

# Sea Level Rise & Coastal Flood Hazard Land Use Guidelines

HB Lanarc – Golder

October 19 2011

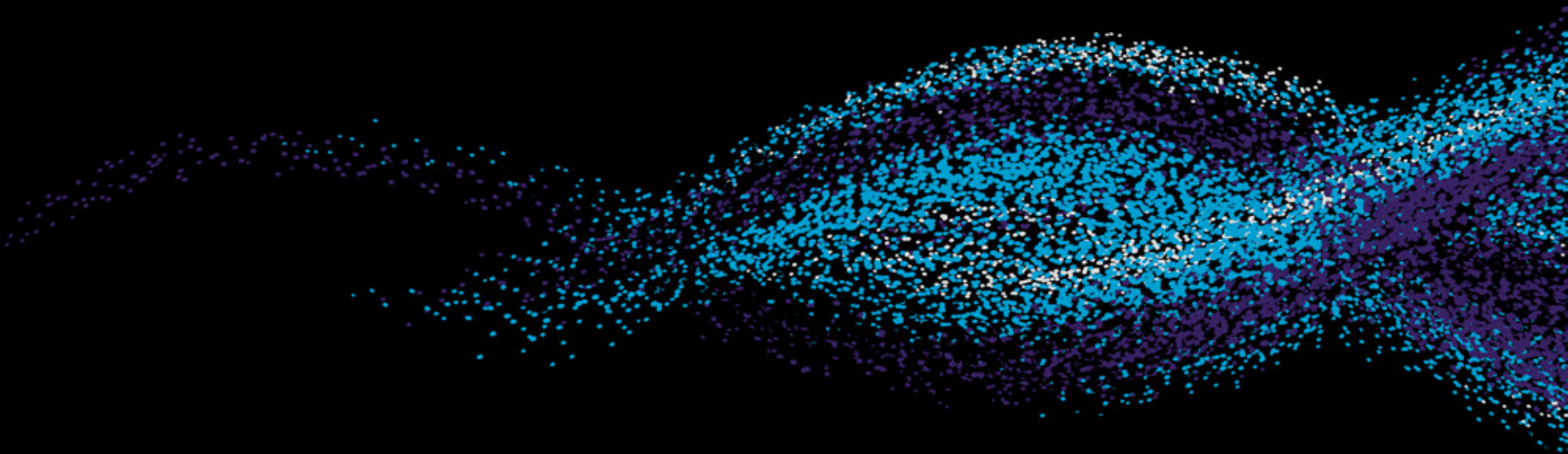


# Agenda



- Context
- Sea Level Rise Planning Areas
- Management Options

# Context





# Adaptive Risk Management



- Minimize the initial costs of integrating SLR.
- Anticipate and minimize future costs of adaptation.
- Work with building lifespans to adapt to gradual SLR.

