RONDOUT HARBOR MANAGEMENT PLAN

CITY OF KINGSTON, NY

US Army Corps of Engineers®
New York District

June 2014

"This document was prepared for the New York State Department of State with funds provided under Title 11 of the Environmental Protection Fund Act."

Table of Contents

I. INTRODUCTION/SUMMARY OF PAST PLANNING EFFORTS

In February of 2011, the U.S. Army Corps of Engineers (USACE), New York District (NYD), in conjunction with the City of Kingston, NY, produced a Planning Assistance to States (PAS) study for the city's waterfront. Running along the Rondout Creek in the City of Kingston, Ulster County, New York, the PAS study area begins at the mouth of the Rondout and ends at the city limits of Kingston, approximately three miles upstream.

PAS studies are completed by the USACE under the authority provided by Section 22 of the Water Resources Development Act of 1974 (PL 93-251), as amended. Pursuant to this section, the USACE can offer assistance to local governments and other government entities, "in the preparation of comprehensive plans for the development, utilization, and conservation of water and related land resources."[1]

The scope of the PAS study for the City of Kingston Waterfront, New York called for a review of existing baseline data, potential alterations to the federal navigation channel, documentation of the existing shoreline bulkhead, potential adaptations of the jetty to the lighthouse, and the identification of required permitting for any construction associated with the proposed actions. Reviews were based on field observations, existing documentation, and record drawings provided by the City of Kingston and/or the NYD.

Earlier, in 1992, the City of Kingston adopted a Local Waterfront Revitalization Program (LWRP), which, among other things, describes the goals and implementation policies of waterfront development for the City of Kingston. The LWRP's area of analysis extends from the northern boundary of Kingston into the Hudson River to the southern boundary of Kingston in the Hudson River, following the Rondout Creek along the Kingston boundary, and extending into the City of Kingston.

The Kingston Waterfront Development Implementation Plan followed the LWRP in 2002. Its primary area of analysis includes the Kingston waterfront along the Rondout Creek, between Block Park and Kingston Point Park, and all of Kingston Point Park. Its purpose was to build on the planning goals and policies presented in the LWRP by providing implementation strategies for them.

An earlier relevant planning venture was Kingston's 1987 Urban Cultural Park Management Plan, which covered the Rondout waterfront area and coincided with the LWRP area.

The study document for the Kingston waterfront PAS, the LWRP, and the Kingston Waterfront Development Implementation Plan are all prominent sources for this Rondout Harbor Management Plan (HMP). They will all be treated at greater length in the text that follows.

[1] http://www.usace.army.mil/CECW/PlanningCOP/Documents/library/pas.pdf; December 27, 2010

II. HARBOR MANAGEMENT PLAN AREA

II.A City of Kingston Local Waterfront Revitalization Program Area Boundary Definition

The HMP area, as defined by the LWRP, is as follows:

> "Beginning at the northwestern most corner of Kingston's Waterfront Boundary where Kingston's Corporate Boundary intersects NY State Route 9W, the boundary extends southerly along the centerline of Route 9W to the intersection of Tammany Street, then easterly along the centerline of Tammany Street to First Avenue, then southerly along the centerline of First Avenue to Kingston Street, then easterly along the centerline of Kingston Street to Fourth Avenue, then southerly along the centerline of Fourth Avenue to the intersection of Fourth Avenue and Ulster Street, then south along a line parallel to and four hundred (400) feet east of Third Avenue to Delaware Avenue, to Livingston Avenue, then south-easterly along the centerline of Livingston Avenue to East Chestnut Street, then crossing Broadway to West Chestnut Street and continuing southerly along the centerline of West Chestnut Street to Montrepose Avenue, then easterly along the centerline of Montrepose to Pierpont Street, then southwesterly along the centerline of Pierpont Street to Hudson Street, then south along the centerline of Hudson Street to Abeel Street, then southwesterly along the centerline of Abeel Street to Davis Street, then northwesterly along the centerline of Davis Street to Dunn Street, then southeasterly along the centerline of Dunn Street to Abeel Street to the Kingston Corporate Boundary, then southeasterly along the Kingston Corporate Boundary to the approximate centerline of Rondout Creek which is also Kingston's Corporate Boundary, then easterly along the Rondout Creek Corporate Boundary to the approximate center of the Hudson River which is Kingston's Corporate Boundary, then northerly along the Hudson River Corporate Boundary to Kingston's Northern Corporate limits, then westerly along Kingston's Northern Corporate Boundary to the point of beginning."

Figure 1 - Plan Area

II.B City of Kingston, Ulster County, NY

Located 91 miles north of New York City and 59 miles south of Albany, Kingston lies on the west bank of the Hudson River at the confluence of the Hudson and Rondout Creek. Such location has given the city a very rich history, which includes its having served as the first capital of New York State in 1777. It was burned by the British in the same year. A more detailed treatment of Kingston/Rondout history is presented below.

Today, Kingston serves as the county seat of Ulster County, which had a population of 182,493 in the 2010 census. The city is governed by a mayor and city council known as the Common Council, which consists of ten members.

II.C Population/Local Economy: Kingston and Neighboring Municipalities

In addition to Kingston, several other communities are located in the plan area, all sharing access to Rondout Creek with the city. The populations of Kingston and these other municipalities appear in Table 1 below. Such totals may serve to represent existing and potential users of the waterway.

Table 1 - Population of Municipalities with Access to Rondout Creek[2]

Municipality	2000 Census	2010 Census
City of Kingston	23,387	23,887 (+2.1%)
Town of Esopus	9,331	9,041 (-3.1%)
Town of Ulster	12,544	12,327 (-1.7%)
Hamlet of Port Ewen	3,650	3,546 (-2.8%)
Total	48,912	48,801 (<-1%)

In the 2010 census, Kingston's population of 23,887 comprised 9,844 households and 5,498 families. There were 10,637 housing units.

The community sprawls over nearly 307 acres, comprised of 135 properties assessed at about 83 million dollars. Within this area, 72 commercial properties flourish on 87% of city boundaries. These have been assessed and valued at 22 million dollars.

The unemployment rate in the City of Kingston and Ulster County rose virtually continuously between 2000 and 2010, even doubling between 2007 and 2012. (The NYS Department of Labor shows identical statistics for the city and county.) Of course, these rates mimic those of the state and nation.

Over the same period, there was a 2.7% increase in the county's population and a 2.1% increase in that of the city of Kingston. The populations of the Towns of Esopus and Ulster, as well as that of the Hamlet of Port Ewen, all declined.

II.D Transportation

Kingston was once a busy transportation hub, with the Hudson River, Rondout Creek, and the Delaware and Hudson Canal all serving as significant commercial waterways. The Rondout was, in fact, the terminus of the D&H Canal, with the canal transporting coal over the Shawangunk Mountains to the Hudson. From here, the canal barges were unloaded and the coal transferred to river boats that took it down to New York City.

This burgeoning water traffic prompted the construction of a lighthouse at the mouth of the Rondout Creek, a necessity to warn captains of the dangers of the shore and the shallow tidal flats surrounding the mouth of the Rondout. The first two lighthouses were located on the south side of the Rondout Creek. The first of the two, a wooden structure, was destroyed by fire. The second lighthouse, Rondout I, a stone structure, was abandoned in 1915 and demolished in 1953. The foundation is still visible.

The current Rondout II Lighthouse is located at the eastern end of the entrance dike, where the dike begins to extend northward. It was built in 1915. Its predecessors, built in 1837 and 1867, were located on the south side of the southern dike of the channel entrance.

[2] <http://www.city-data.com/>

Photo 1- Rondout I Lighthouse Stone Foundation
(Photo: lighthousefriends.com)

Photo 2 – Rondout II Lighthouse
(Photo: HDR)

An historical postcard view[3] of the Rondout II Lighthouse speaks to the historical access to it (Photo 3).

[3] Historic postcard images of U.S. lighthouses posted by Klaus Huelse. *http://www.leuchtturm-welt.net/HTML/USAPK/ORIGINAL/RONDOUT.JPG* January 2011.

Photo 3 – Historical Postcard, Rondout II Lighthouse

At one time, Kingston was served by four railroad companies and two trolley lines. It has, in fact, been designated a New York State Heritage Area with a transportation theme, and the Hudson River Maritime Museum and Trolley Museum of New York are housed on its waterfront.

Reflecting the Heritage Area's transportation theme and Kingston's efforts at restoration and preservation was the engaging of HDR, Inc. to prepare the Reconstruction and Electrification of Trolley Track report in 2008. Providing a summary of the trolley track conditions, the document also presents recommendations for the electrification of the system. The existing track was once the Penn Central Ulster and Delaware branch line. The Trolley Museum of New York leased the line following its abandonment in the early 1980s. The main 1.5 miles of rail line between Kingston Point Park and the West Strand Park Museum were never electrified. The reconstruction of the railroad section has been the work of volunteers of the Trolley Museum.

While passenger rail service to and from Kingston was discontinued decades ago, there is a Rhinecliff-Kingston Amtrak station 11 miles away, and a Poughkeepsie Amtrak/Metro-North station 17 miles away. Freight rail service through Kingston is operated by CSX Transportation on the River Line Subdivision, and there is a small rail yard of about 7 tracks in the city. Commuter bus service between Kingston and New York City is available daily.

The nearest bridge connecting Kingston to the east bank of the Hudson River is just over four miles to the north, on New York State Route 199. The New York State Thruway (Interstate 87) passes through the western part of Kingston, while U.S. Highway 9W runs north-south through the city.

Kingston-Ulster airport, located at the western base of the Kingston-Rhinecliff bridge, serves the area. The major airports closest to Kingston are Stewart International Airport in Newburgh, 39 miles to the south, and Albany International Airport, about 65 miles north. The three major airports serving the City of New York metropolitan area, John F. Kennedy International Airport, Newark Liberty International Airport, and La Guardia Airport, are approximately 93, 86, and 80 miles to the south, respectively.

Bus service within Kingston is provided by the city-owned CitiBus system, while service to other Ulster County locations is offered by Ulster County Area Transit (UCAT). Boasting a thriving arts community, the City of Kingston offers the service of an "art bus," usually a CitiBus tourist trolley, which, on the first Saturday of every month, takes riders on a guided tour of the city's art galleries, all of which have openings on such days.

Water taxi service between Kingston and Rhinecliff operates on weekends from May through October. Launched in 2009, The Lark was well-received, but regarded by some as more of a tourist attraction. Aware of the proximity of the Rhinecliff dock to that community's Amtrak train station, others viewed the water taxi as a pre-cursor to a commuter ferry operating regularly between Kingston and Rhinecliff. Kingston's then-mayor lauded The Lark as "just one more thing we can do to attract people to the waterfront…" Citing the regional economic benefit likely to result from the provision of the water taxi service, he asserted that it would be good for both municipalities. Another observer offered, "Being able to restaurant hop between Kingston and Rhinecliff will be beneficial to both waterfronts."

A service similar to The Lark's was offered in the mid-1990s, but it was discontinued.

II.E History of the Plan Area

The following historical information is taken largely from the City of Kingston Local Waterfront Revitalization Program (1992) and the Kingston Waterfront Development Implementation Plan (2002).

The City of Kingston began as a trading post built by the Dutch in 1614 to trade with the Esopus Indians. By the 1650s, a colony had been established at the mouth of the Rondout Creek, and it was called Esopus after the Indians occupying the area. It was the third area to be settled in what is now New York State.

As trade with the Indians increased, Esopus grew. Out of fear of the Indians, however, the settlers constructed a wooden stockade in 1658. It was built on high ground north of the original settlement as protection against a possible Indian attack. The stockade was ultimately taken by the Indians, who burned the village within.

After more than a decade of violent conflict, the Dutch signed a treaty with the Esopus Indians in 1661. Not long after this, however, the English seized the Province of New Netherland from the Dutch, and made what was now to be called New York a colony of the British crown. The former Dutch settlement came to be called Kingston. The colony of New York was divided by the British into counties in 1683, and Kingston became a part of Ulster County.

As Kingston grew and prospered, its location at the juncture of the Hudson River and Rondout Creek made it ideally suited as a river port. With the construction of the Delaware and Hudson Canal in 1828, the Port of Rondout grew to rival the stockade area in size and volume of activity. Traffic between the two population centers made its way along Broadway, which still functions as the principal link between these two sections of the city.

A second artery connecting the Rondout waterway with the stockade settlement and the interior beyond was Wilbur Avenue. Heavily travelled, this route was used more to carry bluestone and other material bound for shipment via river barges.

During this period, the building of boats and river barges became a major industry in the area. Shipyards capable of building vessels ranging from coal and ice barges to sloops, schooners, and steamboats lined the banks of the Rondout Creek. By the late 1800s, however, the railroads came to replace the canal and river as the dominant form of commercial transportation.

The thriving villages of Kingston and Rondout were able to survive this transition and continued to expand. As early as the 1840s and 1850s, development along the Rondout Creek diversified the local economy. In 1844, cement quarrying began in the Ponckhockie section of Rondout. Similarly, bluestone quarrying emerged locally and met demand in cities throughout the country for paving and building stone. Other prominent industries in the area were brick making; ice-cutting, storage, and shipping; and the manufacture of patent medicines.

In 1872, the Village of Rondout sought to be chartered as a city by the state legislature, which required that the Village of Kingston and the Hamlet of Wilbur be included in the proposed corporate boundaries. The City of Kingston was thus created. In the same year, a City Hall was erected, and the building was sited on Broadway, midway between the parent villages of Kingston and Rondout.

Another major shift in the State's transportation patterns was caused by the arrival of the automobile. As the State's highway system expanded, trucks and cars gradually robbed the railroads of their life's blood, just as the railroads had taken the canal and river's shipping business.

Much of Kingston's waterfront was in deteriorated condition by the mid-1970s. Once a proud beacon welcoming travelers, Kingston Point Lighthouse now stood abandoned, vulnerable to the damages inflicted by weather and vandalism. Formerly gateway to the Catskills, Kingston Point itself had become a landfill. Railroad tracks that had once carried thousands of visitors lay rusting and overgrown with weeds. Rondout had declined from the bustling nerve center it had once been to a series of vacant and deteriorating structures, monuments to the waterfront's recent demise.

Evidence of the waterfront's decline was still apparent by the early 1990s, when scrapyards, oil tank farms, abandoned factories, and deteriorated bulkheads were all very visible.

By 1992, the year the city's Local Waterfront Revitalization Program (LWRP) was adopted, the Kingston waterfront appeared to have begun a renaissance, which had actually begun in the mid-1980s. Kingston Point became a park once again. Lower Broadway and the West Strand commercial district were described by the Kingston Waterfront Development Implementation Plan

(2002) as having witnessed "dramatic improvements". Analyses have concluded that until present day, approximately 1.5% of the city's waterfront land area, a value of 5.8 million dollars is in risk of flood damages.

The West Strand and west side of lower Broadway were redeveloped into a mixed-use area of shops, offices, and apartments, all of which occupy rehabilitated 19th century structures. On the east side of lower Broadway, a once vacant Urban Renewal site was developed to accommodate a mix of uses in two-and three-story brick buildings mimicking the 19th century character of those across the street.

As already indicated, the Kingston LWRP and Waterfront Development Implementation Plan were not the first planning ventures for the Rondout Creek and Hudson River waterfronts. Among those preceding them was the Urban Cultural Park Management Plan in 1987. Kingston is one of seventeen New York State Office of Parks, Recreation, and Historic Preservation (NYSOPRHP)-designated Urban Cultural Park Heritage Areas. The program helps showcase the unique histories of communities throughout New York State. Designation as an Urban Cultural Park, with the subsequent name change to Heritage Area in 1999, allowed Kingston to take advantage of a number of programs contributing to the waterfront's revitalization. The Heritage Area has indeed been credited with stimulating new development and increased tourism.

II.F Environmental Resources: The Rondout Creek Significant Coastal Fish and Wildlife Habitat Area

Rondout Creek is located on the west side of the Hudson River, on the boundary between the City of Kingston and the Towns of Esopus and Ulster, Ulster County, New York (7.5' Quadrangles: Kingston East, N.Y. and Kingston West, N.Y.). It was designated a Significant Coastal Fish and Wildlife Habitat area by the New York State Department of State (NYSDOS) in November of 1987, and the New York State Coastal Fish and Wildlife Rating Form supporting such designation was revised in August of 2012.

Such revision declared that the "area continues to satisfy the criteria of 19 NYCRR Section 602.5, and [that] continued designation of this area will lead to the achievement of the purposes of the significant habitat policy found at Executive Law § 912 (3) and 19 NYCRR Section 600.5 (b) (1)." It went on to indicate that "the modification to the narrative (of the habitat rating form) is justified by changes to the characteristics of the area which were the basis for the original designation." The information below is drawn from that recent rating form.

Encompassing 519 acres, the Rondout Creek fish and wildlife habitat is an approximately four-mile stretch of Rondout Creek, a freshwater tributary of the Hudson River, ranging in width from 250 to 1,300 feet. The habitat area extends from Rondout Creek's mouth on the Hudson, where there are extensive tidal flats, to the dam located just upstream from the New York State Route 213 bridge at Eddyville. The area is shown in Figure 2 below.

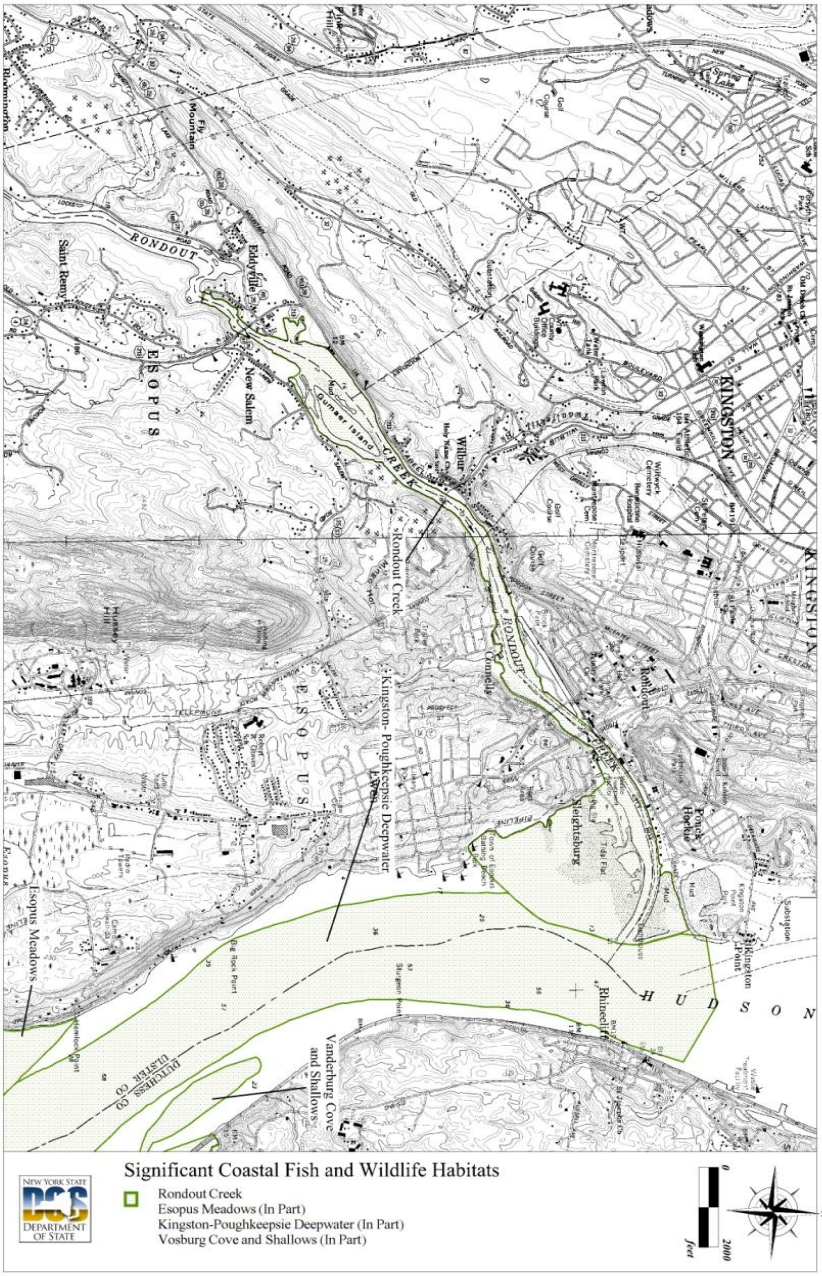


Figure 2 – Significant Coastal Fish and Wildlife Habitats

Rondout Creek is a large, medium gradient, perennial, warm water stream with a drainage area of over 1,100 square miles and an average annual discharge volume of approximately 1,600 cubic feet per second. Municipal water withdrawals upstream may reduce flows year-round by as much as 200 cubic feet per second. All of the habitat is within the tidal range of the Hudson River, and is relatively deep, with a silt and clay substrate. A portion of the habitat consists of flats, tidal wetlands, and shallows, especially behind the undeveloped Gumaer Island. The lower one to two miles of Rondout Creek has been channelized to facilitate barge traffic to adjacent commercial and industrial developments in Kingston. Locally known as Sleightsburg Marsh, an extensive marsh

and mudflat area is located at the creek's mouth. Also present there are submerged aquatic vegetation beds, principally water celery (Vallisneria Americana).

A number of threatened, endangered, and rare plants is found in this habitat, including heartleaf plantain (Plantago cordata – threatened), Frank's sedge (Carex frankii – endangered), swamp cottonwood (Populus heterophila – threatened), smooth bur-marigold (Bidens laevis – threatened), winged monkey flower (Mimulus alatus – rare), spongy arrowhead (Sagittaria calycina var. spongiosa – threatened), and Southern estuary ticks (Bidens bidentoides – rare).

Although habitat disturbances in the area include dredging and discharges of wastewater from industrial and municipal point sources, portions of Rondout Creek and its associated riparian zone continue in a relatively natural condition. At Eddyville, the dam alters flows and impedes migratory fish movement. Invasive species, including water chestnut (Trapa natans), common reed (Phragmites australis), and purple loosestrife (Lythrum salicaria), are present. Marinas and other boating facilities (i.e., fuel docks, boat ramps, and moorings) occupy almost ten percent of the Rondout Creek's total shoreline.

In spite of significant human intrusion, Rondout Creek continues to support large concentrations of coastal migratory and resident freshwater fish species. It is an important spawning area for alewife (Alosa pseudoharengus), rainbow smelt (Osmerus mordax), blueback herring (Alosa aestivalis), white perch (Morone americana), yellow perch (Perca flavescens), tomcod (Microgadus tomcod), and striped bass (Morone saxatilis). These species generally enter the creek between March and June. Adults leave the area shortly after spawning, and within several weeks, eggs hatch and larval fish begin the journey downstream to nursery areas in the Hudson River. An exception is tomcod, which spawn in the area in December and January.

American shad (Alosa sapidissima) spawn in the shallow areas at the creek's mouth. Sizable populations of brown bullhead (Ameiurus nebulosus), yellow perch (Perca flavescens), American eel (Anguilla rostrata), smallmouth bass (Micropterus dolomieui), and largemouth bass (Micropterus salmoides) can be found in the creek year-round. The deepwater area at the mouth of Rondout Creek is, in fact, one of five known important overwintering areas for largemouth and smallmouth bass. In shallow waters, submerged aquatic vegetation, chiefly water celery (Vallisneria americana), provides food and refuge for fish and invertebrates, as well as food for waterfowl.

Rondout Creek's banks provide habitat for common snapping turtles (Chelydra serpentina) and common map turtles (Graptemys geographica). The entire area provides habitat for water snake (Nerodia s. sipedon), red-spotted newt (Notophthalmus v. viridescens), redback salamander (Plethodon cinereus), common mudpuppy (Necturus maculosus), American toad (Bufo americanas), gray treefrog (Hyla versicolor), spring peeper (Pseudoacris crucifer), bullfrog (Rana catesbeiana), green frog (Rana clamitans), and woodfrog (Rana sylvatica).

At the mouth of Rondout Creek, wetlands serve as productive feeding areas for various waterfowl species during spring (March-April) and fall (mid-September-early December) migrations. In addition to fish and waterfowl, shorebirds, wading birds, and songbirds are supported by this habitat. The American bittern (Botaurus lentiginosus) and least bittern (Lixobrychus exilis) are observed in Sleightsburg Marsh, and bald eagles (Haliaeetus leucocephalus) have been seen fishing in the creek

near the marsh. During spring migration, ospreys (Pandion haliaetus) are observed near the mouth of the creek, where clear water and shallows offer prime foraging conditions.

Although some of the wetland area north of Rondout Creek has been eliminated by landfilling and waste disposal, sizable marshes and flats remain intact.

Freshwater inflows from Rondout Creek are vital in maintaining the water quality of the Hudson River estuary. The rich fisheries resources and public access to the creek offer abundant recreational fishing opportunities. The area attracts anglers from all over the mid-Hudson Valley, particularly in the spring (March-April), for herring and bullhead, and during the summer, for largemouth and smallmouth bass. Hunters from throughout the mid-Hudson Valley are attracted by the abundance of waterfowl in the area, which is also frequented by kayakers and canoeists.

II.G Preservation of the Rondout Creek Significant Coastal Fish and Wildlife Habitat Area

In the "Impact Assessment" section of the narrative accompanying the Rondout Creek Coastal Fish and Wildlife Rating Form, and in considerable detail, NYSDOS describes activities and conditions potentially harmful to the habitat, as well as measures likely to protect it and improve its condition. They are, for the most part, rather obvious, but their relevance to the creek's continuing status as a Significant Coastal Fish and Wildlife Habitat recommends their being presented in their entirety in a planning document such as this. NYSDOS advises that:

- Any activities that would substantially degrade water quality, increase turbidity or sedimentation, alter flows, temperature, or water depths in the Rondout Creek would result in a significant impairment of the habitat. All species may be affected by water pollution, such as chemical contamination (including food chain effects resulting from bioaccumulation), oil spills, excessive turbidity or sediment loading, nonpoint source runoff, and waste disposal. Discharges of sewage or stormwater runoff containing sediments or chemical pollutants may result in adverse impacts on the habitat area. Eutrophication caused by runoff from fertilizers, septic tanks, roads, and lawns is of considerable concern; as such over-enrichment of waters may contribute to the establishment of invasive, non-native plants and concurrent displacement of the native flora.

- Any physical alteration of the habitat, through dredging, filling, or bulkheading, could result in a direct loss of valuable habitat area. Substantial alteration of the stream channel, such as impoundment or creation of barriers to fish passage should be prohibited. Impediments to movement and migration of aquatic species, whether physical or chemical (e.g., dams, dikes, channelization, bulkheading and sedimentation), should be prohibited. Plans to reduce or eliminate the impacts of existing hydrological modifications should be developed, including improvements to fish passage, and/or the removal of obstructions or barriers. Habitat disturbances would be most detrimental during bird nesting, and fish spawning and nursery periods, which generally extend from April through August for most warm water species.

- Redevelopment of hydroelectric facilities on the creek should only be allowed with run-of-river operations. Entrainment or impingement from installation and operation of water intakes could have significant impact on juvenile and/or adult fish concentrations.

- Elimination or disturbance of adjacent wetland and forested habitats would adversely affect the habitat. Such areas should be protected, and where possible, restored to provide bank cover, stabilize soil, maintain or improve water quality, and provide buffer areas.

- The presence of invasive species and the expansion of their range within the habitat may result in changes in native plant, vertebrate, and invertebrate species' composition and abundance. In particular, changes in plant communities may affect marsh-nesting birds. Effective control of invasive plant species, through a variety of means, may improve fish and wildlife species' use of the area. Control methods, including biological controls and regulated use of herbicides, must only be implemented if other methods of control have been explored, and then only under permit, with strict adherence to all precautionary measures to avoid impacts to non-target species. The primary goals of such efforts must be recovery and maintenance of habitat for native fish and wildlife species.

- Unrestricted use of motorized vessels, including personal watercraft, in shallow waters can have adverse effects on the benthic community, and on fish and wildlife populations through re-suspension of bottom sediments, as well as through shoreline erosion, which may reduce water clarity and increase sedimentation. Use of motorized vessels should be controlled (e.g., no wake zone, speed zones, zones of exclusion) in and adjacent to shallow waters and adjacent wetlands. Docks, piers, catwalks, or other structures may be detrimental to submerged aquatic vegetation beds through direct or indirect effects from shading, mooring chain and propeller scarring, and other associated human uses. In particular, the submerged aquatic vegetation beds are especially vulnerable to impacts that decrease light penetration into the water.

- Where opportunities exist, appropriate restoration of intertidal and subtidal shallow habitats should be undertaken using the best available science and proper monitoring protocols. Restoration and enhancement efforts should be monitored, and the associated habitat effects should be reported and evaluated.

II.H Historical, Cultural, Architectural, and Archaeological Resources

As already presented, the plan area has a long and rich history. Several areas or sites on or proximate to the waterfront are listed as historic resources. As examples, the Rondout II Lighthouse, the Port Ewen suspension bridge, and the Rondout West Strand Historic District are listed on the National Register of Historic Places. The West Shore Railroad Trestle and Island Dock appear on the Kingston City Landmarks list.

Photo 4 – Rondout II Lighthouse
(Photo: HDR)

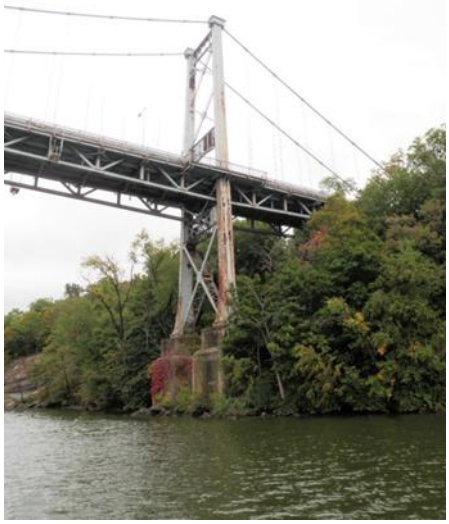


Photo 5 – Port Ewen Suspension Bridge (Photo HDR)

Photo 6 – West Shore Railroad Trestle
(Photo: HDR)

Photo 7 – Island Dock
(Photo: HDR)

The City of Kingston's location offered access to oceangoing vessels of the colonial period, and the Rondout Creek and Barge Canal later played a significant role in the expansion of New York State's industrial base.

