

# PRELIMINARY HUDSON HIGHLANDS FJORD TRAIL DRAFT MASTER PLAN

Cold Spring, NY to Beacon, NY

May 2015



Submitted to:



Town of Philipstown



Town of Fishkill



Village of Cold Spring



City of Beacon

Produced by:



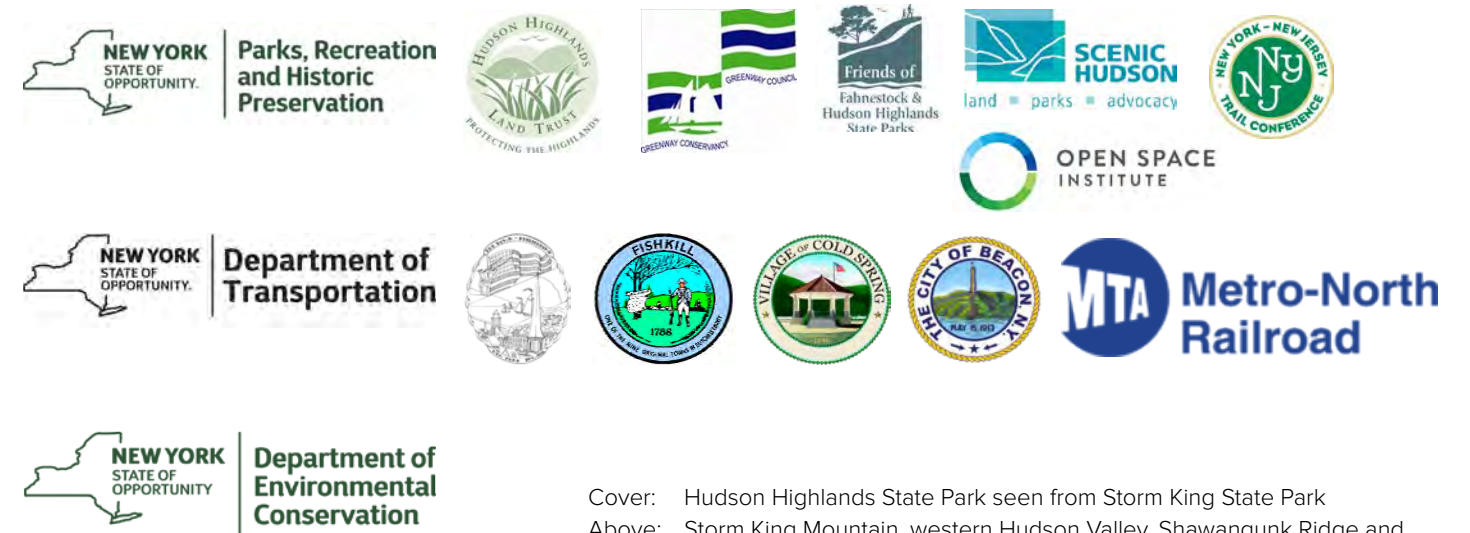


## Project Partners

Scenic Hudson, Hudson Highlands Land Trust, Town of Philipstown, Town of Fishkill, Village of Cold Spring, City of Beacon, Friends of Fahnestock & Hudson Highlands State Parks, New York-New Jersey Trail Conference, Little Stony Point Citizens Association, NYS Office of Parks, Recreation and Historic Preservation, NYS Department of Transportation, NYS Department of Environmental Conservation, and Metro-North Railroad.

## Project Funding

This Master Plan is funded by Hudson Highlands Land Trust, Open Space Institute, NYS Hudson River Valley Greenway, and the Hudson River Improvement Fund.



Cover: Hudson Highlands State Park seen from Storm King State Park  
 Above: Storm King Mountain, western Hudson Valley, Shawangunk Ridge and Catskill Mountains seen from Breakneck Ridge



## Steering Committee

Without the groundwork and support from members of the Steering Committee, the technical products in this project would not have been possible. Thanks to the following group that met regularly over the course of the plan to guide the process and content.

Supervisor Richard Shea, Town of Philipstown  
Supervisor Bob LaColla, Town of Fishkill  
Mayor J. Ralph Falloon, Village of Cold Spring  
Mayor Randy Casale, City of Beacon  
Amy Kacala, Scenic Hudson  
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Martin Brand, NYS Department of Environmental Conservation  
Hank Osborn, New York-New Jersey Trail Conference  
Michael McKee, Philipstown Greenway Committee  
Paul Elconin, Friends of Fahnestock and Hudson Highlands State Parks



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# Introduction

# Introduction

Among the top outdoor destinations in New York is a place called the Hudson Highlands, located 50 miles north of Manhattan. The natural beauty of the area, as well as its rich history of human settlement and centuries-old legacy of artistic inspiration, has contributed to a grassroots consciousness among the local communities to value their environment, history and culture.

In recent years, visitation to the area's popular hiking, biking, ski trails and other historic and cultural destinations has increased tremendously, drawing visitors from communities throughout the Hudson Valley, the New York City metropolitan region, and beyond. This has positioned the Hudson Highlands at the forefront of outdoor recreation in the region, so much so that the area has been named by *Newsweek* magazine as among the top ten hiking destinations in the country. The Breakneck Ridge trail recently ranked as the top day hike destination in the country in an online poll conducted by Trails.com. This influx of people, along with positive press coverage, has boosted local economies and contributed to a cultural renaissance of local communities.

Unfortunately, the increase in visitation has also created serious issues with traffic safety, quality-of-life amenities, and maintenance in the Hudson Highlands State Park Preserve area between Cold Spring and Beacon. The Hudson Highlands are a series of ridges and valleys that are split by the Hudson River, which flows through a steep-sided, U-shaped fjord carved out by glaciers during the Ice Age. This steep topography leaves the travel corridor on the east side of the river highly constrained. This narrow sliver of land must accommodate State Route 9D and MetroNorth Railroad's Hudson Line. However, it is also in this narrow stretch where Breakneck Ridge draws thousands of visitors each week by car, train, bicycle and on foot, creating multi-modal traffic congestion that the corridor cannot currently accommodate safely.

The resulting local desire for safe walking paths in this corridor led community groups to get together and develop plans for a trail that enhances access to the river and restores pedestrian safety. The Philipstown Greenway Committee, along with the Little Stony Point Citizens Association and several individuals, formed an alliance to study the trail. The partnership expanded by 2013 to include the project partners and steering committee members (listed on pages ii-iii) that participated in the Master Plan process, which started in early 2014.

This Master Plan communicates the results of the analysis of route alternatives and establishes a preferred route for the trail envisioned to connect Cold Spring and Beacon. The following sections describe the project goals, study area, partners and local press that advanced the project from its grassroots origins to this Master Plan.



Storm King marks the northern entrance to the Hudson Highlands, where forested mountains slope steeply into very deep water. The scenery here is reminiscent of Norway's fjords. Fjords are defined as valleys eroded well below sea level by glaciers, and then filled by the sea after the glaciers melt. They are deepest upstream of their mouths, where the erosive power of the glacier was greatest. By this definition, the Hudson qualifies as a fjord: it is deepest in the Highlands - up to 175 feet deep at West Point.

– New York State Department of Environmental Conservation, [www.dec.ny.gov](http://www.dec.ny.gov)



# Purpose of the Study - Project Goals

The purpose of this study is to evaluate the feasibility of creating a trail linking the Cold Spring and Beacon train stations. This process began by identifying various route alternatives and further analyzing those that were deemed feasible. Alternatives were then evaluated based on project goals and public input, along with technical and cost feasibility.

The following parameters were used to assess the feasibility and desirability of various proposed route alternatives:

“The goal of the project is to transform a portion of the State Route 9D/Metro-North Hudson Line corridor in the heart of Hudson Highlands State Park between the Village of Cold Spring and City of Beacon from a high speed thoroughfare into a multi-use, user-friendly recreational, tourism-oriented connection that provides people with a stronger visual and physical connection with the Hudson River.”

-www.HudsonFjordTrail.com

## GOALS

- SAFETY**

Lack of pedestrian, hiker and cyclist safety was the initial issue that led to the grassroots support for the trail. It is necessary to address traffic safety concerns along this portion of State Route 9D, where visitors currently park to access the trailheads, by calming traffic and implementing pedestrian safety measures.
- RECREATION**

Creation of this trail is an opportunity to provide a new recreational amenity for the region accessible to a broader population than just hikers. This project could transform the character of this stretch of Route 9D from that of a dangerous high-speed thoroughfare into a multi-modal recreational corridor that acknowledges the diverse needs of the motorists, pedestrians and cyclists using it. ADA access was sought where possible to open this unique area to people with disabilities, families with young children and the aging population. A trail located here would ultimately connect into a regional greenway and trail network, as well as the broader Hudson River Greenway, to create a multi-modal link between adjacent recreational opportunities and natural assets that people of all physical abilities could use.
- HIGHLIGHT & RETAIN NATURAL BEAUTY, ECOLOGY AND ENVIRONMENT**

Creating a continuous off-road, multi-use trail that provides visual and physical connection to the Hudson River and surrounding streams and woodlands is a major focus, given the strong public support for a such a trail. The design concepts developed are based on analysis of critical areas of environmental, cultural and archaeological significance, and have been developed to minimize environmental impacts during construction, to the extent possible, while maximizing exposure to natural surroundings and views.
- ECONOMIC DEVELOPMENT**

Encouraging non-motorized travel between Cold Spring and Beacon and their tourism-based destinations is a major goal that would be realized as a by-product of this trail. Once built, a continuous trail will highlight assets of these two communities as well as Hudson Highlands State Park Preserve. Therefore, unless there are specific economic development benefits for a given route segment, this goal is not analyzed in detail for each segment. Rather, it is regarded as a strong reason in support of implementing the entire trail route.
- CONSTRUCTION FEASIBILITY**

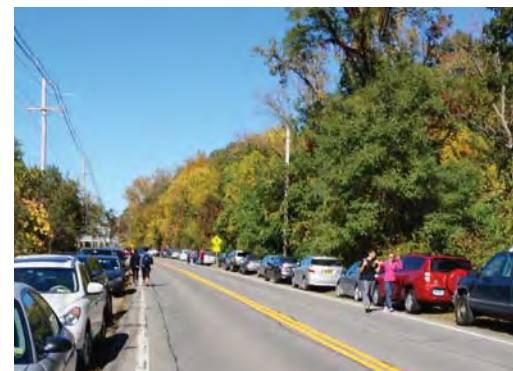
Evaluating the desirability of various route alternatives revealed a serious of practical issues at the forefront of the analysis. These include political jurisdiction, property ownership, environmental constraints, engineering feasibility, construction issues, project cost, and political and public support.



Route 9D just north of Breakneck Ridge



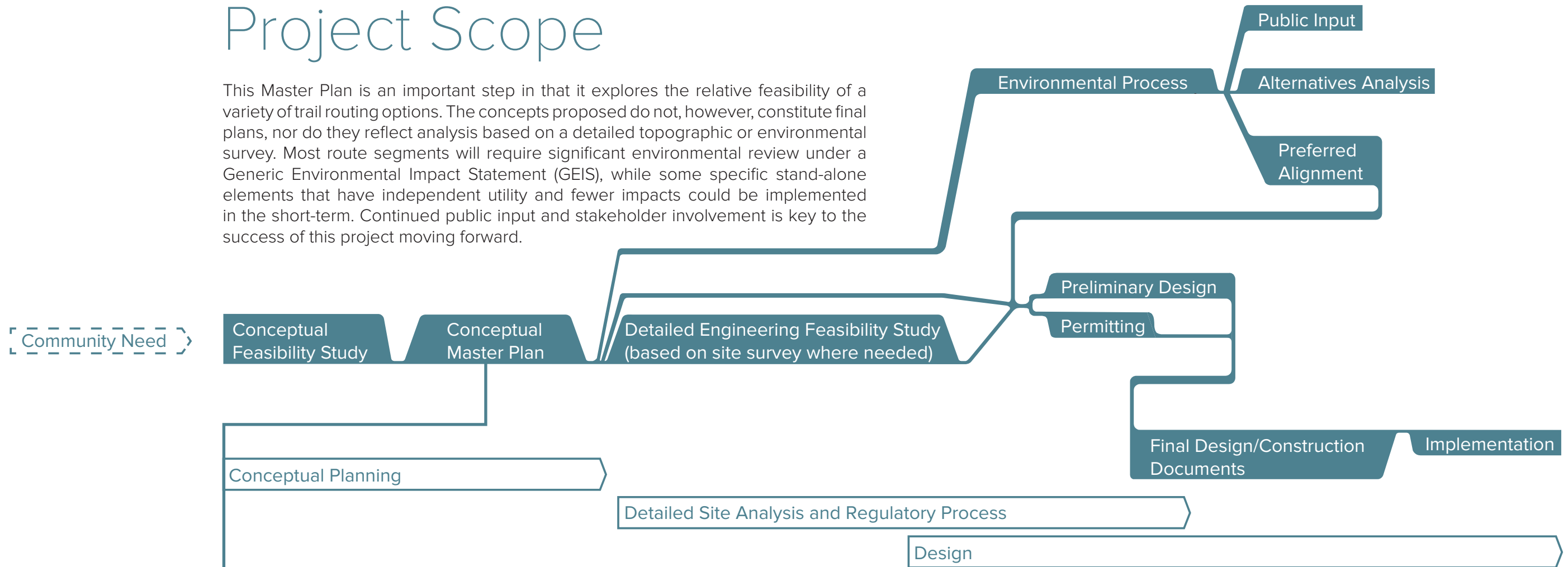
Main Street in Cold Spring



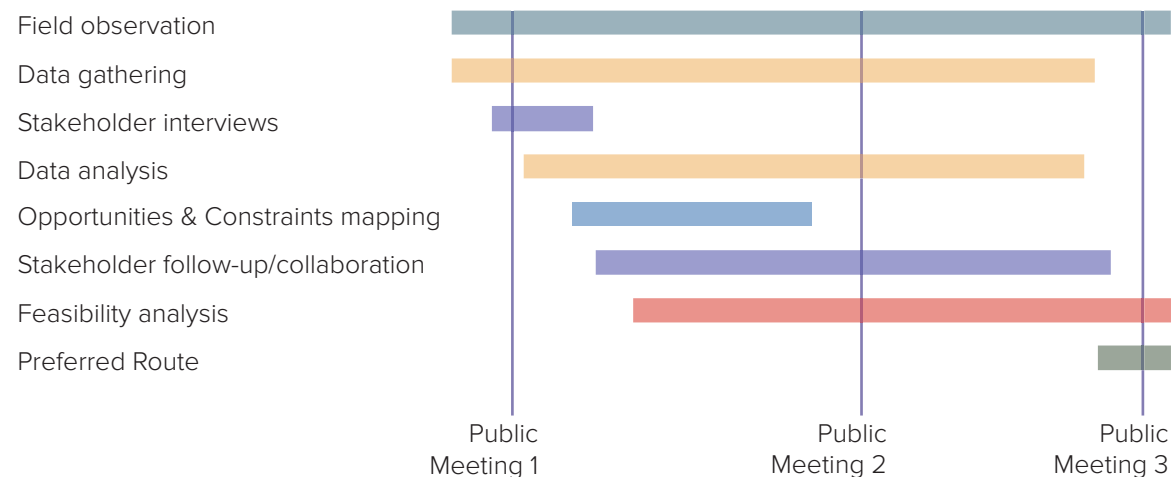
Hikers walking to and from Breakneck Ridge trailhead, 1/2 mile north of trailhead

# Project Scope

This Master Plan is an important step in that it explores the relative feasibility of a variety of trail routing options. The concepts proposed do not, however, constitute final plans, nor do they reflect analysis based on a detailed topographic or environmental survey. Most route segments will require significant environmental review under a Generic Environmental Impact Statement (GEIS), while some specific stand-alone elements that have independent utility and fewer impacts could be implemented in the short-term. Continued public input and stakeholder involvement is key to the success of this project moving forward.



## Master Planning Process



As part of this Master Plan, detailed data collection and analysis took place, resulting in the Preferred Route. This analysis was conducted with respect to the goals listed on page 3.

## Data Collection

Publicly available data, including relevant surveys and previously completed planning studies, were gathered. Requests for data that was known or believed to exist were sent to Dutchess and Putnam Counties. Subsequent data requests were sent directly to specific agencies and organizations for fulfillment. Gathered data was reviewed so that the project team could be as up to date and familiar as possible with existing local conditions, be they physical, economic, political or jurisdictional. Numerous site visits were conducted to verify existing physical conditions throughout the project area. This being a planning study and not a final design assignment, no formal topographic or utility surveys were conducted.

There were two additional data gathering outings of particular importance, for which thanks are in order.

During the first outing in April 2014, the non-profit organization *Lighthawk* flew over the area, allowing us to photograph the study area from above. The photos have proven to be invaluable for analysis of the potential trail alignments. Special thanks to *Lighthawk* for donating the pilot and aircraft for this purpose, and to the Hudson Highlands Land Trust for organizing the flight.

The second outing was a boat ride along the shoreline, arranged by the NYS DEC. With a goal of better understanding the river's edge condition in areas that a shoreline trail was still considered feasible, key personnel from NYS DEC joined the project team on one of NYS DEC's patrol boats. Once again, this perspective proved to be very important for understanding the existing condition of the shoreline. Special thanks to NYS DEC Region 3 Regional Director Martin Brand and his staff for organizing this outing.

## Public Outreach and Stakeholder Interviews

Four public meetings were held: one at the beginning of the process to gather input from the public; the second at the mid-point to present the findings of the Opportunities and Constraints mapping; the third at the end to present the draft recommended preferred alignment, and the fourth on April 29, 2015 to present the final report.

The stakeholder groups within the project area, consisting of local, state and regional government agencies, non-profit organizations (such as: Scenic Hudson, Hudson Highlands Land Trust, Little Stony Point Citizens Association, Audobon Society) property owners and individuals, provided invaluable input throughout the master planning process. Many of these organizations had been working together on the early stages of planning this trail prior to the master plan, and were therefore able to provide background analysis and data.

The following were among the stakeholder interviews held: NYSDOT, OPRHP, Metro-North, NYCDEP, NYSDEC, Central Hudson Power and Light, and Melissa McGill (Artist: Constellations/Pollopol Island/Bannerman's Castle). In addition, two on-site walk-through meetings were held.

The first on-site meeting was held on August 6, 2014 and was attended by residents of Hartsook Lane, although it was open to all of the private property owners west of

Route 9D between the Breakneck Ridge Station and the Brickyards Parkland. Two properties from Hartsook Lane were represented and the discussion was focused on the feasibility of routing the trail along the edge of private parcels in general. No conclusions were reached, but based on the discussion and feedback from other adjacent property owners at the Public Meetings, the determination was made to avoid private property for the routing of the trail in this area. More detail about this determination can be found in the route segment analysis.

After the third public meeting, a site tour was held with representatives from local municipalities, as well as greenway and open space organizations. The purpose was for key stakeholders to better understand the recommendations presented at the third public meeting. This site tour was held on December 11, 2014, and stops were made to discuss the Metro-North Causeway and land south of the Fishkill Creek, Dutchess Junction Park, Breakneck Ridge to discuss the scope and design intent of the 2014 Consolidated Funding Application (CFA) funded project, and Little Stony Point to discuss the proposed trail and shoreline option from Little Stony Point to Breakneck Ridge.

In addition, after the third public meeting, an online public input survey was created to obtain detailed feedback about the preferred alignment. Based on the 464 survey responses, there is widespread support for the preferred alignment. For each route segment, there were minor requests for clarification which have been addressed in this final Master Plan document.

