

# Council Update #3 – Coastal Flood Protection Strategy

## Squamish Integrated Flood Hazard Management Plan



# Agenda

- Purpose
- Sea Dike Discussion
- Other Recommendations



# IFHMP Scope

1 – Background Analysis



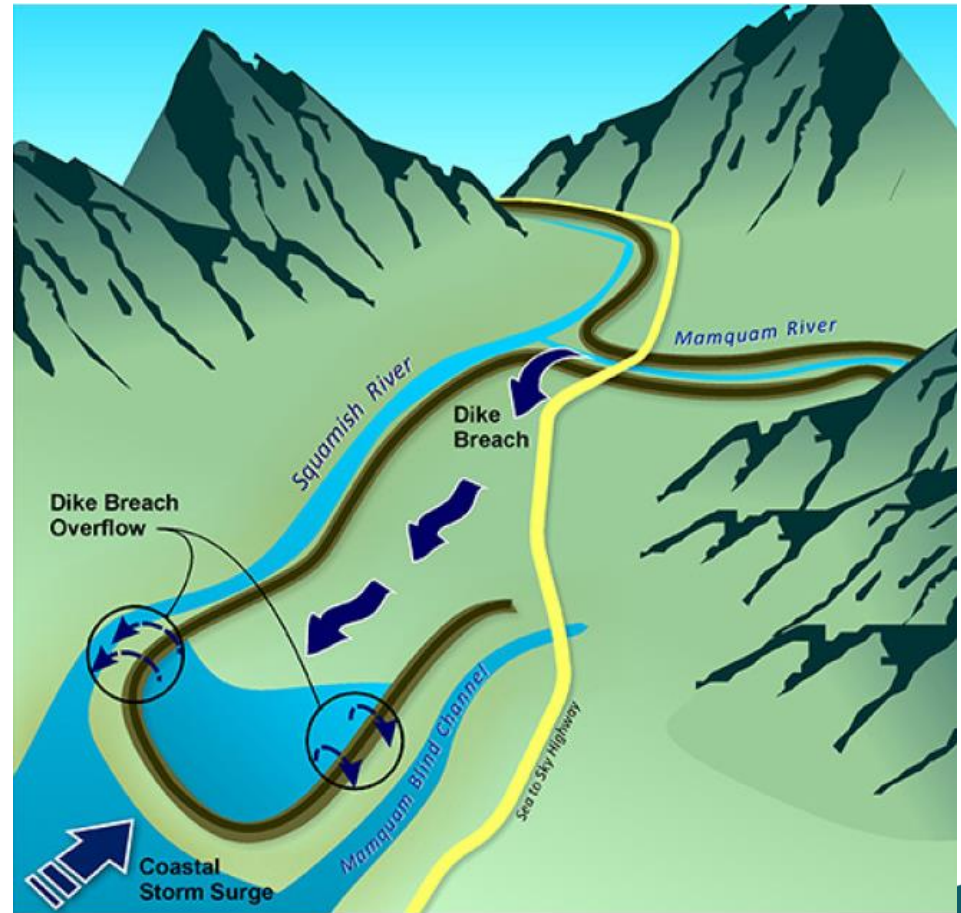
2 - Coastal Flood  
Mitigation Options