The city also played a major part in the development of New York State government. It served as the State's first capital city, and the first State constitution was adopted there.

Kingston's inventory of architecturally significant structures spanning generations is uncommon in a city of its size. Styles include early Dutch, Federal, Greek Revival, Italianate, Victorian, Stick, and late 19th century commercial.

Again, Kingston's designation as one of New York State's seventeen Urban Cultural Park/Heritage Areas has brought abundant cultural and economic benefits to the plan area.

More than just collections of restored buildings and green spaces, each UCP/HA follows a central theme – "transportation" in the case of Kingston – through which its special attributes are interpreted and promoted. As a result, the community itself is the park, dedicated to the preservation of its unique cultural heritage through programs such as ethnic festivals, waterfront walks, lively theater, provocative exhibits, and neighborhood walking tours. The two sections of the Kingston Urban Cultural Park/Heritage Area are located in the Stockade District and the Rondout Waterfront Area. The Hudson River Maritime Museum and Trolley Museum of New York are also housed on the waterfront.

The Hudson River Maritime Museum presents the maritime history of the Port of Kingston and the area industries dependent on the river for transporting their goods. In addition to its holdings of paintings, artifacts, and documents, this popular attraction of the Kingston waterfront houses exhibits featuring river ferries, iceboats, tugboats, and the Rondout Lighthouse.

Prominent in the museum's small fleet of vessels on exhibition is the 1898 steam tugboat, ***Mathilda,*** which traveled the St. Lawrence River and Great Lakes before sinking at her pier in

1976. Her donor, McAllister Towing Company, chose the museum as the best place to preserve this vessel representing the region's maritime history.

Also among the museum's vessel holdings are an Algonquin birch bark canoe, a small wooden sloop, duckboats, rowing shells, guideboats, and an electric launch.[4]

The Trolley Museum of New York's exhibits and educational programs present the history of transportation in the Hudson River Valley. They feature cars from trolleys, subways, and rapid transit from both the United States and Europe. The museum also offers a 1.5-mile trolley ride to Kingston Point Park from May through October.[5]

Archaeological resources in the Kingston area include two pre-historic sites and an underwater site. The latter is the resting place of the Mary Powell, a sidewheel steamboat built in 1861 and last used in 1917. Its remains are located in Rondout Creek adjacent to the Rondout area of Kingston.

III. THE RONDOUT HARBOR FEDERAL NAVIGATION CHANNEL

Federal navigation channels are historically important as major means of transportation for interstate commerce, as well as for national defense. Navigation improvements are directed and authorized by congressional legislation or other action. Such changes include providing channels, anchorages, turning basins, locks and dams, harbor areas, and protective jetties. Federal improvements must be in the public interest and must be accessible to all. Benefits accruing to commercial navigation as a result of USACE projects are a priority, while project benefits accruing to recreational use of vessels are not.

The Rondout Harbor project was adopted in 1872 and modified in 1935 and 1965. The project consists of a channel, 14 feet deep, 100 feet wide, from deep water in the Hudson River to the Route 9W Highway Bridge 1.3 miles above the mouth, thence 12 feet deep, 100 feet wide to 3.5 miles above the mouth, with widening at bends. The project also includes two parallel channel dikes along the entrance channel to the creek, approximately 350 feet apart, and a branch dike extending northward from the downstream end of the north channel dike parallel to the flow of the Hudson River.[6] The dikes were installed in 1913.

[4] World Port Source Web site (www.worldportsource.com)
[5] World Port Source Web site
[6] USACE Fact Sheet, Rondout Harbor, New York, February 2013

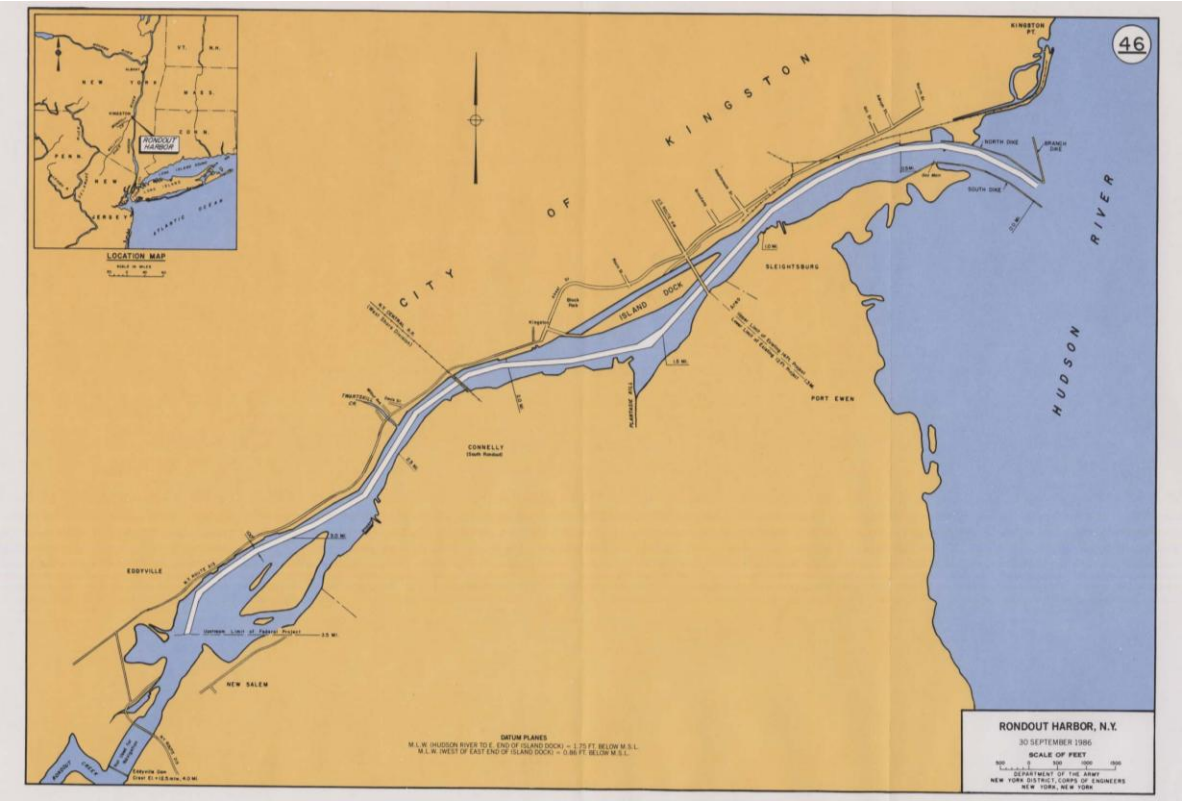


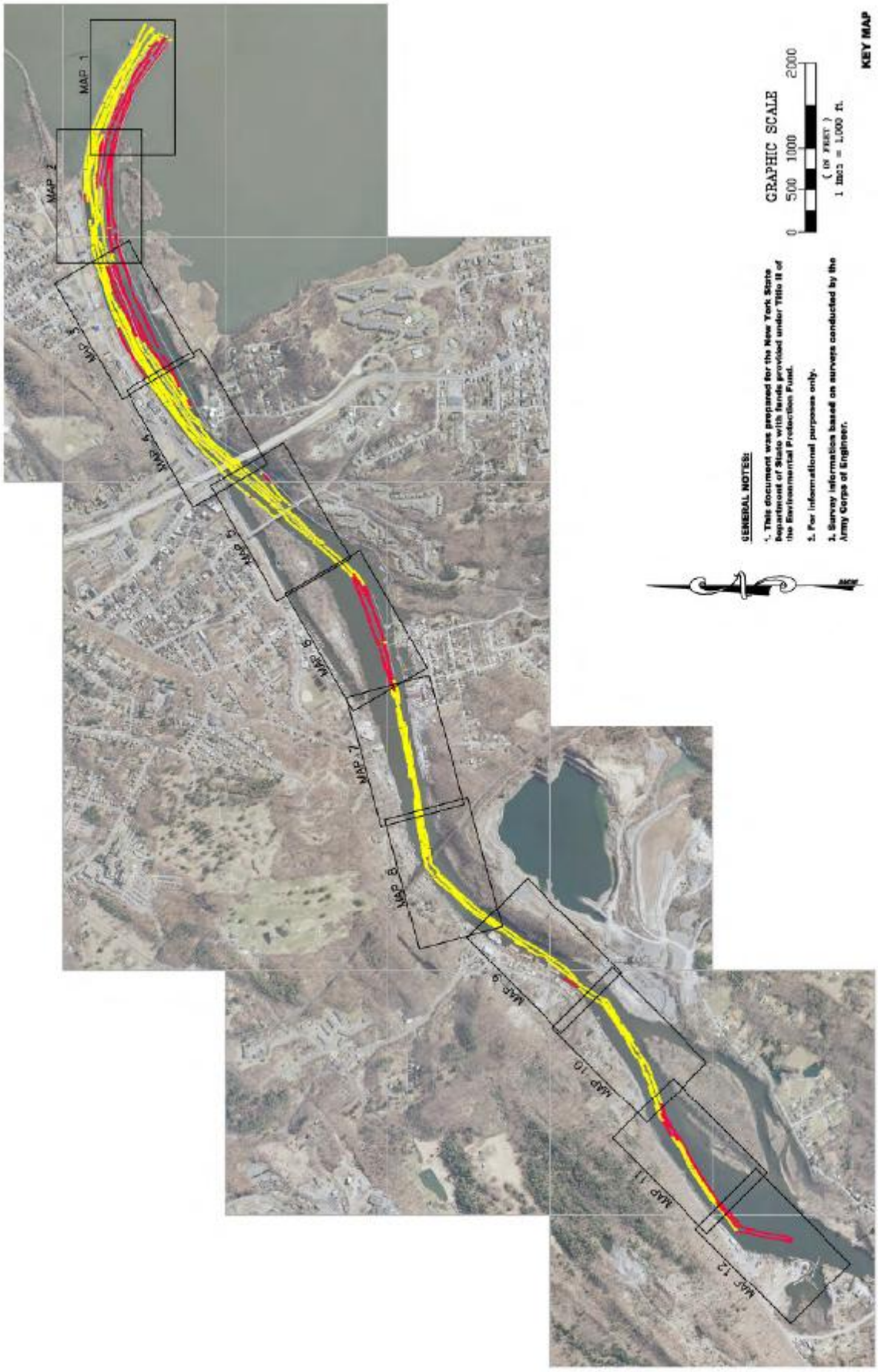
Figure 3 - Rondout Harbor Navigation Channel

This planning document employs the same stationing reference developed for the PAS study document. This channel stationing datum establishes Station 0+00 at the confluence of the Rondout Creek and the Hudson River. The stationing runs along the centerline of the existing channel, increasing as it moves west (upstream) along the Rondout Creek. The stationing system is provided to assist in locating photographs and other elements described.

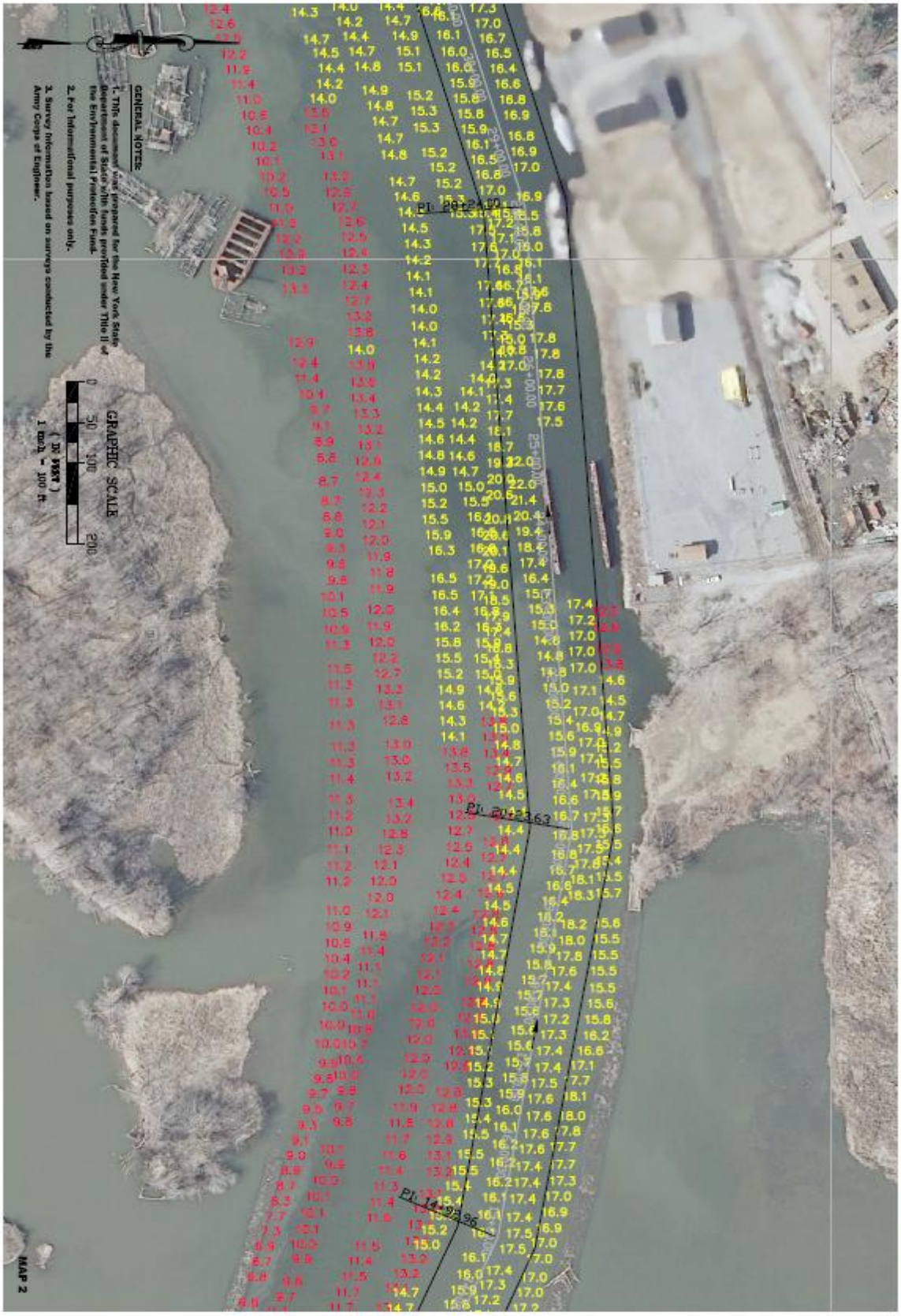
Some of the major points of reference along this alignment include the following:

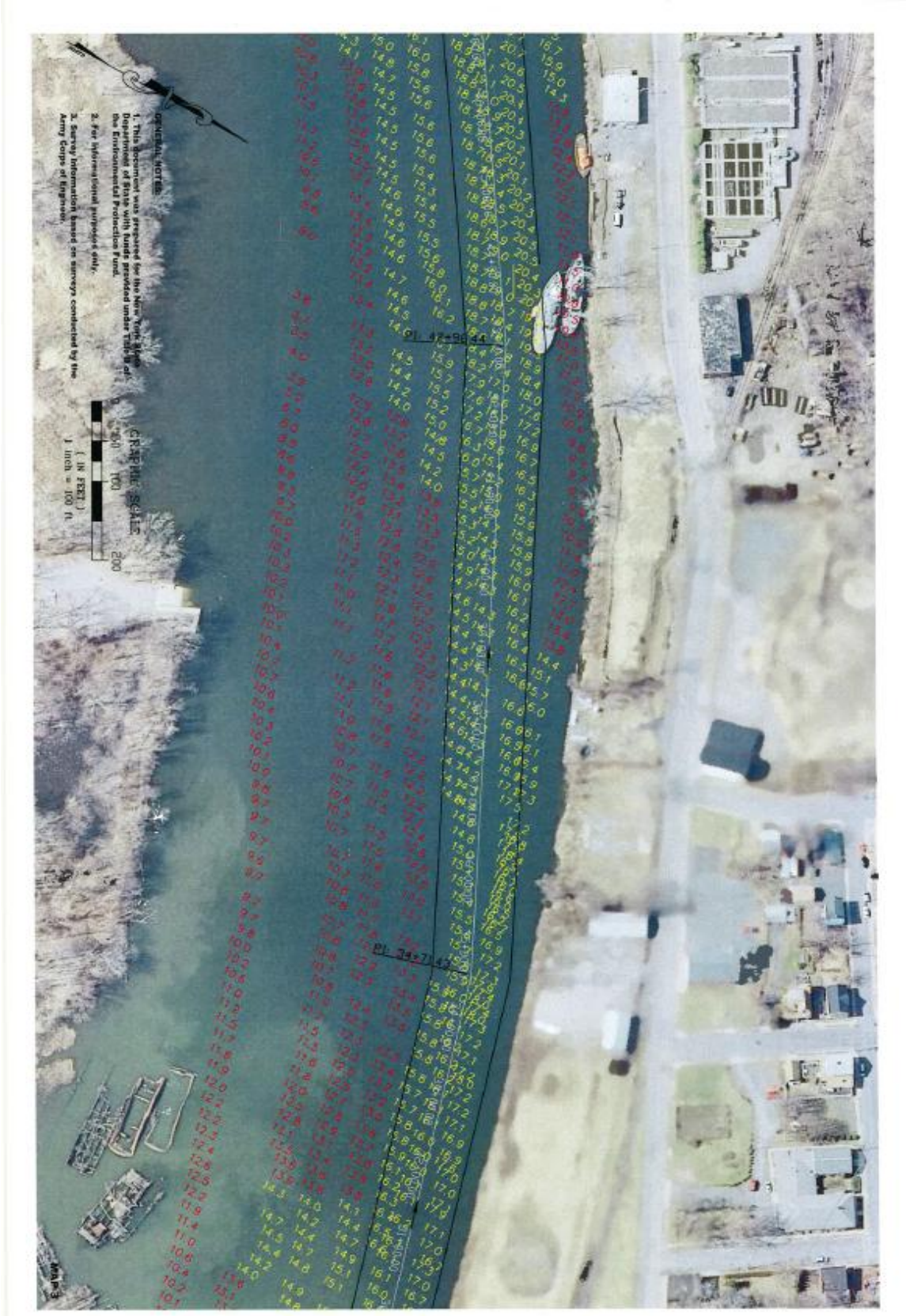
- Station 0+00 – Confluence of the Rondout Creek and Hudson River
- Station 20+00 – Western End of the Jetty
- Station 61+00 – NYS Route 9W Bridge
- Station 65+00 – Eastern End of Island Dock
- Station 97+00 – Western End of Island Dock
- Station 118+00 – Railroad Bridge
- Station 153+00 – Eastern End of Gumaer Island
- Station 184+00 – City of Kingston Limits

The following thirteen pages present the maps of the existing channel for the entire length of the plan area. Stationing, water depths, and aerial photographs are included on these maps.


KEY MAP
GRAPHIC SCALE
0 500 1000 2000
(IN FEET)
1 inch = 1,000 ft.
GENERAL NOTES:
1. This document was prepared for the New York State Department of State with funds provided under Title 11 of the Environmental Protection Fund.
2. For informational purposes only.
3. Survey information based on surveys conducted by the Army Corps of Engineer.
MAP 1
MAP 2
MAP 3
MAP 4
MAP 5
MAP 6
MAP 7
MAP 8
MAP 9
MAP 10
MAP 11
MAP 12


GENERAL NOTES:
1. This document was prepared for the New York State Department of State with funds provided under Title II of the Environmental Protection Fund.
2. For informational purposes only.
3. Survey information based on surveys conducted by the Army Corps of Engineers.
GRAPHIC SCALE
0 50 100 200
1 inch = 100 ft.
MAP 1


GENERAL NOTES:
1. This document was prepared for the New York State Department of State with funds provided under Title II of the Environmental Protection Fund.
2. For informational purposes only.
3. Survey information based on surveys conducted by the Army Corps of Engineers.
GRAPHIC SCALE
0
50
100
200
(IN FEET)
1 inch = 100 ft.
MAP 2

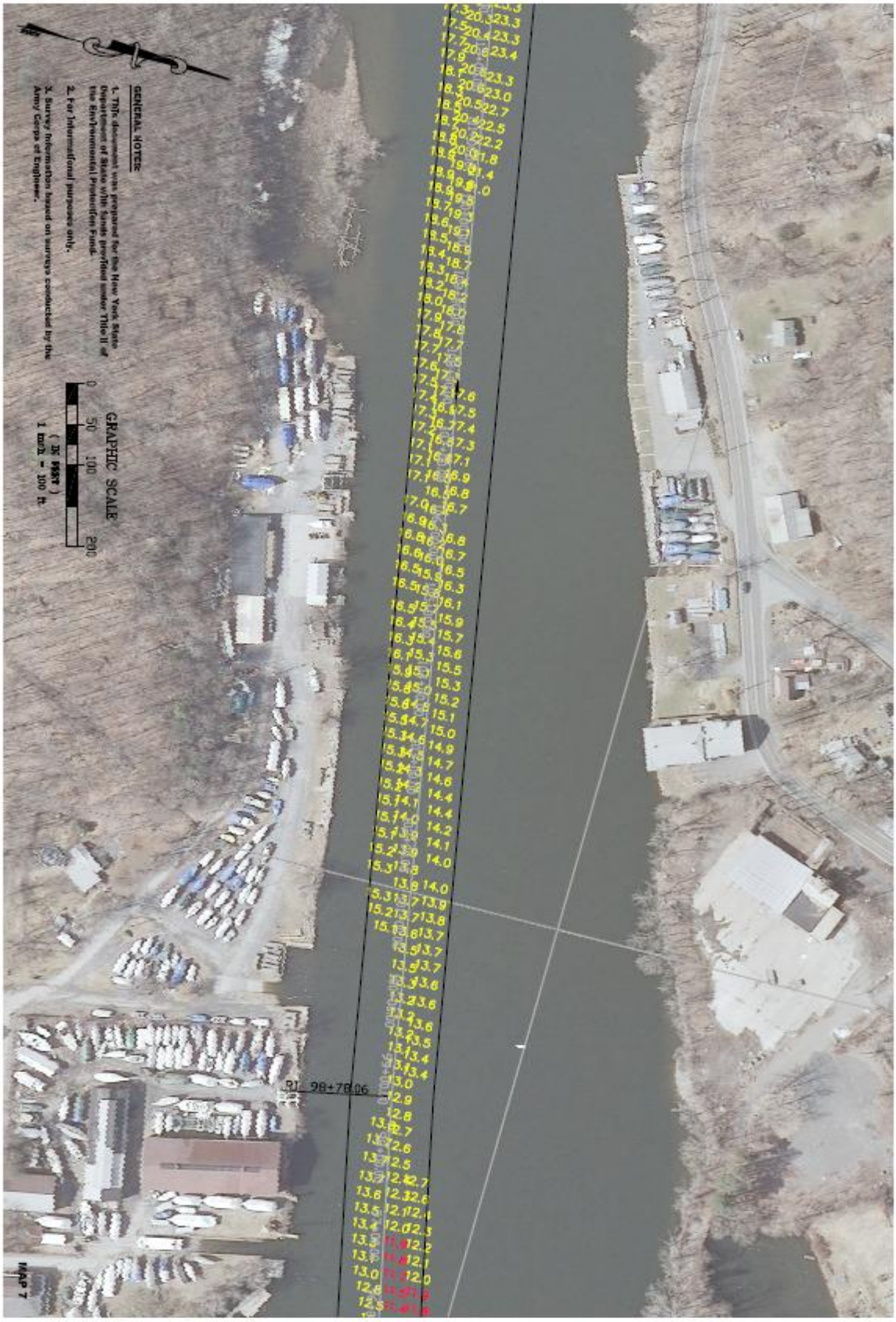

GENERAL NOTES
1. This document was prepared for the New York State Department of State with funds provided under Title 11 of the Environmental Protection Fund.
2. For informational purposes only.
3. Survey information based on surveys conducted by the Army Corps of Engineers.
GRAPHIC SCALE
(IN FEET)
1 inch = 100 ft.
0
100
200
PI 41+96.44
PI 39+71.43

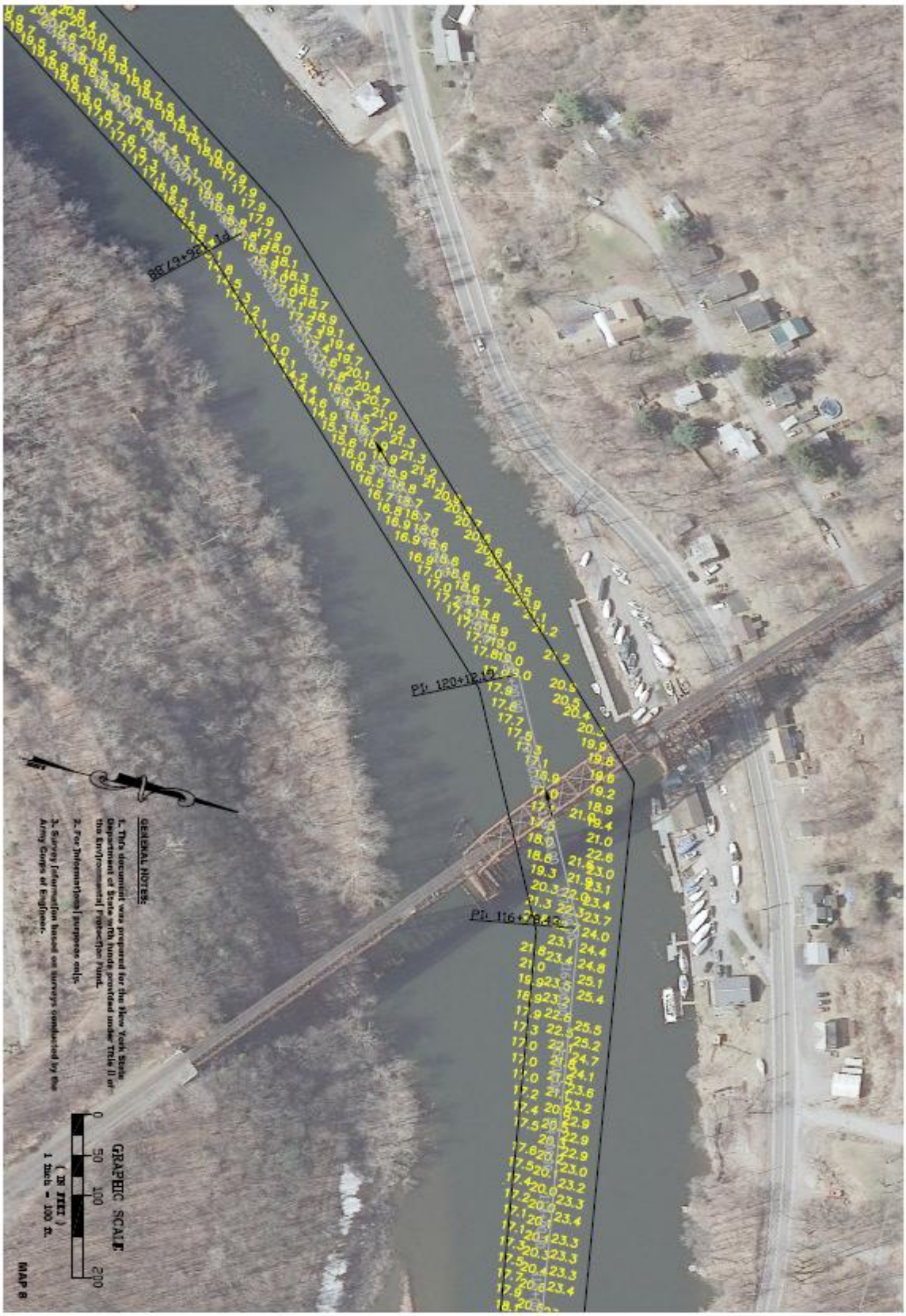

GENERAL NOTES:
1. This document was prepared for the New York State Department of State with funds provided under Title II of the Environmental Protection Fund.
2. For informational purposes only.
3. Survey information based on surveys conducted by the Army Corps of Engineer.
GRAPHIC SCALE
(IN FEET)
1 inch = 100 ft.
0
50
100
200
MAP 4

