

Integrated Flood Hazard Management Plan

# River Flood Mitigation Strategy - Finalization

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KERR WOOD LEIDAL  
consulting engineers

Arlington  
Group  
Planning • Architecture Inc.



# Integrated Flood Hazard Management Plan

## Phase 1

- Background/Gap Analysis
- Complete

## Phase 2

- Coastal Flood Mitigation Strategy
- Complete

## Phase 3

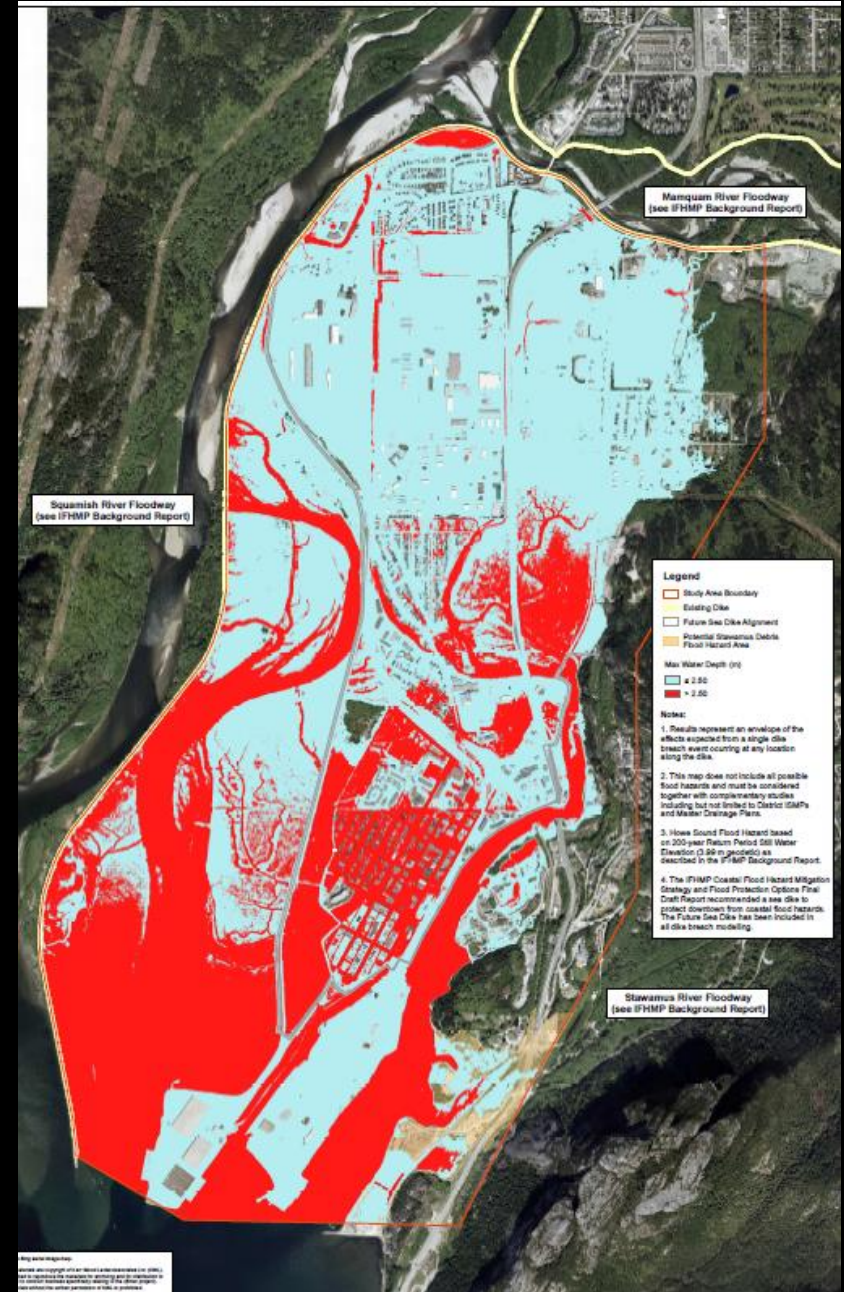
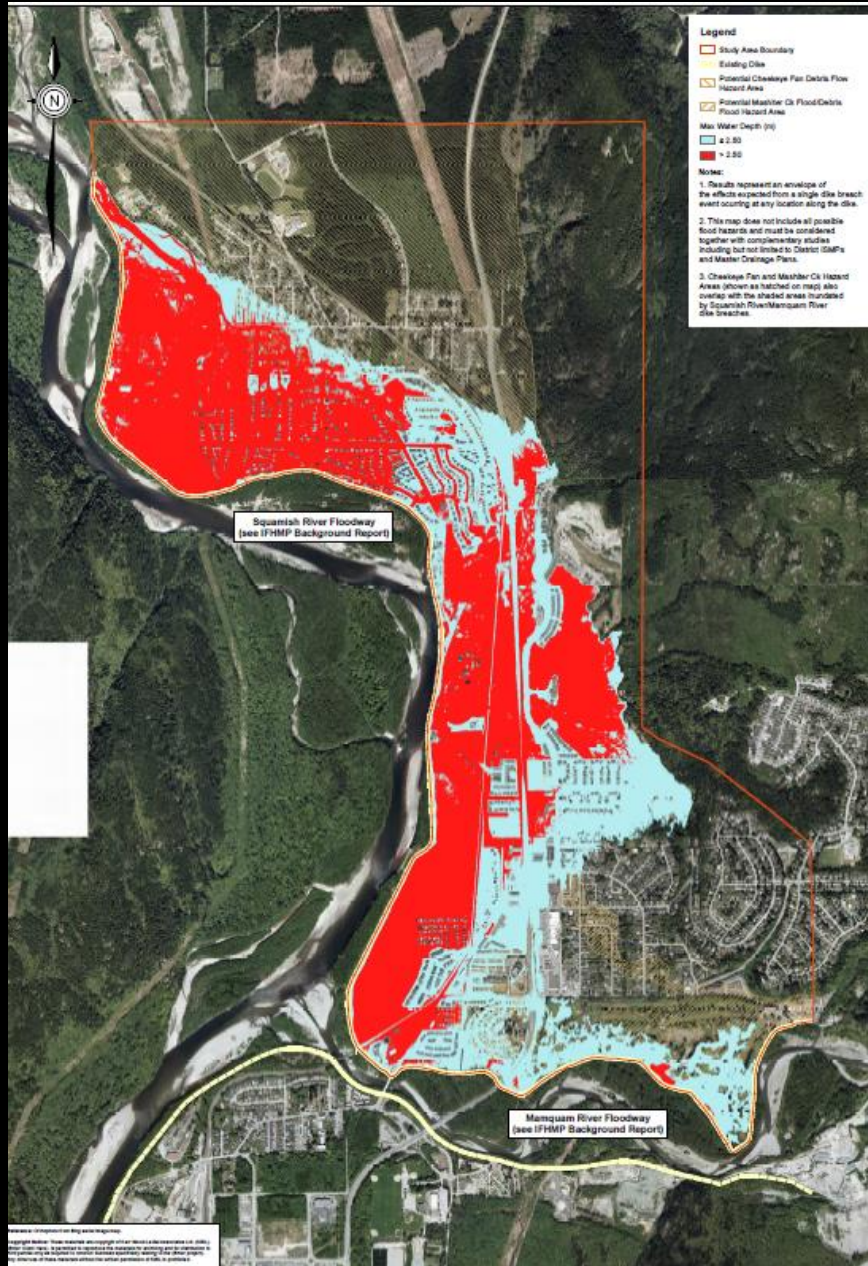
- River Flood Mitigation Strategy
- Finalizing

