



1.2 Shoreline from Little Stony Point to Breakneck Ridge

1.2: Routing The Trail Along The Shoreline

The slopes of the Hudson Highlands come closest to the river in this stretch of the project corridor, thus Route 9D and the railroad tracks are side by side leaving no room for a trail. The only feasible location to route the trail is along the shoreline (see p. 36-37). Certain portions of the shoreline are wide enough to build a trail between the tracks and the water, while other portions are too narrow. Under all scenarios, a 12' offset from the nearest track must be maintained with a fence to separate the trail from the tracks. Therefore, the proposed trail design varies based on existing shoreline width. The proposed trail rests on existing land along the southern half of the shoreline segment (see section 1 on p. 36). Where the shoreline begins to narrow there are three additional design alternatives proposed to accommodate the trail (see graphic on p. 36-37):

1. Partially pile-supported structure (one side rests on land): If less than 4 feet of additional shoreline width is required to build the trail, standard rip-rap fill or a “living shoreline” (explained below, right) is proposed. In the case of small gaps between areas with enough existing land, decking in between these areas using a boardwalk that is partially pile-supported or cantilevered would allow the inland side of the trail to rest on land. This could help minimize the impacts of filling into the river, whether over rip-rap or with a living shoreline.

2. Shoreline widening (living shoreline): In order to widen the shoreline enough to accommodate a trail, the concept of building a new living shoreline has been explored. Rebuilding the river's edge as a living shoreline is a means of stabilizing the land at the water's edge while supporting the important habitats along the shore and protecting them from erosion. Unlike a trail on a pile-supported structure placed out in the water, a living shoreline provides an opportunity to design for sea level rise and protect the land from the threat of storm surges. Shoreline vegetation minimizes erosion, and placing the trail on a ‘semi-armored’ and vegetated berm creates a natural river wall.

The impact of such a design should not be taken lightly. There will be disturbance to the riverbed that will affect an important habitat for many fish species. Using fill to move the shoreline further into the water will also change the coastal bathymetry of the river. This should be minimized wherever possible. This is one of the proposed design concepts to consider during the design development process.

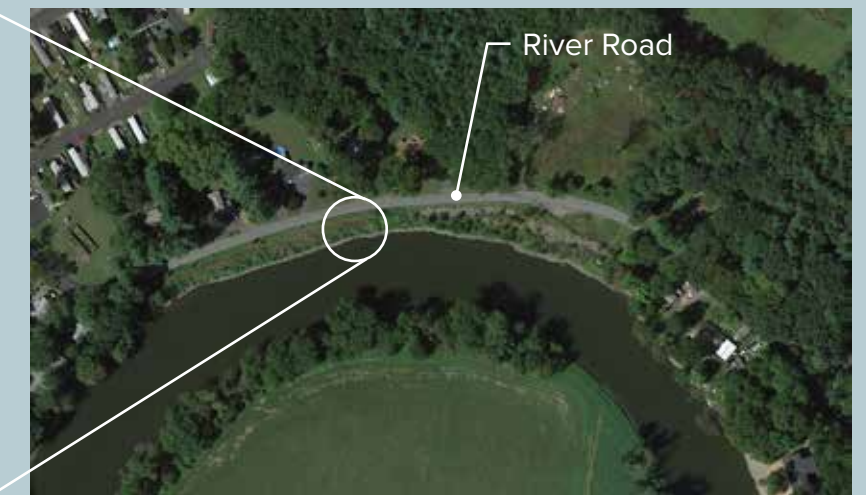
3. Fully pile-supported structure out in the water: A free-standing boardwalk structure on piles is proposed where there is not enough available existing land along the shoreline. Such a structure would need to withstand wave action and ice scour, and would impact the marine habitat in the form of fill and shading.

Case Study: Living shoreline on the Wallkill River, Rosendale, NY.

The Wallkill River living shoreline has stabilized the northern shore adjacent to the road, thus preventing erosion with a natural riparian edge. It also provides habitat for wildlife and offers an improved view.



