

Gowanus Canal Natural Resource Damage Assessment Plan

Public comments received on the draft Plan



June 14, 2024

Re: Response to the Gowanus Canal Natural Resource Damages Assessment (NRDA)

Dear Gowanus Canal NRDA Trustees Council,

I am writing on behalf of Billion Oyster Project in response to the Gowanus Canal Natural Resource Damages Assessment. As an organization dedicated to restoring oyster populations in New York Harbor through public education initiatives, the scope of the assessment should be expanded to include the intertidal zone, which encompasses sessile organisms such as oysters and humans.

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Expanding the assessment to include the intertidal zone is crucial for several reasons. Oysters, as keystone species, filter water, provide habitat for marine life, and protect shorelines from erosion, making their inclusion essential for maximizing their ecological benefits. Additionally, the intertidal zone is home to a diverse array of species. Protecting this area ensures the survival of these organisms and preserves overall ecosystem health in New York Harbor. Including the intertidal zone in the assessment enhances community engagement and education, providing opportunities for public programming. It offers hands-on learning for local students and volunteers, fostering environmental stewardship and inspiring future conservationists.

We join Riverkeeper, the Gowanus Canal Conservancy, and the Gowanus Dredgers in urging the Trustees to expand the NRDA Plan. This will ensure that all affected species are considered, and that local restoration efforts benefit the canal and surrounding communities.

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Battery Maritime Building
10 South Street, Slip 7
New York, NY 10004
212.458.0800

billionoysterproject.org
newyorkharborschool.org

Very truly yours,

A handwritten signature in blue ink, appearing to read "Pete Malinowski", is displayed within a black rectangular box.

Pete Malinowski
Executive Director

June 14, 2024

Thomas Jackson

VIA E-MAIL (NRD@DEC.NY.GOV)

New York State Department of Environmental Conservation
Natural Resources Damages (NRD) Section
c/o Alicia Pasos
625 Broadway, 14th Floor
Albany, NY 12233

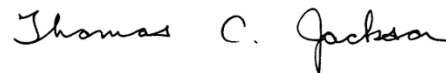
Re: Gowanus Canal Natural Resource Damage Assessment Plan

Dear Gowanus Canal NRDA Trustee Council,

On behalf of The Brooklyn Improvement Company, Consolidated Edison Company of New York, Inc., Hess Corporation, and Honeywell International, I am submitting the attached comments on the Draft Gowanus Canal Natural Resource Damage Assessment Plan prepared by W.H. Desvousges & Associates, Inc. The comments offer suggestions for modifying and conducting the assessment in a manner that recognizes the unique NRD issues involved in an artificial waterway constructed for the specific purpose of industrial waste conveyance, comports with the legal requirements for natural resource damage assessments and uses the most relevant methodologies for conducting the assessment.

We respectfully request that the Trustees give full and fair consideration to these comments.

Very truly yours,



Thomas C. Jackson

Cc: David Naidu, Esq. (Counsel for The Brooklyn Improvement Co.
Jeff Martin, Esq. (Counsel for Consolidated Edison Co. of New York, Inc.)
Jeremy Karpatkin (Counsel for Honeywell International)

Attachment

BAKER BOTTS_{LLP}

New York State Department of
Environmental Conservation

- 2 -

June 14, 2024

Comments on the Draft Gowanus Canal Natural Resource Damage Assessment Plan

Prepared by:

William H. Desvousges, Ph.D.

Holly J. Michael

June 14, 2024

W.H. Desvousges &
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We have reviewed the Draft Natural Resource Damage Assessment Plan for the Gowanus Canal prepared by the Trustee Council and would like to provide comments on the scope and substance of the plan.¹ Based on our review, the draft plan fails to consider the specifics or intent of 43 CFR Part 11 natural resource damage assessment (NRDA) regulations. In particular, the assessment should focus on lost natural resource services that have occurred as a result of hazardous substance releases. Equally important, any potential service losses should be measured relative to the baseline conditions—that is, service levels that would have occurred but for the releases. In addition to baseline, we address the proposed assessment of ecological and human-use service losses and community connections.

BASELINE

Baseline is a critical factor in the assessment of damages at a site with a long industrial history such as the Gowanus Canal, yet there is little discussion in the plan of the importance of these factors and how they will be considered. There is very specific language in the Federal Natural Resource Damages (NRD) Regulations about baseline and the quantification of damages. In the quantification phase, the assessment should “measure the extent to which the injured resource differs from baseline conditions... to determine the change attributable to the discharge or release” (43 CFR 11.71(b)(2)). The next step is to “determine the services normally produced by the injured resource, which is considered the baseline services or the without-a-discharge-or-release condition” (43 CFR 11.71(b)(3)). As part of the quantification phase of the assessment, the regulations require the determination of the “physical, chemical, and biological baseline conditions and the associated baseline services for injured resources at the assessment area” (43 CFR 11.72(a)). Baseline data “should reflect conditions that would have been expected at the assessment area had the discharge of oil or release of hazardous substances not occurred, taking into account both natural processes and those that are the result of human activities” (43 CFR 11.72(b)(1)).

¹ The Trustee Council includes: National Oceanic and Atmospheric Administration, State of New York Department of Environmental Conservation, United States Department of Interior, and U.S. Fish and Wildlife Service.

First and foremost, the canal was developed in the nineteenth century as a waterway for industrial transportation and to remove waste from the city (Hunter 2004; New York Department of Health 2017). In 1848, the State of New York authorized the creation of the Gowanus Canal “to drain the wetlands of South Brooklyn and open the area to development” (New York Department of Health 2017, pg. 7).² As a manmade construct for the conveyance of waste and barges, the Gowanus Canal is an artificial waterway that was not intended to provide habitat or recreation for the City of Brooklyn and presents a challenge for an NRD Assessment. The Assessment Plan does not provide a realistic depiction of the resource and the services it is intended to provide nor does it acknowledge the challenges of addressing an industrial waterway in an NRDA. The City chose to fill in the wetlands and create a bulkheaded waterway to provide for the removal of waste from a rapidly expanding population in Brooklyn and to promote industry to benefit the City of Brooklyn.

“The canal was a focus for new industrial and residential growth... By 1880, there were 31 firms handling lumber, coal and firewood, hay and grain, oil, building materials, and chemical fertilizers on the canal, and participating in the general expansion of Brooklyn industries, commerce, and residential construction... The canal’s low land costs, sheltered water, and accessibility to canal barge and schooner traffic made it an extremely valuable artery into a rapidly developing city.” (Hunter 2004, pg. 2-39).³

The Canal provided easy transportation which supported rapid growth and an economic boom for Brooklyn. “At the apparent peak period of traffic in the 1920s, the number of recorded vessel trips at the crossing indicates that perhaps 23,000 to 25,000 vessels per year used the waterway” (Hunter 2004, pg. 2-43). In fact, the Canal was the primary method of moving goods and materials into and out of the area until the

² New York Department of Health cites: Richards, D. 1848a. Plan for Drainage of That Part of the City of Brooklyn, Which Empties Its Waters into Gowanus Creek & Bay. Willard Day City Surveyor.

Richards, D. 1848b. Report of the Street Committee of the Common Council on the Drainage of the Part of the City Lying Between Court Street, Fifth Avenue, Warren Street, and Gowanus Bay. November 27, 1848.

³ Hunter Research is referencing the following document: Stiles, H.R., ed.

1884 *The Civil, Political, Professional and Ecclesiastical History and Commercial and Industrial Record of the County of Kings and The City of Brooklyn, New York*. New York: W.W. Munsell and Company.

completion of the Gowanus Expressway in 1951 [New York City Department of Planning 1985] (New York Dept. of Health 2017, pg. 7).⁴

Furthermore, the permitted commitment of natural resources is excluded from NRD (43 CFR 11.71(g)(1)).⁵ The Brooklyn Common Council adopted a plan in 1849 to construct a 5,400-foot-long, 100-foot-wide canal and raise adjacent land above the saltmarsh elevations (Hunter 2004, pg. 2-21). The creek and saltmarsh habitat were committed by the government to be repurposed into an industrial waterway for the perceived benefit of the City. Therefore, any lost natural resource services that occurred as the result of the creation and maintenance of the canal itself is part of baseline and should be excluded from an assessment of injury and loss of services.

In addition to the construction and maintenance of the canal itself, the primary baseline factor the Assessment should consider, but does not mention, is sewage in the canal. “The first plans for the Gowanus marshes called for using them as a glorified sewer with commerce a secondary consideration, but the city government quickly shifted the emphasis towards filling the marshes for development and creating a tidewater canal that would somehow cleanse itself of urban wastewater” (Hunter 2004, pg. 2-16). The Canal was developed not only for transportation but as a drain for sewage and waste from industry (Hunter 2004, pg. 2-16). “The Gowanus Canal served as an open sewer even before it was completed for navigation purposes, with the City of Brooklyn laying out sewers emptying into the Canal as early as 1854” (Hunter 2004, pg. 2-48). The Brooklyn City code originally passed in 1885 directed overflow sewage discharges to the Gowanus Canal (Metropolitan Sewage Commission of New York, 1910). Raw sewage continued to flow into the canal until the Red Hook sewage treatment plant was completed in 1987. Unfortunately, sewage in the Canal is not just a historical baseline. Sewage continues to enter the Canal from combined sewage overflows (CSO). “The canal, particularly the

⁴ New York Department of Health is citing: New York City Department of City Planning. 1985. Gowanus: A Strategy for Industrial Retention. October, 1985.

⁵ **Statutory exclusions 11.71(g) (1)** An irreversible and irretrievable commitment of [natural resources](#) identified in an environmental impact statement or other comparable environmental analysis, and the decision to grant the permit or license authorizes such a commitment, and the facility was otherwise operating within the terms of its permit or license, so long as, in the case of [damages](#) to an [Indian tribe](#) occurring pursuant to a Federal permit or license, the issuance of that license or permit was not inconsistent with the fiduciary duty of the United States with respect to such [Indian tribe](#);

upper canal, has and will continue to function as a sewage retention basin (EPA 2013, p. 7). There are 10 active CSOs discharging into the Gowanus Canal (DOI, NYDEC, NOAA 2014, pg. 7). “In addition to hazardous substance, oil and related releases, the significant influx of sewage along the Canal impacts the Site’s trust resources (DOI, NYDEC, NOAA 2014, p. 7).

“Sewage indicators, such as fecal coliform and steroids are found consistently in the surface sediment in the canal. The highest concentrations are located in the upper portion of the canal where most of the CSOs are located” (USEPA 2013, p. 28).

Sewage in the canal impacts ecological and human-use services and is part of baseline. From the initial design, the Canal was a waste transport conduit. There were limited pre-discharge natural resource services being provided by the Canal. Therefore, the assessment should separate out any loss in services related to hazardous substances and oil from losses associated with sewage.

ECOLOGICAL SERVICES

The Assessment Plan indicates that equivalency analysis will be used to assess ecological losses. Equivalency analysis is used to scale service losses with service gains from restoration projects without directly measuring the value of those services which can be difficult to do (Desvousges et al. 2018). The assessment of losses to ecological services as a result of the release of hazardous substances and oil needs to focus on higher level services. The CERCLA rule indicates that, for biological resources, the difference from baseline conditions should be analyzed at the population, habitat, or ecosystem level (43 CFR §11.71(l)). Only losses in ecosystem services that affect habitat and species health and sustainability provide benefits to the public and require compensation (Boehm and Ginn 2013; Desvousges et al. 2018; 43 CFR Part 11).

The use of toxicology studies, as proposed in the plan, does not necessarily provide a direct link to higher level habitat service loss. For example, toxicology studies that measure mortality of a single class of benthic organisms do not necessarily translate to impacts in higher level ecological services such as populations of fish and birds. Similarly, toxicology studies of birds and fish typically assume that the animals remain in

the impacted environment 100 percent of time consuming all their food from the contaminated habitat. In fact, the ecological risk assessment assumes that condition when determining the potential impact to birds from contaminants in the canal (USEPA 2013, pg. 42). Birds would spend only a portion of their time in the Canal which provides very little habitat for them to feed. Instead, an equivalency analysis should focus on higher level ecological services that reflect the health and functioning of the habitat as a whole. Focusing on the ecological services as a whole or a higher-level receptor also avoids double counting of service losses that may occur when assessment of sediment injuries and receptors such as birds are measured separately and then added together. The metric used to measure changes in ecosystem services, such as fish populations, should also be able to distinguish loss of services caused by hazardous substances versus services affected by baseline impacts. For the Gowanus Canal, these impacts are significant. In fact, there is very little actual habitat existing at baseline (USEPA 2013, p. 33).

As a result of converting a creek and wetlands into a bulkheaded waterway, little to no natural habitat remains to provide ecological services in the Canal at baseline. The loss in natural resource services was a result of the creation of the Canal, which as noted above, was due to the express authorization from the State. “The Gowanus Canal has no remaining natural wetlands (various small, unconnected areas of vegetation and intertidal habitat exist) or natural shoreline (the shoreline consists of bulkheads, riprap and piers)” (USEPA 2013, p. 33). “The steep-sided bulkheads of the Canal leave almost no edge habitat for wading birds to forage within the Gowanus Canal. The canal itself only provides useful foraging to birds that feed in the open water” (USACE 2005, p. 20). Therefore, assuming impacts to birds based on 100 percent of food and potential exposure to the canal is completely unrealistic.

Similarly, the Canal does not provide a hospitable environment for resident fish at baseline. “Urbanization of the Bay and Canal has virtually eliminated the physical habitat of natural tidal creeks (e.g. undercut banks, flooded vegetation, in-stream structure). The degraded habitat conditions (biotic and abiotic) in the Bay and Canal are limiting the potential for the resident fish community” (USACE 2005, pg. 21). According to the Assessment Plan, the Canal does not support any rooted plants at baseline which

provide food and habitat for birds and fish (HDR et al. 2011). Studies of the fish populations in the Canal have shown that they are dominated by migratory species that spend only a portion of their life in the canal. “Few resident species were collected in the Gowanus Bay or Canal as adults or in early life stage, suggesting that the study area lacks habitat necessary to support a resident fish community” (USACE 2005, pg. 21).

Furthermore, baseline water quality issues unrelated to hazardous chemicals or oil limit the ecological services of the aquatic habitat of the Canal. Sewage released in the canal causes low dissolved oxygen. “Poor water quality (e.g., low dissolved oxygen, high temperatures) frequently present abiotic barriers to the establishment of a resident fish community. Extended periods of reduced dissolved oxygen are lethal for some species while others will migrate from areas during periods of low dissolved oxygen” (USACE 2005, pg. 21). Oxygen levels have been measured in the Canal below the NYSDEC dissolved oxygen standard (USACE 2005; GEI 2009, pg. 25). Members of a local canoeing club, The Gowanus Dredgers, became concerned about dramatic fish kills they were observing in the Canal in 2023. In response, they began a water testing project which led to the discovery of very low dissolved oxygen and high pH levels.⁶ Again, these are baseline water quality issues that limit ecological services in the Canal and should be accounted for in the NRDA when measuring any loss in services related to hazardous substance releases. Because of the extremely poor baseline habitat quality, it is unlikely that ecological service losses from hazardous substances will be significant enough to justify additional studies.

Finally, the Assessment needs to consider the additional benefits of remediation beyond removal of hazardous substances. Remediation of the canal through dredging and capping will not only remove hazardous substances but also will improve navigation and remove sewage sludge which may improve water quality. These are factors unrelated to hazardous substances. These improvements will provide additional benefits to the public that should be assigned credit against any potential service losses in the assessment. Replacement of a significant portion of the deteriorated bulkheads will be required as part of the remedy. “The condition and appearance of the bulkheads is a

⁶ <https://gowanusdredgers.org/water-quality-monitoring/>

matter of significant concern to affected property owners and the public” (USEPA 2013, pg.90). Replacement of bulkheads will improve the aesthetic appearance of the Canal providing benefits beyond the remedy. Again, bulkhead replacement will provide an improvement in services above baseline that should be accounted for in the Assessment. Part of the remedy is to excavate and restore the filled-in former 1st Street turning basins as well as a portion of the 5th Street turning basin (USEPA 2020). The addition of a wetland area to the 1st Street turning basin is also planned. The restoration of these areas creates additional benefits beyond remediation of hazardous substances. Benefits provided above baseline through the remediation process should be accounted for in the assessment of damages as a credit against service losses (43 CFR Part 11).