3 – River Floodplain  
Modeling and Risk Analysis

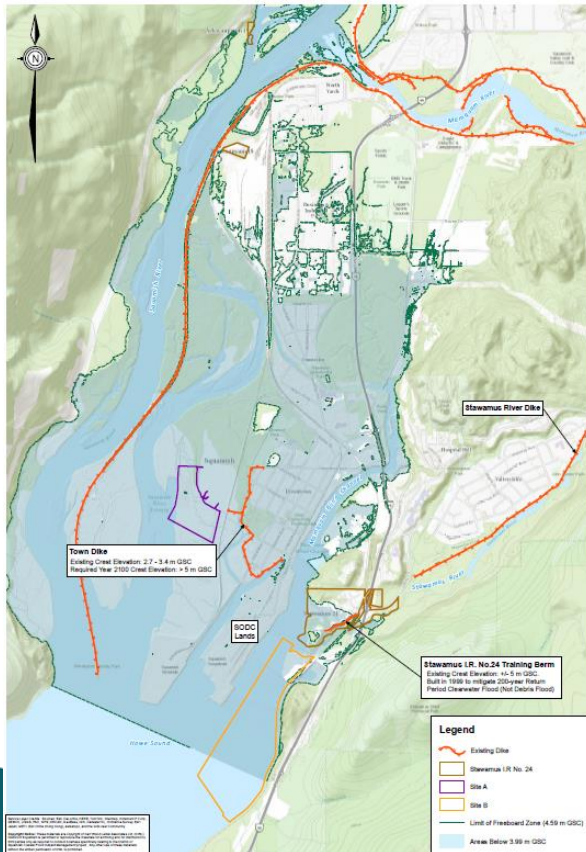


4 – Integrated Flood Hazard  
Management Plan



# Sea Dike Introduction

- Why is it important?
  - Community Planning
  - Financial Planning



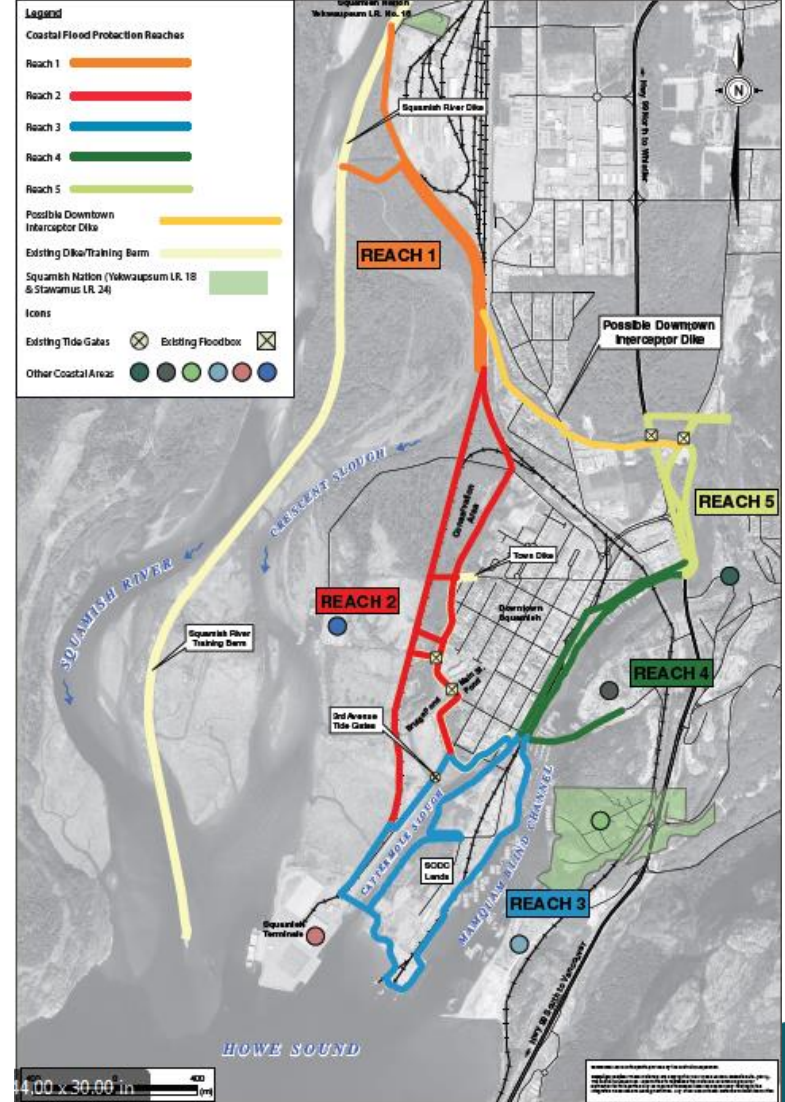
## Why “Protect”?