Living shoreline constructed by ACOE on the Wallkill River in Rosendale, NY - mix of boulders and vegetation.



Living shoreline on the Wallkill River in Rosendale, NY. By 2004, the river had reached and was undermining River Road.

Living Shorelines along the Hudson River

Several small-scale living shoreline demonstration projects have been implemented along the Hudson River and in similar tidal estuary settings in recent years. One such project can be found in Foundry Dock Park, just south of the Cold Spring train station.



Large rocks attenuating wave action help protect the shore from erosion.



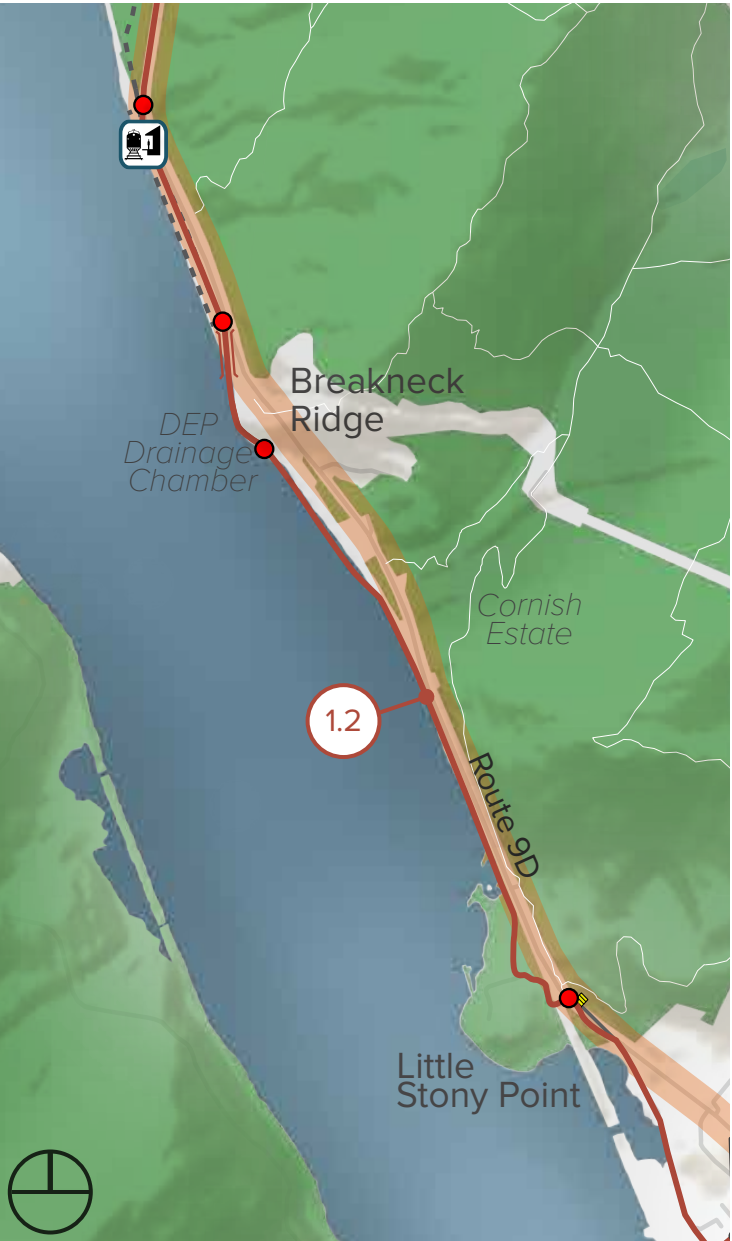
Sand beach is submerged at high tide.

