

RDOS Park Rill, Horn, and Kearns Creek Floodplain Mapping Project

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Outline



- Background
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- Hydrologic Analysis
- Channel Assessment
- Riverine and Lake Modelling
- Flood Hazard and FCL Mapping
- Consequence Characterization
- Flood Mitigation Measures

Background

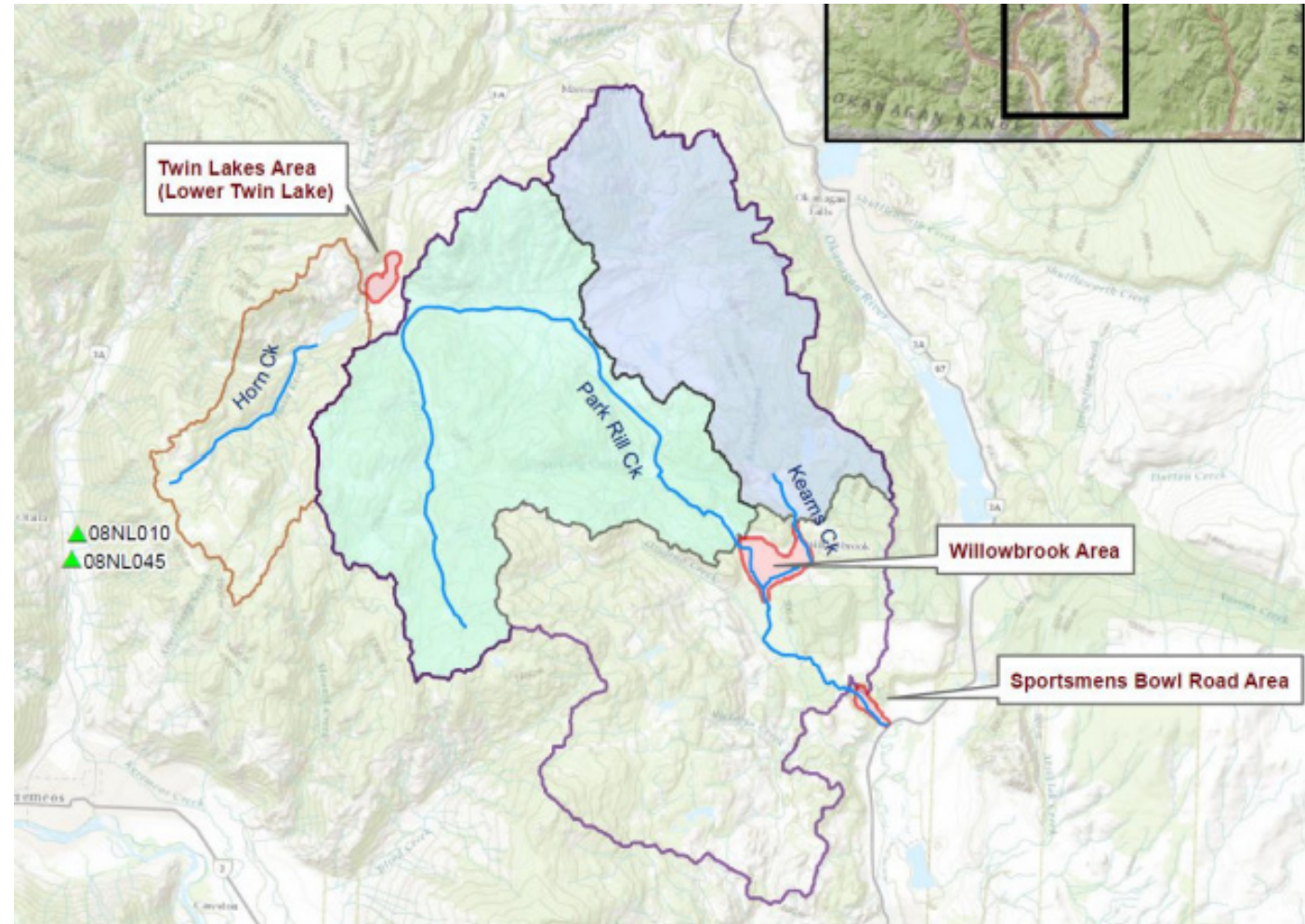


- Park Rill Creek, Horn Creek, and Kearns Creek are subject to flood peaks driven by snowmelt events
- Extensive flooding during the 2018 flood
- Frequent pumping from Twin Lakes to Park Rill Creek during period of high-water levels caused flooding in properties and creek erosion