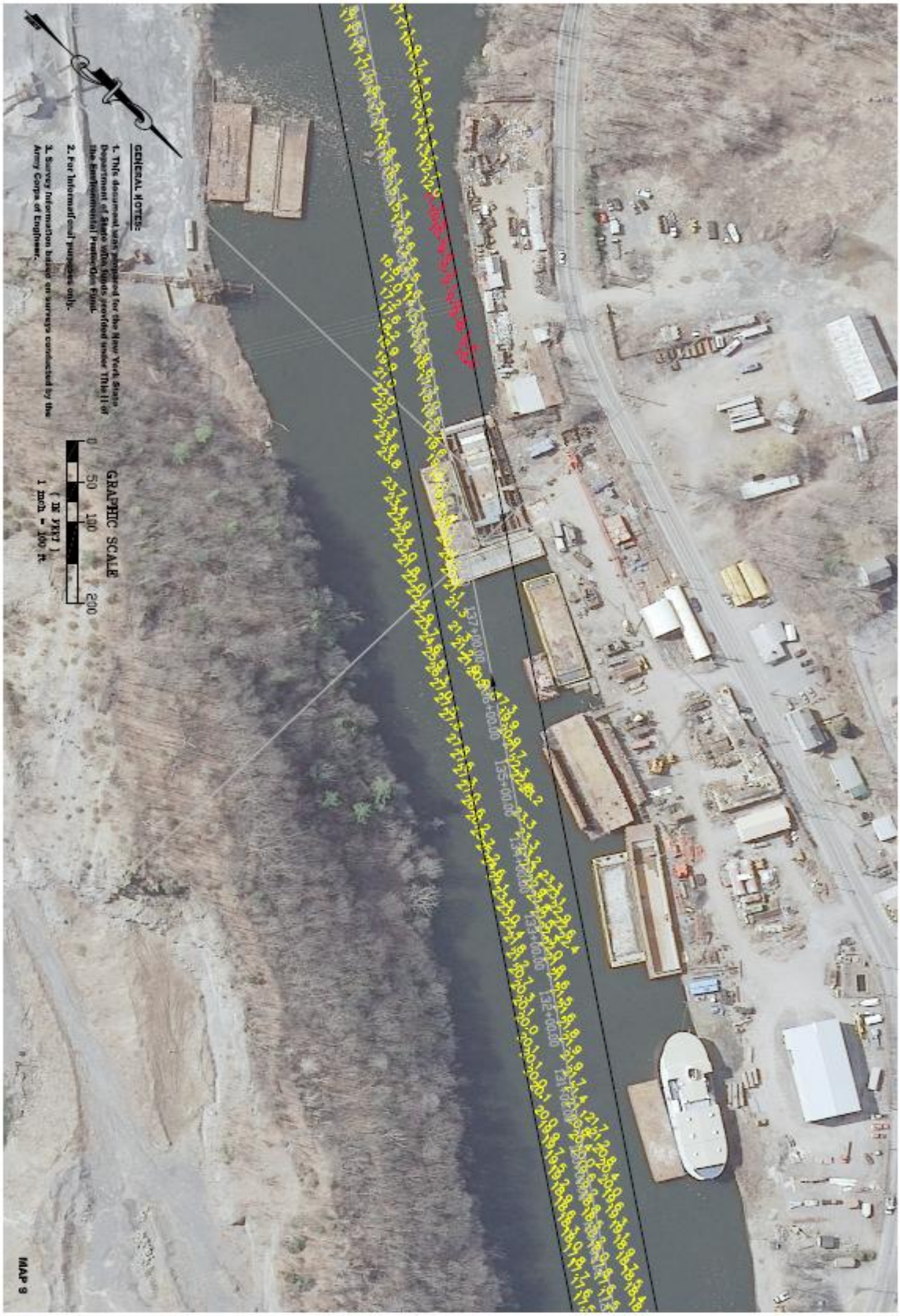

GENERAL NOTES:
GRAPHIC SCALE
0
50
100
200
MAP 5


GENERAL NOTES:
GRAPHIC SCALE
MAP 6

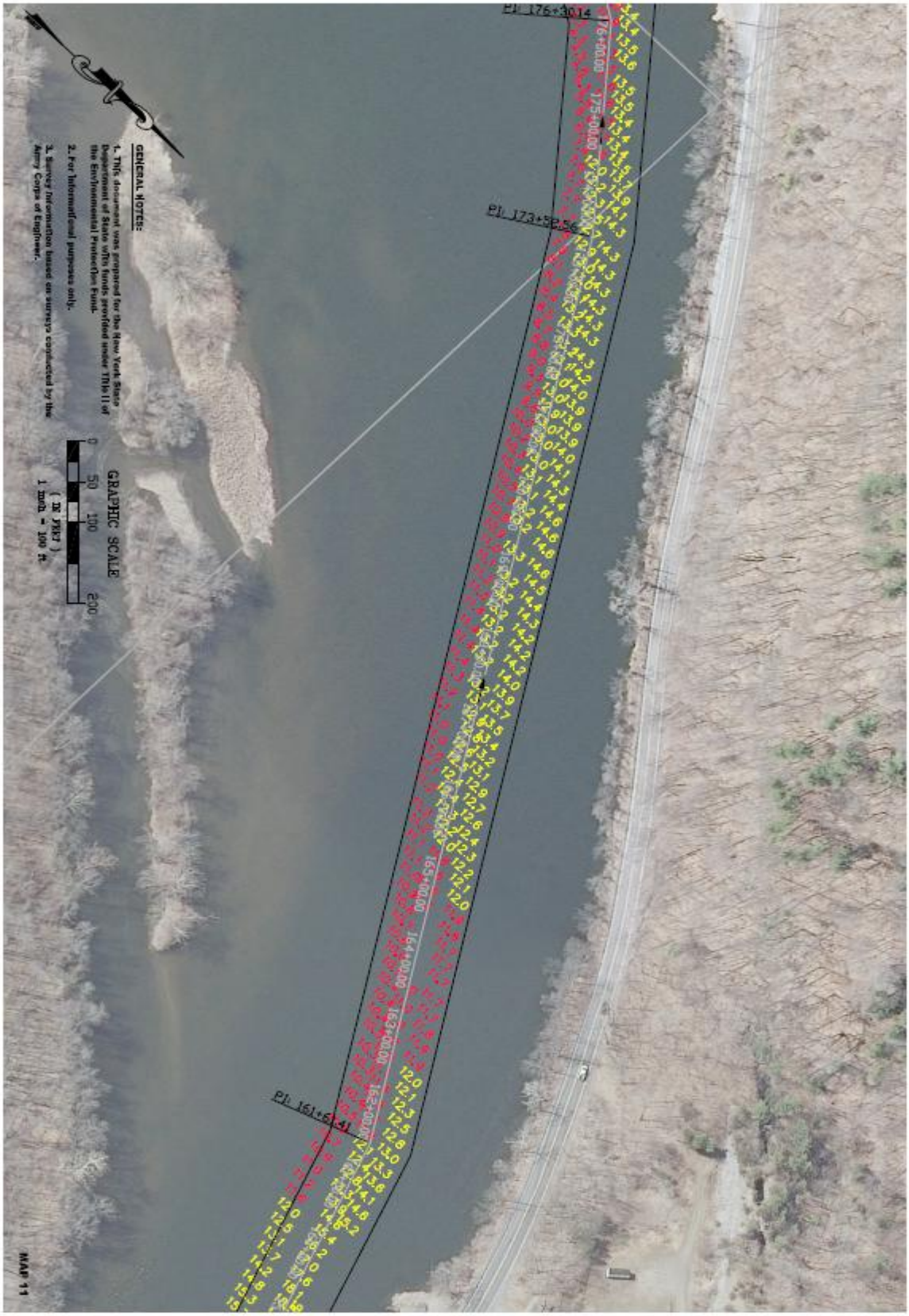
\

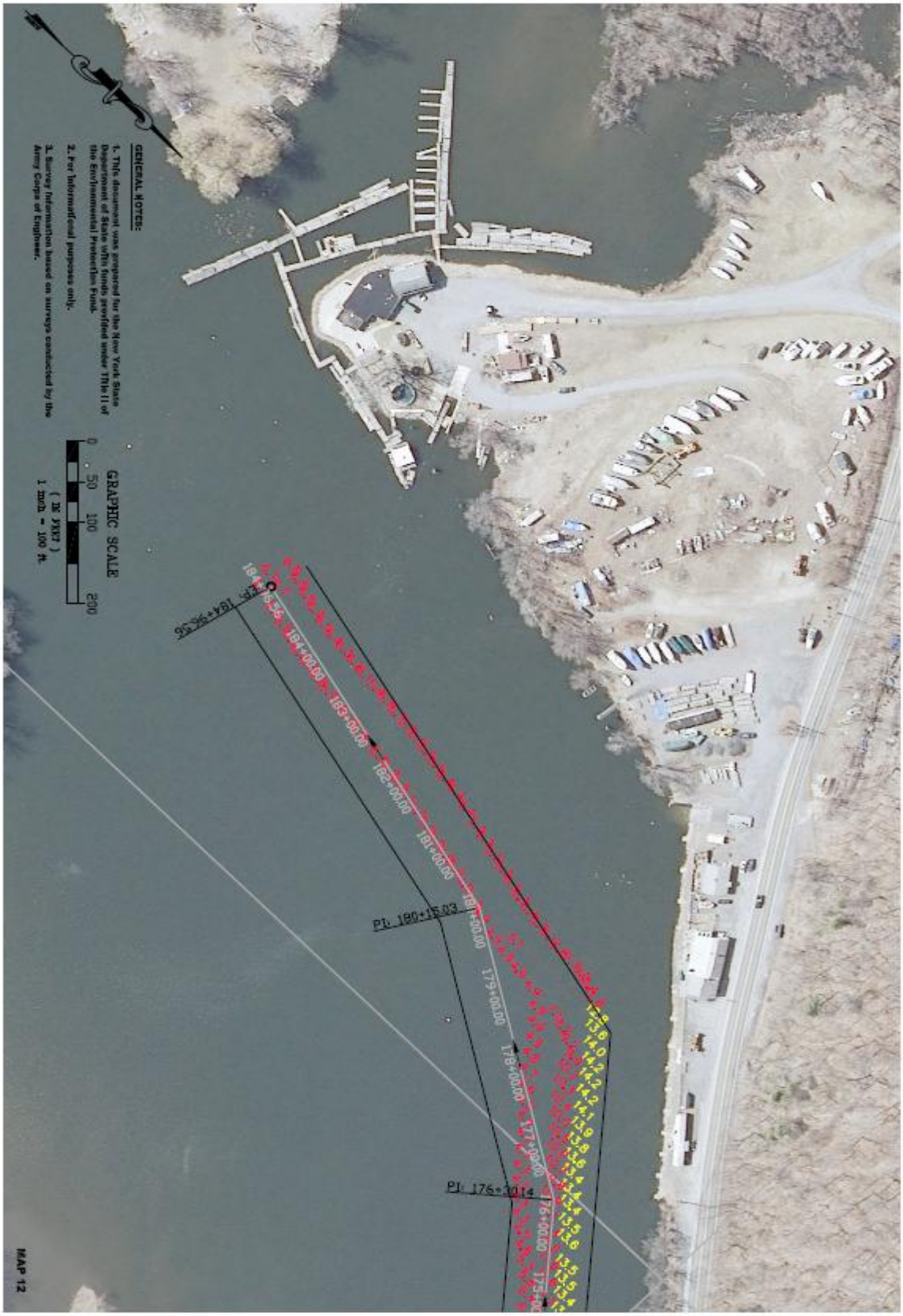

GENERAL NOTES:
GRAPHIC SCALE
0
50
100
200
1 inch = 100 ft.
RT. 9&+76.06
MAP 7


GENERAL NOTES:
GRAPHIC SCALE
(IN FEET)
1 inch = 100 ft.
MAP 8


GENERAL NOTES:
1. This document was prepared for the New York State Department of State's Office of Coastal, Local Government and Community Sustainability under Title 11 of the Environmental Protection Fund.
2. For informational purposes only.
3. Survey information based on surveys conducted by the Army Corps of Engineers.
GRAPHIC SCALE
0 50 100 200
(IN FEET)
1 inch = 100 ft.
MAP 9


GENERAL NOTES:
1. This document was prepared for the New York State Department of Parks with funds provided under Title II of the Environmental Protection Fund.
2. For informational purposes only.
3. Survey information based on surveys conducted by the Army Corps of Engineer.
GRAPHIC SCALE
0
50
100
200
(IN FEET)
1 inch = 100 ft.
PI_153+76.32
PI_145+89.22
MAP 10


PI 176+3014
PI 173+98.56
PI 161+61.41
GENERAL NOTES:
1. This document was prepared for the New York State Department of State with funds provided under Title II of the Environmental Protection Fund.
2. For informational purposes only.
3. Survey information based on surveys conducted by the Army Corps of Engineers.
GRAPHIC SCALE
(IN FEET)
1 inch = 100 ft.
0
50
100
200
MAP 11


GENERAL NOTES:
1. This document was prepared for the New York State Department of State with funds provided under Title II of the Environmental Protection Fund.
2. For informational purposes only.
3. Survey information based on surveys conducted by the Army Corps of Engineer.
GRAPHIC SCALE
0 50 100 200
(IN FEET)
1 inch = 100 ft.
PI: 180+15.03
PI: 176+30.14
MAP 12

IV. DETAILS OF PLANNING VENTURES

IV.A City of Kingston Waterfront Flooding Resiliency Project

This project will acquire key riparian buffers that will shelter the Kingston/Rondout Waterfront. Houses will be bought out or flood proofed, as appropriate, thus reducing risk and down time in the event of another flood. The plan calls for implementation of best management practices for floodplain areas and for exploration of mitigation opportunities for repetitively flooded properties, and if necessary, carry out acquisition, relocation, elevation, and flood-proofing measures to protect these properties. The long term planning for the wastewater treatment facility will be in place to be able to take advantage of funding and make more efficient choices in the future. The infrastructure for servicing water-related interests will be much more resilient reducing direct damages and also serving to protect marine assets that use the Rondout Creek as a hurricane shelter in future events.

- The project has been purposed and organized in the various steps or phases that separate essential task. These items have been identified as the most timely and critical for the project schedule.
    - The city is currently seeking to develop a feasibility study for relocating or decentralizing the Wastewater Treatment Plant. Following development of the long term capital plan for the Wastewater Treatment Plant and associated infrastructure will be realized through the completion of proposed alternatives.

    - The flood-proofing or relocation of residential and commercial structures in the floodplain will be considered and facilitated by providing incentives for private investment. This in turn will lead to the construction of a resilient waterfront wharf, pier and floating dock structures to enable continued waterfront use and to ensure the harbor continues to serve as one of the most storm secure deeper-water ports on the Hudson River.

    - The conclusive purchase and improvement of Island Dock and other various coastal parcels will enable native riparian buffers and passive recreational to serve as open space to protect the active waterfront.

- Project tasks act as a concise strategy in order to approach the plan and inquire on benefits and positive feedback. The public can expect various outcomes from the completion of the project.

    - Critical functions of the Wastewater Treatment Plan will be relocated out of the flood zone thus increasing the level of protection to well above the 500-year flood plain. The assessed value of these is stated at $54.2M.

    - In addition, a long term capital plan for the Wastewater Treatment Plant will provide a 500- year flood level of protection or better for structures in the Rondout Waterfront area. This in turn will cause the removal of approximately 20 structures that enable the targeted flood-proofing, providing a level of protection for a 500-year storm at minimum.

  - 24 waterfront properties on 5.97 acres assessed at $3.95M. Considering that the structures necessary for waterfront activities related to water-related uses such as marinas, boat tours, cruise ship dockage, along 4,500' frontage, $3.95M will result as assessed value as re-engineered environment and facilities become more resilient to high water events and high velocity flood events.

  - Lastly, five waterfront parcels of 23.77 acres and $829,700 assessed value have been proposed to be purchased and protected to service as riparian buffers to the waterfront at key location along the harbor.

- This project is intended to begin addressing recommendations identified in the Kingston Tidal Waterfront Flooding Task Force, a coalition put together after witnessing the results of the severe impacts of storms Irene, Lee, and Sandy on the city's waterfront properties. The Task Force was convened by Mayor Shayne Gallo to take a close look at strategies to militate against the flood hazards caused by these and future storms.

  - Recommendations include the future study the of creative, water-dependent and water-enhanced uses that are resilient, including elevated, amphibious, or floating structures, wharves, berms and elevated rights of way. This would be supplemented by the evaluation of natural buffers and green shoreline infrastructure to reduce flood risk and erosion and conserve natural resource functions.

  - Ensuring that local street networks, utilities and other infrastructure function and remain connected as the City implements adaptation strategies to sea-level rise, also help proposed opportunities exist for open space and recreation over the long term.

  - Developing, both, a near and long term plan dramatically reduces risk of wastewater facility to fail.

  - Some outreach could be performed in order to communicate with property owners, tenants and prospective buys in the Flood Overlay Hazard District.

- Various alternatives have been presented by the Kingston Tidal Waterfront Flooding Task Force.

  - An alternative to increased resilience though protection of riparian buffers, relocation, flood proofing and the like is to consider a flood barrier along the water's edge. This option remains the most crucial as it deals with resilient infrastructure through restoration and modification of natural buffers.

  - Another alternative involves work done on the water's edge to accommodate marine uses, there are varieties of solutions including steel bulkheads as are in place in some areas of the waterfront or a wharf system that involve driving pilings in at regular intervals to secure floating docks. These add capacity for supporting marine uses such as more slips for transient vessels. This option

emphasizes commercial and overall harbor activity through the consideration of risks and measures to residents and visitors.

IV.B City of Kingston Local Waterfront Revitalization Plan: Goals and Policies

The City of Kingston's Local Waterfront Revitalization Program (LWRP), adopted in 1992, presents the goals and implementation policies of waterfront development for the City of Kingston. The LWRP analysis area extends from the northern boundary of Kingston into the Hudson River to the southern boundary of Kingston in the Hudson River, following the Rondout Creek along the Kingston boundary, and extending into the City of Kingston.

The LWRP describes conditions characterizing the plan area, the City of Kingston Waterfront, New York. Goals and/or policies of the LWRP include:

- Restore, revitalize, and redevelop deteriorated and under-utilized waterfront areas for commercial, industrial, cultural, recreational, and other compatible uses.
    - Redevelop the formerly industrialized and mined areas of the Hudson River waterfront to include recreational and other compatible uses that will increase public access to, and public enjoyment of, the area.
    - Promote replacement of existing uses which detract from the Rondout Creek waterfront and which discourage more appropriate development in this area.
    - Restore, revitalize, and redevelop the area between Kingston Point and the East Strand along the Rondout Creek for commercial and recreational water-dependent and water-enhanced uses increasing public access to, and public enjoyment of, this area.
- Facilitate the siting of water dependent uses and facilities on, or adjacent to, coastal waters.
    - Develop new water-dependent uses along the Rondout Creek and Hudson River waterfronts.
    - Preserve existing water-dependent and water-enhanced uses.
- Strengthen the economic base of smaller harbor areas by encouraging the development and enhancement of those traditional uses and activities which have provided such areas with their unique maritime identity.

- Support the continued growth of the Maritime Museum adjacent to the Rondout Creek and the Lighthouse off Kingston Point as valuable institutions devoted to educating the public about the Hudson River and Kingston's historic harbor.

- Promote private development of on-shore facilities, including docks, to serve the Hudson River tour boat industry.

- Significant coastal fish and wildlife habitats shall be protected and preserved, and where practical, restored, so as to maintain their viability as habitats.

  - The Rondout Creek habitat, in particular, shall be protected and preserved, and where practical, restored, so as to maintain its viability as a habitat.

- Expand recreational use of fish and wildlife resources in coastal areas by increasing access to existing resources, supplementing existing stocks, and developing new resources. Such efforts shall be made in a manner which ensures the protection of renewable fish and wildlife resources and which considers other activities dependent on them.

- The construction or reconstruction of erosion protection structures shall be undertaken only if they have a reasonable probability of controlling erosion for at least thirty years, as demonstrated in design and construction standards and/or assured maintenance or replacement programs.

  - Bulkheads shall be reconstructed along Rondout Creek.

- Protect, maintain, and increase the levels and types of access to public water-related recreation resources and facilities, so that such resources and facilities may be fully utilized by all the public, in accordance with reasonably anticipated public recreation needs and the protection of historic and natural resources. In providing such access, priority shall be given to public beaches, boating facilities, fishing areas, and waterfront parks.

  - Provide pedestrian access to the lighthouse at Kingston Point Park.

- Water-dependent and water-enhanced recreation shall be encouraged, facilitated, and given priority over non-water-related uses along the coast, provided it is consistent with the preservation and enhancement of other coastal resources and that it takes into account demand for such facilities. In facilitating such activities, priority shall be given to areas where access to the recreational opportunities of the coast can be provided by new or existing public transportation services, and to those areas where the use of the shore is severely restricted by existing development.

- Develop, expand and improve existing public water-dependent and water-enhanced recreation facilities along the Hudson River and Rondout Creek waterfronts.

- Encourage the development, expansion, and improvement of private water-dependent and water-enhanced recreation facilities along the Hudson River and Rondout Creek waterfronts.

- Protect, restore, and enhance scenic views or vistas of local importance, including the views from Hasbrouck Park, Kingston Point, Rondout II Lighthouse, Island Dock, and the Port Ewen Suspension Bridge.

- Dredging and dredge spoil disposal in coastal waters will be undertaken in a manner meeting existing state dredging permit requirements and protecting significant fish and wildlife habitats, scenic resources, natural protective features, important agricultural lands, and wetlands.

- Preserve and protect tidal and freshwater wetlands and the benefits derived from such areas.

IV.C Kingston Waterfront Development Implementation Plan: Strategies

Building on the planning goals provided in the city's LWRP, the Kingston Waterfront Development Implementation Plan was prepared in 2002 by River Street Planning & Development to provide implementation strategies for LWRP policies. The primary area of analysis consisted of the Kingston waterfront along the Rondout Creek, between Block Park and Kingston Point Park, and the entirety of Kingston Point Park.

In order to make planning recommendations, the implementation plan considered findings from community visioning efforts, area market conditions, physical opportunities and constraints associated with the waterfront, and boating and tourist opportunities and constraints for the area. Recommendations included:

- Pedestrian access around Island Dock to connection with Block Park, and eastward along West Strand Street through West Strand Park.

- Reconstruction of East Strand Street to accommodate cars, pedestrians, bicyclists, trolley service, and local deliveries.

- Trolley service along the entire length of the primary study area, primarily between the former Dayliner dock in Kingston Point Park and West Strand Park, with future extension to Island Dock possible.

- Island Dock area within the Rondout Creek, south of Block Park and West Strand Street.

- Island dock reconstruction of two unused boat launches, additional 60 transient boat slips on the south side of Island Dock, development of a crew pavilion for local rowing teams and clubs, boat and bike rental concession, new park and trails with permanent public art displays, new parking, a possible bridge for pedestrian access from West Strand Park, and the potential location for the proposed Hudson River aquarium.

- Shoreline stabilization and bulkhead reconstruction were addressed as needed improvements.

- Transient marina and dock construction would be needed to address the shortage of transient marina slips in an effort to provide new access for visitors arriving by boat and encouraging visits for tourism revenue.

- In an effort to attract more visitors to the waterfront, the city plans to make the lighthouse more accessible to the public. Access to the lighthouse is impossible during high tide, and it would need to be raised approximately four feet to make it accessible during high tide conditions, either by building a wooden boardwalk above the jetty or by raising the jetty by about four feet and constructing a ten-foot wide concrete sidewalk.

V. PROMINENT COMMERCIAL ACTIVITY IN RONDOUT HARBOR/PORT OF KINGSTON[7]

Kingston's waterfront offers one of the best harbors along the length of the Hudson River with potential for more than 2,000 feet of deepwater dockage space from the Cornell Building along the Steelhouse Restaurant and past the Hudson River Maritime Museum to the first bridge. Regular visitors to this area are Tall Ships such as Clearwater, Half Moon, Ernestina (official vessel of the Commonwealth of Massachusetts) and many others. This is an ideal location to invest funding to promote resiliency by installing sheet piling and increasing bulkhead height to resist impacts from flooding.

The gateway to the Port of Kingston's waterfront, the Kingston City Marina can accommodate vessels to 150 feet. It has deep-water docks ranging from 8 to 12 feet, which have electricity (30, 50, and 100 amps) and water and pump-out services, as well as showers, restrooms, and a marine repair facility.

Located on Rondout Creek, in the first calm water north of Manhattan, Kingston's Rondout Bay Restaurant & Marina is a 150-slip marina in a no-wake zone. In addition to dockage, the marina offers indoor and outdoor dining and an impressive list of amenities, including a swimming pool.

[7] World Port Source Web site

Both land and water storage for winter are available, based on the length of the vessel, and both include hauling, towing, washing, blocking, and spring launch. Seasonal trailer storage is also available, and the marina offers crane, forklift, pumping, haul, launch, block, load/unload services, and pressure-washing, as well.

Also located in Kingston is the Rondout Landing Marine Terminal Site D Dock, which is owned by the State of New York and operated by Hudson River Cruises, Inc. through a lease from the city. With a berthing distance of 120 feet and alongside depth of 9 feet, the dock is used for boarding river-excursion passengers.

A property, previously the Kosco Terminal, owned by Getty Realty, is available for redevelopment. The wharf is connected via three pipelines to five steel storage tanks at the rear of the facility, with a total capacity of nearly 88.4 thousand barrels. The Port Ewen Dock has a berthing distance of 150 feet and alongside depth of 9 feet.

The Kingston Point Terminal Dock is owned by Heritagenergy Corporation and operated by Kingston Point Terminal Corporation to receive petroleum products by barge. Three pipelines connect this wharf to 13 steel storage tanks with a total capacity of over 89.6 thousand barrels. This dock has a berthing distance of 250 feet and alongside depth of 13 feet.

Thomas J. Feeney Enterprises owns and operates a private wharf to moor floating dry docks and vessels for repair. Both a 1200-ton floating dry dock and a 2400-ton dry dock are moored there. The 20-foot dredged basin allows operation of floating dry docks off the bulkhead. At the rear of the dock is a plant building and repairing barges and tugboats. The Thomas J. Feeney Enterprises dock has a berthing distance of 290 feet and alongside depths of 7 and 20 feet.

In addition to local commercial transport activity, the Kingston harbor hosts larger commercial vessels that have significant influence on the local economy. American and Blount, two cruise lines, dock within the harbor on a regular basis. Projections indicate that four more additional cruise lines will dock this year with ships ranging from 184 ft to 215 ft ((Grande Mariner, Grande Caribe, American Star & Independence) in the upcoming season. The season will run from 7/28/2014 to 10/30/2014. Annual commercial cruise visits have been recorded on an average of 20-25 separate dockings. While each vessel provided the town with approximately 100 individuals, the season is expected to cause about 1500 people to pass through the city of Kingston, NY.

.

VI. CONSTRAINT ON RECREATIONAL WATER USAGE AND ECONOMIC DEVELOPMENT: DOCKING CAPACITY

The plan area includes a number of public and privately operated marinas and associated boat slips. These marinas are typically used by seasonal boaters, although transient slips are available in some locations, including the Kingston City Marina, which was described above. According to the Kingston Waterfront Development Implementation Plan, the existing boat slips are

typically filled to capacity year-round, and there is a limited number of available boat slips for tourists for seasonal use. This point is illustrated in Table 2 below.

Table 2 - Rondout Creek Marinas

Marina	**Slips**	**Transient Slips**
Hideaway Marina	100	3
Certified Marina	80	5
Kingston Power Boat Association	24	-
New Ulster Marina	50	4
Tidewater Marina	36	-
Rondout Bay Marina	150	20
Anchorage Marina	60	1
Lou's Boat Basin	-	20
Jeff's Yacht Haven	30	3
Rondout Yacht Basin	150	-
Hudson River Maritime Museum	40	12
Rositas	56	6
Total	**776**	**74**

Other water-based recreation exists along the City of Kingston waterfront. Vessels such as the Rip Van Winkle of Hudson River Cruises dock along the Rondout Creek. The Rip Van Winkle, a 125' long, 300-passenger capacity, 2-deck cruise vessel, conducts tours of the Hudson River from spring thru fall.

As it is currently configured, the Rondout Creek navigation channel is located very close to the northern side of the waterway. This provides only a narrow strip of space for berthing areas along the bulkhead of the City of Kingston. Providing additional docking slips, and particularly those to be designated for tourists and other visitors arriving in Kingston by boat, would greatly enhance the economic viability of the re-development effort.

VII. PROPOSALS TO INCREASE DOCKING CAPACITY

VII.A Channel Modifications

To provide for the additional docking slips, two alternatives for relocating the navigation channel to the south, closer to the physical center of the creek, have been explored. The first alternative to be considered calls for channel alignment alterations without the need for dredging. The second alternative involves a channel re-alignment that would require dredging to maintain the required channel depths.

The channel relocation analysis focused on the channel reaches starting along the entrance jetty (Station 9+00), heading upstream to the west along the developable lands of the Kingston waterfront, up to and including the Route 9W bridge (Station 61+00).

The bank to bank width of the Rondout Creek along this area ranges from approximately 250 ft to approximately 450 ft (Table 3). The defined navigation channel encompasses 100 ft of this width. Table 4 below includes representative distances from the northern edge of the channel to the City of Kingston bulkhead.

Table 3 - Width of Rondout Creek

Rondout Creek Width (approximate)	**Station Number Location (approximate)**
439 feet	20+00
350 feet	29+00
473 feet	41+00
381 feet	49+00
260 feet	57+00
315 feet	60+00
323 feet	73+00

Table 4 - Distances to Existing Channel

Distance to Bulkhead (approximate)	**Station Number Location (approximate)**
27 feet	24+00
23 feet	34+00
56 feet	43+00
58 feet	48+00
50 feet	54+00
100 feet	59+00

This analysis sought to optimize the space available for docking along the City of Kingston waterfront without negatively impacting the federal navigation channel, nor the existing docking facilities along the southern bank of the creek on the Town of Esopus waterfront.

To estimate a potential number of docking slips, a generic dock plan was created. This plan estimates the number of small and medium vessels that could be housed in a 50 foot area beyond the bulkhead. Within an additional 20 ft of space, a large vessel could also be accommodated. It is estimated that this dock scheme could be repeated every 100 ft along the bulkhead. Dock length and number of slips could increase or decrease based on the amount of actual available area along the channel.

There are areas where additional slips using floating docks make sense such as west of the 9W bridge but it may be well to consider sheet pilings and hard bulkhead where larger vessels can come alongside such as small cruise ships in some areas east of the 9W bridge. This is also the area that is more vulnerable to high velocity flood events such as Hurricane Irene. The pilings need to be tall enough and with a regular spacing so that floating docks or the vessels do not float onto the bulkhead in high water events such as Hurricane Sandy.

There are submerged wooden barges that could be removed to promote flushing through the culverts at the western end of Island Dock and there could be additional space for dockage along that side of Island Dock to be determined by the width of that channel. In addition, Island Dock serves as an important riparian buffer to the Marina facilities mentioned above. See Kingston Tidal Waterfront Flooding Task Force Final Report (2013) and the proposal for Hazard Mitigation Grant funds for Waterfront Resiliency.