- Mitigation Options:
  - Protect
  - Accommodate
  - Retreat
  - Avoid
- “Protect” Business Case
- IFHMP recommendation: Consider combination of strategies



# Sea Dike Alignment

- Separated into 5 'Reaches' for analysis
  - **Reach 1** – CN North Yards to Crescent Slough
  - **Reach 2** – Squamish Estuary (Crescent Slough to 3<sup>rd</sup> Avenue)
  - **Reach 3** – Cattermole Slough (3<sup>rd</sup> Ave to SODC)
  - **Reach 4** – Lower Mamquam Blind Channel (SODC to Hwy)
  - **Reach 5** – Upper Mamquam Blind Channel (Hwy to Smoke Bluffs)



# Sea Dike Types

**GreenShores**



**Seawall (vertical face)**



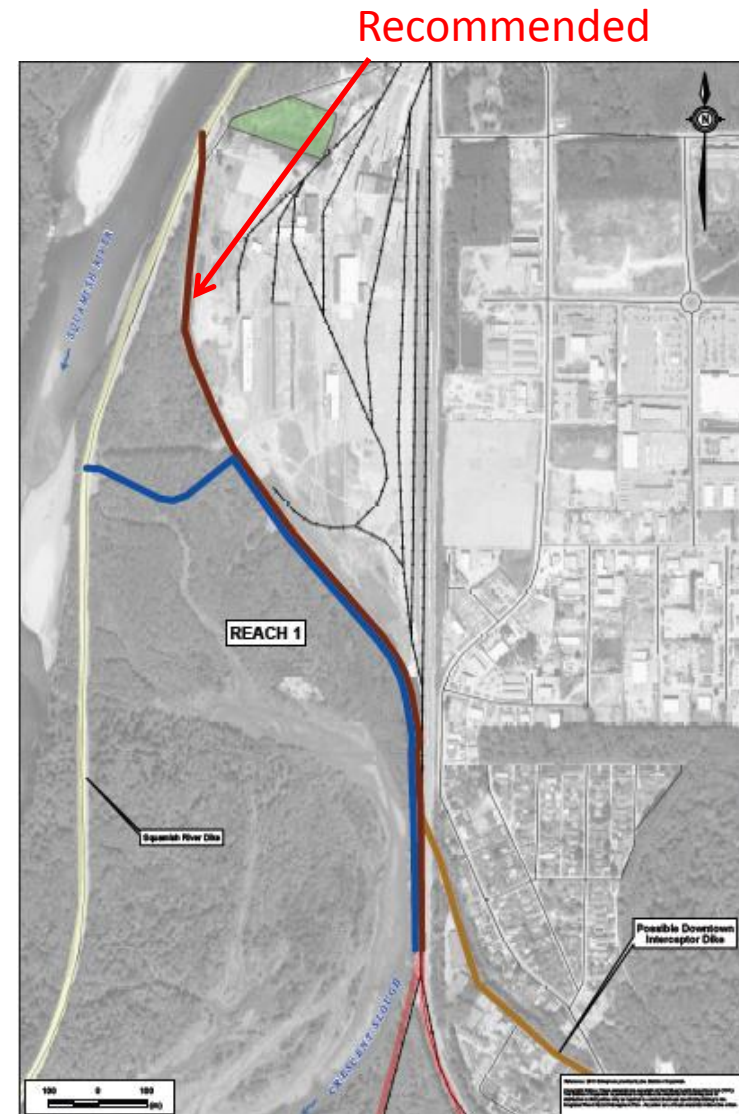