## Opportunities and Constraints Mapping

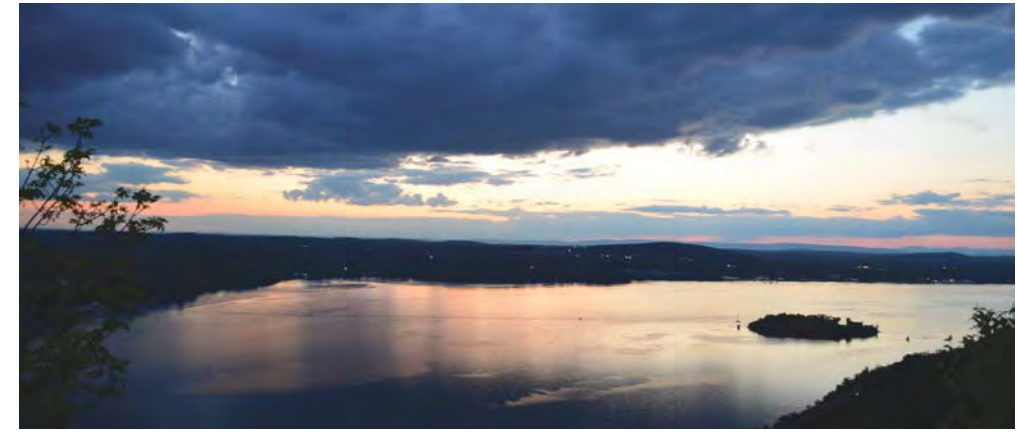
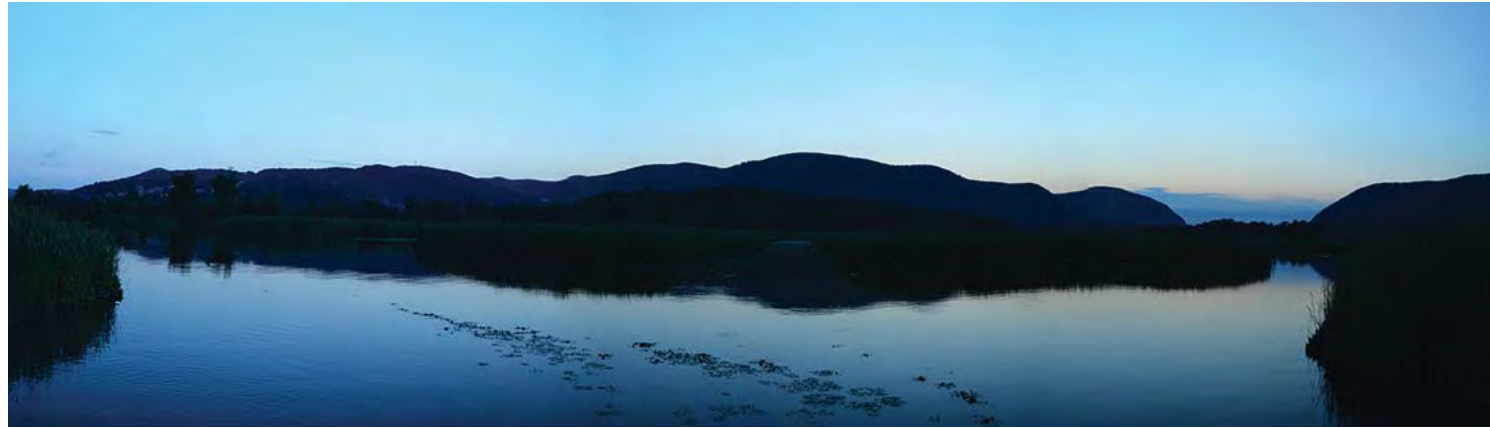
Based on analysis of data provided, combined with observations made during site visits, opportunities and constraints associated with different routing alternatives were mapped. Opportunities and/or constraints may have been physical, jurisdictional or environmental in nature. This mapping was continually supplemented and updated throughout the early part of the planning process, and as needed throughout the entire project.

## Feasibility Analysis

The identification and assessment of opportunities and constraints led to the establishment of relative feasibility of implementation for various routing alternatives. Throughout this process, the design team was prioritizing and eliminating route segments based on technical feasibility. Jurisdictional constraints such as property ownership and sensitive transportation and utility infrastructure operations were also considered, as were impacts to natural and cultural resources. All of these factors were weighed and discussed at monthly Steering Committee meetings.

## Selection of Preferred Route and Development of Design Concepts

Ultimately a vision for a preferred route was crafted. Realizing that in some locations the preferred route might require years to realize, a more near-term interim route alternative was also identified so that a continuous trail could be realized within an acceptable timeframe.



**Existing Conditions within the project study area**

First Row: Constitution Marsh, Cold Spring Harbor

Second Row: Little Stony Point trail, driftwood and Breakneck Ridge seen from Little Stony Point, view from Breakneck Ridge looking northwest

Third Row: Storm King Mountain from Metro North overlook, Pollepel Island and Bannerman's Castle from Metro North overlook, Dutchess Junction Park

Fourth Row: Main Street in Beacon

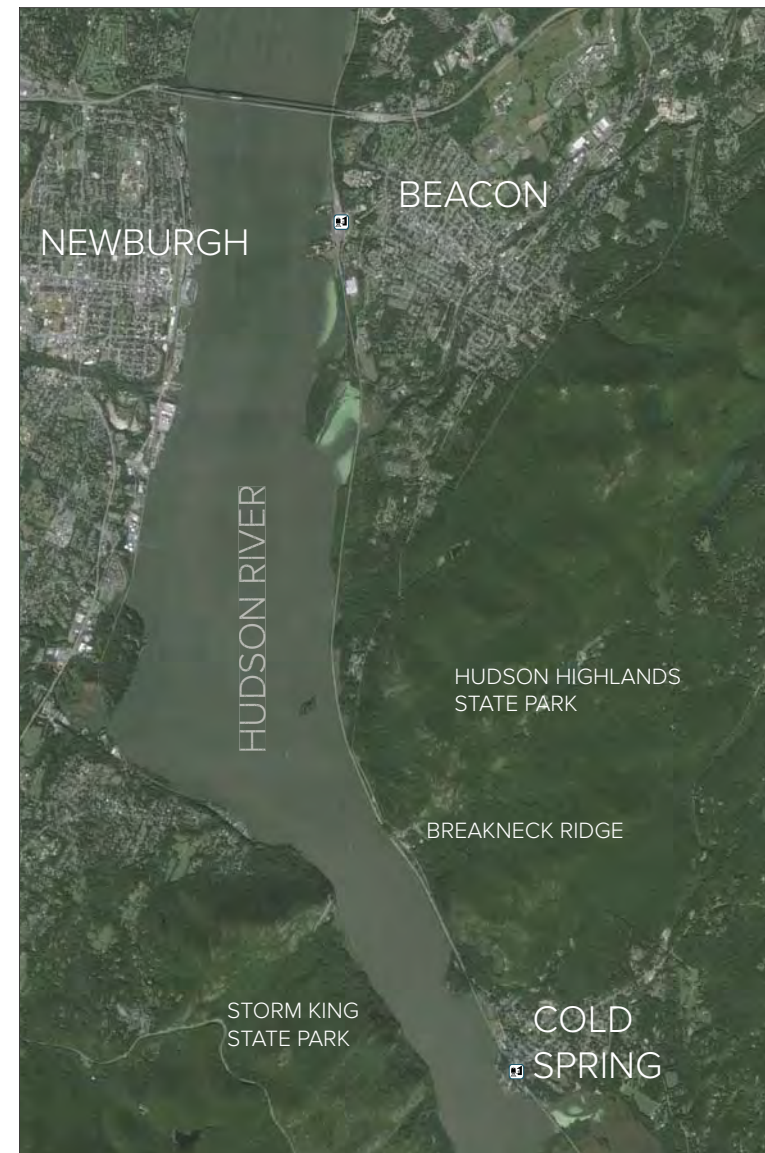
# Project Area - Study Limits

The project limits for the study were the Cold Spring train station and Main Street to the south, the Beacon train station and Main Street to the north, Route 9D and State Park lands located immediately adjacent to the east, and the Hudson River to the west. The project area is generally narrow and constricted, with north-south alignment alternatives restricted to the following possibilities:

- In the State Park east of Route 9D
- On Route 9D within the Route 9D Right-of-Way (ROW)
- Between Route 9D and Metro-North Railroad tracks
- West of the Metro-North railroad tracks directly on the Hudson River shoreline

The project study area contains many important and popular recreational and cultural destinations. Making direct connections among these destinations was an important goal but is not always possible. For example, there are portions of both Main Street in Cold Spring and Main Street in Beacon through which the proposed alignment would not pass. The same is true for many local and regional destinations, including DIA: Beacon, the Beacon Institute, Dockside and Foundry Dock Parks in Cold Spring and the various trailheads along Route 9D, as well as many others.

Therefore, it is recommended that the *Signage and Wayfinding Project*, a parallel effort working to create a logo and to identify a system of signs for the trail, include these destinations to provide context and facilitate connections. For the hiking trailheads along Route 9D that do not directly connect to the Hudson Highlands Fjord Trail, signs indicating the most safe and direct route to each trailhead are recommended.



Project area context map



Conceptual trail alignment developed prior to Master Plan. Map by Scenic Hudson

# Regional Context

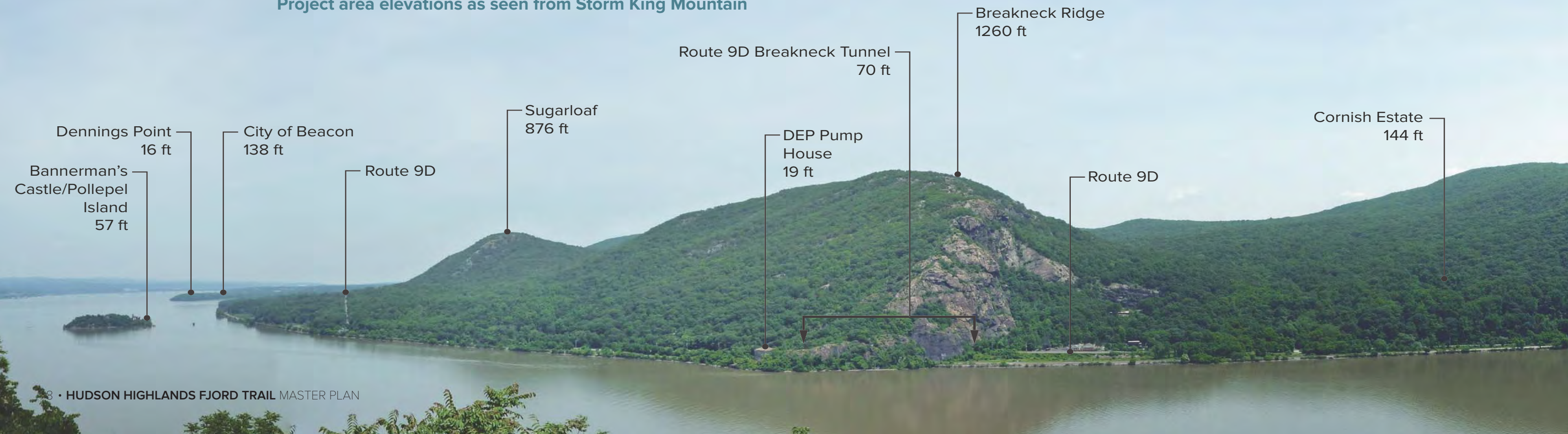
For centuries, the Hudson Highlands have been identified as a gateway to the Hudson Valley. Breakneck Ridge and Storm King Mountain dramatically stand sentinel across the River from each other. The Dutch called this river passage Wey-Gat, or Wind Gate, and Lenape Native American tribes lived on these shores and hunted in these mountains for thousands of years before the arrival of Europeans.

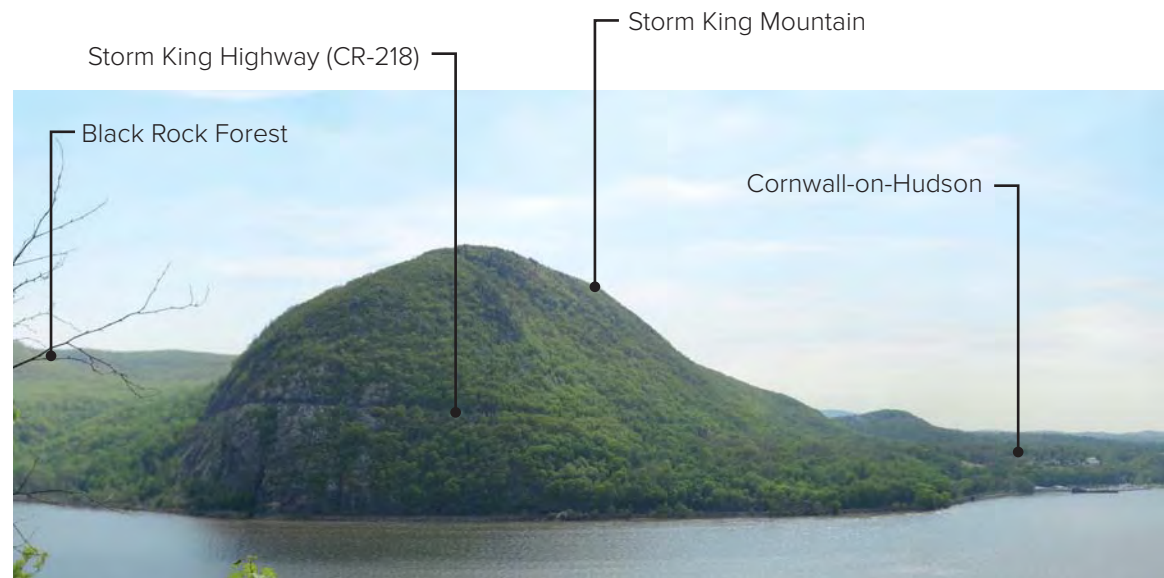
Storm King Mountain survived an attempt to build a massive power generation plant, and the quarrying at Breakneck Ridge was brought to an end before it could forever ruin the scenic quality of the Hudson Fjord. Today, the views are spectacular, bringing thousands of hikers to the Highlands by car, train and bicycle each day during peak season. The growing influx of hikers and outdoor enthusiasts not only demonstrates the beauty and unique character that attracts so many to this place, but also the need for a trail of transformational significance to bring safe access to an even greater population.

Linking two of the region's most important historic communities, Cold Spring and Beacon, Route 9D connects several important public resources, including Hudson Highlands State Park Preserve which includes Little Stony Point, Mt. Beacon and Beacon's trails along the Fishkill Creek and Hudson River. All of these offer outstanding views of the River, Bannerman's Castle on Pollepel Island, Storm King Mountain, and on a clear day, Shawangunk Ridge and the Catskill Mountains beyond to the west and north. This trail would add another important resource to the impressive collection of public open space facilities in the region.

The trail passes through four municipal jurisdictions: Town of Philipstown, Village of Cold Spring in Putnam County, Town of Fishkill, and City of Beacon in Dutchess County. In addition, there are three major agency landowners: Hudson Highlands State Park Preserve (OPRHP), the Route 9D corridor (NYSDOT), and the Hudson Line railroad corridor (Metro-North). All participated in the creation of this plan, and future coordination with these entities will be critical to successful implementation.

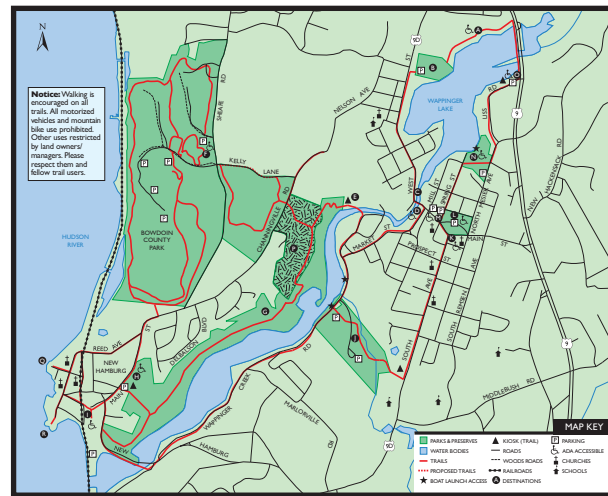
## Project area elevations as seen from Storm King Mountain





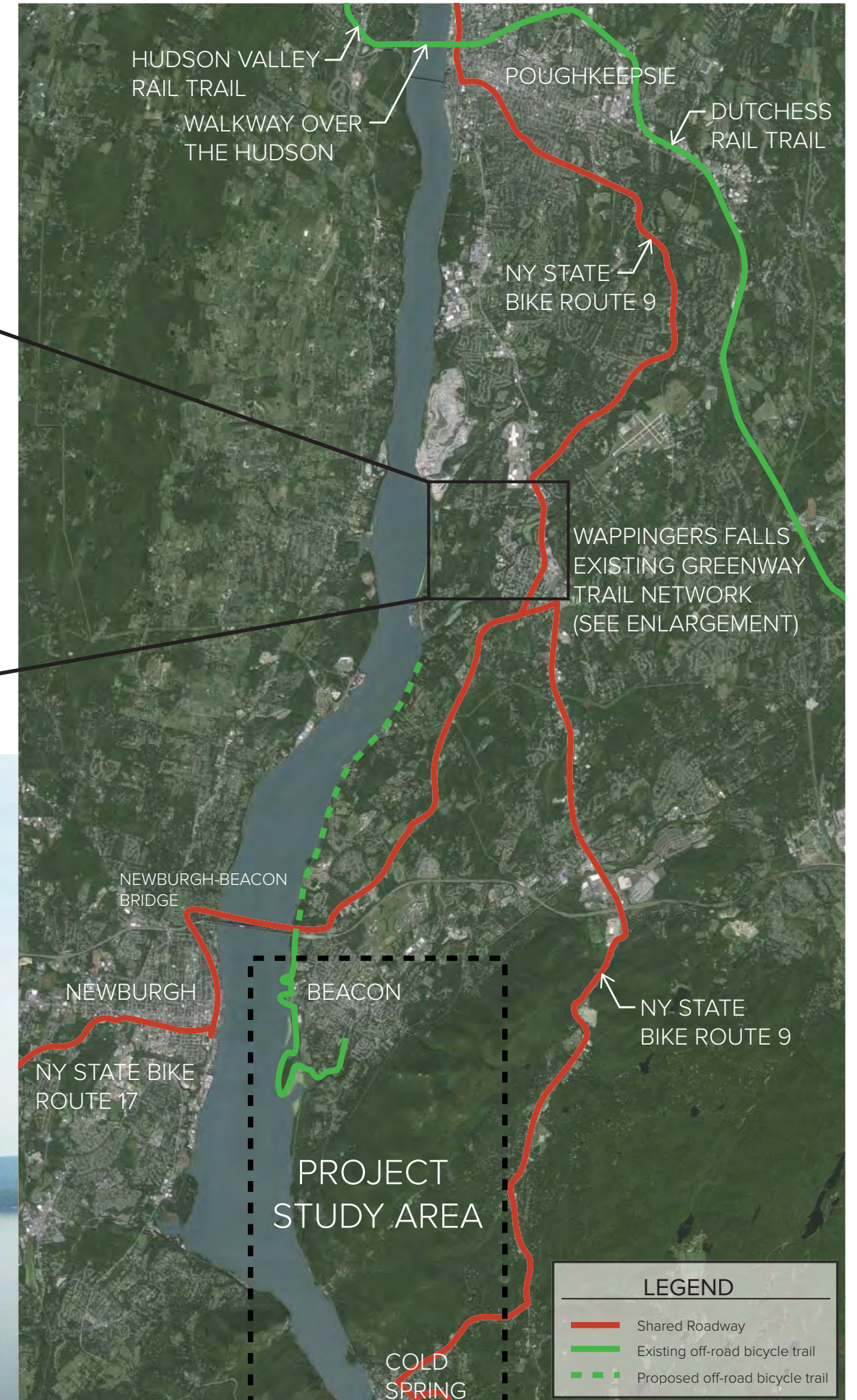
View looking west from Breakneck Ridge

Momentum to create public access to the Hudson River extends north of the existing trail network in Beacon along the eastern shore. A 50' wide easement for use as a public trail has been agreed to by almost all property owners between the Newburgh-Beacon Bridge and the existing greenway trail network in Wappingers Falls. Mostly held by entities in favor of public access to the river, there is only one parcel that lacks a commitment for a continuous unbroken trail easement.