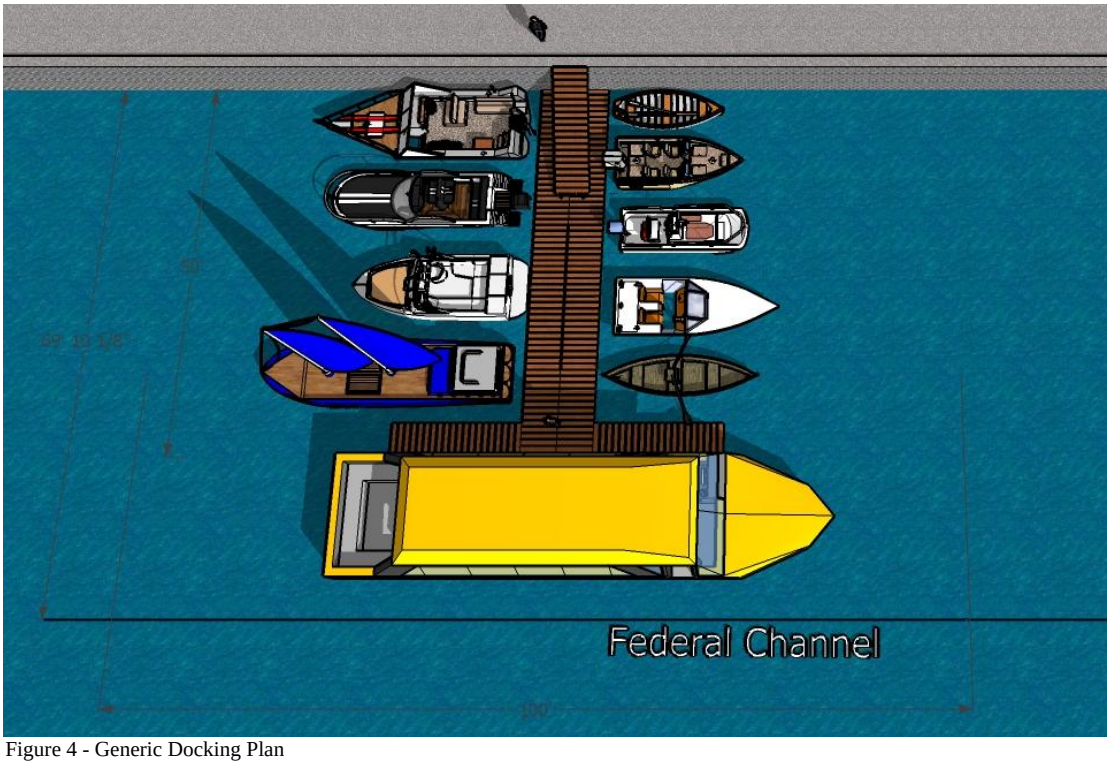


Figure 4 - Generic Docking Plan

Mooring Fields

In the past, recreational boaters have been able to randomly moor their vessels within Kingston Harbor wherever there was open water. Buoy owners informally cooperated to allow space for other boats. Over time, more buoys and boats accumulated to the point where mooring conditions today have become congested, posing a risk to navigational safety. Over the years, various vessels and buoys in the Harbor have been abandoned and have created hazardous conditions for boaters.

A mooring refers to any permanent structure to which a vessel may be secured. Examples include quays, wharfs, jetties, piers, anchor buoys, and mooring buoys. A ship is secured to a mooring to forestall free movement of the ship on the water. An anchor mooring fixes a vessel's position relative to a point on the bottom of a waterway without connecting the vessel to shore. As a verb, *mooring* refers to the act of attaching a vessel to a mooring.

Figure 5: Typical Mooring section view and application

Mooring fields refer to a grid system of anchors where vessels can be docked for extended periods of time.

Photo: Managed Mooring Field, Boot Key Harbor, Marathon, Florida

The development of this section is to address navigational safety concerns and avoid potential adverse environmental effects posed by vessel anchors dragging through eelgrass and herring spawning areas and to minimize possible oil spills from vessels colliding or sinking, as well as encouraging commercial economic activity.

This plan addresses navigational safety concerns and how to avoid adverse environmental impacts. This document addresses the capacity, management, ownership issues and liability; specifically for the State of New York required to establish and manage buoy Fields in the congested areas. Adopting this management option will implement the optimal distribution and maximum spatial carrying capacity for mooring buoys.

State Owned Aquatic Regions

The New York State Department of Environmental Conservancy (DEC) manages the state owned aquatic lands. The DEC manages these aquatic lands as a public trust for the people of the state. As steward of these public lands, DEC works to protect the environment, provide opportunities for recreation, support water-dependent uses, promote sustainable use of natural resources, and protect public navigational and fishing access from obstructions.

The agency supervises these lands for a variety of uses, including marinas and recreational mooring buoys. Before DEC authorizes an infrastructure installation, it must consider the potential impact of the use on the environment, public health and safety, public use and access, navigation, marine animals, shellfish beds, etc.

New York State Law gives incorporated villages the right to regulate activities on surface waters within 1,500 feet of the village shoreline. If you plan to moor a boat within 1,500 feet of one of

these village shorelines, please check with the Village Clerk to determine the Village's mooring policies. In cases where the Village issues its own mooring permit, the Town honors the Village permit and no further Town permit is required.

A Protection Of Waters Permit is required for constructing, reconstructing, or repairing docks or platforms and installing moorings on, in or above navigable waters to create docking facilities, mooring areas or to facilitate other activities.

A docking facility is any marina, boat basin, marine terminal and any other areas on navigable waters containing a single structure or a collection of related structures such as docks, piers, bulkheads, breakwaters and pilings used for the reception, securing and protection of boats, ships, barges or other watercraft. A mooring facility is defined as any device that is fixed in navigable waters to which a vessel can be made fast including buoys, chains, ropes, piles, spars and dolphins. A platform is generally a flat surface located in, on or over a water body, on which structures can be constructed or activities can be conducted.

The most common activities which are exempt from the requirement to obtain a Protection of Waters Permit for a Dock and Mooring Facility are:

1. Constructing, reconstructing or repairing docks or platforms, and installing moorings in, on or above navigable waters lying above underwater lands owned by the State of New York for which a lease or other approval authorizing use or occupancy of such lands has been obtained from the New York State Office of General Services.
2. Constructing, reconstructing or repairing a docking facility for five or fewer boats and encompassing within its perimeter an area less than 4,000 square feet. Perimeter means a boundary encompassing all structures and related water surface area utilized at a docking facility including docks, piers, platforms, bulkheads, breakwaters, pilings, travel lanes and berthing areas.
3. Establishing a mooring area for fewer than ten boats.
4. Temporary anchoring where a boat is not attached to an in-place or fixed mooring device.
5. The seasonal replacement or reinstallation of floating docks and other structures, exceeding the thresholds for regulated activities, which legally existed prior to May 4, 1993 or for which a permit was previously obtained.
6. The relocation, replacement, or rearrangement of floating structures such as docks, ramps, walkways and anchoring devices within an approved perimeter.
7. The ordinary maintenance and repair of structures such as repainting, re-driving piles or replacing boards in docks. Ordinary maintenance and repair does not include substantial reconstruction or restoration involving 50 percent or more of an existing structure.
8. Construction or installation of docks, piers, wharves or other structures used solely as a landing place, providing dockage for 6 to 10 boats and encompassing an area of 4,000 to 8,000 square feet within the facility perimeter.

All other activities and capacities are considered as Major Dock, Platform or Mooring projects for purposes of review and public notice as required by the Uniform Procedures Act.

Detailed requirements, requisites and restrictions are managed by New York States Department of Environmental Conservation (DEC). Specific documentation is addressed in subparts 646-1: Docks, Wharfs, Moorings, and Marinas.

Implementation in Harbor Management Plan

Due to the rise in recreational boating in recent years, an increased stress has been placed on New York's harbors and nearby harbor areas. In response to the negative impact that recreational boating has had on coastal resources and commercial enterprises in harbors, the New York Legislature amended WRCRA in 1992 to allow local governments to adopt Harbor Management Plans (HMPs).[i] Under WRCRA, a municipality that wishes to adopt a LWRP must also include a HMP, or at least address the possibility of establishing a HMP.[ii] If a HMP is not appropriate for a particular area, then the requirement is waived.

> The HMP amendments provide direct regulatory authority to local governments that adopt a harbor management plan. Section 922 of WRCRA provides the following:
> In order to implement a comprehensive harbor management plan the local legislative body of a city, town, or village may adopt, amend and enforce local laws or ordinances to regulate the construction, size and location of wharves, docks, moorings, piers, jetties, platforms, breakwaters or other structures . . . to a distance of fifteen hundred feet from shore.[iii]

Further, the New York Code, Rules and Regulations §603.1 states that "the Legislature . . . recognize[s] the significant role New York's cities, towns and villages are capable of taking in the regulation and management of activities in or over the State's navigable waters and underwater lands if granted clear authority to regulate these areas. Accordingly, the Legislature has provided for the development and approval of local government [HMPs] and the local laws or ordinances necessary to implement these plans."[iv] Factors that municipalities should consider when enacting HMPs include commercial and recreational needs, habitat protection, water-dependent uses, aesthetic values, and public interests.[v]

Harbor management plans can play an important role in enhancing or restricting water-dependent uses. For example, the Town of Mamaroneck/Village of Larchmont plan suggests using the HMP's power to restrict the size of docks, especially within its coves and embayment's.[vi]

Appropriate Vessel Scope and Spacing

A mooring can be placed anywhere in town waters. However, no mooring may be placed within the lines of a channel or within 50' of a channel marker.

In determining the maximum number of permitted docks, wharfs or moorings, the commission may review any subdivision of land created on or after the effective date of these regulations [June 3, 1988] which involved the lot or parcel in issue to determine the maximum number of docks, wharfs or moorings permitted and base such number upon the total footage of waterfront prior to the subdivision

The required vessel scope for any system of boat mooring is determined by the type of anchor used and the relative holding power of the anchor. Boat anchors used for short-term, temporary moorage require considerable scope to provide a shallow angle of line to the vessel. This allows the anchor to settle into the sediment for holding power; yet the anchor can also be pulled up when preparing to leave. Permanent mooring systems are designed with anchors that provide high holding power that require less scope.

The extreme high tide and low tide levels were used to find anchor line length and vessel swing radius by the following formulas:

Anchor line length (L) = SCOPE x EHT (highest observed water level) where SCOPE is the ratio of anchor line length to water depth. DELT= Water Depth at Extreme Low Tide.

$$Vessel\ Swing = \sqrt{(L^2 - DELT^2)} + mooring\ line\ (10ft.\ assumed) + vessel\ length$$

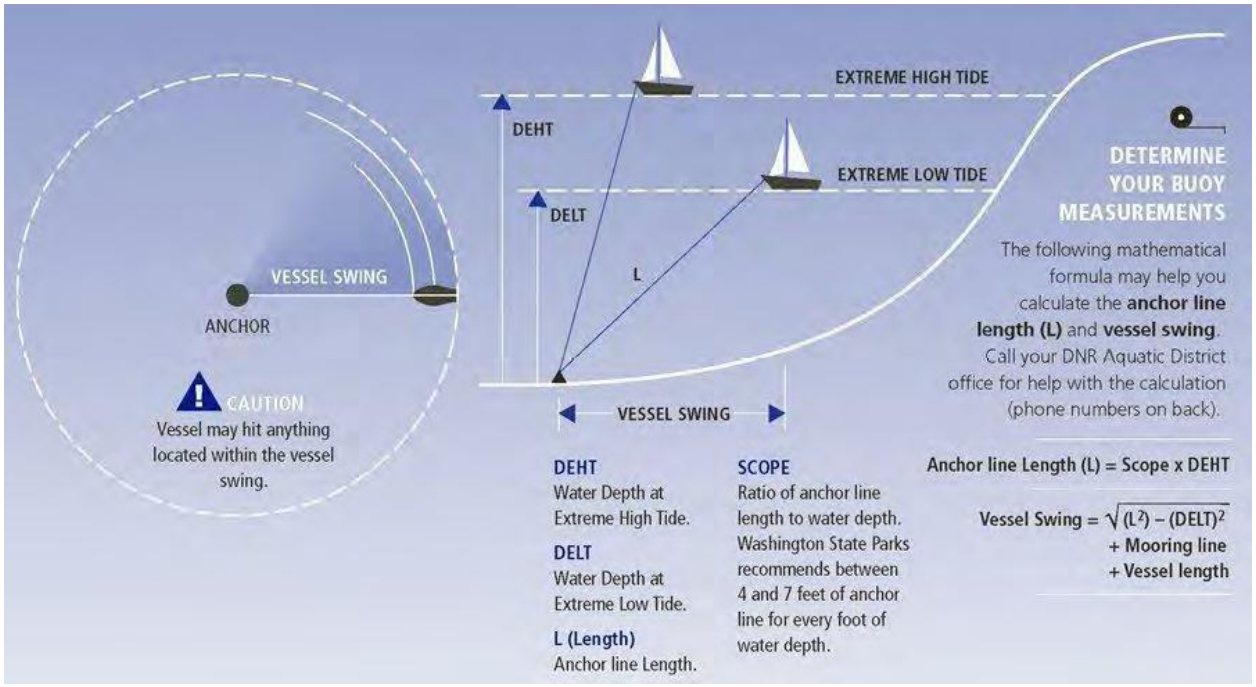


Figure 6: Vessel Swing and Anchor Line—showing formula for calculating radius. (From DNR brochure: "Recreational Mooring Buoys for Residential Owners Next to State-Owned Aquatic Lands.")

Moorings shall be placed so that vessels moored to them, at the full swing of their mooring or anchor line, will be no closer than 20 feet to the projection of the property lines extended into the water along the axis of the property lines as they intersect the water flow, or a line extended at a right angle to the mean high-water mark, whichever results in the greater setback. Moorings shall not be placed so that the full swing of the vessel extends more than 100 feet offshore from the mean high-water mark.

Appropriate Water Depth

The water depths of surveyed mooring buoys are essential to determine the approximate vessel swing circles and densities. Buoys located in shallow water generally encompass smaller swing circles than buoys located in deeper water. Buoys placed too close to one another overlap their swing circles and create potentially unsafe conditions, allowing moored vessels to collide.

This required depth is determined by the optimal buoy density by factoring water depths, allowable vessel scope (by anchor type), and estimated vessel lengths.

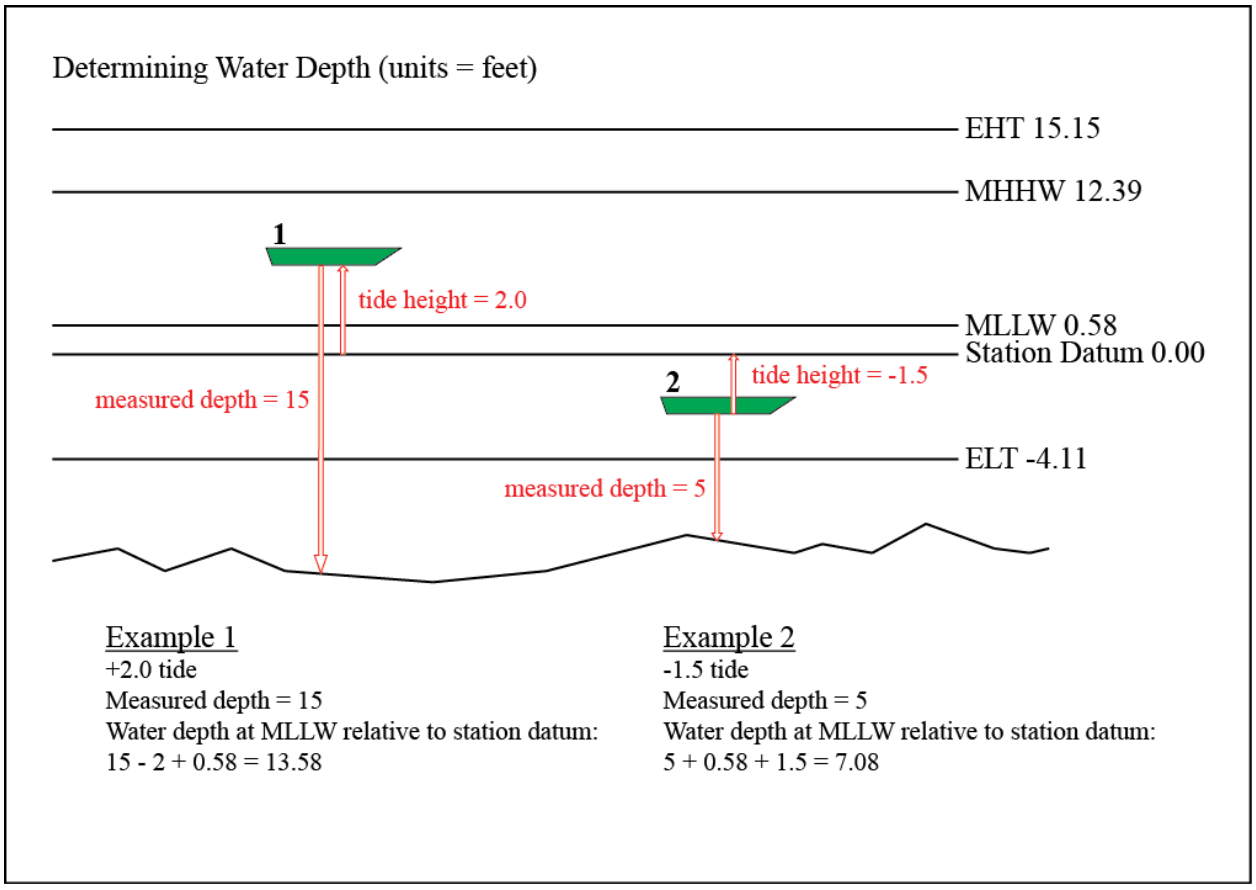


Figure 7: Mooring tidal depth level example

Mooring Field Proposed Locations

The entire extent of Rondout creek within Kingston City limits was studied for proper placement of mooring fields. The proposed locations for this harbor infrastructure have been identified as openings in the main navigational waters on the right bank of the creek on marker STA 85+00, across Island Dock, and STA 52+00, across the cities Cornell building. These locations serve as optimal areas for vessel anchoring due to their inland outline and ground transportation accessibility. These benefits prove essential in significant weather events where water levels become highly volatile towards the center of the channel. The locations depths range 10-13 feet, which suffices private and recreational smaller to moderate sized vessels. In addition, the amount of vacant land in proximity to these locations could be repurposed to serve these docking

facilities. The mooring fields would be directly visible from the city of Kingston busy water front and be aesthetically pleasing due to its encouragement of marine activity.

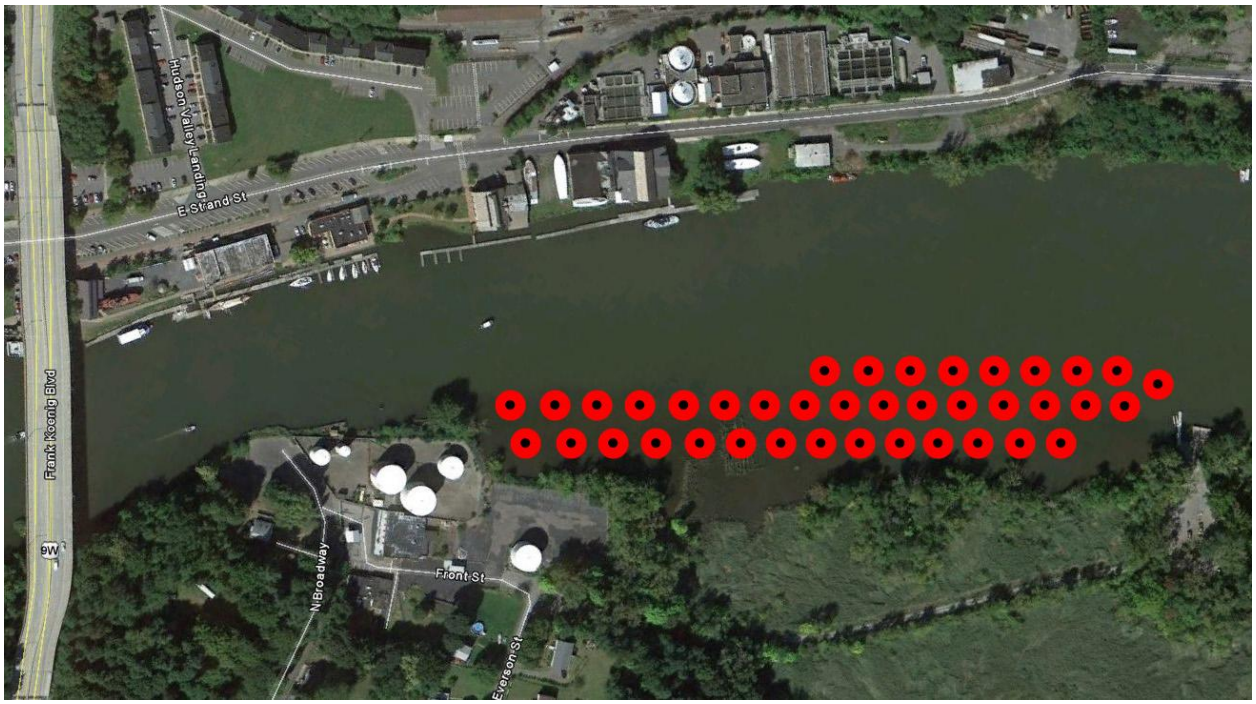


Figure 8: Mooring field proposed location 1: STA 53+00, across Cornell Building

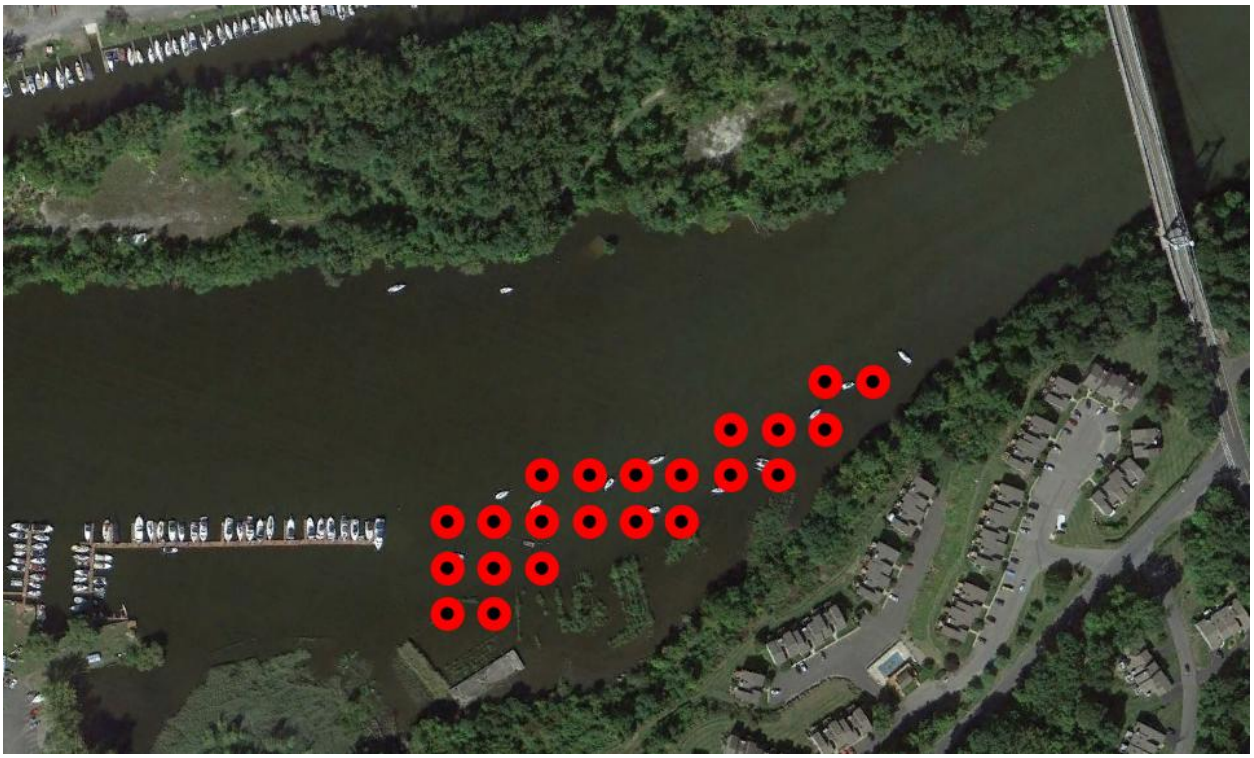


Figure 9: Mooring field proposed location 2: STA 85+00, across Island Dock

Facility Management

Proof of residency would be required to access and use the mooring facility. A valid New York State Driver's License, current Boat Registration, and an additional proof of residency such as utility bill, voter registration card, vehicle registration, etc. would all need to be included in applications and vicinity access. Upon residents would be issued a numbered decal to be affixed to the transom of your boat. A second matching sticker with mooring number must be placed on your mooring ball.

No person shall use or maintain a dock, wharf or mooring unless the dock, wharf or mooring is registered with the commission, and the fees required pursuant to DEC documentation Subpart 645-7 are paid in full.

Fees and guidelines include, but are not limited to:

a. Annual registration. Each dock, wharf and mooring shall be registered with the commission on such forms as the commission may prescribe. Such forms shall include certification by the owner or operator of the number of vessels to be berthed at the facility and the names of the owners thereof, including the vessels that will be registered to the owner or the owner's immediate family, and the vessels that will be registered to other persons.

b. No person shall use or construct a dock, wharf or mooring on the waters of the park without paying the fee required by this section. The owner of a dock, wharf or mooring used for residential purposes shall pay an annual fee for each such dock, wharf or mooring.

c. The owner of an association dock, wharf or mooring shall pay an annual fee in the amount times the total number of units with deeded or contractual access to the association docks, wharfs or moorings, or the actual number of vessels capable of being docked or moored at the association docks, wharfs or moorings, whichever is less.

d. The owner of a mooring used for commercial purposes shall pay an annual fee for each such mooring.

e. Upon the registration of a dock, wharf or mooring, the owner shall affix the registration placard provided by the commission to the structure in a manner that makes it visible.

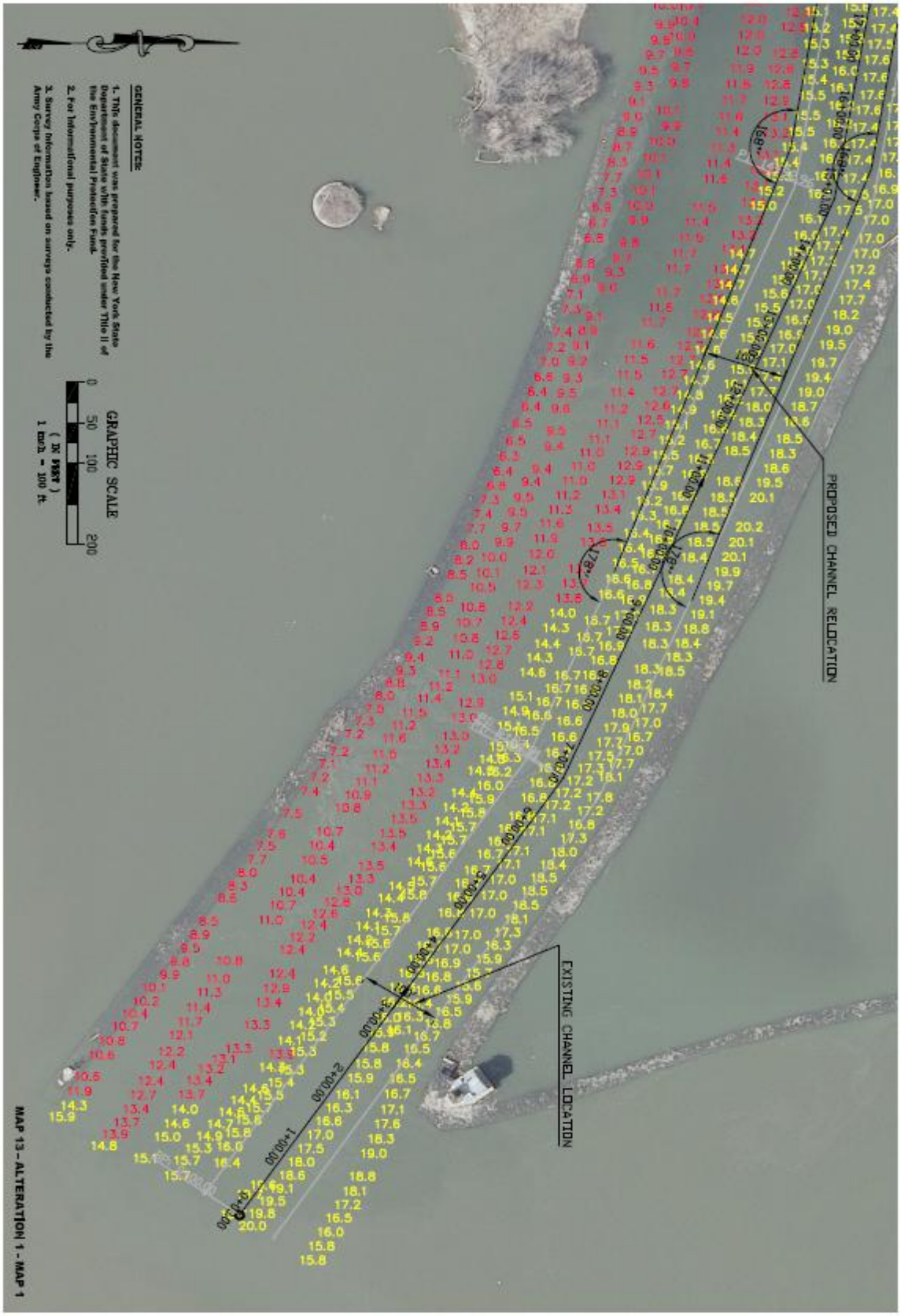
VII.B Channel Alterations without Dredging

