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REPORT

NEW YORK STATE OF OPPORTUNITY. Department of State

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PREPARED FOR:
City of Kingston, NY

Rondout Riverport Shoreline Stabilization and Public Access

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Introduction

In the 19th century the Kingston Rondout Riverport was a thriving, economic and trade center whose economy was founded upon the rich natural resources and confluence of the Hudson River. Originally two distinct villages, Kingston and Rondout were incorporated by the City of Kingston in the late 1800's. The Delaware and Hudson Canal terminated in the Rondout Creek, where shipping vessels obtained goods for transport down the Hudson River into New York City. When canal traffic was replaced by rail transport, a train hub was constructed in the district to take passengers and freight from New Jersey to Albany. Bluestone quarrying, natural cement and brick manufacture further diversified economic opportunities in the region. When highways eventually replaced rail, the Rondout Riverport lost its economic engine and began to slowly decline. Kingston Point (the now beloved Kingston Point Rotary Park) became a landfill, and abandonment precipitated vandalism and decay. Fortunately, stakeholders and residents appreciate the inherent historic, architectural, and natural resources of the Rondout Riverport and are committed to its revitalization.

Recognizing the tourism and investment potential of the area, the City and stakeholders of the Rondout Riverport have invested in revitalization planning of the district through previous studies and subsequent improvement projects. These planning and construction efforts to date, coupled with climate-change related weather disturbances, have necessitated serious consideration to protect the area from catastrophic impacts. The riverport has suffered significant flooding in the last century from over a dozen hurricanes and tropical storms. Flooding is costing the City of Kingston millions of dollars – Hurricane Sandy alone caused 2.3 million dollars of damage (City of Kingston, 2018). Low-lying areas are prone to flooding when rain storms coincide with high tide. The Kingston Waterfront Task Force's Vulnerability Assessment concluded the City could expect tens of millions dollars more of future property damage if flooding/flood risks are not addressed along the Rondout-Hudson waterfront (City of Kingston Tidal Waterfront Flooding Task Force, 2013).

The City of Kingston retained Weston & Sampson in November of 2018 to provide professional design services for shoreline improvements and public access to the eastern portion of the Rondout Riverport waterfront. These services include the design of bulkhead and other shoreline restoration and stabilization applications that will mitigate flooding and improve flood resiliency, while enhancing visual quality, improving public access, and public enjoyment of the district. This project also includes the provision of a promenade with maintenance access, water, and sewer infrastructure to the City's Rondout II Lighthouse, trail connections from the future Kingston Point Rail Trail along an existing causeway to Rotary Park and Kingston Point Park and increased public access to the water. West of the project area, between the east side of the Route 9W Bridge and the Cornell Steamboat Company, McLaren Engineering Group is working with the City of Kingston to develop shoreline stabilization applications, increased landside public access, and bulkhead corrections. This project aims work in tandem with McLaren Engineering design parameters to ensure structural and aesthetic continuity of shoreline stabilization applications along the Rondout Riverport.

The Rondout Riverport Shoreline Stabilization and Public Access project advances the City's 1992 Local Waterfront Revitalization Program, the 2002 Kingston Waterfront Development Implementation Plan, and the 2015 Kingston Waterfront Brownfield Opportunity Area Plan. These plans promote redevelopment of the waterfront business district, which in turn, will provide economic development benefits not only to the City but to the entire region. Careful implementation of improvements will preserve and protect waterfront, ensuring the financial investment in the riverport reflect the values and concerns of the community.

Project Visioning Development

Weston & Sampson is responsible for a wide range of tasks throughout the life of the project. A Kick-Off Meeting (Task 1) with the City and Department of State was held on December 11, 2018 to discuss goals and milestones, existing site conditions, permitting, public engagement, and relevant background materials and reports. A Project Advisory Committee comprised of project stakeholders was formed in Task 2. This group includes the following participants:

Stakeholder	Affiliation
Kristin Haber	Ponckhockie Resident
Kyla DeDea	Kingston Planning
Brenna Robinson	Kingston OECD
Steve Schabot	Ward 8 Alderman
Jim Sperry	Hudson River Maritime Museum
Rob Iannucci	Historic Kingston Waterfront Revival
Julie Noble	Kingston Sustainability
Tyrone Wilson	Harambe/AJ Williams-Myers African Roots Library
Rob Dassie	Rondout Neighborhood Center
Saidee Brown	Ponckhockie Resident
Kevin McEvoy	Kingston Land Trust
Julie Farr	Kingston Land Trust
Emily Hauser	Kingston CAC
Jeff Anzevino	Scenic Hudson
John Schultheis	Kingston Engineer
Lisa Vasilakos	DOS
Elaine Lindgren	

In Task 3 - Site Reconnaissance and Schematic Design, extensive field investigations and a review of all relevant documentation was performed. Field site analysis was performed in January of 2019. Important features and field data were recorded with a handheld GPS (Trimble Geo 7x Centimeter Edition). Background materials reviewed for the production of this report and subsequent design decisions can be found in the References section at the end of this document. For mapping of the project site, an aerial survey was conducted by Robinson Aerials Survey Inc. with control provided by Ryan Biggs Clark Davis. This mapping includes one-foot contour interval topographic and surface features and current aerial photography. Due to the history of this area, a Phase 1A archaeological sensitivity assessment and investigation was conducted by Landmark Archaeology. A geotechnical

investigation will be conducted once individual projects have been identified. A wetland delineation will also be included as part of this task. Finally, Weston & Sampson staff studied sea level rise projections to determine design elevations and compareof natural and engineered shoreline stabilization solutions. This analysis will be used to generate a series of conceptual design options for shoreline improvements along the project corridor.

A public outreach meeting will be facilitated by Weston & Sampson in Task 4 to share the results of existing conditions assessments and conceptual design. The objective of this task is to obtain community input and identify short and long-term solutions. An analysis of Construction Requirements (Task 5) will be prepared to determine all federal, state, and local requirements for the design alternative selected during the stakeholder and community review process. Upon completion of the construction requirements analysis, Weston & Sampson will prepare State Environmental Quality Review Act (SEQRA) documents as part of Task 6. In Task 7, Draft Final Design Development, a cohesive set of draft final design plans and a supporting report will be submitted to the City of Kingston. Comments and concerns will be addressed in the following two weeks, after which signed and sealed Final Design and Construction Documents will be prepared with supporting materials. Weston & Sampson will work closely with the City to apply for the required permits and approvals necessary for the construction of the project (Task 9) and will ensure that deeds and easements have been coordinated to provide public access. Minority and Women-Owned Enterprise (MWBE) and Project Status Reporting will occur throughout the life of the project (Tasks 11 & 12). A Final Project Summary Report and Measurable Results forms will be submitted in Task 12.