**Earthfill Embankment**





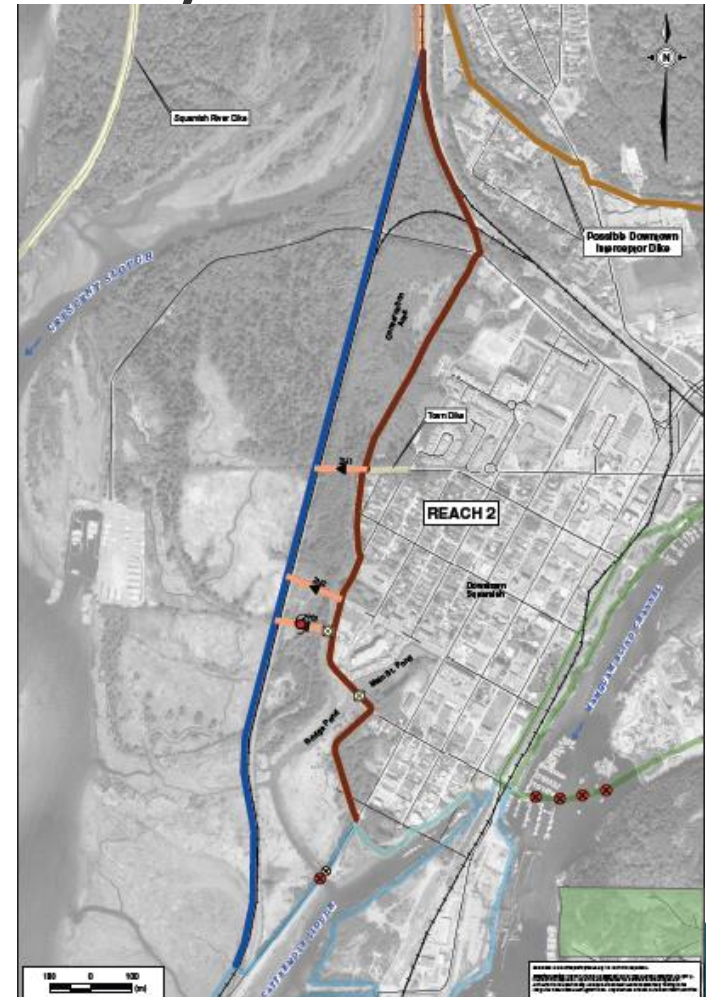
# Reach 1 – CN North Yards to Crescent Slough

- 2 Options:
  - Gov't Road
  - Spit Access Rd
- Considerations:
  - Environmental concerns
  - Dike types
  - Current risk
  - Downtown protection
- Recommendation: Gov't Rd & Greenshores



# Reach 2 – Squamish Estuary (Crescent Slough to 3<sup>rd</sup> Ave)

- 2 main options:
  - 7<sup>th</sup> Ave Connector
  - Town Dike
- Considerations:
  - Environmental concerns
  - Transportation
  - Land Tenure
  - Drainage
  - Constructability
  - Potential environmental mitigation
- Recommendation: Defer until Truck Routing Study complete





