

Living Shorelines for Urban Environments

Revitalizing Waterfronts in the Bronx

dlandstudio

PREPARED FOR
Bronx Council for Environmental
Quality (BCEQ)

LearnUp to SpeakUp as
Stewards of Our Water
& Land Workshop

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Urban Shorelines are disturbed shorelines



Ecological Restoration

Ecological Activation

Water

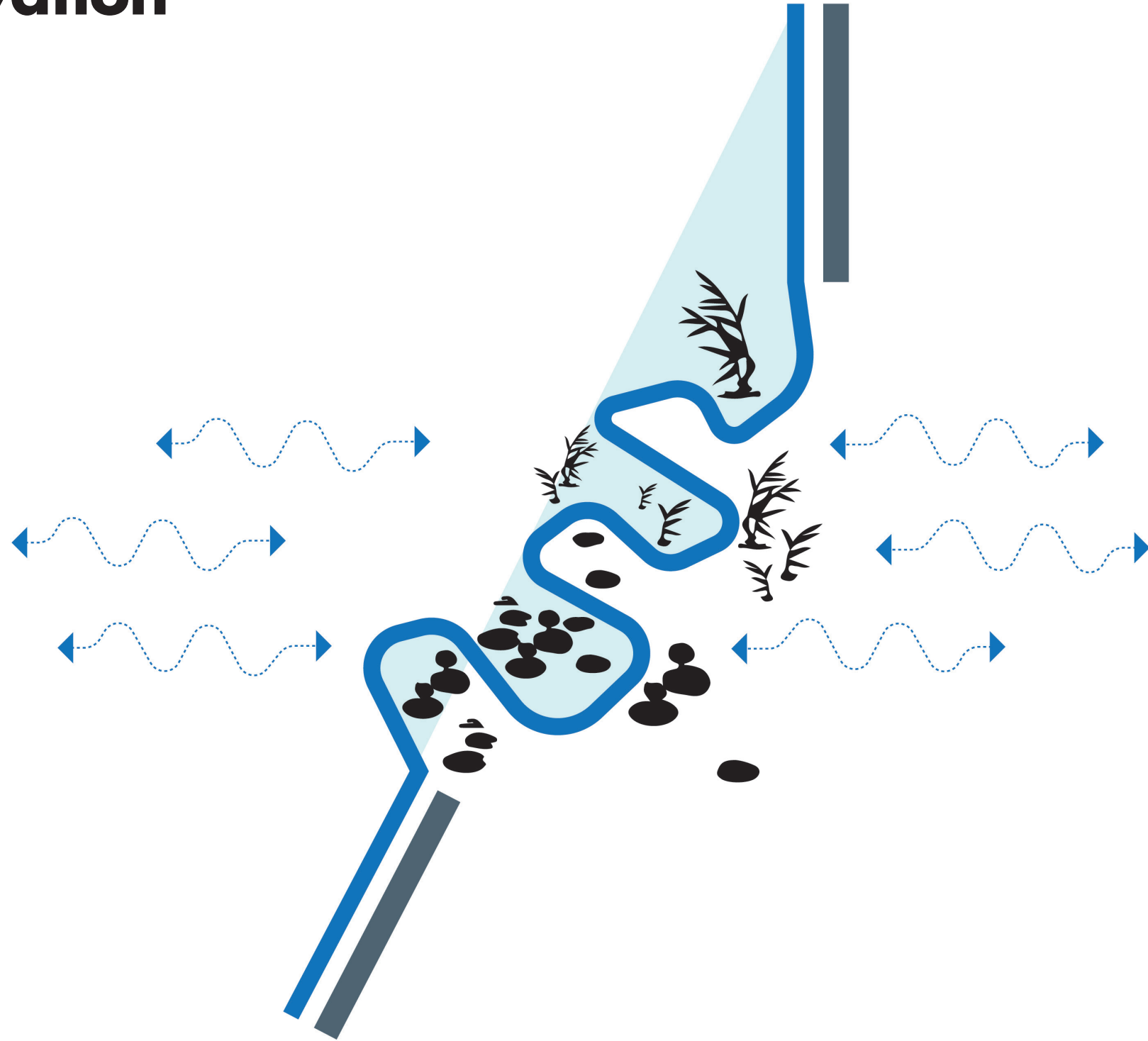
Flooding

Erosion

Wave energy

Nearshore habitat

Marine life



Land

Runoff

Pollution

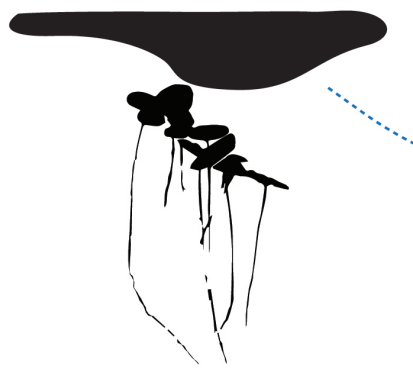
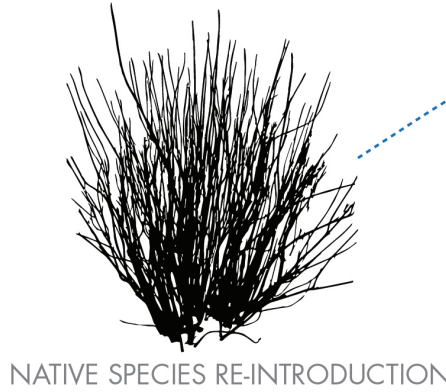
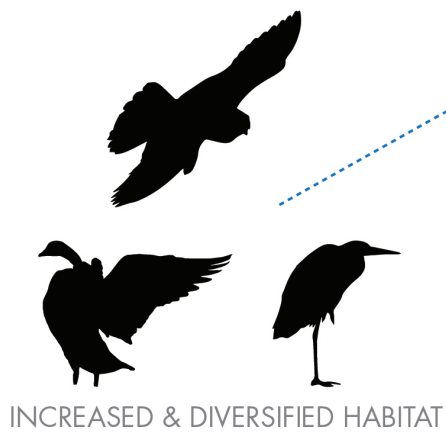
Resiliency

Upland habitat

Recreation

The Activated Edge

ENVIRONMENTAL BENEFITS