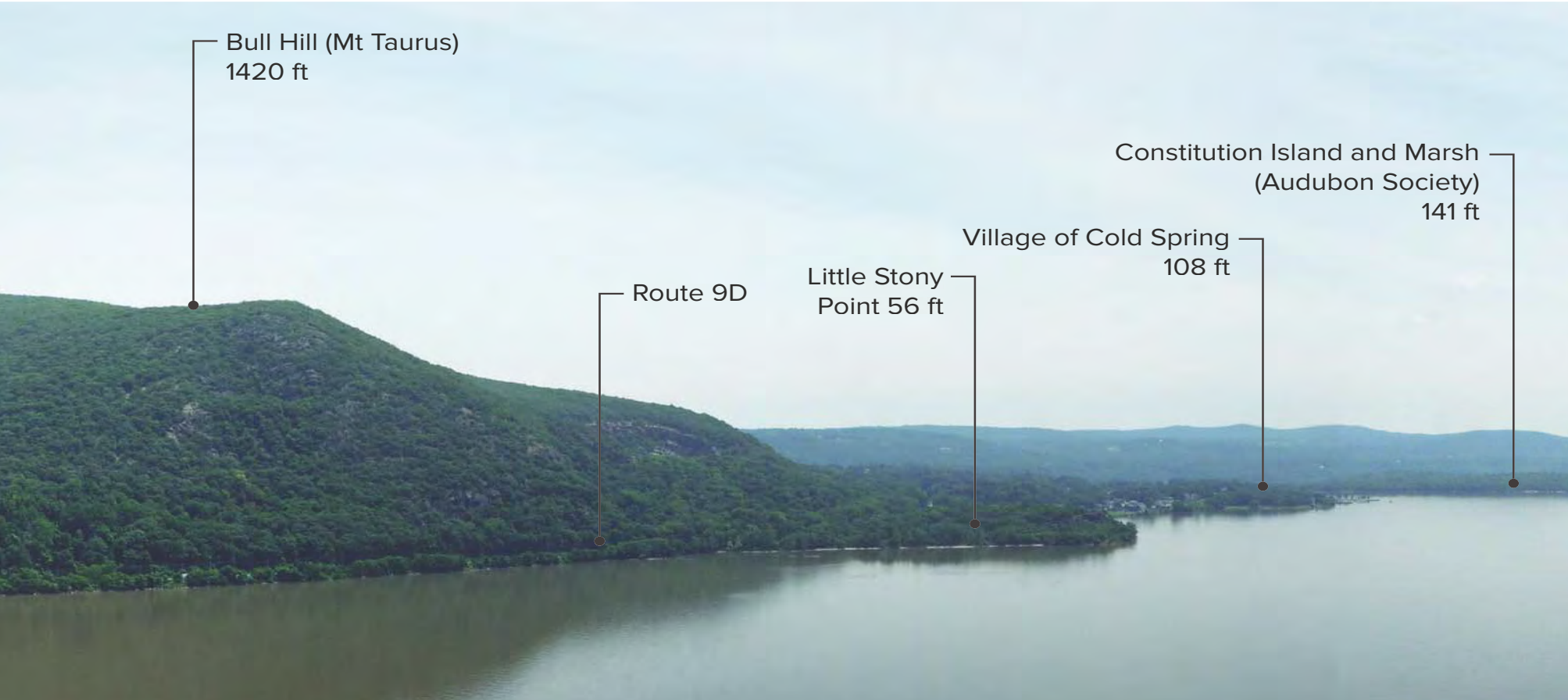
Wappingers Greenway Trail. Map by Wappingers Greenway Trail Committee

### Regional Trail Network



**LEGEND**

- Shared Roadway
- Existing off-road bicycle trail
- Proposed off-road bicycle trail









# Analysis of Route Alternatives

# Assessing Feasibility - Planning Methodology

## Community Outreach and the Planning Process

Public and stakeholder engagement was a critical part of the master planning process. Four public meetings were held (see photos at right) at key intervals during the planning process. Each of the meetings had strong participation, with over 100 people attending each event. Online outreach included direct emails to several local email lists and meeting notifications on the project's website and Facebook page. Public comments were also solicited using a dedicated e-mail address as well as an online survey that received more than 450 responses.

The Steering Committee helped raise awareness of the planning process and opportunities for public and stakeholder input by compiling a list of, and notifying, public agencies and local organizations that focused on topics such as recreational activities, preservation, and economic development. Many of these organizations distributed meeting announcements to their own lists of constituents, which increased awareness of this project and helped attract public participation.

## Public Meetings

### Meeting 1: February 17, 2014

Introduced the project and master planning process, along with trail types that might comprise the different alignment possibilities. Led a table mapping exercise in which participants provided detailed input on the route in three sections. Each section was discussed at three or more tables, after which each group presented their discussion to the larger group.

### Meeting 2: July 9, 2014

Provided updates on the route analysis, including Breakneck Connector funding application (see page 34 for more info on this project component). Fielded public comments and then responded to open questions, with the design team utilizing display boards and maps.

### Meeting 3: October 23, 2014

Public presentation of draft Master Plan recommendations followed by Q & A and ongoing discussions around display boards and maps.

### Meeting 4: April 29, 2015

Presentation of final Master Plan



First row: Photo from Public Meeting 3

Second row: Photos from Public Meeting 2  
(Photo credit: Facebook page)

To communicate progress between public meetings, the design team developed an online newsletter called *Field Notes from the Hudson Highlands Fjord Trail Master Planning Process*, which was posted to the project’s Facebook page.

### Agency Communication and Coordination

Preparation of this master plan required close coordination with the project Steering Committee, key project stakeholders, including numerous government agencies, and the public.

Key government stakeholders included: local, state and regional agencies. Other key stakeholders included: non-profit organizations, property owners and local businesses, all of whom provided invaluable input throughout the master planning process. Many of these organizations had been working together on the early stages of planning this trail prior to the master plan, and, therefore, were able to provide important background information.

The following were among the stakeholder interviews held: NYSDOT, OPRHP, Metro-North, NYCDEP, NYSDEC, Central Hudson, First Responders, Melissa McGill (Artist: *Constellations*)

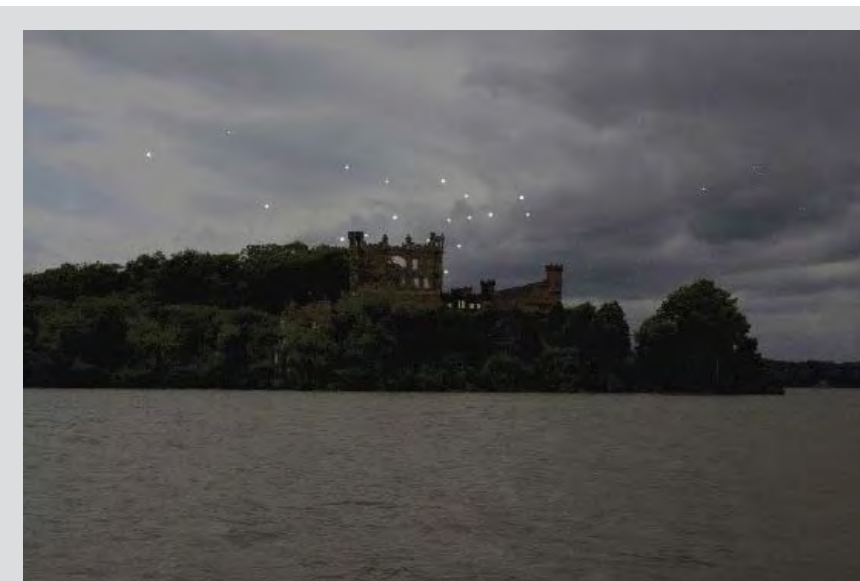
### Property Ownership

Most of the property considered for the various trail alignments is owned, operated and maintained by government agencies, all of which participated in the Steering Committee and were regularly updated about the master planning process. As such, the project team was notified about specific operational or physical constraints within these public properties.

For some alignments considered it was necessary to explore the feasibility of routing the trail on private property. The use of private property would take place only with the consent of each individual property owner. Where trail alignments were considered that would cross private property, efforts were made to engage those property owners in a discussion about the potential and likelihood of granting an easement or change of lot line to accommodate the trail. The sensitive nature of this subject together with the need to cross not just one but several consecutive private parcels was among the most significant constraints associated with the designation of a trail alignment on private property.

### Relevant Agency Abbreviations

<b>DEC</b>	New York State Department of Environmental Conservation
<b>DEP</b>	New York City Department of Environmental Protection
<b>DOT</b>	New York State Department of Transportation
<b>DFW</b>	New York State Department of Fish and Wildlife
<b>NOAA</b>	National Oceanic and Atmospheric Administration
<b>NYNJTC</b>	New York-New Jersey Trail Conference
<b>OPRHP</b>	New York State Office of Parks, Recreation and Historic Preservation
<b>SHPO</b>	New York State Historic Preservation Office
<b>ACOE</b>	United States Army Corps of Engineers
<b>DOS</b>	New York State Department of State
<b>FHWA</b>	Federal Highway Administration



**Constellations Public Art Installation on Pollepel (Bannerman’s) Island**

Local artist Melissa McGill is designing a public art installation at Bannerman’s Castle on Pollepel Island. Early in the planning process, Melissa met with the design team to discuss potential synergies between her installation and the trail. The collaboration continued throughout the planning process.



Hudson Fjord ice in winter

# Opportunities and Constraints Mapping

At the start of this project, data was gathered from publicly available sources, local municipalities and Steering Committee members. Once compiled, this data was mapped to evaluate the opportunities and constraints that needed to be addressed in the routing and design of this trail. While this mapping took place in the first phase of the Master Plan, data was added as it became available. This mapping is not meant to be exhaustive, as further review will be required during design, particularly with respect to wetlands and endangered species.

**Resiliency: Designing for the elements**

The feasibility analysis of the various options included a close look at the weather-related conditions each segment of trail would need to withstand, if implemented. On land, that includes drainage and erosion on steep slopes and selecting materials that can withstand accumulations of snow and ice. The Hudson River is a tidal estuary with strong currents, and is susceptible to sea level rise and storm surges. These were all major considerations for trail alignments proposed along the shoreline. As the photo above shows, the river sometimes freezes in the winter, covered with thick sheets of ice. Any concept considered would have to withstand these conditions. Designing a resilient shoreline is also an opportunity to integrate the trail, thus realizing two important objectives simultaneously.

**LEGEND**

<span style="display:inline-block; width:15px; height:15px; background-color:#c8e6c9; border:1px solid #000;"></span> State Parks	<span style="display:inline-block; width:15px; border-bottom:1px solid #000;"></span> Existing hiking trails
<span style="display:inline-block; width:15px; height:15px; background-color:#a5d6a7; border:1px solid #000;"></span> Municipal Parks	<b>Shoreline Type</b>
<span style="display:inline-block; width:15px; height:15px; background-color:#b2dfdb; border:1px solid #000;"></span> National Wetlands Inventory	<span style="display:inline-block; width:15px; border-bottom:1px dashed #000;"></span> Natural
<span style="display:inline-block; width:15px; height:15px; border:1px dotted #000;"></span> Tidal Wetland	<span style="display:inline-block; width:15px; border-bottom:1px dashed #000;"></span> Engineered
<span style="display:inline-block; width:15px; height:15px; border:1px dashed #000;"></span> Submerged Vegetation	<span style="display:inline-block; width:15px; height:15px; background-color:#fff; border:1px solid #000;"></span> Potential Historic Fill (Udortheents)
	<span style="display:inline-block; width:15px; height:15px; border:1px solid #000; text-align:center; vertical-align:middle;">!</span> Remediation Sites (DEC)

*Mapping for planning purposes only; Map features are approximate and not based on engineering survey* ➔



Map showing known Environmental issues and constraints

# Inventory of Natural and Cultural Resources

## Conservation of Natural Resources

It is critical to understand potential impacts of the proposed trail on sensitive Hudson River ecosystems, identify environmental constraints within the potential trail corridor, and determine how to avoid or minimize any negative impacts to natural resources.

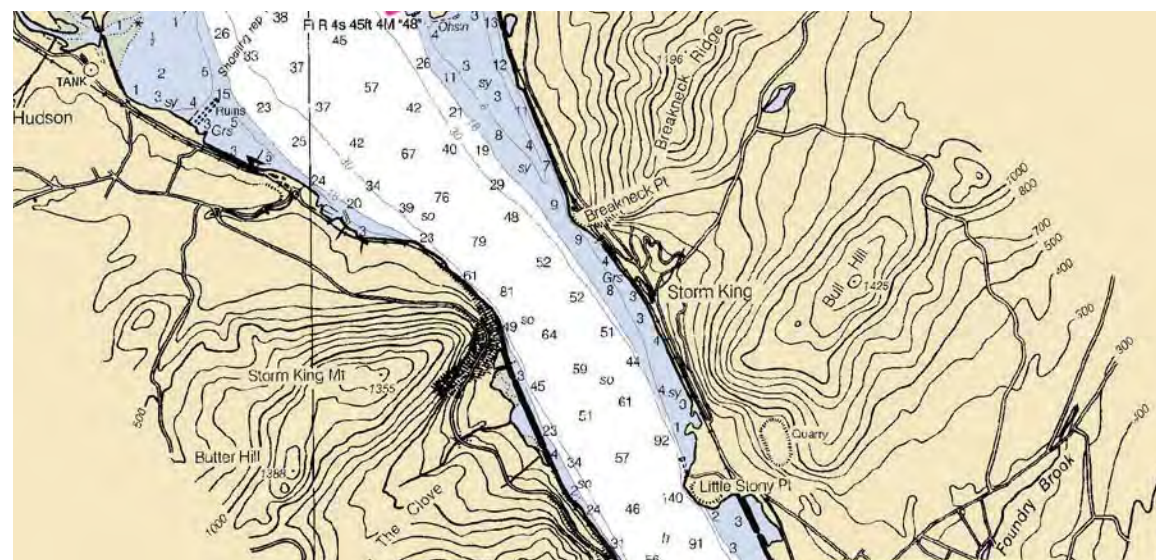
The proposed trail, which is located within a NYS Coastal Area Boundary, traverses or runs closely past several ecological communities, including mature forested and forested/scrub shrub communities, tidal and non-tidal freshwater wetlands, tidal and non-tidal watercourses, and developed urban areas.

The proposed trail may impact both federal and state freshwater wetlands/waters and regulated adjacent areas. Floodplains might be affected for portions of the trail alignment that traverse the Hudson River floodplain.

The trail may also traverse or pass very close to threatened and endangered species habitat and sensitive vegetative communities, as described on the next page. Some alignments proposed must cross steep slopes and/or pass above shallow bedrock.

Given the built and natural characteristics of this section of the Hudson River, the following specific environmental elements are most important to consider for the alignment and design of the proposed trail:

- NYSDEC Freshwater wetlands and regulated adjacent area
- NYS Tidal Wetlands
- Federally mapped wetlands: field delineation may be required
- Local wetlands: if regulated at local level
- Fluvial floodplain areas
- Tidal floodplain limits
- Submerged Aquatic Vegetation
- Threatened and Endangered Species: benthic, avian and land-based species
- Hazardous Materials: depending on degree of excavation required for trail
- Deforestation/Reforestation (depending on the final trail alignment)



NOAA Bathymetry Chart showing river depths



DEC mapping showing Udorthents (potential historic fill sites, landfills and remediation sites)

## Habitat Preservation, Protection, and Restoration

The Hudson River Estuaries are known habitat for Atlantic Sturgeon (*Acipenser oxyrinchus*) breeding and feeding grounds, a recently listed federally endangered species under the jurisdiction of the NOAA's National Marine Fisheries Service.

The entire east side of Route 9D contains potential habitat for the Timber Rattlesnake (*Crotalus horridus*), a species listed as “threatened” by the State of New York. If a known population occurs on the ridges and slopes of the Hudson Highlands within a half mile of the trail, DEC may require construction monitoring and exclusion fences during construction activities. The area is also home to Peregrine falcons, Fence lizards and Eastern worm snakes. Other species may also be found in the vicinity of the project.

Where the trail causes no disturbance to the Hudson River, surveys for freshwater mussels are not anticipated. The route segment along the shoreline may require additional fauna surveys.

Impacts to these species will need to be assessed for any construction in the area (new trails and/or improvements to trails). Impacts can include the construction activity itself and the resultant increase in human activity in the area from increased access. A full impact assessment should be undertaken, and impacts fully avoided or minimized. If impacts to the state-listed threatened and endangered species cannot be avoided and minimized, an ECL Article 11, Part 182 take permit may be required.

## Timing Restrictions

Bald eagles (*Haliaeetus leucocephalus*) utilize portions of this area for fishing and foraging. Nests are known to exist within the vicinity of the project. Construction timing restrictions could be required during nesting and wintering seasons.

A timing restriction may be required for the cutting of large trees (greater than 6” dbh) due to the potential for both the federally listed Indiana bat (*Myotis sodalis*) and the federal candidate species, Northern Long-eared bat (*Myotis septentrionalis*) occurring in the area. Trees might need to be cleared for constructing parking areas on the east side of Route 9D and for constructing the trail on the west side of the road. If trees do not have to be cleared, then there are no anticipated issues with these species.

## Removal of Invasive Species and Prevention of Spread

The entire project corridor from the Hudson River across the Metro-North railroad tracks and Route 9D to the slopes of the Hudson Highlands are heavily overgrown with invasive plant species such as Swallowwort, Glossy Buckthorn, Tree of Heaven, Multiflora rose, Japanese stiltgrass, Common Reed, Norway Maple, Amur Maple and numerous others. Also, along the shore of the Hudson River in the vicinity of the project, thousands of Chinese Water-Chestnut seedpods were observed washed up on the shore. During the construction of the project, best management practices should be included to prevent further spread of these invasive species further into the trail corridor. If project funding allows, invasive species removal and revegetation with native species should be included in the scope of work for trail construction.

## Hazardous Materials

The proposed trail corridor passes through, or immediately adjacent to, NYSDEC mapped wetlands and tidal wetlands. Udorthents are defined and mapped by NYSDEC as “historic fill” areas. Historic fill areas are those areas consisting of non-indigenous material, deposited to raise the topographic elevation of the site, which was contaminated prior to placement, and is in no way connected with the operations at the location of placement. Historic fill area includes, without limitation, construction debris, dredge spoils, incinerator residue, demolition debris, fly ash, or non-hazardous solid waste. Historic fill material does not include any material that is substantially chromate chemical production waste or any other chemical production waste or waste from processing of metal or mineral ores, residues, slag or tailings.

In addition to historic fill areas, the proposed trail corridor runs near but not within any NYSDEC remediation sites located in Beacon, Fishkill and Cold Spring, based on an NYSDEC prepared aerial map showing the locations of NYSDEC site remediation areas and landfills in the vicinity of the proposed trail corridor (see map on p. 15).

A Phase I Environmental Site Assessment should be undertaken to determine whether the presence of any hazardous materials is suspected and if sampling will be required as part of a Phase II to determine the qualitative levels of contaminants.