# Community Infrastructure Service Life

0 25 50 75 100 125 150 175 200

- Residential Buildings



- Commercial Buildings



- Roads



- Sewage Main



- Managed & Natural Environments



# Persistence of Patterns

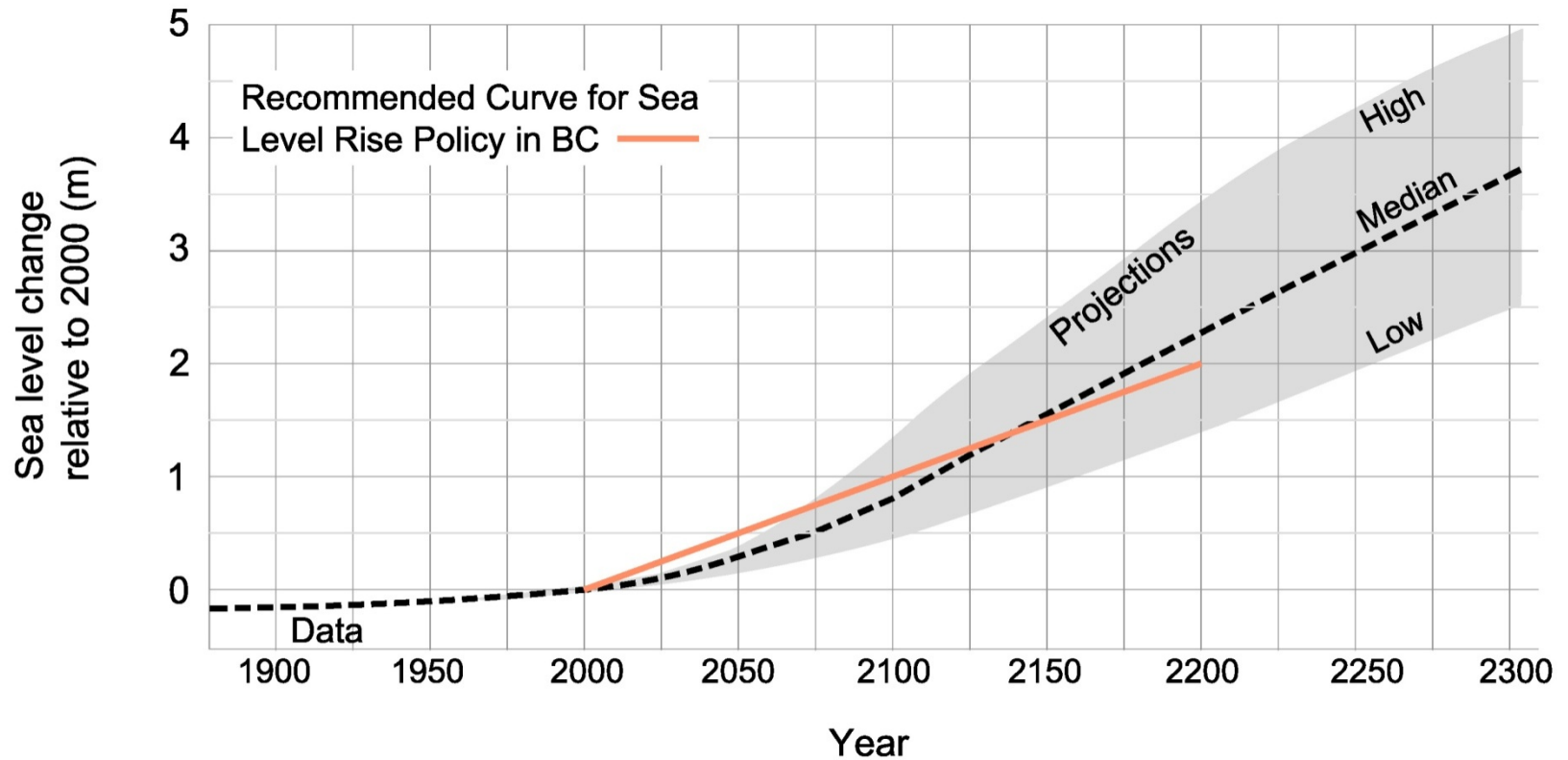
Richmond, 1930



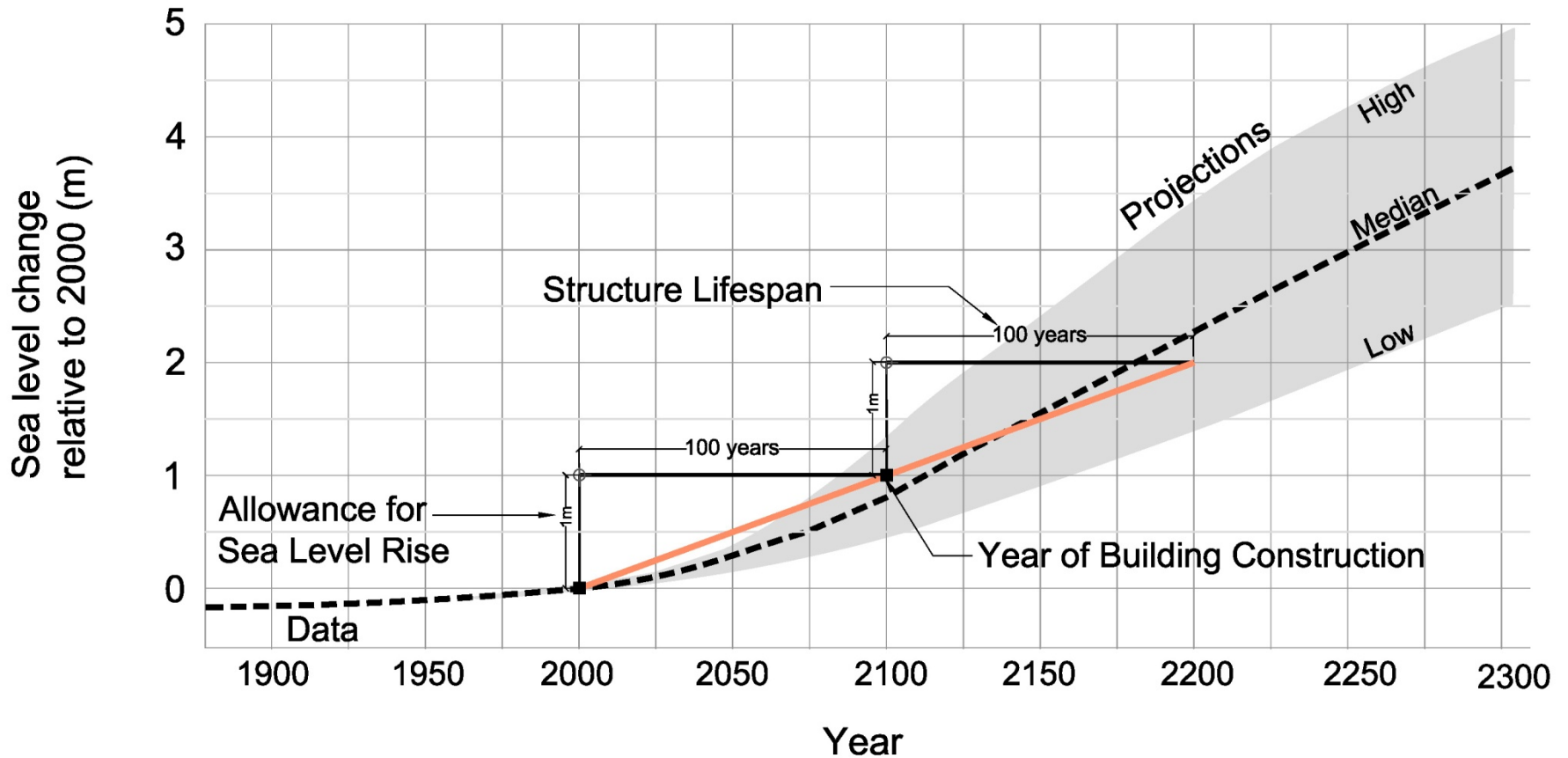
Richmond, 1995



# Issues – Sea Level Rise and Land Use



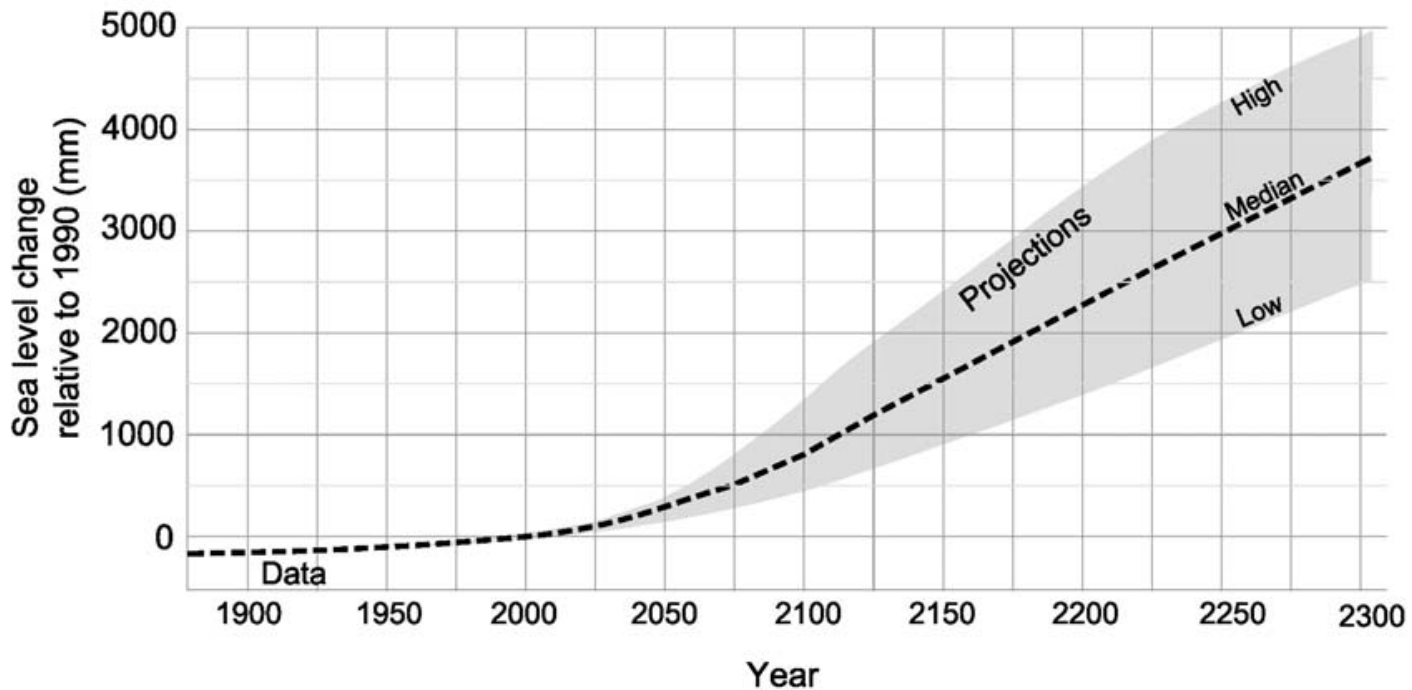
# SLR in 100 Year Development Lifespan



Sea Level Rise Effect on 100 Year Structures Based on SLR Projections

# SLR Guidance

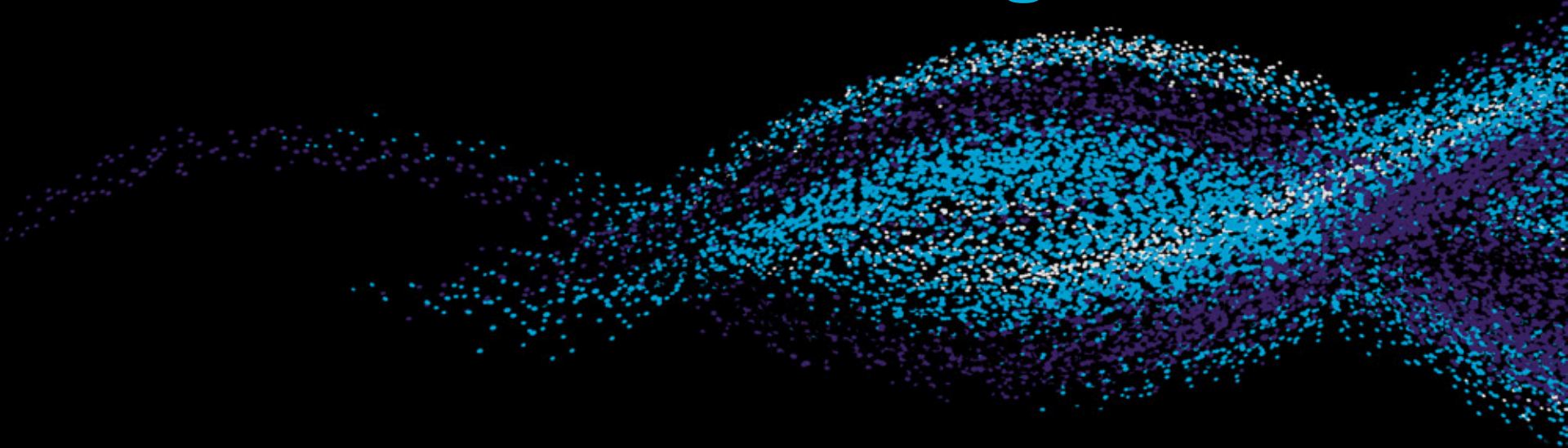
Development Timeframe	Guideline SLR Allowance
Lifespan to Year 2050	0.5 m
Lifespan to Year 2100	1.0 m
Lifespan to year 2200	2.0 m