HUMAN BENEFITS



THE LIVING SHORELINES LANDSCAPE



Study Site

Existing conditions



The Urban Shoreline continuum



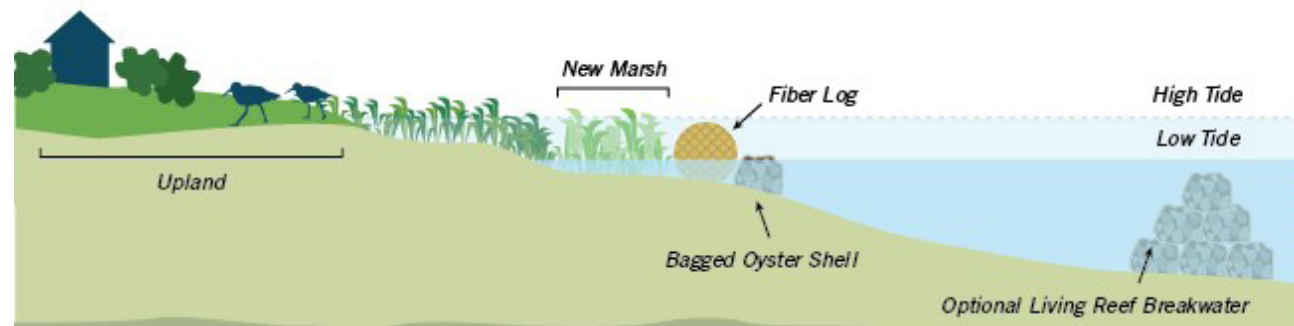
Zones and disturbances



Living Shoreline typologies

Nature-Based Living Shoreline

Nature-based living shorelines are best in low-energy areas. “Biological enhancements,” like biodegradable fiber logs (which also provide habitat for ribbed mussels) or Christmas trees, are placed along the tidal marsh edge to provide a contained area for sediment to accumulate and marsh vegetation to grow. In more moderate energy areas, it might be possible to use a hybrid approach that pairs nature-based living shorelines with living reef breakwaters.



