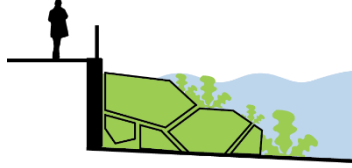


# Vegetated Revetment

## Flood Adaptation Measure



### ECOLOGICAL INFRASTRUCTURE



#### WATER LEVEL RANGE:

Intertidal to supratidal

#### SHORELINE LOCATION:



Shoreline

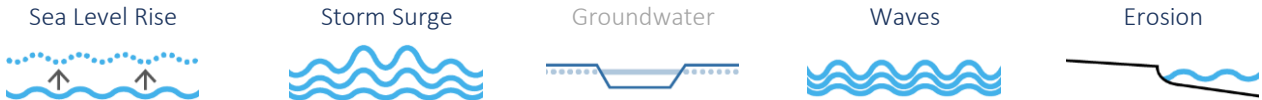


Vegetated rock mattress ©Salix River & Wetland Services Ltd.

DESIGN LIFE	ADAPTABILITY	IMPACT ON THE WATERFRONT	CONSTRUCTION COST
Decades	Medium	Minor Intervention	TBD

### COASTAL FLOOD HAZARDS MITIGATED:

Enhancements can provide flood protection when combined with other physical infrastructure



MEASURES COMPATIBILITY:		ECOSYSTEM SERVICES: Measure may affect these shoreline values			
Flood	Seismic	↑	↑	— / ↑	↑
Seawalls, Levees	Nearshore Buttress, Landside Buttress, Liquefaction Mitigation	Aquatic Habitat	Terrestrial Habitat	Water Quality	Carbon Storage
		—	—	—	—

### DESCRIPTION:

Plantings can be added to the voids between a revetment’s armor units to improve the aesthetics of the structure and/or create riparian and fish habitat. Plants can slow flows, reduce wave runup, and increase sediment deposition. Engineered revetments protect coastal shorelines and river banks and, depending on site conditions, are armored with rip-rap, articulated concrete blocks (ACB), marine mattresses, or fabric-formed concrete mats. Geotextiles are also used to protect bare slopes in low wave and/or weak flow locations.

### CONSIDERATIONS:

- Design should anticipate migration pathways or re-planting as sea levels rise

### ADVANTAGES:

- Enhances aesthetics.
- Can improve riparian and fish habitats.

### DISADVANTAGES:

- Can collect floating debris.
- Potential need to remove invasive species and debris, and trim vegetation.

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- Suitability is determined by water quality, water levels, and wave environment
- Vegetation can increase the structure or slope stability in waves and seismic events
- Some flood mitigation effect due to increased slope roughness which could reduce wave runup

### CONSTRUCTION IMPACTS TO THE PUBLIC:

- Landside access necessary. Access to the shoreline will be constricted due to construction, and may impact parts of the Promenade.

### SEA LEVEL RISE ADAPTATION OPPORTUNITIES:

- Plantings should be compatible with design high water levels and tide range.
- Future sea level rise will submerge intertidal vegetation requiring re-planting or migration of the plants up the slope.

### CASE STUDIES:

- None cited

### DESIGN OPPORTUNITIES:

#### Ecological Enhancements

- Native/local plant species should be installed to maximize habitat across the land-water transition zone.

#### Urban Design

- Vegetation would mitigate what would otherwise be considered an aesthetically unpleasant revetment. Public access should be safely designed to prevent climbing over the revetment.

#### Form

- Form is determined by geotechnical and structural stability.

### DESIGN CONSIDERATIONS:

- Waves could unroot or damage vegetation. Best for use in low wave environments.
- Within bays, wind and waves and their potential to transport and settle floating debris in the vegetation should be considered.
- Vegetation must be native and compatible with water quality and range of water level.

### SITE-SPECIFIC CONSIDERATIONS:

- Success will depend on climate and water quality and the tolerance to flooding of the selected species.

### URBAN DESIGN CONSIDERATIONS:

- As with unvegetated revetments, vegetated revetments can present a hazard if people walk on or climb down the revetment.
- Measures should be employed to discourage people from climbing down to the water over the revetment and damage vegetation.

### INSTALLATION AND CONSTRUCTABILITY CONSIDERATIONS:

- Planting in an existing revetment would be more difficult than in a new one because existing voids may not be suitable to achieve the desired planting density.
- Planting density will be dictated by the availability of voids.

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### OPERATIONS AND MAINTENANCE CONSIDERATIONS:

- Watering may be necessary initially for vegetation planted above high water and subsequently if the site experiences dry conditions.
- Less maintenance is required over time once the vegetation becomes established (after up to 3 years).
- Maintenance may be required to re-plant after storm damage, remove invasive species, trim the vegetation if it grows too much, or collects floating debris.