Study Objectives



- NHC was retained in 2022 to complete the RDOS' Park Rill, Horn, and Kearns Creek Floodplain Mapping Project
- Primary Objectives:
 - Prepare floodplain and flood hazard maps for Lower Twin Lake, Willowbrook and Sportsman Bowl Road
 - Assess consequences of flooding
 - Identify mitigation measures
 - Complete a visual inspection of a 12 km reach of Park Rill Creek



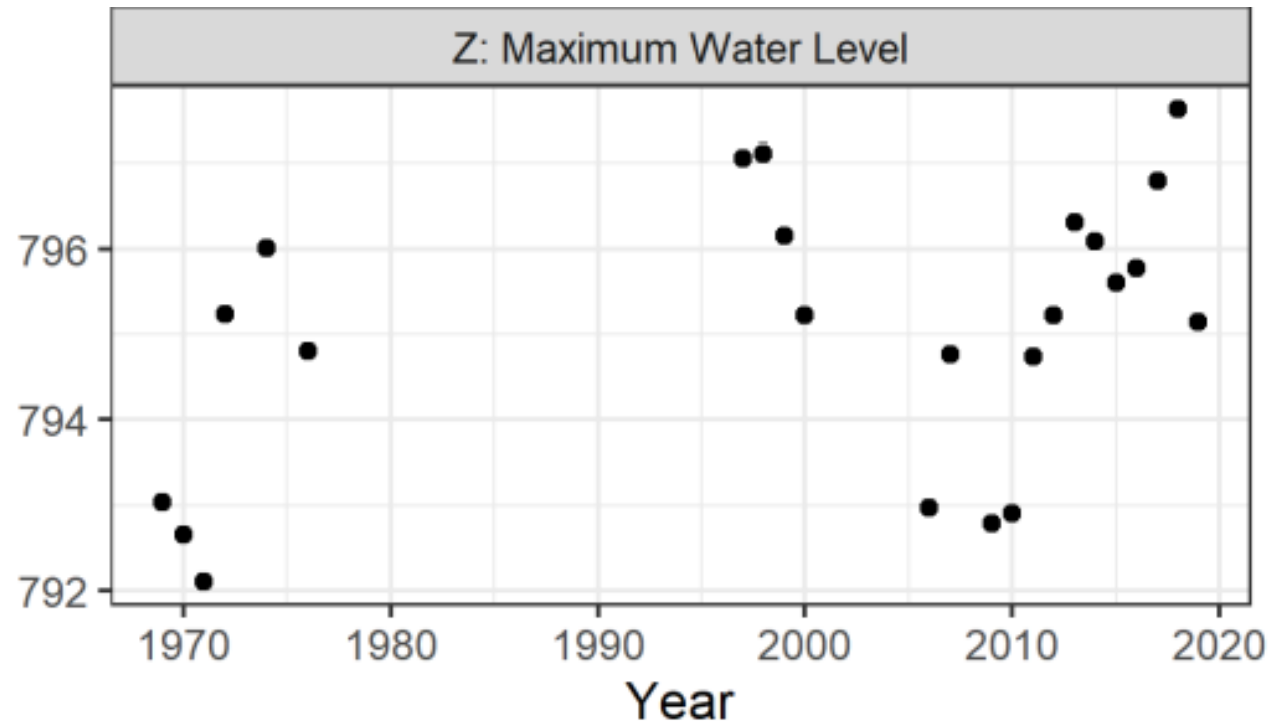
Hydrologic Analysis - Park Rill Creek



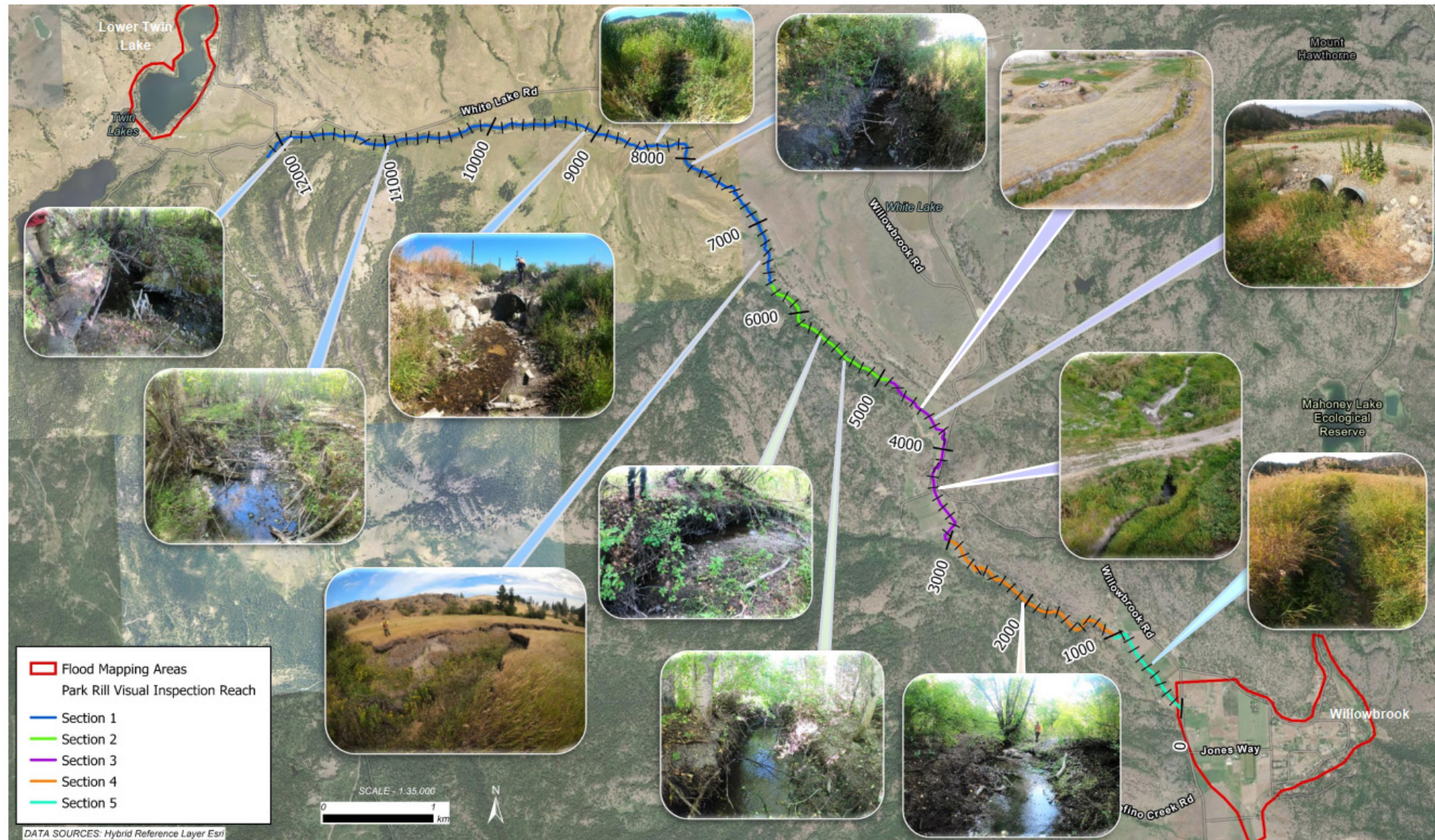
- Hydrologic analysis developed design flows (i.e. 200-year flow) and climate change adjustments as required by EGBC
- Design flows calculated for three locations: Kearns Creek, Park Rill Creek upstream of Willowbrook, and Park Rill Creek upstream of Sportsmen Bowl Road
- Limited historic data on Park Rill Creek – regional analysis used instead
- Climate change factors based on hydrologic modelling completed for the Okanagan Mainstem Mapping (10-13%)
- Long term monitoring would reduce uncertainty in estimates

Hydrologic Analysis – Lower Twin Lake

- Analysis of lake levels on Lower Twin Lake
- Complicated by pumping, sporadic record keeping, autocorrelation
- Naturalized lake levels (no pumping)
- Performed a frequency analysis that is dependent on the pre-freshet water level
- Climate change based on relative increase to inflows (10 to 13%)