## In the face of uncertainty

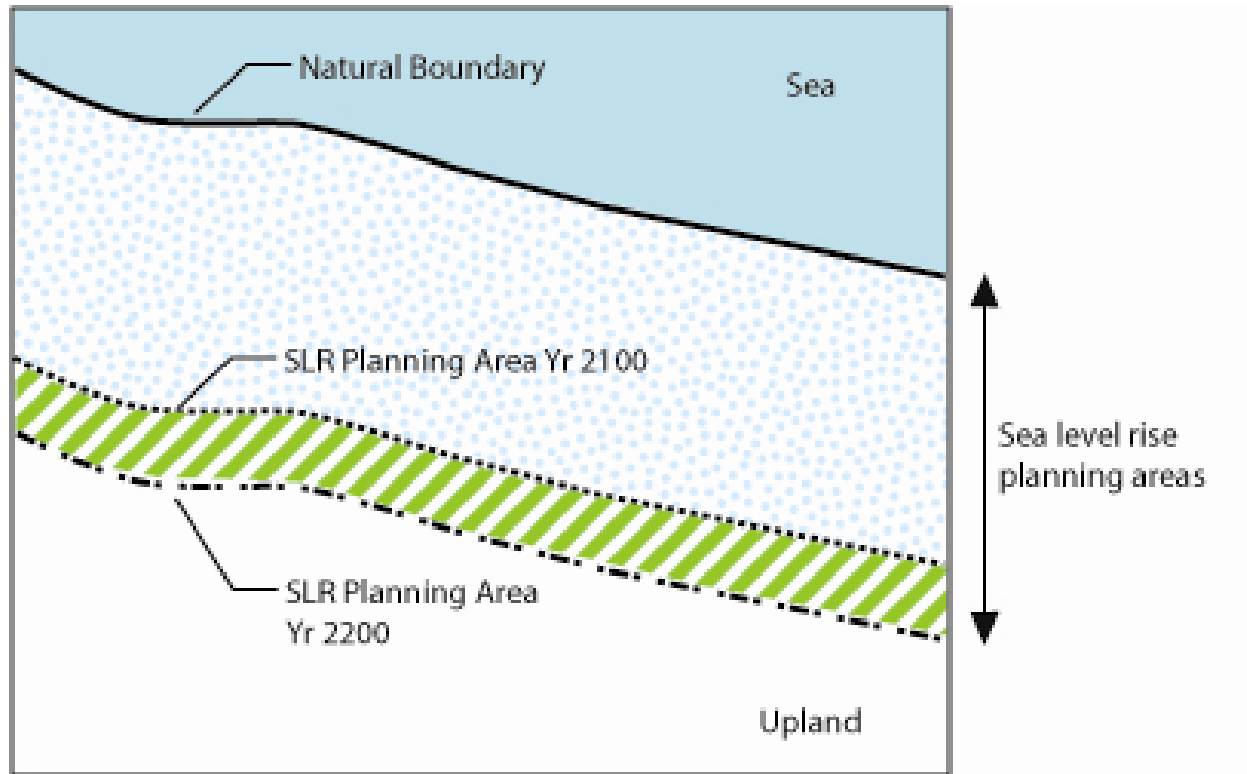
- Base current building Flood Construction Levels (FCLs) allowing for projected SLR at Year 2100.
- 90 year span allows for either one long-term building lifespan or two short-term building lifespans.
- Revisit SLR projections in 5 years (2015) and every 25 years thereafter.
- Adjust Flood Construction Levels (up or down) as new information becomes more certain.
- Effect of this approach is that new Flood Construction Levels would be set every 25 years, with an expected general trend upward.
- Maintain an adaptation strategy for where SLR may be 200 years ahead, but not require FCL to that level, as uncertainty is too great.