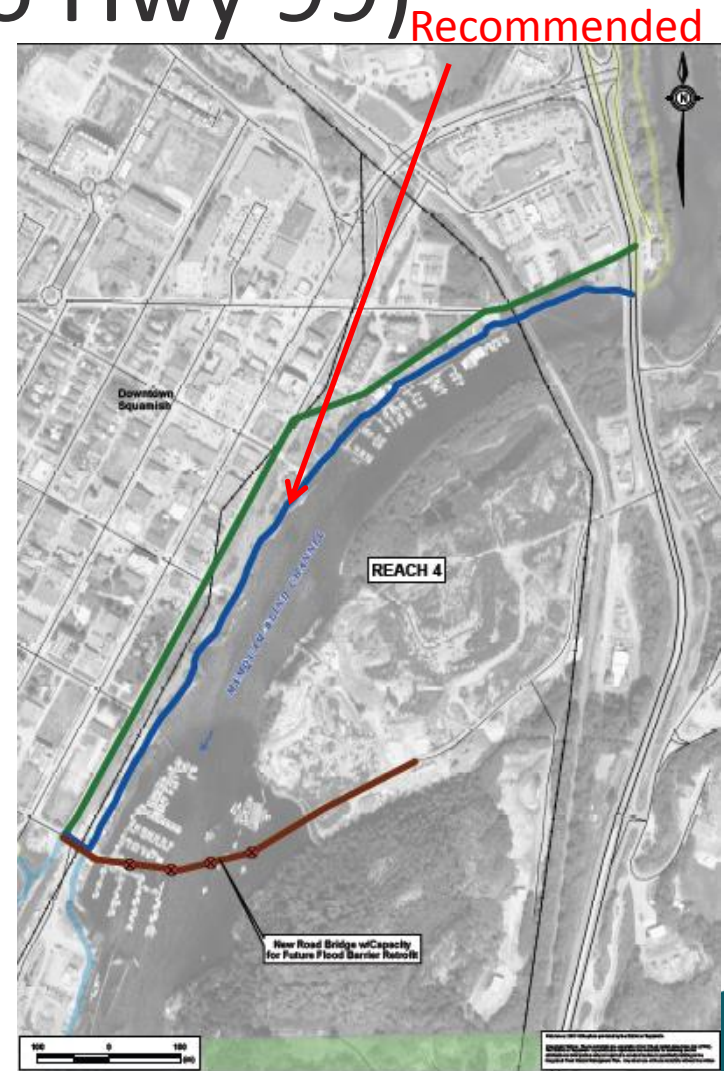
## Special Study Area

- ## Recommended



# Reach 4 – Lower Mamquam Blind Channel (SODC to Hwy 99)

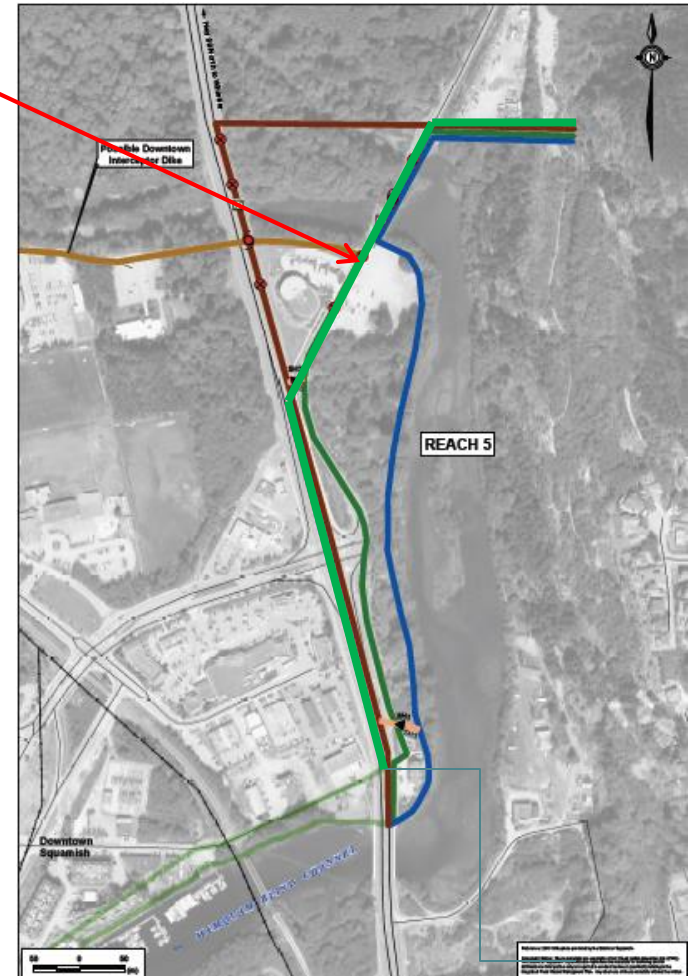
- 3 main options:
  - Shoreline
  - Flood Gates (and shoreline)
  - Setback Dike
- Considerations:
  - Dike type
  - Downtown revitalization
  - Challenges
  - Access
  - Efficiency
  - Complexity
  - Mireau
- Recommendation: Shoreline & vertical seawall
- Long Term - Investigate long-term bicycle/pedestrian traffic flow along underpass