Description of Project

The project area begins at the eastern edge of the Cornell Steamboat Company Building property and continues along the Rondout Creek waterfront out to the Rondout II Lighthouse. Where the

Figure 1: Project Area

lighthouse stands, the Rondout Creek tributary flows into the Hudson River. Where the pier connects to land, the project corridor continues to the northeast along a causeway to Kingston Point Rotary Park. The total project area contains approximately 6,100 linear feet of shoreline along the Rondout Creek and Hudson River. Additional considerations for public access include East Strand Street, east of the Cornell Building, and North Street from its intersection with East Strand to Delaware Avenue and approximately 12 acres of privately and publicly owned property between East Strand and the waterfront. Existing conditions assessments revealed the presence of recently constructed steel bulkhead, deteriorated concrete bulkheads, eroded banks flanked by scrub vegetation, wetlands, riprap, brick fill, and wood pilings.

Goals

The goal of the Rondout Riverport Shoreline Stabilization and Public Access project is to develop resilient, adaptive, and culturally sensitive shoreline improvements to City's waterfront in order to protect important facilities, ensure the safety of visitors and residents, and to stimulate economic growth in the region.

Project objectives include:

1. Development of site-sensitive shoreline stabilization applications.
2. Stabilization of infrastructure along the shore of the Rondout Creek and Hudson River.
3. Improvements to land and water based public access.
4. Enhanced aesthetics and visual continuity along the project corridor.
5. Easements and agreements with property owners in the project area to ensure successful implementation of project infrastructure and amenities.

Land & Water Use

Zoning

The project area is zoned as the Rondout Creek District within City of Kingston's Local Waterfront Revitalization Program (LWRP) boundary. This district strives to control development, provide public access and views to the waterfront, grant priority to water-dependent uses, and create distinct Rondout Creek and Hudson River waterfront activities. The Rondout Creek District encourages restoration and new construction activities that are in accord with the original character of the area in design, color, and scale (City of Kingston, 2019).

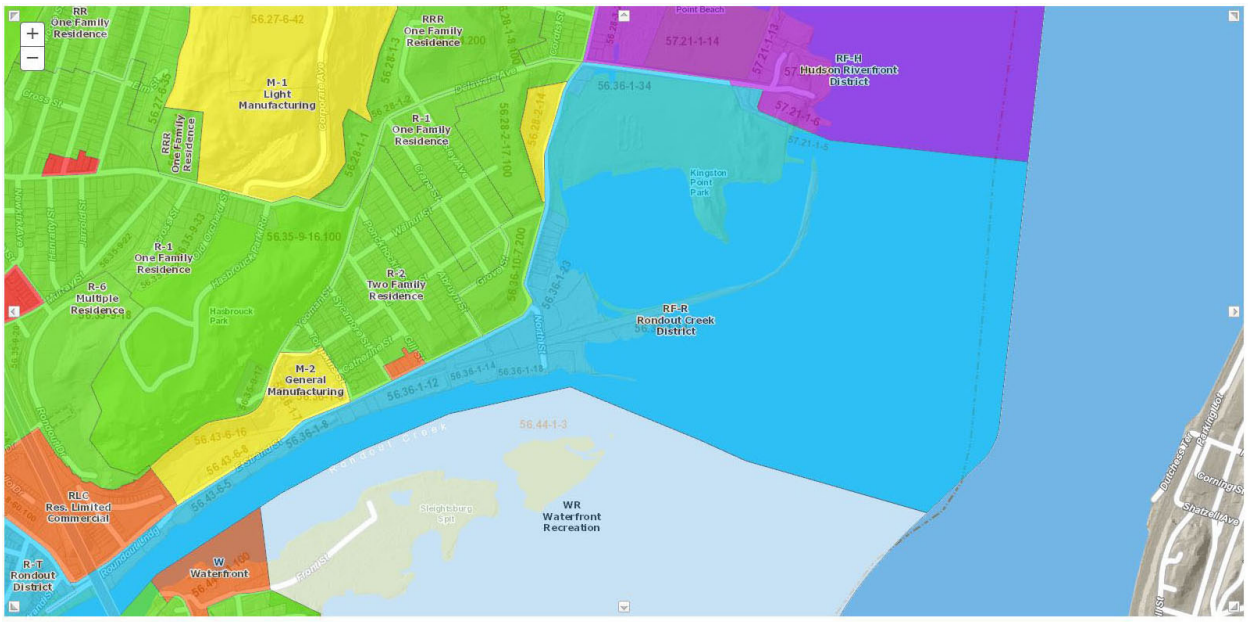

Figure 2: Zoning in the Project Area

Adjacent parcels around the Route 9W Bridge are zoned as residential limited commercial; the westernmost section of East Strand Street is zoned for general manufacturing. Further east, most adjacent zoning is one and two-family residential, with a small section between Sycamore and Gill Street defined as residential limited commercial.

Property Ownership

The 24-acre (approximate) project area is comprised of 18 distinct properties. The shores of ten properties border the Rondout Creek, and four properties have shoreline access to the Hudson River. The Trolley Museum and Kingston Wastewater Treatment Plant do not have property immediately adjacent to the creek or river.

Figure 3: Project Area and Adjacent Property Locations

1) Boat Storage Site: The parcel adjacent to the Cornell Steamboat Company is currently utilized for the storage of two historic PT boats. These fast, torpedo-armed easily maneuverable boats were used by the United States Navy in World War II. A storm/sanitary outfall is located at the western edge of the property.

   Historic Kingston Waterfront
   124-134 E Strand Street
   Kingston, NY 12401
   0.3 acres
   Parcel #: 56.43-6-6

2) Turnaround Area/Storage Building: An equipment and/or boat storage building spans the border of this and the above listed property. The building is surrounded by 6'-tall chain-link fence with a double chain-link access gate. A deteriorated asphalt parking area is found along the front and eastern side of the building. A wide gravel turnaround area with a removable soft boat launch is sited immediately east of the storage area. The remainder of the parcel is vacant and wooded, with what appears to be a mound of fill/spoils on the western portion of the property. This property has been identified as a brownfield[1] (Avison Young, 2015).

   Historic Kingston Waterfront
   136-138 E Strand Street
   Kingston, NY 12401
   1.9 acres

[1] A brownfield is a property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant.

Parcel #: 56.36-1-8

3) Marine Fire Rescue: A paved access drive crosses the trolley tracks at the intersection of East Strand Street and the Marine Fire Rescue site. The parcel is surrounded by 6'-high chain link fences with barbed wire at the top. A gate permits access to fire and police personnel vehicles.

   Historic Kingston Waterfront
   200-206 E Strand Street
   Kingston, NY 12401
   0.3 acres
   Parcel #: 56.36-1-9

4) Vacant Properties: Two contiguous properties east of the marine fire rescue parcel are vacant and wooded. A NYSDEC stormwater outfall is found at the shore of this property, immediately adjacent to the above-listed marine fire-rescue property. A wooden structure with two towers and a hanging plank bridge is on the site, though its purpose is not known. These properties are not fenced.

