

**Disclaimer:**

This document has been prepared by **Northwest Hydraulic Consultants Ltd.** for the benefit of **Cowichan Valley Regional District** for specific application to the Chemainus River Flood Mapping Program. The information and data contained herein represent **Northwest Hydraulic Consultants Ltd.** best professional judgment in light of the knowledge and information available to **Northwest Hydraulic Consultants Ltd.** at the time of preparation, and was prepared in accordance with generally accepted engineering and geoscience practices. Despite these efforts, actual flood levels and extents may vary from those shown; **Northwest Hydraulic Consultants Ltd.** and **Cowichan Valley Regional District** including officers and employees, do not assume any liability for such variations, or for use of the maps or data for uses other than that intended.

**General Depth - Velocity Map Notes:**

1. Please Refer to the Disclaimer.
2. The flood depth and velocity maps were prepared under the Cowichan Valley Regional District's "Chemainus River Flood Mapping Program" by Northwest Hydraulic Consultants Ltd (NHC) in 2021-2022. This study's final report should be consulted prior to use of the flood maps.
3. The maps delineate potential flooding and velocities caused by a designated flood event. Two types of floods are assessed:
  - a. Riverine floods, having a 200-year return period event with a 20% climate change allowance
  - b. Coastal flood, having a 200-year return period event + 1 m global sea level rise (with an adjustment for local tectonics) and local wave effects.
4. The future climate change scenario represents plausible conditions in the year 2100. However, the actual time frame for the changes is uncertain.
5. The depths and velocities are based on the maximum values from the designated flood event. Depths do not include freeboard. All hazard layers were modelled with the same parameters and boundary conditions as the design flood.
6. Velocities shown on the map are depth-averaged values. Surface velocities may be higher. The velocities shown on the maps don't include local flow acceleration effects due to obstructions around structures, buildings or debris or local wave effects.

**Data Sources:**

1. Floodplain topography is based on Lidar flown by GeoBC between October 14, 2018 – October 1, 2019. Chemainus River and immediate overbank topography is based on Lidar acquisitioned by the Cowichan Watershed Board on March 27, 2021 and was provided to NHC by the CVRD.
2. River channel bathymetry on Chemainus River and Bonsall Creek were surveyed by NHC on various dates from May 2021 – June 2021. Offshore bathymetry in Stuart Channel was supplied by Canadian Hydrographic Service (CHS) Non-Navigational 10 m Gridded Bathymetric Data (NONNA-10).
3. Municipal boundaries, and cadastral information were provided by the CVRD and GeoBC.
4. High-resolution orthoimagery flown in June 2019 was provided by the CVRD and displayed on the maps where it exists. 2020 orthoimagery from Esri is displayed where the high-resolution data was not available.

**Use and Limitations of Depth - Velocity Maps:**

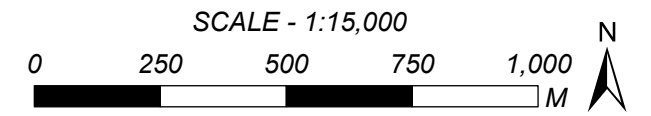
1. Floodplain maps are an administrative tool that depict the potential flood depth, extent, and velocity. They are not designated floodplain maps and should not be used for determining flood levels as they do not include freeboard. Please see the designated floodplain maps prepared for the same study (NHC, 2022) for flood construction levels (FCL).
2. The maps depict the flooding conditions at the time of surveys. Future changes to the river channels, floodplain, and future climate change/sea level rise will render the maps obsolete. The information on the maps should be reviewed after 5 years have elapsed since publication or after any extreme flood occurrence. .
3. Underlying hydraulic analysis assumes channel and shoreline geometry is stationary. Erosion, deposition, degradation, and aggradation are expected to occur and may alter actual observed flood levels and extents. Roads, railways, bridges, new dikes and future developments on the floodplain can restrict water flow and increase local water levels. Obstructions, such as log-jams, blockages, local storm water inflows, groundwater, other land drainage or tributary flows beyond those indicated were not modelled and may cause flood levels to exceed those indicated on the maps. Additionally, flooding may occur outside of the designated boundaries caused by ponding from rainwater on the floodplain, groundwater seepage, or local drainage courses.
4. The floodplain limits have not been established on the ground by legal survey. The accuracy of the flood boundaries is limited by the Lidar base mapping and orthophotography.
5. The flood maps do not represent hazards due to erosion, avulsion, or channel migration. Details on those hazards can be found in the Erosion Hazard Maps prepared in the same study (NHC, 2022).
6. Industry best practices were followed to generate the flood maps. However, actual flood levels and extents may vary from those shown. Residual flood risk beyond that mapped exists for flood events more extreme than the design events; Northwest Hydraulic Consultants Ltd. (NHC) and the Cowichan Valley Regional District do not assume any liability for such variations.