HUMAN-USE SERVICES

The Assessment Plan indicates that damages to recreation services would be quantified. Again, baseline factors that impact recreation on the Canal need to be accounted for in the Assessment. The Gowanus Canal does not provide a hospitable environment for recreational activities at baseline. There are issues of physical safety and safety to health from fecal coliform and pathogens. “Large commercial boat traffic and high bulkheads (marine retaining walls) in many locations present physical safety concerns for swimming and other water recreation. Bulkheads may make it difficult to get out of the canal when necessary for safety. In addition, there are physical hazards that can cause injury, as well as drowning hazards (for example, steep slopes, drop offs and poor water clarity) that have not been assessed” (NY Dept. of Health 2017, p. 1).

In addition to the physical safety concerns, bacteria and pathogens occur often at high levels associated with the CSOs. Historically, raw sewage entered the canal causing foul odors. Today, sewage continues to enter the canal from the CSOs creating an unhealthy environment for recreation that requires dermal contact or could result in water being swallowed (NY Dept. of Health 2017, p. 1-2). The remedy includes CSO control measures. New York City is currently working to reduce CSOs to the canal by approximately 34 percent in middle and lower canal outfalls and are constructing a retention tank (USEPA 2013, pg. 6). Additional green infrastructure projects hope to reduce stormwater discharges to the CSOs by an estimated 10 percent (USEPA 2013,

6). Even with these proposed improvements, USEPA states in the Record of Decision for the Remedy that CSO events will continue to result in the discharge of sanitary sewage captured by stormwater (USEPA 2013). Therefore, these baseline factors which historically limited or prohibited recreational activities in the Canal will continue to limit the recreation services that the Canal can provide into the future.

Limited nonmotorized recreational boating currently occurs on the Canal. There is a public boat launch where canoes are available at 2nd Street (USEPA 2013). As mentioned earlier, a canoeing club is located on the Canal at the 2nd Street launch, the Gowanus Dredgers Canoe Club. The Department of Health has concluded that “recreational boating or catch and release fishing from a boat is not expected to harm people’s health” although there may be physical hazards such as commercial boat traffic (NY Dept of Health 2017, pg. 3). Therefore, there is no need for an assessment of boating recreation service losses.

Fish consumption advisories for New York Harbor extend into the Canal. Fish consumption advisories may impact fishing behavior and result in a loss of wellbeing which may be measured by studying the choices people make in the presence of consumption advisories. People may choose to fish in a different less desirable location because it is further away, or they may choose to not fish at all. Alternatively, people may catch and release fish rather than keeping them for consumption. Because fish in the Gowanus Canal move in and out of the Bay, there is no distinguishing how hazardous substances in the Canal impact these advisories. “There is some uncertainty as to whether chemical concentrations in fish and crab tissues can be attributed to the Gowanus Canal. The blue crabs and many of the fish species that were sampled represent transient populations that are only seasonally present in the canal. The body burden of these species is, therefore, likely to reflect chemical concentrations accumulated both from the Gowanus Canal and other locations” (USEPA 2013, pg. 42). Consequently, even in the absence of hazardous substances in the Canal, fish consumption advisories likely would exist in the Canal because of contaminants present in Upper New York Harbor. Therefore, baseline conditions likely include a fish consumption advisory. Consequently, any measurement of potential losses in

recreational fishing or crabbing would likely be very limited given the baseline conditions in the Canal.

The Assessment Plan proposes that a primary data collection may be necessary if existing data is not sufficient to assess injury and loss of services. It is unlikely that any potential service losses measured would justify the cost of a primary data collection. However, if a primary data collection were deemed appropriate and cost effective, the study should be done using proper methods and protocols to avoid bias such as the Dillman Design method (Dillman et al. 2014; Dillman 2011). Reference areas selected for the study should include baseline factors similar to the Gowanus Canal including a bulkheaded waterway with commercial traffic and sewage from CSOs. Substitute sites should be included in the analysis. If focus groups were used, they should be conducted based on a research design that will provide useful unbiased data that would aid in the assessment of damages or developing restoration (Desvousges and Smith 1988 and Desvousges and Frey 1989). Considering the tremendous impact of baseline factors, it would be difficult to imagine how lost human-use services could be reliably measured relative to baseline. Furthermore, the limited use of the resource by the public makes cost-effectiveness a primary concern in the design of any assessment studies (43 CFR Part 11).

Benefits transfer would be a more appropriate method of assessment in this case than a primary data collection. Benefits transfer is a common method and is sanctioned by the 43 CFR Part 11 regulations as an available tool in damage assessment. Benefits transfer uses the results of previously conducted studies in one area to infer the value in a different area (Johnston et al. 2015; Desvousges et al. 1998). The key to an effective benefits transfer is the choice of a quality study that values services of similar quality and quantity (Desvousges et al. 1998). There are databases with values from previously conducted studies that may be used as a resource such as the Recreation Use Value Database (Rosenberger 2016).⁷ Caution should be used when selecting a study for transfer. Studies based on behavior and choices, revealed preference, are more reliable than stated preference studies based on hypothetical markets which elicit values from

⁷ Recreation Use Values Database. 2016. Corvallis, OR: Oregon State University, College of Forestry. <http://recvaluation.forestry.oregonstate.edu/>.

contingent value surveys. Likewise, studies with similar populations and resources should be used. For example, the value for a day of fly fishing in Montana would not be used to value a day of fishing on an urban waterway. Existing studies that value services in an urban setting are more appropriate such as Bingham et al. 2011. Moreover, this study employed state of the art modeling and a rigorous data collection methodology.

Finally, measuring the value of lost recreation services and then treating the value as a cost of restoration is biased if an adjustment is not made for the benefits provided by the restoration services. Equivalency analysis, trading lost recreation days for gains in recreation days from a restoration project, eliminates the scaling of value and cost. However, when using a transfer of values, the benefits of the project rather than the costs need to be equated with the lost services. Concrete evidence of the benefit cost ratio for restoration projects has been recently shown from an evaluation of projects developed from the Deepwater Horizon NRD case which showed an average benefit cost ratio of 3.3 across projects (Byrd and Wakefield 2024). Alternatively, a trip equivalency approach should be considered in which lost trips are equated with a gain in trips from restoration projects (MacNair et al. 2022).

COMMUNITY CONNECTIONS

Any study of a loss in community connection with the Canal requires an understanding of the purpose and intention of the Canal and the industrial nature of the area. The Canal was developed to provide infrastructure to facilitate the removal of waste from the City and the economic development of the area. It was not developed as a recreation site for Brooklyn. The development and use of the Canal has provided jobs and boosted the economy of the area. The City chose to trade natural resource services for economic prosperity. It is clear there is interest in the community to improve access to the Canal and improve conditions for human use. Groups such as Gowanus Canal Conservancy and the Gowanus Dredgers Canoe Club advocate for improved access. However, it is not clear in the Assessment Plan how loss of community connection fits in the NRD process. Historically, the connection between the Canal and the neighborhood was strictly commercial and economic. Access to the public was not encouraged by the development of parks along the Canal, piers, or boat ramps. It is likely that community

connections with the Canal have improved in recent history because of the reduction in sewage in the Canal eliminating the foul odors that the area was once known for (Metropolitan Sewage Commission of New York 1914). Remediation work on the Canal and bulkheads will further improve the aesthetics of the Canal. New developments on the Canal have been incorporating walking paths to allow the public better access. However, community connection is not a natural resource service, and therefore, should not be included in a damage assessment. Furthermore, the value of community connection would be difficult to reliably assess in a damage assessment particularly apart from baseline. Understanding how to improve such connections may be a highly laudable goal, but such a goal is not part of the natural resource damage assessment. It should be pursued in a different venue.

SUMMARY

The Draft NRDA Plan for the Gowanus Canal is very broad in the coverage of potential injuries and service losses that are to be assessed as well as potential quantification methods that may be used. Considering the nature of the Canal and the baseline issues impacting natural resource services in the Canal, it is unlikely that any significant service losses have occurred as a result of hazardous substance releases. There is little habitat available in the Canal and very limited access. Therefore, the assessment should reflect the scale of natural resource services that the site provides and the potential change in these services that may have occurred as a result of hazardous substances alone. Including all potential services in the assessment when most are clearly not provided at baseline is not cost effective. For example, the ecological risk assessment indicated that only dabbling ducks would be potentially exposed to impactful levels of toxicity, yet there is no habitat in the Canal for dabbling ducks to feed and be exposed. Nonetheless, the NRDA Plan states that the assessment may include birds. Likewise, the ecological risk assessment indicated that the toxicity levels in the water column are not harmful to fish, yet the assessment states that it may quantify ecological service losses to fish. The assessment identifies baseline only as physical features of the Canal and does not include other human-induced factors such as sewage which has been part of historical as well as current baseline and unarguably the most impactful factor in the provision of both ecological and human use services.

The Assessment needs to include the measurement of benefits above baseline that the remediation will provide. Not only will remediation remove hazardous substances, but it will also improve ecological and human use services by improving the baseline character of the Canal. The benefits provided by these improvements need to be accounted for and may in fact provide full compensation for any lost services caused by hazardous substances alone. Improved navigation, improved water quality, improved aesthetics of bulkhead replacement and the addition of some habitat is primary restoration that will provide benefits to the public and should be assessed as part of the damage assessment.

Finally, the cost and time involved in the administration of any additional studies or data collection must be weighed against the damages associated with potential service loss. The Assessment plan presents a broad scope of potential injuries that would be considered in the assessment and studies that may be required for quantification of service losses with little evidence that these potential injuries have produced significant damages. Therefore, existing data should be used to evaluate potential injury and service losses and additional studies should only be undertaken if the costs can be justified.

“Costs are reasonable when: ... the anticipated increment of extra benefits in terms of the precision or accuracy of estimates obtained by using a more costly injury, quantification, or damage determination methodology are greater than the anticipated increment of extra costs of that methodology; and the anticipated cost of the assessment is expected to be less than the anticipated damage amount determined in the Injury Quantification, and Damage Determination phases (43 C.F.R. 11 § 11.14(ee)).”

Considering the history of the Canal as an industrial waterway and not a natural resource, it is unlikely that the potential magnitude of damages would warrant the additional expense of primary studies at this site.

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Fifth Avenue Committ
Our Community. Our Future.

June 14, 2024

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Dear Ms. Pascos:

Thank you for the opportunity to submit comments on the draft Gowanus Canal Natural Resource Damage Assessment (NRDA) Plan.

Fifth Avenue Committee (FAC) is a 46f-year old local non-profit comprehensive Community Development Corporation located in Gowanus, Brooklyn whose mission is to advance economic, social and racial justice in New York City. FAC serves over 6,000 low- and moderate-income New Yorkers annually through a range of programs that include our Turning the Tide (T3) Environmental Justice initiative and our work with the Gowanus Neighborhood Coalition for Justice (GNCJ) to ensure an inclusive, equitable and sustainable rezoning of the Gowanus community. FAC has also been a long-time member of the US EPA Gowanus Canal CAG, is the nonprofit owner and manager of existing affordable housing for low-income residents within a few blocks of the Canal and is co-developing Gowanus Green, the 955-unit, 100% affordable housing development, that includes a public park and public school on the Public Place site along the Canal.

The Gowanus Canal waterway in Brooklyn, NY and its upland sites have withstood generations of industrial, commercial, and residential development and contamination. Alongside this waterway, which is New York City's first Superfund cleanup site, also lives the longstanding public housing communities in Gowanus and Red Hook that have unique burdens and vulnerabilities as environmental justice populations living, working and recreating in and around the Superfund site.

The NRDA Plans for this waterway provide a unique opportunity to ensure that damage to this famously polluted area is properly assessed and used to restore the environment and



improve the living conditions for the surrounding communities with priority for the surrounding environmental justice (EJ) communities in public and affordable housing.

We at FAC urge the Trustees to work closely with relevant agencies and stakeholders, including the Environmental Protection Agency, the City of New York, and the local community to ensure the NRDA Plans will provide the maximum restoration benefit in a timely fashion. Incorporate community knowledge and prior work into the NRDA where appropriate. There is considerable community knowledge of existing shorelines and community use of the Gowanus Canal. Gowanus Canal Conservancy, Riverkeeper, and others have published detailed vision plans for restoration, and some of those plans could be implemented prior to remediation, or pilot studies beginning now could lay the groundwork for future restoration efforts. These plans detail local knowledge of intertidal habitat, species usage within the waterways, and community use.

Importantly, the natural resources along the Gowanus Canal do not just include the waterway and marine life, but the vegetative and green cover that plants, trees and grasses can provide to both humans and the environment. These natural resources have been grievously injured by industrial activities along the waterway over the last several hundred years. Through the NRDA, the Trustees--on behalf of the public--can ensure adequate damages are awarded to fund restoration within and along these waterways and areas adjacent to the waterways that will benefit the environment and community for generations to come.

To ensure meaningful restoration around the Gowanus Canal Superfund site, we at FAC, along with the community stakeholders we serve, ask that the draft NRDA Plans be re-evaluated to address the following concerns:

- 1) Expand the scope of the NRDA Plans of natural resource injuries and damages considered to ensure meaningful restoration in these waterways and upland areas for the low income and communities of color residential areas which have suffered decades long disinvestment and disproportionate environmental burdens to:
 - Provide for a broader and more comprehensive scope of community engagement and damages to be assessed based upon the EPA's own guidelines for Superfund Remediation and Redevelopment for Environmental Justice Communities and New York State's implementation of prioritizing justice for disadvantaged communities in its implementation of the 2019 Climate and Leadership Community Protection Act.



- Address Environmental Justice issues within the boundaries and scope of NRDA project studies to include the [Environmental Justice Neighborhoods of Red Hook and Gowanus](#), in particular related to local public housing communities, as identified in NYC's [EJNYC: A Study of Environmental Justice Issues in New York City](#) (cityofnewyork.us) where the community is impacted by extreme heat and in need of green space adequate enough to mitigate preventable injury and death due to heat exposure.
- Assess impacts to the residents in Gowanus and Red Hook impacted by decades of contamination and the exposure pathways brought about by flooding and Combined Sewer Overflow events.
- Address known contamination from other types of contaminants such as volatile organic compounds (VOCs), polychlorinated biphenyls (PCBs), hazardous pesticides, and metals such as lead, mercury, and copper and the multiple hazardous substances to which not only natural resources have been exposed, but residents as well.

2. Scaling restoration and quantifying damages to restore, increase and grow greenspace and community connections in the Canal area to:

- Collect primary data to evaluate and estimate site specific changes in community connections and their relationship to the assessment area resulting from contamination related to degradation as it relates to community loss of green space and resources.
- Create a green infrastructure fund for Gowanus and Red Hook as compensation for the impacts on air quality and urban heat islands resulting from industrial uses and contamination from the PRP's and the loss of greenspace and corresponding value loss to the public of community connections.
- Invest in new publicly owned green spaces along the Canal including the future public park at Gowanus Green.
- Analyze Thomas Greene Park recreation community use, and evaluate contaminant related effects, associated damages, and quantify contaminated



flood and groundwater waste, soil and air quality impact assessments for recreation and people who live and work in the nearby area.

- Reassess the damages for PRP National Grid for Thomas Greene Park and Double D Pool replacement and remediation plans at the former Fulton MGP site.
- Consider acquiring the PRP Con Edison lot on Butler and Nevins to serve as the required temporary community swimming pool site.
- Assess opportunities and plans for continuous expansion of Thomas Greene Park by demapping Nevins Street between Douglas and Degraw streets and creating a “borderless” open space connection to the NYC DEP CSO tank site for passive recreational space to connect the Gowanus waterfront to the park and provide “gateway” access.
- Invest in the [Gowanus Improvement District](#) and greenspace build out on the DOT street ends and bulkheads and waterfront access plan designs.

3. Utilize public engagement opportunities and community knowledge to inform the NRDA Plans to design, implement and monitor remediation projects and evaluate contaminants:

The neighborhoods surrounding are being extensively redeveloped, providing opportunities for stormwater maintenance, habitat restoration, and community amenities. The Trustees must ensure restoration opportunities that become available during new development are not missed.

