

# District of Squamish Integrated Flood Hazard Management Plan IFHMP Adoption

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KERR WOOD LEIDAL  
consulting engineers

Arlington  
Group  
Planning + Architecture Inc.



# Integrated Flood Hazard Management Plan

Phase 1

- Background/Gap Analysis

Phase 2

- Coastal Flood Mitigation Strategy

Phase 3

- River Flood Mitigation Strategy

Phase 4

- Integrated Flood Hazard Management Plan



# Mitigation Strategies

## Limit Densification in High Hazard Areas

*Discourage densification through rezoning*

## Improve Dike Protection

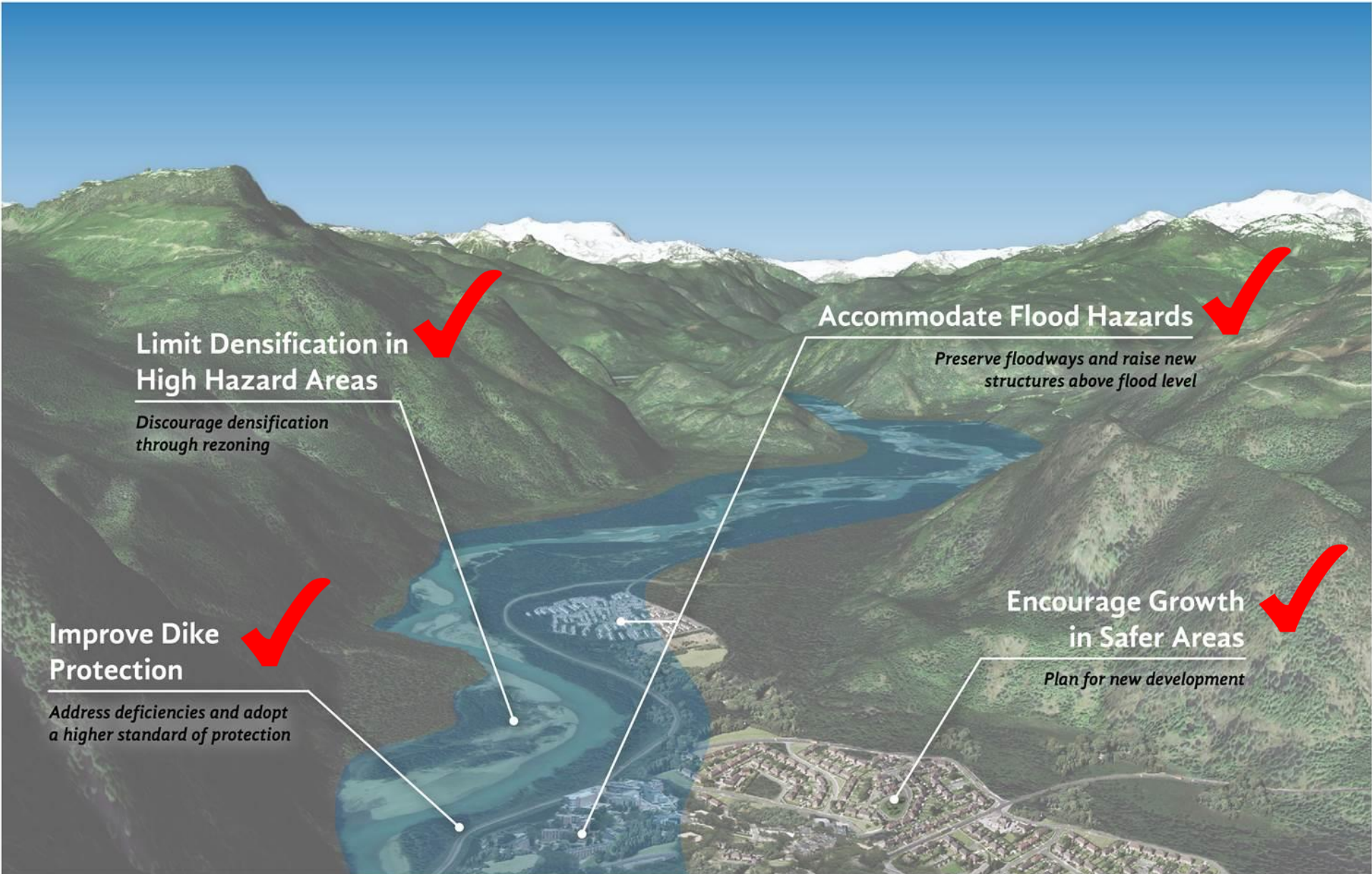
*Address deficiencies and adopt a higher standard of protection*