## Potential Approvals and Permits Required

Construction of the trail will require regulatory approvals and permits. Until the trail is in design, it is not known specifically which permits will be required. Permits that may be required include:

- SEQRA approval based on findings once the lead agency accepts a Final Environmental Impact Statement
- US Army Corps of Engineers wetland permits (likely one or more Nationwide Permit)
- NYSDEC Wetlands Permits and possibly local wetland permits
- ECL Article 11, Part 182 take permits where state listed species are found
- A SPDES Permit for construction stormwater will likely be required (anticipate greater than one acre of site disturbance for the overall trail) with a SWPP and Erosion and Sedimentation Control Certification requirement as well
- Timing restrictions on tree clearing and other trail construction and related activities are likely to apply due to the potential for threatened and endangered species impacts
- Given that the proposed project is also in a New York State Coastal Area Boundary, Coastal Zone Management Approval and a Federal Consistency Determination may be required from the New York State Department of State
- NYSDOT Highway Work Permit



Wetland in Brickyards Parkland near the adjacent Metro-North tracks



Wetland south of Breakneck Ridge, between Route 9D and the Metro-North tracks



Gordons Brook in the Brickyards Parkland

## Funding

If federal funding is used for the project, a National Environmental Policy Act (NEPA) compliance document will be required. The federal agency providing the funding would typically be designated as the Lead Federal Agency. The document may potentially be completed as a Categorical Exclusion (CE), as trail projects are typically listed as being considered to have minimal environmental impact and, thus, categorically excluded from NEPA. Given the nature of the route and the environmental constraints involved, the impacts could potentially be significant enough to elevate the NEPA document to a Generic Environmental Impact Statement (GEIS). A GEIS is the most likely route of future environmental review.

If the trail results in any impacts to Hudson Highlands State Park or any other publically owned designated park land, and federal transportation funds are obtained via FHWA/NYS DOT, an additional layer of review (ie. Section 4/f) may be required as part of the NEPA process.

## Historic and Cultural Resources

There are several sites in the study area that are listed on the National Register of Historic Places. Below are sites either directly on or in the vicinity of the proposed route of the trail. See map on p. 20 for locations of the following National Register sites.

### 1. Cold Spring Historic District

#### Part of the Hudson Highlands Multiple Resource Area

From the river along a generally east-west axis, largely along Market, Main, Fair, and Chestnut Streets and Paulding Avenue. The proposed trail route's southern end begins in the district, proceeding north along the railroad, then turning right onto Main Street, then left onto Fair Street and Church Street (see p. 32-33 for details).

### 2. Bannerman's Island Arsenal

#### Part of the Hudson Highlands Multiple Resource Area

Pollepel Island, Beacon. Commonly known as "Bannerman's Castle," the complex was designed by military surplus dealer Francis Bannerman in the style of a castle. Construction completed in 1918. The complex was partly destroyed by an explosion in 1920, vacated in 1950, and has been subject to further collapse over the years. The locally famous ruins are easily viewed from the shoreline and by rail commuters. Bannerman's Island, also called Pollepel or Pollepel's Island, was important in the American Revolution, when a chevaux de frises, or blockade of iron spikes, was set up between the island and the western shore of the Hudson. The entire island is included in the National Register.

### 3. Dutchess Manor

#### Part of the Hudson Highlands Multiple Resource Area

400 Breakneck Road (Route 9D), Beacon. Distinctive home built in 1889 in the Second Empire style for brickyard owner Francis Timoney. The building faces east toward Route 9D and is readily visible from this proposed route. The bricks used in the buildings were produced at Timoney's nearby brickyard (located on the river on the north side of Wade's Brook to the north, see Map 5); architect unknown. Currently a restaurant and event venue.

### 4. St. Luke's Episcopal Church Complex

Wolcott Avenue and Rector Street, Beacon. Stone Gothic Revival style Church and Rectory built circa 1870, designed by noted architect Frederick Clarke Withers. The naturalistic landscape design is attributed to noted landscape gardener and Beacon resident Henry Winthrop Sargent. The property comprises 12 acres and includes the associated cemetery.

### 5. Howland Library

477 Main Street, Beacon. Built in 1872 as Matteawan Village's library, the building was designed by noted architect Richard Morris Hunt, brother-in-law of the owner, Joseph Howland. It features varied forms, materials, colors, and patterns, an excellent example of the eclectic style of the time, though unique within the cityscape. Now the home of the Howland Cultural Center, the building is also within the locally designated Upper Main Street Historic District.

### 6. Beacon Post Office

369 Main Street (at the corner of Veterans Place), Beacon. Colonial Revival style locally-sourced, rough-cut stone building erected in the mid-1930s, an excellent example of the Federal architecture adopted for public projects during the Great Depression.

### 7. Lower Main Street Historic District

142-192 Main Street and 131-221 Main Street, Beacon. The district comprises the first few blocks at the west end of Main Street, including 32 buildings in several distinct groupings. Most are of late-19<sup>th</sup> to early 20<sup>th</sup>-century (circa 1870-1929) construction, predominately 2 to 3-story attached brick rows dating to the 1870s to 1890s. The district reflects the development of the village of Fishkill-on-Hudson, which would later be merged with neighboring Matteawan into Beacon. One individually-listed property, the Lewis Tompkins Hose Company No. 1 Firehouse at 140 Main Street, is located within the district. This Second Empire style building was erected in 1893. It is currently an art glass studio.



#### 8. Trinity Methodist Church

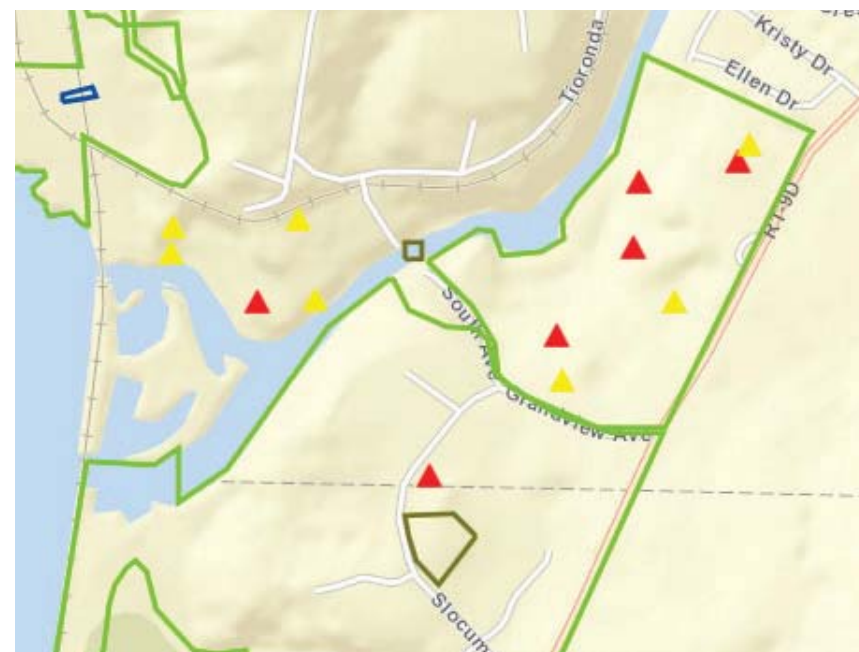
8 Mattie Cooper Square, Beacon. Brick edifice built in 1849 (subsequently expanded several times). It is currently the Springfield Baptist Church. The church faces south and is easily visible and very noticeable from the proposed Main Street route, located one block to the north at the end of Digger Phelps Court.

#### 9. National Biscuit Company Carton-Making and Printing Plant

Beekman Street, Beacon. The 300,000 square-foot factory was built in 1929 by the National Biscuit Company (Nabisco), on the banks of the Hudson with ready access to the rail line. It remained in operation until 1991. Constructed of brick, steel, concrete, and glass, the facility is exemplary of early twentieth century industrial architecture. The building was renovated by the Dia Foundation and opened as a museum in 2003 housing Dia:Beacon, Riggio Galleries, a museum for Dia Foundation's collections.

#### 10. Tioranda Bridge (dismantled)

South Avenue over Fishkill Creek, Beacon. This bridge, built by the Ohio Bridge Company between 1869 and 1873, was listed in the National Register in 1980 but dismantled in 2006. The mortared stone abutments and piers remain. The original bridge was a rare multiple-span, wrought iron, riveted tubular bowstring arch truss bridge.



Screenshot from NYS Historic Preservation Office on-line system: green areas have had an archaeological survey conducted, red triangles are pre-historic sites, yellow triangles are historic sites





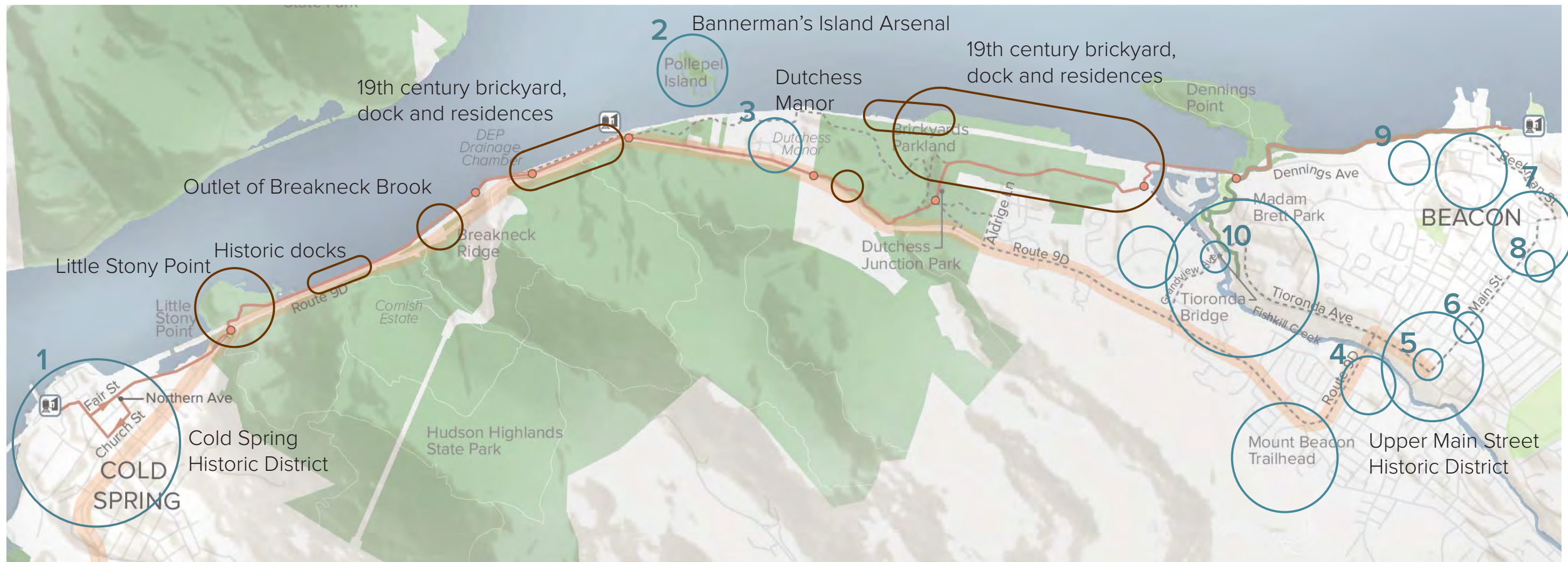
1858 Bachman Map of Dutchess County  
Published by John E. Gillette

## Archaeological Sensitivity

Some areas considered sensitive based on historic map research are indicated on the map below. Many areas within the City of Beacon, especially along Fishkill Creek, also have potential for both historic-period and pre-contact period archaeological resources.

In future phases of design, additional map research can be used to pinpoint anticipated historic archaeological sites. It is also recommended that archaeologically significant locations along the preferred trail alignment be used as an educational opportunity, telling the story of the rich historic and pre-contact background along the trail through interpretive signage.

-  National Register of Historic Places listed site
-  Potential archaeological site



# Trail Alignment - Alternatives Considered

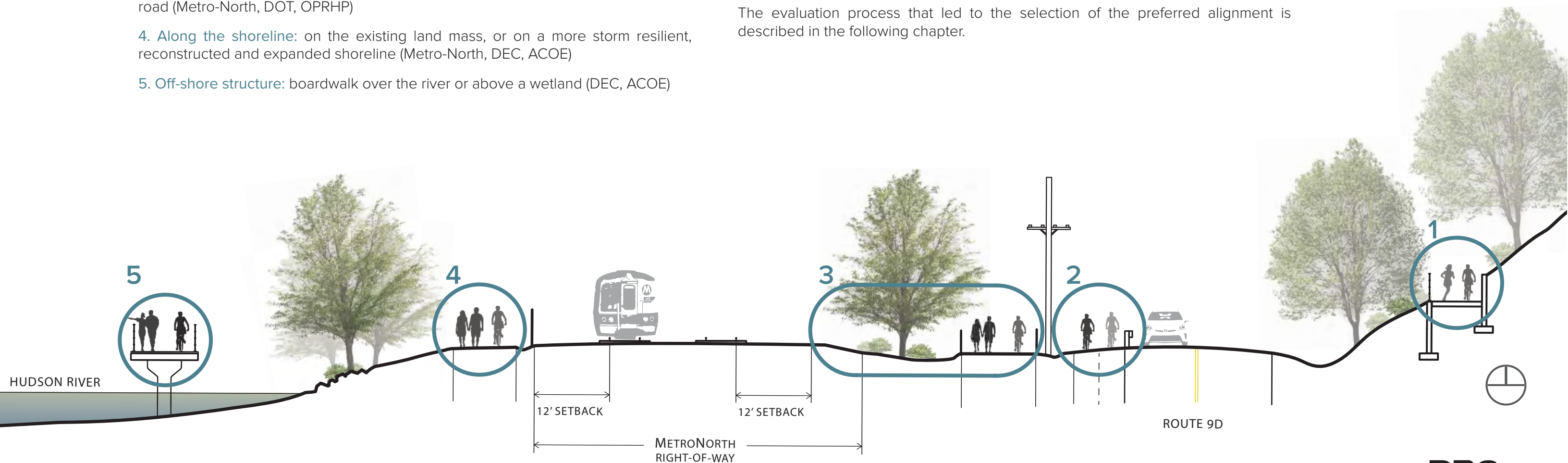
Due to various constraints within the project study area, the design team assessed several route alternatives for each route segment. The cross-section below illustrates those alternatives in general terms. The recommended route of the trail makes use of Alternatives 2-5. No portion of the proposed route of the trail, however, lies east of Route 9D (Alternative 1). From right to left, with the primary custodial agencies indicated, they are as follows:

1. **East of Route 9D:** on or along the steep slopes of the Hudson Highlands State Park Preserve (OPRHP)
2. **Along or on Route 9D:** in right-of-way, alongside roadway (DOT)
3. **Between railroad and Route 9D:** area width and character varies along this State road (Metro-North, DOT, OPRHP)
4. **Along the shoreline:** on the existing land mass, or on a more storm resilient, reconstructed and expanded shoreline (Metro-North, DEC, ACOE)
5. **Off-shore structure:** boardwalk over the river or above a wetland (DEC, ACOE)

Early on in the planning process, Alternative 1 - routing the trail in state park land east of Route 9D - was seen as a viable choice, but upon closer examination this option was ultimately not selected for any portion of the trail because it would require multiple at-grade road crossings or expensive bridges over Route 9D. In addition, it is very costly and disruptive to build a trail into a steep wooded mountainside with stream crossings and private parcels nearby.

The preferred alignment, as detailed in the next chapter, consists of a combination of Alternatives 2-5. Consideration of technical feasibility, cost, construction impacts, jurisdictional issues/availability of necessary property and a lightness of physical touch were weighed in the context of the project goals to improve corridor safety, enhance recreation, and maintain or provide greater access to natural beauty.

The evaluation process that led to the selection of the preferred alignment is described in the following chapter.



# Preferred Trail Alignment

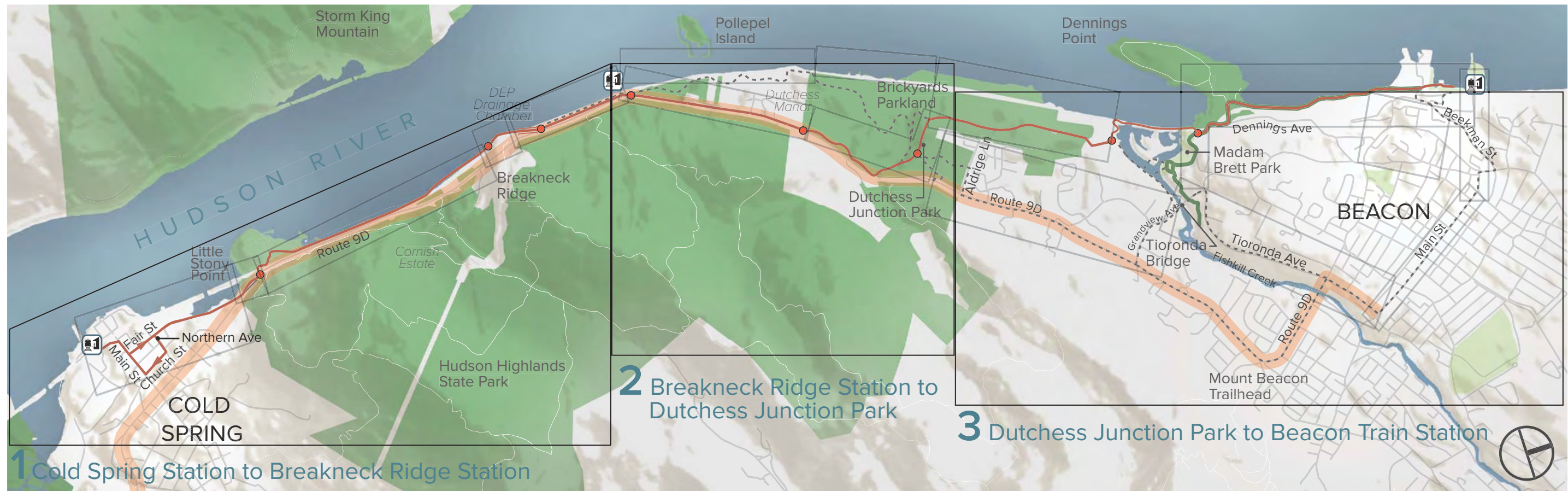


# Preferred Trail Alignment

The Hudson Highlands Fjord Trail Master Plan sets forth actionable recommendations for a definitive route divided into discrete segments, which may be implemented over time or all at once. The Preferred Alignment consists of the most feasible route alternatives based on conceptual-level analyses, and achieves the goal of establishing a continuous off-road multi-use path connecting the Cold Spring train station to the Beacon train station.

In some locations the most desired alignment, from the ‘user’ viewpoint (close proximity to the river with great views), is either extremely costly, requires agreements with private property owners, presents safety and operational concerns to Metro-

North, requires agreements or is dependent on a lengthy permitting and regulatory process. The Preferred Alignment described on the following pages is believed to be the most feasible alternative for implementation within a 10-year period. Each “sub-area” in this chapter includes an evaluation criteria page that documents how the proposed alignment best satisfies project goals. These evaluations present trail alignment alternatives that were studied and explain how the Preferred Alignment was chosen. While preliminary discussions with property owners have occurred the preferred alignment will still be subject to final approvals and agreements with property owners, including Metro-North. The Preferred Alignment is presented in three main sections as show in the map below, with subareas.



Preferred Trail Alignment Map

1

# Cold Spring Station to Breakneck Ridge Station



# 1 Cold Spring Station to Breakneck Ridge Station

## Existing Conditions

From Cold Spring to the Metro-North Footbridge, there are four distinct sub-areas:

**1.1 Cold Spring Station to Little Stony Point:** Consists of station connection path, Main Street and residential streets connecting to Route 9D.