- Plan for public participation and opportunities to study and create restoration plans and settlement agreements regarding human uses of and connections to the Gowanus Canal specifically how to use those connections that have been impacted by contamination.
- Conduct targeted focus groups to determine natural resource injuries from former MGP sites. Create targeted assessment areas for the three former MGP sites and two CSO tank sites.
- Reconvene the Community Visioning processes (see attached from 2018) for the Northern end of the Canal for the Thomas Greene Park (re)designs, and for temp and permanent replacement of the Douglas and Degraw swimming pool,



facilities, etc. and for Northern Canal corridor connections, such as a new foot bridge.

- Consider continuing the northern Canal restoration plan previously ordered by EPA to advance planning at the northern Canal for a green and open space and waterfront access now that the CSO facility is under construction in the northern end.
- Further geographic scope, injury, quantification, and damage determination for the human uses associated with the canal as it relates to green and park space as well as transportation along the canal and Third Avenue corridor for the east west connections and recreational and environmental community activities and connections in the northern and southern ends of the canal.
- Fund and sponsor hyper local community air monitoring projects and pilot programs to make future plans for air pollutant mitigation. Cleaner air should be of utmost importance because of the way air pollutants can cause, aggravate, or intensify chronic conditions like asthma, or even various cancers. Organizations to look to for models on air quality monitoring are South Bronx United: <https://www.southbronxunite.org/heat-map-air-quality-monitoring>, and Red Hook Initiative.

We also include with our comments the *Urban Land Institute's Vision for a Greener, Healthier, Cooler Gowanus: Strategies to Mitigate Urban Heat Island Effect*.

We appreciate your attention to this important matter and offer our continued community services for facilitating community outreach, planning processes and focus groups to support public participation with the longstanding community and neighborhood stakeholders in Gowanus and Red Hook that we serve.

Sincerely,

Sabine Aronowsky



Fifth Avenue Committ
Our Community. Our Future.

South Brooklyn Accountable
Development Initiative Fifth
Avenue Committee
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Brooklyn, NY 11217

GOWANUS, BROOKLYN

A Vision for a Greener, Cooler Gowanus: Strategies to Mitigate Urban Heat Island Effect

DECEMBER 2017



Table of Contents

1 | Acknowledgments 3

2 | Urban Land Institute and the TAP program..... 5

3 | Gowanus TAP Panelists, Stakeholders, Sponsor, and Process 7

4 | Introduction..... 11

5 | Study Area..... 15

 • Location and Boundaries

 • Description and Land Uses

 • Demographics and UHI's Impact on Gowanus's Low-Income Population

6 | New Challenges for Gowanus..... 21

7 | Key Observations and Findings 23

8 | Recommendations for a Greener, Cooler Gowanus 27

9 | Funding, Incentives and Implementation 39

10 | Conclusion 49

11 | Appendix 51

1 |

Acknowledgments

The Gowanus Urban Heat Island Mitigation Technical Assistance Panel—and this report, which springs from it—were made possible through generous funding from the New York Community Trust. The Urban Land Institute's New York District Council and the Fifth Avenue Committee, Inc. are grateful for the support and the opportunity to explore this pressing issue.



Urban Land Institute and the TAP program

Founded in 1936, the Urban Land Institute (ULI) is a 501 (c)(3) nonprofit research and education organization whose mission is to provide leadership in the responsible use of land and in creating and sustaining thriving communities worldwide. ULI has more than 40,000 members worldwide representing the entire spectrum of land use and real estate development disciplines working in private enterprise and public service. As the preeminent multidisciplinary real estate forum, ULI facilitates the open exchange of ideas, information, and experience among local, national, and international industry leaders and policy makers dedicated to creating better places.

The ULI's New York District Council (ULI New York) covers most of New York State and has more than 2,300 members, including real estate developers, investors, property owners, brokers, architects, planners, public officials, engineers, and students. ULI New York

embraces the best practices in leadership development, community service, and enhancement of land-use policy and practice at the local level.

ULI New York convenes Technical Assistance Panels (TAPs) at the request of public officials, community stakeholders, and nonprofit organizations facing complex land-use challenges. TAPs provide objective, unbiased recommendations from a panel of diverse experts from ULI New York's membership who are assembled specifically for their expertise in the issues identified by the TAP sponsor. Typically, the TAP panelists spend one to two days visiting the study area and analyzing existing conditions, exploring specific planning and development issues, and formulating realistic and actionable recommendations to move initiatives forward in a way that is consistent with the sponsor's goals and objectives.



Gowanus TAP Panelists, Stakeholders, Sponsor, and Process

TAP Panel Members and Support Staff

As organizer of the Gowanus Urban Heat Island (UHI) Mitigation Technical Assistance Panel (TAP), ULI New York convened a panel of volunteer members representing disciplines including development, transportation engineering, landscape architecture, engineering, architecture, urban and environmental planning, and healthcare. Panel members were selected who possess professional expertise relevant to the objectives for this TAP.

The following individuals served as TAP panelists:

James Lima

President, James Lima Planning + Development (TAP Chair)

Matthew Brian

Executive Vice President of Development, Omni New York LLC

Nancy Choi

Senior Environmental Engineer, ARUP

Bret Collazzi

Principal, HR&A Advisors

John Imbiano

Principal/Partner, IQ Landscape Architects, PC

Aviva Laurenti, P.E., PTOE

Deputy Director of Traffic Engineering and Associate, Sam Schwartz Engineering

Matthew Payne

Vice President of Built Ecology, WSP

Jeffrey Raven

Principal, RAVEN Architecture + Urban Design, LLC
Director and Associate Professor of the Graduate Program in Urban + Regional Design, New York Institute of Technology

Rupal Sanghvi

Founder, HealthxDesign

Donna Walcavage

Principal and Landscape Architect, Stantec

Maud Fouquerand and Anna Dai, master's degree students at New York Institute of Technology, provided on-site research support.

Felix Ciampa, Executive Director of ULI New York, and Kathryn Dionne, a Manager for ULI New York, along with Katharine Burgess, Senior Director of Urban Resilience at ULI, provided organizational and technical support in preparation for and during the TAP process.

TAP Stakeholders

The TAP benefited from the participation of a diverse group of stakeholders who met with the panelists and shared information, ideas, and opinions on a range of issues relevant to Gowanus and UHI. These stakeholders represented local non-profit and advocacy organizations, neighborhood institutions, New York City government (including New York City Housing Authority and New York

Members of the ULI panel and Fifth Avenue Committee pictured at the Gowanus Canal.

Credit: Steve Lipofsky





The ULI panel touring the study area.

Credit: Steve Lipofsky

City Department of Environmental Protection), the Mayor's Office of Recovery & Resiliency, public officials and their staff, residents of Gowanus, and local developers.

Sponsor: Fifth Avenue Committee

Founded in 1978, the Fifth Avenue Committee, Inc. (FAC) is a community-based non-profit organization in South Brooklyn that, in its own words, "advances economic and social justice by building vibrant, diverse communities where residents have genuine opportunities to achieve their goals, as well as the power to shape the community's future." FAC's goal is "to transform the lives of over 5,500 low- and moderate-income New Yorkers annually so that we can all live and work with dignity and respect while making our community more equitable, sustainable, inclusive and just."

After Hurricane Sandy in 2012—during which the Gowanus Canal overtopped its banks, causing severe flooding—FAC broadened its scope to include work

on environmental issues, initiating its Turning the Tide (T3) program. The organization's interest in UHI is an expression of that new area of focus. FAC seeks to leverage activities happening now and in the near future—including environmental remediation and an anticipated rezoning that will likely permit higher density, mixed-use development—to mitigate UHI in Gowanus and secure meaningful benefits for low-income residents and the community at large.

In its briefing materials for the panel members, FAC posed a series of questions that helped shape the way panel members approached the assignment. Those questions were as follows:

1. **What can property owners, property managers, NYC Housing Authority (NYCHA), NYC Parks, NYC Department of Transportation (NYCDOT) and others responsible for the public and private realm do to reduce UHI effect without compromising industrial, manufacturing, commercial and mixed uses in Gowanus?**
 - How can these adaptation/mitigation strategies tie into planned large-scale remediation and sustainability projects that are part of the Gowanus Superfund cleanup?
2. **In the context of all the neighborhood's environmental problems—particularly UHI and combined sewer overflows—what types of land-use actions, design standards and other frameworks could be put in place through special districts, measures, and/or development standards as part of the expected Gowanus rezoning?**
 - How can these measures address the neighborhood's long-term sustainability in anticipation of additional growth and increasing climate related impacts?
3. **What have been key components of successful environmental improvement special districts nationally? What is the precedent nationally for a local environmental infrastructure fund that could support a range of green infrastructure, including maintenance of UHI-offsetting measures, and green workforce development efforts?**

4. **Since Thomas Greene Park, Gowanus's only public park, will be taken offline for many years, where could a temporary park and swimming pool be located and how could their design showcase UHI-offsetting measures?**

- What are some UHI-offsetting measures that should be considered as part of any Thomas Greene Park re-design effort?

Michelle de la Uz, FAC's Executive Director, and Sabine Aronowsky, its South Brooklyn Accountable Development Coordinator, led FAC's preparation for the TAP, with support from FAC colleagues and partners at the Pratt Institute.

TAP Process

The Gowanus UHI TAP was held April 24-25, 2017, and was based at Fairfield Inn & Suites by Marriott New York Brooklyn, on Third Avenue in Gowanus. Panelists came primed for the assignment, having reviewed the briefing materials from FAC in advance. On the morning of April 24, after Michelle de la Uz and Sabine Aronowsky (both of FAC) gave a brief presentation to the group, the panelists toured the study area on foot and by bus. Following the tour, the panelists interviewed stakeholders to gain a better understanding of the issues, dynamics, challenges, and opportunities in the area.

TAP panelists, who formed groups reflecting their expertise, then worked to formulate recommendations. Some took time to head out into the neighborhood again to check their recommendations against on-the-ground conditions.

The panelists presented their recommendations to FAC at the end of the day on April 25. This report recaps and elaborates on that presentation.



Fifth Avenue Committee
Our Community. Our Future.



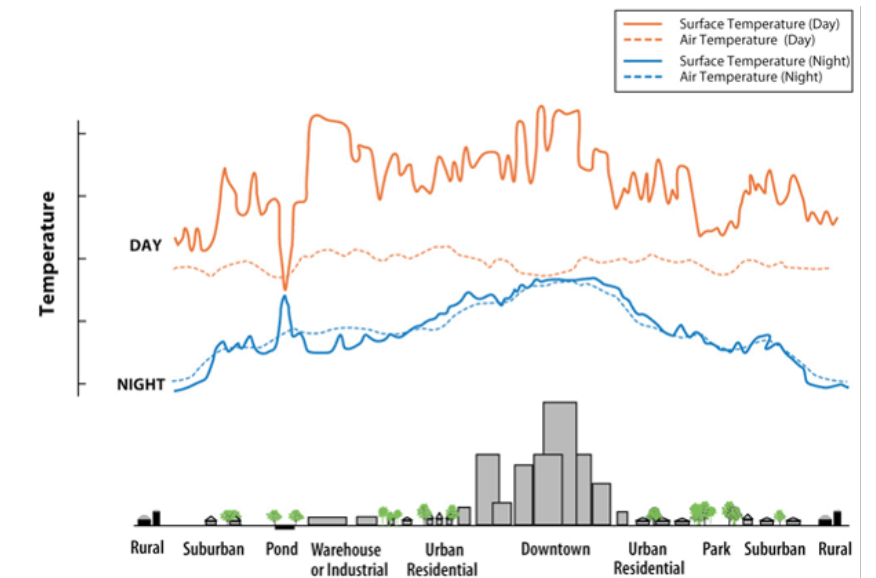
Introduction

Buildings. Cement and asphalt paving. Such things give us places to live and work in and sidewalks and streets to walk and drive on. But they also sit baking in the sun, absorbing—and re-radiating—heat.

That’s why cities, with a preponderance of buildings and paved areas, can be hotter than less-developed nearby areas, particularly at night. This phenomenon is referred to as the Urban Heat Island (UHI) effect. Per the U.S. Environmental Protection Agency (EPA), the annual mean air temperature of a city with a population of 1 million or more can be 1.8 to 5.4 degrees Fahrenheit hotter than its surroundings. In addition to causing higher daytime temperatures, urban heat islands keep cities and their residents from cooling off at night. In the evening, cities can be as much as *22 degrees Fahrenheit hotter* than neighboring areas.

This phenomenon is a serious concern. Extreme heat increases peak energy demand, air conditioning use and costs, air pollution, and greenhouse gas emissions. It also affects water quality—and, importantly, it affects our health. Extreme heat can exacerbate chronic conditions, particularly for vulnerable populations such as children and the elderly. And it causes more deaths than any other weather-related hazard, including hurricanes, tornadoes, and flooding, according to *“Climate Change and Extreme Heat: What You Can Do to Prepare,”* a guide published by the EPA and the Centers for Disease Control and Prevention (CDC). The guide indicates that each summer, more than 65,000 Americans on average visit an emergency room for acute heat illness. Between 2006 and 2015, a total of 1,130 people died from the heat.

As one of the densest cities in the world, New York City is particularly susceptible to the risks related to UHI. With climate change, the health dangers for New Yorkers are likely to grow. According to the New York City Panel on Climate Change (NPCC), temperatures associated with climate change will rise by 4.1 to 5.7 degrees Fahrenheit by 2050. This rise in overall temperature will be coupled with more frequent and prolonged heat waves. According to the *New York Times*, in July 2006 a heat wave in New York resulted in 140 deaths. The NPCC has predicted that by 2050, there will be 500 heat-related deaths in the city per year.



While the City of New York has acknowledged the seriousness of UHI—the Mayor’s Office of Recovery & Resiliency has an Urban Heat Island Task Force and launched the Cool Neighborhoods NYC program in June 2017—the topic has not received the level of funding or attention that other climate-related concerns, such as coastal protection, have. That is perhaps not surprising given that heat rarely produces extreme events as singularly destructive as a major storm like Hurricane Sandy, which struck the New York region in 2012. And in some parts of the city, the heat is mitigated by cooling ocean breezes (for example in Rockaway, Queens) or by expansive green space (such as the many neighborhoods with leafy, tree-lined streets and long-established parks with lush, mature plantings). However, other areas don’t have such advantages.

One of these areas is Gowanus, in South Brooklyn. Originally a salt marsh that was filled in, then an industrial powerhouse that relied on the Gowanus Canal to transport goods, the area developed without the abundance of shade trees and other greenery that beautify, and cool, other longtime residential communities. According to neighborhood residents and visitors who were interviewed over the course of the TAP, summer days in Gowanus can be brutal. In fact, “A Case-Only Study of Vulnerability to Heat Wave-Related Mortality in New York City (2000-2011)” shows that the entire length of the eastern Gowanus corridor has a “higher composite vulnerability heat index” compared

According to the United States Environmental Protection Agency (EPA), the term “heat island” describes built up areas that are hotter than nearby rural areas – as exhibited by the above graphic which shows the day and night temperature differentials between downtown areas compared to rural and suburban areas.

Credit: Jeffrey Raven

with neighboring Park Slope and Carroll Gardens. Furthermore, Gowanus has a higher proportion of poor and underserved residents—residents who may not be able to afford air conditioning—and studies have shown that the health risks associated with UHI disproportionately affect those populations.

And just as things are heating up because of a changing climate, the neighborhood is expected to experience

NYC Panel on Climate Change (NPCC) – Summary of Heat Stats

Released in 2015, “Building the Knowledge for Climate Resiliency” is a New York City Panel on Climate Change (NPCC) publication that provides temperature projections through the year 2100. The report discusses key climate change-related issues and their impacts on the citizens of the New York metropolitan region. Topics addressed include flood risk, increased precipitation, and increased heat—and the associated public health impacts.

Extreme heat is a key focus of the publication. Climate change will lead to increased temperatures, which will be exacerbated in urban settings such as New York City due to the Urban Heat Island (UHI) effect, the phenomenon of urbanized areas having higher temperatures than surrounding areas. Increased temperatures lead to an increased need for cooling, which can cause an increase in energy consumption as well as financial and health burdens. Heat-related health impacts are most likely to affect the elderly, people with chronic diseases, outdoor workers, and low-income households, including those without air conditioning. Health impacts can include exhaustion, heat stroke, respiratory problems, compromised mental health, and heat-related mortality.