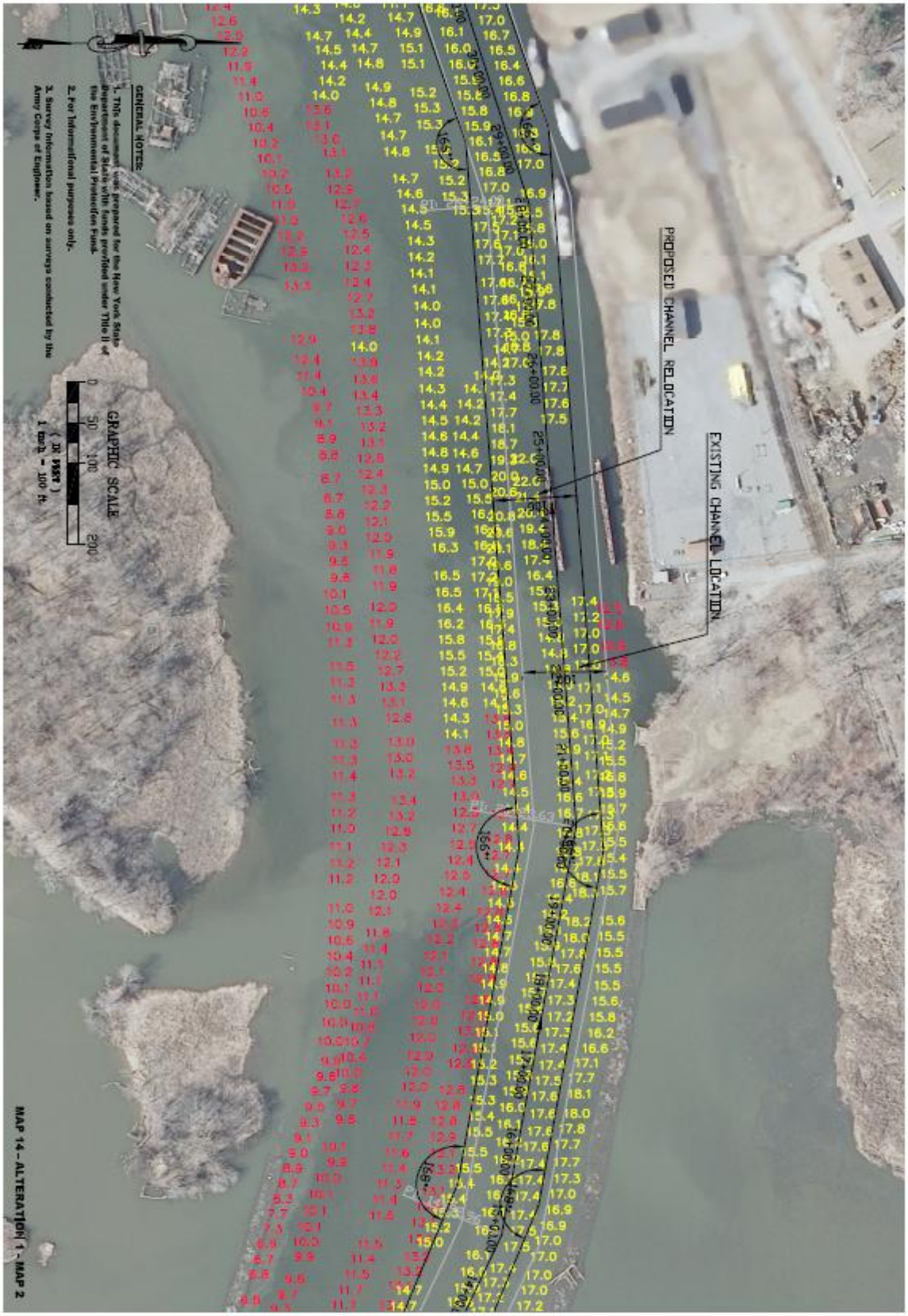
Within the navigation channel relocation area, the required depth of the navigation channel is 14 ft. To maintain this depth without the need for dredging, the channel can be moved in some locations. Table 5 below presents the distances gained by moving the channel within the

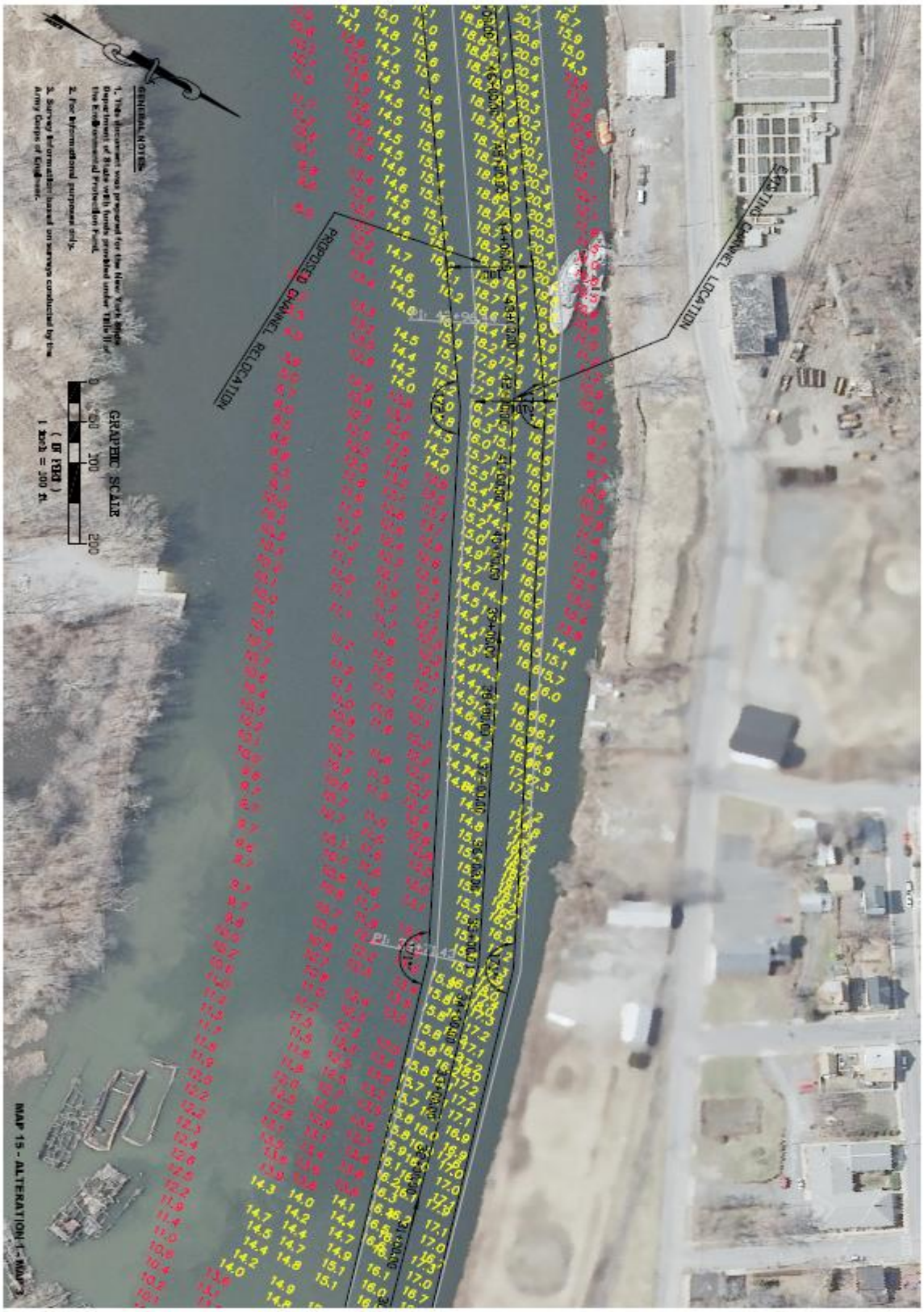
required depths. It shows that there are some areas that remain with less than 25 ft of space between the channel and the bulkhead, while in other places, an additional maximum of 50 ft can be gained.

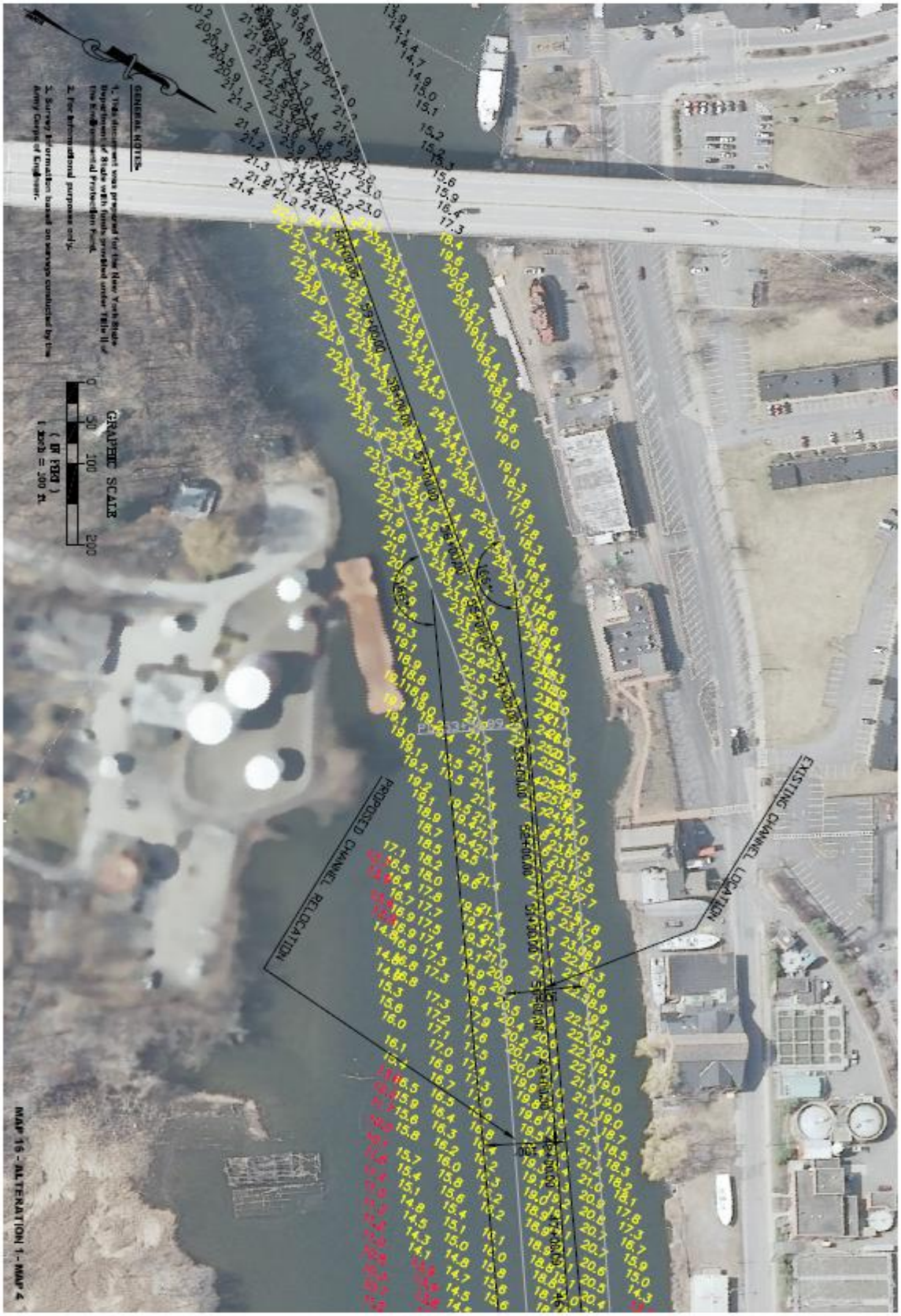
Table 5 - Distances to Proposed Channel, Alteration 1		
Distance Moved South (approximate)	**Distance to Bulkhead (approximate)**	**Station Number Location (approximate)**
12 feet	50 feet	20+00
30 feet	75 feet	24+00
0 feet	21 feet	32+00
37 feet	95 feet	48+00
49 feet	97 feet	54+00
0 feet	100 feet	59+00

Following are maps showing the existing channel location and proposed channel relocation at several creek stations under the without-dredging alternative.


GENERAL NOTES:
1. This document was prepared for the New York State Department of State with funds provided under Title II of the Environmental Protection Fund.
2. For informational purposes only.
3. Survey information based on surveys conducted by the Army Corps of Engineer.
GRAPHIC SCALE
(IN FEET)
1 inch = 100 ft.
0
50
100
200
PROPOSED CHANNEL RELOCATION
EXISTING CHANNEL LOCATION
MAP 13 - ALTERATION 1 - MAP 1


PROPOSED CHANNEL RELOCATION
EXISTING CHANNEL LOCATION
GRAPHIC SCALE
1 inch = 100 ft.
GENERAL NOTES:
1. This document was prepared for the New York State Department of State with funds provided under Title II of the Environmental Protection Fund.
2. For informational purposes only.
3. Survey information based on surveys conducted by the Army Corps of Engineer.
MAP 14 - ALTERATION 1 - MAP 2


PROPOSED CHANNEL RELOCATION
EXISTING CHANNEL LOCATION
GRAPHIC SCALE
MAP 15 - ALTERATION 1 - MAP 2


GENERAL NOTES:
GRAPHIC SCALE
PROPOSED CHANNEL RELOCATION
EXISTING CHANNEL LOCATION
MAP 16 - ALTERATION 1 - MAP 4

VII.C Channel Alterations with Dredging

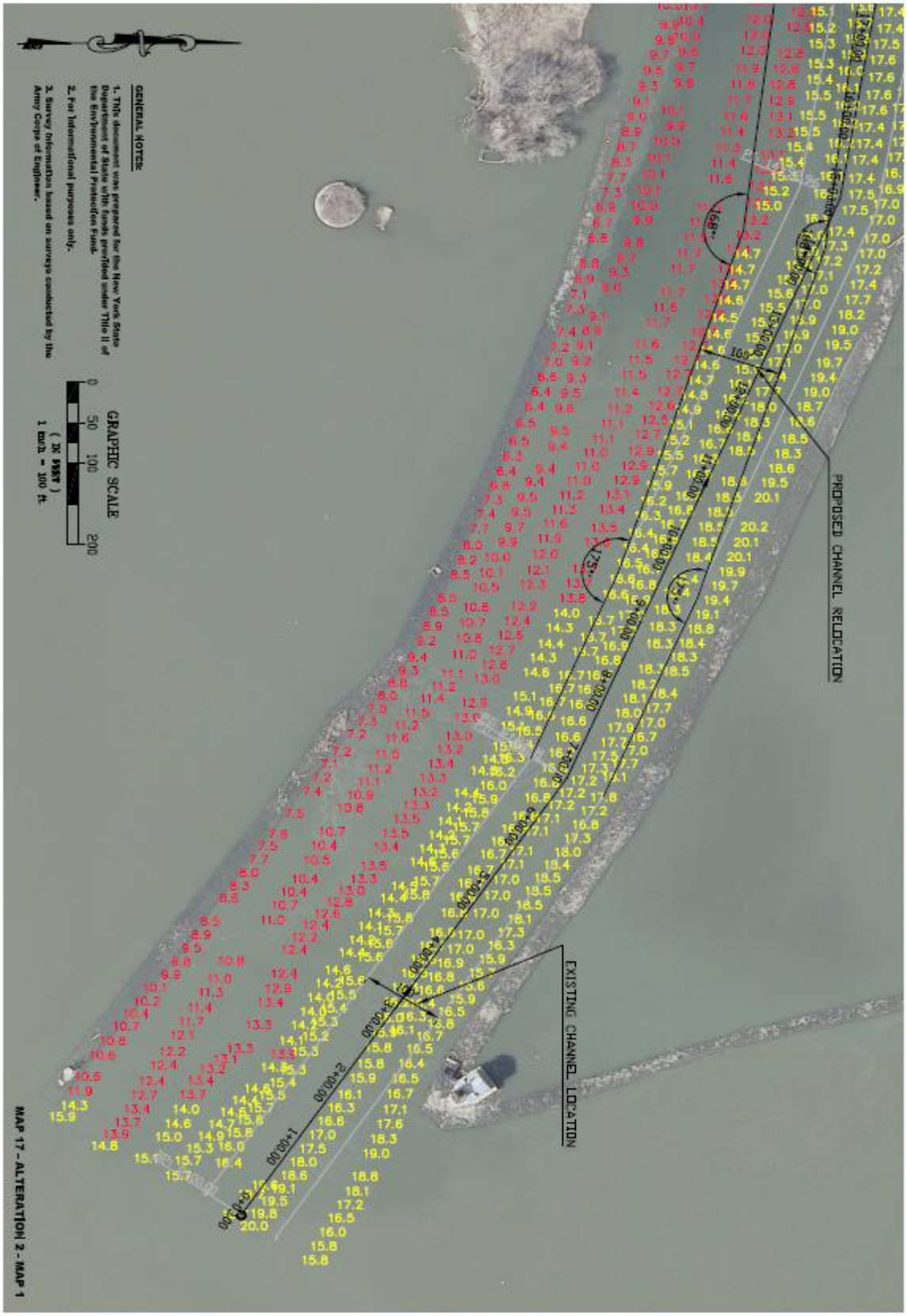
Dredging can be utilized to gain additional width within the creek to maintain the 100 ft wide navigation channel. Table 6 below presents the distances gained in moving the channel with areas needing to be dredged. This option holds the center of the Rondout Creek as the southern edge of the navigation channel, so as not to impose on the Town of Esopus waterfront. Within this area, the navigation channel would remain on the City of Kingston side of the Rondout. The navigation channel can be moved from 75 ft to 139 ft to the south. In moving the channel, docking space between 75 ft and 140 ft could potentially be created.

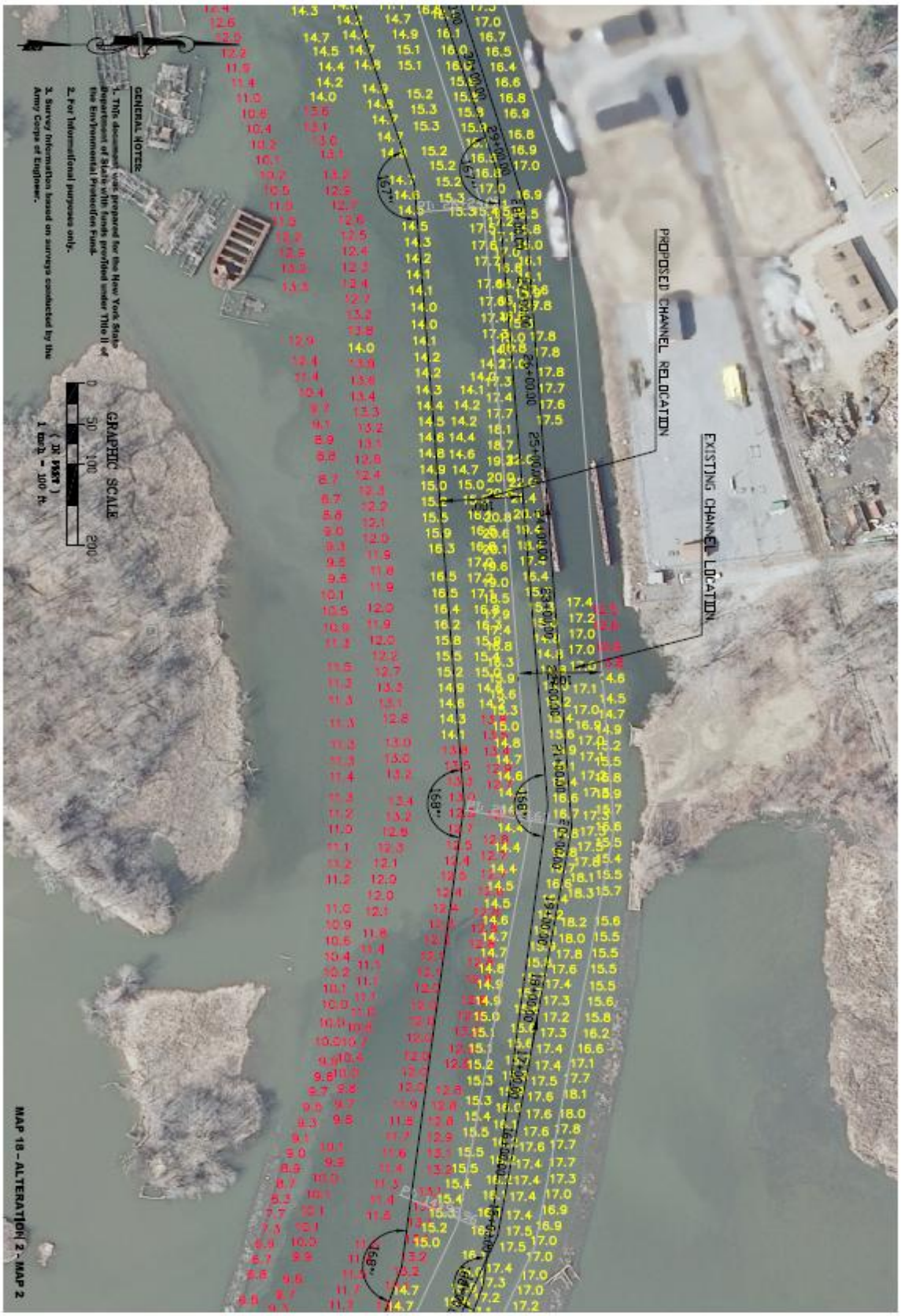
Table 6 - Distances to Proposed Channel, Alteration 2

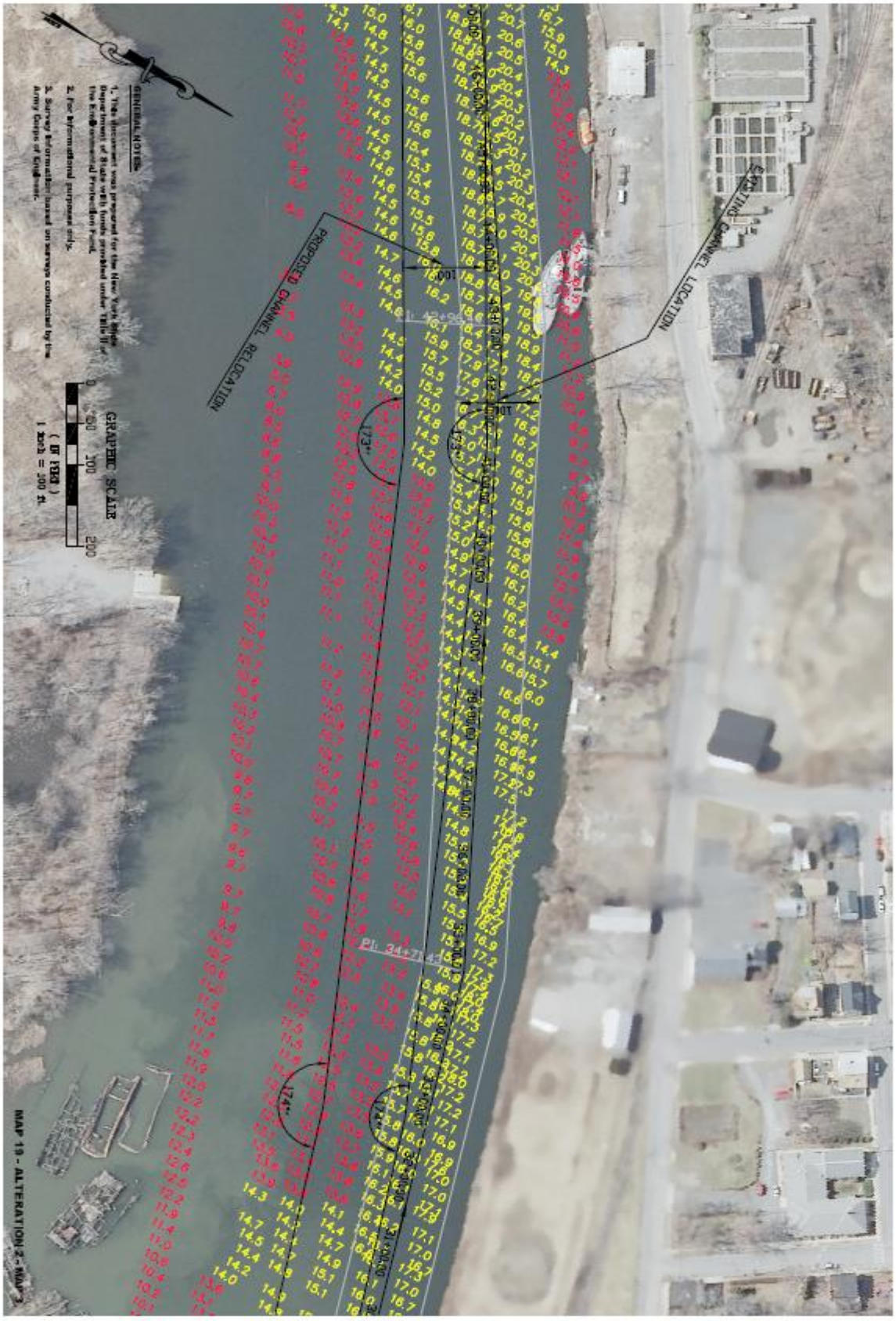
Distance Moved South (approximate)	Distance to Bulkhead (approximate)	Station Number Location (approximate)
37 feet	73 feet	14+00
82 feet	120 feet	20+00
69 feet	98 feet	29+00
86 feet	139 feet	37+00
71 feet	127 feet	43+00
37 feet	95 feet	48+00
46 feet	96 feet	54+00
0 feet	98 feet	58+00

There are two principal areas in which dredging would need to occur. The first area begins at approximately Station 13+50 through Station 22+00, and encompasses approximately one acre in area, with additional depths needed between 0 ft and 1.5 ft. The second area begins at approximately Station 31+50 through Station 42+00, and encompasses approximately two acres in area, with additional depths needed between 0 ft and 2.5 ft.

Following are maps showing the existing channel location and proposed channel relocation at several creek stations under the with-dredging alternative.


GENERAL NOTES:
1. This document was prepared for the New York State Department of State with funds provided under Title II of the Environmental Protection Fund.
2. For informational purposes only.
3. Survey information based on surveys conducted by the Army Corps of Engineer.
GRAPHIC SCALE
(IN FEET)
1 inch = 100 ft.
0
50
100
200
PROPOSED CHANNEL RELOCATION
EXISTING CHANNEL LOCATION
MAP 17 - ALTERATION 2 - MAP 1


GENERAL NOTES:
1. This document was prepared for the New York State Department of State with funds provided under Title II of the Environmental Protection Fund.
2. For informational purposes only.
3. Survey information based on surveys conducted by the Army Corps of Engineer.
GRAPHIC SCALE
0
50
100
200
1 inch = 100 ft.
PROPOSED CHANNEL RELOCATION
EXISTING CHANNEL LOCATION
MAP 18 - ALTERATION 2 - MAP 2


GENERAL NOTES
PROPOSED CHANNEL RELOCATION
EXISTING CHANNEL LOCATION
GRAPHIC SCALE
MAP 19 - ALTERATION 2 - MAP 3


GENERAL NOTES:
GRAPHIC SCALE
EXISTING CHANNEL LOCATION
PROPOSED CHANNEL RELOCATION
MAP 20 - ALTERATION 2 - MAP 4

VII.D Pursuing Channel Relocation Alternatives

The movement of the federal navigation channel resulting from both of the alterations described above would increase waterfront access for both public and private land uses along the Rondout Creek. The extent to which the channel alignment can be moved will open up more docking space along the Kingston waterfront, which may create more opportunities for economic development and re-development for properties along the waterfront. It will also enhance commercial navigation benefits.

The two channel relocation alternatives presented above are both located within the confines of the defined federal navigation project. The first alternative, the no-dredging option, calls for the relocation of approximately 0.74 miles of the channel. The second alternative involves dredging portions of the new channel and the relocation of approximately 0.84 miles of the channel. Because both alternatives call for modifications to the existing federal navigation project, each would require federal government approval. There are several ways to pursue the federal government's approval of the channel modification. These include, but are not limited to, the following:

- de-authorization of the federal project;
- Congressional approval of the channel relocation without construction; and
- Congressional approval of the channel relocation with construction, subject to the findings of a Project Reevaluation Report prepared by the US Army Corps of Engineers.

De-authorization of the Federal Project

De-authorization of the federal navigation project would likely be the path of least resistance through the regulatory and study processes. As a result of this alternative, the federal project would be turned over to the local sponsor who may then elect to redefine the boundaries of the navigation channel within reasonable limits. The downside to this approach from the local perspective would be that the federal government will no longer be responsible for the operation and maintenance of the Rondout Harbor. The responsibility and associated costs would then become the burden of the local sponsor.

Congressional Approval of the Channel Relocation without Construction

Congressional approval of the channel relocation without construction would apply only to the no-dredging alternative, which involves the relocation of the channel within the creek where the contours of the creek bed satisfy the authorized depth of the channel requirements. To complete this project modification, the local sponsor would need to present a case to the district office of the US Army Corps of Engineers (USACE). The sponsor will also need to engage its congressional representative to make a formal request for relocation of the federal navigation channel. Approval of such request would start a formal process in which the USACE would remap the boundaries of the federal channel, and then relocate all channel markers in the creek to coincide with the new alignment. The construction required under this alternative would be limited to relocating the channel navigational aids. All modifications to channel alignment and navigational aids are subject to the review and approval of the U.S. Coast Guard.

Congressional Approval of Channel Relocation with Construction

Congressional approval of channel relocation with construction would be subject to the findings of a Project Reevaluation Report prepared by the US Army Corps of Engineers.

In order to structurally modify an existing federal navigation project, the USACE would need to be directed by congress to conduct a reevaluation study of the project to determine whether the proposed modifications are in the federal interest.

> *"Federal improvements must be in the general public interest and must be accessible and available to all on equal terms. Although federally-provided general navigation facilities may serve them, improvements are not made to provide navigation access to privately-owned facilities (including commercial marinas) or access to restricted membership yacht clubs and similar establishments not open to the general public on equal terms, nor are improvements undertaken to enhance and primarily benefit land development schemes, waterway cargo transfer and lightering facilities, or to provide barge fleeting areas."*[8]

Any modification to the existing channel or other elements of the Rondout Harbor would need to be conducted in conformity with the regulations contained in the USACE Digest of Water Resources Policies and Authorities.

As the local sponsor for a Rondout Harbor modification project, the City of Kingston would need to engage its congressional representative to request that the USACE be directed to conduct any necessary studies. This process will need to be followed under any of the three proposed scenarios described above to varying degrees, depending upon the level of complexity of the harbor modifications proposed.

VIII. EXISTING WATERFRONT CONDITIONS

The shoreline of Rondout Creek has been occupied by a mix of residential and commercial structures, heavy and light industrial buildings, recreational facilities, and vacant properties. Scrapyards along the shoreline have been a particularly aesthetically offensive land use. At the time of the PAS study, the only points of unrestricted public access to the waterfront observed within the plan area were Kingston Point Park and West Strand Plaza, with boat launching only possible at Kingston Point.