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1:5,000 MAP SHEET  
FIRST NATION ADMINISTRATIVE BOUNDARY  
ELECTORAL AREA BOUNDARY



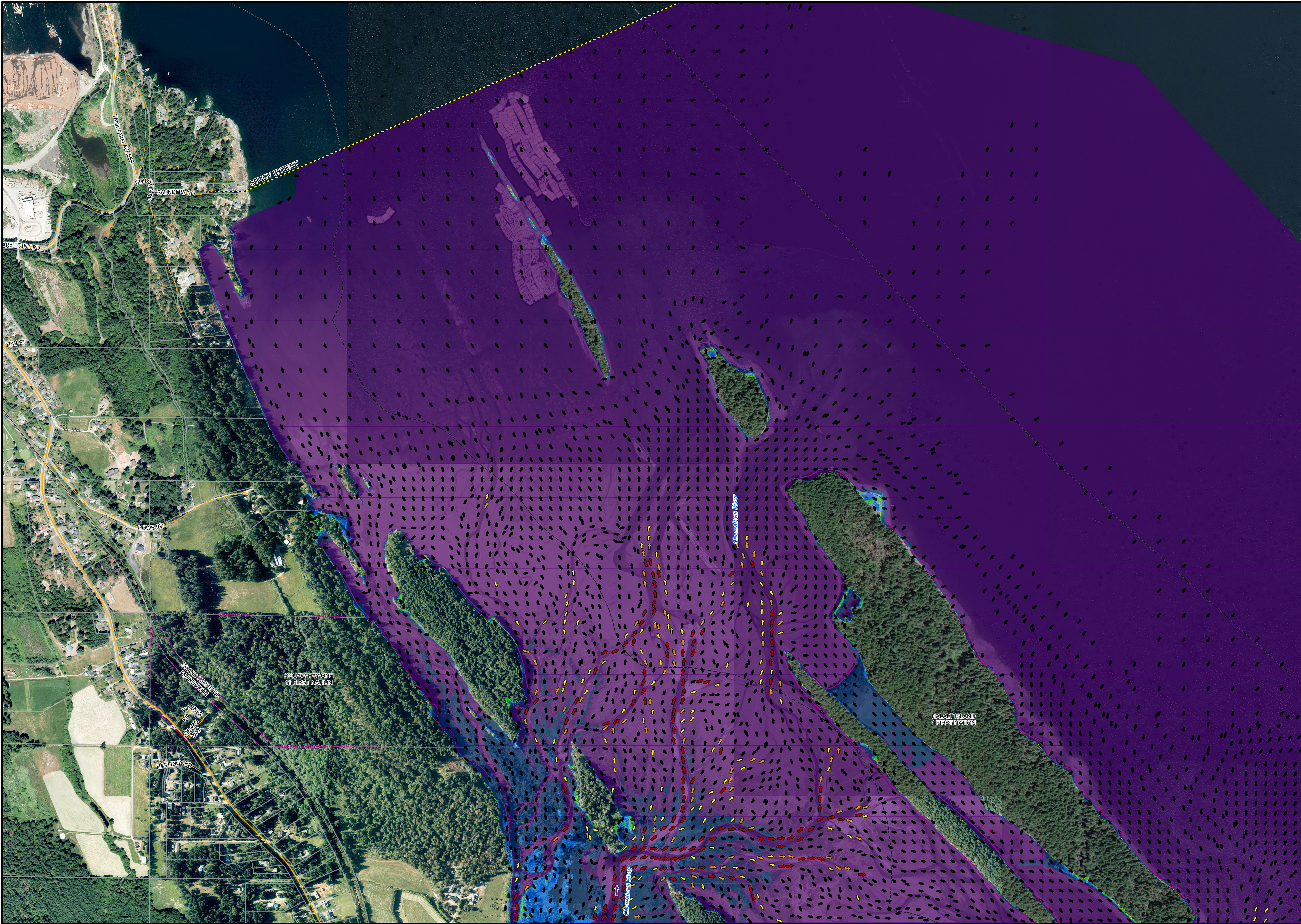
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Units: Metres; Vertical Datum: CGVD2013