Main Street (State Route 301) and Fair Street comprise two of Cold Spring's spines, intersecting near the railroad station. Main Street is a low-volume, traditional "main street" with shopping and services for residents and visitors. Fair Street intersects with Main Street two blocks from the western terminus of Main Street at the railroad underpass walkway. Fair Street is mostly residential, with a village park to the west along the middle portion. The northern portion runs along a river inlet, meeting Route 9D at a wide intersection.

**1.2 Little Stony Point to Breakneck Ridge:** Consists of the highly constrained lowland area along Route 9D, including parkland at the foot of Hudson Highlands, areas adjacent to Route 9D roadway and shoreline outside of railroad right-of-way.

At the southern end of this corridor, a newly installed crosswalk connects the Little Stony Point trailhead to the Washburn Parking Lot and trailhead, which will be expanded to hold up to 50 vehicles, approximately double the current capacity. This parking lot serves several trails accessible from the Washburn trailhead, as well as Little Stony Point. The Little Stony Point trailhead has typical trailhead parking, which accommodates approximately 6 vehicles.

**1.3 Through/Around Breakneck Tunnel/Headlands:** The alternative to routing the trail through the narrow tunnel is to take advantage of what is left of the original graded roadway that circumvented Breakneck Ridge before the tunnel was built.

**1.4 Breakneck Connector: Breakneck Tunnel/Headlands to Breakneck Ridge Station Pedestrian Bridge:** Once at the trailhead on the north side of Breakneck Ridge, the area between the railroad tracks and the road widens slightly, while the area between the railroad tracks and the river is more narrow and irregular than south of Breakneck Ridge. It is in this 0.6 mile area where thousands of visitors park on the roadside and walk to reach the Breakneck Ridge trailhead on peak weekends.



Map 1.0 - Preferred Route from Cold Spring Station to Breakneck Ridge Station

### Legend

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

# 1.1 Cold Spring Station to Little Stony Point

## Route Overview

This segment of the route lies mostly on sidewalks along local roads, with short off-road connections at both ends. Fair Street provides the only comfortable connection to the Route 9D corridor without being on Route 9D. Therefore, the route described below provides the most direct alternative, which was identified early on in the route analysis phase as the preferred route through Cold Spring.

### Station Platform Connections to Main Street

The existing path from the north end of the northbound platform leads to the foot of Main Street. Main Street is accessible from the southbound platform via a pedestrian underpass/tunnel.

### Main Street

Railroad right-of-way forms the western terminus of Main Street at the railroad underpass. The path from the northbound platform leads directly to the terminus.

### Fair Street Sidewalk Extension (planned work)

Fair Street is a low volume residential street that runs two ways between Main Street and Route 9D. Fair Street is one-way northbound for vehicular traffic between Main Street and Northern Avenue on Sundays only. The Village of Cold Spring has plans to extend the sidewalk along the west side of Fair Street all the way to Route 9D sometime in 2015.

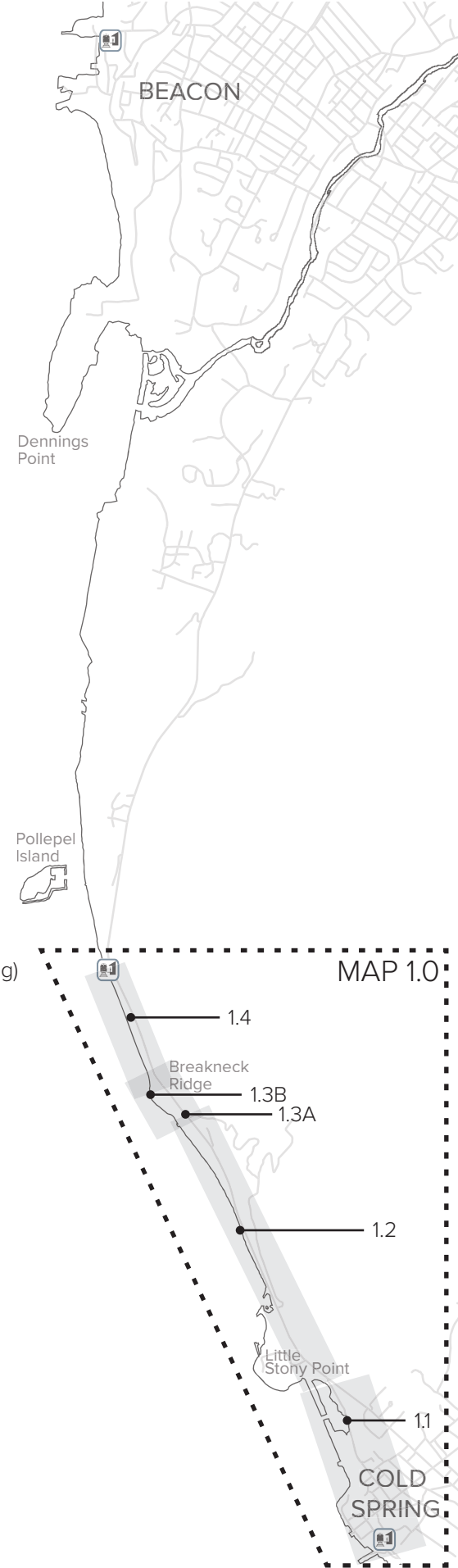
### Enhanced trail to Little Stony Point (partially planned work)

The Little Stony Point Citizens Association will be enhancing the existing woodchip trail that connects the base of Little Stony Point bridge to the extended Fair Street sidewalk. It is a plan recommendation that the wood chip path be upgraded to a 12' wide multi-use trail.



Map 1.1 - Cold Spring Station to Little Stony Point

- Washburn parking lot
- Upgrade wood chip path to 12'-0" shared-use path
- New sidewalk and bicycle sharrows (Village of Cold Spring)
- Route 9D
- Main Street - stencil bicycle sharrows





# Train Station Area and Main Street

The northbound platform of Cold Spring station connects to the southwest corner of the end of Main Street via a ramp and fenced walkway.

Sharrows, or shared lane markings, are recommended for Main Street, similar to the existing markings on Main Street in Beacon (use of shared lane markings must be reviewed and approved by DOT, based on the Department's policy). The sharrows are proposed for four blocks to connect to Church Street, bringing bicycle users of the trail through the lower half of Main Street (with pedestrians on Main Street's sidewalks). This would bring trail users through Cold Spring's downtown, providing access to the stores and restaurants at this starting or ending point of the proposed trail.

Cold Spring should consider applying the shared lane markings over the full length of Main Street within village limits, or at least to Route 9D, rather than stopping them at Church Street, to improve cycling connections to other amenities and points of interest that are not directly adjacent to the proposed trail.



Shared lane marking



Northbound platform path facing south



Northbound platform path facing north



Western terminus of Main Street looking east, away from railroad right-of-way intersection with Depot Square. Church Street is three blocks up on the left. There is no traffic signal at Church Street. Bicycles will make left turns against oncoming traffic.

Southern sidewalk, Main Street

Connection to northbound platform path

Railroad walkway underpass

# Fair/Church Streets to Route 9D/Little Stony Point

As shown in Map 1.1 on p. 31, the proposed primary connection from Main Street to Route 9D is via Fair Street. Fair Street is two-way, except for the portion between Northern Avenue and Main Street, which is one-way northbound on Sundays only. Church Street is two way, and could carry the trail southbound. Therefore, it is recommended that the southbound trail go south on Fair Street from Route 9D, east on Northern Ave, south on Church Street, and west on Main Street to the train station access ramp. The northbound trail would go east on Main Street from the train station, turn left and go north on Fair Street all the way to Route 9D. Pedestrians can continue along Fair Street to connect to Route 9D.

Fair Street has sidewalks for approximately half of the distance between Northern Avenue and Route 9D. Through a combination of State funding and local in-house design and construction forces, the sidewalk will be extended to the Little Stony Point trailhead at Route 9D.

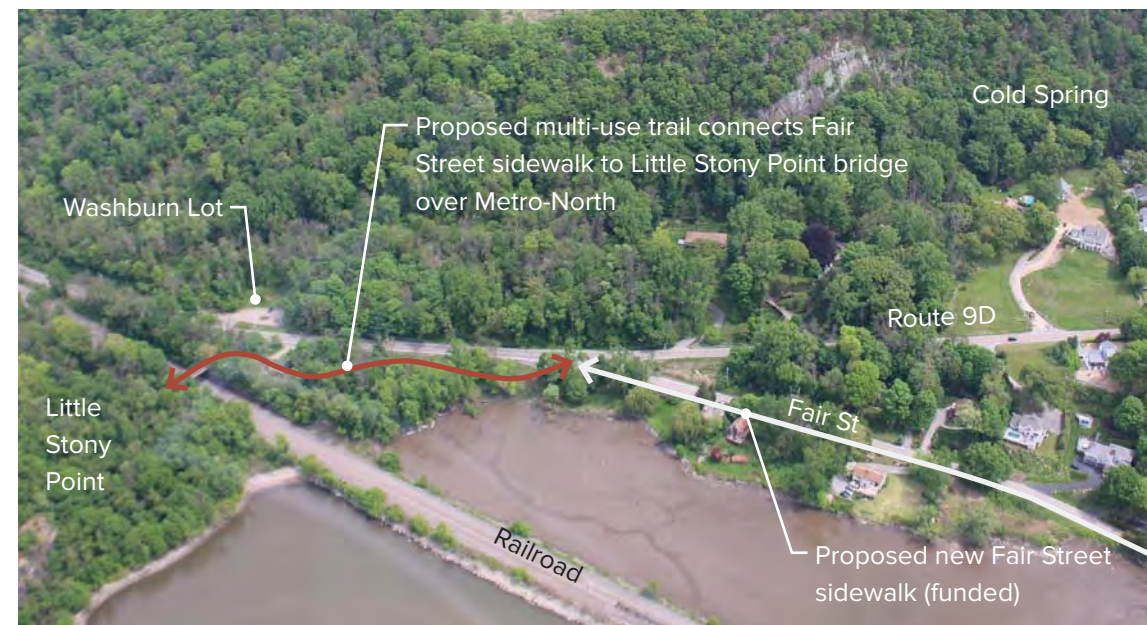
At the north end of Fair Street the proposed multi-use trail will connect to the Little Stony Point bridge over the Metro-North tracks. It is proposed that the 9D/Fair Street intersection be reconfigured by bringing Fair Street and Route 9D to a right angle as shown below. The Little Stony Point trail will be enhanced by the Little Stony Point Citizens Association through the removal of invasive plants and the planting of shrubs as a buffer between Route 9D and the trail. The woodchips on the trail would remain under their enhancement plan, therefore as an alternative a wider path should be installed, constructed of asphalt or compacted stone screenings to maintain a smooth surface and a more steady grade for cyclists not continuing along Route 9D in the shoulders.



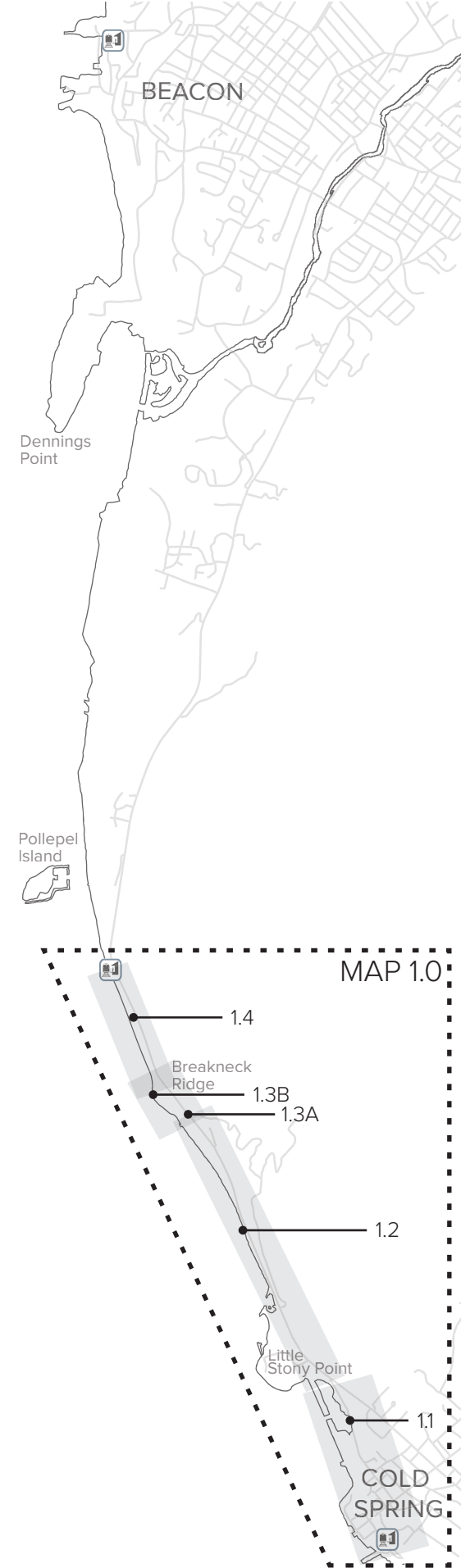
Intersection of Fair Street and Route 9D looking south



Rendering of Fair Street between Main Street and Route 9D looking north



Intersection of Fair Street and Route 9D from above





# 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

## 1.2 Shoreline from Little Stony Point to Breakneck Ridge

### 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 Storm 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.

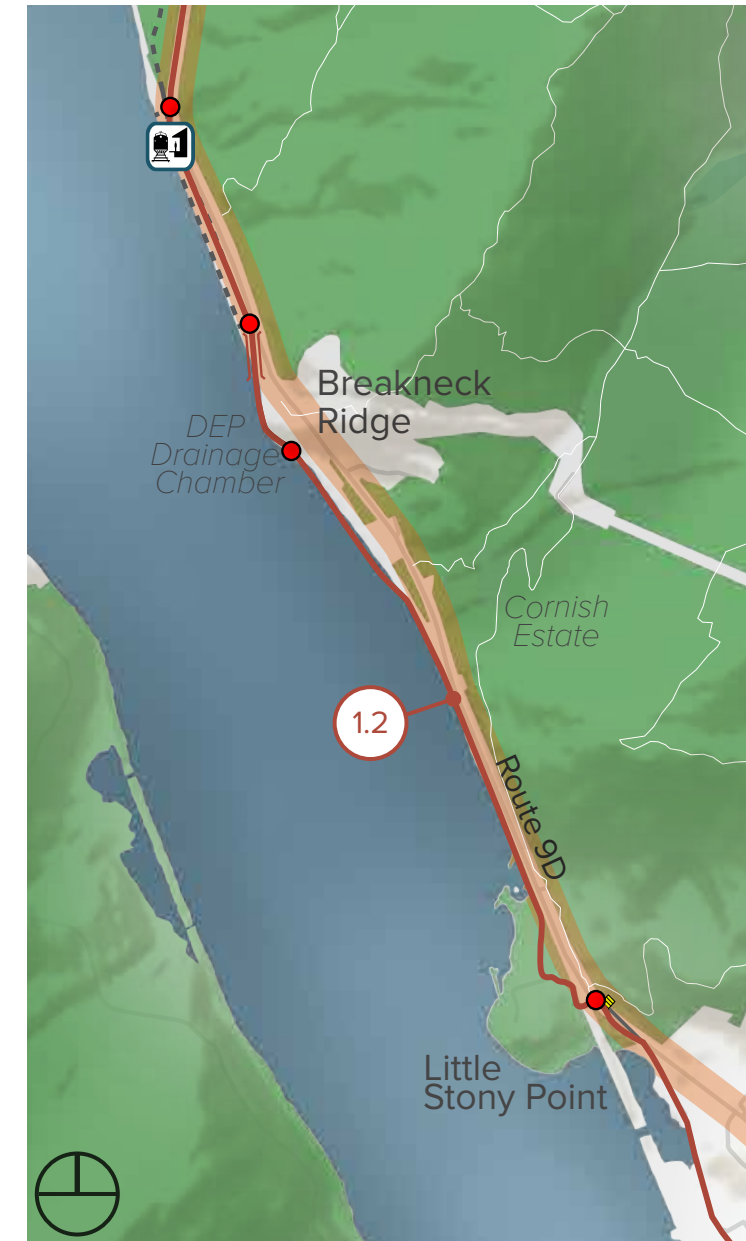
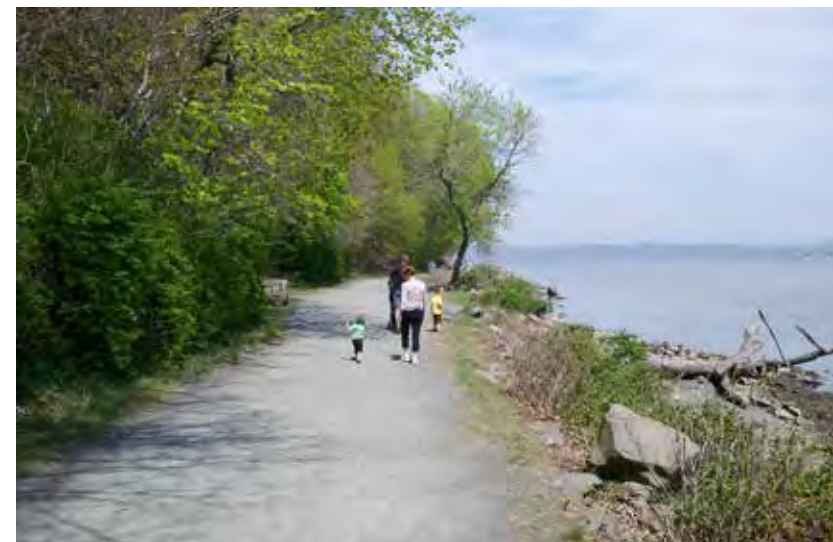
### CONSTRUCTION FEASIBILITY

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

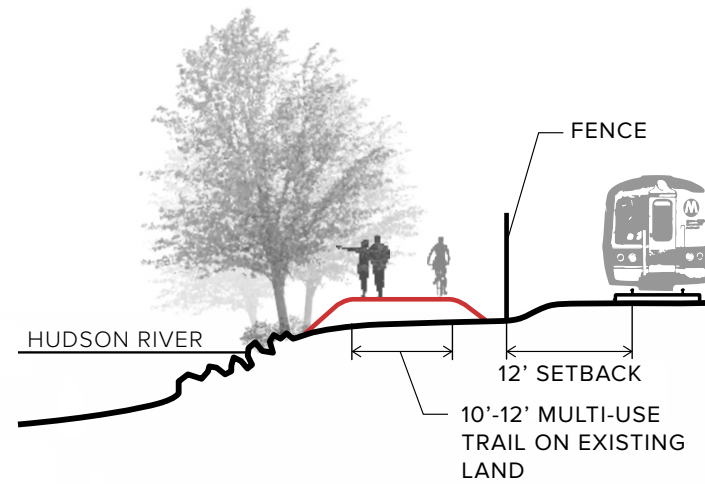
- Preferred Route
- Change in route segment
- - - Alternate Route
- Proposed Route 9D Corridor safety improvements
- State Parks

# Shoreline Typologies

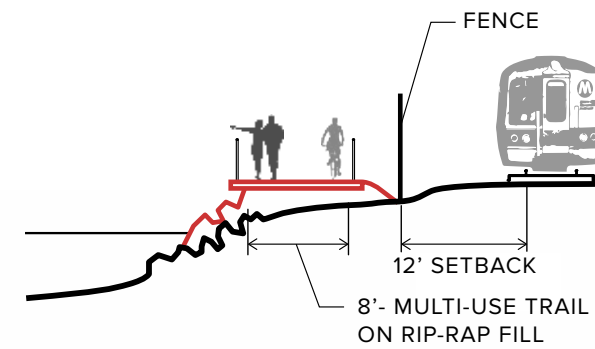
## Conceptual typologies

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.