Between 1900 and 2013, the mean annual temperature in New York City increased by 0.3F per decade—a total of 3.4F. However, the future mean annual temperatures are projected to increase at an even faster rate. By 2050, the mean annual temperature is estimated to increase by 4.1F to 5.7F, and, by 2080, the estimated

increase is 5.3F to 8.8F. During this time, heat waves (defined as three or more consecutive days with maximum temperatures at or above 90F) will potentially triple in frequency. By 2080, the number of days that will reach 90F or more is estimated to be between 44 and 76, and the number of days that will reach 100F or more is estimated to be between 4 and 14.

On average, heat has been the largest weather-related cause of death since 1988 and disproportionately affects socioeconomically disadvantaged populations. Mortality due to extreme heat is also higher among residents in areas of New York City with higher summer daytime surface temperature and lower among residents who live in areas with green space. However, mortality due to extreme heat is strongly correlated with a lack of air conditioning. Eleven percent of New York City homes lack air conditioning, and the residents who do not have it most often cite cost as the impediment.

Although New York City has already put programs in place to adapt to more frequent and intense climatic events, “Building the Knowledge for Climate Resiliency” cites gaps in the capacity for preparedness to mitigate negative impacts on residents’ health.

For more information, visit <http://www1.nyc.gov/site/orr/challenges/nyc-panel-on-climate-change.page>

	Baseline (1991-2007)	2020	2050
Number of heat waves per year	2	3-4	5-7
Duration of heat waves (days)	4	5	5-6
Number of days with max T° above 90°F	18	26-31	39-52

The number of heat waves and heat-related deaths per year in New York City will continue to rise due to climate change. The NPCC projects that there will be an additional 500 heat-related deaths in New York City by 2050.

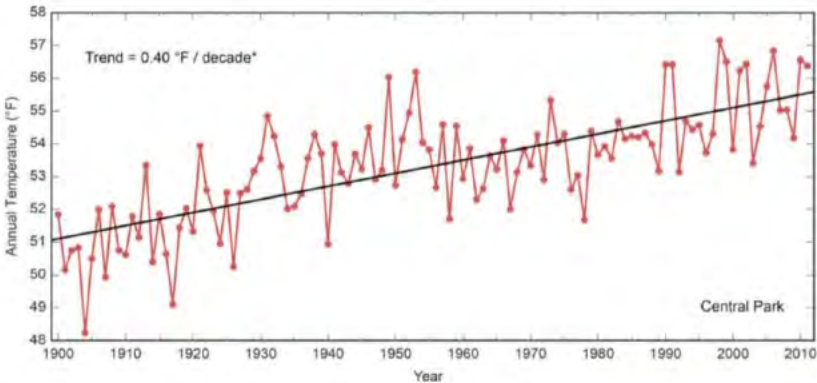
more development, due to an anticipated rezoning of Gowanus. The New York City Department of City Planning (NYC DCP) has initiated a PLACES (Planning for Livability, Affordability, Community, Economic Opportunity and Sustainability) study for Gowanus in support of Mayor de Blasio’s housing plan, *Housing New York: A Five-Borough, Ten-Year Plan*, and to help accommodate the growing population of the city. The NYC DCP study is expected to result in rezoning for greater density in the area.

On the face of it, the anticipated rezoning will put Gowanus at an even greater risk for UHI. However, while development is likely to create additional stresses on the neighborhood—which already contends with a host of challenges including flooding, combined sewer overflows, and traffic problems—it could also, if harnessed in ways that mitigate heat, yield benefits for the community as a whole. The desire to leverage the planned rezoning for the benefit of the community was the impetus for the partnership between ULI New York and the Fifth Avenue Committee—and for the TAP.

PLACES and Gowanus

PLACES (Planning for Livability, Affordability, Community, Economic Opportunity, and Sustainability) is a de Blasio administration initiative that seeks to foster diverse, mixed-income neighborhoods with supporting services. Part of the Housing New York plan, PLACES studies key planning and zoning issues in neighborhoods and then formulates recommendations on land-use strategy and investment. The initiative has included a series of place-based studies led by the Department of City Planning, addressing land use as well as related issues such as affordable housing preservation, community support services, infrastructure priorities, and economic development. A new \$1 billion Neighborhood Development Fund is dedicated to increasing the capacity of the infrastructure and facilities in neighborhoods that PLACES studies.

Gowanus is one of several neighborhoods in Brooklyn that have been under study.



Clearly, Gowanus needs a strategy for localized cooling, and the TAP was convened to inform that strategy—which is presented in this report. The recommendations contained here include the creation of a new network of green spaces and the implementation of measures that will encourage human-powered transportation. Together they will make Gowanus not only a safer and healthier place, but also a more comfortable and pleasant one. And they will yield a reduction in energy use that will benefit local residents, tenants, building owners, and manufacturers—as well as the planet.

The graphic above shows the mean annual temperature in NYC from 1900 through 2010. According to the New York City Panel on Climate Change (NPCC), the city’s future mean temperatures are projected to increase at an even faster rate.

Credit: NYC Panel on Climate Change.

Engagement has included a planning study, a workshop, and a pilot community-engagement platform called Plan Gowanus. The PLACES work sought to build from past planning efforts, such as Bridging Gowanus, and engaged government agencies, stakeholders, community groups, and local elected officials.

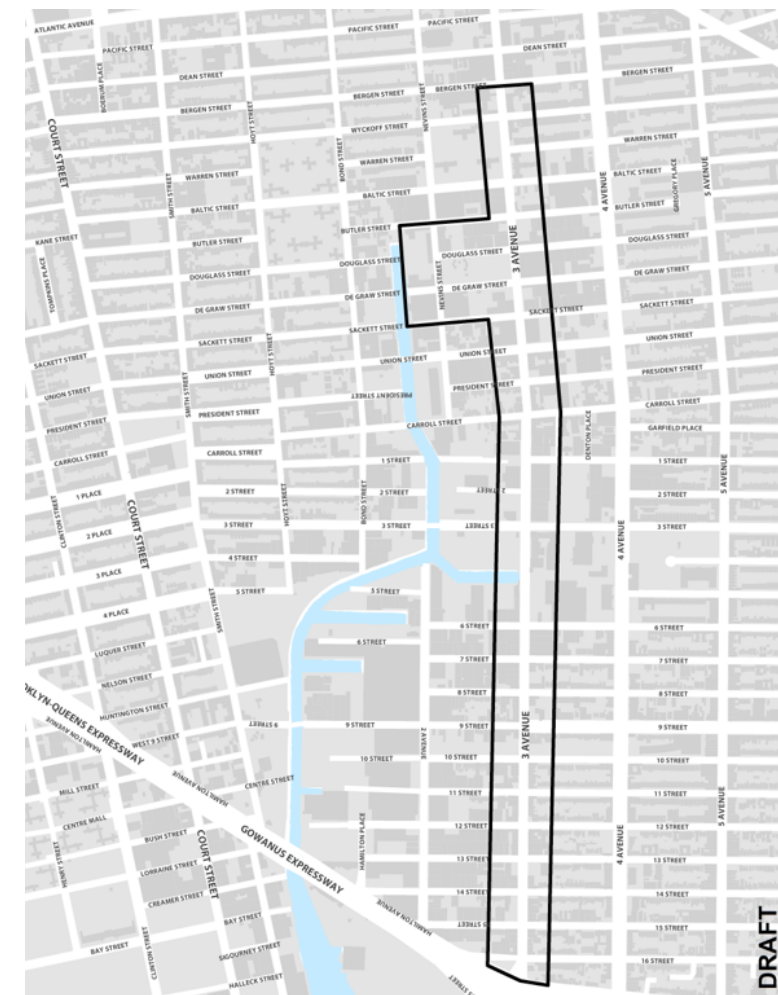
The neighborhood is likely to be rezoned as a result of the PLACES process. Fifth Avenue Committee and partner organizations—such as Families United for Racial and Economic Equality (FUREE), the Gowanus Alliance, the Gowanus Canal Conservancy, and five organizations associated with local NYCHA developments—have formed a Gowanus Neighborhood Coalition for Justice to advocate for a rezoning that will benefit longtime residents and consider racial and economic equity. The Technical Assistance Panel in Gowanus explored specific strategies for the rezoning to address the Urban Heat Island effect, which will impact the health and quality of life of Gowanus residents, particularly low-income residents.

Study Area

Location and Boundaries

Gowanus is in South Brooklyn, sandwiched between the more affluent neighborhoods of Park Slope and Carroll Gardens. All three of these communities are part of Community Board 6, along with Columbia Waterfront, Cobble Hill, and Red Hook.

The TAP study area, as identified by the sponsor, is a long, narrow portion of the neighborhood centered on Third Avenue, stretching from Bergen Street on the north to the Gowanus and Prospect Expressways on the south. Between Butler and Sackett streets, the study area widens, extending west to the Gowanus Canal; that portion includes Thomas Greene Park.



Gowanus Heat Island Study Area

Urban Heat Island Study Area

data: DCP & Pratt Center

0 0.125 0.25 0.5 Miles

PRATT CENTER
FOR COMMUNITY DEVELOPMENT



The study area, located in the Gowanus neighborhood of Brooklyn, extends from Third Avenue from Bergen Street on the north to the Gowanus and Prospect Expressways on the south. The study area also includes Thomas Greene Park.

Credit: Fifth Avenue Committee

Description and Land Uses

Although the study area is largely zoned for industrial use—and there is a small but committed group of industrial businesses—it is quite diverse, also containing commercial and residential uses. Commercial enterprises include co-working sites, business incubators, and arts-related facilities. In recent years, a number of hotels have opened, and the nightlife scene is growing. There is a small but vibrant residential community.

North of Third Street, the area tends to be more mixed in uses and is increasingly seeing residential development. South of Third Street is more industrial.

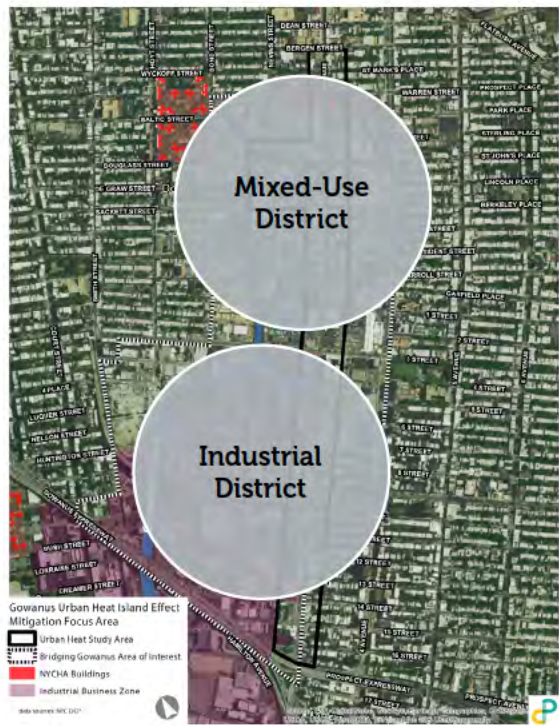
Running through it all is Third Avenue, the spine of the study area, a highly trafficked six-lane thoroughfare with vehicles of all types—18-wheelers, small delivery trucks, cars, and cabs—and an intersection at 15th Street that is dangerous. The avenue is flanked by narrow sidewalks and, generally, low-lying buildings.

The Gowanus Canal runs roughly parallel to the study area. Although most of the canal lies to the west of the study area and not technically within it—with the exception of the canal’s Fourth Street Basin, which branches towards Third Avenue—it is impossible to think comprehensively about the study area without taking into account this significant waterway.

Historically, the canal was not only a critical transportation route for the area, it was also a dumping ground for industry due to years of lax environmental regulation. In 2010, the EPA placed the Gowanus Canal on the National Priorities List, designating it a Superfund site. The EPA is in charge of the site’s cleanup, which will involve dredging the canal. Some of the work has



The Douglass-Degraw Pool that adjoins the Thomas Greene Playground.
Credit: Steve Lipofsky

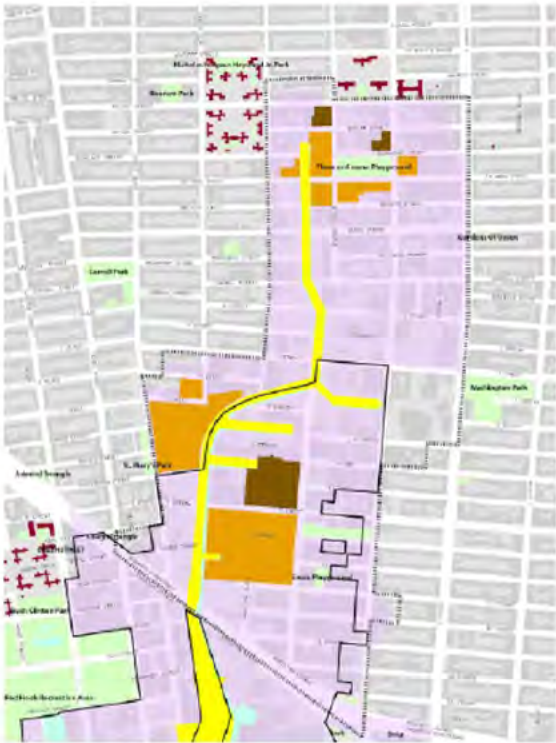


The study area and its diverse land uses.
Credit: Fifth Avenue Committee

started, but continued funding is needed to carry out the full plan.

Surrounding the canal were three manufactured gas plants (MGPs) that are believed to be sources of polycyclic aromatic carbon (PAH), which contribute to coal tar contamination in the canal. These former sites, too, are scheduled for cleanup, which will reduce health and environmental risks and prepare land for redevelopment. The New York State Department of Environmental Conservation is in charge of that project, with input from the EPA.

Another major investment in the area comes in the form of sewer and water upgrades. Sewage backup has been a chronic problem in Gowanus, causing sewage overflow into the canal and flooding streets. To help alleviate this issue, nearly three miles of high-level storm sewers are being installed throughout the neighborhood. While the new storm sewers will significantly address flooding, the process of installing the new sewer lines has resulted in the removal of some of the neighborhood’s mature trees. The new trees that have been planted are still



young, and not yet able to provide shade and relief from the sun.

Thomas Greene Park—notably, the only public park in the area—is a modest 2.25 acres. It contains an outdoor swimming pool called the Douglass and DeGraw Pool, commonly referred to as the Double D Pool, as well as a toddler pool. The park is a crucial resource for the community, with the pool functioning not only as a recreational outlet but also as a summer cooling center—important to combat the impact of UHI on neighborhood residents. A recently refurbished part of the park borders Third Avenue and features a playground and mature trees with lush leafing. That portion of the park is only about a third of its footprint; the remainder is paved or built area, including the pool.

However, large portions of this popular—and important—park are expected to be taken offline for several years, due to the discovery by the EPA of the remains of an old manufactured gas plant, located on the western two-thirds of the park, which contains underground coal tar waste that is leeching into the Gowanus Canal. The site must be remediated as part of the Superfund cleanup. Furthermore, the EPA has plans to site an 8-million-gallon raw sewage and stormwater retention tank, to be built by the New York City Department of Environmental

Environmental Interest Areas

- New York City Housing Authority (NYCHA) Owned Buildings
- Gowanus Study Area

Environmental Hazards

- Gowanus Canal Superfund Site
- Gowanus Brownfield Opportunity Areas (BOA's)
- Manufactured Gas Plant (MGP) Sites

Industrial Zones

- Industrial Zoned Areas
- Industrial Business Zone

Source: Manufactured Gas Plant and Brownfield Opportunity Areas map is produced from the New York State Department of Environmental Conservation. Digital data is derived from the Environmental Protection Agency.

Environmental Interest Areas in Gowanus.

Credit: Fifth Avenue Committee

Protection (NYC DEP), across from the park—a project that will result in the disturbance of as much as two-thirds of the park for excavation operations. The EPA, which is in charge of the cleanup, has said that a temporary park will be established while Thomas Greene is offline, and community members have suggested that the corner lot owned by Con Edison, on Nevins Street between Baltic and Butler streets, be considered for the temporary park.

In the vicinity of the existing park, there are a number of private recreational facilities offering indoor tennis, fencing, rock climbing, and other sports. However, these new recreational facilities are costly and unaffordable to much of the Gowanus population—neighborhood residents rely on the park.

