processes and increase local erosion rates or potential for channel avulsions. Obstructions such as debris jams, landslides, or other instabilities can alter channel processes and the levels shown on the Floodplain maps and can also increase local erosion rates and potential for channel avulsions shown on the Channel Migration Zone maps.

9. The Floodplain maps do not represent hazards due to erosion, avulsion or channel migration.

10. The Channel Migration Zone maps do not represent actual/fan hazards from tributary channels, slope instabilities, or Cowichan River floodplain limits.

11. The Floodplain maps were intended to generate these maps however, actual flood levels and extents and extent of channel migration zone hazards may vary from those shown. Northwest Regional District does not assume any liability for such variations.



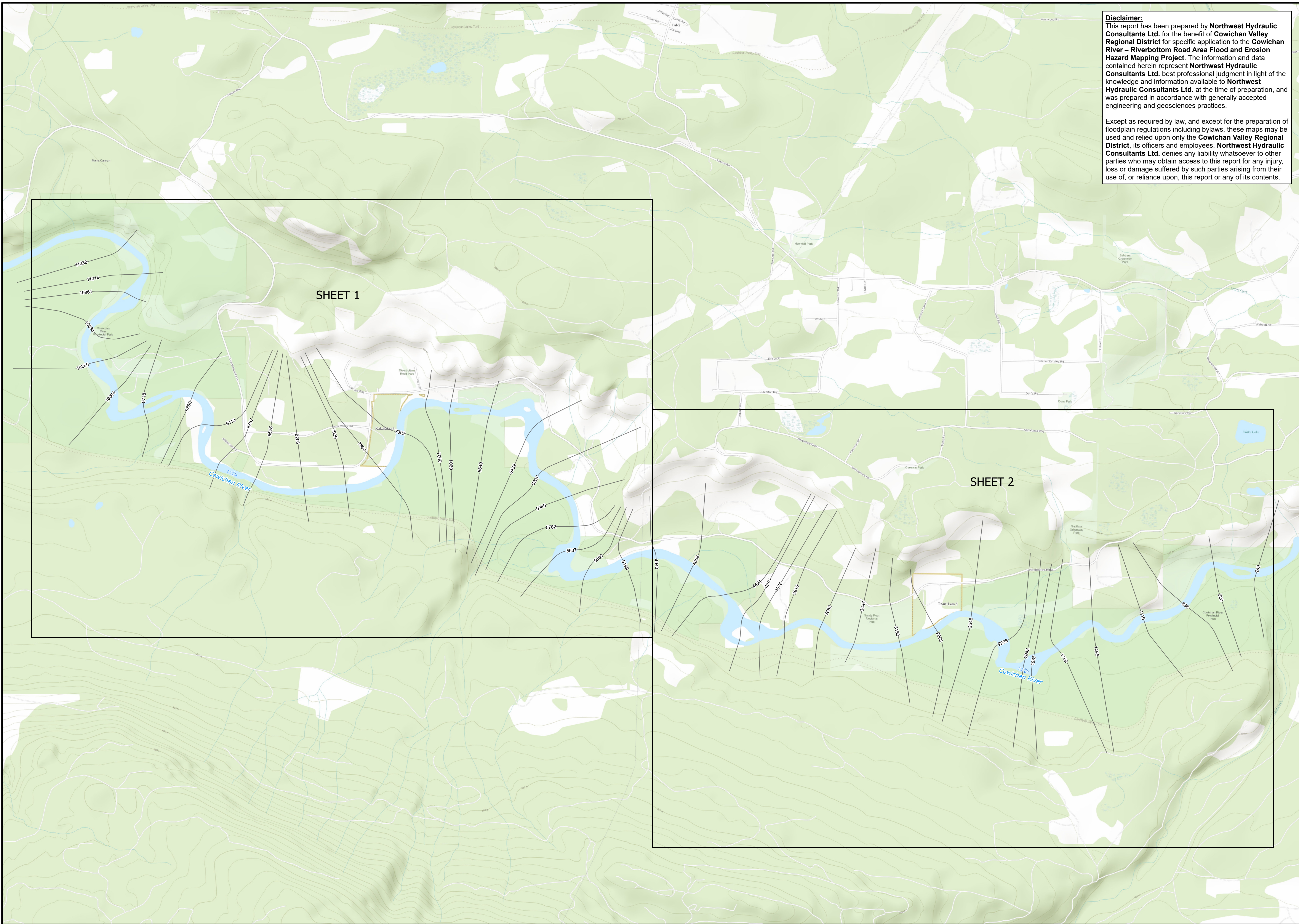
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Units: Metres; Vertical Datum: CGVD2013