   Historic Kingston Waterfront
   208-216 E Strand & 216 E Strand Street
   Kingston, NY 12401
   0.3 acres; 0.2 acres
   Parcel #s: 56.36-1-10 & 56.36-1-11

5) Storage Facility: This fenced site has two metal buildings on the south side of East Strand Street. A floating, wooden dock is positioned at the shore. The eastern portion of the property has abandoned walls, grassy areas, and clusters of trees near the river. A small sliver of property is situated north of the eastern portion of the site, across the Kingston Point Rail Trail and Trolley Tracks. This vacant, grassy parcel is also owned by the Historic Kingston Waterfront. Parcel # 56.36-1-12 has been identified as a potential brownfield.
   Historic Kingston Waterfront
   224-258 E Strand Street (storage facility)
   260-270 E Strand Street (northern sliver)
   Kingston, NY 12401
   2.0 acres (storage facility); 0.15 acres (northern sliver)
   Parcel #s: 56.36-1-12; 56.36-1-13

6) Space Lift Woodworking Shop and Brick Buildings: Located on the south side of East Strand Street, this woodworking shop is housed in a brick building on a fenced lot. Two small buildings with a storage shelter are also found at the site, with ample parking and boat docking in between. The property is bisected by the Kingston Point Rail Trail and Trolley Tracks. A parking lot is sited just over the tracks to the north. It is a former brownfield (NYSDEC, 2018)..

   Historic Kingston Waterfront
   272-276 East Strand Street
   Kingston, NY 12401
   1.9 acres

Parcel #: SBL: 56.36-1-14

7) B. Millen's Scrapyard: Three contiguous parcels are located to the north of the Kingston Point Rail Trail and the Trolley Tracks, with road frontage along East Strand Street. The brick B. Millens Scrap Metal operations building is on the northwestern portion of the site. These sites were remediated for PCBs and various metals in 2012 and 2013, after operating as a scrap yard and automobile recycler for at least 50 years. This site is a former brownfield (City of Kingston, 2011).

   Millens Family Credit Shelter
   296, 290 East Strand Street
   Kingston, NY 12401
   0.4 acres; 0.6 acres; 0.9 acres
   Parcel #: 53.36-1-15, 56.36-1-16 & 56.36-1-17

8) Kingston Gas Holdings: This site, found at the shores of the Rondout Creek along the western edge of North street, is a natural gas distribution facility with gas transmission/distribution lines. This property had significant coal tar contaminated soils on and off site. Clean up, replacement, and capping of the property was carried out in 2016. Dredging and capping of contaminated sediment occurred offshore in the Rondout Creek. A new permanent sheet pile bulkhead wall was constructed along the existing bulkhead (NYS DEC, 2018). This site is a former brownfield (City of Kingston, 2011).

   Central Hudson Corp
   298-322 R East Strand Street
   Kingston, NY 12401
   1.6 acres
   Parcel #: 56.36-1-18

9) Vacant Parcels/Wetlands: Three contiguous vacant parcels span the distance between North Street, the Rondout Lighthouse Jetty, and the Kingston Point Rail Trail. The two western parcels are wooded and appear to be accessed by the public via a footpath to reach the Rondout Lighthouse II jetty. The eastern parcel is dominated by common reed (*Phragmites australis)*. This site has been identified as a brownfield (City of Kingston, 2011).

   Historic Kingston Waterfront
   Address: Listed as LAND, North
   0.8 acres; 1.0 acre; 2.0 acres
   Parcel #: 56.36-1-18, 56.36-1-20 & 56.36-1-21

10) Trolley Tracks: Trolley Tracks extend from the Trolley Museum on the north side of Rondout Landing behind the Wastewater Treatment Facility, before cross Rondout Landing to continue along the southern side of East Strand Street. The tracks follow the causeway from the intersection of East Strand and North Street, north to a terminus near the footbridge at Kingston Point Rotary Park. Heading west, these tracks cross Rondout Landing in front of the Ole Savannah Restaurant, extending along the southern side of the road to T.R. Gallo Waterfront Park. Parcel information within the project area is identical to that of the Kingston Point Rail Trail.

City of Kingston
Address: not listed
Parcel #: N/A

11) Kingston Point Rail Trail – Trolley Section: The Trolley Section is currently an informal stone-dust multi-use trail that begins at the intersection of Sycamore Street, continuing northeast on the south side of East Strand Street. The trail parallels the trolley tracks along the causeway up to at the Kingston Point Rotary Park. The trail does not currently connect to park amenities in a continuous fashion, but travelers can access the Delaware Avenue intersection on foot by following the access road to the picnic pavilions to the north of the causeway bridge. At Delaware Avenue entrance visitors will find seasonal restrooms and a pedestrian and path system connecting users to other park amenities.

City of Kingston
Address: not listed
4.7 acres
Parcel #s: 57.29-1-35; 57.29-1-35

12) Rondout II Lighthouse: This historic building, constructed in 1915, is primarily accessed by boat and is most frequently visited during the warmer months. It is one of only seven lighthouses still in place along the Hudson River. The lighthouse became automated in 1954 with a modern optic lens and continues to be operational with a navigational light. The Hudson River Maritime Museum guides tours of the building and light during from May to October (Hudson River Maritime Museum, n.d.).

City of Kingston
Hudson River
Kingston, NY 12401
1.2 acres
Parcel #: N/A

13) Kingston Point Rail Trail Terminus/Lookout: A parcel with a breakwater and lookout area is found at the terminus of the Kingston Point Rail trail. A footbridge connects the western edge of the causeway with Kingston Point Rotary Park. This bridge is constructed with wooden decking and cor-ten steel handrails. At this point of the causeway, the 1% annual chance flood elevation is 8.2 feet. Current daily high tide levels (+4 feet) do not put the terminus or its structures at risk.

City of Kingston
Address: not listed
2.0 acres
Parcel #: 57.21-1-5

14) Kingston Point Rotary Park: This popular park has fenced dog runs for small and large breeds, a baseball field, a playground, and BMX tracks. There is a small loop trail with views overlooking the tidal flats. A pedestrian trail connects the active use part of the park with a wooded parcel to the east. The trail crosses the above-listed pedestrian footbridge and ultimately connects with the Kingston Point Rail Trail. The eastern section of the park has

several covered pavilions and benches. A small concessions/seasonal restroom building is situated between both park entrances.

City of Kingston
53 Delaware Avenue
Kingston, NY 12401
84.7 acres
Parcel #: 56.36-1-34

Land Use Adjacent to the Project Area

15) Trolley Museum of New York: The museum is located on the site of the former Ulster and Delaware Railroad Yards, across the street from the Ole Savannah Restaurant. The museum is adjacent to a network of train tracks behind the wastewater treatment plant. The future Kingston Point Rail Trail – Phase 2 connection to the museum and trailheads are planned at this site.