# Reach 5 – Upper Mamquam Blind Channel (Hwy 99 to Smoke Bluffs)

- Options:
  - Shoreline
  - Highway
  - Logger's Lane
  - Hybrids
- Considerations:
  - Existing and future development
  - Transportation
  - Cost
- Recommendation: Hybrid – Hwy 99 to Logger's Lane. Raise Logger's Lane to north MBC – tie to Smoke Bluffs
- GreenShores + Earthfill embankment

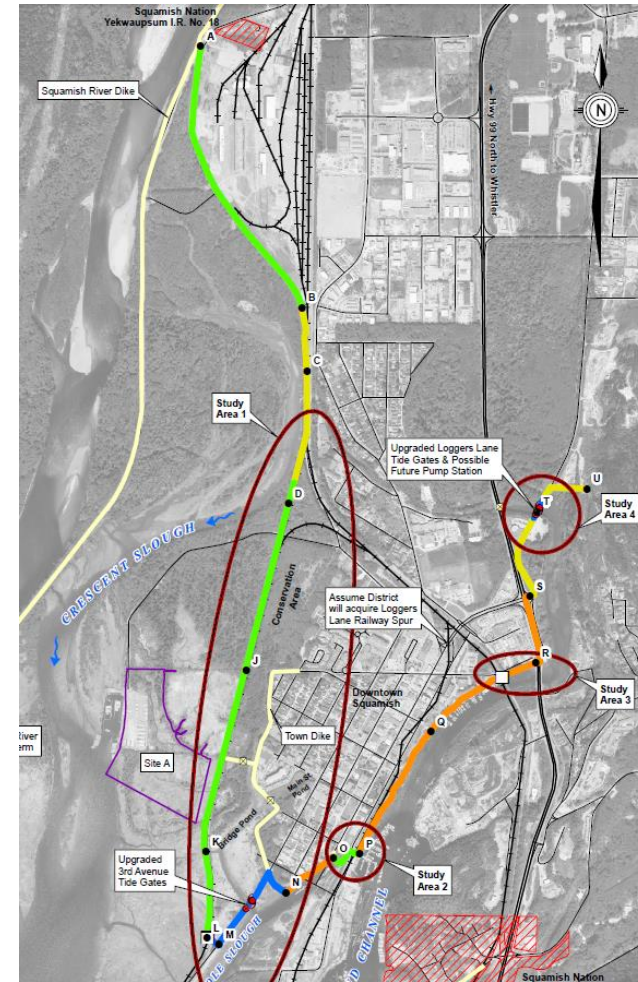
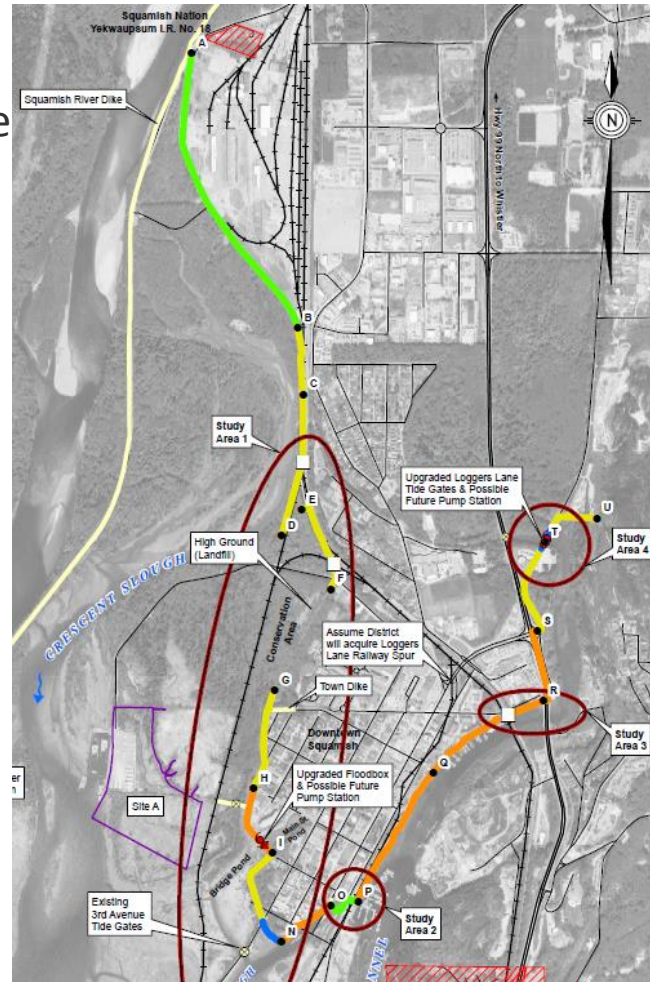
Recommended