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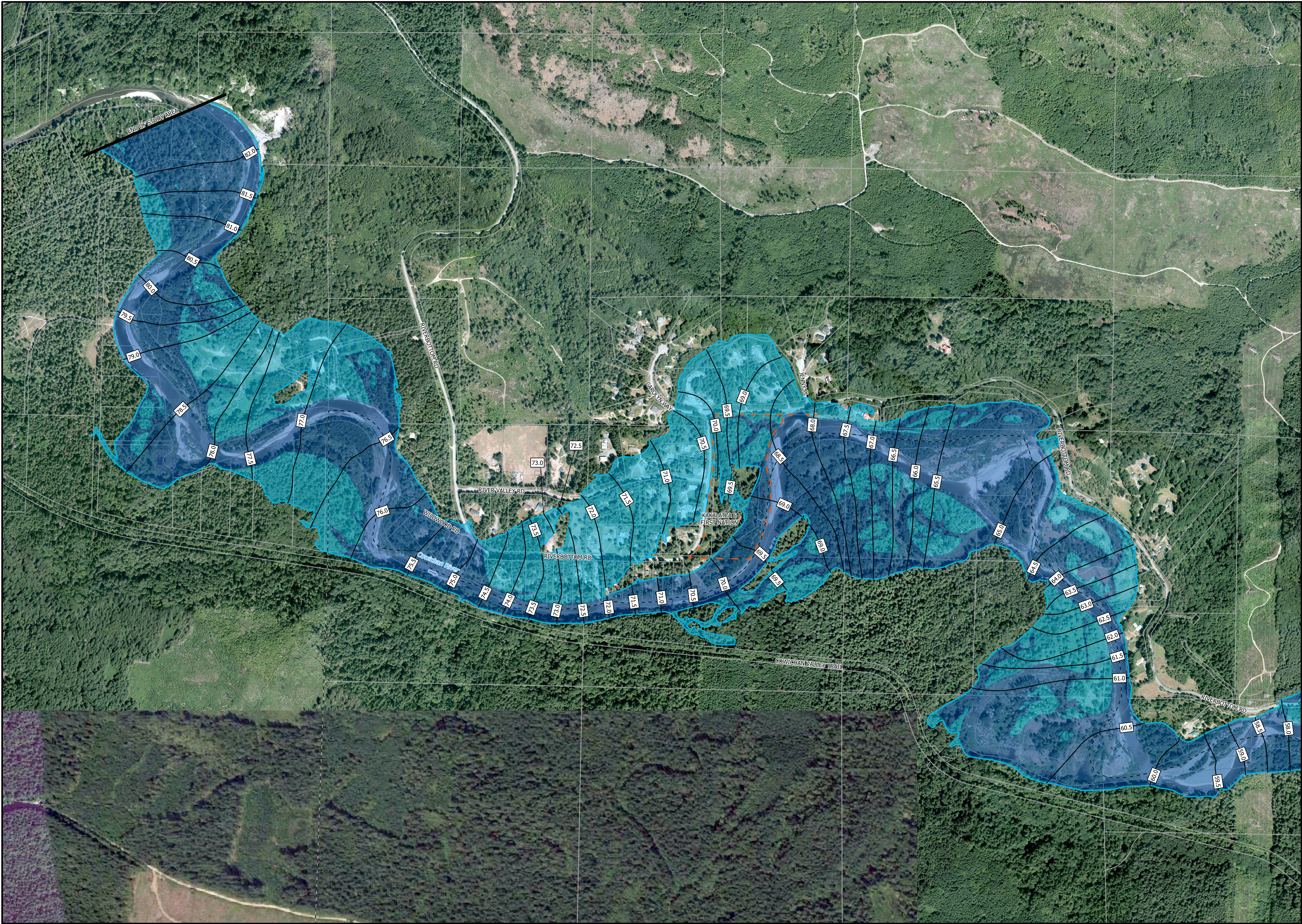
<i>Job Number</i> 3004940	<i>Date</i> 07-AUG-2020
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COWICHAN RIVER-  
RIVERBOTTOM ROAD AREA  
FLOOD AND EROSION HAZARD  
MAPPING PROJECT