16) Wastewater Treatment Plant: The wastewater treatment plant is located on the north side of Rondout Landing, across from the Cornell Steamboat Company Building. The site is heavily developed with storage tanks, distribution and processing facilities. Current plans to adapt the site for climate resiliency are utilizing a 100-year storm elevation of +/- 11 feet.

17) Ponckhockie Neighborhood: The neighborhoods adjacent to the project site are classified as one or two- family residences, constructed from brick or wood between the 1870's and early 1900's. Most of the buildings are 2 ½ stories tall on small (50' x 100' average) lots. An important historic structure – the façade of a former mule barn for the Newark Lime and Cement Manufacturing Company built in 1870 – is found at the end of Yeoman Street. A nearby Children's Church was constructed for the families of the cement company workers at the same time. The mule barn (an impressive gothic-style building) was slated for conversion to an African-American Baptist Church in the 1920's, though little evidence of that use remains. More recently, a library devoted to educating visitors about the role of African American's in the development of America opened on Gill Street in a former corner grocery store. Many residential properties with historic character in the neighborhood are being restored.

18) New Central Baptist Church: This brick Church is located between Sycamore Street and Tompkins Street on the north side of East Strand Street. Beautiful gothic-style stained glass windows adorn this simple structure, and a staircase brings visitors to the elevated front doors. A smaller wooden structure resembling a home is attached to the northwestern side of the building. This building has a parking lot and is across from parcels Parcel #s: 56.36-1-12; 56.36-1-13.

19) Children's Home of Kingston: The Children's Home of Kingston is situated on a hill across from B. Millen's Scrapyard, on the north side of East Strand Street. This non-profit organization provides services to boys and young men who benefit from specialized care.

20) Millens Staging Area: This site is a former scrap & metal recycling yard with bulk oil storage. Two abandoned warehouses are located inside the fence with a degraded gravel and asphalt parking lot. Storage containers, junked cars, palette piles, steel scraps, and concrete

barriers are strewn about the site. The northern section of the property is owned by the Rondout Land Corp. The southern portion is owned by Barney Millens.

21) Kosco Heritage: Located at the end of Delaware Avenue north of Kingston Point Park, Kosco Heritage is a full-service retail heating and propane gas company. Fuel storage and distribution operations are located here on the shores of the Hudson River waterfront. This site is listed as a Brownfield Opportunity Area (City of Kingston, 2011).

Above & Below Ground Infrastructure

Electrical poles and lines span the north side of Rondout Landing. An overhead power line crosses East Strand at the intersection of Tompkins Street. These lines terminate at a pole near the shore in the vacant Historic Kingston Waterfront property (Parcel #: 56.36-1-10). Power lines also cross the road at the Marine Fire Rescue site. Moving eastward, power lines are positioned along the north side of East Strand Street all the way to North Street, where the poles and lines cross the street, spanning the western side of the road as it travels north. A crossing of power lines with a corresponding pole can be found at each intersection of cross streets along the length of East Strand Street.

A storm/sewer outfall was observed at the shore across from the wastewater treatment plant. A NYS Permitted Discharge Point sign was found in the vacant parcel (56.36-1-9) across from Tompkins Street; however, an outfall was not found. Multiple storm/sewer outfalls were noted in 1990's mapping obtained from the City but these were not observed during the field reconnaissance.

Figure 5: Wastewater Treatment Plant Outfall

Figure 4: NYS Permitted Discharge Sign

Gas crossings are located at the shore in two locations: across from the easternmost portion of the wastewater treatment plant and at the terminus of the gravel drive on the eastern side of the Kingston Gas Holdings Station. Anchoring and dredging are not permitted at or near the gas crossings.

Transportation

Bicycle

The Kingston Greenline multi-use trail is built as a separated lane from the intersection of Ravine and West Strand Street over to the Cornell Steamboat Company Building. Heading east along the project corridor, the trail is has shared-use pavement markings along East Strand Street to North Street, the Kingston Point Rotary Park and beyond. This trail is part of the 750-mile Empire State Trail, which will eventually connect New York City to Canada and Buffalo to Albany. Another segment of the Greenline includes the Kingston Point Rail Trail – Phase 1 Project currently under construction. Phase 2 plans will connect the existing trolley line to Trolley Museum where it will be integrated into shared roadways and abandoned rail-line easements to complete the connection to downtown Kingston. The Delaware Avenue connection provides users with the option to proceed north along North Street towards the proposed Hudson Landing Promenade and DOT Projects.