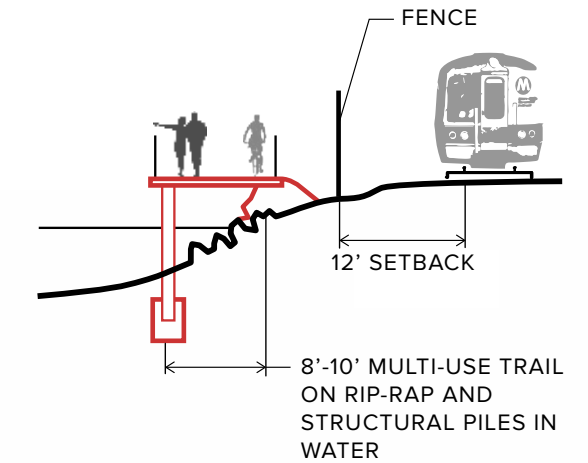
Section 1: Trail on existing land mass



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



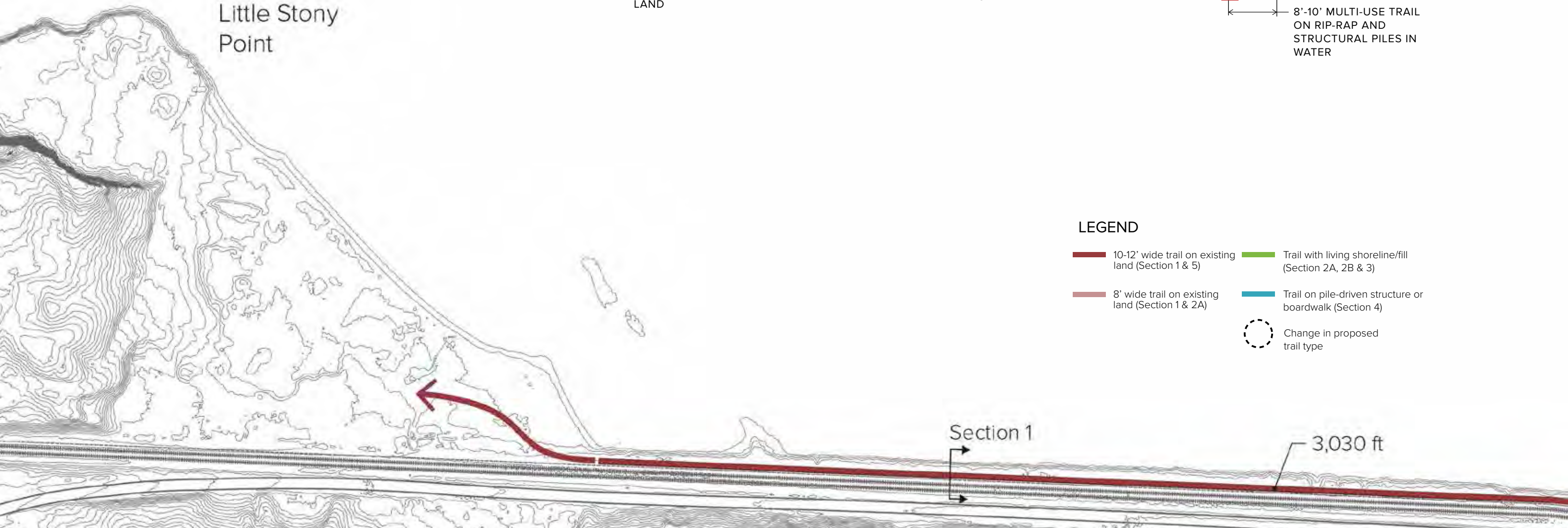
Section 2B: Partially pile-supported structure



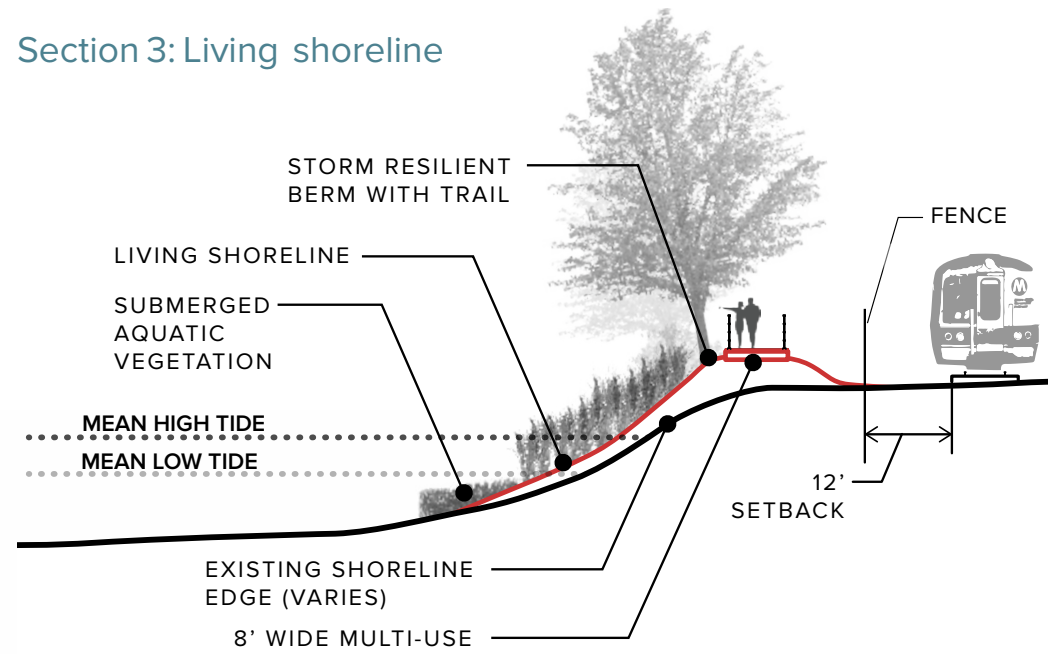
Little Stony Point

## LEGEND

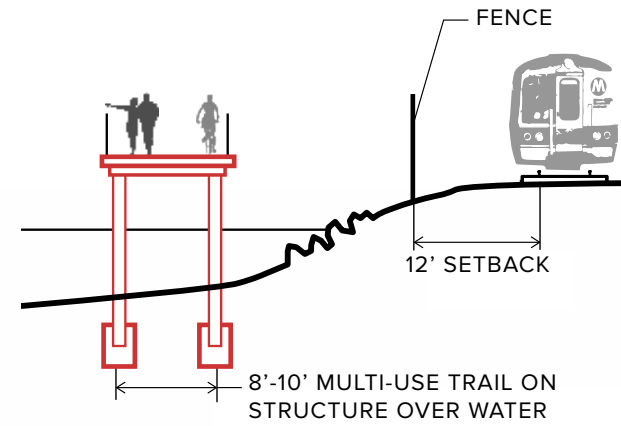
- █ 10-12' wide trail on existing land (Section 1 & 5)
- █ Trail with living shoreline/fill (Section 2A, 2B & 3)
- █ 8' wide trail on existing land (Section 1 & 2A)
- █ Trail on pile-driven structure or boardwalk (Section 4)
- Change in proposed trail type



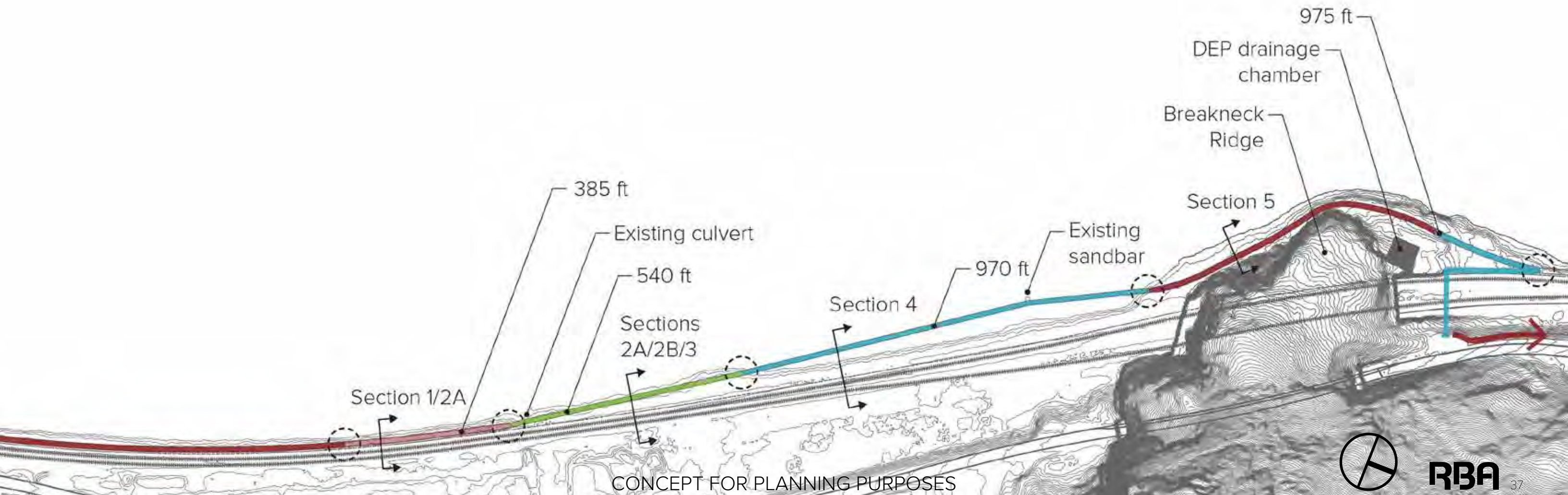
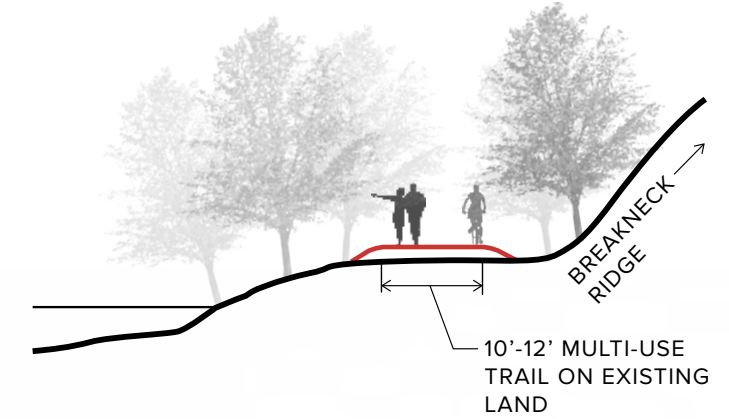
Section 3: Living shoreline



Section 4: Off-shore pile-supported structure



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





# 1.3 Through/Around Breakneck Tunnel/Headlands

Breakneck Ridge presents the most challenging physical constraint along this route due to its size and steepness, and because the most heavily used hiking trail in the area runs up the ridge. There are only two options for navigating this land form: through the tunnel (1.3A) or around the headlands (1.3B).

**1.3A - Through Breakneck Tunnel:** The tunnel is approximately 30 feet wide, wall to wall, and accommodates one travel lane in each direction. Lighting is poor and the moving lanes are together 27 feet wide. Pedestrian accommodation is inadequate. At times hikers are forced to walk through the tunnel between available parking and their destination, which is typically a trailhead. This is not the proposed route.

There are two options for routing the trail through the tunnel:

**Option 1:** A narrow 8-10 foot two-way side path through the west side of the tunnel. The moving lanes could be narrowed to 11 feet from the existing 13.5 feet, which would have the benefit of slowing vehicles. This would leave 8 feet for a barrier-protected multi-use trail. However, only 6-7 feet of this space would be usable after subtraction for the barrier. This would not provide the level of comfort desired for this trail. An alternative would be to narrow the travel lanes further to 10 feet leaving 10 feet for the trail. Motorist warning signage for the narrow lanes and a reduced speed limit for the tunnel would accompany the 10 foot lanes.

**Option 2:** Narrow the travel lanes to 10-11 feet and install a 4-5 foot wide red painted shoulder. This option would slow traffic by narrowing the travel lanes, however, there would be no barrier between the shoulder and motorists. Cyclists would have to share the travel lanes, again, falling well short of the desired comfort level desired for this trail. However, this option would be implemented as part of the Route 9D corridor improvements.



Cyclist-activated warning signage with flashing beacon to notify drivers about presence of cyclists in tunnel

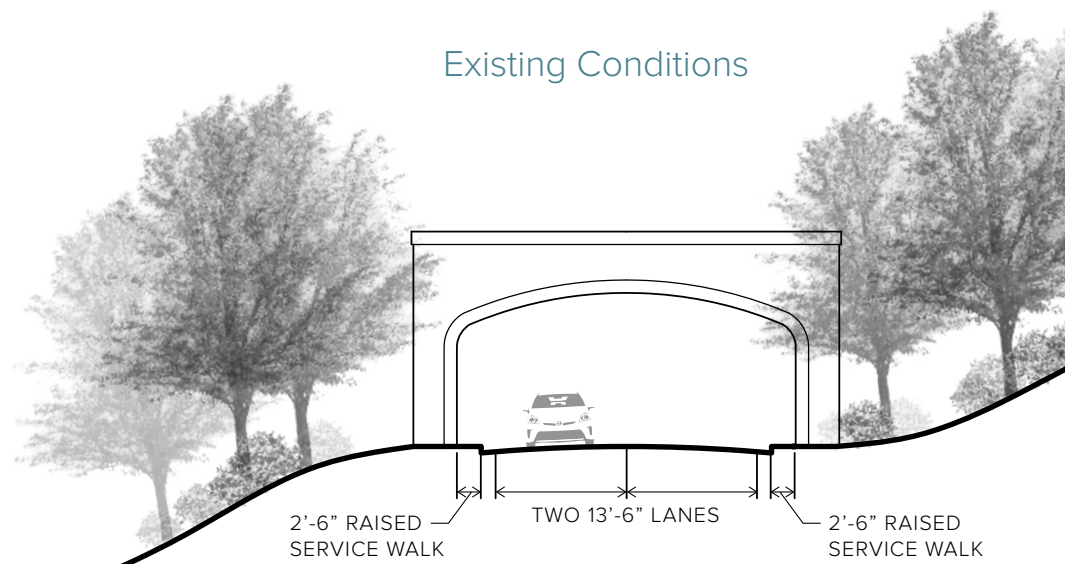


Looking north on Route 9D at the Breakneck Ridge Tunnel

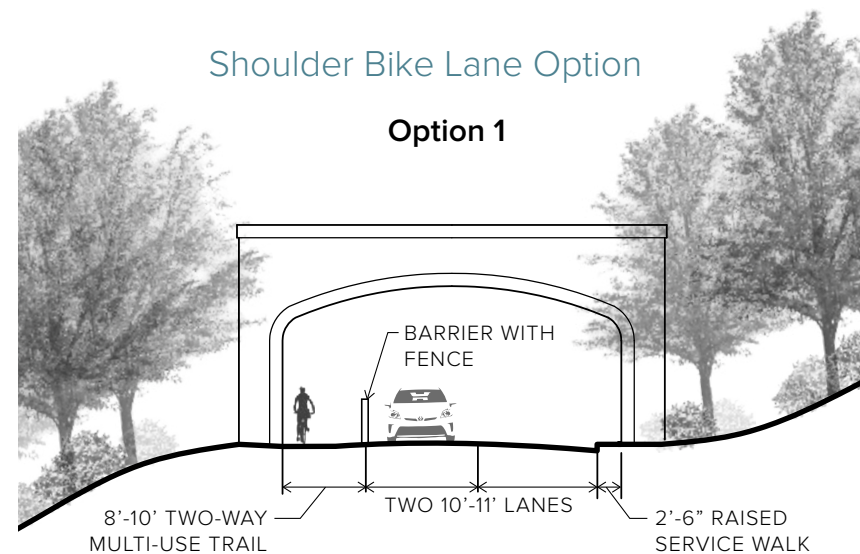


Looking north on Route 9D from inside of the Breakneck Ridge Tunnel

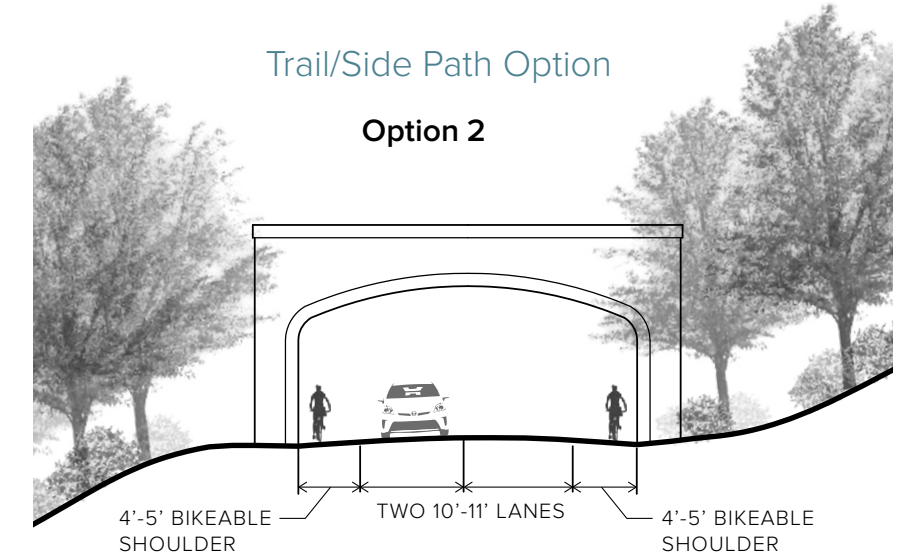
Existing Conditions



Shoulder Bike Lane Option



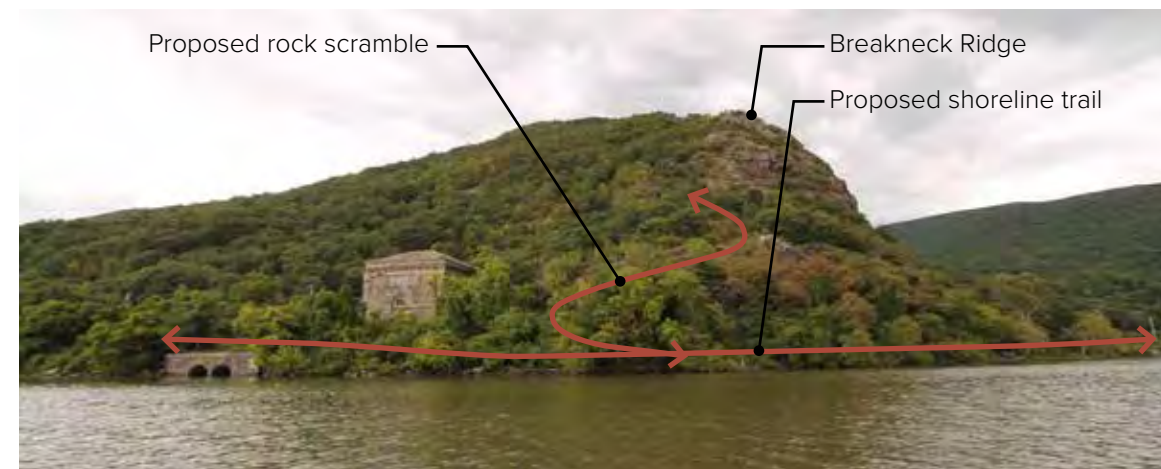
Trail/Side Path Option



**1.3B - Breakneck Headlands/Shoreline:** The proposed route is along the shoreline around the Breakneck Ridge headlands (see image on p. 40). The remnants of the original graded roadbed (see image below) around Breakneck Ridge can be seen today, though the roadbed is overgrown and has fallen into disrepair. With some clearing of invasive plants and native plant restoration, this area could serve as a connection around the Breakneck Ridge headlands. This connection could also host a viewing area where trail users can pause and engage the spectacular view across the river to Storm King Mountain, and West Point. For those who are not physically able to hike, there is no other opportunity to experience this unique relationship between mountains and river, meeting at the water's edge across from one another. Participants at the public meetings heavily favored this route option for its safety and scenic benefits compared to routing the trail through Breakneck Tunnel.