Engineer	GIS	Reviewer
VCCM	BLH, SWM	DGM
Job Number	Date	
3006373	20-OCT-2022	

CHEMAINUS RIVER  
FLOOD MAPPING PROGRAM

HAZARD MAPPING  
INDEX SHEET

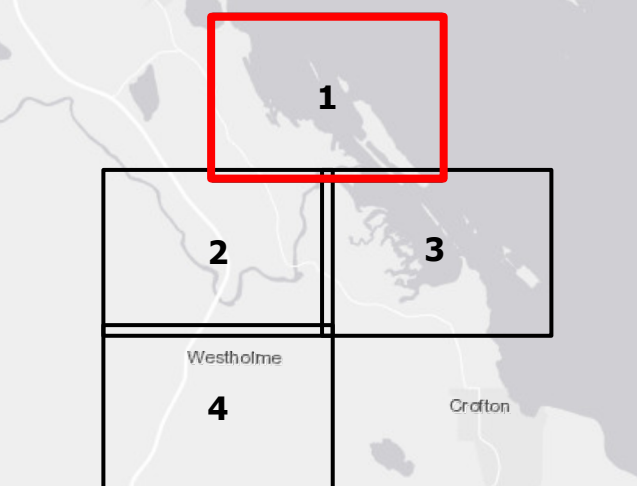






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1  
2  
3  
4  
Westholme  
Crofton

VELOCITY

- < 0.25 m/s
- 0.25 - 0.50 m/s
- 0.50 - 1.00 m/s
- > 1.00 m/s

DEPTH

- 0 to 0.1 m
- 0.1 to 0.3 m
- 0.3 to 0.5 m
- 0.5 to 1.0 m
- 1.0 to 2.0 m
- > 2.0 m

FLOW DIRECTION

EXTENT OF STUDY

FIRST NATION ADMINISTRATIVE BOUNDARY

CVRD ELECTORAL AREA BOUNDARY

MINOR ROAD

MAJOR ROAD

RAIL

PARCEL BOUNDARY

REFER TO GENERAL NOTES AND LIMITATIONS ON INDEX MAP

SCALE - 1:5,000

0 100 200 300 M

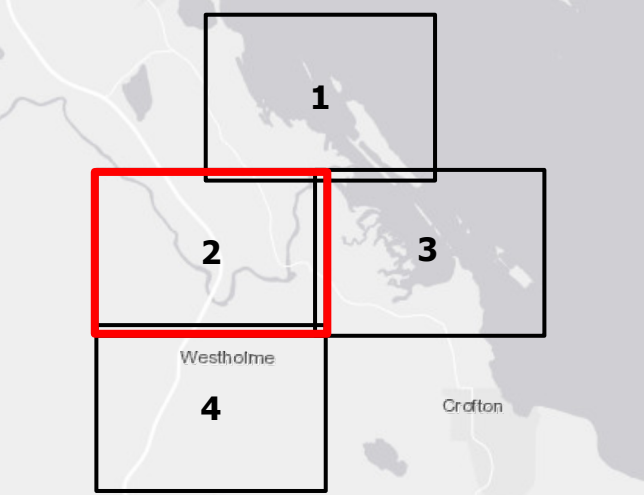
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CHEMAINUS RIVER  
FLOOD MAPPING PROGRAM