Some of the low income residents of the community live in the three New York City Housing Authority (NYCHA) properties in Gowanus. One of them, NYCHA’s Wyckoff Gardens, is within the study area and consists of three 21-story white-brick buildings containing 527 apartments. NYCHA is opening some of its campuses to private development as part of its NextGeneration NYCHA program, and the agency has selected Wyckoff Gardens as one of the first sites where it will allow private developers to build on public-housing land.

NYCHA has proposed a small parking lot in a grove of large, leafy, mature trees as the future site of this new development, to be comprised of 50 percent market-rate units and 50 percent affordable units.

Meanwhile, private market-rate housing is being developed—on their tour of the neighborhood, panel members saw a construction site for a new development across the street from Wyckoff Gardens. While residents in public housing might be paying \$500 a month in rent, panel members were told that some older townhouses in the area are selling for as much as \$2 million. A tenant leader at Wyckoff Gardens who met the group on its walking tour bemoaned the loss of a block of stores—including a pharmacy, a grocery store, and a 99-cent store—to the aforementioned construction project. All were businesses NYCHA tenants, and others in the area, have long relied on.

What's Happening in Gowanus: A Post-TAP Update

The New York City Department of Environmental Protection's (NYC DEP) application for 'Gowanus Canal CSO Facilities' to acquire the three privately owned parcels on the head of the Gowanus Canal was certified by the New York City Department of City Planning in September of 2017 to begin the formal public review process. Additionally, NYC DEP presented their design and massing of the 8 million gallon CSO retention tank and head house for the site to the Public Design Commission in August of 2017 and highlighted the goal of providing publicly accessible open space on 2/3 of the site on top of the CSO tank. To learn more, visit NYC.gov.

Demographics and UHI's Impact on Gowanus's Low-Income Population

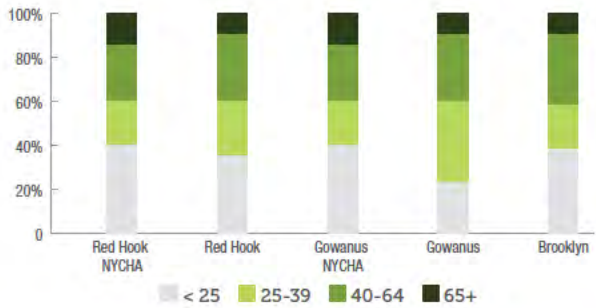
FAC provided comprehensive demographic data for Gowanus and its surrounding neighborhoods in the briefing book, in order for the panelists to familiarize themselves with the residents who call Gowanus home.

Population & Household Characteristics (2010)

	Population	Housing Unites	Households	Average Household Size
Brooklyn	2,504,700	1,000,293	916,856	2.69
Red Hook	12,399	5,604	5,302	2.33
Red Hook Houses	6,948	2,846	2,829	2.46
Gowanus	14,728	6,727	6,185	2.36
Gowanus Houses	5,209	1,900	1,860	2.67

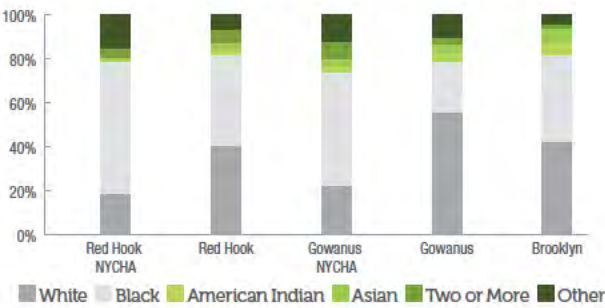
Source: [1] "Demographic Overview| D.A.R.E.S. Report". HR&A Advisors, Inc. February 24, 2015.

Age Distribution (2010)

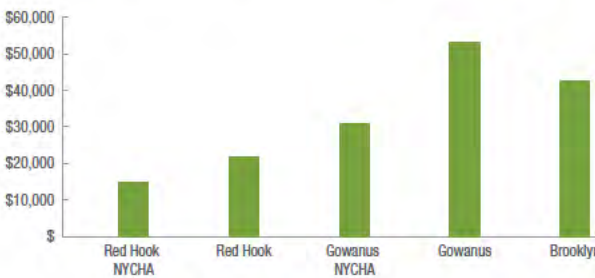


Source: [1] "Demographic Overview| D.A.R.E.S. Report". HR&A Advisors, Inc. February 24, 2015.

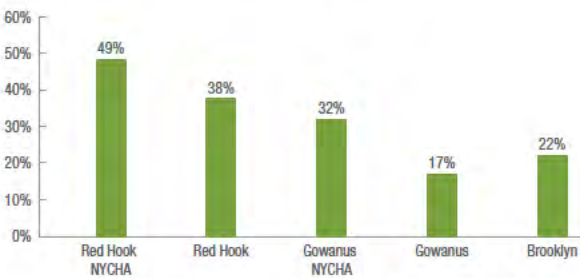
Race (2010)



Median Household Income (2008-2012)



Rate of Poverty (2008-2012)



Source: [1] "Demographic Overview| D.A.R.E.S. Report". HR&A Advisors, Inc. February 24, 2015.

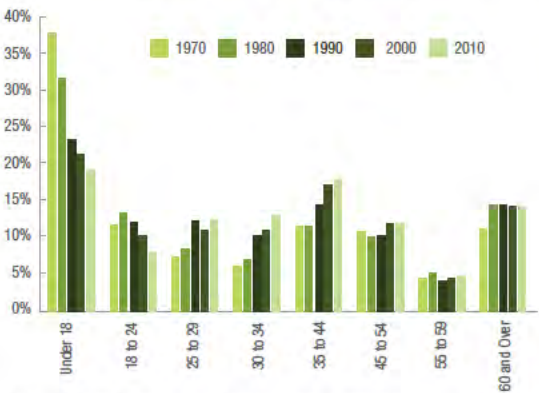
Among these residents are 4,000 public housing tenants, and these tenants tend to be lower-income and older than the population at large. NYCHA residents also tend to have higher rates of asthma and other chronic diseases. According to U.S. Census data, as much as 10 to 25 percent of the Gowanus population lives below the poverty line; and in Wyckoff Gardens, 25 to 50 percent of residents live below the poverty line.

UHI is a particular concern for Gowanus's poor and underserved population because UHI disproportionately affects such vulnerable populations. Hotter nighttime temperatures are especially dangerous during extreme heat events. Residents are often unable to recover from the daytime heat, and most do not have air conditioning units due to the cost of the units themselves and associated fees imposed by NYCHA. As a result, they become more vulnerable to heat-related health problems in subsequent days.

Furthermore, there are specific places in the study area that could be described as "urban heat deserts"—areas

where paved surfaces are unrelieved by shading and greenery of any type. These include gas stations and parking lots. Also included are bare warehouse walls that re-radiate heat, increasing air temperatures—

Age Distribution of Gowanus as Percentage of Total Population, 1970-2010



Source: U.S. Census Bureau (1970-2010 Decennial Census). Accessed through Minnesota Population Center, National Historical Geographic Information System (NHGIS), www.nhgis.org

According to U.S. Census Bureau statistics, the age distribution in Gowanus has skewed older in recent years. Older populations are more vulnerable to UHI.

New Challenges for Gowanus

Gowanus clearly is already burdened with significant challenges: poverty, Superfund toxicity, lack of parks and open space, heavy traffic and a lack of pedestrian safety, poor air and water quality, high asthma rates, poor access to services and pharmacies, and hospital and health center closures leading to increased emergency room visits. Now climate change—and additional challenges—lie ahead. These challenges are explored in this chapter.

Scarce Park and Green Space at Risk

Gowanus already has a dearth of park and green space, and what little is there is currently at risk. In the near future, a portion of the only park in the area—Thomas Greene Park—will likely be taken offline due to cleanup of an old manufactured gas plant, located on the western two-thirds of the park, which is leeching coal tar waste into the Gowanus Canal, and the siting of an 8-million-gallon raw sewage and storm water retention tank that will reduce the amount of raw sewage that enters the canal. In addition, the community will lose mature trees if NYCHA allows the infill development at Wyckoff Gardens to be built on the tree-shaded area of the Wyckoff campus that it has identified as the site for the new development. The installation of new sewers in the community—while hugely important—has meant the loss of some of the community’s mature trees, and the new ones that have been planted are not yet big enough to provide shade.

Third Avenue, in particular, is open, exposed, and *hot*. There are some blocks where, walking along, all one sees are the solid sidewalls of buildings. Those solid walls radiate heat—adding to UHI—and they also project unfriendliness. Not only is Third Avenue a hot zone, in places it is an inhospitable one.

However, adding green space to the community is more complicated than simply planting a lot of trees—and this is aside from the fact that there is not an abundance of tree pits to begin with. For one thing, manufacturers and businesses in the area have mixed feelings about street trees. They have concerns about trees blocking the

areas in front of their warehouses and shops, possibly affecting parking, pickups, and deliveries that are crucial to the efficiency of their businesses.

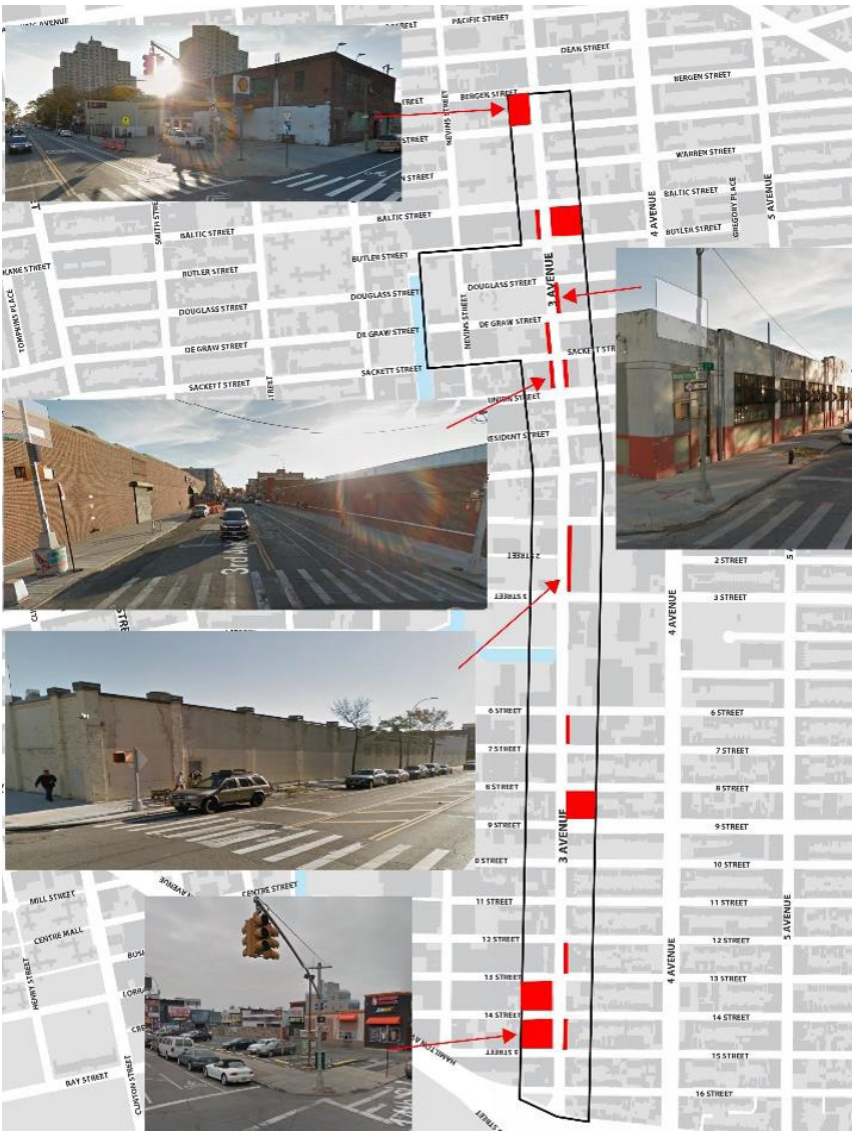
There are other reasons tree planting must be managed with care. Flooding in Gowanus is not only a matter of the canal overflowing its banks—it also relates to the fact that this former salt marsh has creeks running underground, resulting in a high water table that causes groundwater seepage. This can make it difficult for trees to take root. Furthermore, because of the widespread contamination in the area, there can be issues with soil contamination and with digging deep for tree planting.

The Social Repercussions of a Changing Climate for Gowanus

With its increased temperatures and more frequent and prolonged heat waves, climate change will only intensify UHI in Gowanus. If all else does not change, the health risks for local residents and workers will increase, especially those who are elderly or have chronic health conditions or are at risk for developing such conditions. In addition, it will be more difficult for people to stay outdoors for an extended length of time in the decades ahead. Today, when it’s such a long, hot slog to get from place to place in summer, the elderly, people with disabilities, and others might already be inclined to just stay home. More heat will lead to further isolation, declining social cohesion, and, with that, the potential for certain chronic illnesses to worsen.

The Implications of the Proposed Rezoning

Panel members heard from stakeholders that the anticipated Gowanus rezoning would likely not affect the Industrial Business Zone in the southern portion of Gowanus, as part of the effort to preserve industrial jobs. The focus is expected to be north of Third Street. There, the rezoning will likely permit higher density, particularly for residential uses.



Urban heat deserts identified in the study area.

Credit: Fifth Avenue Committee

Gowanus Neighborhood Planning Study Context Map, produced by New York City's Department of City Planning. The anticipated rezoning plan will likely permit higher density and mixed-use development, while simultaneously prioritizing preservation of industrial jobs within the IBZ.

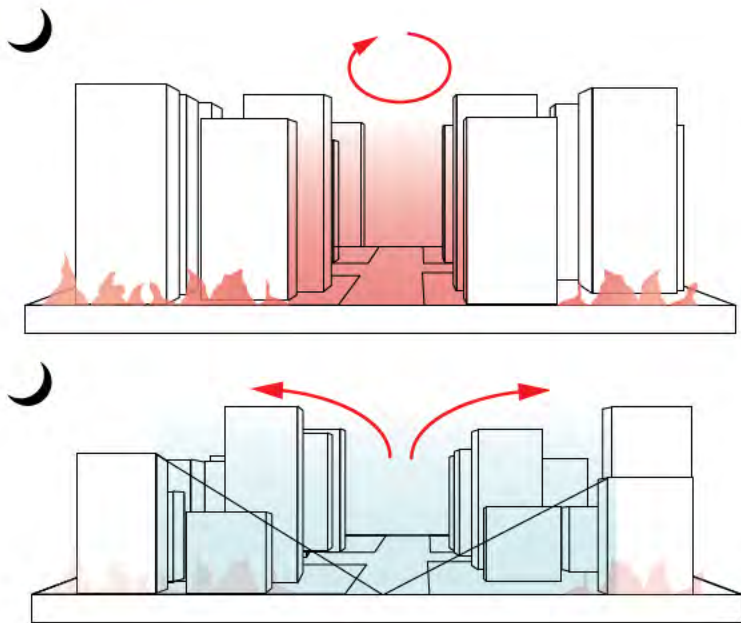
Credit: NYC DCP



Figure 6: NYC DCP Study Area, Gowanus Rezoning
Source: (22) Gowanus Neighborhood Planning Study, Context Map. New York City Department of City Planning (DCP). Fall 2016. File: gowanus_context_map.pdf

The graphic below demonstrates how higher buildings prevent streets from cooling at night leading to the intensification of UHI in neighborhoods of higher densities. The top illustration demonstrates heat being trapped at night in an area with higher buildings, whereas the bottom illustration demonstrates heat dissipating at night in an area with shorter buildings.

Credit: Jeffrey Raven



Although it is not known exactly what form the rezoning will take, maximum building height and Floor Area Ratio (FAR) are likely to increase in portions of the district, resulting in an overall increase in height and bulk. This would have huge implications for UHI because tall buildings prevent the streets that are at the base of the canyons they create from easily releasing their heat at night. Coupled with increasing temperatures and heat waves projected for the city, the heat could build up for days before being released into the night sky. Clearly, if the City proceeds with a rezoning for higher density, counter-balancing measures to mitigate UHI should be incorporated in the new zoning.

Furthermore, by rezoning, the City will be creating significant new development value by permitting more valuable residential uses, which are currently restricted. One order-of-magnitude analysis by members of the panel estimated that, if one-quarter of significantly underbuilt sites within the rezoning study area north of Third Street were developed as a result of the rezoning, the resulting value of land transactions would be \$600 million higher than if they occurred today¹. Some of that value could be captured to improve the area and mitigate the effects of the new development. The City, for its part, has said that it is making a funding commitment to neighborhoods that are being rezoned. Some of those public funds might be used to address UHI in Gowanus.