In an inspection conducted for the PAS study, the creek was found to be segmented with large areas of underutilized, abandoned, and deteriorating shoreline. As the LWRP supports mixed use, water-based land uses along the Rondout Creek, it envisions improving the appearance and stability of the shoreline via a joint effort by the City of Kingston and the private sector. Part of this vision has already been realized, with the northern shoreline of Rondout Creek having already been extensively developed for marinas, dry docks, and residential and commercial uses.

The physical conditions of the Rondout Creek shoreline have been observed to vary considerably along the approximate three mile length of the plan area. Shore conditions consist of original

[8] EP 1165-2-1, 30 Jul 99, section 12-1 The Federal Interest, paragraph b. Project Beneficiaries.

timber bulkheads, newly installed timber, steel sheet piling, precast concrete blocks, rip rap slope protection and, in several cases, no protection at all. In some locations, the bulkheads have been maintained or replaced, while in others, they are failing.

The Hudson River shoreline north of Rondout Creek near Kingston Point has been subject to wave damage. Tidal deposition of logs, branches, and other plant debris have been observed; large bluestone boulders have been placed along portions of the easterly side of the trolley tracks in an effort to protect the shoreline. The northern shoreline of Rondout Creek has been stabilized by a variety of means, including steel sheetpiles, wooden timber cribbing, concrete and stone rip rap, and railroad ties. Evidence of erosion and tidal scouring has been observed along the northern channel (north of Island Dock, Station 70+00 to 96+00) upstream of the Route 9W bridge. The northern shore ranges from level to moderately steep, with some evidence of erosion or bank slippage where the timber cribbing or driven wooden piles have deteriorated. The shoreline rip rap has also slipped or eroded into the creek at a number of locations.

VIII.A Existing Waterfront Conditions: Photos, Details

HDR assisted in observing and documenting conditions along the northern shoreline of the Rondout Creek in the City of Kingston, Ulster County, NY. Along with a representative of the City of Kingston, HDR performed a field reconnaissance of the shoreline on October 13, 2010. This evaluation was conducted on foot, along the shoreline immediately accessible by land in the City of Kingston Marina, and via observation of the remaining shoreline within the plan limits by boat. No excavation or physical inspection was performed, and only conditions above the water level at that time were assessed. The results of this inspection are presented at some length below and are followed by a description of two conceptual schemes for the repair and stabilization of existing bulkheads and unprotected shoreline, with associated costs on a per cubic yard, square foot, and linear foot basis.

Plan area sites and boundaries appear in Figure 5 below.

The condition assessment followed the shoreline, beginning with the Kingston Lighthouse Jetty, proceeding around Island Dock, and concluding at the western city limit.

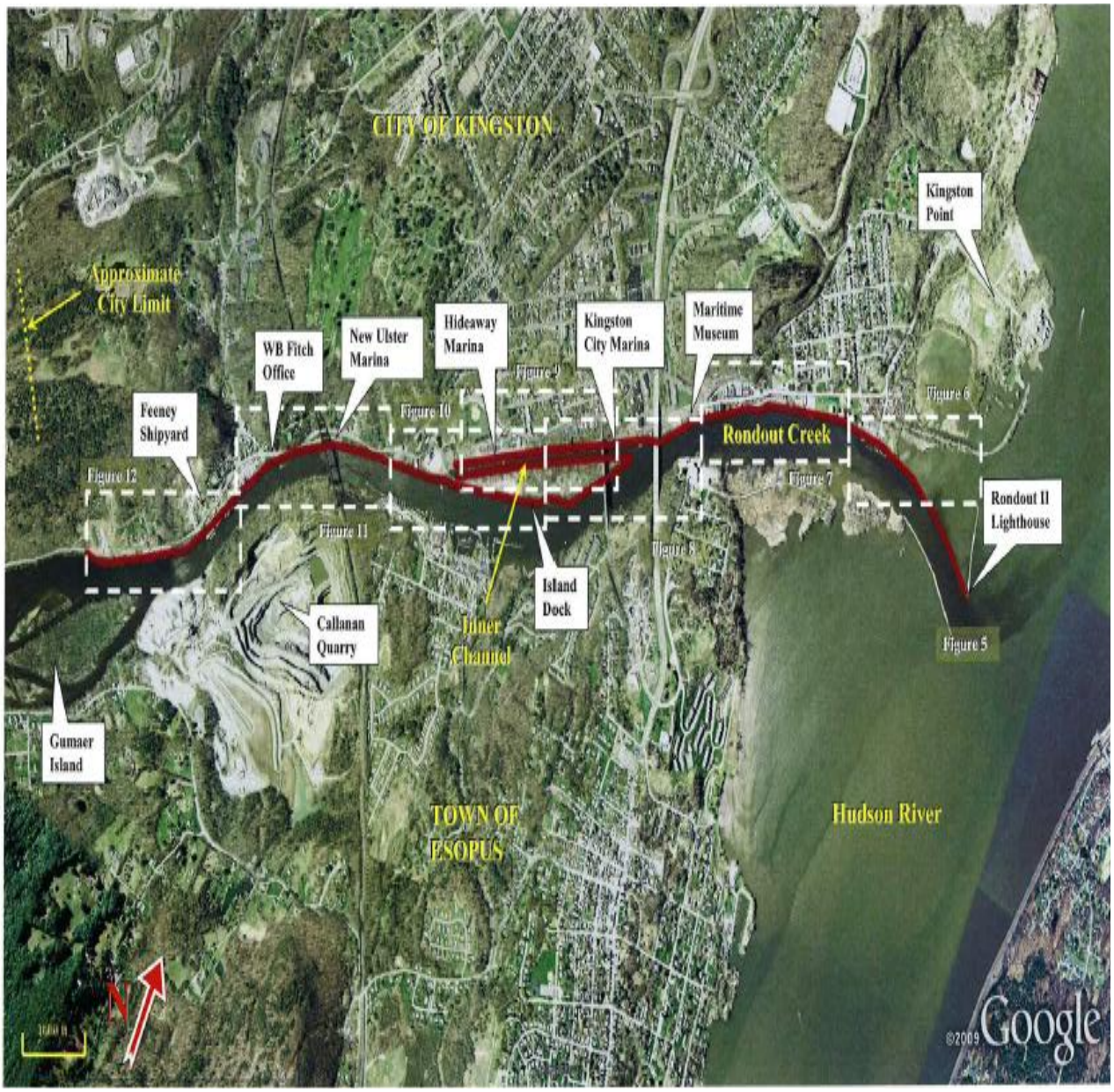


Figure 5 – Plan Area Sites

Aerial views along the plan area limits are shown in Figures 6 through 12 below. Appearing beneath the aerial views are photos of typical shoreline conditions taken during the field reconnaissance. The reconnaissance was performed aboard the Lark Water Taxi, and the exact limits of each condition could not be measured. Approximate linear footage is provided for each of the condition assessments presented below.

Figure 6 - Rondout Creek, Map 1

Photo 5 - Natural Stone with Piles and Deteriorated Timber Cribbing

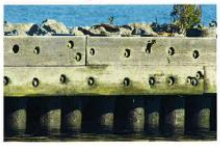


Photo 7 -Lighthouse Jetty

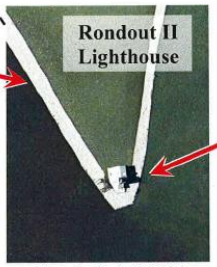


Photo 8 - Rondout II Lighthouse on Jetty

Photo 4 - Timber Cribbing with Piles

Photo 6 - Timber Pile with Stone Blocks

Figure 5 – Rondout II Lighthouse

Photo 4:

Horizontal timber cribbing with a timber fender system was observed protecting this 655 ft (+/-) section of shoreline. The bulkhead appeared to be in fair to poor condition with deteriorated cribbing, broken fenders and vegetative growth. An abandoned dry dock within Rondout Creek appeared to require dismantling and removal prior to repair or replacement of this bulkhead.

Photos 5 & 6:

This partially unprotected 410 ft (+/-) section of shoreline featured a variety of stabilization measures, including rip rap, stone blocks, timber cribbing, and timber piers, all of which appeared to be in a state of disrepair. The timber cribbing was missing along several stretches, and where it remained, it was deteriorated with exposed connecting rods. The rip rap and unprotected shoreline, although stable under observed conditions, seemed to require further stabilization to accommodate any new development of the adjacent land. The timber piles appeared to be part of a previous fender system. Several were connected at the top with a horizontal timber member, while others were free-standing or missing entirely.

Photo 7 & Figure 5:

The 1730 ft (+/-) jetty connecting the shoreline to the Rondout II Lighthouse was reconstructed during the 1990s. The jetty was observed to be framed on both sides by horizontal timber cribbing frame anchored to timber piles in some locations and timber piers in others. The frame was filled with rip rap and vegetation. Although the jetty appeared to be in good condition, consideration was

being given by the City of Kingston and the New York District of the USACE to raising the jetty in order to allow pedestrian access to the lighthouse during high flow events.

Photo 8:

Located at the tip of the Rondout Creek, the Rondout II Lighthouse is protected by the jetty, which was reconstructed in the 1990s, and which is depicted in Photo 11. The lighthouse serves as the end of the planning area for this harbor management plan.

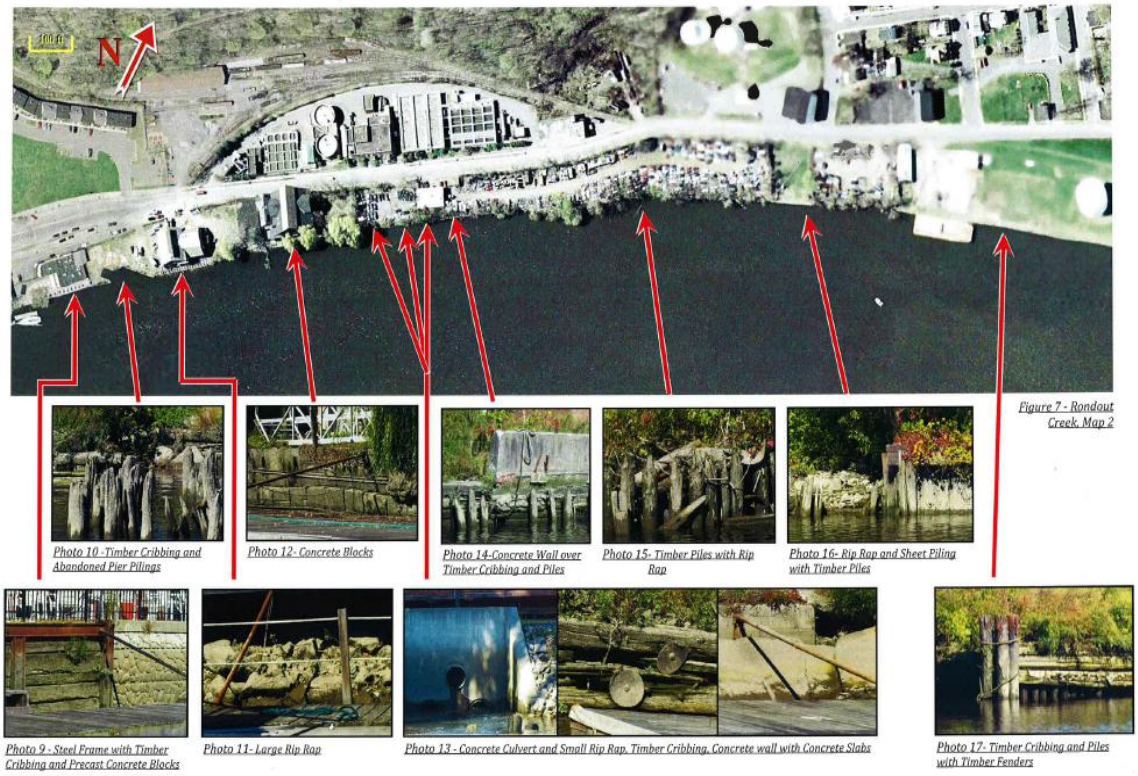


Photo 9:

A steel frame with timber cribbing fronted a 90 ft (+/-) section along the parking lot of Rosita's restaurant. Several docks were anchored to the steel frame. The steel appeared to be in good condition, while the timber showed signs of deterioration and vegetation. In front of the restaurant was another 93 ft (+/-) long section consisting of a precast block wall in good condition.

Photo 10:

This 180 ft (+/-) section of shoreline once housed a ferry slip. The existing timber cribbing was deteriorated and, in some locations, missing altogether. The shoreline behind the cribbing was stabilized with rip rap and other concrete debris. The piles from the ferry pier were abandoned and appeared to require removal prior to any additional shoreline stabilization.

Photo 11*:*

The location of The Steel House Restaurant and Bar, this shoreline consisted of large rip rap appearing to be in stable condition. Public docks were anchored into the framing of the restaurant's deck, rather than into the shoreline. This section of shoreline was approximately 260 ft (+/-) in length.

Photo 12:

This 50 ft (+/-) section of shoreline, in front of a boat-building business, featured stacked concrete blocks. The adjacent dock was anchored to this block wall, which also supported a set of access stairs. The wall seemed stable, but slightly out of plumb. Assorted rip rap was also present in front of the wall. Further stabilization appeared to be necessary.

Photo 13:

In front of the boat yard, shoreline conditions changed several times within a 200 ft (+/-) span. Included were a concrete culvert structure, small stone rip rap, horizontal timber cribbing, and a concrete wall with concrete slab rip rap. The adjacent dock was anchored to the concrete wall. The culvert, small stone rip rap, and concrete wall appeared to be in good and stable condition. The timber cribbing, however, was in poor condition, deteriorated and exposing or missing connection rods.

Photo 14:

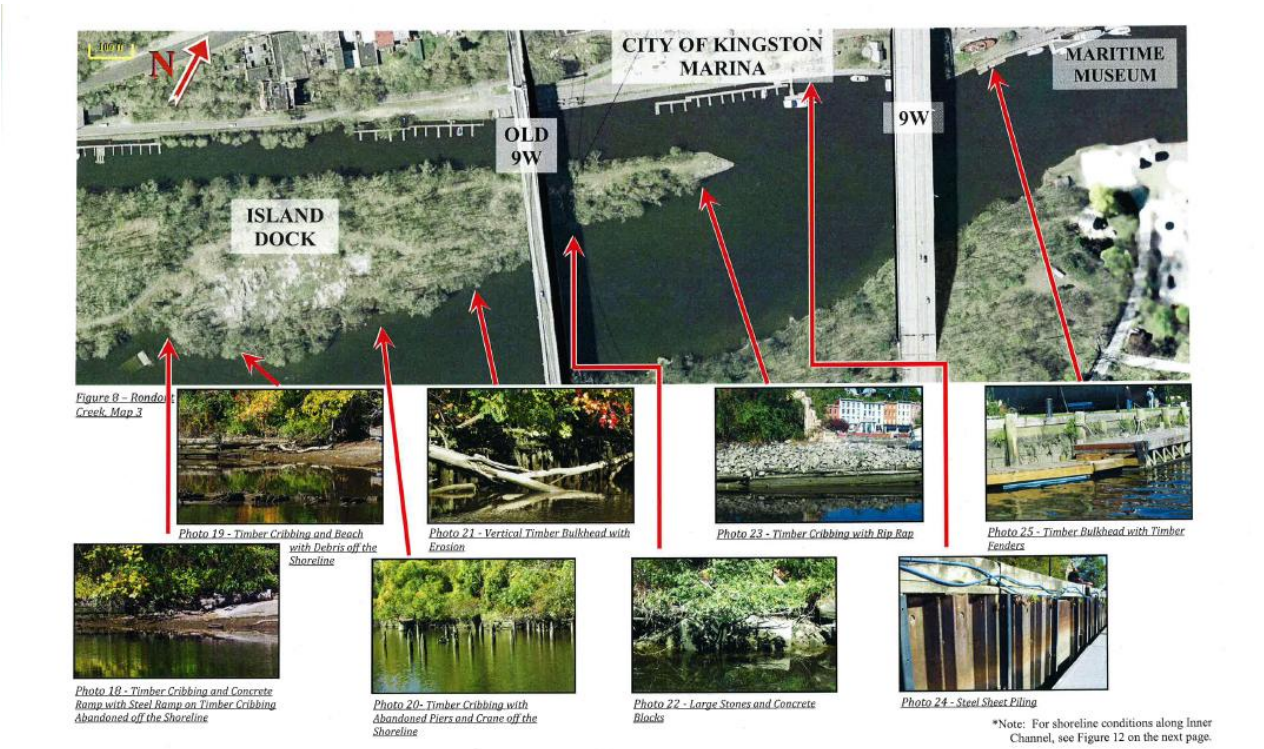
This 40 ft (+/-) section consisted of horizontal timber cribbing with timber piles and a concrete barrier wall on top of the cribbing. The timber was apparently deteriorated and the piers were misaligned, broken, or missing. The concrete wall was noticeably leaning in the direction of Rondout Creek and required stabilization.

Photos 15 & 16:

The shoreline featured mainly deteriorated timber piles with rip rap and debris along a 390 ft (+/-) length. Included in this stretch was an approximately 100 ft long section of sheet piling with a timber fender system. The shoreline appeared stable, but potentially in need of further stabilization to accommodate development of the adjacent property.

Photo 17:

Consisting of timber cribbing on timber piles, with groups of timber piers acting as a fender system, this 580 ft (+/-) section of bulkhead appeared to be in fair condition, with cracked cribbing and missing connector rods.



Above, Figure is 9.

Photos 18 & 19:

This 500 ft (+/-) section of Island Dock consisted of timber cribbing, one concrete ramp, and a short span of unprotected shoreline. There were also various forms of debris in the Rondout Creek which would require removal prior to any stabilization efforts. These included a steel ramp on timber piles, an abandoned crane, abandoned timber piles, and what appeared to be a sand jetty. Although this section of bulkhead appeared to be in fair condition, development of the adjacent land would likely necessitate additional stabilization.

Photos 20 & 21:

The timber cribbing with vertical timber piers was in poor condition in this 340 ft (+/-) section of shoreline. The roots from adjacent trees imposed on the bulkhead and either pushed the timbers out of alignment, or broke through the wall. Some vertical timbers were missing and the shoreline was eroding behind the bulkhead. Although this section of shoreline appeared stable, additional stabilization would be necessary to accommodate development of the adjacent land.

Photo 22:

The shoreline was protected by rip rap including large stones, as well as concrete blocks. This 400 ft (+/-) section of the shoreline was in poor condition and required stabilization.

Photo 23:

The tip of Island Dock was protected by timber cribbing filled with rip rap. In poor condition, with deteriorated, misaligned timbers and exposed connecting rods, this 190 ft (+/-**)** section required stabilization.

Photo 24:

This 400 ft (+/-) section of bulkhead, in front of the City of Kingston Marina, was constructed of steel sheet piling. Public floating docks were located adjacent to the bulkhead, and the boardwalk above was renovated as part of the 2010 Pedestrian Waterfront Walkway project. The steel appeared to be in good condition, and not to require further stabilization.

Photo 25:

Located in front of the Maritime Museum, this 380 ft (+/-) section of bulkhead consisted of timber cribbing with timber fenders for the adjacent dock. The bulkhead was in good condition and did not need additional stabilization.

.

Figure 9 - Inner Channel

Photo 26 - Timber Cribbing in Fair to Poor Condition

Photo 28 - New Timber Bulkhead (2010)

Photo 27 - Various Forms of Timber Cribbing and Piles in Disrepair with Loose Connecting Rods and Erosion

*Note: For shoreline conditions along Rondout Creek, see Figure 11

Photo 26:

This 1280 ft (+/-) section of bulkhead featured timber cribbing in fair to poor condition. Within the bulkhead were timber posts connected to private docks at Hideaway Marina. Owners also parked

their vehicles up to the shoreline. The timber cribbing appeared to be deteriorating, causing the wall to cave in. This section was in need of repair.

Photo 27:

The southeast shoreline of the Inner Channel was comprised of various forms of abandoned timber cribbing and piles. The entire 3000 ft (+/-) shoreline was in disrepair, characterized by deteriorated or missing timber, exposed connecting rods, and erosion. The roots of adjacent trees had forced the bulkhead out of alignment or had torn the wall apart completely. Although this section of shoreline was stable under observed conditions, any development of the adjacent land would render additional stabilization necessary.

Photo 28:

In 2010, the bulkhead alongside the City of Kingston Marina was repaired. A 300 ft (+/-) section of wall was replaced with timber cribbing, which was tied into the existing timber piles. A 240 ft (+/-) section was also replaced with a similar timber cribbing wall, but steel sheet piling was added in front of the wall foundation for protection. The sheet piling was backfilled with crushed stone. The new bulkhead sections remained in good condition. An additional 620 ft (+/-) section of timber cribbing was extended under the same contract, in order to increase the elevation of the wall. The new timber cribbing was attached to the existing cribbing with cut-in deadmen beams and backfilled with crushed stones. Another 620 ft (+/-) section, also constructed under the same contract, maintained the existing timber bulkhead and replaced the boardwalk above. The existing bulkhead in both sections remained in good condition.

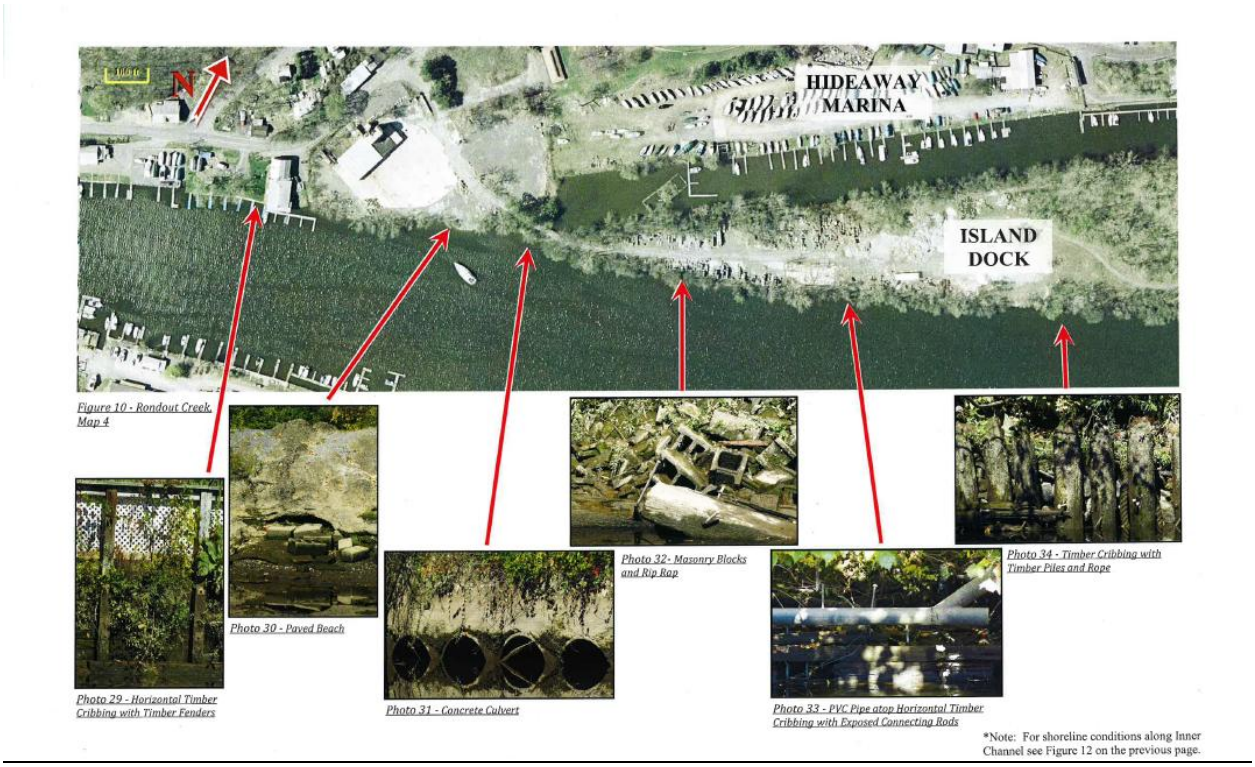


Photo 29:

Approximately 60 ft (+/-) of the timber cribbing bulkhead along the Kingston Power Boat Association was in fair condition, but appeared to be in need of some repair.

Photo 30:

This 560 ft (+/-) section of unprotected shoreline included a short span of poured concrete, which seemed to be part of the closed lumber yard. The unprotected shoreline did not appear to be compromised. If the adjacent land were to be developed, however, stabilization would likely be necessary.

Photo 31:

A concrete culvert connected the Inner Channel to Rondout Creek. The concrete appeared to be in good condition and not to require further stabilization.

Photo 32:

This 550 ft (+/-) section consisted of rip rap and debris, including masonry blocks, which extended out into Rondout Creek. In some locations, there were remnants of timber cribbing. These sections were no longer stable, with fallen members and exposed or missing connecting rods. Roots from adjacent trees had forced the bulkhead out of alignment, or had broken through the timber ties.

Although this section of shoreline was stable under observed conditions, further development of adjacent land would require additional stabilization.

Photo 33:

The timber cribbing bulkhead along this 210 ft (+/-) section also supported a large PVC pipe. The bulkhead appeared to be in fair to poor condition, with timber missing and connecting rods exposed. The roots from adjacent trees had forced the bulkhead out of alignment, or had broken through the timber ties. Although this section of shoreline was stable under then-current conditions, further development of the adjacent land would make additional stabilization necessary.

Photo 34:

Horizontal timber cribbing, with vertical piles, rope ties, and steel anchor brackets, formed the bulkhead along this section of shoreline. This 880 ft (+/-) stretch was in poor condition. Timber piles and ties were missing or misaligned, rope ties were frayed, and connecting rods were exposed. The roots from adjacent trees had broken through the bulkhead. Although this stretch of shoreline was stable under existing conditions, further development of the adjacent land would require additional stabilization.

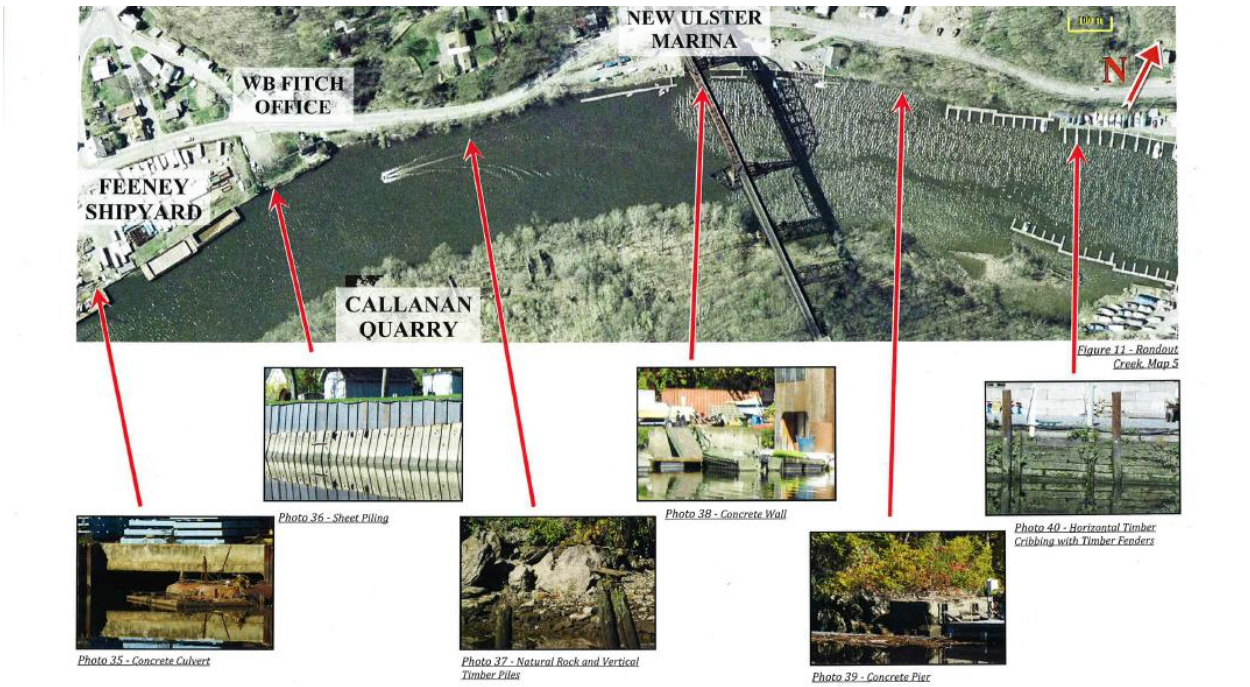


Photo 35:

There was a concrete culvert for a creek outfall along the Feeney Shipyard. This 30 ft (+/-) section of concrete appeared to be in good condition.

Photo 36:

The bulkhead in front of the WB Fitch Office was reportedly repaired in 2007. In most locations, the existing sheet piling was determined at the time to be in good condition, although out of alignment. Consequently, the existing steel was realigned and anchored to a continuous beam. In some locations, new sheet piling was installed. This 180 ft (+/-) bulkhead remained in good condition.

Photo 37:

This 800 ft (+/-) section of shoreline was stabilized with large rocks and abandoned vertical timber piles. Most of this stretch of shoreline runs along Abeel Street with no developed property observed. However, approximately 200 ft (+/-) was alongside docks at the New Ulster Marina. The shoreline did not appear to be compromised, but development of adjacent land would require further stabilization.

Photo 38:

Most of the New Ulster Marina bulkhead consisted of a 380 ft (+/-) concrete wall in good condition. Additional stabilization did not appear to be necessary.

Photo 39:

The 500 ft (+/-) of unprotected shoreline included large stone and two concrete piers anchoring a dock. The unprotected shoreline did not appear to be compromised, but if adjacent land were to be developed, stabilization could be required.

Photo 40:

The Kingston Power Boat Association was fronted by a horizontal timber cribbing bulkhead with vertical timber fenders. The 640 ft (+/-) of newer cribbing was in good condition and stabilization did not appear to be necessary.