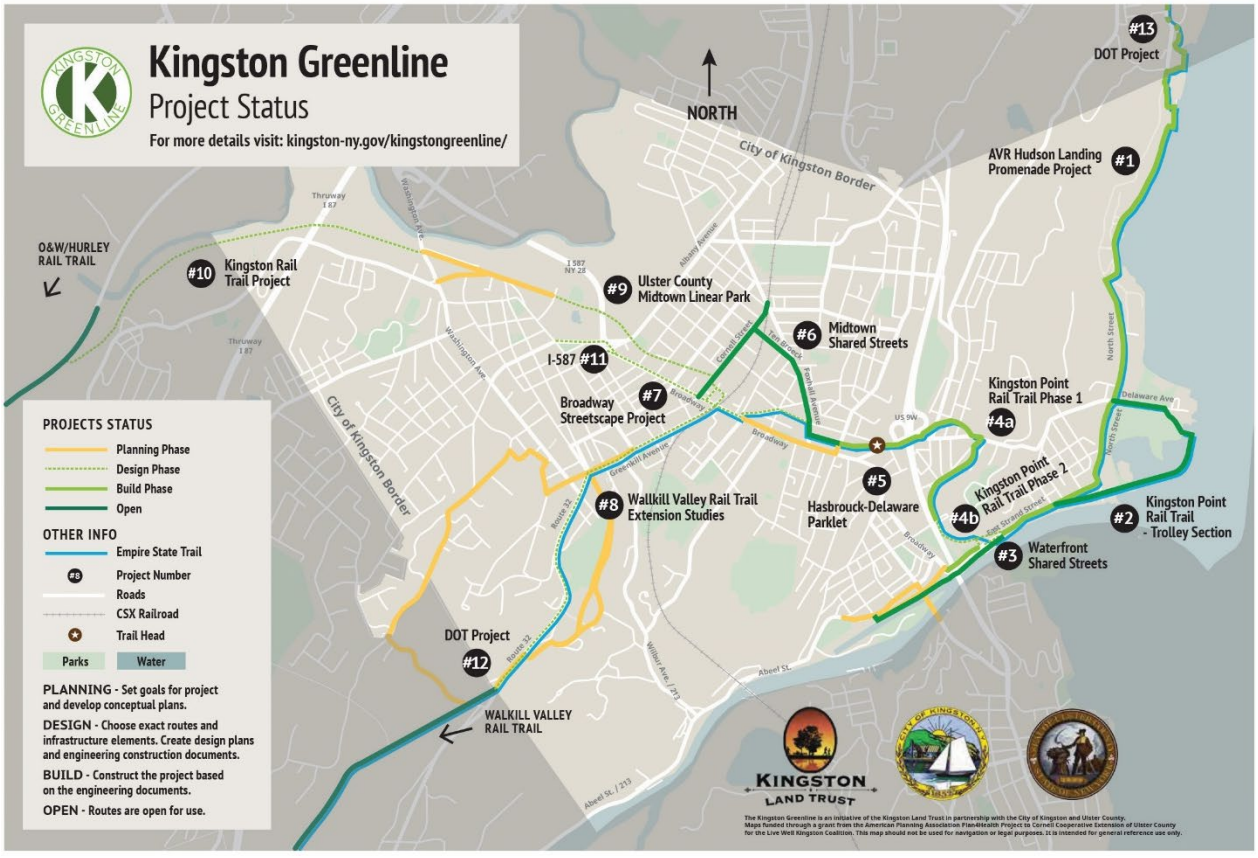

Figure 6: Mapping Courtesy of the Kingston Land Trust

Pedestrian

Sidewalks are in poor condition throughout much of the project area. From the Ole Savannah Restaurant to the Cornell Steamboat Company Building, the more recently constructed sidewalk is

in good condition on the southeastern side of the road. Narrow, cracked, and heaving asphalt sidewalks are prevalent along East Strand east of the Cornell building. The Ponckhockie neighborhood has adequate sidewalks in varying states of repair on both sides of the street. These sidewalks typically range between three and five feet in width and are predominately poured concrete slab construction.

There is no formal path to the lighthouse - loose rocks and ice make footing unstable and slick. In the winter this breakwater is particularly dangerous because of its proximity to icy waters. High tide floods the jetty each day and have the potential to trap users at the building – use of this structure to access the lighthouse is strongly discouraged.

The Kingston Point Rail Trail – Trolley Section serves bicyclists and pedestrians. The trail begins at the intersection of Sycamore Street, traveling parallel to the trolley tracks along the south side of East Strand Street. Properties to the south of the rail trail are vacant or utilized for light industrial purposes, and the trail is typically bordered by grass and herbaceous material in this section. At the intersection of North Street and East Strand, the trail continues along the trolley tracks over the length of the causeway. To the east, the trail is bordered by trees, low shrubs, and riprap. To the west, the vegetation is dense with high shrubs, trees, and herbaceous volunteer species. At present, the trail terminates at the bridge connecting the causeway to the Kingston Point Rotary Park. Much of this stone dust trail is flat and wide enough to accommodate groups and couples; however, in the middle portion of the causeway the path has narrowed and may only be safe for one person at a time.

Pedestrians can access Kingston Point Rotary Park on foot - there are stone-dust trails within the park and a loop foot path through a wooded area overlooking the tidal flats.

Figure 7: The Kingston Point Rail Trail Trolley Section

Trolley

The trolley runs from late April through late October on Sundays and Saturdays, and on holidays from noon to 5pm (Trolley Museum of New York, 2018). Along the Rail Trail, the trolley line travels parallel to the existing gravel path with no separation or barrier. The trolley tracks cross Rondout Landing just east of the wastewater treatment plant with adequate railroad crossing and yield signage. At East Strand the tracks are positioned extremely close to the road. This is a potential hazard when vehicular, pedestrian, and/or cyclist traffic conflicts with the trolley route.

Bus

CitiBus Route A travels along Rondout Landing Road and East Strand Street and into a residential neighborhood via Sycamore and East Union Street. Route A culminates in a loop around Lindsley Avenue, Delaware Avenue, and North Street. Within and adjacent to the project area, the CitiBus drops travelers at the Rondout Gardens Apartments, the Maritime Museum, Sycamore Street (north of New Central Baptist Church), and Kingston Point Rotary Park (The City of Kingston, 2019).

Boating

The principal location for boat access is sited to the west of the Route 9W bridge in the Rondout Creek, where wooden docks connect to a brick riverfront promenade. An extensive network of docks are positioned along the waterfront behind the Hudson River Maritime Museum, the Ole Savannah Restaurant, and the Cornell Steamboat Building. Kayaks, yachts, motor boats, sailboats, and small cruise vessels have access to the commercial district (City of Kingston, NY, 2019). A small metal pier provides limited boat access from the open area with a gravel turnaround (Parcel #: 56.36-1-8). Further along the water heading east, a small dock is used by the sheriff's office and marine fire-rescue personnel. This site is fenced and not accessible to the public. Several other fenced properties moving eastward have private water access. Where properties are not fenced, it is possible to walk down to the water along the riprap and vegetated shoreline. Evidence of broken fishing lures and trash suggests that people use this area for recreation. The main spur of the Kingston Point Rail Trail has no formal boat launches, but the water is easily accessed by pedestrians and bicyclists.

Hudson River Cruises operates 2-hour sightseeing cruises between May and October. Cruises depart from 1 East Strand Street and stop at the Kingston Rondout II Lighthouse, before traveling south on the Hudson River to Hyde Park. Occasionally, the company runs summer music cruises at night. Private charters are also available for special events (Hudson River Cruises, 2019).

Vehicular

Rondout Landing becomes East Strand at the intersection of Tompkins Street. Rondout Landing is currently in better condition than East Strand Street, and East Strand is not striped. Broadway and Delaware Avenue are the primary vehicle routes connecting the Rondout Riverport to the greater City of Kingston. The Route 9W highway and bridge connects Port Ewen and downstate New York Cities to Kingston by traversing the Rondout Creek. Drivers accessing the riverport from Route 9W must exit the highway at Delaware Avenue and travel southbound on through streets to the waterfront district.

Parking

On-street parking is found on both sides of Rondout Landing near Hudson River Maritime Museum. Diagonal parking can be found on both sides of the street along Rondout Landing, up to the western side of the Ole Savannah Restaurant and west of the project area. A public parking lot underneath the elevated Route 9W highway provides easy access to businesses and the Kingston Point Rail

Trail. Parking lots are also located at the Trolley Museum of New York, at the North Street spur east of the Kingston Gas Holdings facility, and at Kingston Point Rotary Park.

Site Conditions

Existing Shoreline Conditions

Varied shoreline treatments were discovered during the site reconnaissance phase. These include steel bulkheads, riprap, brick infill, gravel fill, concrete bulkheads, wooden and concrete pilings and construction fill. Variations in the severity of erosion are typically a result of edge treatment, proximity to impervious surfaces (stormwater runoff), and exposure to different types of wave energy[2] (SAGE, 2015). Erosion in the root zone is an indication of high-energy wave input. Where shoreline stabilization is inadequate, standing trees are being undermined by high-energy wave action by wind and boat wakes. Scouring[3] of natural edges gradually reduces the width and collapses the shore; insufficient vegetative barriers in these conditions further exacerbates the problem. Bulkheads are not immune to the effects of erosion – damage inflicted by overtopping or seepage was frequently observed.