# Sea Level Rise Planning Areas





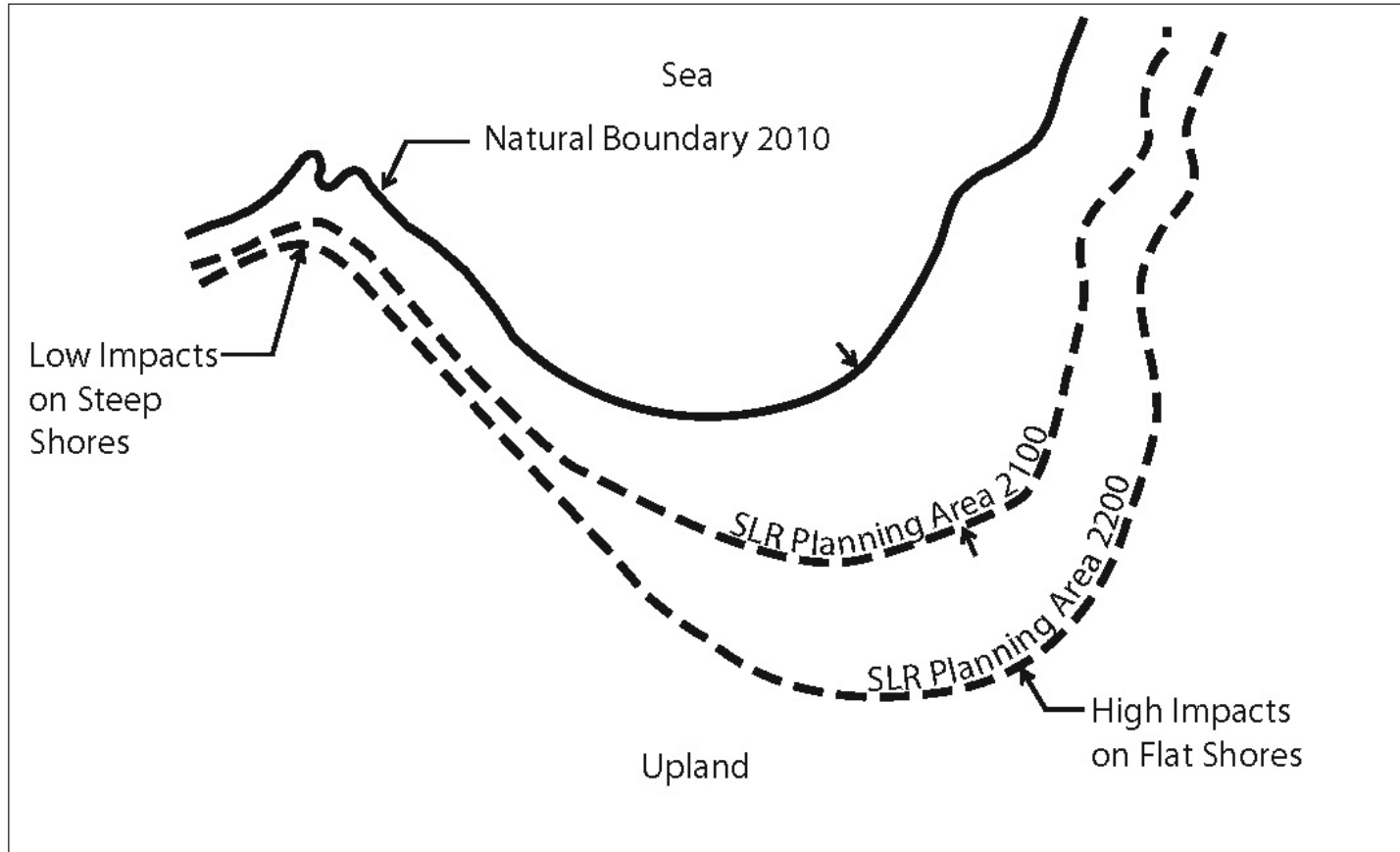
# SLR Planning Area



**Concept Plan of SLR Planning Area**



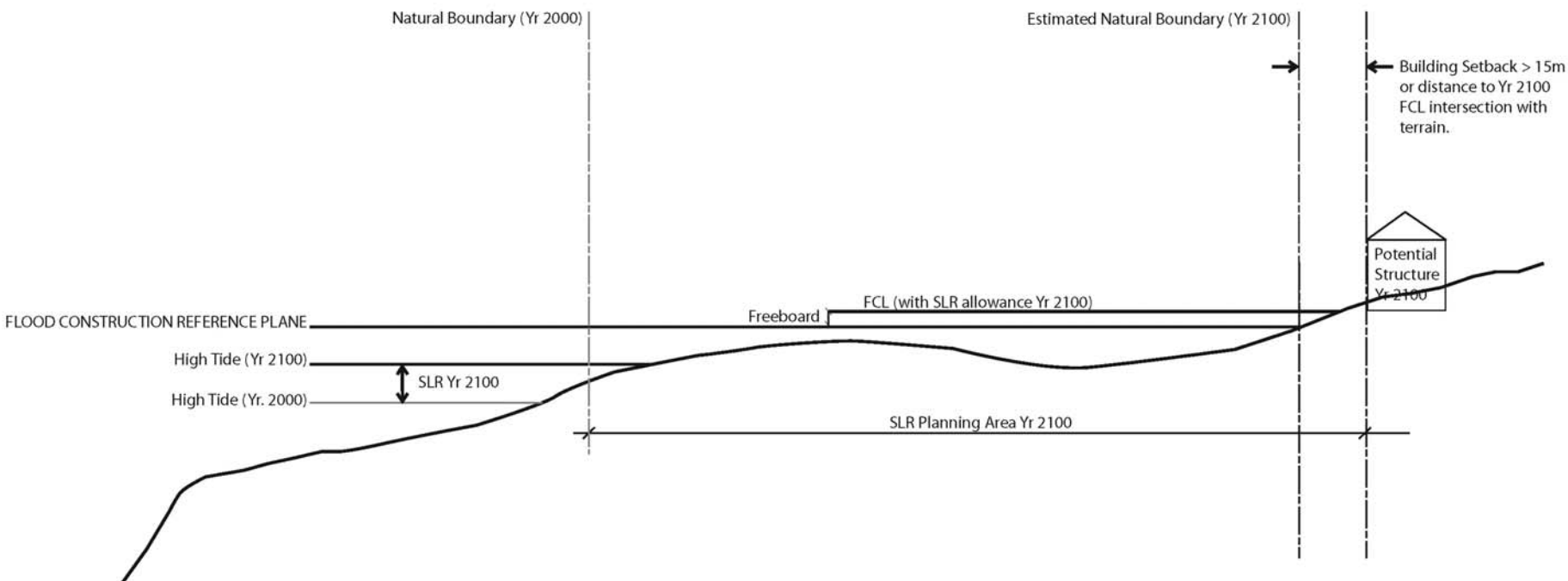
# SLR Planning Area and Shore Terrain



**Concept Plan of SLR Planning Area Varying with Terrain**

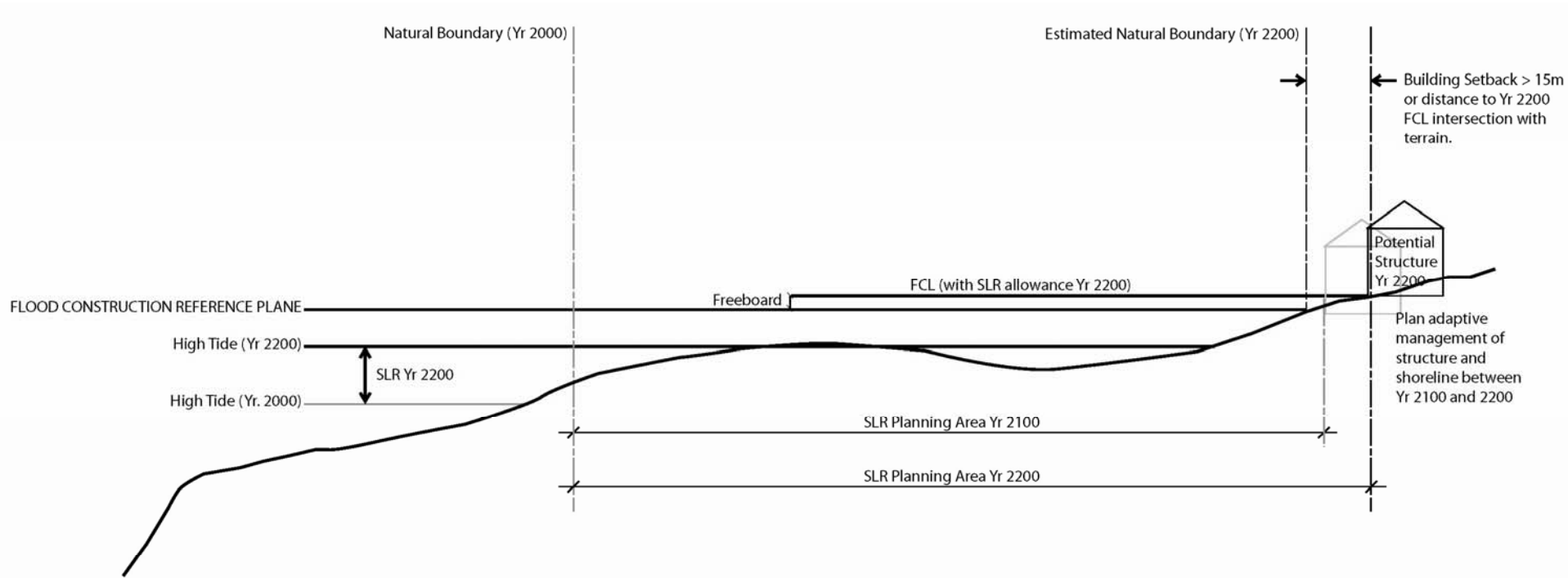
# Planning Responses to SLR

## SLR Planning Area and Terrain Yr. 2100



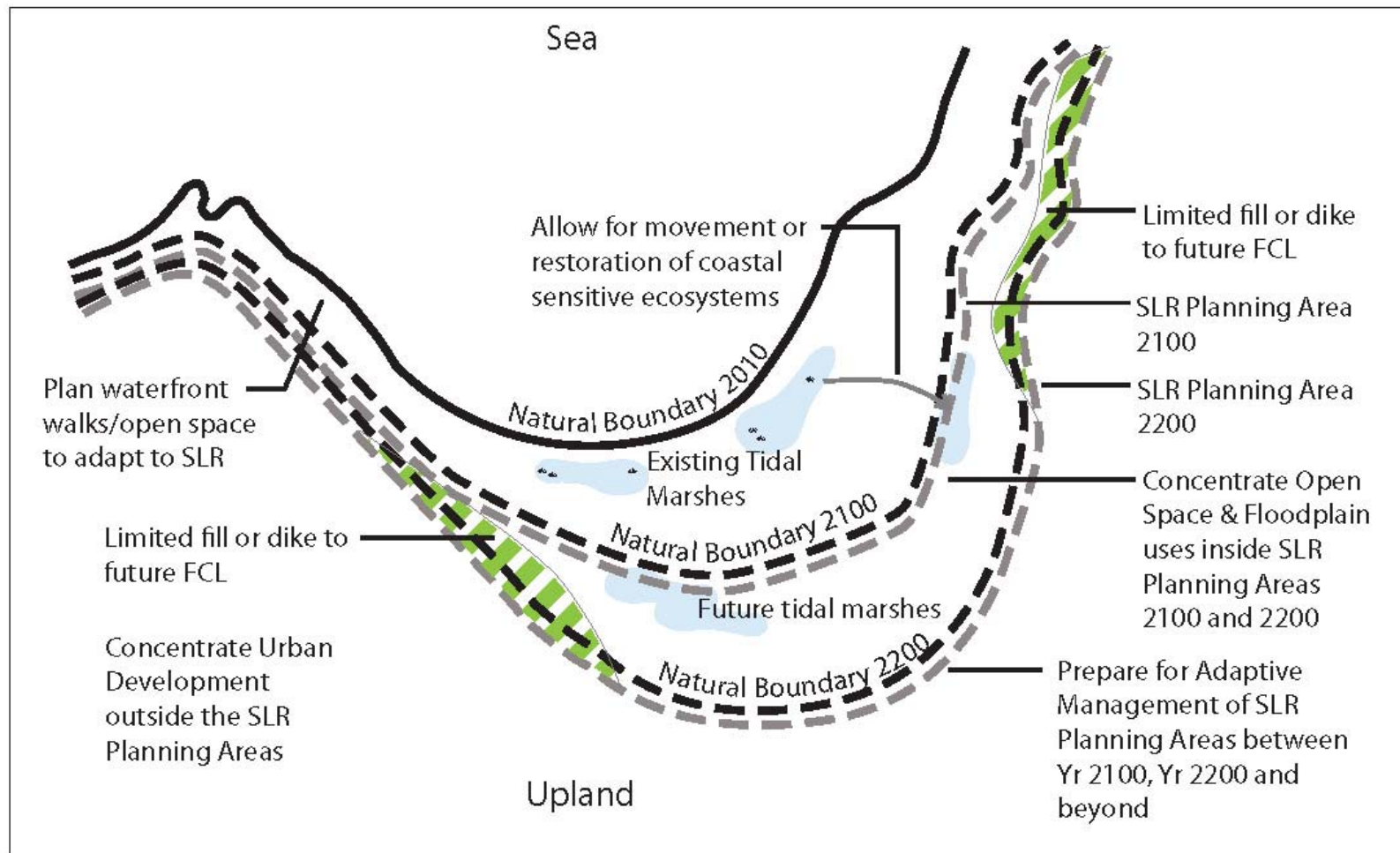


# SLR Planning Area and Terrain Yr. 2200



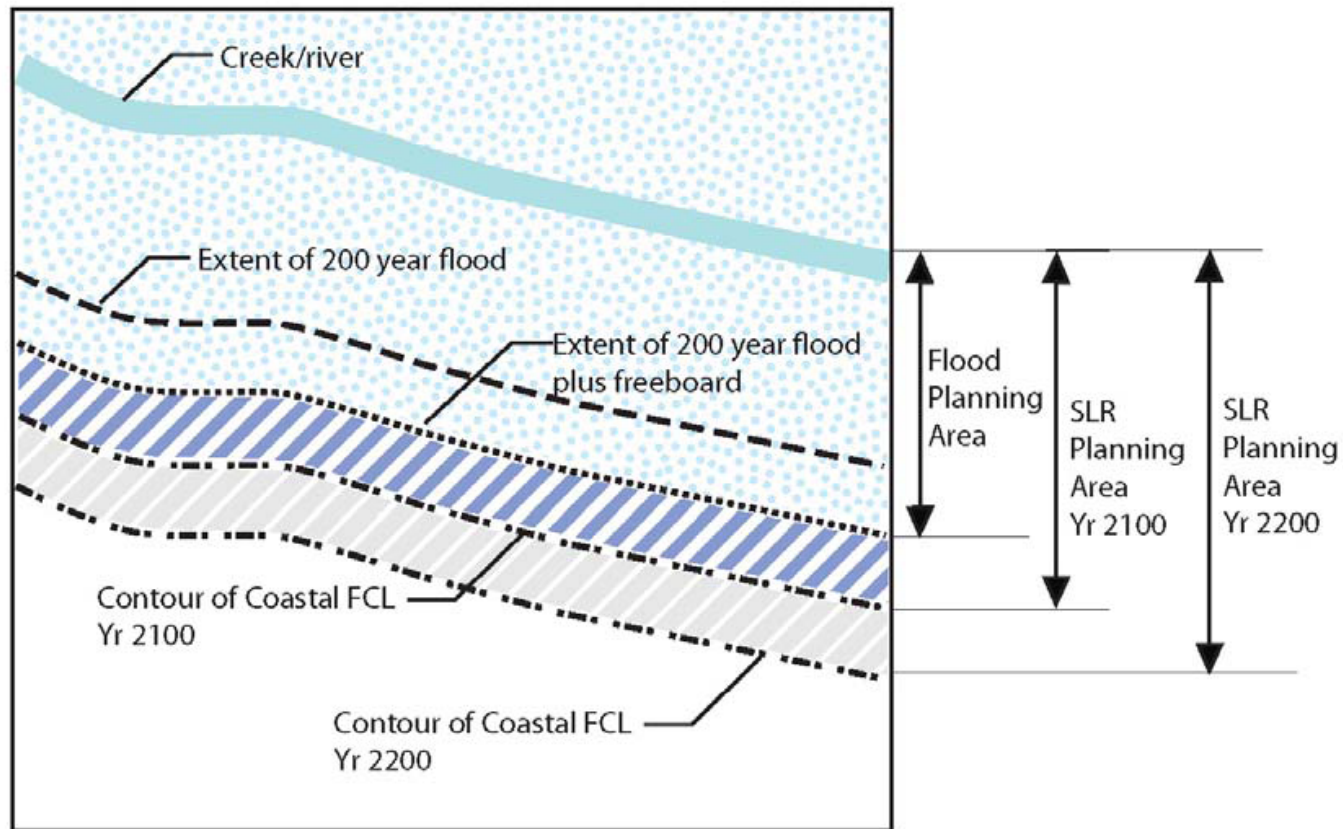


# Planning Integration





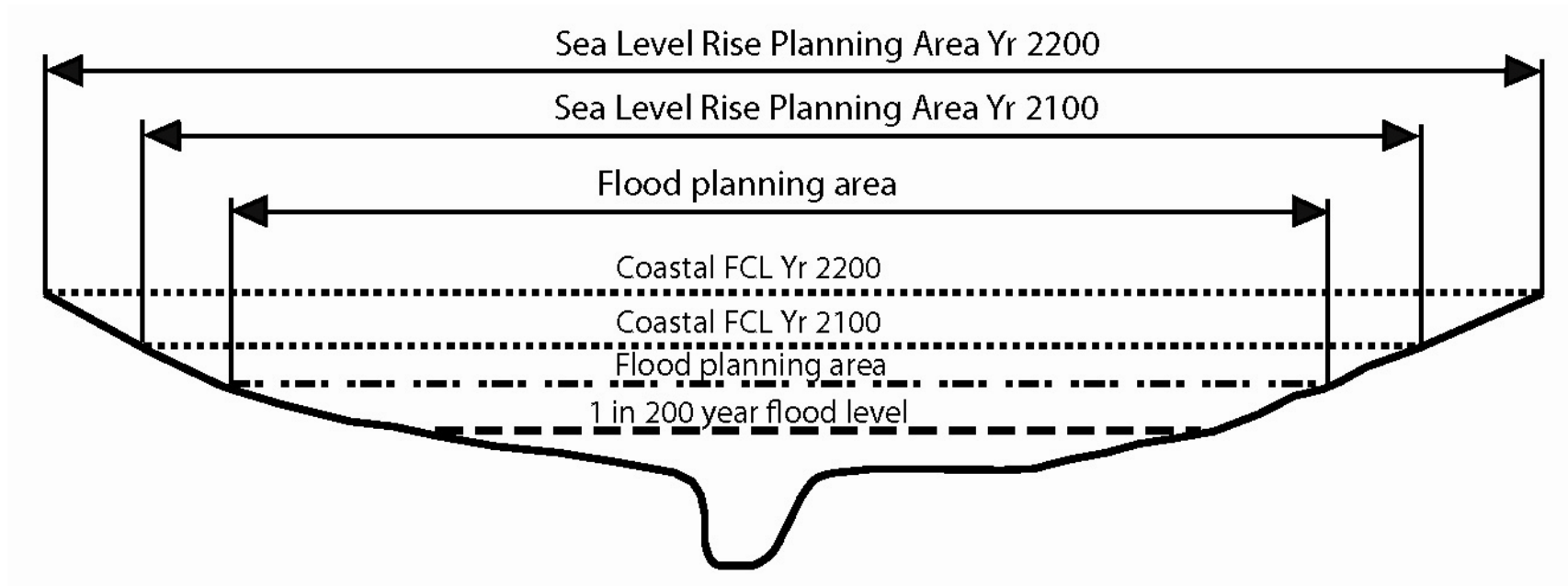