Figure 12 - Rondout Creek, Map 5

Photo 41 - Unprotected Shoreline with Abandoned Commercial Piers

Photo 42 - Large Stone with Dock Supports and Building Foundations

Photo 43 - Sheet Metal with Soldier Piles and Steel Sheet Piling

Photo 44 - Steel Sheet Piling and Vertical Timber Piles

Photo 41:

Near the city limits, the shoreline was unprotected. Along this 800 ft (+/-) section, there were deteriorated timber piers, both along the shoreline and extending out into the water. These abandoned piers had been part of commercial docks that had been removed. The unprotected shoreline did not appear to be compromised, but development of adjacent land might make stabilization necessary.

Photo 42:

This section was sloped and consisted of large stones along some lengths and smaller stones along others. This 1500 ft (+/-) stretch abutted private docks and supported what appeared to be a private residence in one location. The stairs from a parking lot down to the docks were built into the slope. At the residence, there was a dock at the shoreline, and then a second sloped section of smaller rock deposits. The structure's supports were located adjacent to the shoreline. This section of bulkhead appeared to be in stable condition.

Photo 43:

This 410 ft (+/-) section consisted of a sheet metal wall with soldier piles along the West Kingston Recycling Center. The seams of the plates appeared to be separating and, in several locations, holes had been punched through the steel. Although the bulkhead appeared to be stable at the time of inspection, it was determined that preventive maintenance should be considered, and that a detailed evaluation would be required if further development of the land were to be proposed.

Photo 44:

Steel sheet piling formed the bulkhead along the southern 1000 ft (+/-) of the Feeney Shipyard. The bulkhead then switched to vertical timber piles for approximately 70 ft (+/-). The steel sections appeared to be in good condition, but the timber pilings showed deterioration.

Table 7 below provides a summary of the conditions found at each section of the bulkhead during the condition assessment conducted for the PAS study. Each site is identified and located by station, approximate length, condition of the bulkhead, and associated photograph number.

Table 7 – Bulkhead Summary					
Approximate Beginning Station	Approximate Ending Station	Approximate Length (feet)	Type	Condition	Total Consecutive Length (Approximate)
2+00	19+00	1,700	Photo 11	Good	1,700
19+00	23+00	400	Photos 9,10	Poor	
23+00	29+50	650	Photo 8	Poor	1,050
29+50	35+50	600	Photo 21	Neutral	600
39+00	43+00	400	Photos 19,20	Poor	
45+00	46+00	100	Photo 18	Poor	
46+00	48+00	200	Photo 17	Poor	
49+00	50+00	100	Photo 16	Poor	800
51+00	53+00	200	Photo 15	Good	200
52+00	54+00	200	Photo 14	Poor	200
54+00	55+00	100	Photo 13	Neutral	100
55+00	56+00	100	Photo 13	Good	
56+00	60+00	400	Photo 29	Good	
63+00	67+00	400	Photo 28	Good	900
65+00	67+00	200	Photo 27	Poor	
67+00	70+50	350	Photo 26	Poor	
71+00	74+50	350	Photo 25	Poor	
74+50	79+50	500	Photos 22-24	Poor	
79+50	88+50	900	Photo 38	Poor	
88+50	90+50	200	Photo 37	Poor	
90+50	96+50	600	Photo 36	Poor	3,100
96+50	97+00	50	Photo 35	Good	50
97+00	102+50	560	Photo 34	Neutral	
103+00	103+50	60	Photo 33	Neutral	620
104+00	110+50	640	Photo 44	Good	640
110+50	115+50	500	Photo 43	Neutral	500
115+50	119+30	380	Photo 42	Good	380
119+00	127+00	800	Photo 41	Poor	800
127+00	129+00	180	Photo 40	Good	
136+00	136+30	30	Photo 39	Good	210
129+00	139+00	1000	Photos 47,48	Neutral	
139+00	143+10	410	Photo 47	Neutral	
144+00	159+00	1500	Photo 46	Neutral	2910
160+00	168+00	800	Photo 45	Poor	800
Inner Channel, South Shore					
70+00	100+00	300	Photo 31	Poor	300
Inner Channel, North Shore					
71+00	80+00	900	Photo 32	Good	900
83+00	96+00	1280	Photo 30	Poor	1280

*All lengths are approximate, and do not necessarily encompass the entire length of the shoreline.
*All condition assessments were based on visual survey only; no structural analysis was completed.

Table 8 below summarizes the reconnaissance mission's observations of the overall condition of the bulkheads along the Rondout Creek on the Kingston waterfront. A rating of "Good" was given for 28% of the waterfront, "Neutral" for 26% of the waterfront, and "Poor" for the remaining 46% of the waterfront.

Table 8 – Bulkhead Summary Totals		
Condition	Length (feet)	Length (miles)
Good	4,980	0.94
Neutral	4,730	0.90
Poor	8,330	1.58

IX. OVERVIEW OF PROPOSED REPAIR SCHEMES FOR EXISTING SHORELINE CONDITIONS

This section of the plan describes measures presented in the PAS report. The first of these, shoreline stabilization, could be implemented in unprotected shoreline locations, or to buttress bulkheads in disrepair. This approach involves the use of rip rap, articulated concrete blocks, or gabion mattresses.

A second option to be described here is a repair/replacement measure for existing bulkheads. In 2010, the City of Kingston replaced a portion of timber bulkhead as part of The Pedestrian Waterfront Walkway project, which was used as the basis for further consideration of this measure.

Additional considerations for both schemes include required environmental permitting and channel geometry restrictions for navigation. The slope or possible drop-off of the Rondout Creek or Inner Channel riverbed would determine the scheme used, but further investigation would be required.

IX.A Shore Stabilization

Shoreline embankment slopes are generally between 1:2 and 1:3. The design of the stabilization must be based on material properties of the soils and groundwater; superimposed loads of nearby land-side features (roads, rail, or buildings); and nearby channel configuration (large-scale slope stability). Marine loads, such as wave impact, must also be considered. Slope protection to prevent erosion may include rip rap, gabion mattresses, or articulated concrete block, all of which are described in the text to follow. Factors considered in the selection of a type of slope protection include cost, availability, constructability, and aesthetics.

Rip rap

Rip rap consists of durable, large size stone on well-graded bedding placed along a shoreline to prevent scour. Rip rap can also be used to buttress deteriorated walls, if the geometry of the shoreline is acceptable. In 2010, the City of Kingston reported a cost of approximately $100 per cubic yard for rip rap installed at that time.

Figure 14 - Rip rap
(Photo: Randall's Island Seawall Stabilization – HDR)

Articulated Concrete Block

Articulated Concrete Block (ACB) is a revetment system using precast concrete blocks, either chained together or placed side by side in a mat form. This system is flexible and able to conform to any changes in the subgrade, while it maintains a protective cover. Due to its flexibility, however, ACB is meant for shore protection rather than stabilization. Stabilization must be achieved prior to the block placement. The core of the block can be left open for vegetation, helping to improve shoreline stabilization, or it can be grouted in combination with anchor rods. The approximate cost was $35 per square foot in 2010.

Figure 15 - Articulated Concrete Block
(Photo: landandwater.com)

Gabion Mattresses

Gabion baskets are wire baskets filled with stone. Gabions have been used to protect shorelines and to construct abutment walls. The baskets can be placed side by side or set back in a tiered formation in order to protect steeper slopes. The wire baskets prevent the enclosed rip rap from washing away.

Gabion mattresses can be used to stabilize the riverbed, as well as the shoreline, depending on the geometry of the bed. Vegetation can grow through the baskets to provide a more natural appearance. The approximate cost was $215 per cubic yard in 2010.

Figure 16 - Gabion Baskets
(Photo: ridgeway-online.com)

IX.B Timber Bulkhead Repair/Replacement

The Pedestrian Waterfront Walkway project, initiated by the City of Kingston in 2010, is the basis of comparison for a timber bulkhead replacement for the plan area. The bulkhead would consist of timber cribbing backfilled with stone and attached to steel sheet piling below the water line. The City of Kingston reported a cost of approximately $1,000 per linear foot installed along the shoreline in 2010.

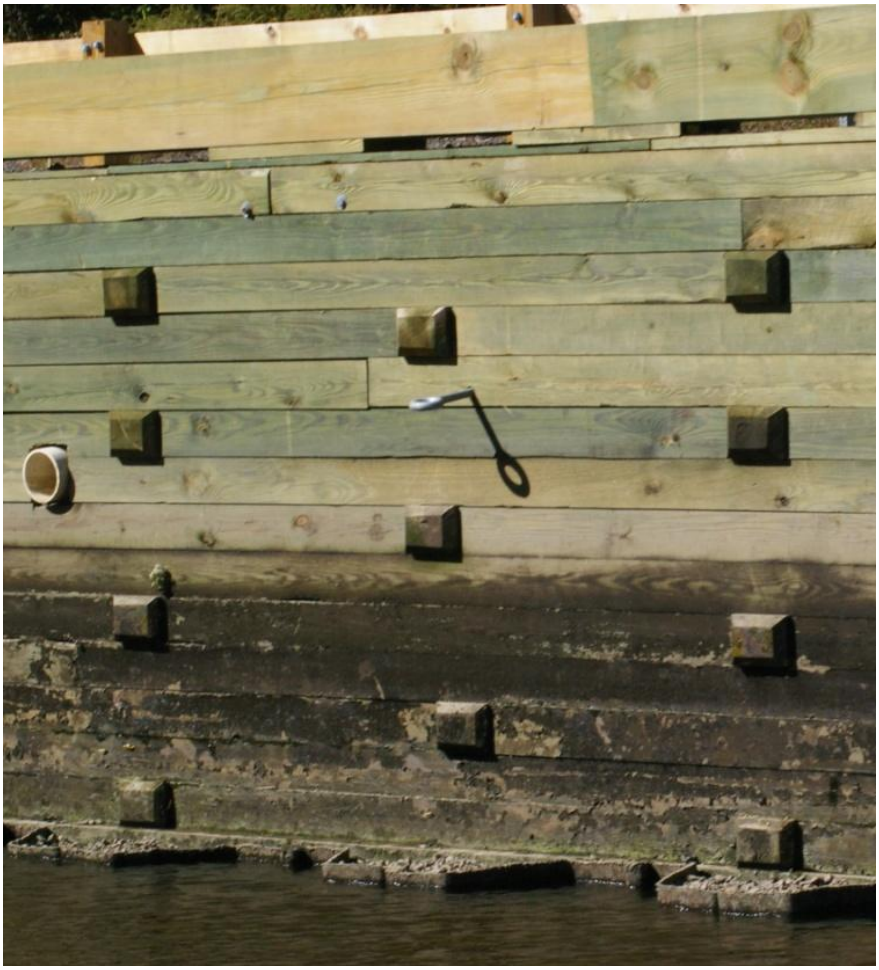


Figure 17 - Timber Bulkhead

X. IMPROVING ACCESS TO KINGSTON'S PROMINENT WATERFRONT ASSETS: THE RONDOUT II LIGHTHOUSE AT KINGSTON POINT PARK

The LWRP (1992) calls for the provision of "pedestrian access to the lighthouse at Kingston Point Park". The Kingston Waterfront Development Implementation Plan (2002) addressed the city's planned efforts to attract more visitors to the waterfront and described the conditions limiting access to the lighthouse, as well as potential solutions to the problem. It reported that:

> "…the city plans to make the lighthouse more accessible to the public. The lighthouse is inaccessible during high tide, and would need to be raised approximately four feet to make it accessible during high tide conditions, either by building a wooden boardwalk above the jetty, or by raising the jetty by about four feet and constructing a ten foot wide concrete sidewalk."

Owned by the City of Kingston and "interpreted" by the Hudson River Maritime Museum, the lighthouse has more recently been accessible exclusively by boat. Currently, it is completely inaccessible. The museum's Web site advises that:

> **"**Due to a distinct lack of available US Coast Guard inspected, licensed, and insured passenger vessels able to dock at the lighthouse, the museum is not able to offer tours of the Rondout Lighthouse at this time. We apologize for any inconvenience."

X.A Adaptation of Jetty to Lighthouse

The Rondout II Lighthouse features an adjacent dock, along with a jetty that extends to the shore. The dock (*Photo 4*49) is multi-leveled, and its bottom level has an inclined ramp. The ramp is about level with the top of the jetty, and it leads to a staircase for access to the top level, which is the same height as the base of the lighthouse. A jetty serves as an extension from the shore that projects into a body of water to influence the current or tide, or to protect a harbor or shoreline from storms and erosion. The lighthouse jetty is approximately 1,680 feet long and it has been prone to inundation by

Photo 45 - Rondout II Lighthouse Dock
(Photo: HDR)

Flooding during high tide and high precipitation events (Photo 51) .

The goal of a project at this location would be to provide pedestrian access from the shore to the lighthouse, while allowing for light vehicle emergency response capability, Americans with Disabilities Act (ADA) accessibility, maintenance of the jetty to serve the purpose of defining the federal navigation channel, and the protection of the shoreline from further erosion.

Photo 46 – Submerged Jetty Sign
(Photo: HDR)

Photo 47 – Submerged Jetty
(Photo: www.kingstonlighthouse.com)

At least three alternatives for providing pedestrian access to the lighthouse under the above constraints have been proposed. Each of the three introduced in this planning document features pedestrian amenities, such as benches for rest areas, galvanized handrails, trash receptacles, lighting, and pay-to-view binoculars. The style and quantity of such amenities would, of course, depend on the budget available. In addition to these features, security fencing or a gate would be installed.

The three options, all presented below, were developed without the benefit of structural data on the jetty, or survey information on its width and exact location. For the purposes of the conceptual plans, jetty dimensions were taken from aerial photographs. Full underwater and structural analysis would be necessary to determine the actual structural feasibility of all alternatives considered, and survey data for the area surrounding the landfall of the jetty would be required, as well.

All three alternatives assume that the height of the walkway to the lighthouse would be equal to the current height of the lighthouse platform. This would allow for ADA accessibility and would provide a walkway at a height protected from daily high tides and storm surges. The jetty is currently not built to a constant width and turns at various angles. Each option has its own relationship to the jetty width.

Based on engineering practices available, it is anticipated that water and sewer services can be extended to the lighthouse using concrete encased conduit running along the underside of the walkway. A force main and pump system would be required to maintain proper flow in both directions. It is further assumed that connections to the City of Kingston water and sewer plants are available in proximity to the western end of the jetty.

XI. JETTY WALKWAY

XI.A Option 1

The first option would provide access for pedestrians above the existing jetty along a deck platform. The structure would consist of 20 foot long by 14 foot wide steel deck sections (Figure 18). The deck structure would consist of a concrete plank constructed nine feet above the existing jetty, supported by 24 inch diameter concrete columns extending into the bedrock below the riverbed. The deck would be 13.5 feet wide. It is assumed that this option would be available in prefabricated sections for ease of installation.

The open base of the walkway would allow for water and ice to flow beneath it, thereby limiting ice damming during the winter months. This open type of walkway also preserves views over the jetty to the land and river beyond.

Figure 18 – Walkway, Option 1

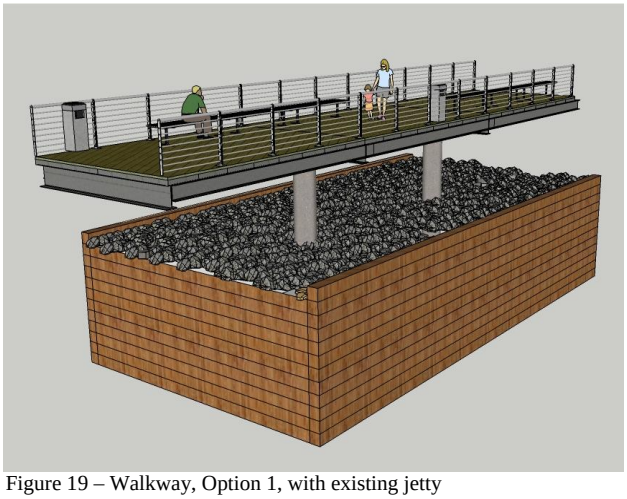


Figure 19 – Walkway, Option 1, with existing jetty

Figure 17 – Walkway, Option 1 *Figure 18 Walkway Option 1, with existing jetty*

Figure 20 – Walkway, Option 1, easterly view

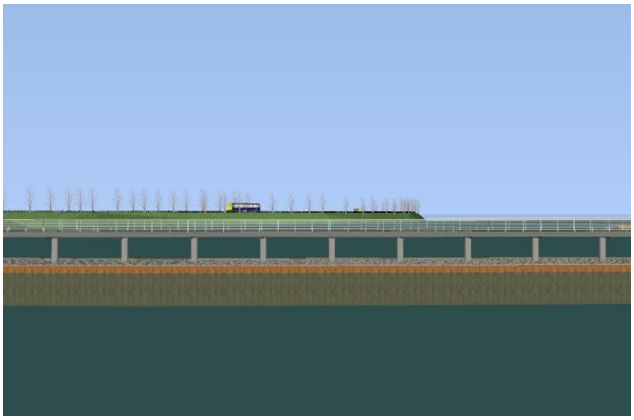


Figure 21 – Walkway, Option 1, with existing jetty, northerly view

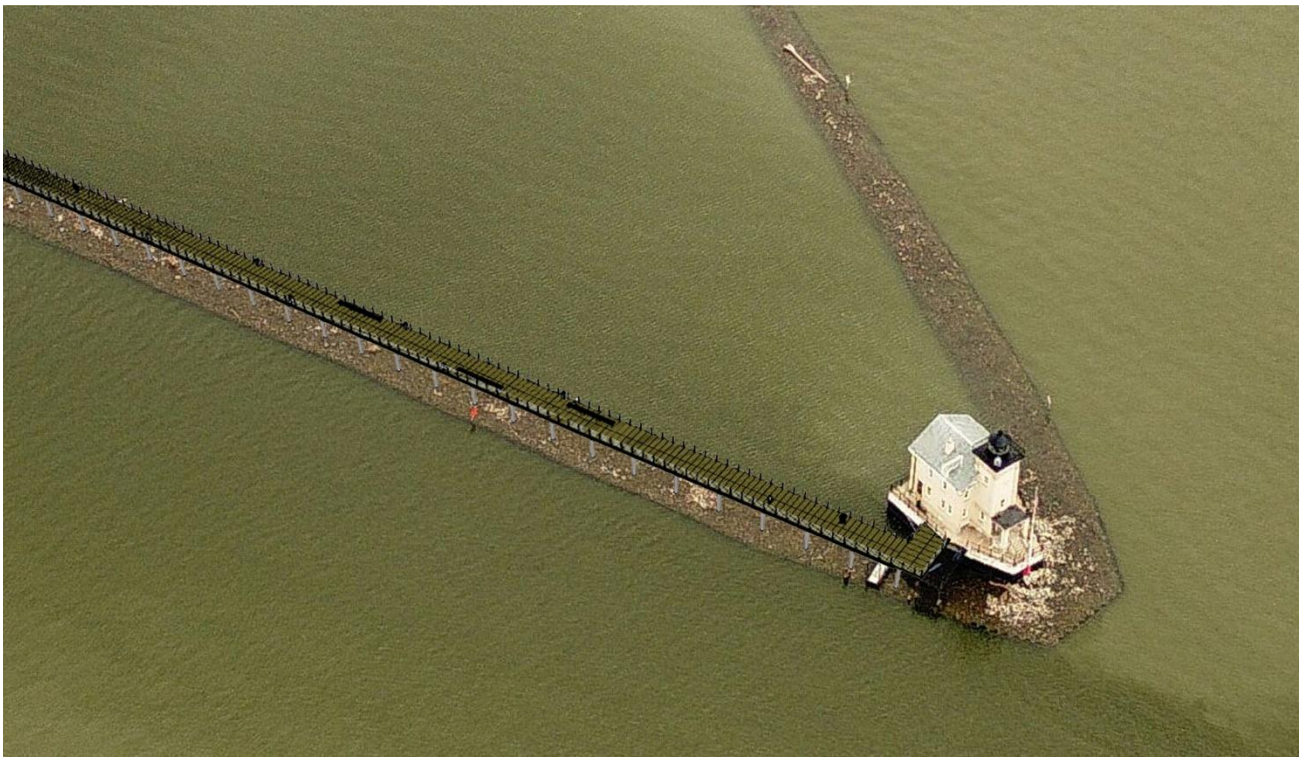


Figure 22 – Walkway, Option 1, aerial view

XI.B Option 2

The second option would raise the jetty to a height flush with the lighthouse for pedestrian access (Figure 23). The existing sheet pilings would be extended upwards, or new sheet pilings would be installed directly adjacent to the existing jetty, to about nine feet above it. The entire decking would measure approximately 27½ feet wide, with a varying width over the entire length of the jetty. The proposed wall would be consistent with the color, texture and shape of the existing wall. The middle portion between the walls of the jetty would be filled with gravel and concrete for durability. Since there would be some possibility of water flowing underneath the walkway structure, ice damming is a potential issue during winter months. The upward extension of the wall, however, would protect the inner shoreline from further erosion.

This option provides for a wider walkway, but it limits the views from the water/boat level across the jetty.

With a solid extension, this option is likely to be more expensive than the other two.

Figure 23 – Walkway, Option 2

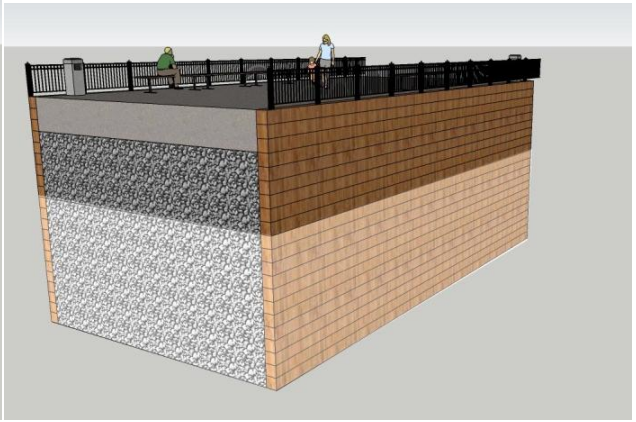


Figure 24 –Walkway, Option 2, with existing jetty

Figure 25 – Walkway, Option 2, easterly view

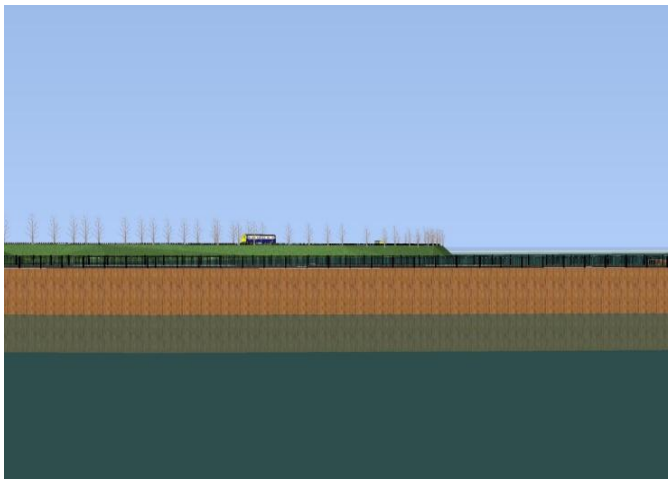


Figure 26 – Walkway, Option 2, with existing jetty, northerly view

Figure 27 – Walkway, Option 2, aerial view

XI.C Option 3

The third option would construct the deck platform above rows of gabion baskets atop the existing jetty Figure 28).

The gabion baskets can accommodate water plantings and vegetation to grow along them, allowing for natural aesthetics of the gabions. The gabions would rise to about eight feet above the existing jetty. With the gabions and decking, the 20 foot wide structure would be even with the lighthouse platform at nine feet above the existing jetty. The gabions would be placed atop the existing jetty sheet pilings, and would support the deck above. Since the jetty is not a consistent width, it is assumed that the 20 foot wide structure would span somewhere between the existing jetty sheet piles, with the gabions extending beyond the deck on either or both sides of it.

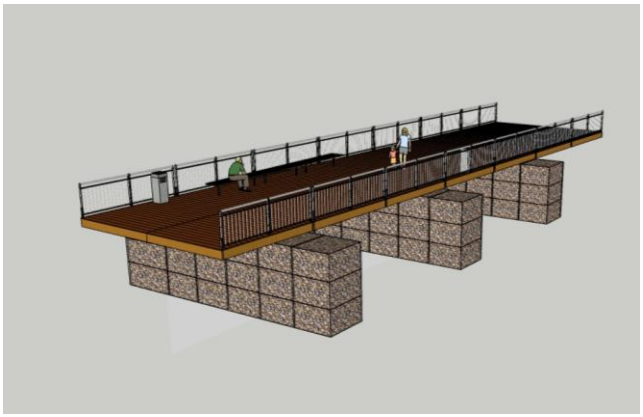


Figure 28 – Walkway, Option 3

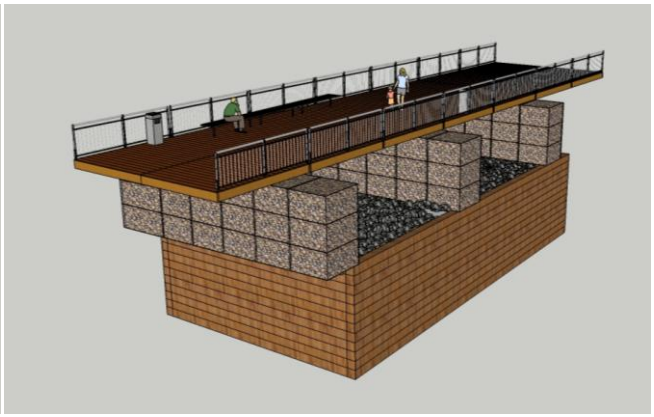


Figure 29 – Walkway, Option 3, with existing jetty


Figure 30 – Walkway, Option 3, easterly view


Figure 31 – Walkway, Option 3, with existing jetty, northerly view

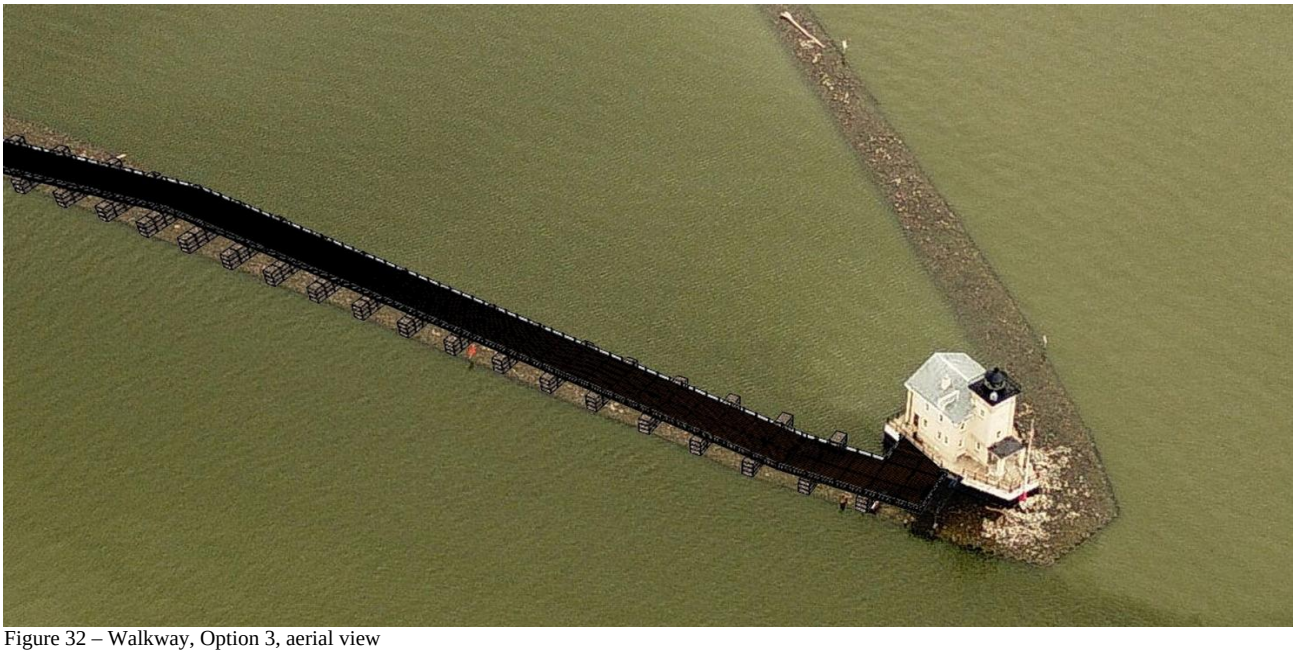


Figure 32 – Walkway, Option 3, aerial view

XI.D Construction Cost Estimates

The following is a summary of the order of magnitude of the probable cost of construction for each of the three options proposed for the adaptation of a walkway above the existing jetty to gain pedestrian access to the Rondout II lighthouse at Kingston Point Park. These cost estimates are based on the concept level plans and, as such, should not be used for formal budgeting purposes. The purpose of these cost estimates is to allow for screening of project alternatives and to establish the order of magnitude of the potential costs involved in building a walkway above the existing jetty.

Included in **Appendix A** are the details of how the cost of each plan option has been calculated. While each option is unique, there are some common features among the top-of-deck items and the electrical and plumbing systems appearing in the proposals. A tabular breakdown and explanation with references is compiled in the memorandum included in **Appendix A**. Costs are based on 2009 price data, escalated 3% per year to 2014 price levels.

Option 1 – Pier Support System Total: $4,240,873

The structure would consist of 20' long by 14' wide prefabricated concrete sections supported by 24" diameter concrete columns extending into the bedrock below the riverbed, which is assumed to be 21' deep.

Option 2 – Built-up Sheet Piling and Rip Rap Total: $9,258,676

This alternative would call for new sheet pilings to be installed immediately adjacent to the existing jetty, to about 9'above and 21' feet below it, with the entire decking measuring approximately 27½' wide. The decking would use prefabricated concrete sections. The estimate for this option is conservative, taking into account strengthening the jetty in order to support the build-up of 9' of fill, since the existing condition of the jetty below the water is not known.

Option 3 – Gabion Support System Total: $3,142,683

The structure would consist of gabion retaining walls 9' high placed atop the existing jetty every 14' to support the prefabricated concrete deck. Since the jetty is not a consistent width, it is assumed that the deck is 20' wide, with the gabions extending beyond the deck on either or both sides of it.