Figure 8: Wooden Pilings Along the Shore at the Rondout Creek

Topography & Hydrology

[2] Wave energy is dependent upon the height of a wave and its subsequent force against a shoreline. The intensity of a wave is contingent on the orientation of the shore, wind velocities, and waterbody depths. Motorized watercraft also produce waves, called wakes.

[3] Scouring: removal of rock and soil resulting from wave action and flowing water.

The topography of the project area is generally level, with a few exceptions. The majority of the project corridor landscape as it exists today was gradually constructed from fill over the course of a hundred years, between the mid 19th and 20th centuries (refer to maps in Appendix C – Historic & Archaeological Resources. A substantial pile of spoils/fill materials is mounded in the western portion of the turnaround/storage parcel near the Cornell Steamboat Building. Steep slopes were noted at eastern edge of the Kingston Point Rail Trail – Trolley Section into the Hudson River, particularly along the middle stretch of the causeway to the south of the peninsula at Kingston Point Rotary Park. Deteriorating stabilization structures and inadequate vegetative buffers have also contributed to a progressive steepening of the slopes along the shore of the Rondout Creek.

Significant topographic change occurs just outside of the project area, across Rondout Landing and East Strand Street. From the eastern edge of the wastewater treatment plant to the intersection of North Street, grades gradually rise along East Strand Street with steeper grades ascending into the Ponckhockie neighborhood and beyond. Along the commercial and residential corridor of the Riverport between the Route 9W bridge and North Street, widths of level parcels range from 200 to 600-feet.Much of this landscape is covered by impervious surfaces, and since there is not a lot of space,stormwater coming from higher elevations does not have an opportunity infiltrate before it reaches the shore. High velocities of this upland stormwater runoff contribute to erosion issues along the shoreline.

Urban development, engineered shoreline stabilization structures, dredging, and fill can change patterns of erosion and sediment deposition over time along a river corridor. Areas with lower flow velocities, shallow water depths, and inlet geometry will accumulate detached sediments as they travel downstream. Invasive aquatic vegetative species gradually increase the depth of organic materials in the river bed and can also alter currents. When storms coincide with high tide in rivers, erosion can occur rapidly and change depositional patterns.

The Rondout Riverport is a hub of maritime activity. Watercrafts generate waves (called wakes[4]) that can degrade the shore. Boats are not the only source of wave-action erosion; winds generate waves that have significant impacts to the composition and character of the shore. Wind-wave caused erosion is typically seen in areas with low-lying lands or long expanses of open water (Alden Research Laboratory, Inc., 2006). The way a wave affects the shoreline is dependent upon the geometry, water depth, and topography of that shore. The shallower the water and the more gradual the slope, the less momentum a wave will be able to gather before it reaches land. Conversely, walls and steeply angled slopes with deeper water depths experience the full force of waves.

Ice is a factor in erosional processes as well. River currents, tides, temperature fluctuations, and winds all influence the movement of ice along the Hudson River and the Rondout Creek. As the ice pushes up against the banks of the shore, sediments and riparian vegetation can be dislodged and carried into the river. In tidal flats, ice may disturb the substrate and damage aquatic vegetation. Ice jams[5] are another concern in the waters adjacent to the project area. The tidal portion of the Rondout Creek has been identified as a trouble spot for ice jams in the winter (Weather.gov, 2019). Waters behind the jam can flood adjacent properties. When the ice begins to thaw when temperatures warm, sudden break ups of the jam may release elevated waters rapidly, precipitating dangerous flooding conditions.

[4] Boat wakes tend to be larger in height and shorter in duration than waves caused by the wind.
[5] Ice jams are blocks of ice that obstruct the flow of a river occur during extremely cold weather.

Figure 9: Ice Accumulation at the Shore

Floodplain Considerations

The Rondout Riverport Shoreline Stabilization and Public Access project site falls within FEMA Zone AE. This zone is included within the Special Flood Hazard Area (SFHA), which shows the extent of the 100-year flood, otherwise known as the 1% Annual Chance Flood. Zone AE also includes Base Flood Elevations (BFEs) showing the anticipated height of the 1% Annual Chance Flood. The FEMA-defined BFE indicated for the project site is 8 feet NAVD88.

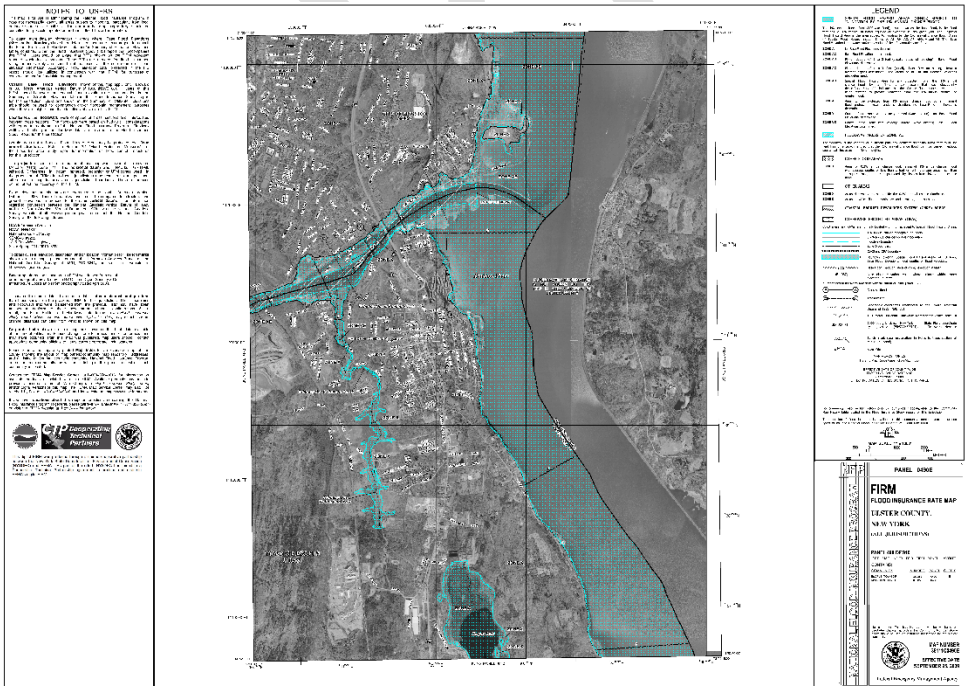

Figure 10: The FEMA FIRM, Showing BFEs Near the Project Site

The FEMA FIRM, showing BFEs near the project site.