## Phase 4

- Integrated Flood Hazard Management Plan
- Up next

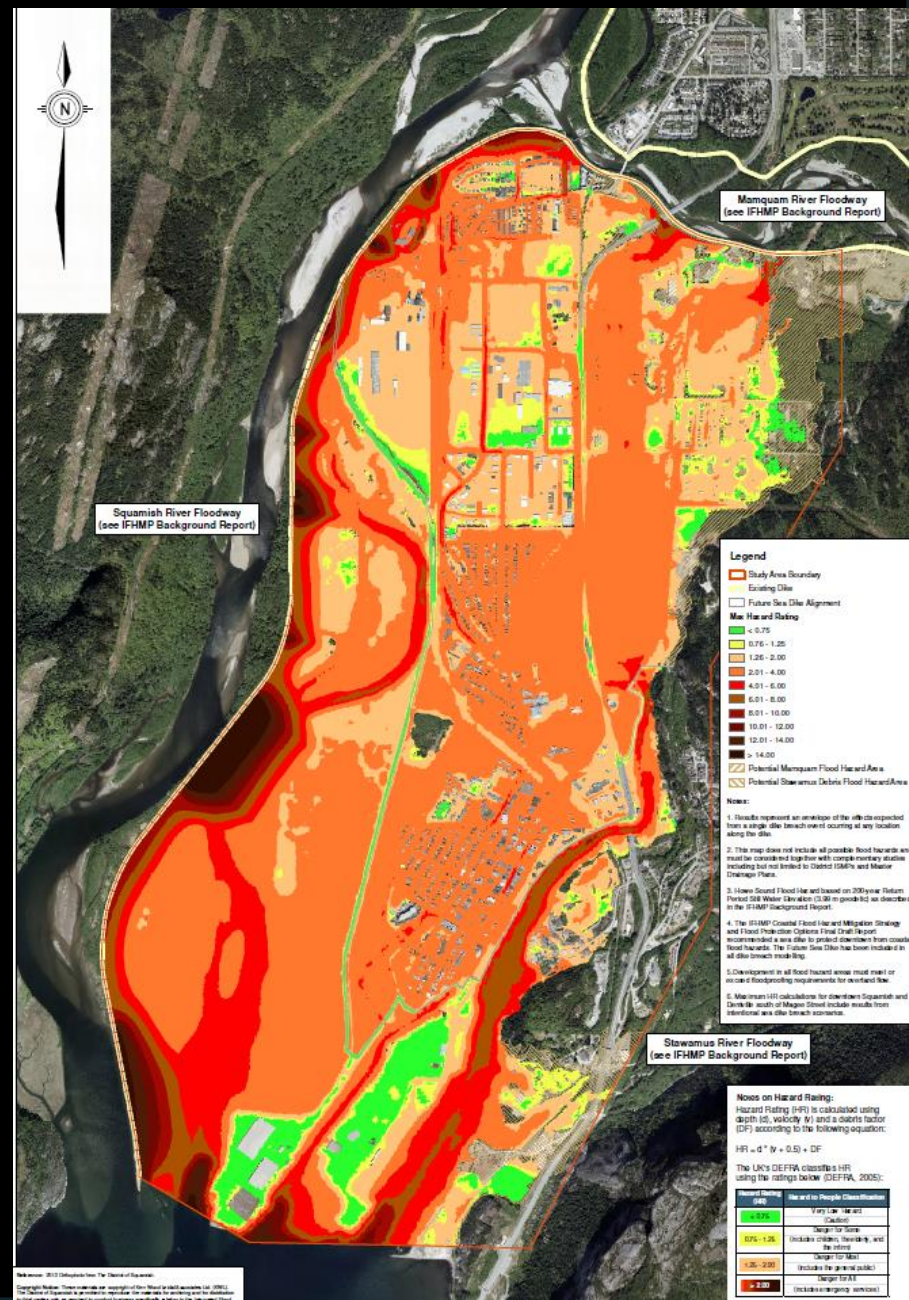
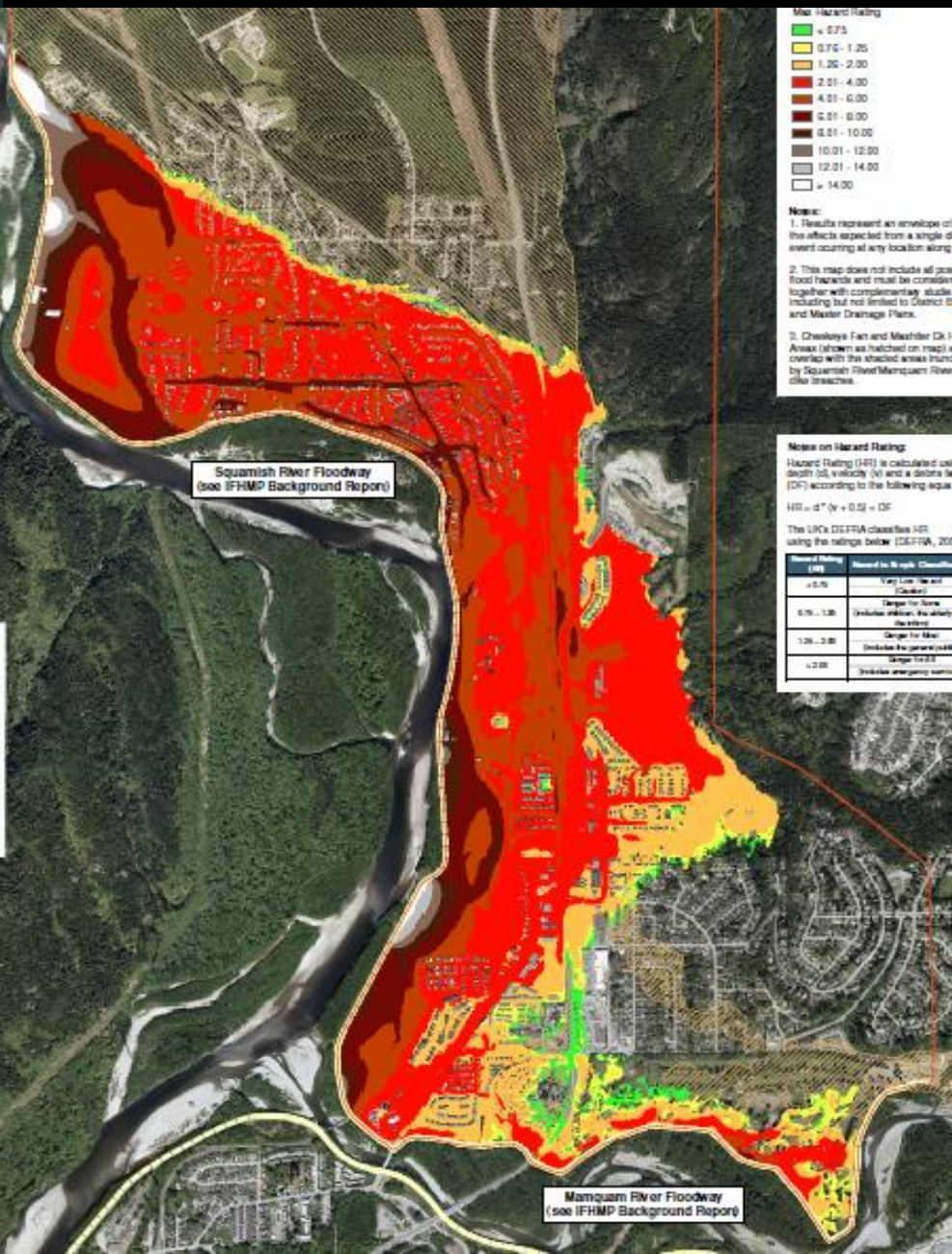