In short, the rezoning presents an opportunity to leverage the potentially extraordinary value generated to address the complex and pressing challenge of UHI. Approaching the rezoning with proposals for specific tools and investments to mitigate UHI could improve the likelihood of implementation of such measures and, as a result, have a meaningful, positive impact on the neighborhood level. This report introduces a number of types of tools, investments and development strategies that could be effective for mitigating UHI in Gowanus.

¹ The panel's analysis identified approximately 3,000,000 square feet of land area that would be significantly underdeveloped under a rezoning scenario, and assumed one-quarter of sites would be developed as a result of the rezoning. It also assumed a future residential FAR of 6.0, an existing FAR of 2.0, and an average land value for residential uses of \$200 per buildable square foot.

Key Observations and Findings

How to convert many of the challenges Gowanus is facing into opportunities? How to leverage the investment in the neighborhood to address UHI at the building and district scales? How to develop funding and delivery structures, particularly for UHI-vulnerable populations? In casting about for answers, the panel members drew on their own experience and expertise—and on-site research—to come up with the following observations and findings:

Urban Climate Factors

A new book called *Climate Change and Cities: Second Assessment Report of the Urban Climate Change Research Network*, contains a framework that panelists found helpful for thinking about Gowanus and UHI. The book describes four factors that contribute to the urban climate, all of which should be considered for mitigation opportunities in Gowanus:

1. Efficiency of urban systems:

Reducing waste heat that goes into the atmosphere, including from buildings and transportation, and also reducing emissions from air conditioners, automobiles, factories, and industry.

2. Form and layout:

Whether the three-dimensional form of a district allows for wind to flow through it and for hot air to escape at night—meaning the area can cool itself off.

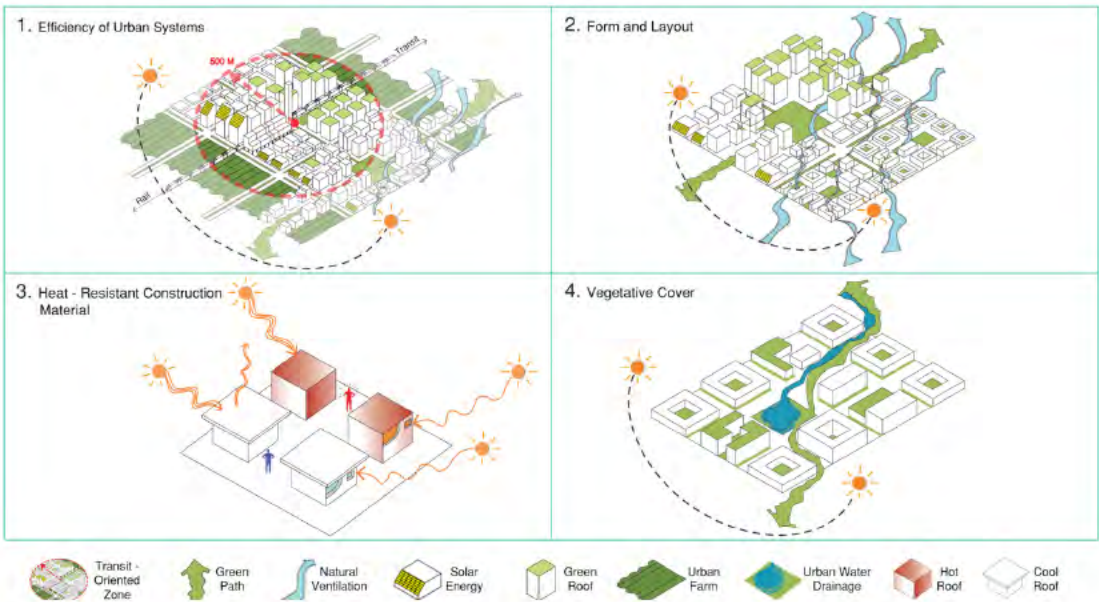
3. Building mass, construction materials, and surface characteristics:

Such as whether walls and roofs prevent the re-radiation of heat from the sun.

4. Vegetative coverage:

Which provides shading and evapo-transpiration, and does not store and re-radiate heat as much as built surfaces do.

Giving further support to the value of vegetative coverage mentioned above is a 2011 study entitled "Realising a green scenario: Sustainable urban design under a changing climate in Manchester, UK." In this study of Manchester, England, the baseline vegetative coverage was 15 percent. The study laid out three development scenarios in the context of climate change. In the first scenario, in which vegetative cover ratios remained the same, it was projected that climate change would



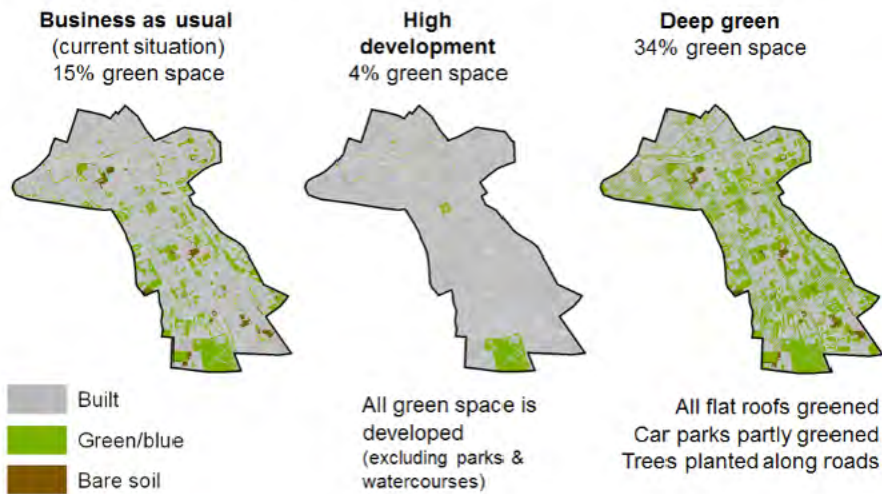
The framework in which the ULI panel based their UHI mitigation recommendations on includes addressing the efficiency of urban systems; form and layout; building mass, construction materials, and surface characteristics; and, vegetative coverage.

Credit: Jeffrey Raven

Vegetation drives urban microclimate through direct shading, evapo-transpiration, and storing and re-radiating less heat than built surfaces. A study conducted in Manchester, UK demonstrates the importance of vegetative coverage as it can decrease average surface temperatures.

Methods

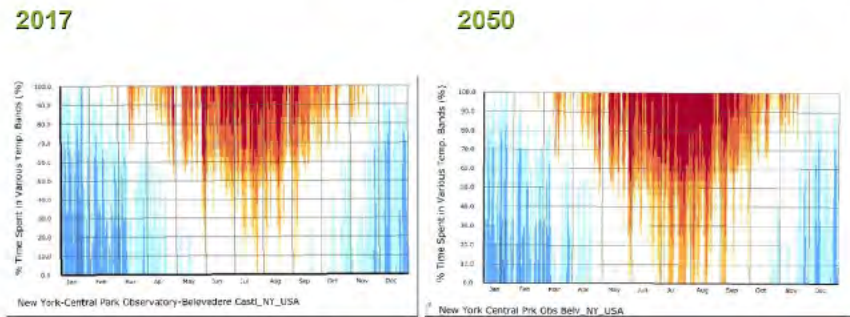
Three development scenarios were proposed:



Simulated development scenarios from aerial photograph Interpretation. Base map is © Crown Copyright /database right 2015. An ordnance Survey/ EDINA supplied service.

Climate change impacts to New York City in 2017 and projected for 2050. By 2050, New York City will experience more days that will cause extreme heat stress.

Credit: Jeffrey Raven



Comfort based on air temperature, solar radiation, wind speed and water vapour pressure



The Cooling Potential of Gowanus's Hidden Creeks and Prevailing Winds

A researcher named Eymund Diegel has been mapping the hidden underground streams in Brooklyn, and panelists discussed whether the hidden stream system in Gowanus could be harnessed for a cooling effect. Likewise, data on wind direction and force led the panel to explore whether there was a way of opening up the study area to the prevailing winds to ventilate and cool the area. Panelists also discussed the idea of the canal and the public promenade that is to be developed along it as part of a larger cooling system.

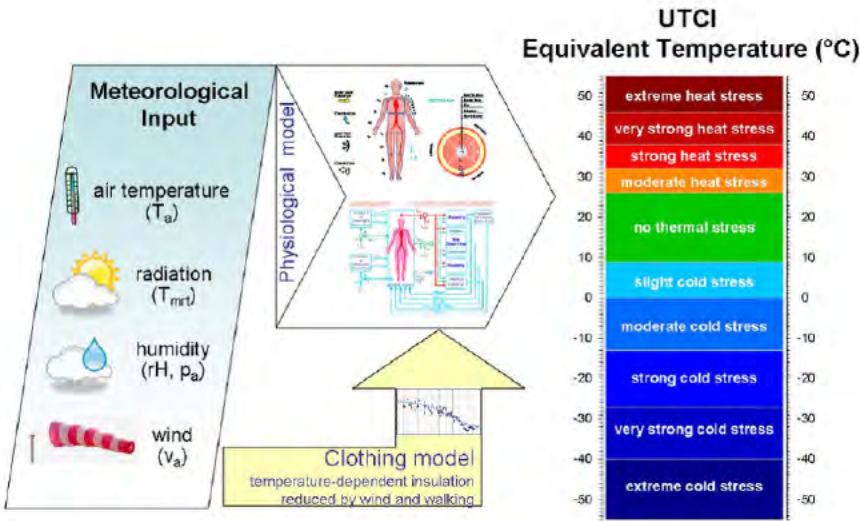
Potential Health Benefits of UHI-mitigation Strategies

Design strategies that address UHI could significantly lower health risks for area residents. A 10 percent increase in urban surface reflectivity (as opposed to absorption) has been shown to reduce the number of deaths during heat events by 6 percent, according to the



Building upon local researcher Eymund Diegel's work, the ULI panel recommends taking advantage of the hidden underground stream system in Gowanus, which could be harnessed for a cooling effect.

Credit: Provided by Fifth Avenue Committee



Global Cool Cities Alliance Study, 2013. The same study said that increasing vegetative cover by 10 percent on top of increased reflectivity can reduce mortality during heat events by 7 percent. Meanwhile, according to a study appearing in *Atmospheric Environment* entitled "The Effects of Land Use in Meteorological Modeling: Implications for Assessment of Future Air Quality Scenarios," a 40 percent increase in urban tree cover in U.S. cities was found to decrease air temperatures by up to 10 degrees Fahrenheit.

The Universal Thermal Climate Index (UTCI) is a metric for comfort that factors in air temperature, radiation, humidity, and wind.

Credit: Jeffrey Raven



A map showing the direction of the prevailing summer winds.

Credit: ULI Panel

Recommendations for a Greener, Cooler Gowanus

Perhaps not surprisingly, there is no silver-bullet solution for UHI in the study area. Furthermore, not every idea the panelists proposed is equally suitable for all parts of the area—some might be more appropriate for the more residential and mixed-use area north of Third Street and others might lend themselves to the more industrial area south of it.

However, there are many things to be done that, cumulatively, can leverage the opportunity presented by the rezoning to combat UHI and, at the same time make improvements that build on and complement the existing character of Gowanus. The following recommendations reflect the panel's vision for the Third Avenue corridor as a pleasant public space that encourages walking and biking and serves as a connector—linking the mixed-use north with the industrial south, drawing people out of their homes and workplaces and onto the street, strengthening community bonds in the process.

Achieve 20 Percent Vegetative Coverage in Gowanus

Panel members estimated that if the area were to achieve 20 percent vegetative coverage (1,000,000 square feet) it would reduce air temperature by 3 degrees Fahrenheit. The panel explored this as a potential target, particularly given that local temperatures are also likely due to climate change. Increased vegetation would also offer stormwater retention, helping combat flooding. And, of course, it would make the public realm in Gowanus much more pleasant. Greening the study area could be achieved in the following ways:

Turn the Con Edison lot between Baltic and Butler streets into a park

To address the park needs of the community, it is crucial that a replacement park be established while Thomas Greene Park is closed, as discussed earlier in this report. Because of its size and proximity to Thomas Greene Park, the Con Edison lot between Baltic and Butler streets is a good site for a temporary park that might ultimately become a permanent second park for the community. The following features are suggested for the park:

- **A pool**, to compensate for the closure of the community's single public pool.
- **A water play area**, with jets coming out of the ground, so children too young to swim in the pool have a place to frolic and cool off.
- **Shade-giving elements**, because there are no trees on the site. Some shade can be provided by installing seating with trellises that are planted with vines.
- **A pop-up tree nursery**, which could be used to propagate trees to be planted on Gowanus streets while doubling as a park-like green spot. This operation could be undertaken in conjunction with the Parks Department's Native Plant Center, using stock grown from seeds collected locally—since trees with local DNA will be better adapted to conditions in the community. Not only could the nursery become a lovely community amenity—and perhaps a permanent one—it could provide jobs to local residents who could be trained in horticulture and tree care.

Redesign Thomas Greene Park

The park should be redesigned so that it has additional green space when it reopens.

- Given that the goal is to open a pool in the new park created on the Con Edison lot, the Thomas Greene Park pool should not be re-opened but rather should receive soil and plantings for additional green space.

Vines covering the side of a building.
Credit: Max Pixel



Plant trees

Trees address the need for shade, which provides cooling, as well as greenery. But on Third Avenue—where the sidewalks are narrow and businesses are wary of anything that might block access or egress—the solution must be nuanced. Trees can be a viable option where sidewalks are wider and businesses not quite as industrial.

Pilot a project exploring new detailing for planting street trees

The current details do not offer enough green cover on the streets. The pilot should explore the spacing and design of tree pits, planting medium, and species selection.

Examples of strategies to add vegetation to the urban public realm.
Credit: ULI Panel



Add vines to cover the side walls of existing buildings

Vines will keep heat from re-radiating off buildings and increasing air temperature—and make it more pleasant to walk on the sidewalks of Gowanus. Vines will also help cool the buildings themselves, reducing the need for air conditioning and thus lowering energy costs and carbon emissions. Not least, they will make otherwise blank walls more attractive. Panel members noted that some buildings already had vines, such as Virginia creeper, growing on them. Of vital importance in the industrial area, vines will not impinge on business operations.

- Adding vines is a relatively straightforward matter. It simply requires cutting away the sidewalk near the building and installing drainage leading away from the building (so water does not infiltrate, and undermine, the structure).
- Similarly, window boxes can be added to building facades that have windows. The impact may be small, but window boxes can be aesthetically-pleasing and will increase vegetation throughout the neighborhood.

Add planters throughout the community

Walking through the area, panelists admired handsome square steel planters outside one local business—designs they felt were very much in keeping with the



industrial feel of the neighborhood. Local fabricators could make planters such as those for more widespread use throughout the neighborhood.

Green Workforce Development Opportunities

The design, installation, and maintenance of green infrastructure and other green technologies present cities with an economic development opportunity. Many of the cities implementing policies promoting green infrastructure have seen associated economic benefits and have often looked to catalyze green jobs and skills through training programs. For example, the positive economic impact of Philadelphia's Green City, Clean Waters plan was realized five years into the program. The green infrastructure industry catalyzed by the plan represented a \$60 million positive impact, and is estimated to sustain 430 jobs and \$1 million in tax revenue.

Green workforce development opportunities are crucial for programs like Green City, Clean Waters to continue and hire local workers with the desired skills and maintain the creation of jobs to support the demand of a growing green economy. To help meet this need, the National Association of Regional Councils (NARC), in partnership with ICF International, Monster Government Solutions, MWH Global, and Colorado Energy Group, received a Pathways Out of Poverty grant from the U.S. Department of Labor to create strategies in four regions to train and place workers in green jobs. Through this program, NARC established training programs in green trades in tandem with local community colleges that could provide credentials. More information is available here: <http://narc.org/development/workforce-development/green-jobs/>.