# FLOODPLAIN AND CHANNEL MIGRATION ZONE MAPPING INDEX SHEET







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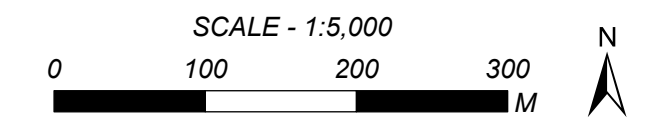
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- FLOW DIRECTION
- RIVERINE FLOOD CONSTRUCTION LEVEL (FCL) INCLUDING FREEBOARD
- FLOOD FRINGE ZONE
- FLOODWAY ZONE
- FIRST NATION RESERVE BOUNDARY
- ELECTORAL AREA BOUNDARY
- PARCEL BOUNDARY

PLEASE REFER TO DETAILED NOTES ON INDEX MAP

- Floodplain Map Notes:
1. The Floodplain maps depict flooding from a 200-year flood event, adjusted to account for a 20% increase in discharge due to future climate change.
  2. Two flood inundation areas are delineated on the Floodplain maps. The FLOODWAY ZONE corresponds to the portion of the floodplain and channel that experiences relatively frequent flooding (20-year flood) and is exposed to higher velocities and flood depths. The FLOOD FRINGE ZONE represents the area on the floodplain that is subject to inundation and ponding from floodwaters during the designated 200 year flood event.
  3. The Flood Construction Levels shown on the Floodplain map include a freeboard of 0.6 m.
  4. The extent of the Flood Fringe area includes a freeboard of 0.6 m.
  5. The Cowichan River is subject to channel shifting, avulsions, meander bend cutoffs and erosion that are not represented on these Floodplain maps. Additional information on channel migration hazards has been developed as part of this project and should be consulted.