# Floodplain Depth



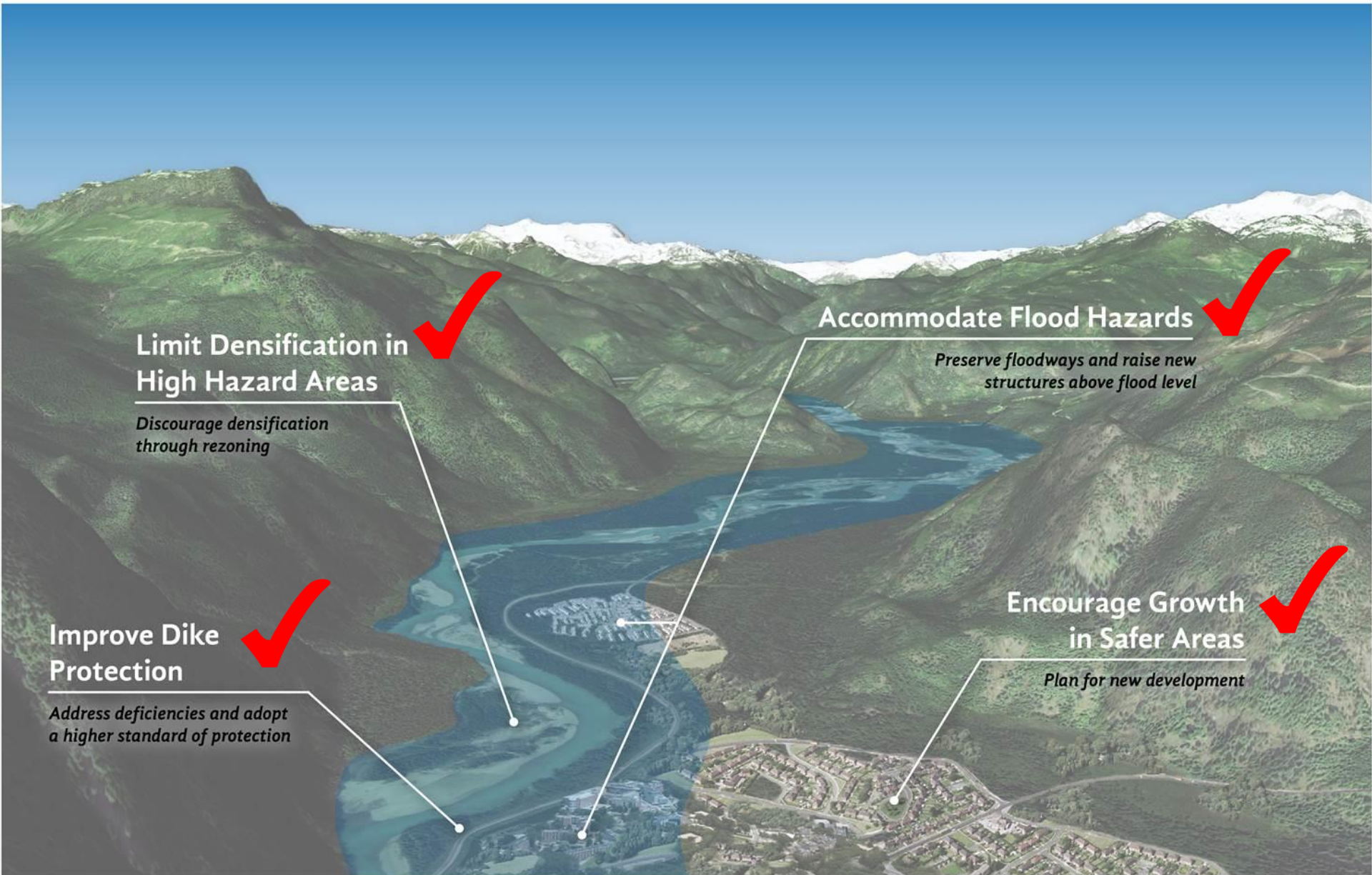


# Hazard Rating





# River Mitigation Strategies



## Limit Densification in High Hazard Areas

*Discourage densification through rezoning*