New York State (NYS) floodplain construction requirements for new structures in Zone AE require building to the BFE plus an additional 2 feet of freeboard, resulting in an elevation of roughly El. 10 feet NAVD88 for the site. The NYSDEC webpage on Floodplain Construction Requirements provides more information. Non-residential structures may be flood-proofed in-lieu of meeting the elevation requirements.

Figure 11: East Strand Roadway Flooding Sign

The team reviewed available climate research and sea level rise (SLR) projections for the City of Kingston and NYS. Since the intended design life of the project is 35-years, the team identified projections for the 2050and 2060-time horizons. These projections are summarized in the table below, shown as ranges. For more information related to SLR projections, please refer to the resources listed in the bibliography at the end of this report.

Time Horizon	SLR Projections (inches)
2050 [A]	5 to 27
2060 [B]	20 to 36

A: Climate Projections for the Hudson Valley, 2019 and Working Towards Climate Resilience, 2018
B: Planning for Rising Waters, 2013

The 2016 City of Kingston Comprehensive Plan also recommended designing with SLR in mind. Strategy 10.1.4 suggested the following requirement:

> "…that any proposed new public structures or infrastructure or major renovations be construction to withstand flood elevations of 14 feet above 2014 mean sea level. Current (2014) 100-year flood elevation is 8.2 feet. **High range projections for sea level rise for 2100 are for 5 to 6 feet.** Long-term planning for public infrastructure and facilities should be designed and located in a manner that will not subject them to future flood risk, based on high-range projections" (City of Kingston 2016, page 88).

Although the project has a shorter proposed design life than the end of the century, this strategy from the Comprehensive Plan reinforces the goal that climate resilient projects in this area should design with both current and future flooding in mind. A related 2017 memo from the *Climate Smart Kingston Commission* and *Kingston Conservation Advisory Council* suggests planning for 36 inches of sea level rise by 2060, and references the Kingston Zoning Code and the Flood Hazard Overlay District. This design standard is in line with the climate research reviewed for this project and falls within the proposed 35-year design life of the project.

Limited expanses of low-lying level terrain may factor into the severity of storms. The less area water has to move and infiltrate into the landscape, the higher the flood elevation. Fortunately, grades rise steeply into the adjacent residential neighborhoods, providing some measure of natural protections. The major exception to this rule is the wastewater treatment plant, which is situated at the same elevation of Rondout Landing. Engineering and construction are underway to protect the facility from an 11-foot, 100-year flood elevation. Flooding due to rising sea levels will impact properties, transportation networks, sewer outfalls, and other infrastructure and utilities. Rising sea levels will also impact areas of the Rondout Riverport that provide habitat, as locations that were once tidal may become permanently submerged.

Incorporating climate resilience into design can help mitigate these impacts. With this in mind, the project seeks to design to El. 10 NAVD88 (the current BFE plus 2 feet of freeboard). Where possible, the design incorporates 36 inches of SLR to achieve a design life of 35 years based on currently available data.

There are opportunities to design the site to protect the community from SLR impacts. Grades increase sharply north of the shoreline, where it becomes feasible to design to a higher elevation and tie into existing grades. Lower lying areas can be designed to accommodate flood waters. Incremental adaptation concepts can be implemented, such as planning for future increasing grades and migrating living shorelines.

Natural Resources

Coastal Fish & Wildlife

Coastal migratory and resident freshwater fish and waterfowl species are found in unusual concentrations at the Rondout Creek tributary and associated wetland and upland habitats. The project area has Class II Wetlands, which supply food for waterfowl migrating in the spring and fall. Shorebirds, songbirds, and wading birds are all supported by the wetlands on the northern side of the creek and in the Sleightsburg Marsh to the south. The banks of the Rondout Creek are home to a variety of turtles, snakes, frogs, toads, and lizards (DOS Office of Planning and Development, 2012). Five species of plants, fish, and mammals are listed as endangered in the project area: Shortnose sturgeon (*Acipenser brevirostrum*), Indiana bat (*Mytosis sodalis*), American waterwort (*Elatine americana*), Riverbank quillwort (*Isoetes riparia*), and the Hudson River water-nymph (*Najas muenscheri*). Of these species, the Shortnose sturgeon and Indiana bat are listed as federally endangered, while the others have state protection endangered species classifications (NYS DEC, 2014).

The aquatic natural resources of Rondout Creek tributary and Hudson River are diverse, unique, and critically important to the health and resilience of the riparian ecosystem. The tributary is listed as one of five overwintering sites along the Hudson River for adult largemouth and smallmouth bass. Submerged aquatic vegetation provides forage and shelter for fish, waterfowl, and invertebrates. Inflows of freshwater from the Rondout Creek significantly influence the water quality of the Hudson River estuary.

The New York State Department of Environmental Conservation (NYSDEC) has classified the regulated freshwater wetland as a Class II[6] wetland, and Rondout Creek as a Class C[7] waterbody (Milone & MacBroom, Inc. , 2016). The Rondout Creek continues to support unique ecological resources, despite considerable human disturbance over time. Ongoing threats to sensitive habitat include sedimentation, altered flows, temperature variations, and changing water depths (DOS Office of Planning and Development, 2012). Over-enrichment of waters from fertilizer, septic systems, and roads may be contributing to the increased distribution of invasive plants and subsequent displacement of native species.

Landscape Ecotypes

Undeveloped waterfront parcels between the Cornell Steamboat Company Building and Kingston Gas Holdings are dominated by pioneer[8] species of trees, shrubs, and vines. Larger Cottonwood (*Populus spp.)* trees are commonly found along the shore. Shoreline conditions are variable – where vegetation is dense the shore is stable with a few exceptions of undercutting and scouring. Shores lined with concrete construction debris fill, wooden pilings, and concrete bulkheads are frequently found to have scoured earth and standing water behind the stabilization measures.

[6] Class II wetlands provide significant floodwater storage and wildlife habitat.
[7] Class C: best use of the waterbody is classified for fishing and non-contact actives.
[8] The first plants to colonize a site after disturbance; typically adapted to poor soils, drought, and full sunlight.

Figure 12: An Example of Scoured Earth Behind Stabilization Infrastructure Found in the Project Area

Aquatic and terrestrial systems between Rondout II Lighthouse jetty and Kingston Point Rail Trail causeway are a matrix of upper[9] and lower[10] intertidal, submerged aquatic[11], and extensive populations of invasive water chestnut (*Trapa natans)* (NOAA , 2019). North of the Kingston Point Rail Trail the landscape is dominated by lower and upper intertidal conditions, submerged aquatic vegetation, and open water. Wetlands throughout the project area are dominated by the invasive common reed (*Phragmites australis).*

Scenic Areas & Views

Scenic views of the Hudson valley can be enjoyed along Rondout Creek between the Hudson River Maritime Museum and the Cornell Steamboat Company Building. Views are interrupted by trees and vegetation from this point until visitors pass the wetlands on the south side of the Kingston Point Rail

[9] Upper Intertidal – covered by water at high tide only; organisms exposed to long periods of exposure to sun and air

[10] Lower Intertidal – habitat is the least variable; uncovered only at low tide

[11] Submerged Aquatic – vegetation (often grasses) which grow under the surface of the water

Figure 13: Views of the Hudson River from the Kingston Point Rail Trail

Trail. Intermittent trees and managed vegetation permit wide-open views to the Hudson River all along the trail until the path terminates at the bridge crossing to Kingston Point Rotary Park.