Channel Assessment



Riverine and Lake Modelling

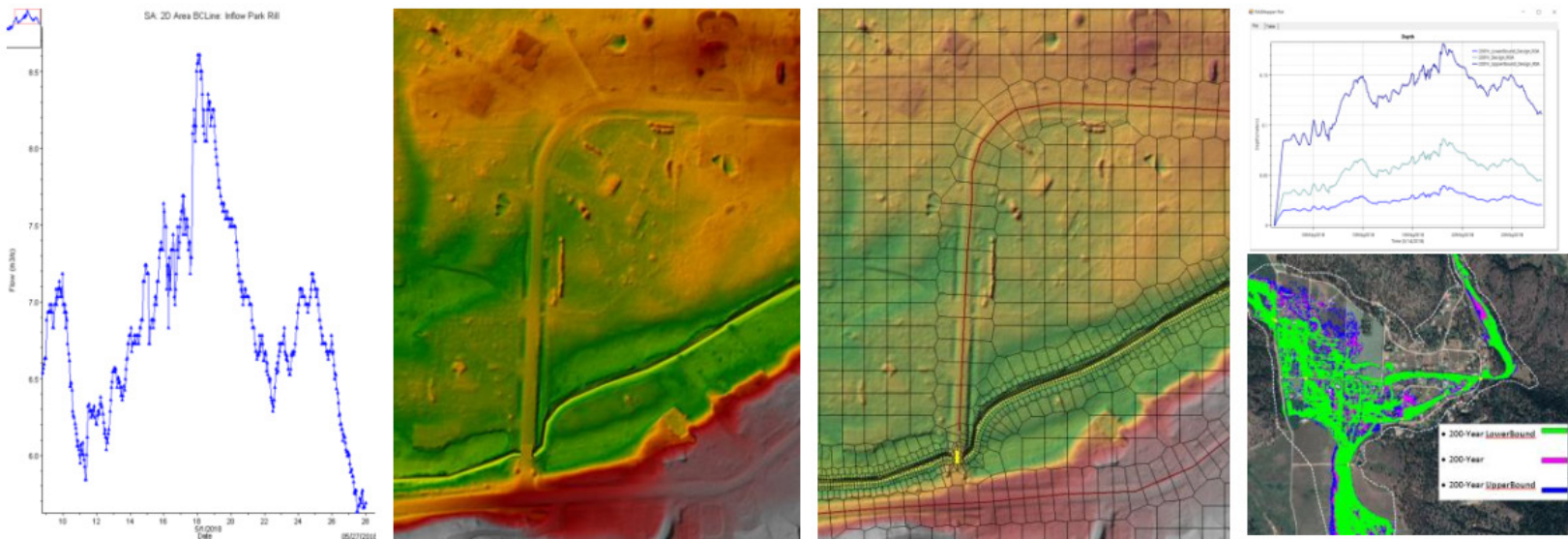


Figure 7.1 Overview of steps undertaken for development of the HEC-RAS 2D models

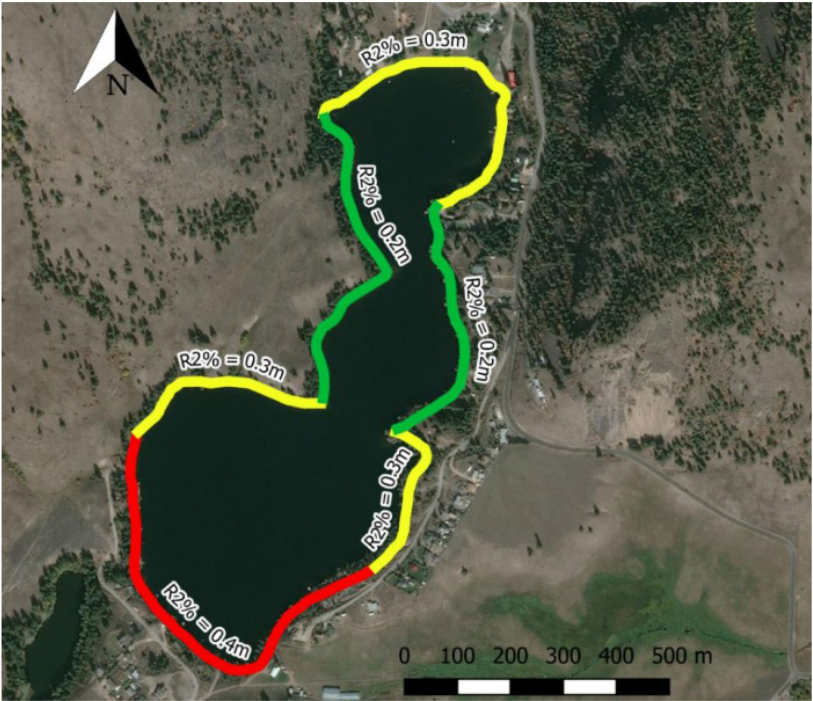
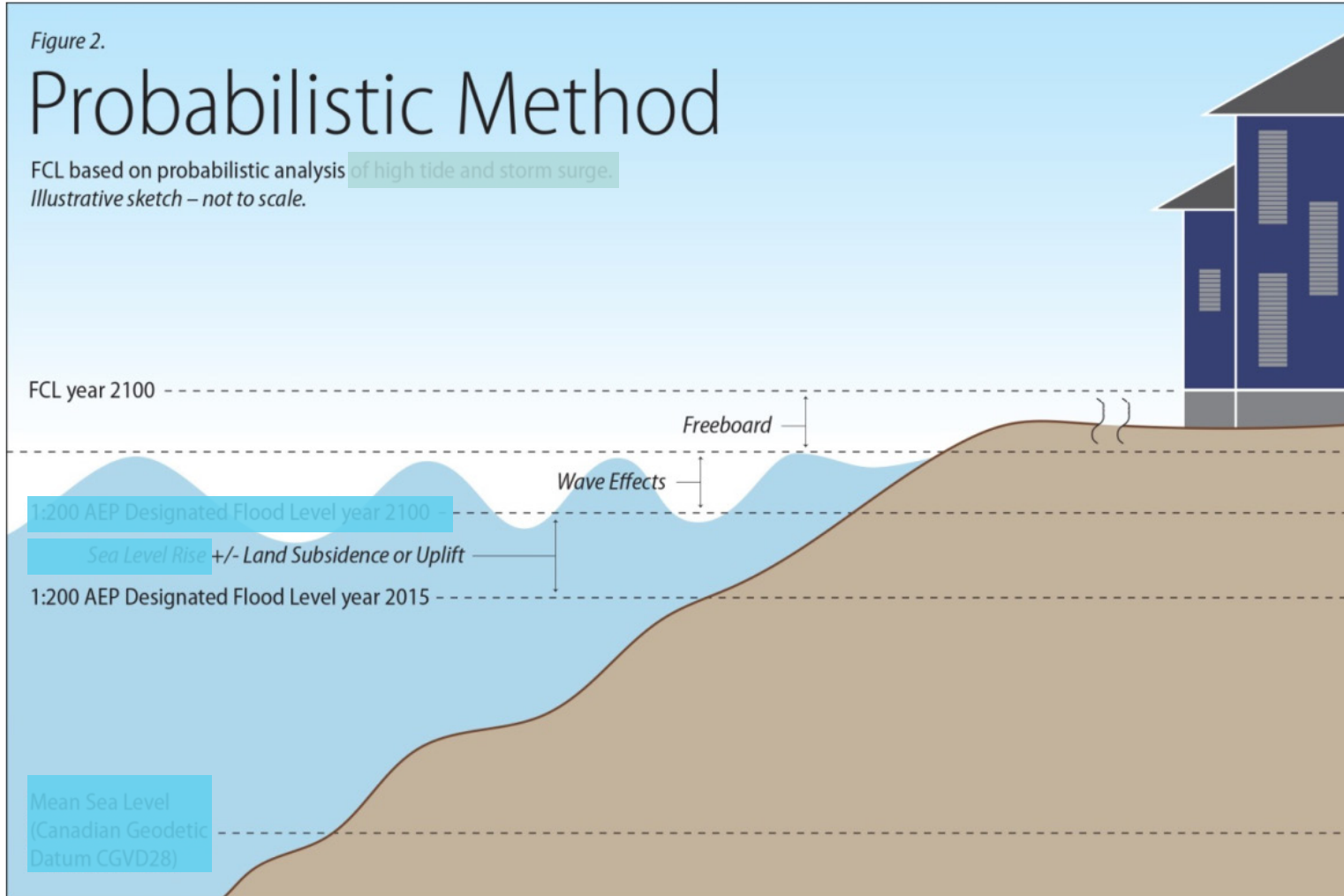


Figure 6.1 Recommended runup values for use in flood mapping



- Flood Hazard Area Land Use Management Guidelines (amended 2018):
 - 1:200 or 1:500 year Annual Exceedance Probability (AEP) total water level (2100)
 - Allowance for regional uplift, or subsidence to the year 2100;
 - Estimated wave effects associated with the Designated Storm (1:200 or 1:500)
 - Minimum freeboard of 0.6 metres.