XI.E Federal Requirements for Implementation of Project Allowing Pedestrian Access to Rondout II Lighthouse

Three potential alternatives have been evaluated for the purpose of constructing a pedestrian walkway atop the jetty running along the northern bank of the Rondout Creek on the City of Kingston waterfront. The jetty begins at its western end, where it intersects with the land, and then extends easterly along the channel to the lighthouse for a distance of approximately 1,700 linear feet. As the jetty is part of the Rondout Harbor federal navigation project, any modifications to it must be done in accordance with federal guidelines. As with the proposed alterations to the navigation channel, the City of Kingston, as the local sponsor for the Rondout Harbor modifications, would need to coordinate with its congressional representative to request that the USACE be directed to conduct any studies or reviews of local plans necessary to approve the proposed construction. In addition to conducting technical evaluations of the existing and proposed structures, the City of

Kingston would also need to secure the rights to construct, access, and maintain any new walkway structure.

XII. REQUIRED PERMITTING

XII.A Regulatory Background

The Hudson River, Rondout Creek, and associated wetlands are regulated by the United States Army Corps of Engineers (USACE, New York District) as "Waters of the United States". USACE has no buffer zone or adjacent area bordering wetlands or watercourses under its jurisdiction. Repair of the bulkheads could be authorized by USACE under one or more Nationwide Permits (NWP), such as NWP 3 (Maintenance) or NWP 13 (Bank Stabilization). An Individual Permit would be required from USACE for the proposed channel relocation work.

The Hudson River at the mouth of Rondout Creek is regulated by the New York State Department of Environmental Conservation (NYSDEC, Region 3) as a Class A watercourse under Article 15 (Protection of Waters Program). A 50-foot buffer zone or adjacent area (as measured from the high water mark) is also regulated under Article 15. The Rondout Creek is listed as a Class C waterbody by NYSDEC, and is therefore not regulated under Article 15. NYSDEC also maps and regulates wetlands equal to or greater than 12.4 acres in size (and a 100-foot buffer zone or adjacent area) under Article 24 (Freshwater Wetlands Protection Program). NYSDEC Wetland KE-4 (Figure also known as the Kingston Point Marsh, is present on the northern side of Rondout Creek on both sides of the trolley tracks. NYSDEC Wetland KE-11, also known as Sleightsburg Marsh, is located on the southern side of the mouth of Rondout Creek.

NYSDEC would have jurisdiction over the work described in this plan under both Articles 15 and 24. A 401 Water Quality Certificate issued by NYSDEC would also be required as part of an Individual Permit. While the wetlands are tidally influenced, NYSDEC's Tidal Wetlands' (Article 25) upriver boundary occurs at the Tappan Zee Bridge.

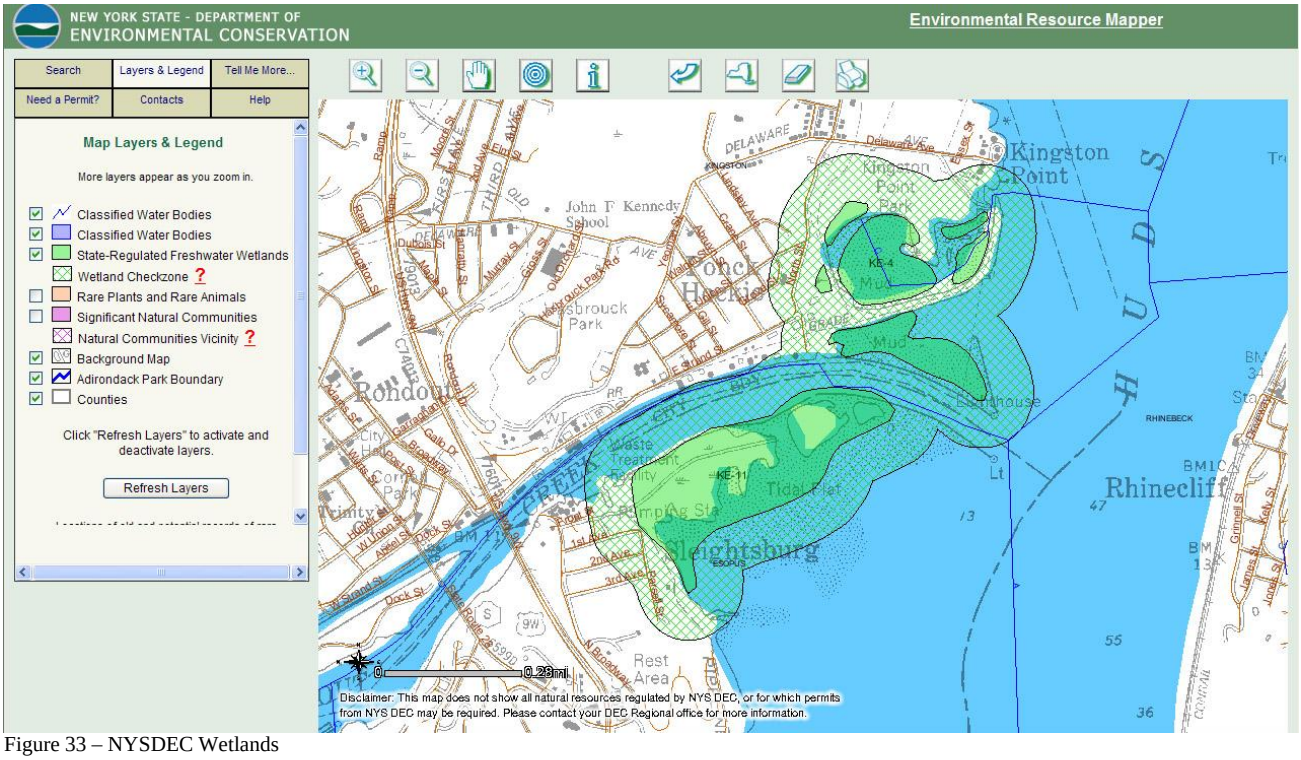


Figure 33 – NYSDEC Wetlands

The National Wetlands Inventory map (NWI, Kingston East and Kingston West USGS quadrangle) Figure 34 – National Wetlands Inventory charts the herbaceous portions of the wetlands at the mouth of Rondout Creek and north of the existing navigation channel as a "PEM 1/2T" (Palustrine emergent, persistent/nonpersistent vegetation, and semipermanent tidal) wetland. The open-water portion of the wetland is mapped by the NWI as "R1US3N" (Riverine, tidal, unconsolidated bottom, mixohaline [brackish], and regularly influenced by tidal action) wetlands. Rondout Creek upstream of the West Shore railroad trestle is mapped as a "R2UBH" (Riverine, lower perennial, unconsolidated bottom, permanently flooded) wetland; downstream of the railroad bridge to the mouth, it is mapped as a "R1UBV" (Riverine, tidal, unconsolidated bottom, permanent-tidal) wetland.

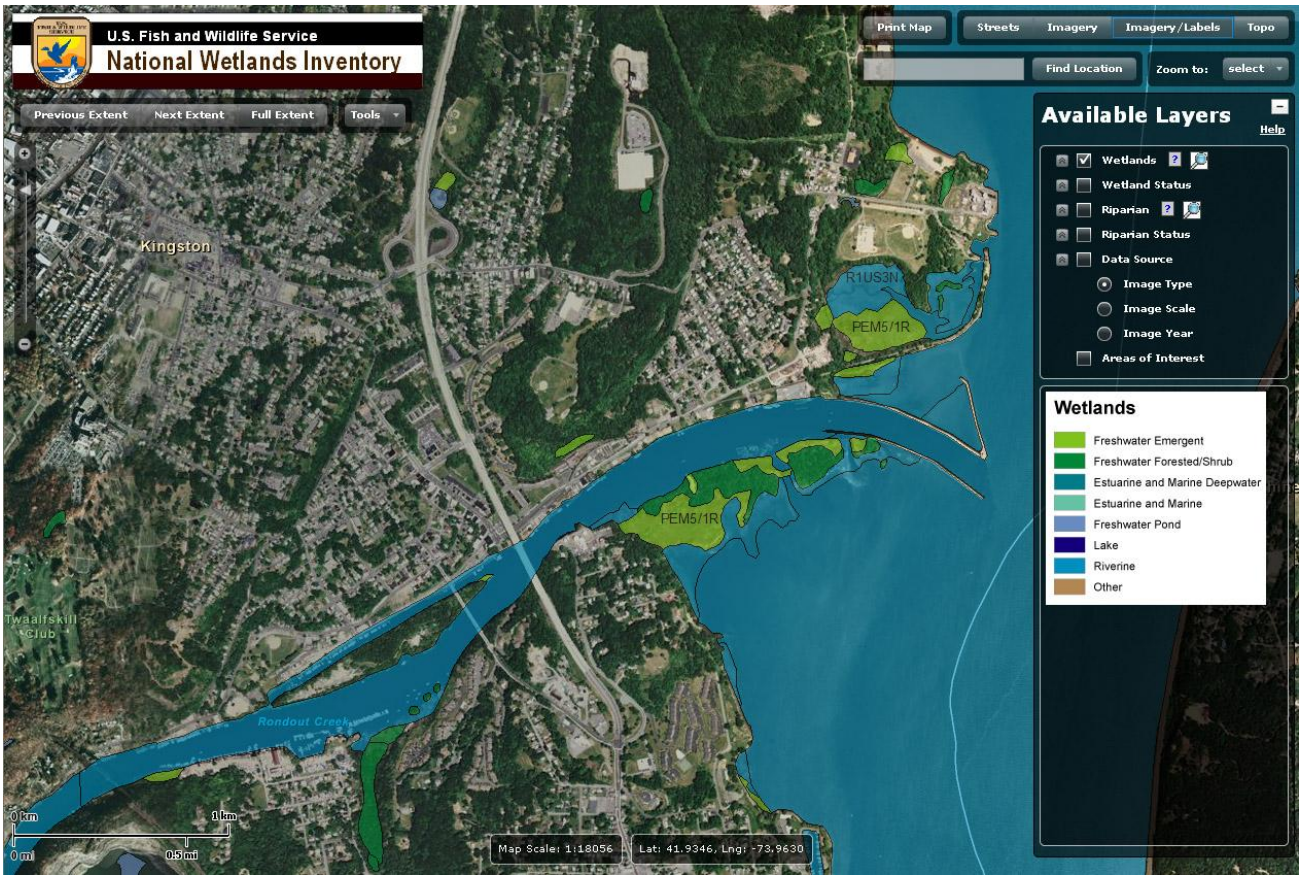


Figure 34 – National Wetlands Inventory

The Hudson River and Rondout Creek are also within the designated Coastal Zone, which is managed concurrently by the New York State Department of State (NYSDOS) (Figure 35) and the City of Kingston's Local Waterfront Revitalization Program (LWRP). As was reported earlier in this plan, NYSDOS has designated Rondout Creek a Significant Fish and Wildlife Habitat. The NYSDOS Significant Habitat area extends from the mouth of Rondout Creek upstream for approximately four miles to the dam just upstream of Route 213. NYSDOS-cited aspects of the Significant Fish and Wildlife Habitat designation serve as the area's resources for recreational fishing and waterfowl hunting, as a spawning area for fish, and as a concentration area for osprey during their spring migration.

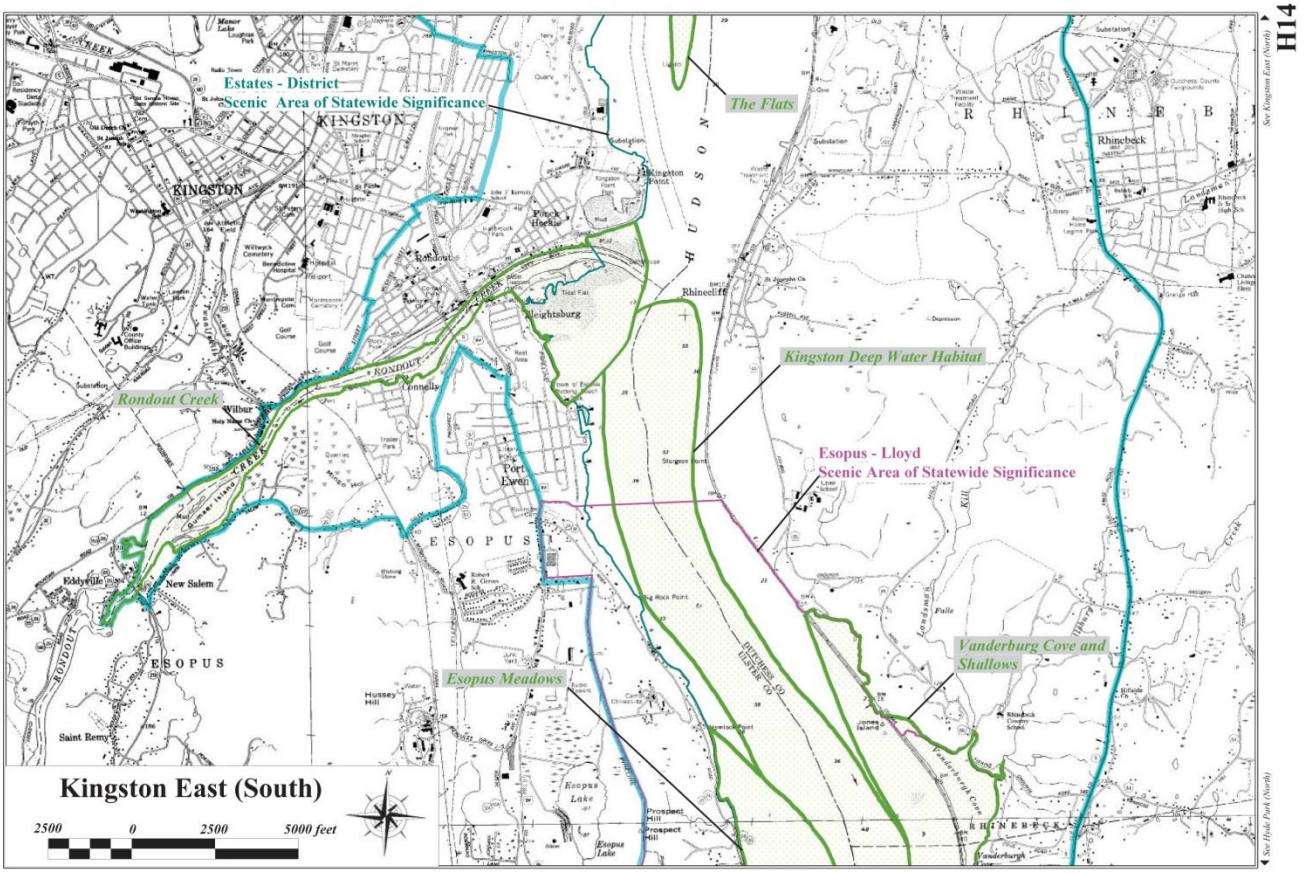


Figure 35 – NYSDOS Coastal Zone Map, Kingston East (South)

Fish resources present in Rondout Creek and adjacent areas of the Hudson River are cited in the NYSDOS Coastal Fish & Wildlife Habitat Rating Form and in the LWRP. As reported earlier in this plan, Rondout Creek is described in the Fish and Wildlife Values of the NYSDOS Rating Form as an important spawning area for alewife, smelt, blueback herring, white perch, Atlantic tomcod, and striped bass. The rating form also indicates that substantial populations of brown bullhead, yellow perch, sunfish, and smallmouth and largemouth bass occur in Rondout Creek throughout the year.

The regulatory agencies impose in-water work windows to protect aquatic life, particularly early stages for fish, in the Hudson River. Hudson River work windows may annually limit the time when work may be done. For example, there is a no-dredge window in the Hudson River from 1 February to 15 April to protect Atlantic tomcod, and from 15 April to 31 July to protect blueback herring. These two no-dredging windows, prohibiting dredging activities from 1 February to 31 July, limit channel work to the six month period from 1 August to 31 January. Appropriate agencies must be consulted regarding which, if any, in-water activities may be allowed during the work windows.

The LWRP, adopted in 1992, articulated specific local policies and goals for redeveloping the Kingston waterfront, while preserving the environmental, historic, and social values associated with it. The need for shoreline stabilization and repair was cited in the city's Waterfront Development Implementation Plan.

Among its efforts to implement the policies and goals of the LWRP, Kingston has developed a Coastal Assessment Form (CAF) that must be completed and filed by an applicant for the approval of the City of Kingston Common Council as part of a permitting action. Proof of compliance, in the form of a Letter of Coastal Zone Consistency concurrence by the city, is forwarded to NYSDOS and USACE as part of the permitting process. The CAF is part of the quite rigorous Waterfront Consistency Review protocol required by local law and intended to ensure that all waterfront development (new construction projects, etc.) conforms to the requirements of the LWRP.

XII.B Environmental Permits and Approvals Potentially Required for the Channel Relocation and Shoreline Stabilization Proposed in this Plan

The following is a list of permits potentially required prior to the performance of any of the work proposed in this plan, whether in the water or along the shoreline:

1. NYSDEC – Article 24 (Freshwater Wetlands), Article 15 (Protection of Waters) and 401 Water Quality Certification, for wetland disturbance

2. USACE – Individual Permit with a Public Notice/Public Comment Period and a potential public hearing; USACE Nationwide Permits could be used incrementally for some of the proposed (maintenance and stabilization) work

3. NOAA (Fisheries) – Essential Fish Habitat Assessment, including assessment of non-listed species (striped bass), endangered/threatened species (Atlantic and shortnose sturgeon), and forage species (alewife and blueback herring)

4. USF&WS – Concurrence on endangered and threatened species issues (principally, the shortnose sturgeon)

5. United States Coast Guard – Hazard to Navigation Assessment and Relocation of Channel Markers

6. NYS Office of General Services – Lease of Lands Underwater confirmation and remapping of channel bathymetry

7. NYSDOS – Coastal Zone Consistency concurrence

8. NYSOPRHP – Section 106 concurrence, which requires federal agencies to take into account the effects of their undertakings on cultural resources and affords the Advisory Council on Historic Preservation a reasonable opportunity to comment with regard to such undertakings

9. City of Kingston – Local Waterfront Revitalization Program/Coastal Zone Consistency concurrence

10. Nationwide Permits - There are several USACE Nationwide Permits that could be used in the short term to address specific issues. Nationwide Permits have a shorter review timeframe (typically, 45 days for USACE's receipt of a complete Nationwide Permit concurrence

request package) than Individual Permits. Descriptions of three Nationwide Permits potentially applicable to this plan follow.

a. NWP #3 (Maintenance) – This permit covers the repair, rehabilitation, or replacement of any currently serviceable structure, provided the structure is to be used for the same intended/permitted use. Bathymetric surveys are required if removal of accumulated sediment is proposed, and repaired/reconstructed bulkheads cannot extend waterward of the existing location (a project-specific 401 Water Quality Certification is required if structures are proposed waterward of the existing location). Project-specific Coastal Zone Consistency Concurrence would be required since the plan area is within both a Significant Coastal Fish and Wildlife Habitat and an area managed by a LWRP.

b. NWP #13 (Bank Stabilization) – This permit covers activities associated with erosion prevention. A Preconstruction Notification to USACE is required if new vertical structures (bulkheads) are proposed. Projects greater than 200 feet in length or using more than one cubic yard of fill per running foot below the high water mark or high tide line require a project-specific 401 Water Quality Certification. Again, project-specific Coastal Zone Consistency Concurrence would be required since the plan area is within both a Significant Coastal Fish and Wildlife Habitat and an area managed by a LWRP.

c. NWP #22 (Removal of Vessels) – This permit covers the removal of wrecked, abandoned or disabled vessels, manmade obstructions to navigation, and any temporary fills associated with this work. Compliance with endangered species and historic properties provisions is required. A project-specific 401 Water Quality Certification is required for any project within 1,000 feet of a NYSDOS-mapped Significant Coastal Fish and Wildlife Habitat. Project-specific Coastal Zone Consistency Concurrence would be required since the plan area is within both a Significant Coastal Fish and Wildlife Habitat and an area managed by a LWRP.

XIII. ENVIRONMENTAL CONDITIONS

A boat and pedestrian tour of the plan area took place on October 14, 2010 to photodocument the shoreline features and verify the environmental conditions along the waterfront. No vegetated tidal wetlands were observed on the northern side of Rondout Creek from the Route 9W bridge upstream (Station 70+00 to the end Station 185+00). The northern shoreline had been extensively developed for marinas, dry docks, residences, and commercial uses. Portions of the shoreline area, particularly along Island Dock, were heavily vegetated with a mixture of trees and vines (Station 64+00 to 96+00). Dominant trees observed included red and silver maple, eastern cottonwood, red elm, black locust, sycamore, and tree-of-heaven. Some trees were observed growing in and through timber cribbing and would have to be removed to facilitate shoreline stabilization work.

The tidally influenced wetlands north of the existing channel at the mouth of Rondout Creek consisted of a mixture of herbaceous plant species (Station 19+00 to 23+00). The water chestnut, an

invasive plant species, dominated the tidally influenced areas at the mouth of Rondout Creek. The wetlands landward of the high water mark featured herbaceous plants (narrowleaf cattail, yellow water lily, eelgrass, water chestnut, water hemp, and pickerel weed), open water, and a fringe of palustrine forested wetlands. The forested wetland fringe consisted mainly of red maple, false indigo, willows, and silver maple.

XIV. POTENTIAL PERMITTING ISSUES

XIV.A Fill Material

The regulatory agencies will consider any material (precast concrete forms, sheetpiles or riprap) placed below the high water mark as fill. The amount and type(s) of fill proposed must be specified in a permit application. This also applies to any areas where sheetpiles or other bulkheads are proposed to be placed seaward of any existing structures.

XIV.B Dredging

If dredging is required to re-locate the channel and/or to install shoreline protection, the agencies will require sediment testing to evaluate any potential threat to the aquatic environment, protective measures to be employed during dredging, and placement options for the dredged material. While probably exempt from any testing requirements, the volume of old concrete and rock fill material that has eroded into the creek and is proposed for removal (and potentially for backfill behind new shoreline protection features) must also be indicated.

XIV.C Deteriorated Bulkheads and Timber Cribs

Wooden piles, timber cribs, and rock/concrete backfill removed as part of shoreline stabilization must be properly disposed of offsite. This may include creosote or chemically treated lumber previously used for shoreline stabilization. Electric and water connections to some of the docks may have to be relocated while shoreline stabilization work is taking place.

XIV.D Historic Structures

As already reported in this planning document, several areas or sites on or proximate to, the waterfront are listed as historic resources. As examples, the Rondout II Lighthouse (Station 2+00), the Port Ewen suspension bridge (Station 70+00), and the Rondout West Strand Historic District (Station 63+00 to 86+00) are all listed on the National Register of Historic Places, while the West Shore Railroad Trestle (Station 118+00) and Island Dock (Station 65+00 to 96+00) appear on the Kingston City Landmarks list. Any work on or proximate to (within the viewshed) a listed historic

site must be reviewed and evaluated by the New York State Office of Parks, Recreation, and Historic Preservation (NYSOPRHP) if disturbance is unavoidable.

XIV.E Endangered/Threatened Species

The United States Fish and Wildlife Service (USF&WS) database lists six wildlife and plant species (bald eagle, bog turtle, shortnose surgeon, Indiana bat, small whorled pogonia, and Northern wild monkshood) as potentially occurring in Ulster County. Based on habitat requirements, two of these, the bald eagle and shortnose sturgeon, are likely to occur in the plan area. Bald eagles use the tidal Hudson and major tributaries as foraging, nesting, and wintering habitat. The shortnose sturgeon (state and federally endangered) uses deepwater areas in the Hudson River as habitat. The New York State Department of Environmental Conservation (NYSDEC) Environmental Resource Mapper indicates that virtually all of the plan area is within habitat for a state-listed endangered or threatened species. A formal file search with the NYSDEC Natural Heritage Program is conducted when the permitting process commences.

The plan area is contained within three (5763B, 5764C, and 5864C) NYSDEC Breeding Bird Atlas Blocks. Block 5864C encompasses the mouth of Rondout Creek and wetlands to the north and south, as well as the eastern bank of the Hudson River. Two state-threatened species, the bald eagle and least bittern, are cited as confirmed and possible breeders, respectively, within this breeding block.

XIV.F Recreational Use

Ice cover in Rondout Creek and the Hudson River would preclude work during the winter months. Temporary displacement of some docks and slips might be required during channel relocation and/or shoreline stabilization. Coordination with the marina owners and boating organizations may reduce comments during the public notice phase and avoid conflicts while work is taking place.

XIV.G Existing Hazards to Navigation

A partially submerged steel deck barge (Station 79+00) was observed on October 14, 2010 along Island Dock. There was also a deteriorating dry dock (Station 24+00) along the northern shore east of the Route 9W bridge. Other hazards, such as old pile fields and sunken vessels, may exist in the plan area. These may be located as part of the bathymetric survey. The LWRP reports that some of these barges may contain items of historic value, the removal of which would have to be coordinated through the City of Kingston Landmarks Commission and NYSOPRHP.

Photo 48 – Submerged Steel Deck Barge
(Photo: HDR)

Photo 49 – Dry Dock
(Photo: HDR)

XIV.H Walkway to the Rondout II Lighthouse

As already reported, the existing stone jetty to the lighthouse is overtopped during extreme high tide and storm events. Overtopping during the winter, when pack ice is present, could damage railings and the proposed walkway. At a minimum, the railings should be removable to prevent ice damage. The Kingston Waterfront Development Implementation Plan proposed a wooden deck walkway and a concrete walkway as options for providing access to the lighthouse. Though more costly, the concrete walkway has been considered better able to withstand the ice conditions in the area. Human safety, prevention of access during closed hours, and precluding any walkway materials from being dislodged and becoming hazards to navigation would all be likely agency concerns during the permitting process.

XIV.I Relocation of Cables and Outfalls

There are several designated cable crossing areas in Rondout Creek. The location and depth of any cables in the plan area would have to be determined, and any conflict with proposed in-water work, such as sheetpile driving, identified. The need for any protective features, such as armor stone to be placed over the cables, would also have to be addressed.

Photo 50 - Pipeline Crossing
(Photo: HDR)

XIV.J Streams and Outfalls

Twaalfskill Brook is a small stream (NYSDEC, Class C) entering the Rondout Creek from the north, near Wilbur (Station 131+00), via a double-barreled box culvert. The outfall from the City of Kingston wastewater treatment facility (Station 47+00) enters the northern side of Rondout Creek approximately a half-mile east of the Route 9W bridge. Any changes to the outfall potentially affecting the flow/dispersion of the treatment plant effluent would have to be addressed.

Photo 51 – Twaalfskill Brook Outfall
(Photo: HDR)

XV. PREAPPLICATION MEETINGS

Preapplication meetings with USACE and NYSDEC are encouraged to discuss a prospective project's purpose and need, and to identify environmental issues and supporting documentation required for the permit applications.

XVI. ENHANCING THE ATTRACTIVENESS/ACCESSIBILITY/SCENIC VIEWS

Enhancing the attractiveness/accessibility/scenic views of the waterfront area and expanding waterfront recreational activities, including walking and cycling. It is, perhaps, an over-simplification, but healthy, continuing economic development of Kingston's Rondout Creek waterfront district requires the city to attract and deliver more people to the area by boat and otherwise. Once there, it should be easier to get around, especially for pedestrians and cyclists. To such end, the following observations have been made by a USACE planner:

- There appears to be an over-abundance of parking space in the immediate waterfront area. Freeing up some space for purposes other than accommodating motor vehicles would certainly be in keeping with the city's various plans calling for more open spaces. At least some of the newly-displaced vehicles may be parked in designated facilities at some reasonable distance from the waterfront district. Some may elect to walk to the waterfront from such locations, but others would benefit from the provision of a shuttle bus or trolley transporting them there.

- Depending upon a negative determination of their historical/restoration value, empty and seemingly abandoned buildings and industrial facilities on the waterfront should be removed. Some of these structures make the waterfront appear forbidding.

- Seasonal slips are essentially taking both land and water parking away from people who might otherwise visit Kingston. Provision must be made for more transient boat slips, as the current situation deters those interested in arriving by boat to spend, perhaps, just a few hours and a few dollars on the Kingston waterfront. If possible, locations for new boat slips should be identified.

- If construction of new boat slips is not possible, incentives may be offered to users of seasonal boat slips to use other facilities located away from the waterfront commercial area or restrictions may be placed on the number of slips available to seasonal clientele. Of course, any revenues lost by such an action must be weighed against the loss in waterfront economic activity resulting from transient boat slip users being turned away. Parking for seasonal slip users may be provided at current brownfield sites. In such case, again, consideration would have to be given to the provision of a shuttle or trolley transporting such boaters between their vessels and their cars.

- Under the heading, "Opportunities: Need more adaptive reuse", our planning observer recommends converting the abandoned rail line into the "Lighthouse Rail Trail". This would improve access to the Rondout II lighthouse by converting the old rail line to a bike and pedestrian trail. This would require paving the trail, but also removing fences restricting access to the water and making the rail area unpleasant. It would also require work on the lighthouse jetty like that described in detail above.

- The Lighthouse Rail Trail should link in with the Harbor Walk to downtown.

- Add a pedestrian and bicycle connection between T.R. Gallo Waterfront Park and Town to Island Dock through Wurts Street (9W) crossing.

- Investigate access to the quarry for swimming or, alternatively, consider where it might be possible to provide swimming access closer to the city.

- Consider provision of active summer and winter recreation at waterfront park. This could be in the form of a pool/ice rink.

- Consider having an outdoor facility for trolley and rail museums. This could be a joint endeavor and become a destination.
- Make the underside of 9W more approachable - a "gateway" to downtown.

APPENDIX A

APPENDIX B

[i] *See* N.Y. EXEC. LAW §922. *See also* Gail S. Shaffer, Harbor Management Plans, 19__.
[ii] *See* N.Y. EXEC LAW §915(5)(i).
[iii] N.Y. EXEC. LAW §922(1).
[iv] 19 N.Y.C.R.R. §603.1(b) (1995).
[v] *See* 19 N.Y.C.R.R. §603.3(m)(3).
[vi] *See* Town of Mamaroneck/Village of Larchmont LWRP, IV-15