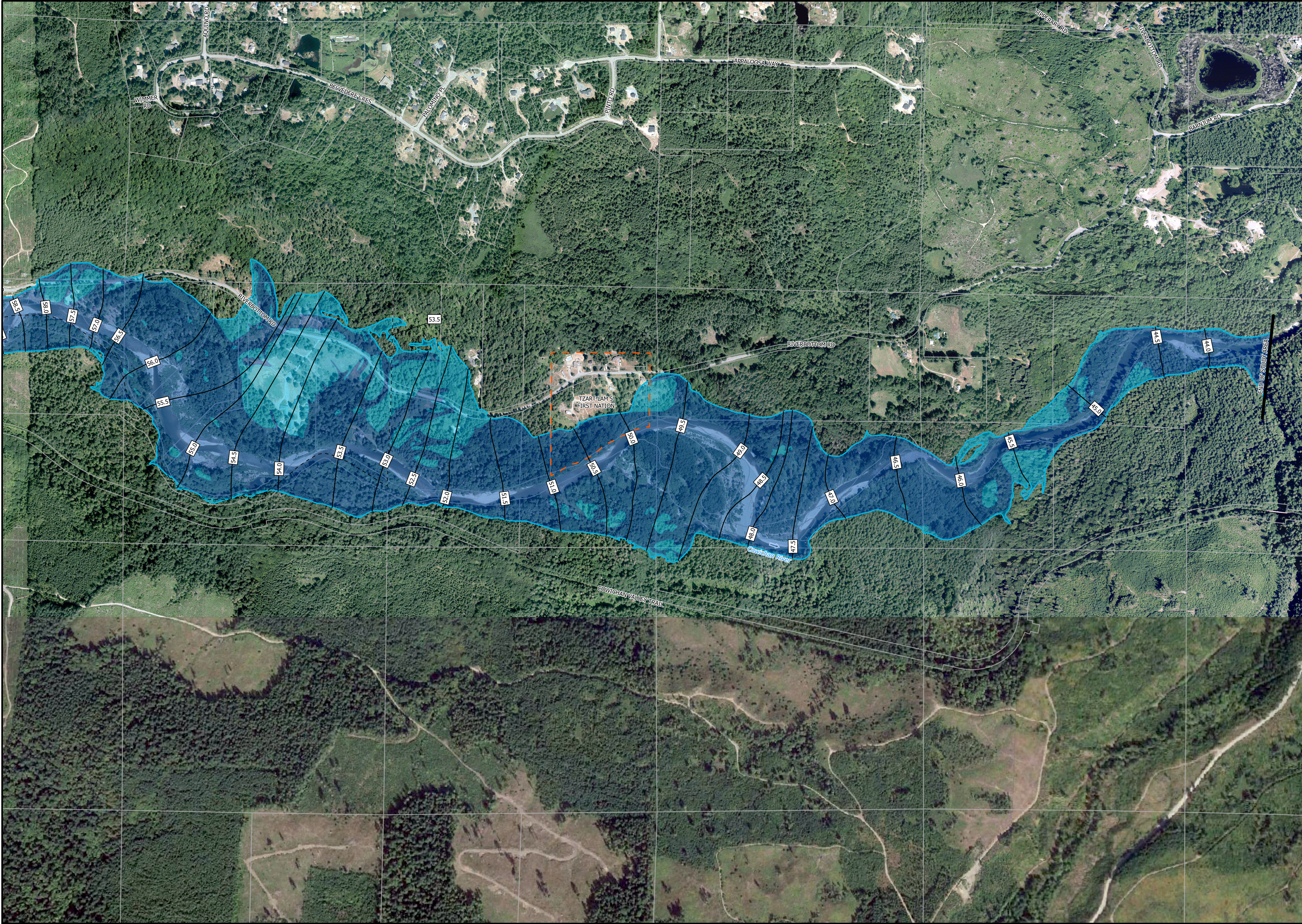


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COWICHAN RIVER-  
RIVERBOTTOM ROAD AREA  
FLOOD AND EROSION  
HAZARD MAPPING PROJECT  
  
FLOODPLAIN MAP  
SHEET 1 OF 2





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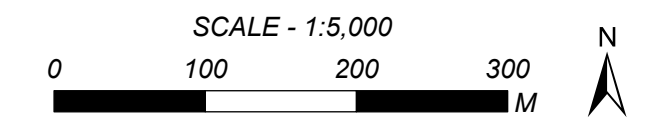
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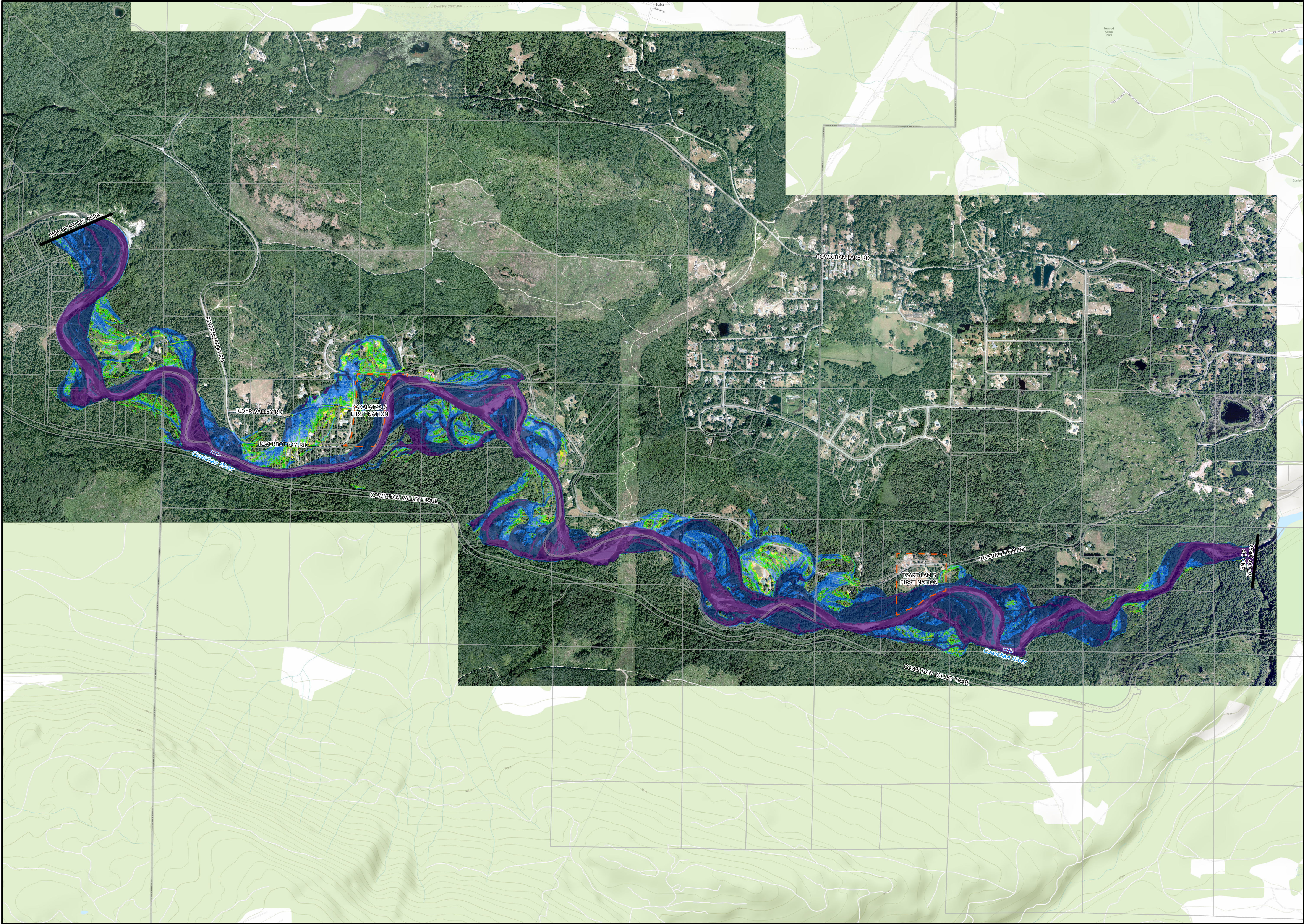