## Accommodate Flood Hazards

*Preserve floodways and raise new structures above flood level*

## Improve Dike Protection

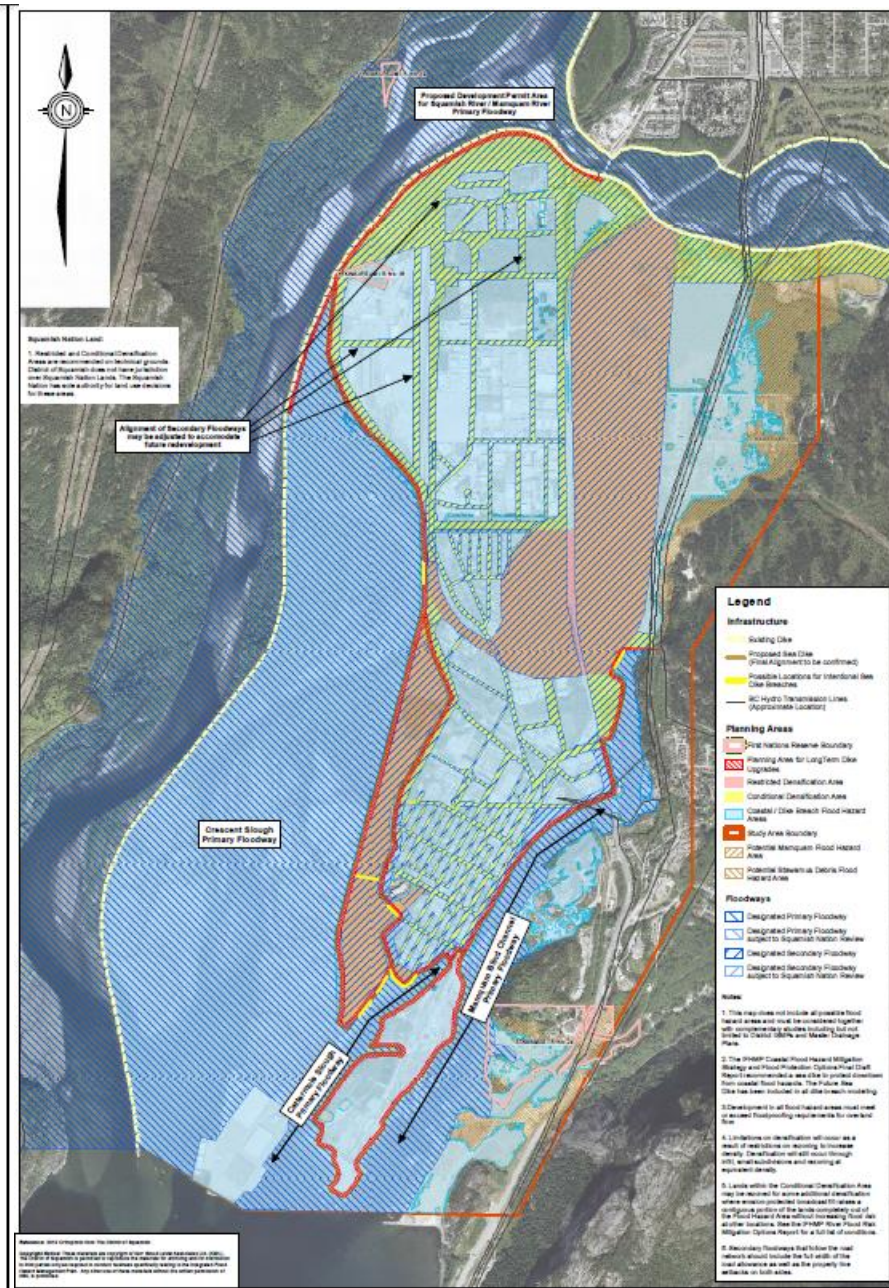
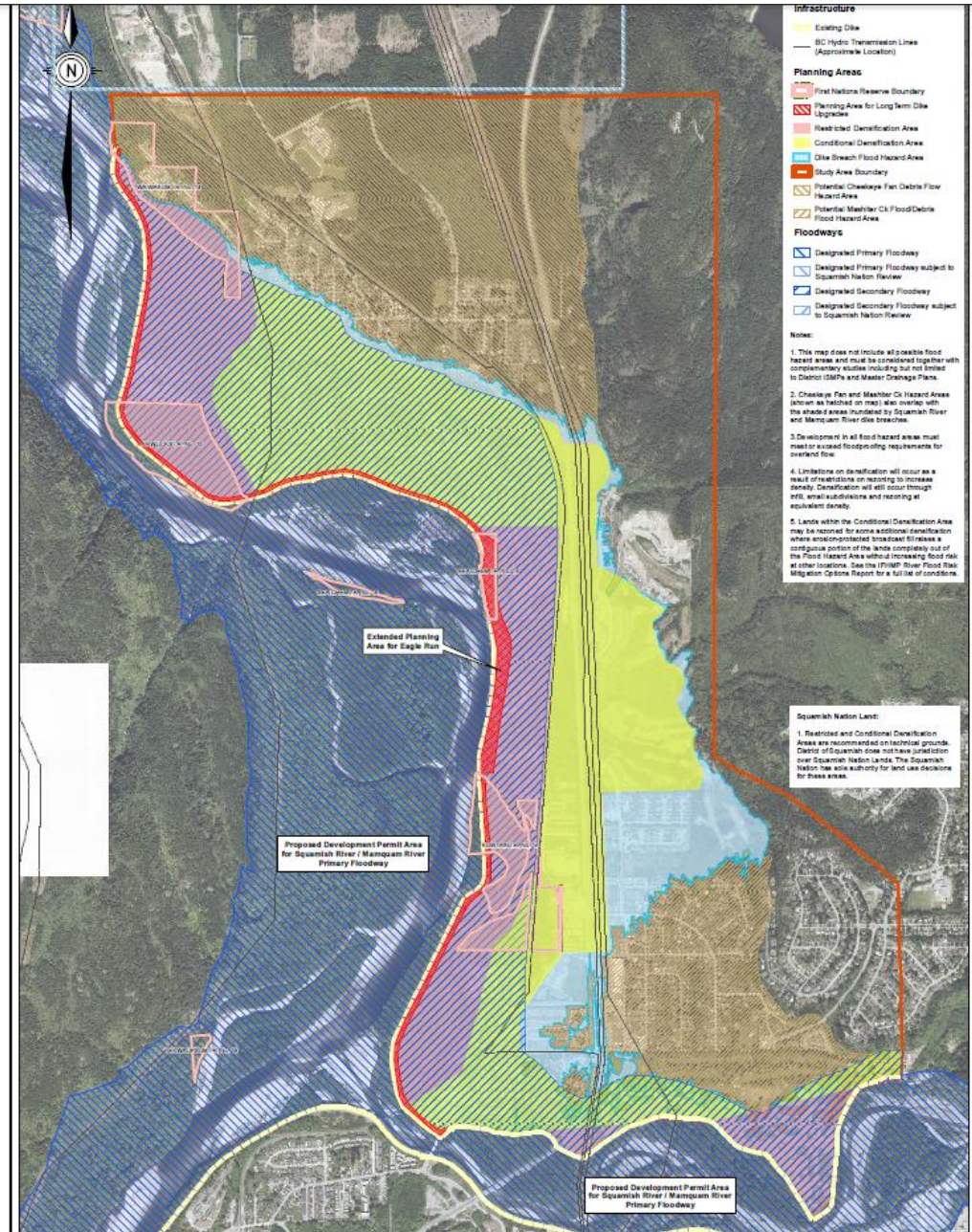
*Address deficiencies and adopt a higher standard of protection*