# SLR Planning Area in Estuaries



**Concept Plan of SLR Planning Areas at Estuary Floodplain**

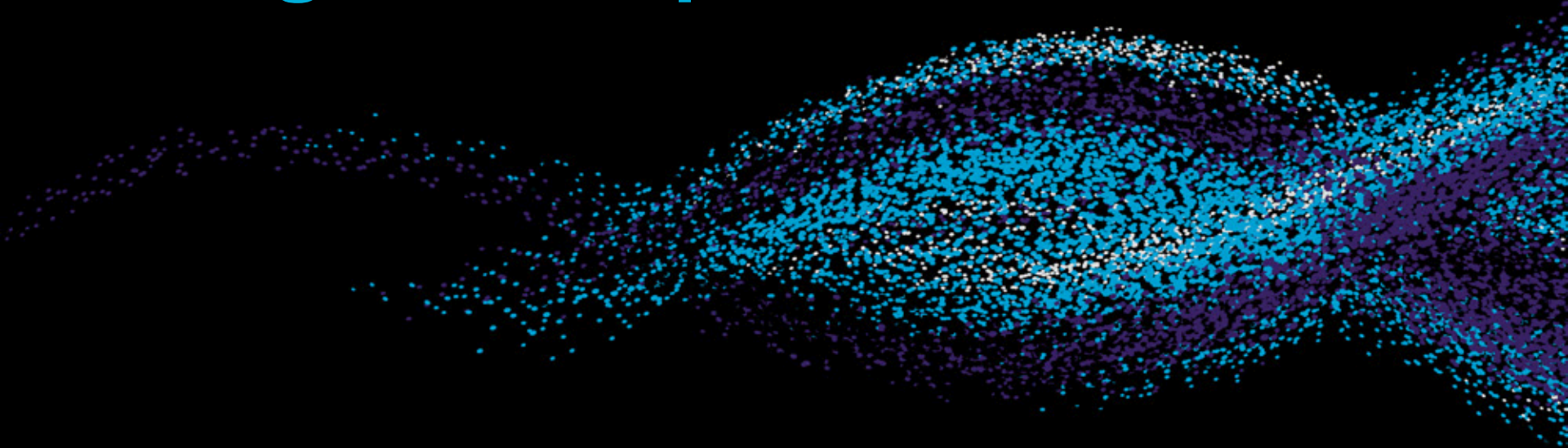


# SLR Planning Area in Estuaries



**Concept Section of SLR Planning Areas at Estuary Floodplain**

# Management Options



# SLR Management Options

- Avoid
- Accommodate
- Retreat
- Protect

# SLR Management Options

## Avoid

Concentrate urban uses outside floodplain areas (e.g. OCP)

Restrict land use, density or size of developments to uses with low impact of flooding e.g. agriculture, recreation, parks/open space, forestry, short term industrial. (e.g. OCP)

Provide setbacks to allow for SLR and shoreline changes, moving wetlands. (e.g. Zoning, DPAs)

# SLR Management Options

## Accommodate

Elevate structures and some land areas.

Use flood resilient construction practices: e.g. Electrical systems above FCL, one-way valves in drainage pipes; waterproof resilient building materials; move building contents out of the path (e.g. DPAs, Covenants)

Plan evacuation notices and routes.



# SLR Management Options

## Retreat

Prohibit shoreline protection structures – avoid ecological impacts.

Plan to move flood sensitive land uses as SLR occurs (e.g. Covenant)

Managed realignment – set back or breach dike to a new line of defence.