DEP's Hudson River Drainage Chamber is located on the north side of the ridge, set back 80 feet from the river. This facility is scheduled to be rehabilitated in 2015, with temporary staging to the north. Should the trail be routed along the historic roadbed, it would closely pass by the drainage chamber. As this is part of DEP's critical infrastructure, security measures would need to be installed to secure the facility.

It is recommended that a hiking trail (a rock 'scramble') be blazed for hikers who might want to climb from the proposed headlands trail closer to the water's edge to the existing Breakneck Ridge trail above. This will allow hikers to walk unimpeded from the Cold Spring Station up onto Breakneck Ridge via the Hudson River shoreline.



Breakneck Ridge headlands seen from the river, with DEP Hudson River Drainage Chamber

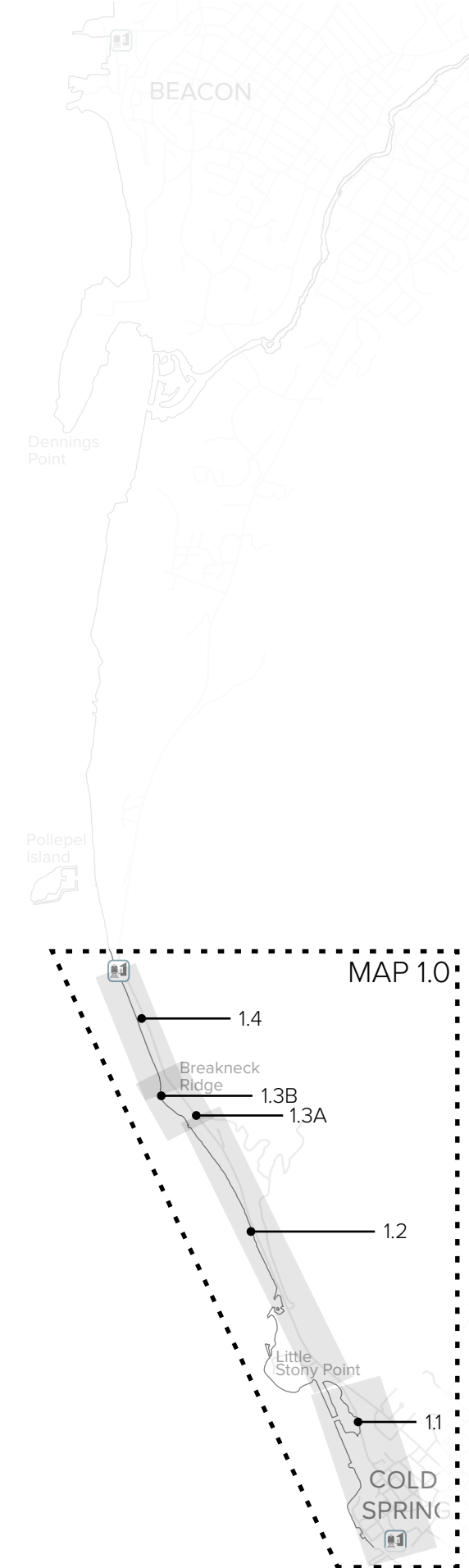
**1.3C - Bike-Ped Bridge over railroad tracks:** A railroad crossing is required in order to connect the proposed route around the Breakneck Ridge headlands to the preferred route north of the ridge, which lies between the Metro-North railroad and Route 9D. The north side of Breakneck Ridge is ideal for this, because the grade of the Breakneck Ridge trailhead area east side of the Metro-North railroad tracks is significantly higher than the shoreline grade, and the proposed bridge would likely connect at that higher elevation without the need for a ramp on the east side. This crossing would allow the trail to continue around the headlands, connecting the trail at a crucial, and challenging, point along the shore. Any bridge over the railroad right-of-way must meet all DOT and Metro-North requirements regarding the structure and minimum height above rail.



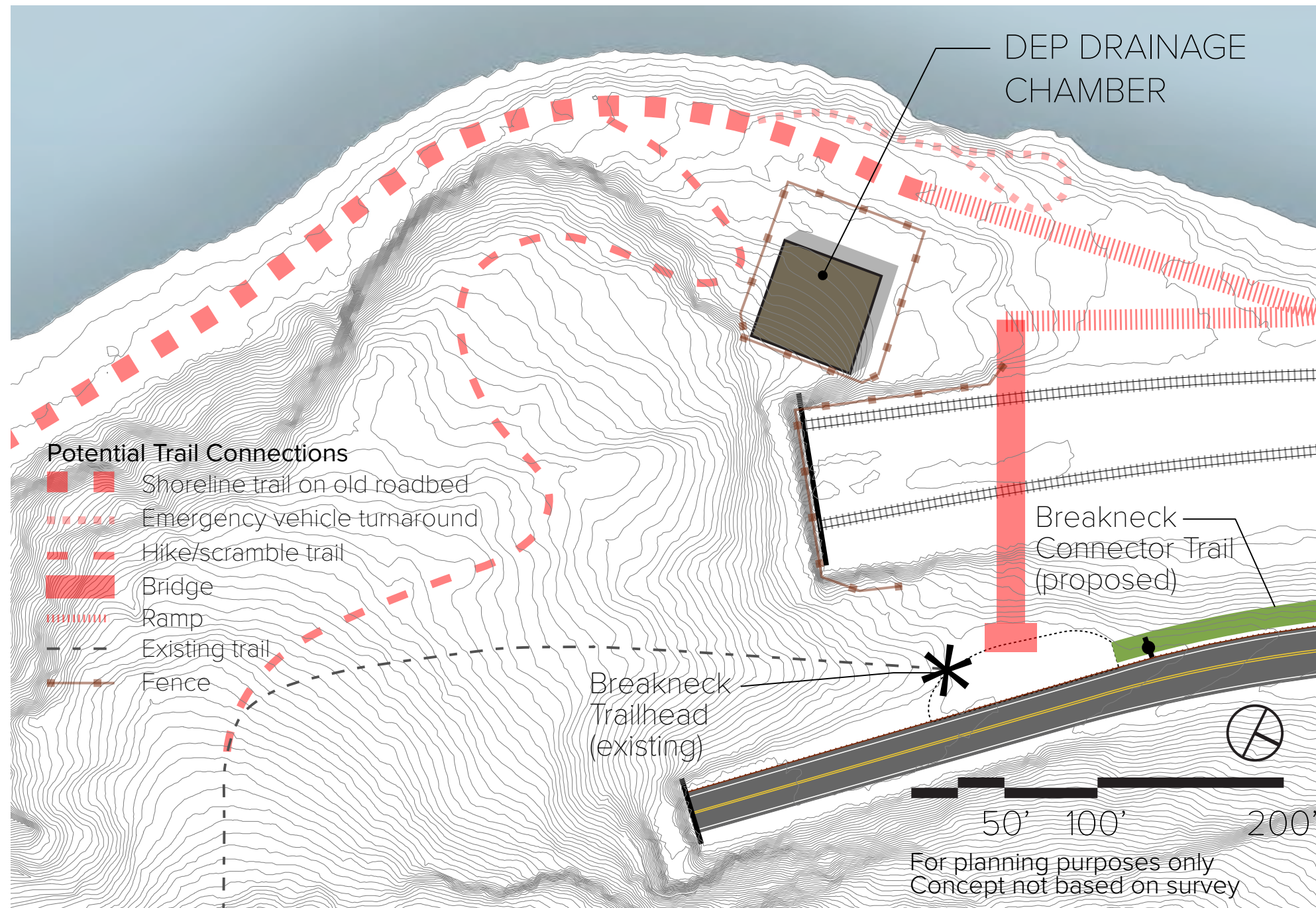
View from Breakneck Ridge headland, west across the river to Storm King Mountain



Rendering of proposed bike-ped bridge over railroad tracks at north side of Breakneck Ridge



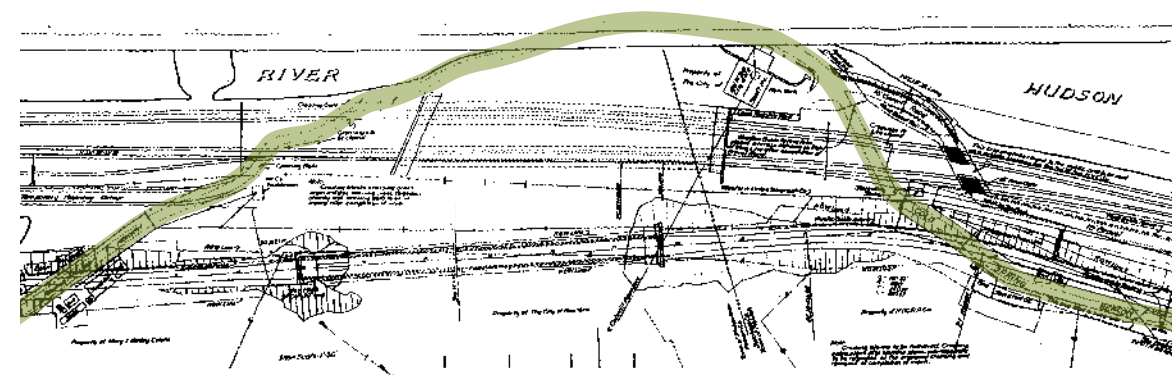




Plan showing proposed trail connections around the Breakneck Ridge headlands, including a proposed connection to the existing Breakneck Ridge trail

### Emergency Access to Shoreline Trail

Access to the entire shoreline segment of the trail, from Little Stony Point to Breakneck Ridge Headlands would be provided from the south at Little Stony Point. The entire shoreline trail would be designed to accommodate vehicles, including those portions built on structure over the water. A vehicle turnaround, built on retaining walls as needed, would be provided at the north end under the ramp, west of the DEP Drainage Chamber. As an alternative, the proposed bicycle-pedestrian bridge could be designed to carry the load of emergency vehicles, as well as DEP maintenance vehicles accessing the Drainage Chamber. Such a connection on the north side of the proposed shoreline trail would allow for better circulation and access for emergency and maintenance vehicles.



Historic Plan showing old road alignment around west side of the Breakneck Ridge headlands

# Summary Evaluation

## 1.3A Breakneck Tunnel

### GOALS

#### SAFETY

Breakneck tunnel is narrow and vehicles travel at high speeds. Even by narrowing moving lanes as much as possible, conditions for cyclists and pedestrians would not be significantly improved over the existing conditions.

#### RECREATION

This segment would provide no recreational value for most trail users aside from making a connection to other recreational areas along the trail corridor.

#### HIGHLIGHT & RETAIN NATURAL BEAUTY

This segment would not highlight the surrounding natural beauty.

### CONSTRUCTION FEASIBILITY

The limited width of the tunnel leaves few options, none of which meet the goals of this master plan. The widened walkway on the west (southbound) side of the tunnel that was considered here could be easily constructed, although it would impact underground utilities in the same area.

## 1.3B Breakneck Headlands/Shoreline

Completely separated from vehicular and rail traffic, this alignment would provide the maximum safety for trail users.

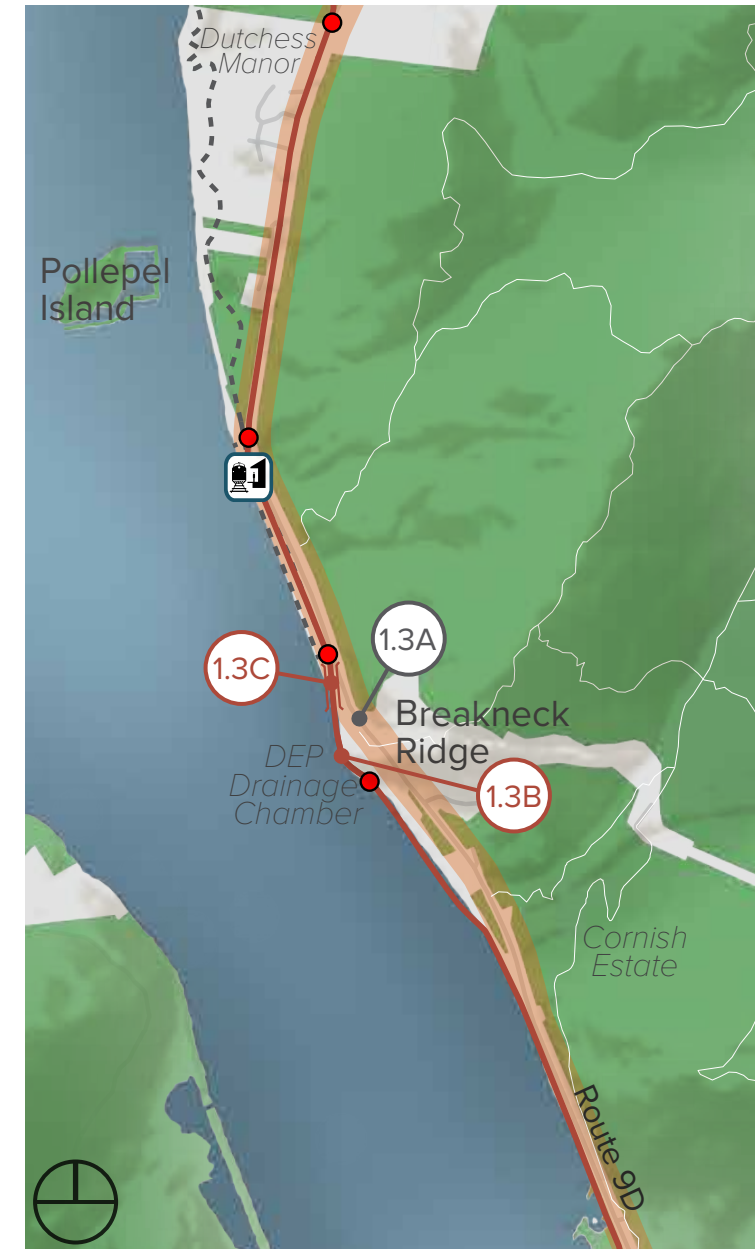
This trail segment would provide a recreational asset that would make the trail as a whole a transformative force in the region.

The uninterrupted views of the western Hudson Highlands, including Storm King State Park directly across the river, would provide greater visual access to these natural features for many more users than existing conditions allow.

This route segment will be challenging to implement, and will perhaps require means and methods that are more expensive in order to minimize construction impacts. Because the old but degraded road bed still remains, efforts to stabilize and elevate the shoreline would require less construction than the portion along the shoreline to the south.

## 1.3C Bike-Ped Bridge over railroad tracks

P R E F E R R E D R O U T E



Map 1.3 - Through/around Breakneck tunnel/headlands

### Legend

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



## 1.4 Breakneck Connector: Breakneck Tunnel/Headlands to Breakneck Ridge Station Pedestrian Bridge

**1.4A - Shoreline:** It is not feasible to continue the shoreline trail concept described earlier beyond the Breakneck Ridge headlands up to the Metro-North footbridge. This is due to the extremely narrow width of the land west of the Metro-North tracks and the sensitivity of submerged aquatic vegetation growing along the river bottom immediately offshore. Therefore, this is not the preferred alignment.

**1.4B - Along Route 9D (separated):** The segment between Breakneck Ridge and Breakneck Ridge Station is currently the most heavily-used area, with thousands of hikers arriving by car, train and bicycle on peak weekends. With limited parking, no pedestrian walkways, and no designated bicycle accommodation, the need for a facility to support the high visitor volume is clear. Parallel to the development of this master plan, an advanced conceptual design was developed for this trail segment, in support of an annual New York State Consolidated Funding Application. The trail is designed as an off-road shared-use facility located between the Metro-North tracks and State Route 9D (see plan on p. 46-47).

At the north and south ends of this segment, the trail alignment sits on steep slopes that require elevated walkway structures to provide a level trail. This elevated walkway (p. 43, 44) design concept does not disrupt existing drainage patterns over the steep slopes of Breakneck Ridge by preserving them in their current state beneath the portions that require a structure. A lengthy central portion of this trail segment can be installed at-grade with minimal site work and grading required.

This concept also seeks to provide as much additional parking as possible to accommodate the high visitor population. The existing parking area would be expanded to create a visitor welcoming area that is paved and marked with parking stalls to maximize the use of the space. Permeable pavers would be used to minimize surface runoff and reduce erosion. Parallel parking would be formalized and there would be an additional parking area located at the entrance to the northbound platform for Breakneck Station. It is proposed that parking along Route 9D be relocated from

the trailhead area on the west side and at the trailhead on the east side, just north of Breakneck Tunnel. There is limited sight distance at the southern end of this segment of Route 9D, just north of the tunnel, and high travel speeds throughout (posted speed limit is 55 mph). People trying to parallel park on the narrow shoulders of the road close to the Breakneck Ridge trailhead sometimes turn around at the bend in the road just north of the tunnel where sight distance is short. These unanticipated vehicular movements create extremely dangerous conditions for pedestrians and drivers.

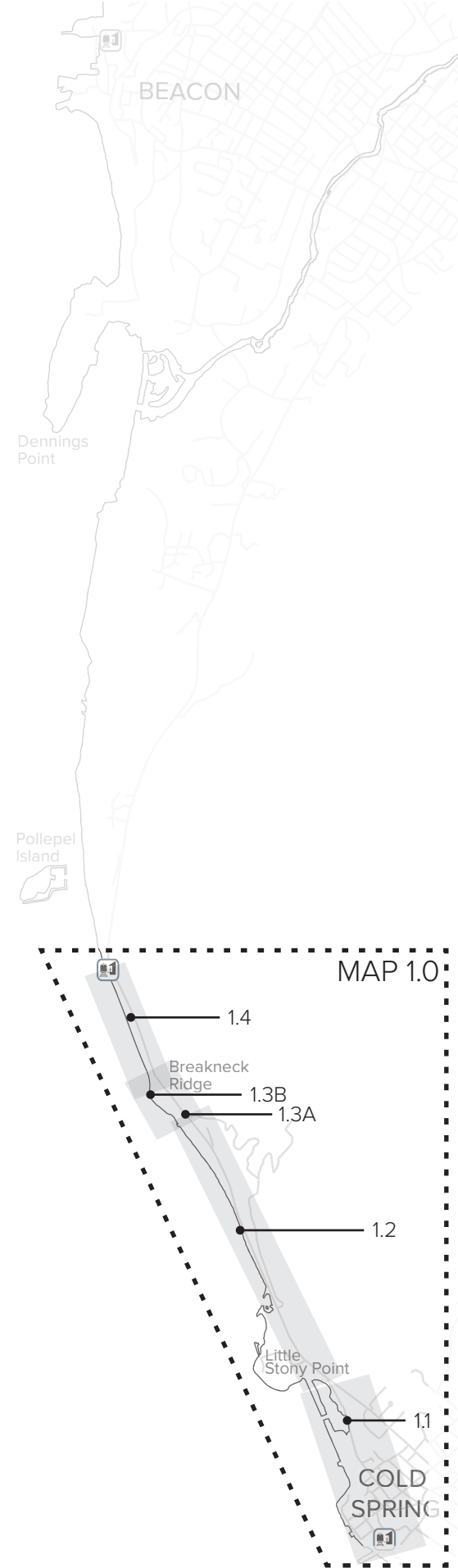
At the south end, five utility poles would need to be relocated down the embankment toward the Metro-North tracks to make room for the trail next to Route 9D so that it can rise up to the Breakneck Ridge trailhead (see Section A-A on p. 46). The design team coordinated with Central Hudson, the local power authority, to determine the feasibility and cost for this work. One of these poles is a 'riser' pole, which brings underground utility lines running under Breakneck Tunnel overhead. The other four poles are standard utility poles and could be rebalanced between the relocated riser pole and the existing utility poles north of the trailhead.