## Encourage Growth in Safer Areas

*Plan for new development*



# Conditional/Restricted Densification Areas





# Densification Conditions

- 1) Raise entire development area above 1:200yr flood level
- 2) Provide erosion protection for the fill
- 3) Must avoid significant impacts on floodway capacity
- 4) Ensure that designated floodways receive permanent dedication
- 5) Must avoid unmitigated environmental impacts and preserve an unreduced 30m buffer to watercourses
- 6) Must avoid significant transfer of risk **due to re-directing floodwater from a river dike breach and/or changes in local hydrology /drainage patterns.**
- 7) If next to dike, upgrade the dike frontage and provide SROW to 1:500 year standard
- 8) Limit density to **29 dwelling units/ha where flood depth is > 2.5m unless the site is on the margin of the floodplain.**
- 9) QP/QEP certify the above
- 10) Satisfy an independent third party peer review, if and when needed

# Condition 1: Raise Development Area



## Elevated Feature

- No hazard
- No rationale for density restriction

## Proposal

- Created elevated feature
- Limited risk with additional density



# Condition 1: Raise Development Area





# Condition 1: Options Analysis



1. Raising Entire Development Area



2. Conventional Floodproofing



3. Raising the building footprint



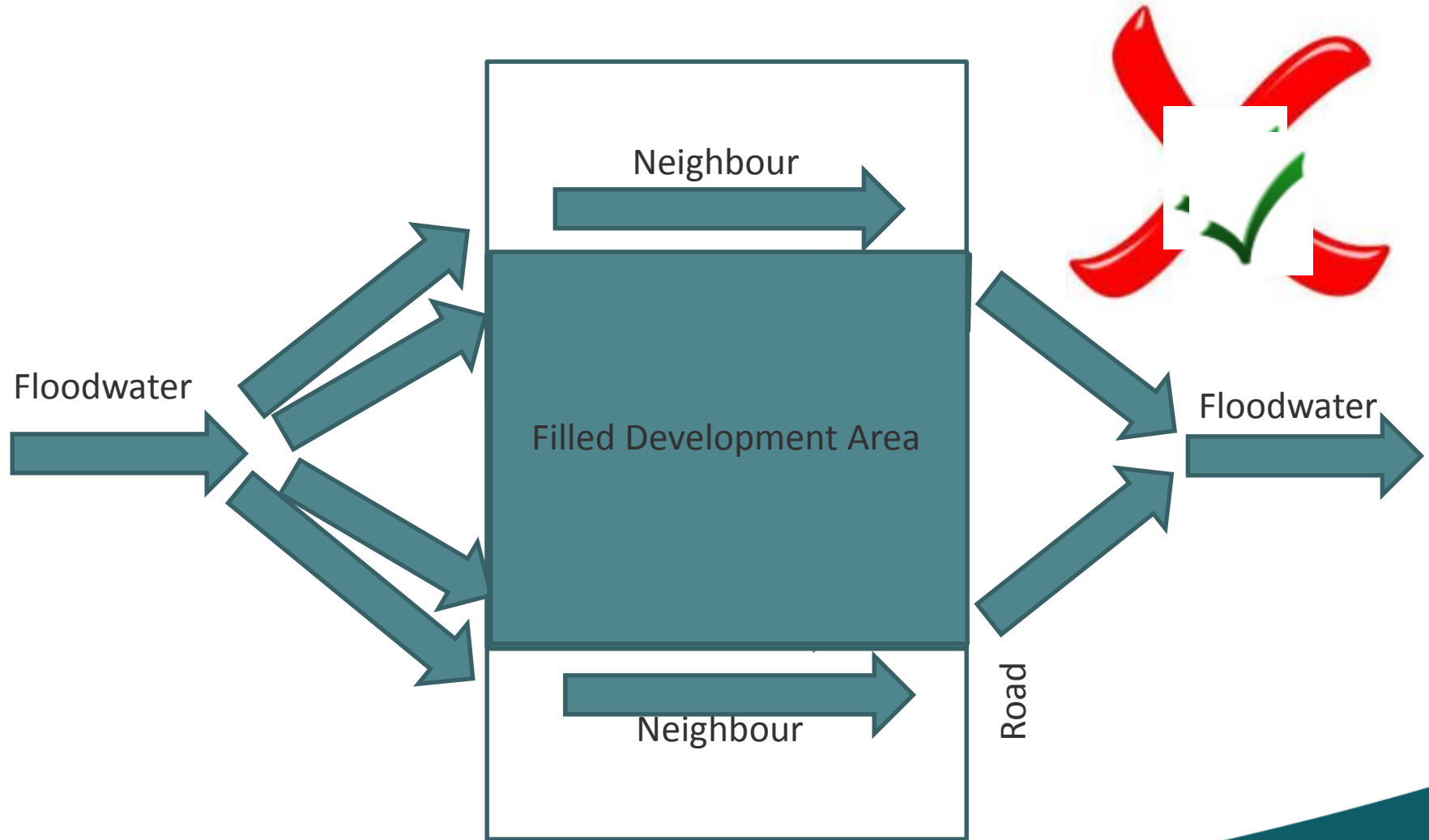
# Option 1: Raise Entire Development Area