Relocation within a property boundary

# SLR Management Options

## Protect

Seawall – tends to create scour and loss of beach in front of wall

Revetment – can lead to ‘squeezed out’ wetlands as SLR occurs

Dike – protects land use but can thwart ecological benefits of floods

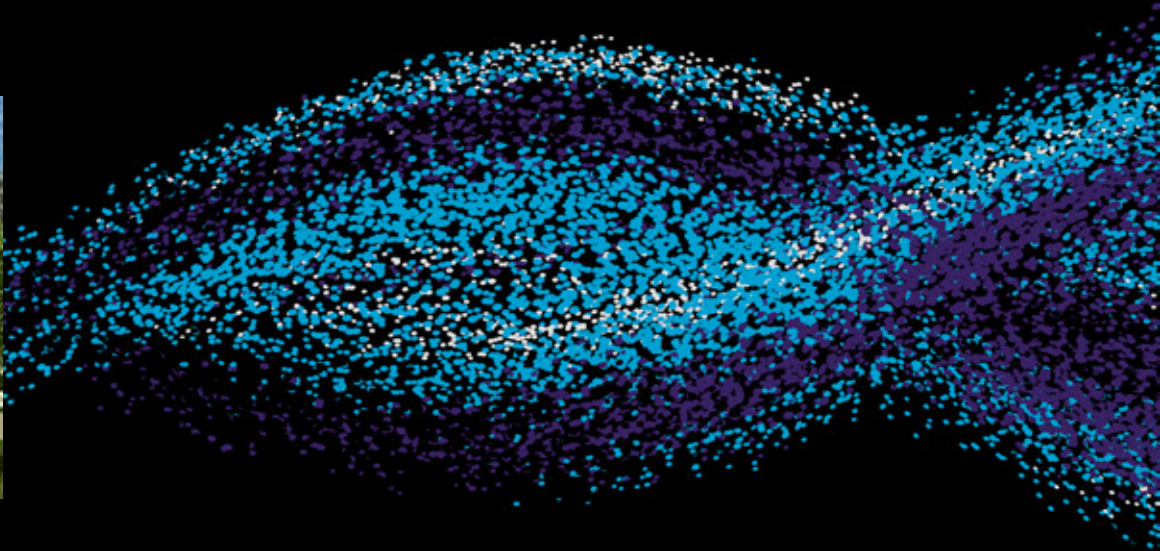
Tide gate – can impact fish movement and saline balance

Storm surge barrier – can effect ecosystem of salt marshes

Dune – can provide shoreline habitat and sand source to offset erosion

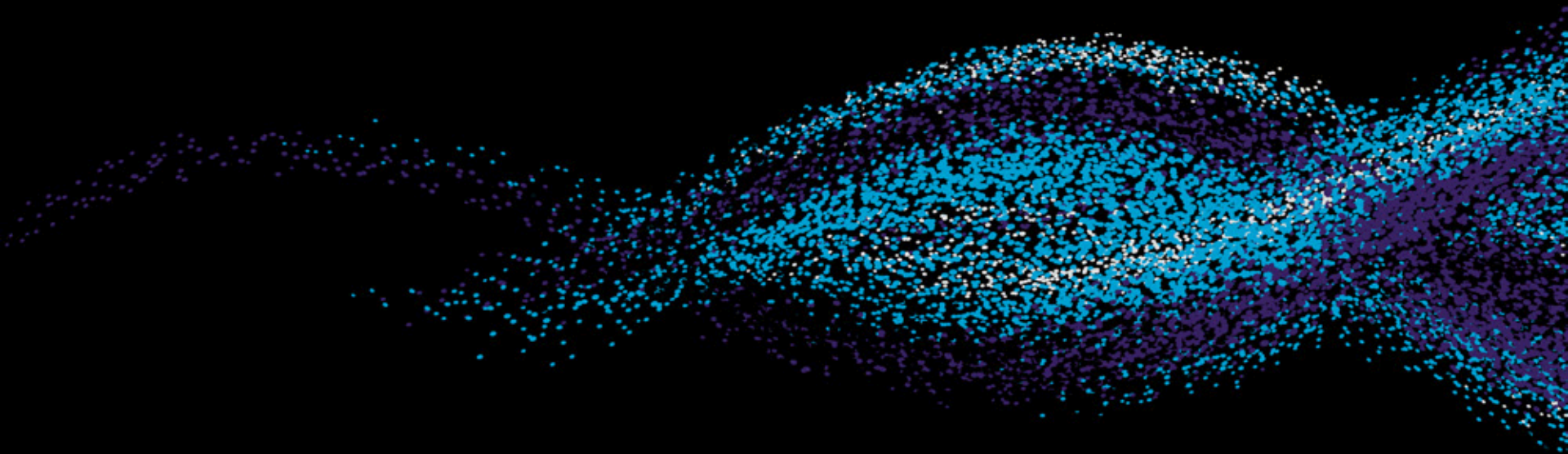
Beachfill – short term loss of shallow marine habitat – may provide new habitat

See Dike Guidelines & Greenshores.ca

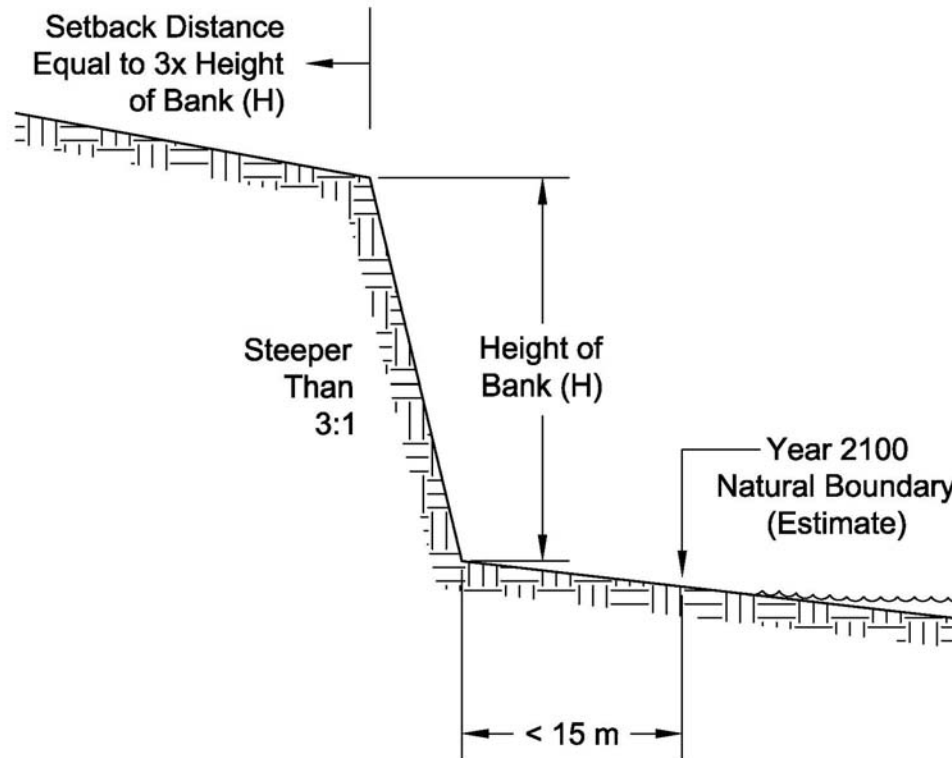


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# Questions?