SUMMARY EVALUATION

GOALS	
SAFETY	Completely separated from vehicular and rail traffic, this alignment would provide the maximum safety for trail users.
RECREATION	As a continuous route, this trail would provide a recreational asset that would make the trail as a whole a transformative force in the region.
HIGHLIGHT & RETAIN NATURAL BEAUTY	The uninterrupted views of the western Hudson Highlands, including Strom King State Park directly across the river from the northern portion of this segment, would provide visual access to these natural features for many more than can enjoy them now.
CONSTRUCTION FEASIBILITY	This route segment will be challenging to implement, and will require costly means and methods to minimize the impacts of shading, fill and disturbance to the marine habitat. If deemed feasible during an environmental and engineering feasibility analysis (to follow this Master Plan), this alignment could be funded in large part with private donations. This segment also requires environmental permits, and coordination with DEC, ACOE and the Office of General Services.
P R E F E R R E D R O U T E	



Above and below: Hudson River shoreline trail in Nyack Beach State Park, Upper Nyack, NY. This shoreline segment would resemble the aesthetic shown here, with additional safety features as required by Metro-North.



Map 1.2 - Shoreline from Little Stony Point to Breakneck Ridge

Legend

- Preferred Route
- Change in route segment
- Alternate Route
- Proposed Route 9D Corridor safety improvements
- State Parks

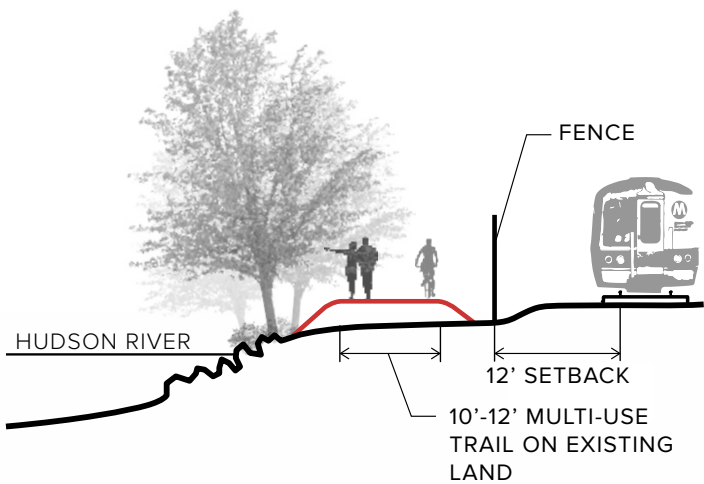
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Shoreline Typologies

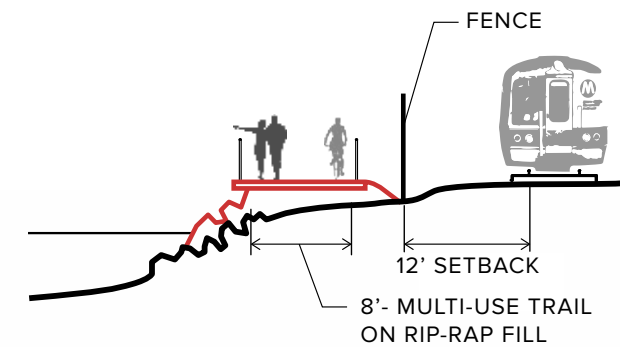
Conceptual typologies

These conceptual trail designs represent what may be technically feasible, based on a limited review of existing conditions. Further review by Metro-North (owner), DEC and other governing bodies must take place and necessary agreements must be executed before a trail can be implemented at this location.

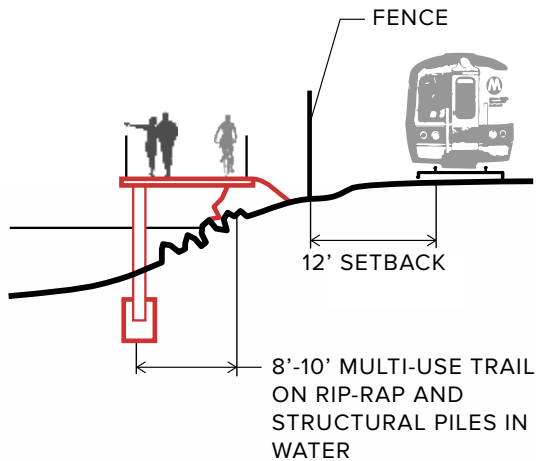
Section 1: Trail on existing land mass



Section 2A: Trail on existing land mass with some fill and shoreline stabilization