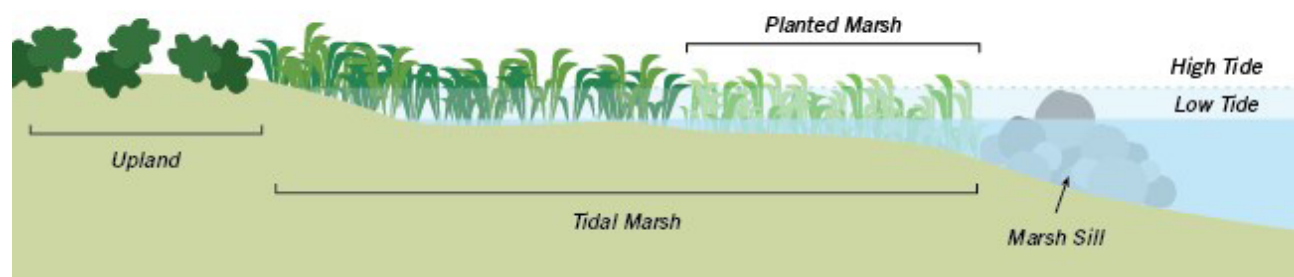
Beach Restoration

Restoring beaches requires placing additional sand along a shoreline to help maintain habitat for key species—like horseshoe crabs, red knots and piping plovers—that use sandy beaches for spawning or feeding. The natural sloping beach allows waves to break across the sand, minimizing erosion of the shoreline edge.



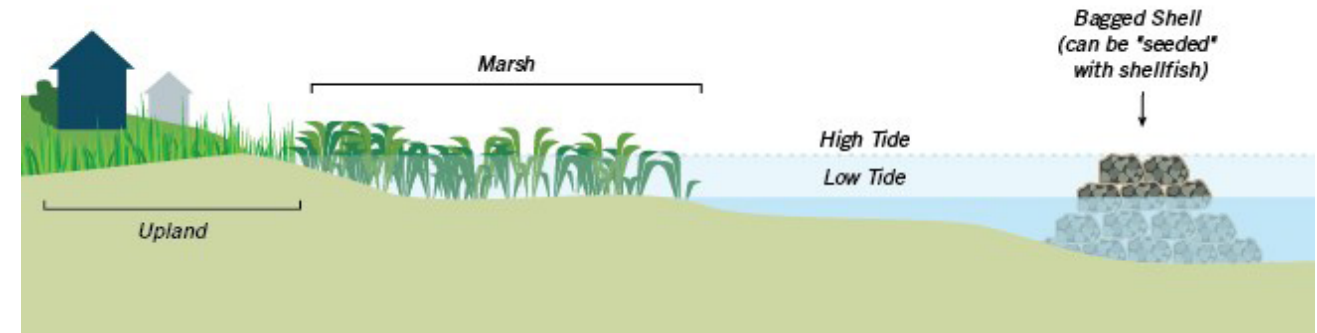
Marsh Sill

Marsh sills are low elevation structures (e.g., rocks or bagged oyster shell) that run parallel to the shoreline and are below water at high tide. The area between the sill and the marsh is often filled and planted with marsh vegetation to speed up shoreline stabilization.