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COWICHAN RIVER-  
RIVERBOTTOM ROAD AREA  
FLOOD AND EROSION  
HAZARD MAPPING PROJECT  
  
FLOODPLAIN MAP  
SHEET 2 OF 2





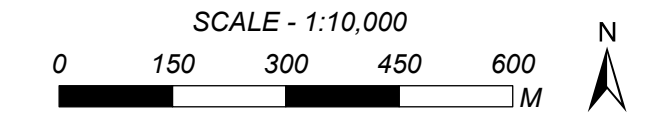
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→ FLOW DIRECTION	DEPTH
□ ELECTORAL AREA	0 TO 0.1 M
□ FIRST NATION RESERVE	0.1 TO 0.3 M
□ PARCEL	0.3 TO 0.5 M
	0.5 TO 1.0 M
	1.0 TO 2.0 M
	> 2.0 M

**Symbology Notes:**  
Designated 200 year flood depths (without freeboard), elevation in metres.  
0 – 0.1m – Most buildings expected to be dry; underground infrastructure and basements may be flooded.  
0.1 – 0.3m – Water may enter buildings at grade, but most expected to be dry; walking in moving water or driving is potentially dangerous; underground infrastructure and basements may be flooded.  
0.2 – 0.5m – Water may enter ground floor of buildings; walking in moving or still water or driving is dangerous; underground infrastructure and basements may be flooded.  
0.5 – 1.0m – Water on ground floor; underground infrastructure and basements flooded; electricity failed; vehicles are commonly carried off roadways.  
1.0 – 2.0m – Ground floor flooded; residents and workers evacuate.  
> 2.0m – First floor and often higher levels covered by water; residents and workers evacuate.