# Final Sea Dike Alignment

- Preliminary dike crest elevation estimates range from 4.7m (estuary) to 5.4m Mamquam Blind Channel



# Implementation

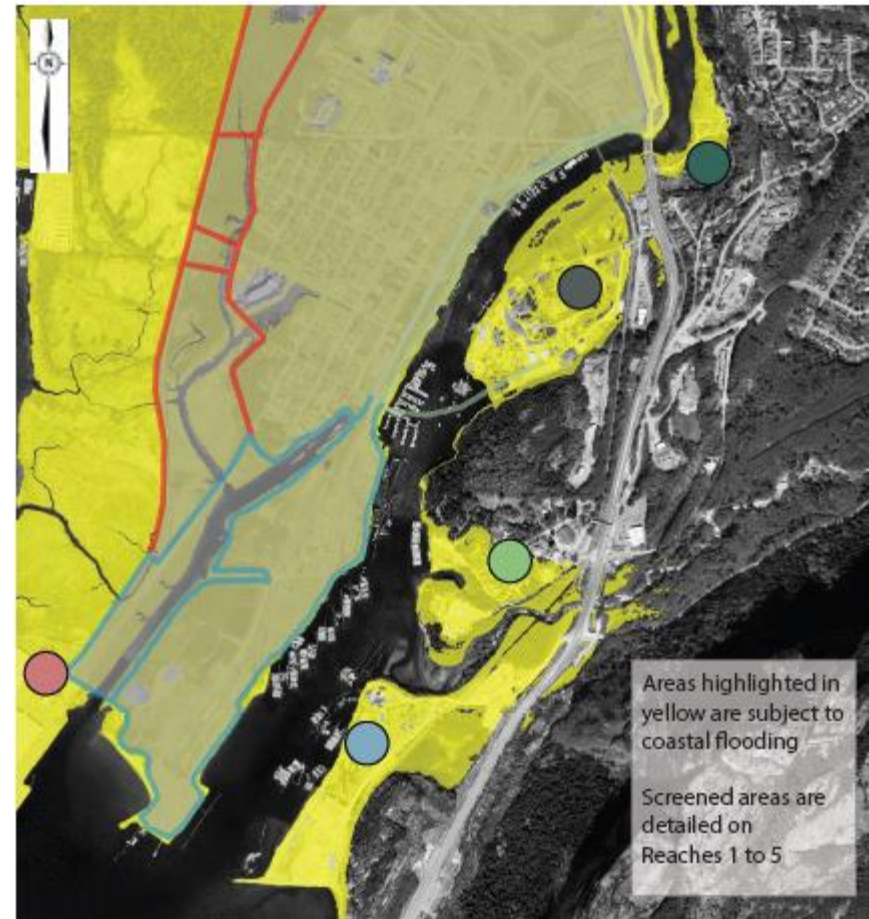
**Table 5: Priorities for Sea Dike Implementation**