Scenic Areas of Statewide Significance (SASS) are mapped at the northern part of the project area along the Kingston Point Rail Trail, at the mouth of the Rondout Creek Tributary, and along the southern side of Sleightsburg Marsh. These areas were determined to have universally appreciated aesthetic significance, with special landscape features and views contributing to the community's visual quality. Scenic landscapes protected by the SASS require review to ensure impacts will enhance and/or preserve the scenic character of the waterfront.

Aesthetics

Project area aesthetics are characterized by brick inlays on roads and promenades, historic buildings, and a mix of commercial, residential, and industrial land uses. The area surrounding the Hudson River Maritime Museum is composed of materials that reflect the history and heritage of the City's waterfront. Common themes include weathered wood, limestone masonry, iron railings, and historically-relevant light fixtures. Chain-link fences, weathered storage buildings, and asphalt sidewalks are common visual elements as the corridor transitions from commercial to residential and industrial activities. Waterfront buildings are in various stages of disrepair, with some appearing to be abandoned altogether. East of Kingston Gas Holdings the landscape becomes quite natural and unscripted. The Kingston Point Rail Trial and trolley line are bordered by trees, wetlands, and views of the Hudson River.

Opportunities & Constraints

Infrastructure (Content to be provided by ENG)

Constraints: Roadways, trolley tracks, trails, and sidewalks are currently at an elevation that may experience damage due to flooding. Elevation of these systems will be extremely expensive and

may change the character of the district. Existing buildings and associated utilities are situated below predicted flood elevations.

Opportunities: Installation of boardwalks and floodable infrastructure may provide occasion to retain existing elevations and use. Rainwater capture, storage, and reuse a viable strategy on existing and proposed structures. Future buildings and associated utilities can be elevated to ensure flooding does not affect the structure or its operations.

Utilities (Content to be provided by ENG)

Constraints: Elevations of storm and sewer systems may require redesign based on anticipated storm surge and base flood elevations. Electrical service does not currently extend into all properties slated for redevelopment.

Opportunities: Potential for Low-Impact Development (LID) practices, including roadside bioretention, tree plantings, rain gardens, and pervious pavements. Opportunity to enhance infiltration of stormwater on site, rather than conveyance to a facility. Rainwater capture, storage, and reuse a viable strategy on existing and proposed structures. Solar energy in parking lots and on the rooftops of buildings can provide shade to parked cars, capture solar heat gain, and provide energy without requiring inputs from distant carbon-intensive sources.

Figure 14: East Strand Opportunities to Incorporate LID Stormwater Controls

Traffic/Circulation

Constraints: Limited parking and room to expand parking availability. As economic, architectural, and landscape upgrades make the Rondout Riverport a beloved recreational and tourist destination, traffic volumes will undoubtably grow. Impervious parking, roads, and sidewalks contribute to stormwater runoff volumes.

Opportunities: Improvements to sidewalks and crosswalks will increase pedestrian safety and shift circulation dynamics away from vehicle-dominated travel. Providing alternative transportation routes is one method to reduce vehicular traffic and associated road/parking development. Increased ownership of residential properties in the surrounding neighborhoods will increase pedestrian-based visitation to the waterfront.

Water & Land Access

Constraints: Private ownership of parcels along the waterfront. Deteriorated conditions, safety hazards, and sensitive natural resources. Limited room at the shore for docking and launches. Potential conflicts between motorized and non-motorized watercraft.

Opportunities: Easements granted by the Historic Kingston Waterfront LLC. will provide additional access points to the water, which can be designed to be accessible, resilient (or floodable), and viewshed amenities. Interpretive signage and restricted access can protect sensitive natural resources. Community engagement, volunteerism, and resources allocated to the maintenance of amenities will promote safe use of the waterfront. Establishing a uniform, consistent style of boat launches will promote a sense of visual continuity and structural cohesion in the project area. Several areas along the waterfront have been identified as potential opportunities for enhanced public access to the water, including the Space Lift Woodworking Shop, Kingston Gas Holdings, Rondout II Lighthouse, and the Kingston Point Rail Trail causeway terminus. Public education, interpretation, and monitoring will ensure the success of multi-modal watercraft travel.

Soil Conditions
A geotechnical investigation and report will be performed by Dente Engineering. The results of this investigation can be found in Appendix D.

Aesthetics & Identity
Constraints: Preservation of historic properties is critical to the success of the revitalization of the Rondout Riverport. New construction must be carefully designed to preserve and enhance the existing visual character of district. Building dimensions and appearance must not alienate occupants of existing residential neighborhoods or eliminate existing views. Similarly, scenic qualities of the riverport from the river should be improved or at least maintained.

Opportunities: Kingston has a strong sense of history, which is evident in the architecture and in smaller details like lighting and signage. Continued use of these design elements in recently revitalized areas will serve to unify the visual identity of the Kingston-Rondout Riverfront. Careful attention paid to scale and viewsheds should increase the value and appearance of district overall.

Resilience
Opportunities: This project is an opportunity for the City of Kingston to take action in preparing for climate change and provide a resilient example and standard for future development. Existing lower adjacent infrastructure and properties may be able to tie into this site in the future, and the City may be able to use this project to enact neighborhood-scale protection. Resilient, green infrastructure strategies can support open-space creation, value creation, and increased public access to the waterfront.

Constraints: Designing to a higher grade can add additional cost to a project. However, studies have shown that every $1 spent on mitigation can save $6 in disaster recovery (National Institute of Building Sciences 2017). Where possible, the design incorporates 36 inches of SLR to achieve a design life of 35 years based on currently available data. It may not be possible to elevate to this extent in all portions of the site. With this in mind, the project seeks to design to El. 10 NAVD88 (the current BFE plus 2 feet of freeboard) at a minimum.

Stormwater
Opportunities: Stormwater management will be required behind any waterfront barrier that is constructed as part of this project. Gravity drainage may current work but in the future with the

expected 36 inches of SLR, pumping may be required. Limited stormwater drainage current existing on East Strand. This project presents opportunities to manage stormwater using LID Approaches

Constraints: LID stormwater controls present a new approach and modified operation and maintenance requirements by the City. LID can manage the lower volume stormwater events but larger and high intensity precipitation events will need to be managed by incorporating more detention storage, infiltration where possible, and conventional stormwater conveyance.

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