200 YEAR FLOOD WITH YEAR 2100  
CLIMATE CHANGE SCENARIO  
FLOOD HAZARD MAP  
SHEET 1 OF 4





 < 0.25 m/s  
 0.25 - 0.50 m/s  
 0.50 - 1.00 m/s  
 > 1.00 m/s

0 to 0.1 m  
0.1 to 0.3 m  
0.3 to 0.5 m  
0.5 to 1.0 m  
1.0 to 2.0 m  
> 2.0 m

## EXTENT OF STUDY

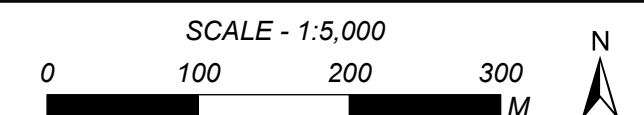
--- CVRD ELECTORAL AREA  
BOUNDARY

MAJOR ROAD

 PARCEL BOUNDARY

REFER TO GENERAL NOTE

REFER TO GENERAL NOTES AND LIMITATIONS  
ON INDEX MAP



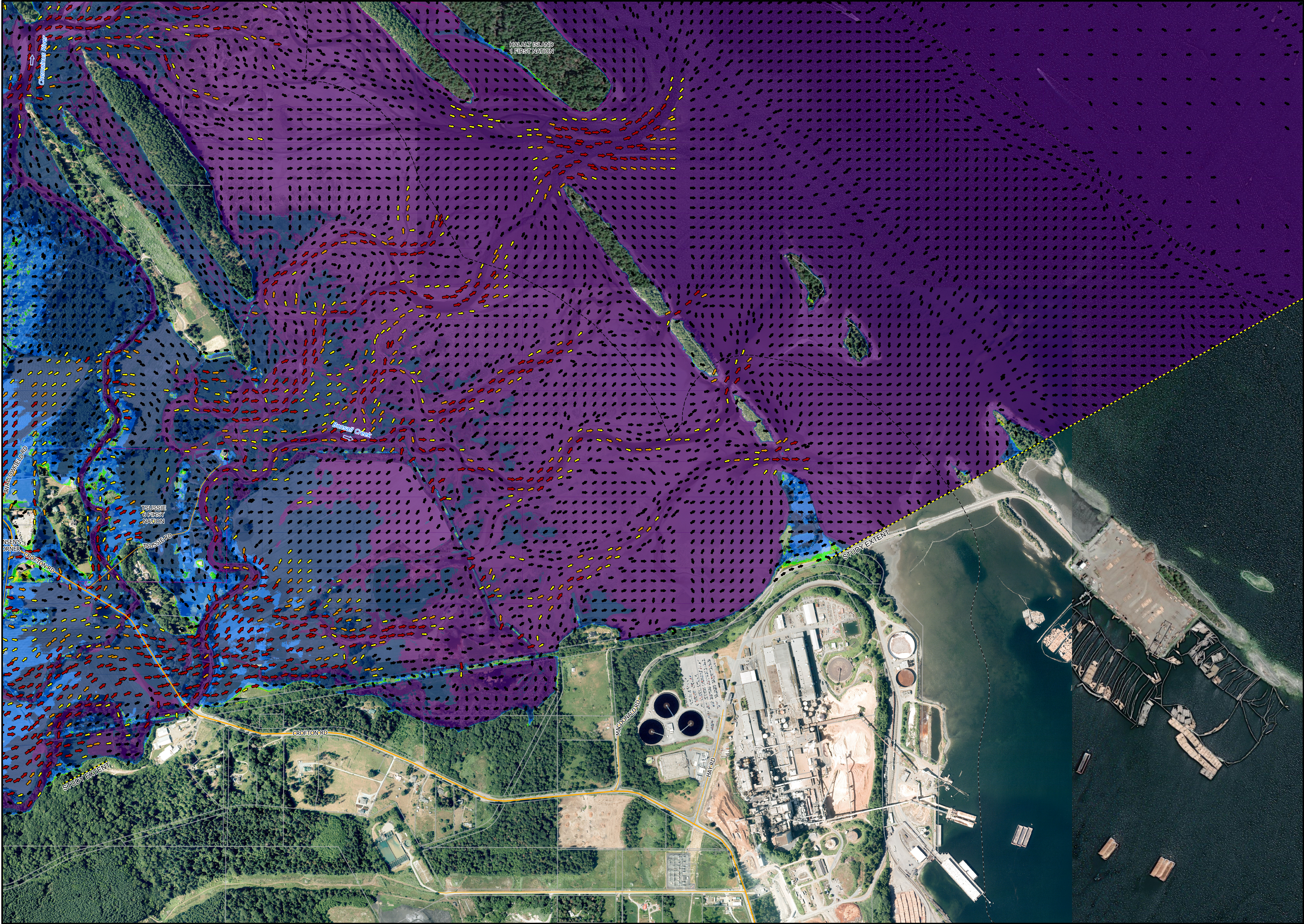
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CHEMAINUS RIVER  
FLOOD MAPPING PROGRAM