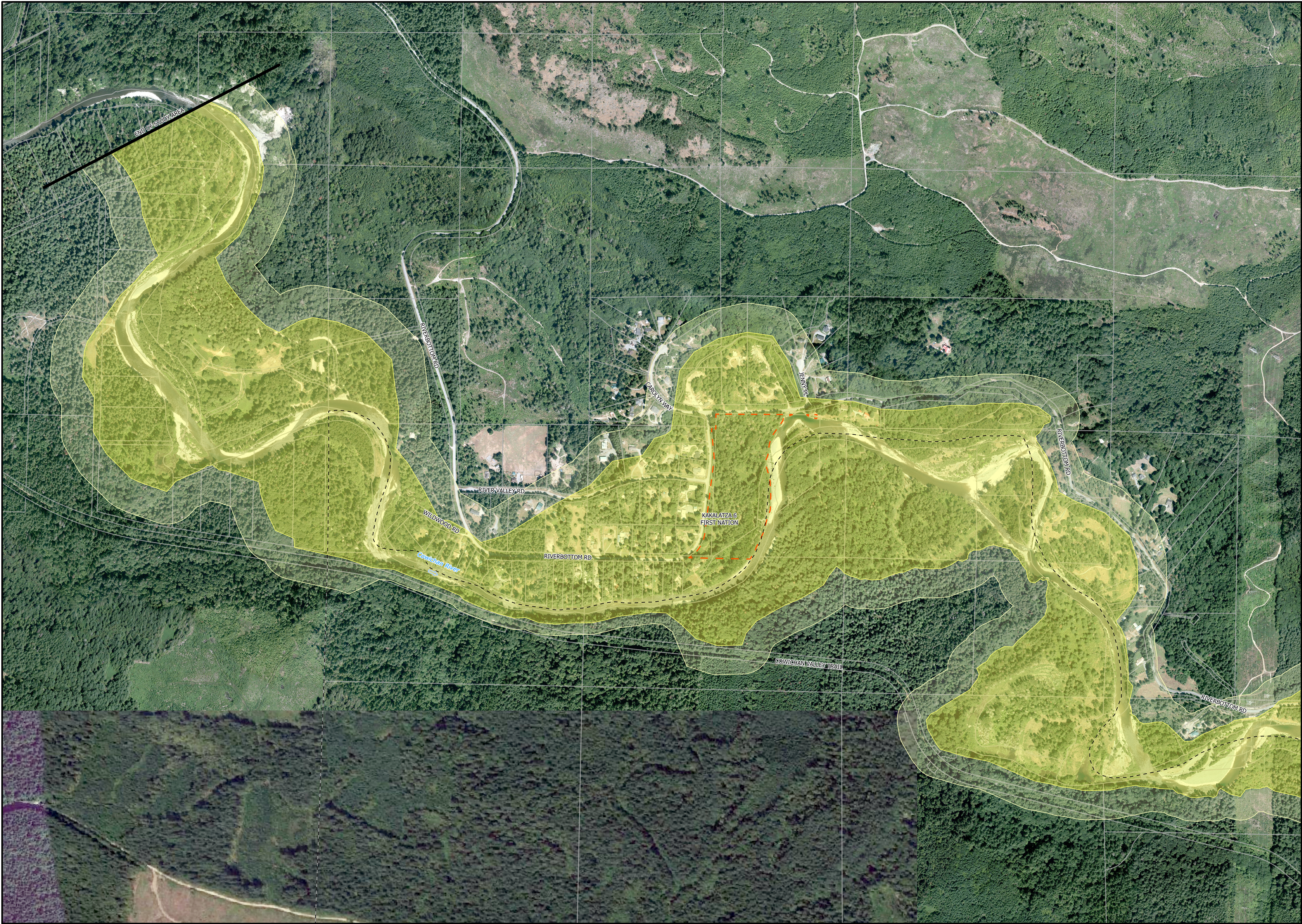


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COWICHAN RIVER-  
RIVERBOTTOM ROAD AREA  
FLOOD AND EROSION HAZARD  
MAPPING PROJECT  
  
FLOOD DEPTH MAP-  
200 YEAR FLOOD  
INCLUDING 20% CLIMATE  
CHANGE ADJUSTMENT





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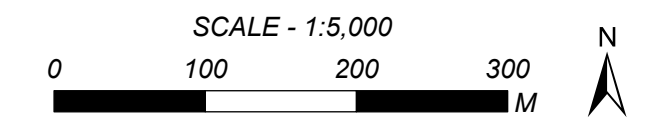
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- FLOW DIRECTION
- EROSION HAZARD AREA
- MODERN VALLEY BOTTOM
- FIRST NATION RESERVE BOUNDARY
- ELECTORAL AREA BOUNDARY
- PARCEL BOUNDARY

PLEASE REFER TO DETAILED NOTES ON INDEX MAP

Channel Migration Zone Notes:  
1. Two areas are delineated on the Channel Migration Zone maps. The MODERN VALLEY BOTTOM corresponds to the portion of the floodplain and channel that is susceptible to active channel processes. The EROSION HAZARD AREA represents areas potentially susceptible to channel erosion over a 50-year planning time horizon.  
2. Areas within the Channel Migration Zone boundaries may be susceptible to tributary fan hazards that are not represented on these maps. In addition to channel migration hazards, a Qualified Professional should assess for potential hazards from tributary channels.  
3. Areas within or adjacent to the Channel Migration Zone boundaries may be susceptible to geotechnical instabilities that are not represented on these maps. In addition to channel migration hazards, a Qualified Professional should assess for potential hazards from geotechnical instabilities.  
4. The Cowichan River is subject to flooding that is not represented on these maps. Additional information on flood hazards has been developed as part of this project and should be consulted.