# Condition 1

## Option 1: Raise Entire Development Area





# Option 2: Fill and Structural





# Option 2: Fill and Structural





# Option 3: Fill Building Footprint





# Option 3: Fill Building Footprint



# Condition 1: Summary



1. Raising Entire Development Area



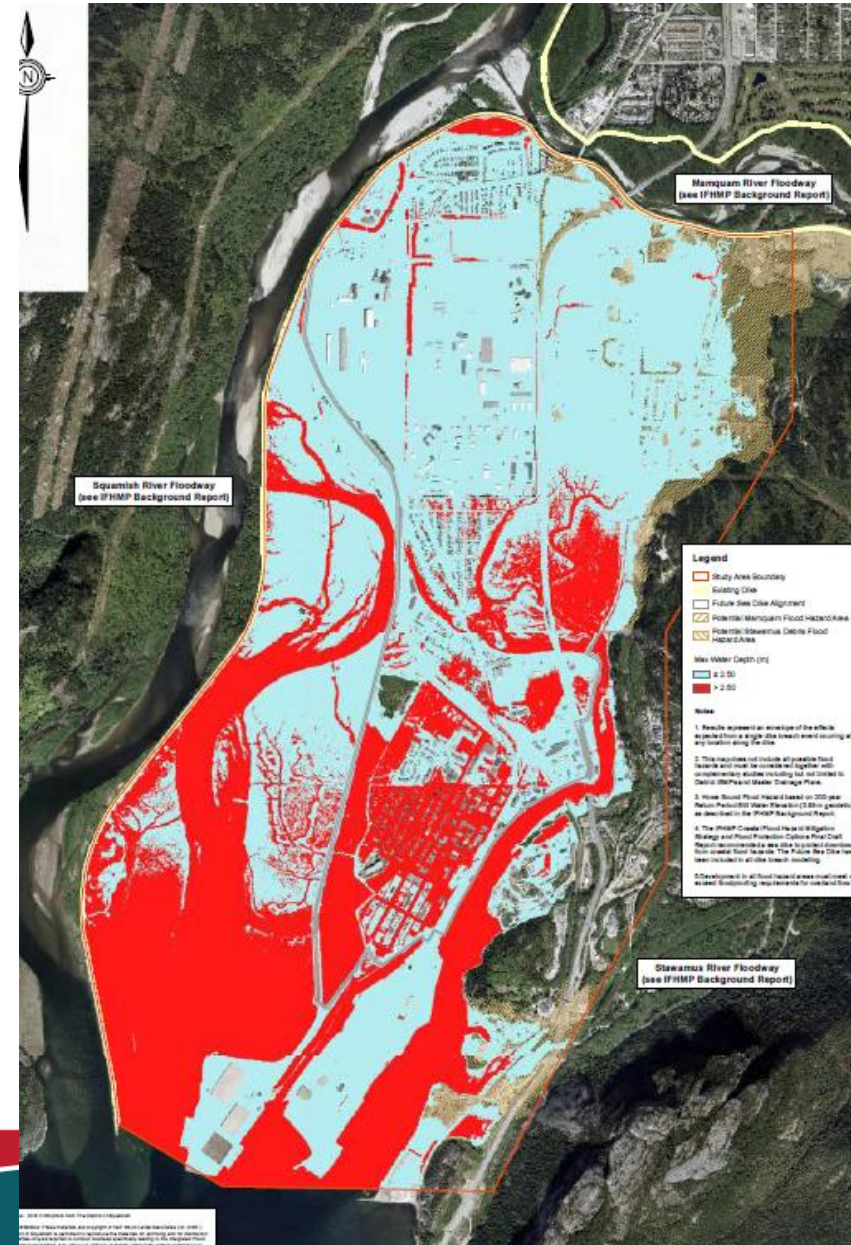
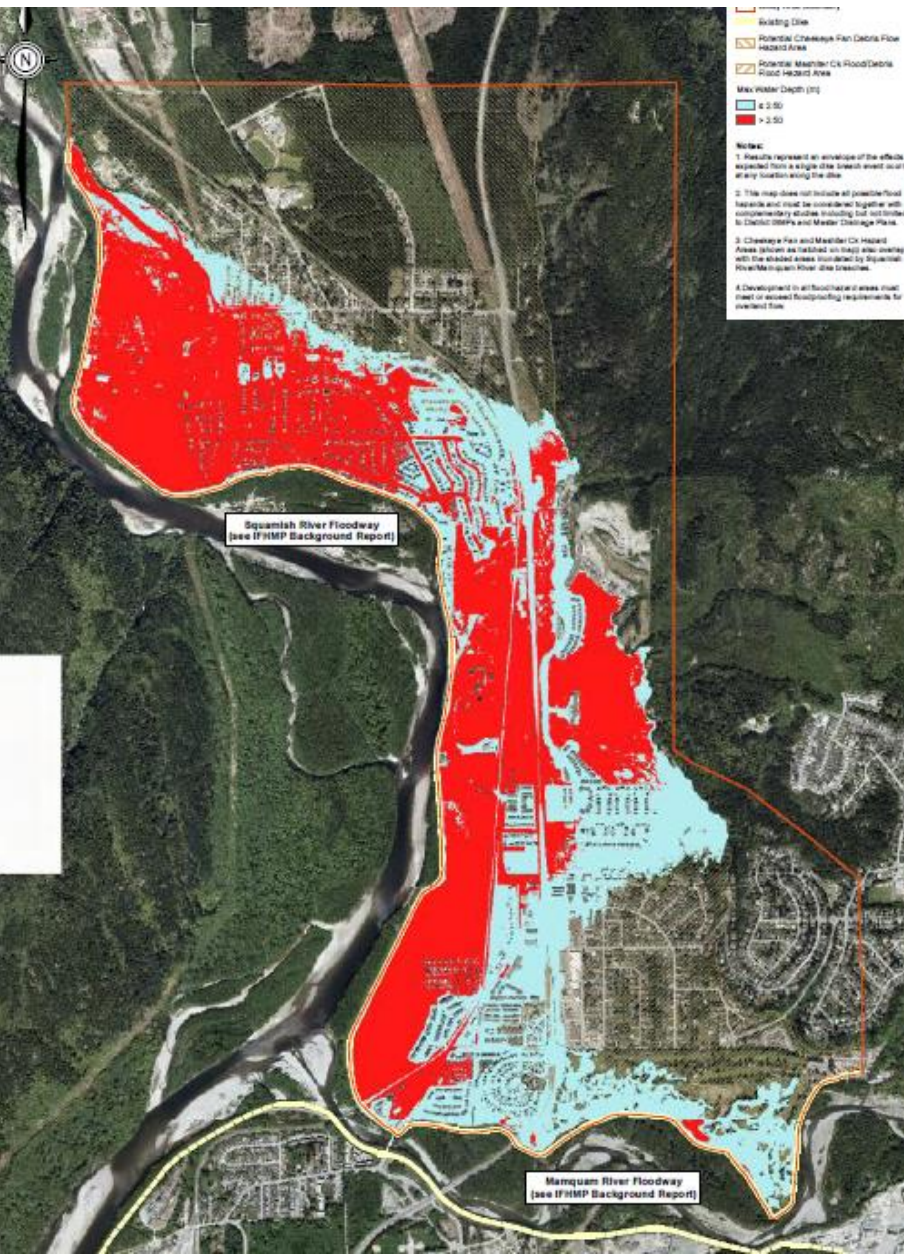
2. Conventional Floodproofing