Implementation of this segment of the trail also creates an important opportunity to remove harmful invasive plant species that have colonized areas between the railroad and the water's edge, and to restore a native riparian and upland habitat with native flora that supports wildlife. This work will require Metro-North's review to ensure no impact to operations or buried utilities.

The northern segment of the trail (on structure) meets grade approximately at the southern end of the current (and proposed) parking area. It then continues northward at grade along an existing clearing in the woods. This central segment will have less environmental impact than the northern and southern segments. Approximately halfway between the existing Metro-North northbound Breakneck Ridge train stop and the Metro-North footbridge, the trail begins to climb, again on a raised structure, in order to meet the existing grade at the Metro-North footbridge.



This axonometric rendering depicts the proposed Breakneck Connector trail, as seen looking south towards Breakneck Tunnel and trailhead. The long-term vision includes burying utilities underground. Occasional vaults with manhole access would be required for maintenance, as shown in the foreground.





Existing condition photo taken from atop the Metro-North footbridge looking south



This rendering depicts the proposed multi-use trail on an elevated structure between Route 9D and the railroad, that climbs up to meet the Metro-North Footbridge (view taken looking south from atop the Metro-North footbridge). This concept will be more fully developed in the preliminary design process for this segment of the trail.

# Summary Evaluation

1.4A Shoreline north of Breakneck Ridge

## GOALS

### SAFETY

Completely separated from vehicular and rail traffic, this alignment would provide the maximum safety for trail users.

### RECREATION

This segment of 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 view of the river from the shoreline is spectacular. However, to create a trail here would require significant environmental impacts, such that it has been discounted.

## CONSTRUCTION FEASIBILITY

As stated above, the construction impacts surpass what is considered reasonable and necessary.

1.4B Breakneck Connector (2014 CFA application)

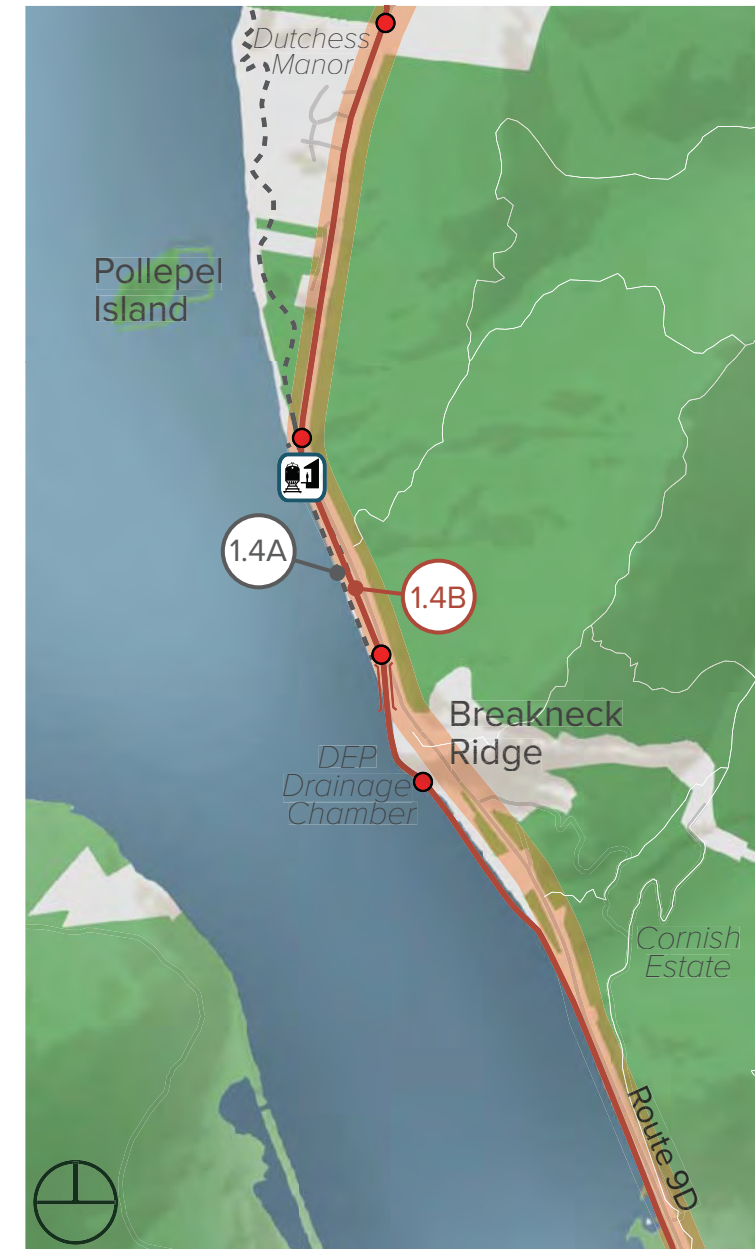
Completely separated from vehicular and rail traffic, this alignment would provide safety for trail users. In this area, the crucial safety improvement would be to the access of the two popular trailheads by motorists and pedestrians.

A 12-foot multi-use path here would provide sufficient space for both users arriving and passing through. As a main entry point for Hudson Highlands State Park, the proposed welcome area would provide much needed trail and stewardship information in addition to more parking.

While the railroad would separate this segment of trail from the river, the trail would rise up on the north and south ends to meet the landing points at higher elevations, providing views above the tracks. These structures were carefully considered to minimize environmental impacts.

This section of trail would require a structure on each end, but care was taken to ensure that the proposed concept was slightly raised off of the ground on the east side, so water can continue to run off the Highlands as it does today. Rather than proposing a trench that would have to be up to 20' deep in some places, a structure on support posts is proposed. Land ownership approvals for the alignment have been given for the concept of this trail, and a portion of the funding applied for has been awarded.

P R E F E R R E D R O U T E

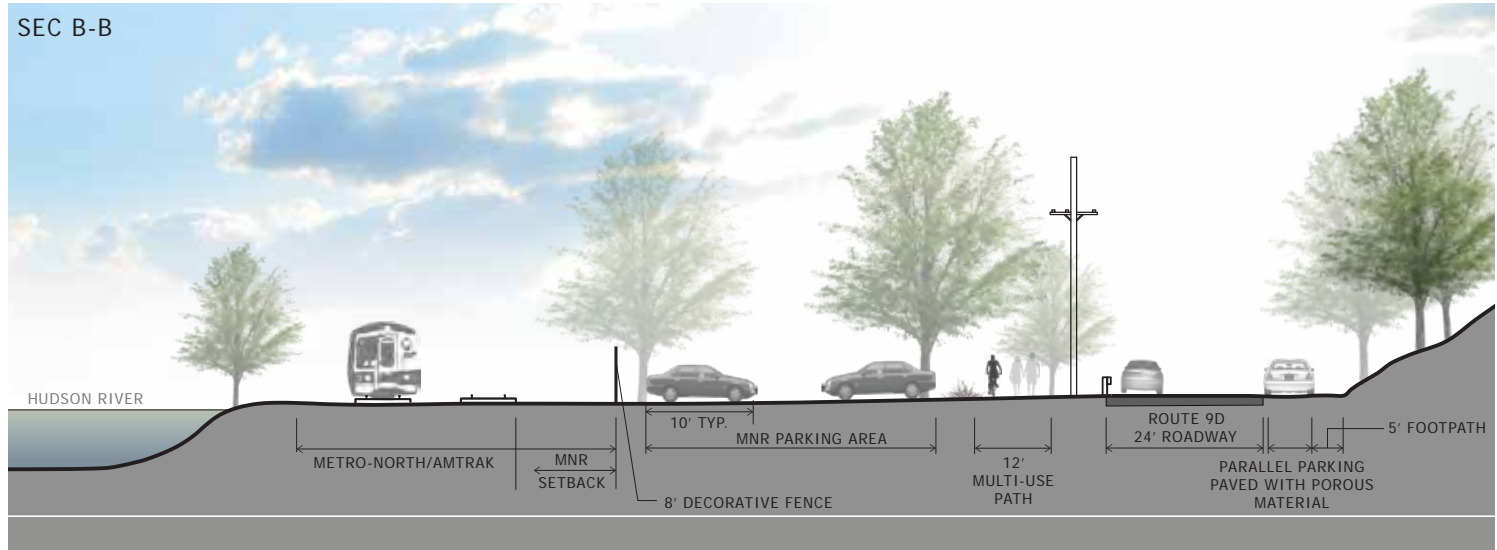
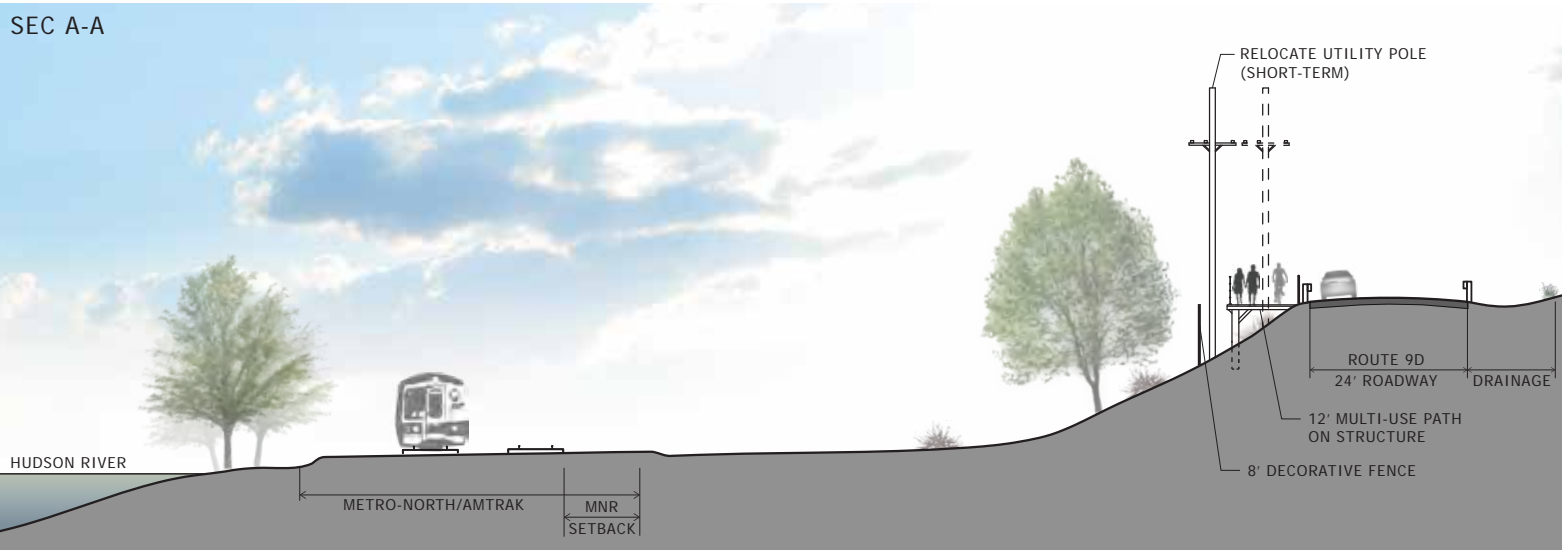
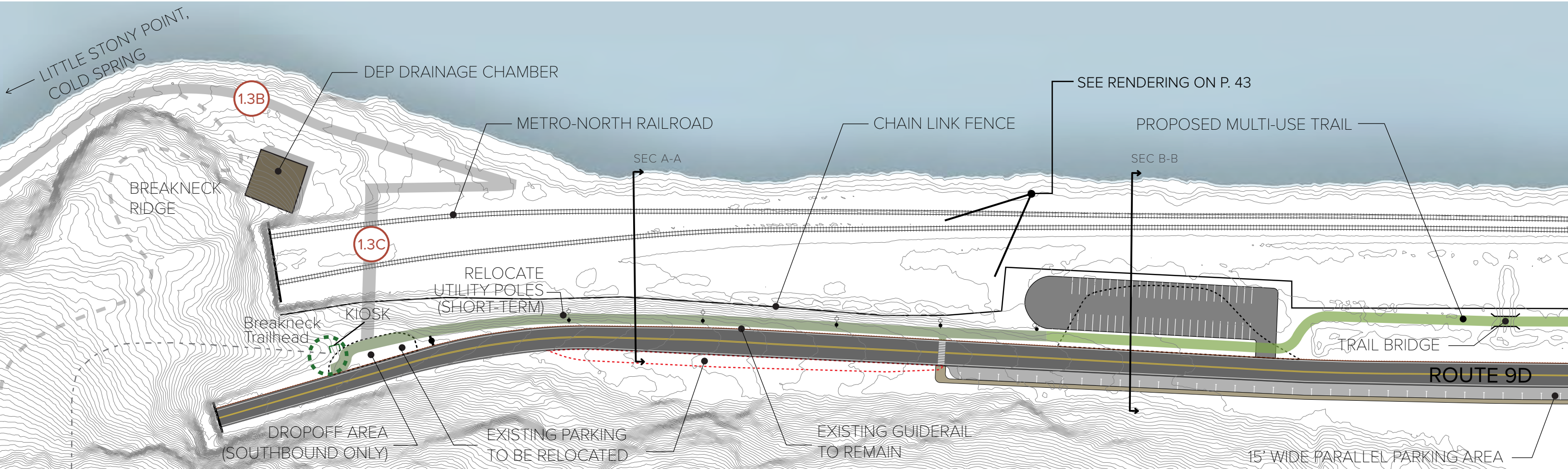


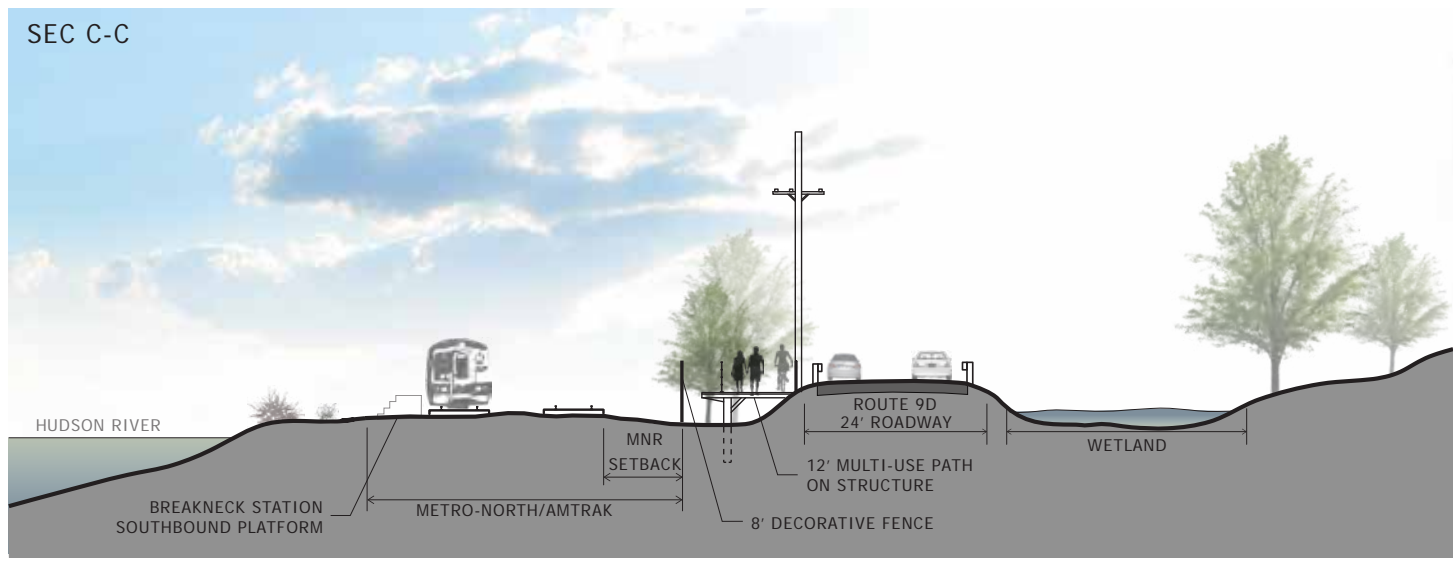
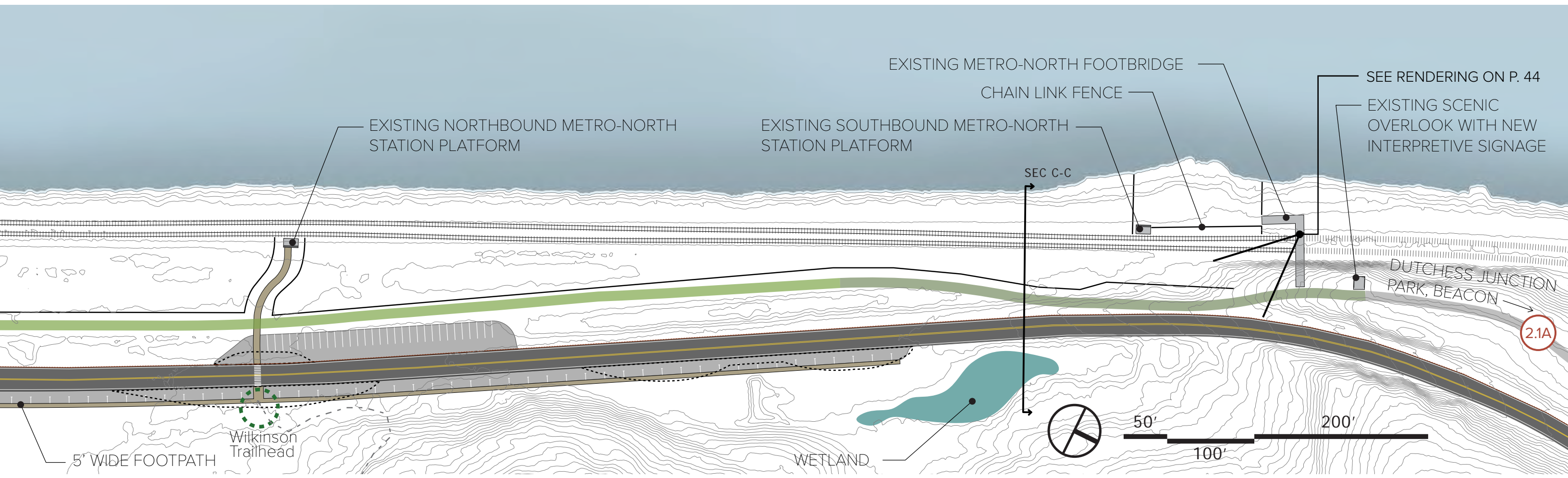
Map 1.4 - Breakneck Connector: Breakneck Tunnel/Headlands to Breakneck Ridge Station Pedestrian Bridge

### Legend

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

# “Breakneck Connector” Proposed Plan (NYSCFA funding applied for in June 2014)





LEGEND

- EXISTING HIKING TRAIL
- ⊙ EXISTING TRAIL ACCESS POINT
- EXISTING RISER POLE
- EXISTING UTILITY POLE
- PROPOSED UTILITY POLE
- MULTI-USE TRAIL AT GRADE
- MULTI-USE TRAIL ON STRUCTURE
- CONTINUATION OF PROPOSED TRAIL
- ⊡ EXISTING PARKING AREA
- PROPOSED PARKING AREA

Note: These plans do not currently show proposed corridor-wide Route 9D aesthetic and bicycle transportation safety improvements. Design integration required. The reconstruction of the Metro-North parking lot requires an agreement between MTA, DOT and Parks.