Flood Hazard and FCL Mapping

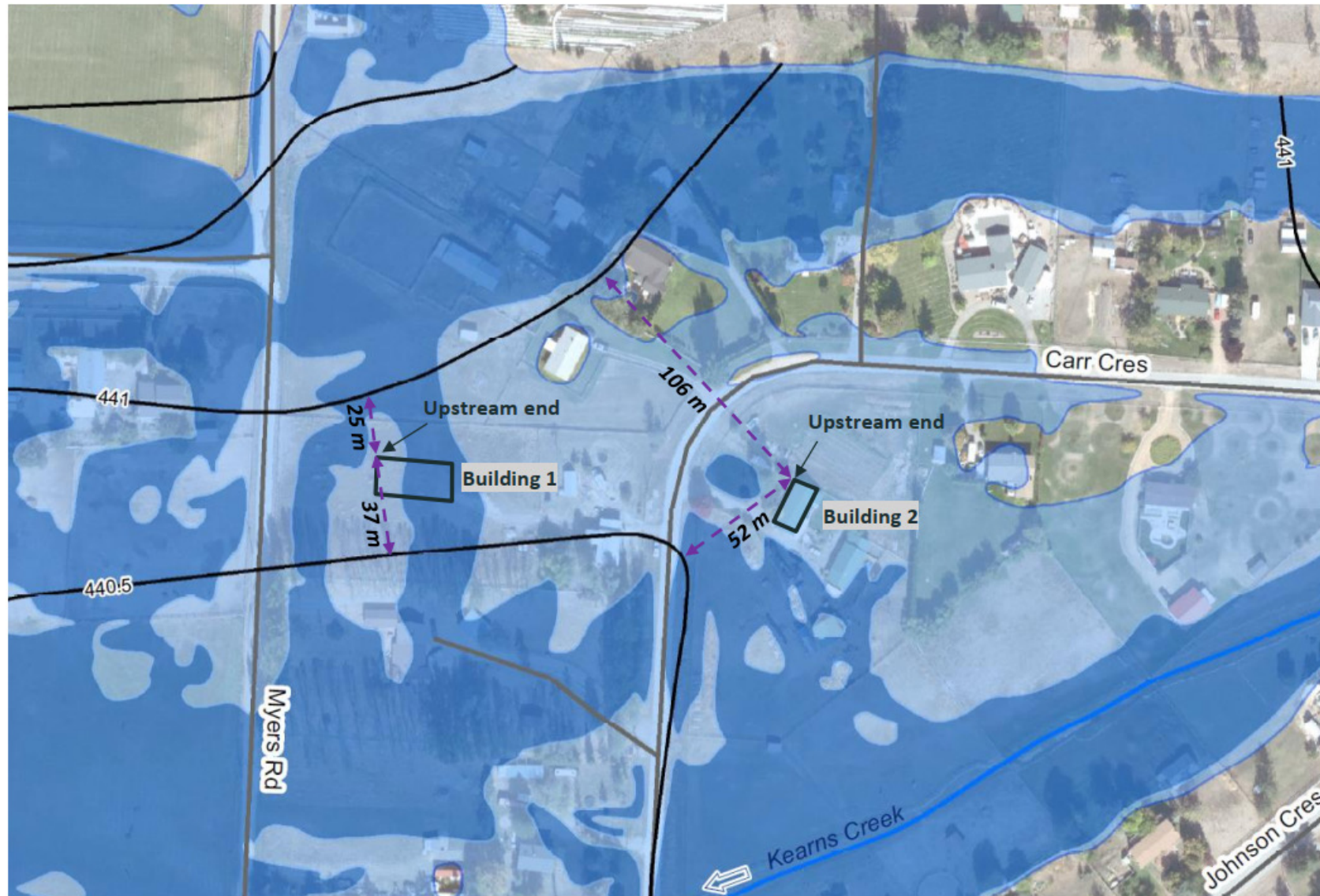


Figure 8.1 Example of FCL calculation for one hypothetical building and one existing building in Willowbrook

Consequence Characterization



Table 9.9 Lower and upper bound population counts

Study Area	Population Per-building (mean)	Total Population	Population Count – Lower Bound	Population Count – Upper Bound
Lower Twin Lake	2.24	52	38	43
Willowbrook	1.53	164	3	43
Sportsmens Bowl Rd	1.36	27	0	15
Total		243	41	101