Section 2B: Partially pile-supported structure



Little Stony Point

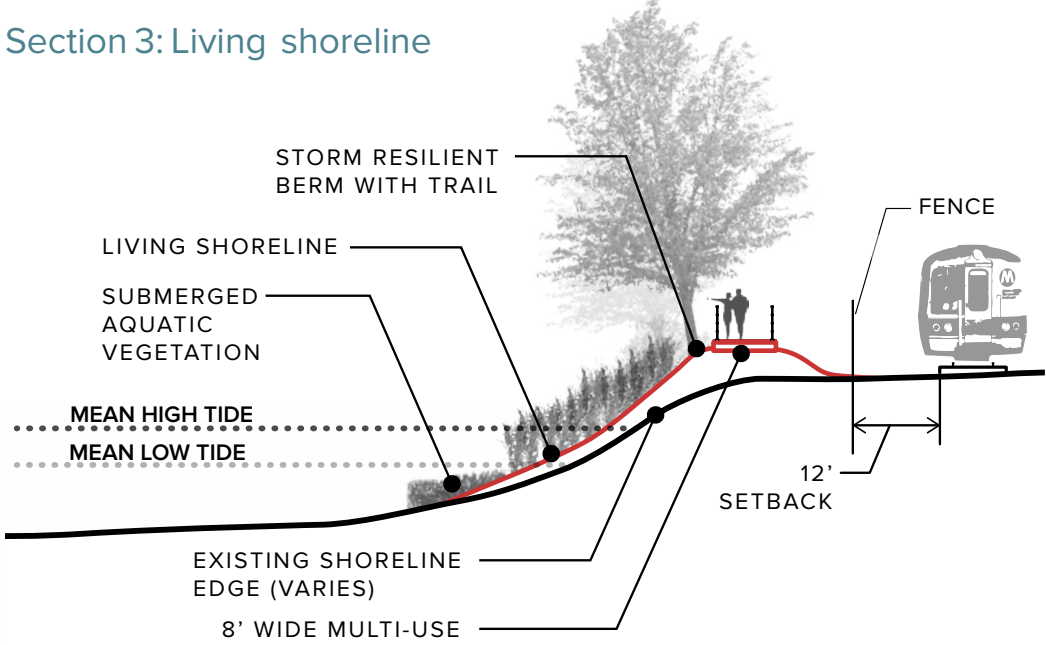
LEGEND

- 10-12' wide trail on existing land (Section 1 & 5)
- 8' wide trail on existing land (Section 1 & 2A)
- Trail with living shoreline/fill (Section 2A, 2B & 3)
- Trail on pile-driven structure or boardwalk (Section 4)
- Change in proposed trail type