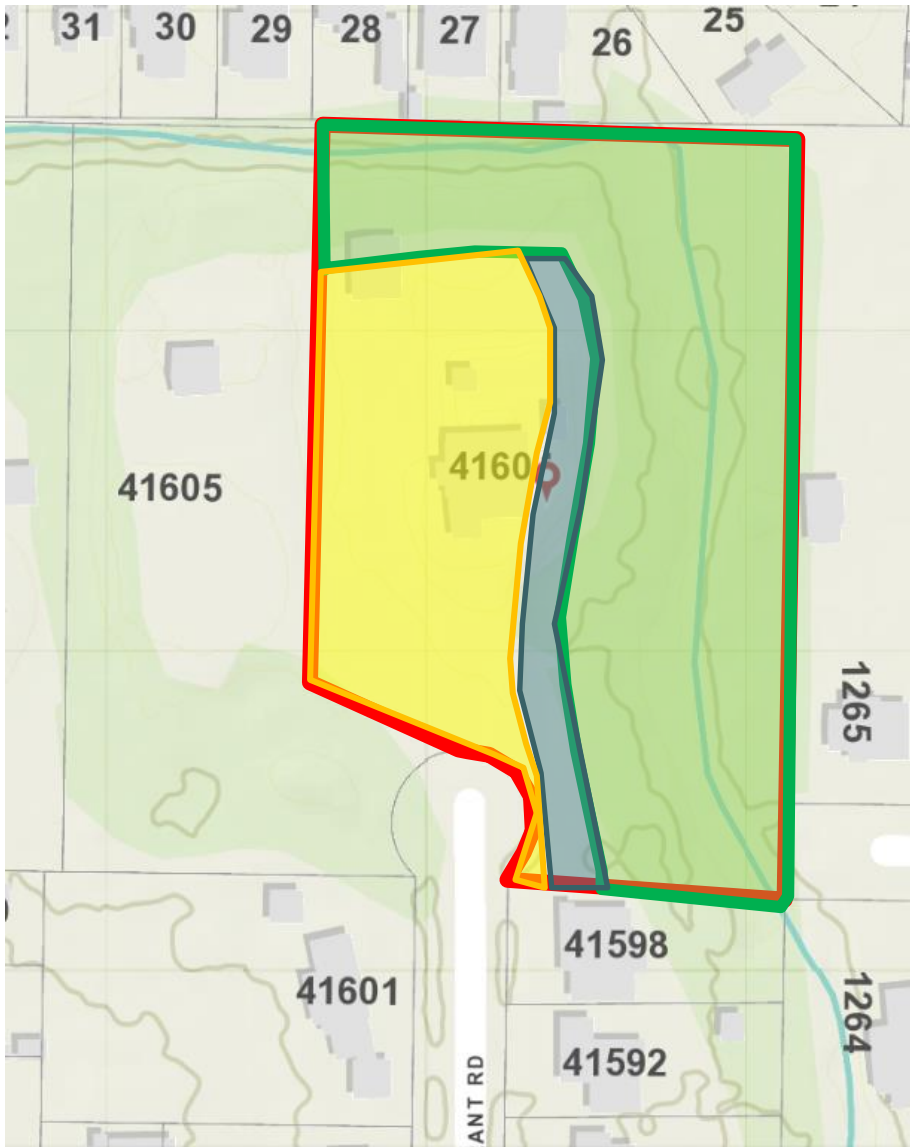
3. Raising the building footprint



# Condition 8: Densification Conditions







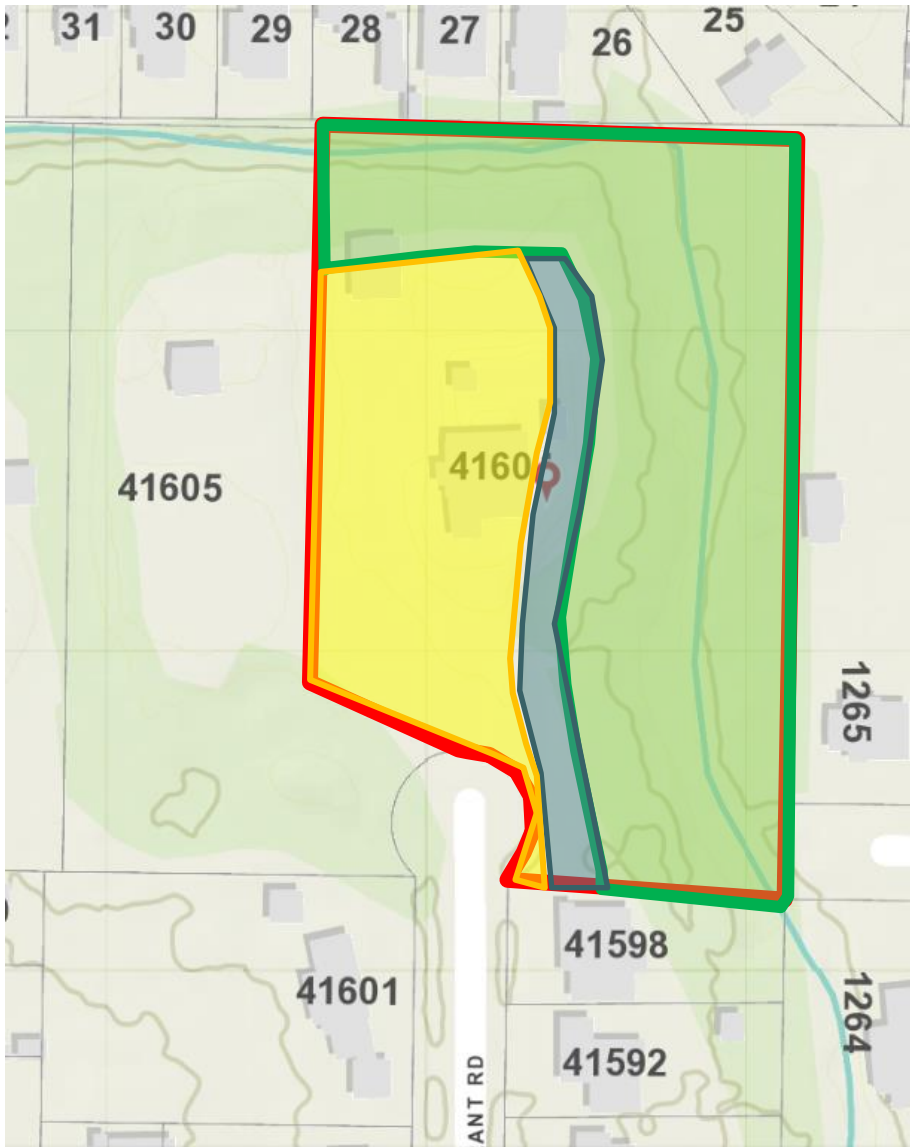
## Density Cap

- RS-2
- 29 units/ha

## Net development area

- Total – non development area
  - Riparian/Steep slopes
  - 20% Roads

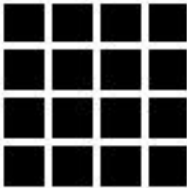
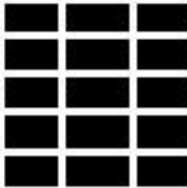


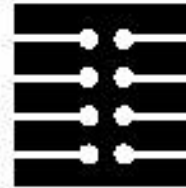




- 1.46 ha lot
- Remove Riparian  
= 0.5 ha remaining
- Exclude 20% for infrastructure  
= 0.4 ha remaining
- $0.4 \text{ ha} * 29 \text{ units/ha}$   
= 11 units

# 20% Road Allowance

**Figure 1: Comparison of area used for streets, among five typical patterns .**

					
	<b>Square grid</b> (Miletus, Houston, Portland, etc.)	<b>Oblong grid</b> (most cities with a grid)	<b>Oblong grid 2</b> (some cities or in certain areas)	<b>Loops</b> (Subdivisions - 1950 to now)	<b>Culs-de-sac</b> (Radburn - 1932 to now)
<b>Percentage of area for streets</b>	<b>36.0%</b>	<b>35.0%</b>	<b>31.4%</b>	<b>27.4%</b>	<b>23.7%</b>