Priority	Recommendation	Timing
1	Upgrade all low-lying areas of the dike perimeter to at least 3.3 m geodetic elevation with an engineered standard dike cross-section.	Immediate
2	Implement a Development Permit Area for Coastal Flood Protection Works that establishes requirements and constraints for site development and redevelopment proposals.	Immediate
3	Secure and retain legal land tenure along the ultimate length of the sea dike as properties redevelop or become available.	Ongoing
4	Opportunistically implement segments of sea dike to the Year 2100 crest elevation and configuration as part of ongoing redevelopment.	Ongoing
5	Raise dikes to minimum elevation 4.0 m with sufficient width to allow future capping to design grade.	As funding permits
6	Raise dikes to Year 2100 (1m SLR) design grade and configuration.	Once SLR observations raise still-water design levels beyond 3.3 m.

- Until priority 1 complete, develop emergency response plan
- Interim solutions may also be considered

# Unconnected Coastal Floodplain Areas

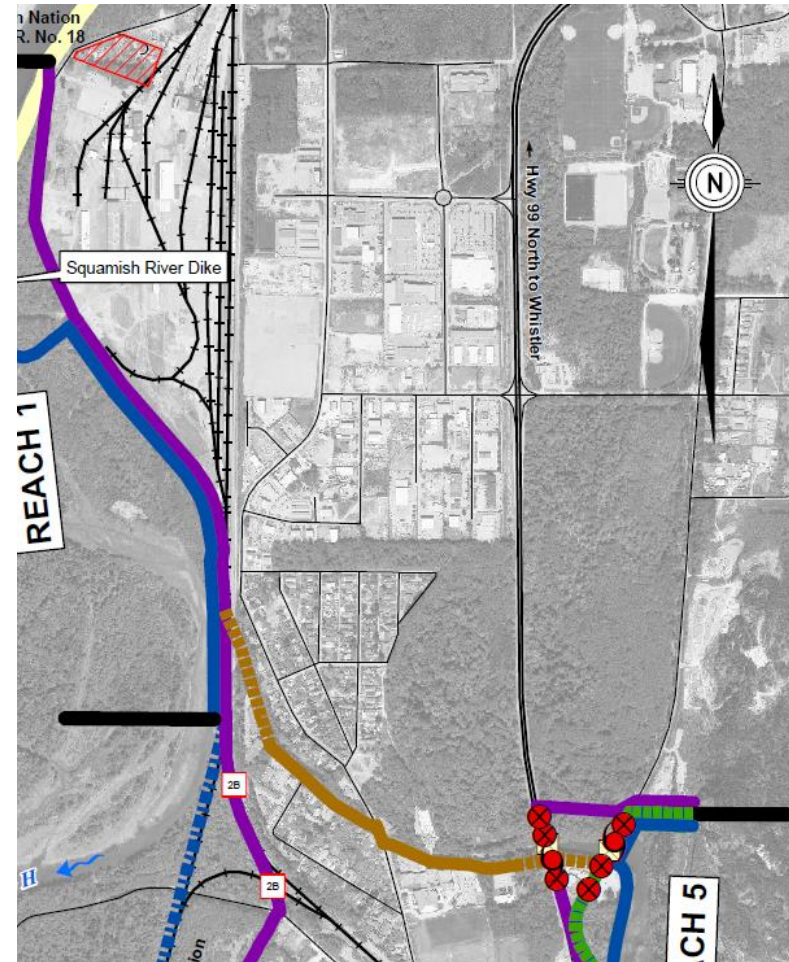
- “Unconnected”?
- Affected sites:
- Considerations:
  - Not part of sea dike strategy
  - Based on development
  - Mitigation options
- Recommendation: Case by case basis





# Interceptor Dike

- Concept
- Challenges:
  - Downtown only?
  - Complexity
  - Transfer of risk
- Alternate concept: Improve river dike protection
- Benefits:
  - Greater area protected
  - Avoids challenges/transfer of risk
- No easy solutions
  - Investment, encroachment will still be required



# Next Steps

- Adopt coastal flood protection strategy
- Report back to Technical working Group
- Proceed to River Floodplain Modeling and Risk Assessment

# Questions?