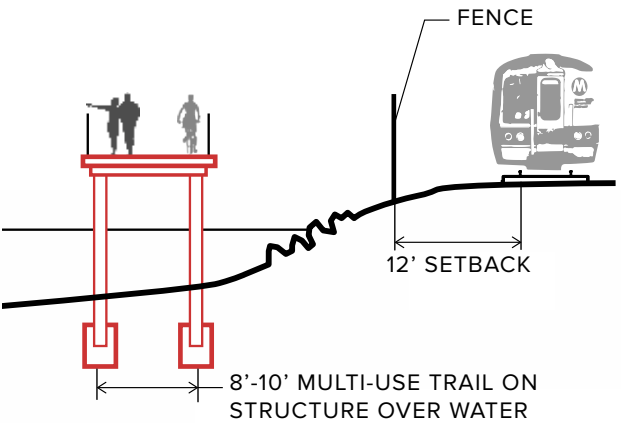
Section 1

3,030 ft

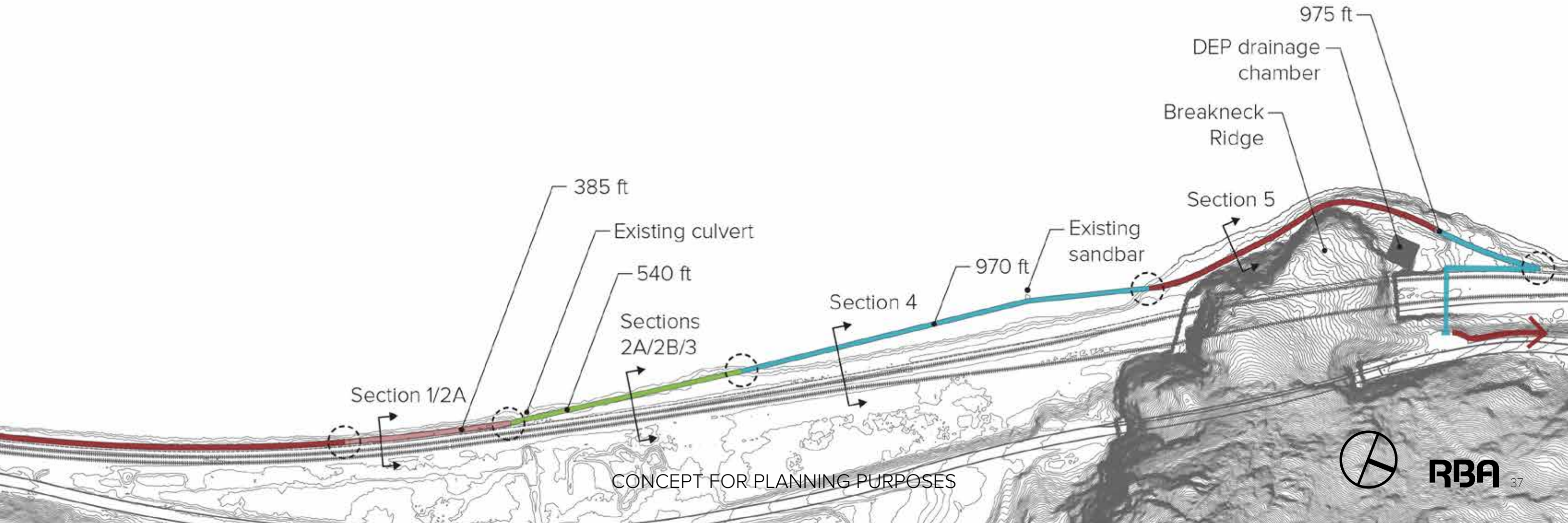
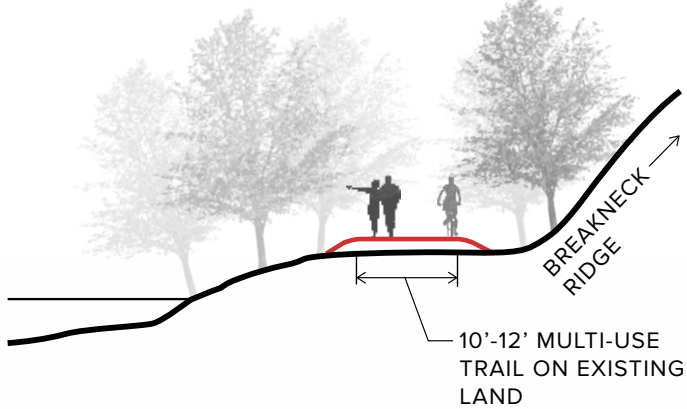
Section 3: Living shoreline



Section 4: Off-shore pile-supported structure



Section 5: Trail on old road bed at Breakneck Ridge Headland only



CONCEPT FOR PLANNING PURPOSES