Explore starting a program to enlist local metalworkers to create planters for the community

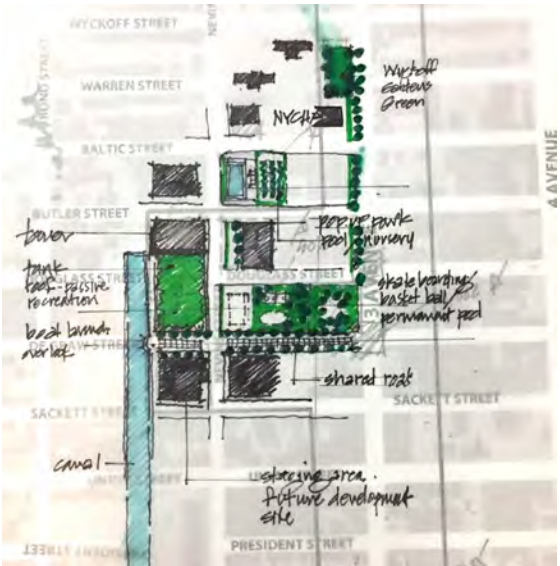
Such a program could perhaps involve an apprenticeship in which local residents learn to make planters from professional metalworkers.

Preserve the leafy area at Wyckoff Gardens that has been proposed for infill development

Panelists felt strongly that this pleasant area, with its mature, shade-giving trees, should be preserved. In fact, they recommend extending the greenery there by landscaping the small parking lot amid the trees. As for the new development, it could be located on the empty parking lot on the corner of Baltic Street and Third Avenue where it won't disturb precious existing greenery.

Require that new parking lots associated with new development in the area have trees and bioswales

Trees and bioswales will add greenery to what would otherwise be barren, paved places that would exacerbate UHI.



An overall green vision for Gowanus.
Credit: ULI Panel

Plant grass atop the sewage tank to be sited between Butler and Degraw

A grassy area here would provide a spot for passive recreation in the community.

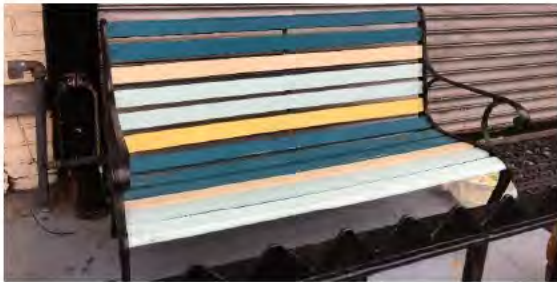


The panel recommends that additional green space is created atop the CSO tank siting area, and that other public realm improvements - such as the creation of a pedestrian corridor - are made within the study area.

Credit: ULI Panel

Create “areas of respite”

Much of the discussion during the TAP focused on how UHI can make it difficult to spend time outdoors during peak heat for the elderly, mobility impaired and others less likely to move quickly. In response, the panelists



The panel recommends creating “pathways of respite” throughout the study area.

Credit: ULI Panel

explored creating “pathways of respite” and ‘areas of respite” which would provide people with pleasant, cool spaces to break up journeys through the summer heat. These small, green areas should be added throughout the community to provide spots for people to pause in the shade and for older people to sit and rest. These micro parks could be street-corner parks or even just a bench between two street trees. Such spots—especially if they are placed where there’s airflow and contain seating—could help draw people out into the community and contribute to the social resiliency of Gowanus while combating UHI. These spaces would also offer an inviting amenity in the public realm at other milder points in the season.

Create “paths of respite”

Linked together, these “areas of respite” could create a “pathway of respite” which would offer relief from UHI, contribute to mitigation and improve neighborhood connectivity for pedestrians. This series of linear green spaces providing shade and vegetation should be required in the rezoning and should be designed to make the most of opportunities to mitigate UHI. These green corridors—aligned with prevailing winds and underground streams—should feature street trees, vines on blank walls, and, where possible, green roofs. Features along these corridors could be accessible to the public or not. The corridors should be established along wider east-west streets to capture the summer breeze and circulate air, allowing the neighborhood to cool off at night.

The most promising streets for this new green network are as follows (starting in the southern portion of the study area and, in some cases, spreading beyond the study area’s boundaries):

- **9th Street, from the canal to Fourth Avenue** (connecting with two places of respite on the northeast and southeast corners of Third Avenue)
- **5th Street, from Third Avenue to Fourth Avenue** (thereby connecting with Washington Park)
- **3rd Street from the canal to Fourth Avenue** (again, connecting with Washington Park, but also with a place of respite on the northeast corner of Third, and, finally, with the canal)
- **Carroll Street from the canal to Fourth Avenue** (connecting with yet another place of respite, on the northeast corner of Third Avenue)

- **Douglass Street and Degraw Street from the canal to Fourth Avenue** (drawing people from Fourth Avenue to Thomas Greene Park and then, ultimately, to the new green corridor along the canal)

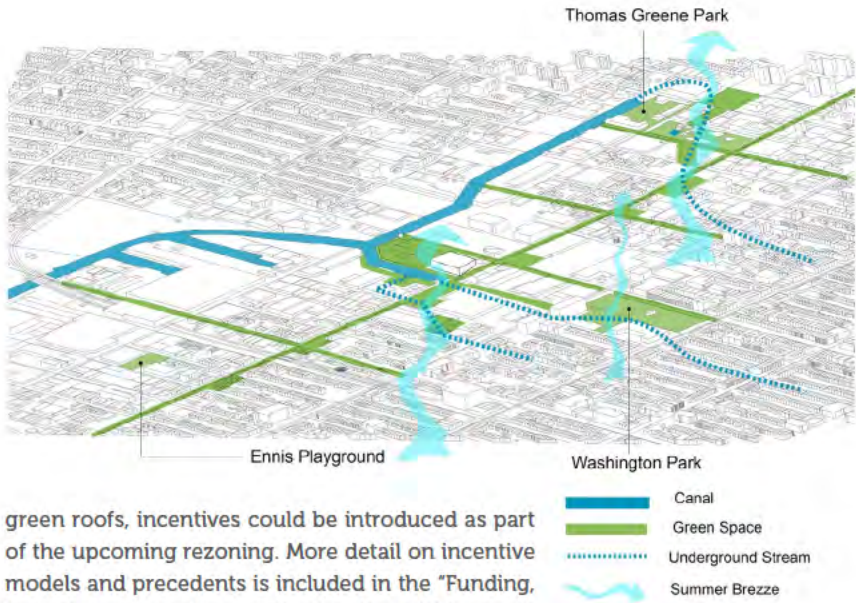


A pathway of respite that weaves through the study area. This includes enhancing Thomas Greene Park and the connection to the canal, opening areas to prevailing winds for cooling, a vegetative connection from Washington Park to the canal, creating east-west green corridors, and reconfiguring the roadway south of Carroll Street to add vegetation in the right-of-way.

Credit: ULI Panel

Introduce additional green roof incentives

The panel members estimated that the proposals above could achieve 300,000 square feet of green coverage in Gowanus. To reach 20 percent green coverage, an additional 700,000 square feet would still be required. This could be accomplished with green roofs as well as the proposed parks and green infrastructure at the street level. To encourage the implementation of these



green roofs, incentives could be introduced as part of the upcoming rezoning. More detail on incentive models and precedents is included in the “Funding, Incentives and Implementation” section of this report.

Improve the Street Environment to Better Encourage the Use of Transit and People-Powered Transportation

Such a street environment would both reduce heat exhaust that exacerbates UHI and benefit the health of the local community by providing better opportunities for walking and biking.

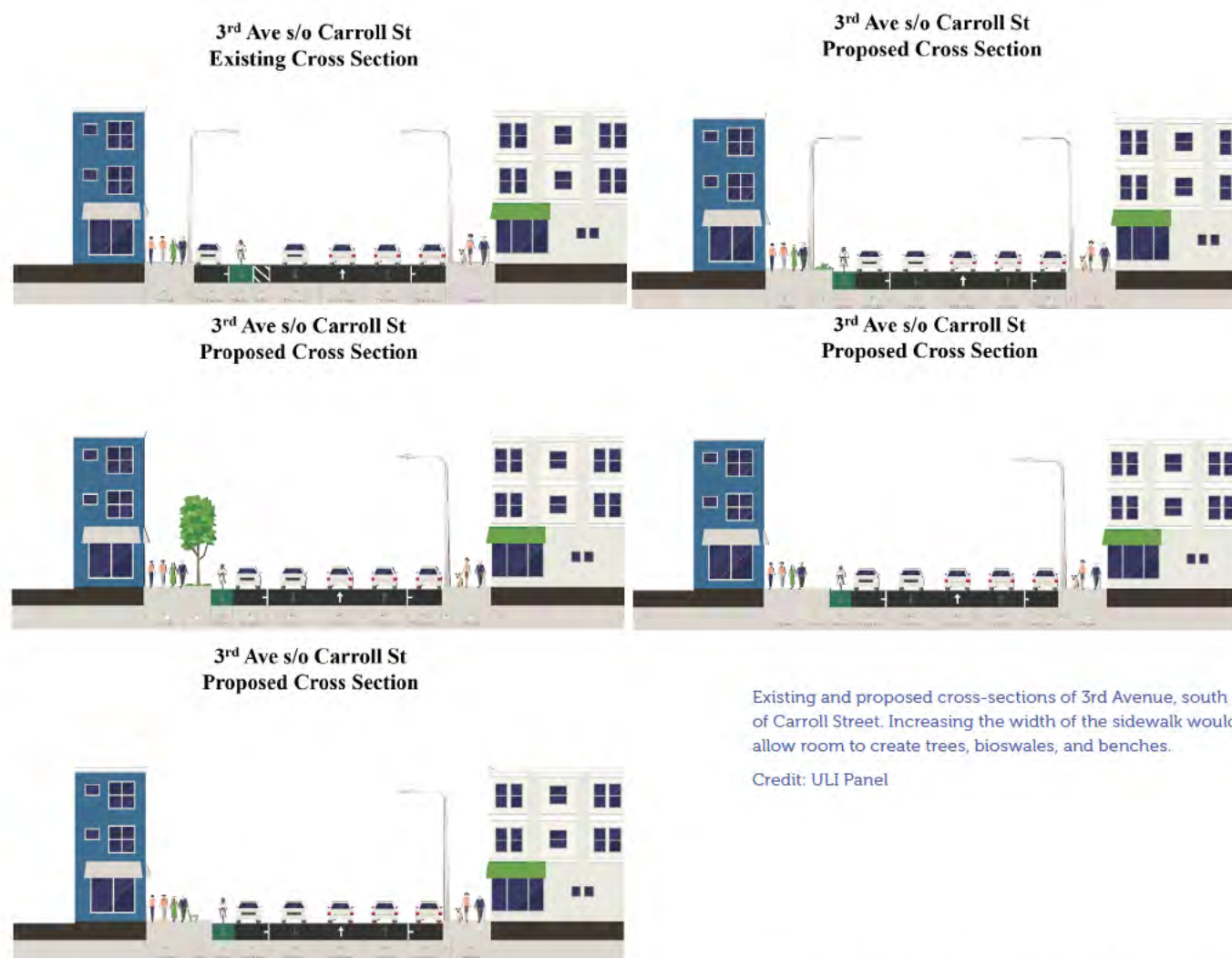
Reconfigure Third Avenue South of Carroll Street

Currently this six-lane roadway has a lane on either side devoted to parking; a bike lane; and three driving lanes. The sidewalks on either side are 11 feet wide, allowing two feet for lampposts.

Increasing the width of the sidewalk to 15 feet on the west side of the avenue by rearranging the existing bike and parking lanes would yield four feet of space for trees, bioswales, and benches. In the new configuration, the bike lane would shift to the edge of the street bordering the new vegetation, providing a safer and more pleasant ride for cyclists—and perhaps enticing more people to use bikes instead of personal vehicles, which would help to reduce heat exhaust on Third Avenue.

The “Green and Blue Strategy” for Gowanus, which knits together UHI mitigation strategies such as increasing vegetation, creating pathways of respite, creating additional public green space, while simultaneously harnessing the cooling power of underground streams and the prevailing summer winds.

Credit: ULI Panel



Existing and proposed cross-sections of 3rd Avenue, south of Carroll Street. Increasing the width of the sidewalk would allow room to create trees, bioswales, and benches.

Credit: ULI Panel

Implement safety improvements at the intersections of Third Avenue at 16th Street, and Third Avenue at Prospect and Hamilton Avenues

The panel heard from multiple stakeholders that the intersections where Third Avenue intersects with 16th

Street, and then where Third Avenue intersects with Hamilton and Prospect Avenues, are dangerous for pedestrians, bicyclists, and drivers alike. In order to implement safety improvements at this key intersection, the panel recommends replacing the stop signs with a traffic light at the intersection of Third Avenue and 16th Street, restricting traffic on 16th Street by forcing traffic to turn right onto Third Avenue to create fewer conflicts, and tying the traffic signal between the two intersections and providing a safer pedestrian crossing at the southern side of the intersection.



Proposed safety improvements to the intersections of Third Avenue and 16th Street and Third Avenue at Hamilton and Prospect Avenues.

Credit: ULI Panel

Explore bicycle parking at NYCHA sites

It is important that there is sufficient bike parking for those who currently live in NYCHA properties and want to cycle as well as those who will reside there once infill development is constructed. The provision of adequate bike parking may encourage cycling among members of the NYCHA community.

Review parking regulations to provide more commercial loading space on Third Avenue

Reserve parking spaces for EV and hybrid vehicles

Make the Transportation System More Efficient

Making the transportation more efficient would decrease emissions that exacerbate UHI. Panel members suggest short-, medium-, and long-term strategies that can be pursued:

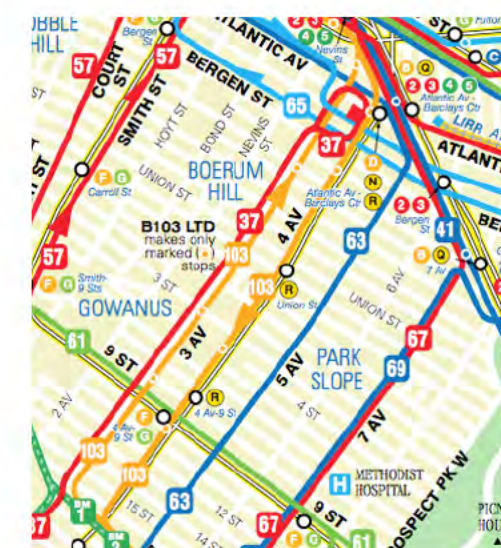
Short-term solutions:

Increase and improve transit service to encourage more people to take a subway or bus rather than drive or use taxis and other ride services

- Increase frequency on the B37.
- Add B103 stops on Third Avenue.
- Improve R train service.
- Consider NYCHA shuttles to key destinations.

Reduce traffic on Third Avenue

- Maintain a single travel lane in each direction during AM peak period north of Union Street.



Transit routes serving the study area.

Credit: Provided by Fifth Avenue Committee

Medium-term solutions:

Increase transit connectivity

- Consider east-west bus transit routes.

Address Industrial Sector Opportunity

- Provide incentives for industrial businesses to purchase low-emission fleets.
- Consider barge delivery of goods.

Short-Term Transportation Interventions and Associated Urban Heat Island Mitigation

Transportation Intervention	Urban Heat Island Mitigation
Increase transit service B37 Increased frequency More B103 stops on 3rd Avenue Better R train service Consider NYCHA shuttles to key destinations	Decreased emissions (via increased usage of multi-modal transportation)
Reduce traffic on 3rd Avenue Maintain 1 travel lane in each direction during AM peak period north of Union Street	Decreased emissions
Review parking regulations to provide more commercial loading space on 3rd Avenue Implement safety improvements at key intersections 3rd Avenue and 16th Street	Decreased emissions (via fewer stalled vehicles)
Provide more safe bicycle parking at NYCHA sites Reserve parking spaces for EV and hybrid vehicles	Decreased emissions (via increased pedestrian activity, bike use and EV/hybrid vehicle use)

Medium-Term Transportation Interventions and Associated Urban Heat Island Mitigation

Transportation Intervention	Urban Heat Island Mitigation
Increase transit connectivity Consider east-west bus transit routes	Decreased emissions (via increased usage of multi-modal transportation)
Reduce traffic impacts re: rezoning Provide parking maximums/no on-site parking Provide incentives for industrial uses to purchase low emission fleets Design for good land use mix to create walkable community Redesign 3rd Avenue between Carroll Street and 15th Street Create parking-protected southbound bike lane and reuse hatched buffer area for bioswale/greening measures	Decreased emissions (via increased usage of multi-modal transportation, increase in ped/bike travel and use of low-emission fleets)

Long-Term Transportation Interventions and Associated Urban Heat Island Mitigation

Transportation Intervention	Urban Heat Island Mitigation
Increase transit connectivity Canal-based transit to/from subway Integrate BQX into transit network	Decreased emissions (via increased usage of multi-modal transportation)
Implement pedestrian improvements New pedestrian bridge over canal (Degraw) Pedestrianize Nevins Street	Decreased emissions (via increase in ped/bike travel)
Consider new pavement designs/concrete pavement on 3rd Avenue to reduce black-top surface	Building Materials

Reduce traffic impacts from new development that will result from the rezoning

- Institute parking maximums/no on-site parking.
- Design for good land-use mix to create a walkable community.