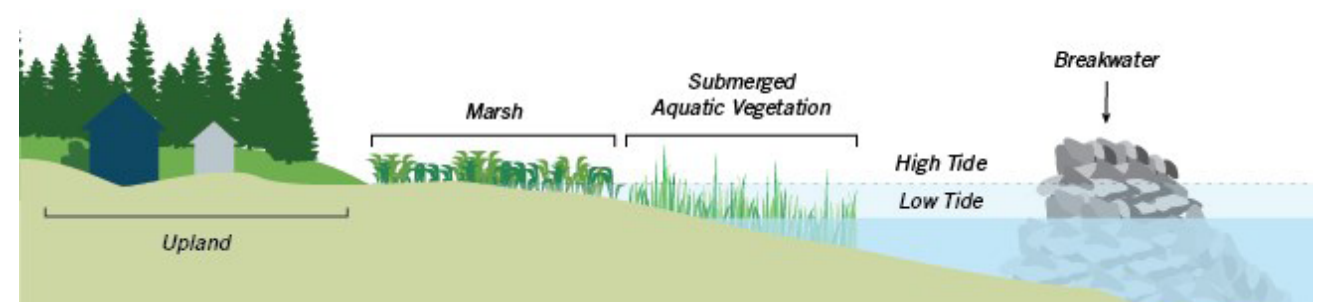
Living Reef Breakwaters

Living reef breakwaters function similarly to constructed breakwaters, but are built to provide habitat for baby oysters, mussels and other reef species to settle upon. Reef balls, oyster castles, bagged shell and other reef structures provide a durable and heavily-weighted substrate. Over time, large reef structures can form that not only serve as a natural breakwater, but also provide critical aquatic habitat.



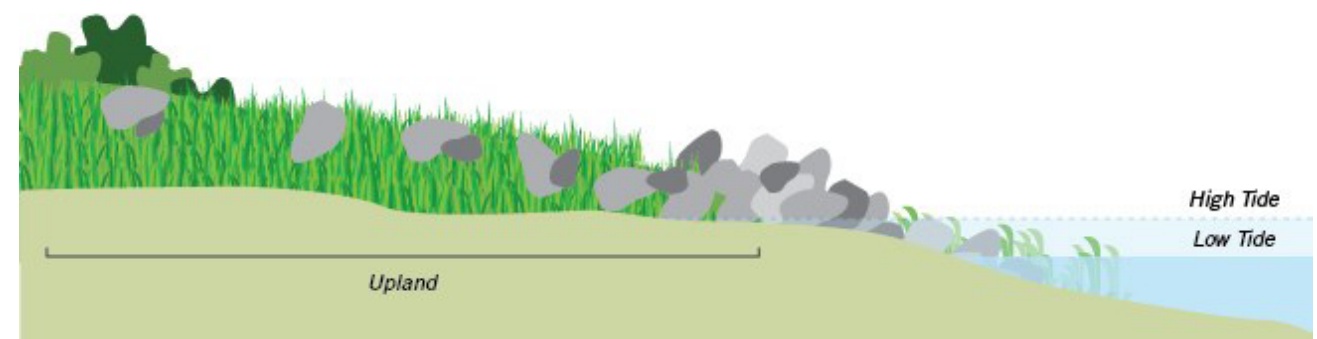
Breakwater

Breakwaters are typically constructed parallel to the shoreline and designed to reduce the amount of wave energy experienced by the shoreline directly behind them. Sometimes a vegetated (typically marsh) shoreline is established behind the breakwater. Unlike marsh sills, they are typically constructed in deeper water with more energetic waves. They also tend to be slightly larger and are typically visible at high tide.