## Accommodate Flood Hazards

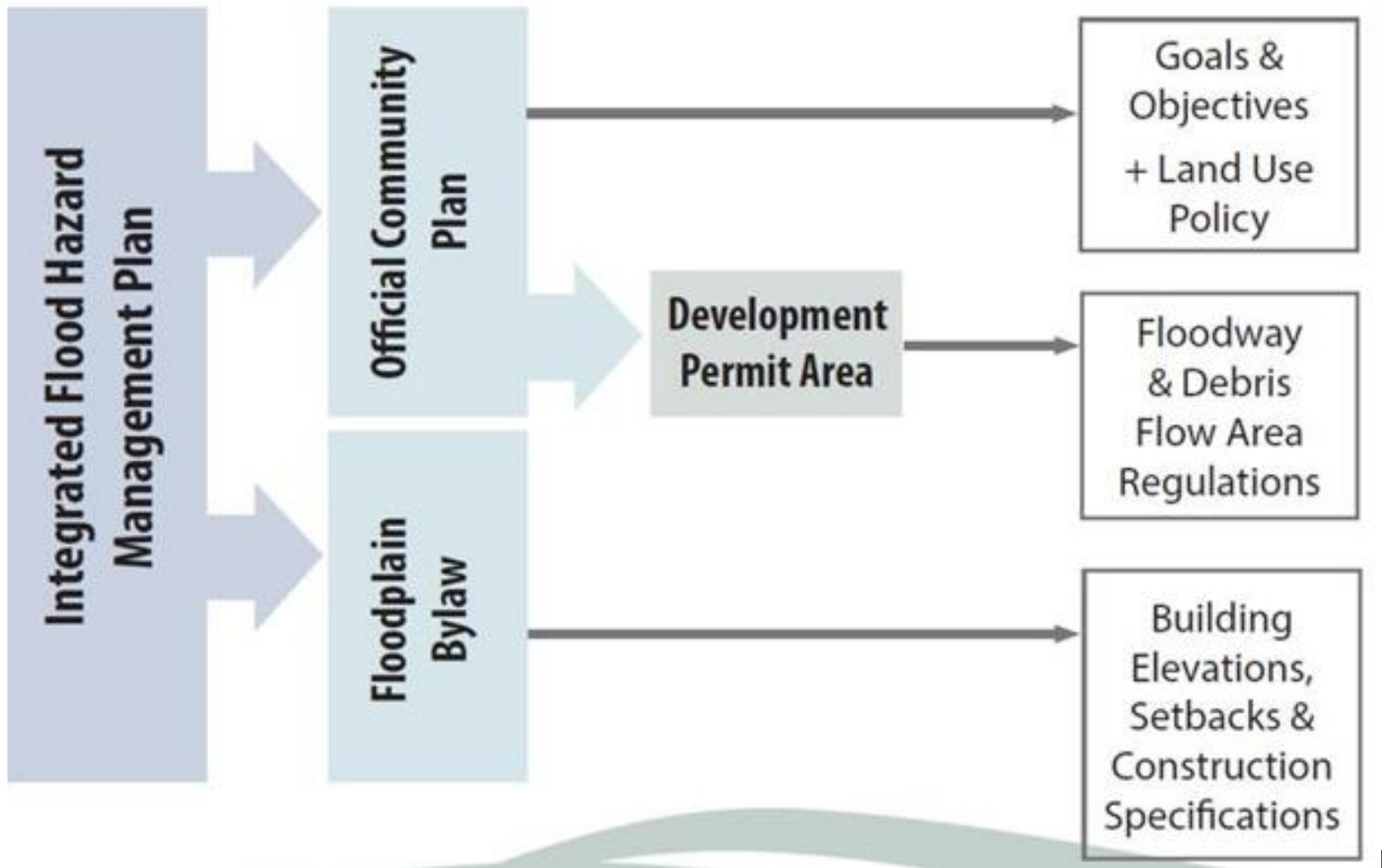
*Preserve floodways and raise new structures above flood level*