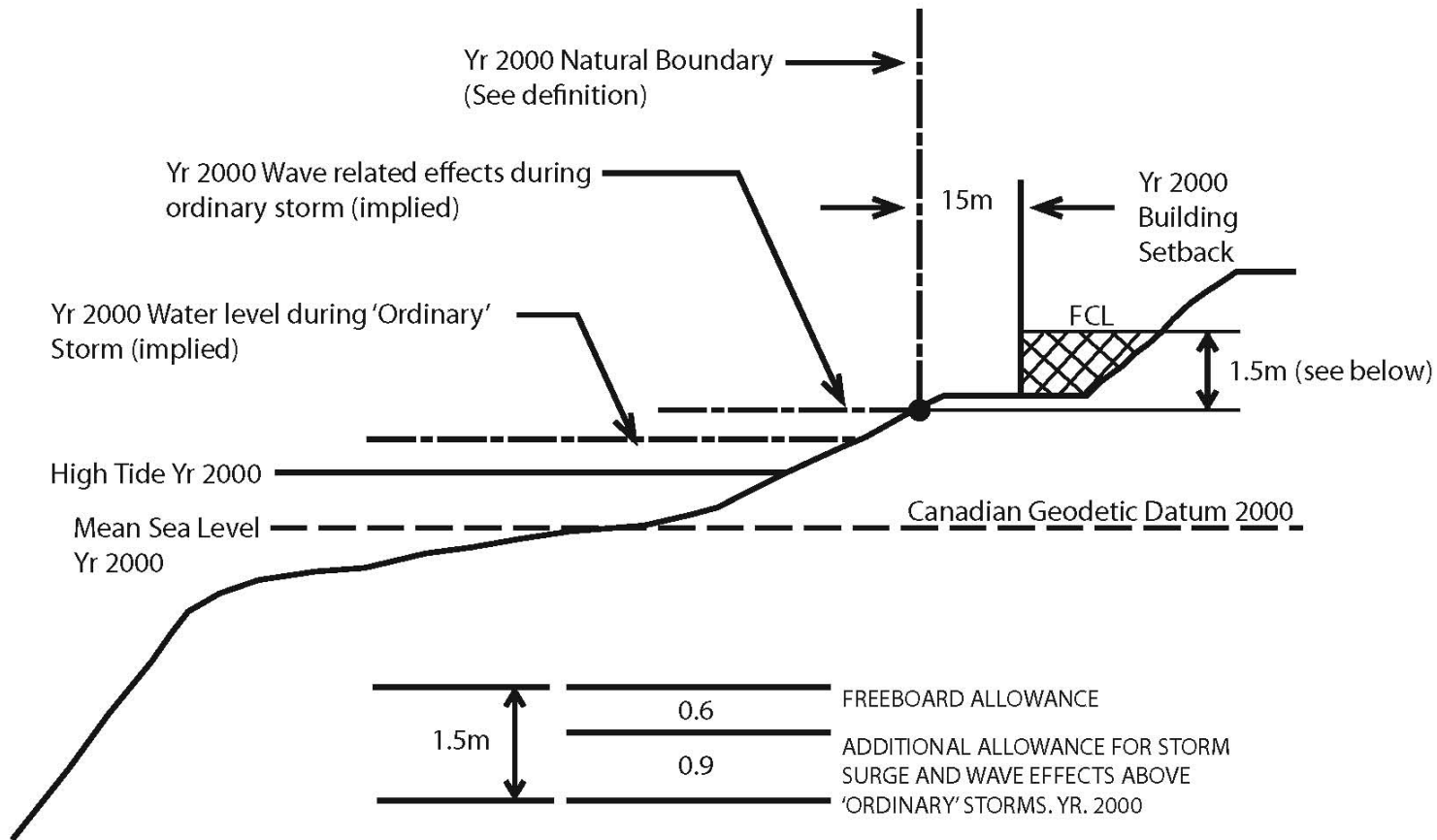


# SLR Planning Area and Shore Cliffs



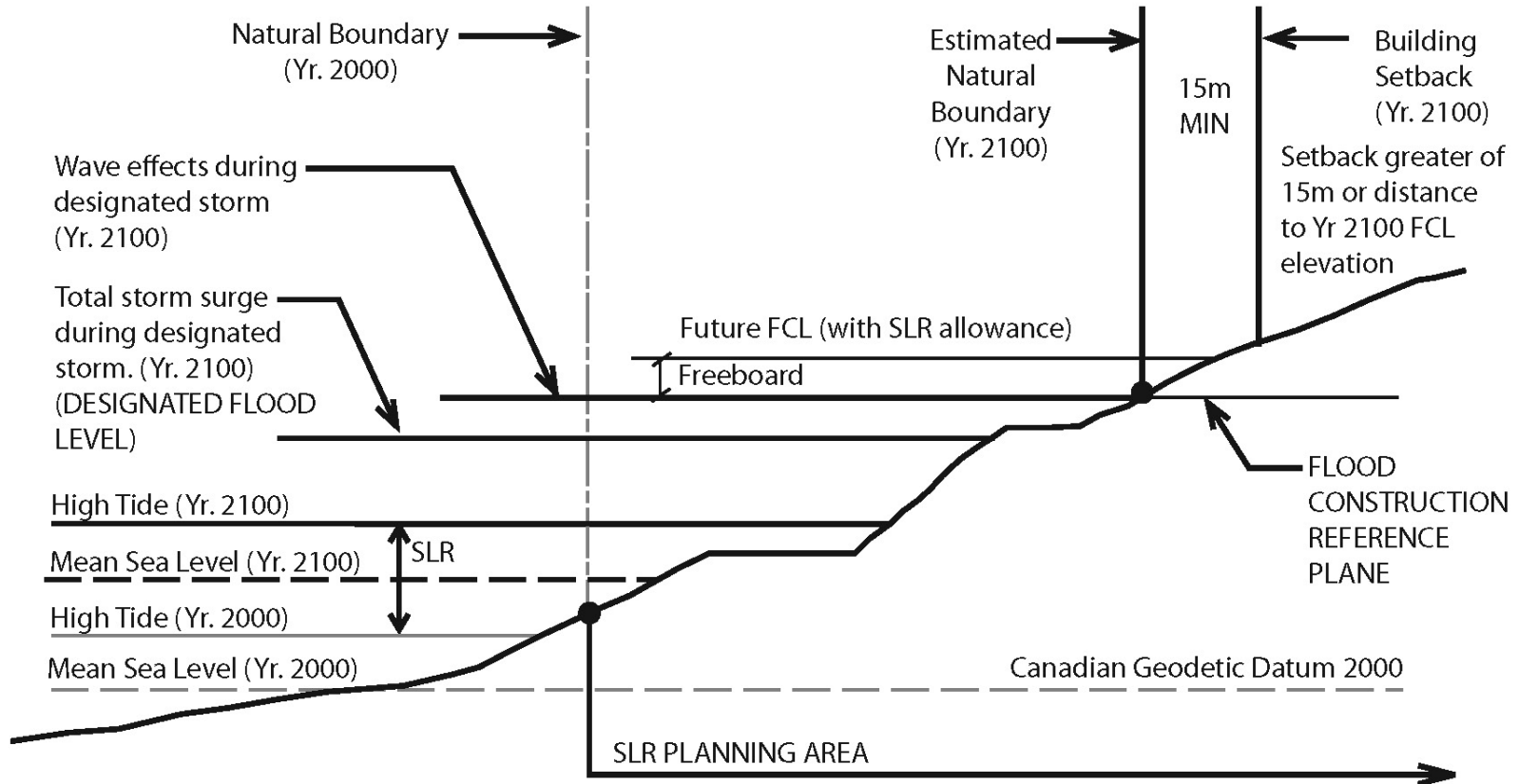
Re Questions about cliffs

# Fundamentals of Coastal Flood Hazard



## Coastal Flood Hazard - Interpretation of Existing 2004 Definitions

# Fundamentals of Coastal Flood Hazard



## Coastal Flood Hazard – Adaptation for Climate Change