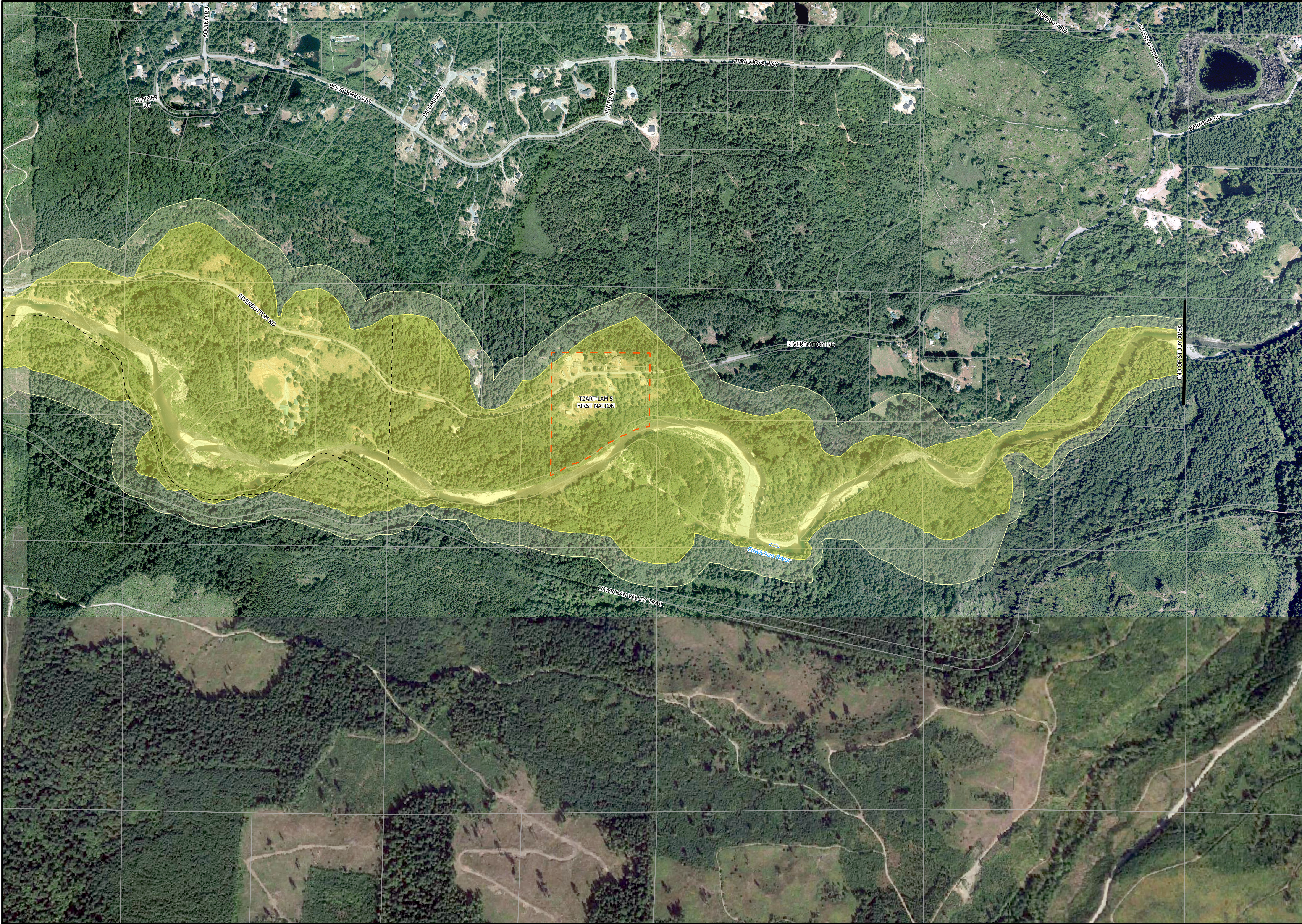
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COWICHAN RIVER-  
RIVERBOTTOM ROAD AREA  
FLOOD AND EROSION  
HAZARD MAPPING PROJECT  
EROSION HAZARD MAP  
MAP SHEET 1 OF 2





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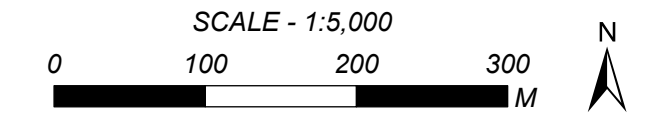
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MAP SHEET 2 OF 2