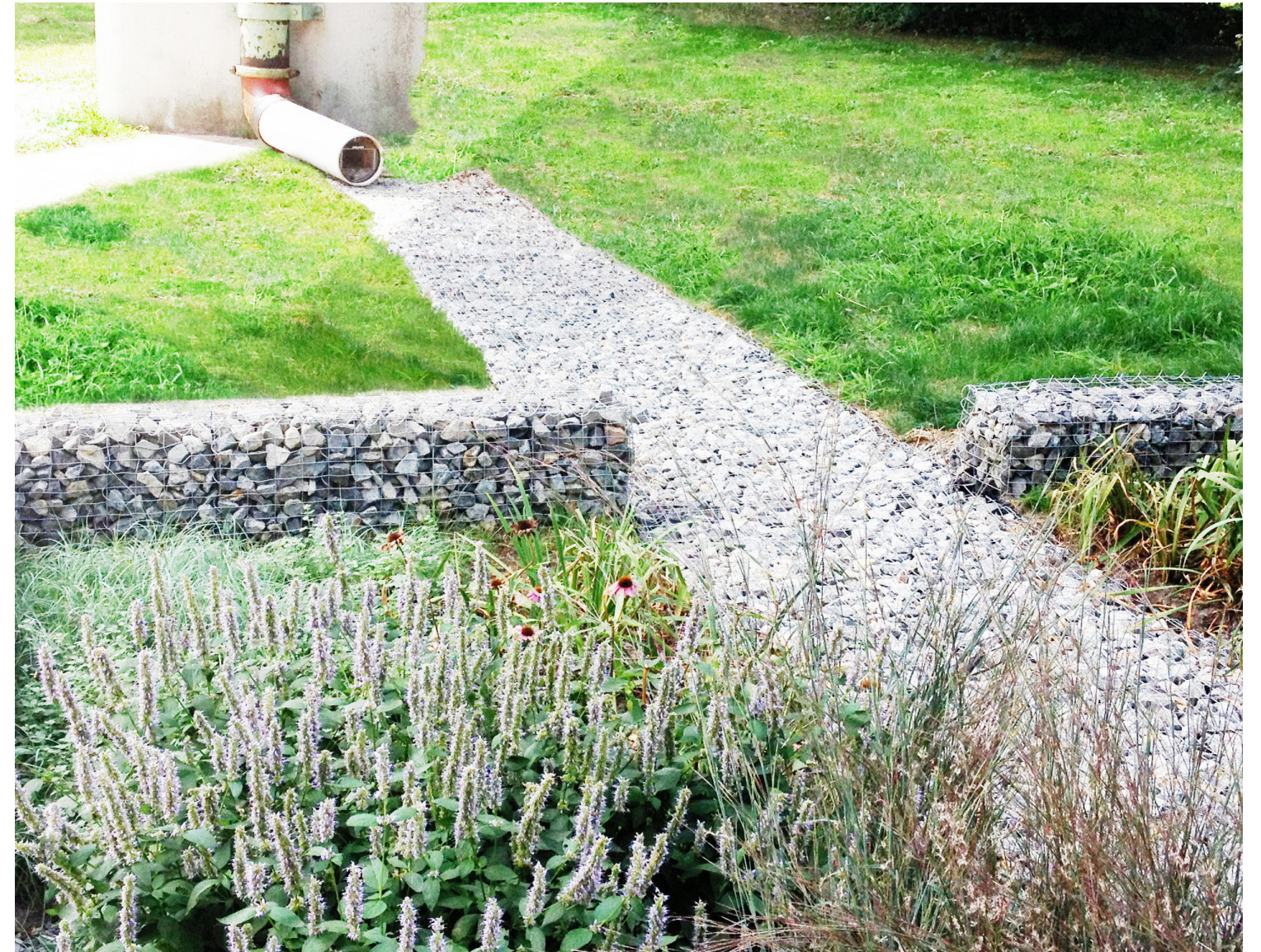


Ecologically Enhanced Revetment

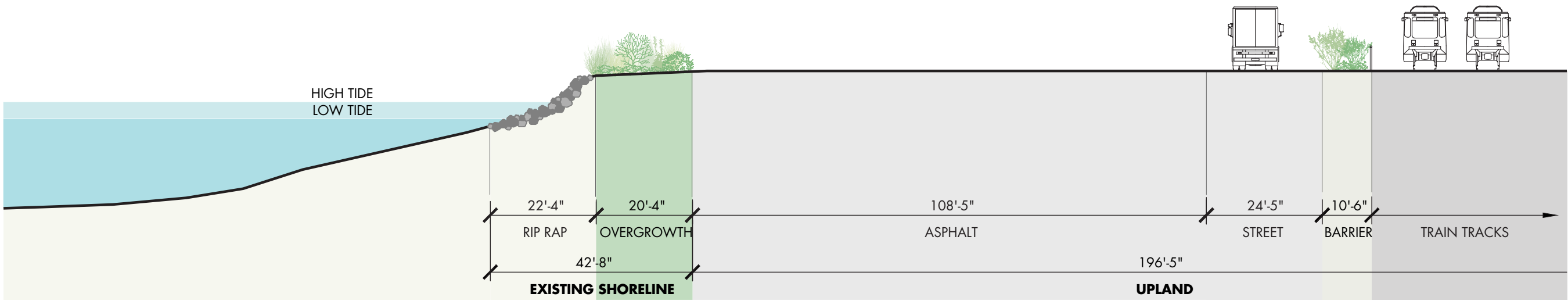
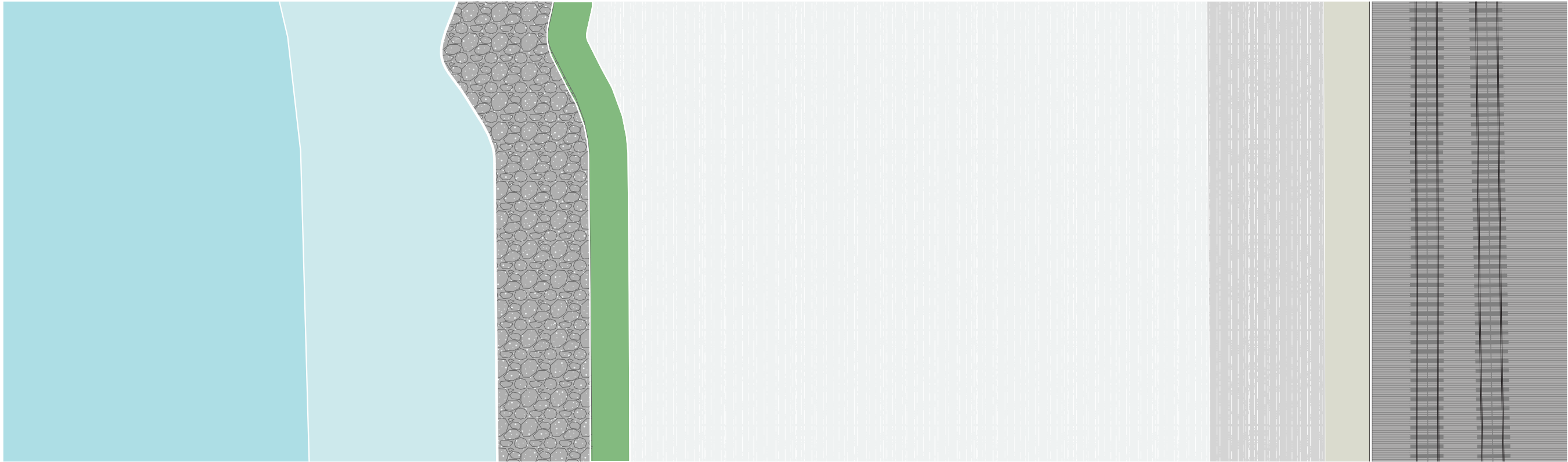
Ecologically-enhanced revetments are porous, vegetated structures attached to the shore. They are typically constructed from rock or broken up concrete, although other materials can be used (e.g., gabion baskets, rubble/debris, and even felled trees). They can be used at both open coastal locations and on lower energy sheltered areas.