200 YEAR FLOOD WITH YEAR 2100  
CLIMATE CHANGE SCENARIO  
FLOOD HAZARD MAP  
SHEET 2 OF 4





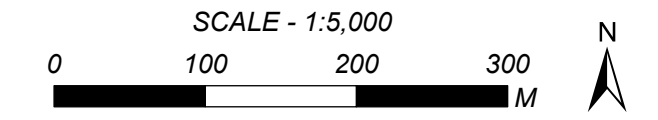
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- FLOW DIRECTION
- EXTENT OF STUDY
- FIRST NATION ADMINISTRATIVE BOUNDARY
- CVRD ELECTORAL AREA BOUNDARY
- MINOR ROAD
- MAJOR ROAD
- RAIL
- PARCEL BOUNDARY

REFER TO GENERAL NOTES AND LIMITATIONS ON INDEX MAP



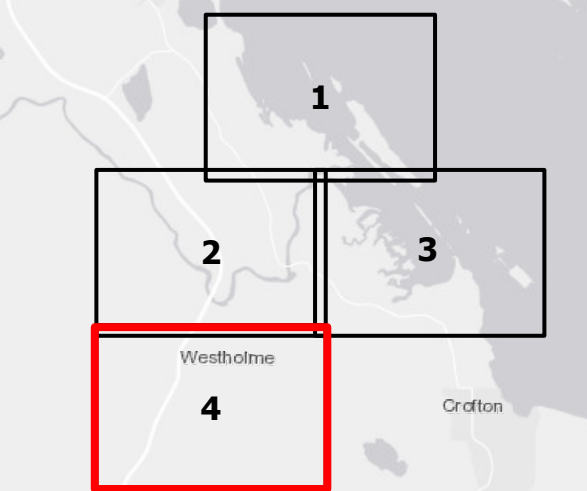
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CHEMAINUS RIVER  
FLOOD MAPPING PROGRAM

200 YEAR FLOOD WITH YEAR 2100  
CLIMATE CHANGE SCENARIO  
FLOOD HAZARD MAP  
SHEET 3 OF 4





 < 0.25 m/s  
 0.25 - 0.50 m/s  
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 > 1.00 m/s

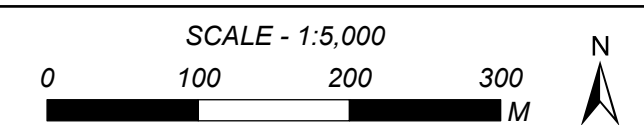
0 to 0.1 m  
0.1 to 0.3 m  
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0.5 to 1.0 m  
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> 2.0 m

--- BOUNDARY

→ RAIL

REFER TO GENERAL NOTES AND

ON INDEX MAP



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SHEET 4 OF 4