## Encourage Growth in Safer Areas

*Plan for new development*



# Flood Policy Overview



# Improve Dike Protection

## Summary

- 1) Correct existing dike deficiencies
- 2) Build Sea Dike according to implementation plan
- 3) Long-term: Adopt higher standard of protection for Squamish & Mamquam River South dike

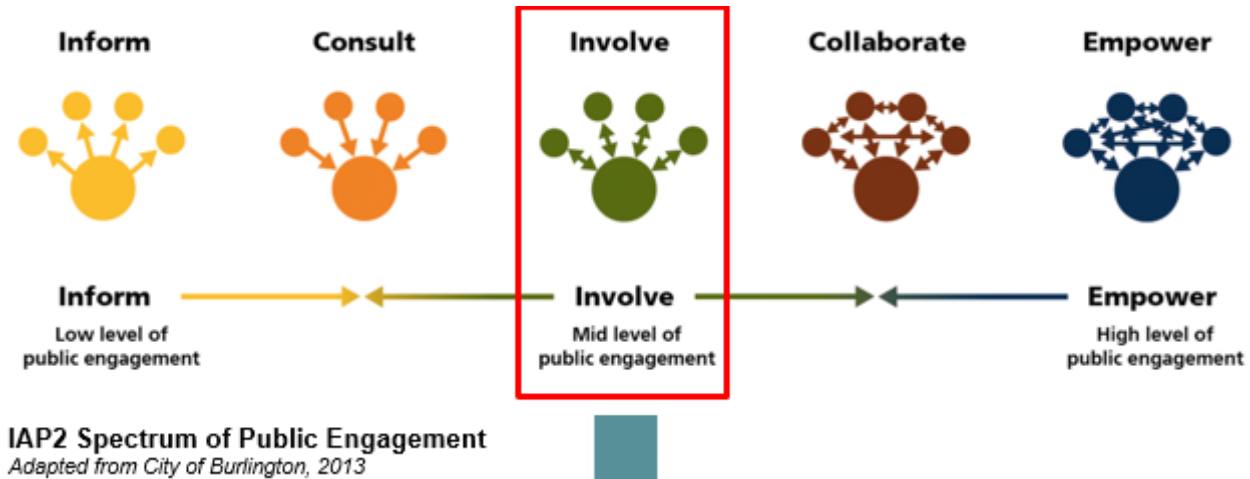
Projects prioritized based on risk:

- Likelihood of failure
- Consequence of failure
- Cost-weighted

Priority	External Funding Required?	Dike / Area	Action
1	No	All	Condition inspection for all penetrations and flow control gates, upgrades at priority problem spots
1	No	Mamquam / Downtown	Implement stockpiling and deployment plan for dike closures at CNR, Hwy 99, and sea dike
1	No	All	upgrade / secure penetrations and flapgates identified as high-risk during inspection
1	No	All	Inspect erosion protection and identify priority problem spots (eg u/s Judd Slough PS)
1	Yes	Upper Squamish	Judd Slough standard dike improvements (includes removal of deactivated culvert)
1	No	Lower Squamish	Replace flap gate and CCTV broken culvert on lower Squamish River dike and slipline as required
2A	No	Squamish	Obtain engineering opinion on unauthorized fill
2A	No	Stawamus	Complete riprap to dike crest on upper Stawamus River dike
2A	Yes	Lower Squamish	Widen Squamish River dike at the Fish (standard dike)
2A	Yes	Downtown	temporary sea dike upgrades to 3.3 m on perimeter (Lot 1 downtown plus local areas on reaches 2, 4, 5)
2A	Yes	Upper Squamish	Eagle Run toe berm at Cheema / McIntosh and standard dike improvements
2B	No	All	complete seismic assessment of critical dike sections where a flow slide would require major realignment
2B	No	Upper Squamish	Work with Squamish Nation to re & re gabion backslope on Seaichem I.R. No. 16
2B	Yes	Upper Squamish	Brackendale standard dike upgrades, Judd Slough PS to Seaichem I.R. No. 16 (incl gates and SROW verification)
2B	Yes	Downtown	sea dike to 4.0 m (reaches 3-4-5)
2B	Yes	All	Upgrade riprap protection and add toe at prioritized locations (assume incremental implementation)
3A	Yes	Upper Squamish	Judd Slough superdike upgrades
3A	Yes	Lower Squamish	Raise / widen Squamish River dike from the Fish to the Railway Museum dike access (superdike standard)
3A	Yes	Mamquam	Review Mamquam dike downstream of Brennan Intake against superdike standard and address deficiencies
3A	Yes	Paradise Valley	Upgrade Bailey Bridge Training Works and accept responsibility for Dike 5C
3A	Yes	Downtown	Implement Reach 2 sea dike to 4.0 m elevation
3A	No	Mamquam	Upgrade Mamquam North dike and riprap upstream of Government Road
3B	No	Mamquam	Mamquam River south standard dike upgrade upstream of Reunion Intake
3B	No	Upper Squamish	Harris Slough standard dike upgrades
3B	Yes	All	upgrade / secure balance of flapgates
3B	Yes	Lower Squamish	Raise / widen Squamish River dike from the Railway Museum dike access to Fortis ROW (superdike standard)
3B	Yes	Upper Squamish	Brackendale superdike upgrades
3B	Yes	Upper Squamish	Eagle Run superdike upgrades
3C	Yes	Stawamus	Stawamus River dike upgrades for debris flood design event (pending debris flood study)
3C	Yes	Mamquam	Mamquam north (golf course) standard dike upgrades
3C	Yes	Upper Squamish	Harris Slough superdike upgrades

# Community Consultation

Level of  
Engagement



Engagement  
Activities

Open Houses, online surveys, workshops, Council meetings, Squamish Nation meetings & more

Final IFHMP Online Survey results show strong community support for plan.



# IFHMP Finalization Engagement

- 1) June 20, 2017 – Draft IFHMP presented to District Council
  - Received feedback related to funding strategy & preparation of developer guide
  - To be included in IFHMP implementation (Fall 2017)
- 2) June 26, 2017 – Draft IFHMP presented to Squamish Nation
  - Received written feedback (appended to IFHMP)
  - Made report modifications
  - Addressing SN concerns will be ongoing as part of IFHMP implementation
- 3) June 26, 2017 – Open House #3
  - General support
  - Request for ongoing public education around emergency management
- 4) June 26-July 17 Online Survey #4
  - 57 responses: indicated strong support for IFHMP
  - 77% agreed with OCP policy
  - 85% agreed with DPA
  - 83% agreed with Floodplain Bylaw
  - 91% agreed with dike improvement approach

# Next Steps

- IFHMP Adoption
- Fall 2017 – Adopt Floodplain Bylaw & OCP
  - Determine funding plan, report back to Council
- 2017-2027
  - Implement dike/flood protection upgrades
  - Regulate development with new policy
  - Continued SN engagement
- ~2027 – Scheduled IFHMP Update



# Recommendation

- **THAT** the District of Squamish finalize and adopt the Integrated Flood Hazard Management Plan and begin implementation of the plan.

# Questions/Discussion



KERR WOOD LEIDAL  
consulting engineers



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