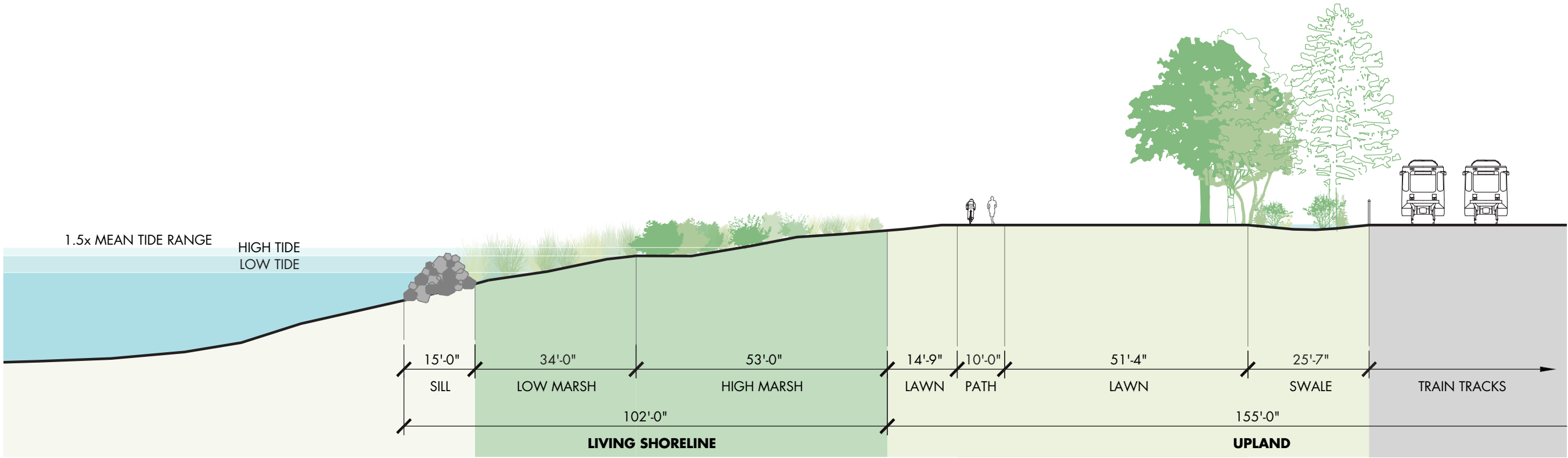
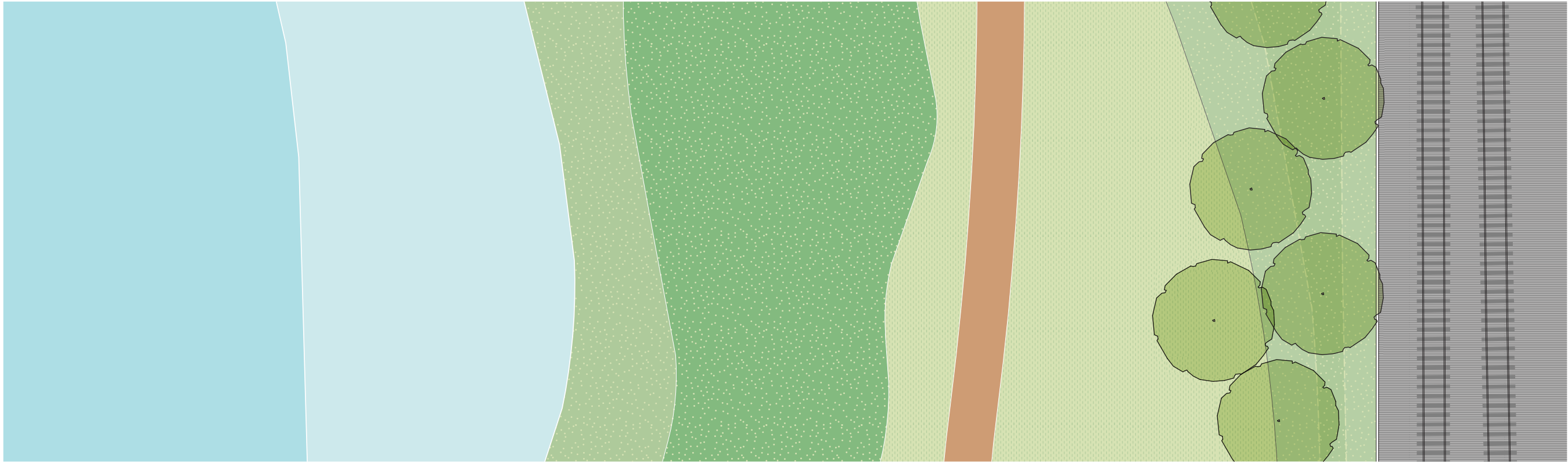
Extending the Urban Shoreline



Existing conditions



Proposed conditions



Enhanced ecology, resiliency and natural beauty



Example: The Active Edge

Hunters Point South



An Urban Living Shoreline for Bridge Park South