Table 9.8 Lower and upper bound building counts

Area	# of Buildings	Building Count – Lower Bound	Upper Count – Lower Bound
Lower Twin Lake	27	17	19
Willowbrook	132	2	28
Sportsmens Bowl Rd	21	0	11
Total	180	19	58

Table 9.10 Length of road inundated per road type (m)

Study Area	Loose	Paved	Rough	Total
Lower Twin Lake	-	340	114	454
Willowbrook	-	254	143	397
Sportsmens Bowl Rd	-	812	59	871
Total	-	1,406	316	1,722

Flood Mitigation Measures

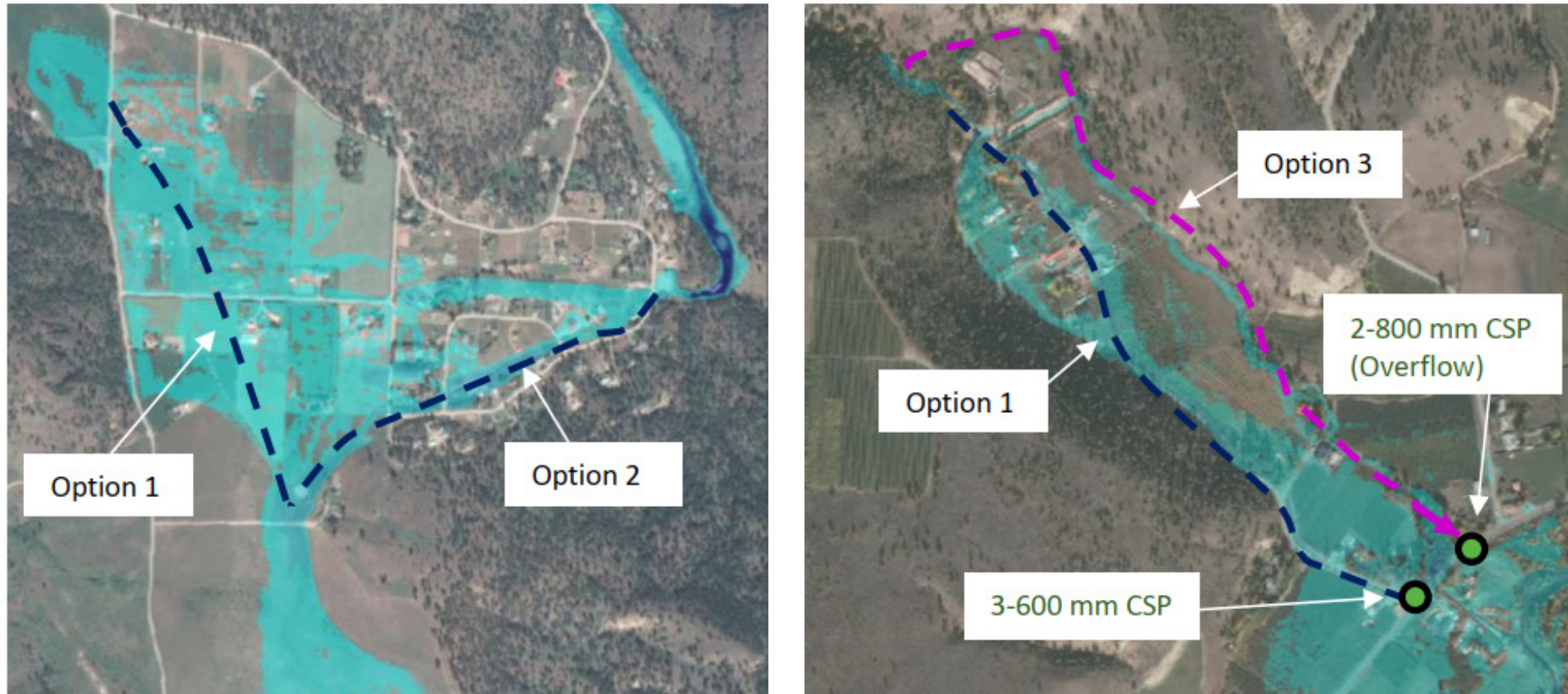


Figure 10.6 Flow conveyance improvement concepts for Willowbrook (left) and Sportsmens Bowl Road (right). Proposed upgrade reaches are shown in blue and diversion alignments in pink