<b>Percentage of buildable area</b>	<b>64.0%</b>	<b>65.0%</b>	<b>68.6%</b>	<b>72.6%</b>	<b>76.3%</b>

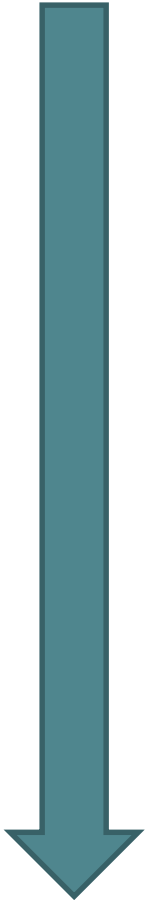


# IFHMP Next Steps

Now

- Direction from Council on 2 items
- Council endorsement for finalizing report and moving to phase 4
- Phase 4 Implementation
  - Further public engagement
  - Floodplain bylaw and OCP policy
  - Timing and funding of dike upgrades

Sept  
2016



# Recommendation

That Council approve the following resolutions:

**THAT** the District of Squamish finalize the River Flood Risk Mitigation Options report prepared as part of the ongoing Integrated Flood Hazard Management Plan (IFHMP) as described in this report;

**THAT** staff begin utilizing the policy presented in the River Flood Risk Mitigation Options report when assessing land development applications in the interim until the Official Community Plan is updated.

## Items for Resolution

1. Raise Development Area vs Footprint vs conventional
2. Density limitations where no safe evacuation.



# Questions