Long-term solutions:

Increase transit connectivity

- Institute canal-based transit to and from subway.
- Integrate BQX into transit network.

Implement pedestrian improvements

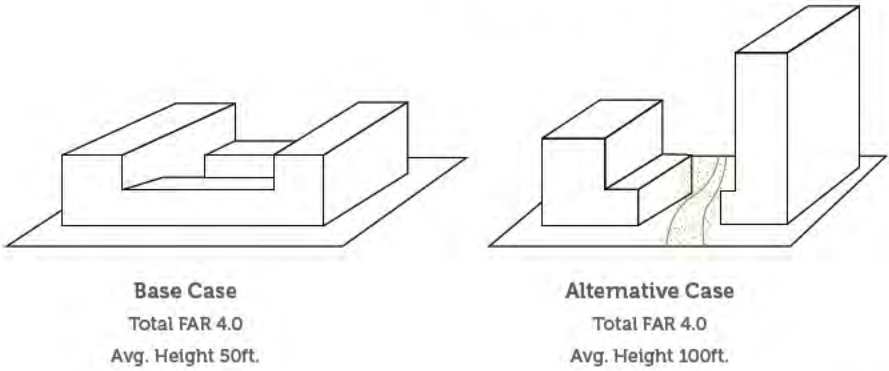
- Build new pedestrian bridge over the Gowanus Canal (at Degraw Street).
- Pedestrianize Nevins Street.
- Consider new pavement designs/concrete pavement on Third Avenue to reduce black-top surface.

Promote Efficient Building Design

Buildings can contribute to UHI in a number of ways; conversely, they can be designed to mitigate UHI. Incentives and requirements for efficient building design could be a component of the rezoning and complement requirements and incentives addressing green space in the neighborhood.

Encourage buildings that enhance airflow

The massing, or form, of a building can either block airflow or encourage airflow through the community, permitting heat to escape. Zoning should require the sort of massing that allows ventilation of the community, or it could incentivize doing so by permitting an increased FAR for such buildings. Maps of the prevailing winds should be referenced in the context of airflow, as airflow along the path of the prevailing winds will provide the most cooling and relief from UHI.

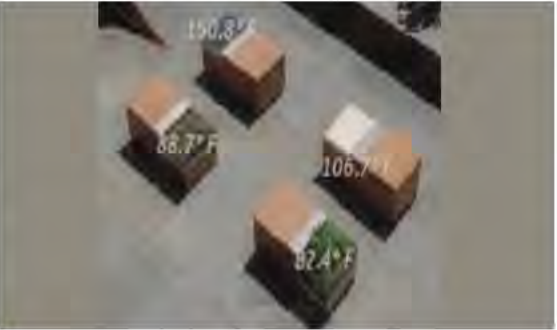


Example of massing that allows, rather than inhibits airflow through a building to promote UHI mitigation.

Credit: ULI Panel

Encourage cool and green roofs

Rooftops absorb and re-radiate heat, especially since they are typically black. On an 85-degree Fahrenheit summer day, a black roof can get as hot as 151 degrees Fahrenheit. However, a white roof—or “cool” roof—heats to just 107 degrees Fahrenheit. With a green roof the temperature drops to 89 degrees Fahrenheit, and if the green roof is thickly planted, the temperature plummets to 82 degrees Fahrenheit—lower than the air temperature. Buildings with cool or green roofs will not only contribute less heat to the atmosphere, their interiors will heat up less and require less air conditioning, thereby lowering energy costs and reducing emissions.



Construction materials matter. This graphic to the left shows the drastic surface temperature difference among different types of roofs. An intensive green roof remained a cool 82.4 degrees Fahrenheit on an 85 degrees Fahrenheit day, as compared to a traditional black roof – which reached a sizzling 151 degrees Fahrenheit.

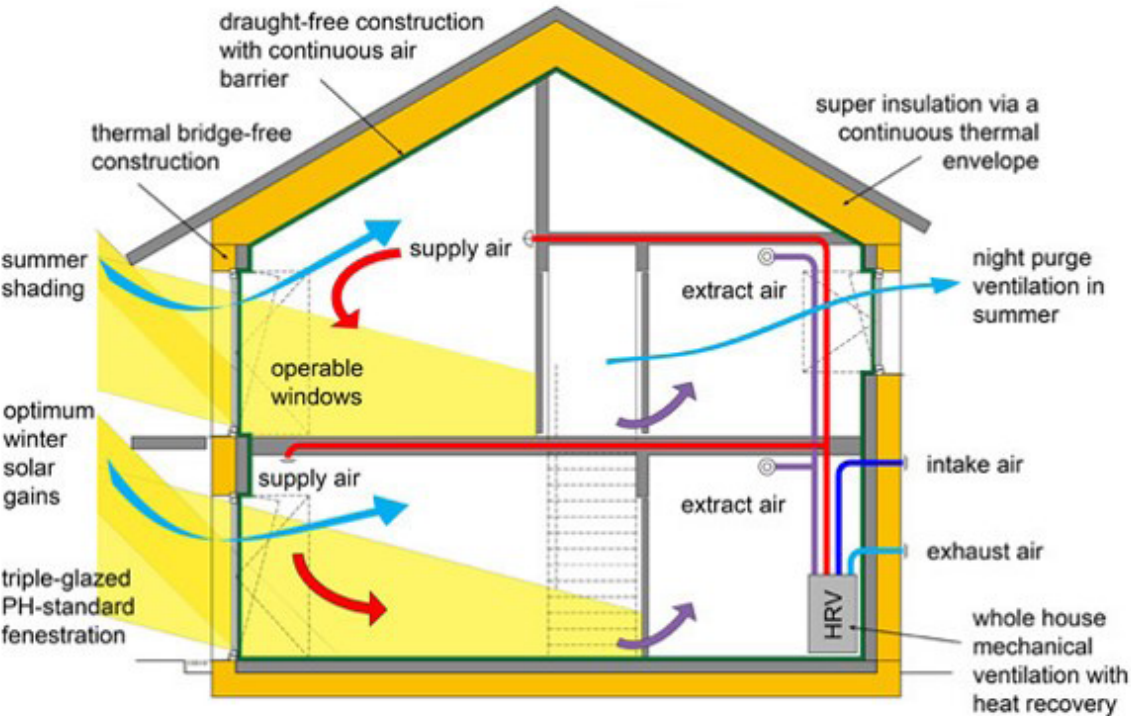
Credit: Provided by Matthew Payne

Encourage green walls

Building facades also contribute to UHI through what’s called “heat rejection”—when the building re-radiates heat from the sun. As discussed earlier, adding vines to the exterior sides of buildings—creating “green walls”—can minimize the amount of heat that radiates off them. Not only will buildings with vined walls contribute less heat to the atmosphere, their interiors will heat up less and require less air conditioning, thereby lowering energy costs and reducing emissions.

Encourage energy-saving features

Improving a building’s efficiency—and thus reducing energy expenditures and emissions—can also be achieved through energy-saving features. These features include insulation and double- or triple-pane windows (to minimize energy waste through the leakage of heated or cooled air) as well as awnings (that provide shade and keep rooms from heating up so much, reducing the need for air conditioning). Breezeways can provide natural ventilation, having the same effect.

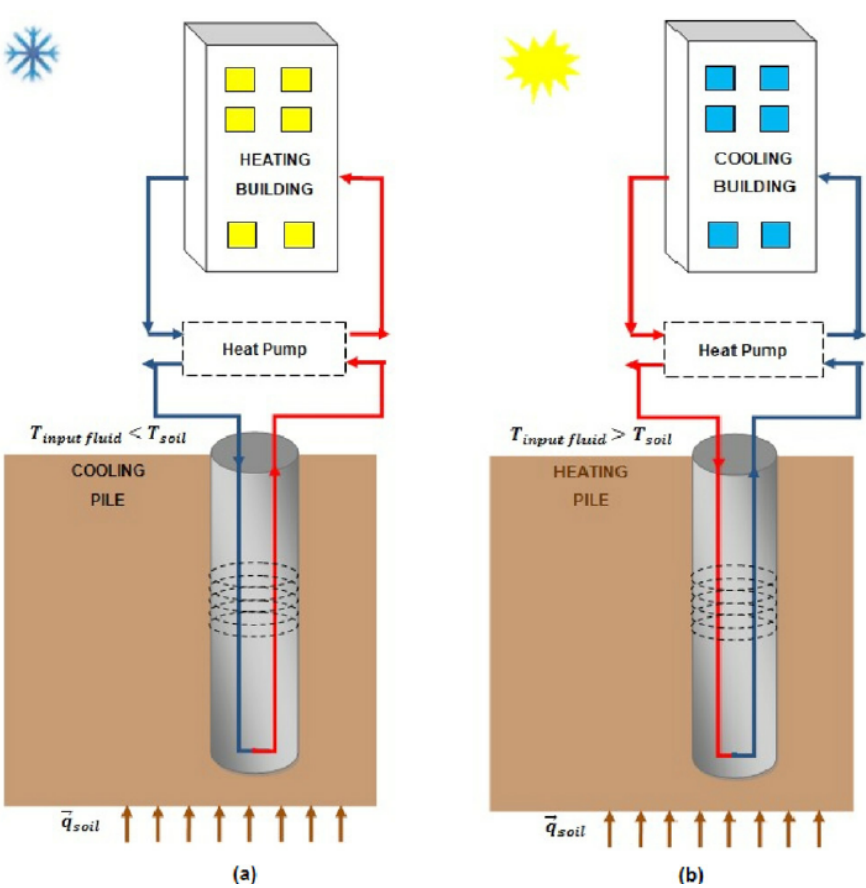


There are numerous ways to improve the efficiency of a building. For example, implementing “envelope improvements” (i.e., insulation, shading) as well as taking advantage of natural ventilation (i.e., breezeways, floor plate depths).

Credit: Provided by Matthew Payne.

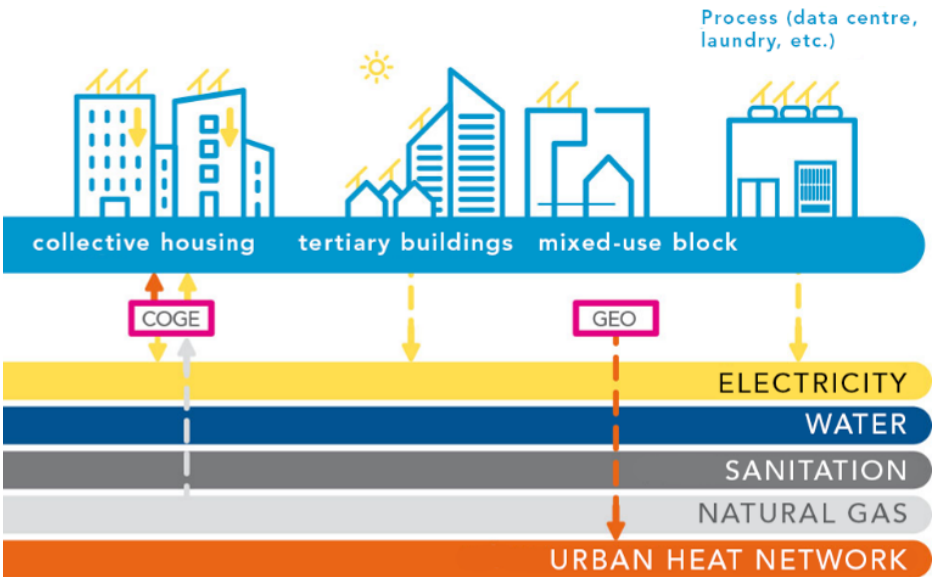
Explore the idea of re-using or re-directing solar heat

The solar heat being captured in buildings could be re-used or re-directed instead of being “wasted” (i.e., released, contributing to higher air temperatures). In the baseline “do nothing approach” the “waste” heat goes back into the atmosphere. However, waste heat can be re-directed and re-used within a building for hot-water generation, and it can also be redirected to another building (either directly, from one building to another, or indirectly, through a district heat network). It is also possible to channel heat into the ground below a building or buildings or, in Gowanus, into the canal. Clearly, some of these measures may be easier to accomplish in new buildings, with the necessary features built into them from the start.



Redirection of waste heat to ground or canal to improve energy efficiency of buildings.

Credit: Matthew Payne



Redirection of waste heat to other buildings or uses.

Credit: Matthew Payne

Funding, Incentives and Implementation

So how does Gowanus accomplish the ambitious recommendations the panel has outlined? Panel members explored ideas for ways in which to implement UHI-mitigation measures in Gowanus, and looked to examples of how similar measures have been financed and implemented in cities across the country – which include a combination of regulatory and incentive-based strategies. These strategies would be specifically tailored for the two distinct districts in the panel’s study area – the mixed-use district north of Third Street and the industrial district south of Third Street.

New York City’s Track Record for Incentivizing Green Building

New York City already has some of the most advanced climate action planning in the U.S., including dedicated action outlined in the OneNYC Plan and recent commitments to the Paris Climate Agreement. New York City also already has incentive programs in place to encourage sustainable and energy-efficient development. For example:

- New York City and New York State passed legislation in 2008 to provide a one-year property tax abatement (the Green Roof Tax Abatement) for property owners that install green roofs on their buildings – an abatement that is now available through March 15, 2018.
- The City Council adopted the Zone Green Text Amendment in 2012 which is a citywide zoning text amendment that removed zoning impediments to the construction and retrofitting of green buildings, allowing owners more choices for the investments they can make to save energy and money while improving environmental performance.
- Some boroughs also offer specific programs to incentivize green roofs and other energy



efficiency measures, such as the Bronx Environmental Revolving Loan Fund (RLF), which provides zero-interest loans of up to \$100,000 to businesses and building owners to implement energy efficiency measures that improve air quality.

This “sticks vs. carrots” approach incentivizes owners, developers and tenants to make green infrastructure and energy efficiency improvements, while also placing requirements (or penalties) that also work to offset the effects of UHI.

Credit: ULI Panel

Harnessing Value Created by the Rezoning for UHI-Mitigation

To advance UHI-mitigation in Gowanus, specific requirements and incentives aimed at addressing UHI should be incorporated into the upcoming rezoning. Importantly, the panelists recommended that the effects of Urban Heat Island should be included in the analysis of public health impacts in the Environmental Assessment Statement (EAS) associated with the rezoning. This would set a precedent that could be followed by other areas subject to rezoning, and even by other cities searching for strategies to mitigate Urban Heat Island.

As mentioned earlier in this report, a back-of-the-envelope estimate created by the panelists envisioned that as much as \$600 million in gross land value could be realized through the Gowanus rezoning. Panelists noted that this significant value creation could be leveraged in part to address UHI. In other words, a portion of the value created could be captured to fund green infrastructure investments, such as the creation and maintenance of parks, green roofs, cool roofs, cooling centers and the “path of respite” envisioned by the panel.

The panelists agreed that there are many ways to fund the recommendations, one of which would be to incentivize developers, businesses and homeowners to pay for mitigation measures upfront and get paid back through rebates, similar to New York City’s Green Roof Tax Abatement mentioned earlier. There are many examples of this type of arrangement elsewhere in the county, which include:

- In Minneapolis, Minnesota, any building that improves its storm water management—such as by installing a green roof—receives a 50 percent credit against mandated storm water usage fees paid to the City.
- In Philadelphia, Pennsylvania, businesses that implement a green roof can earn a rebate of 25 percent on costs up to \$100,000 through the Green Roof Tax Credit program.
- Seattle, Washington’s RainWise Program offers rebates for rain gardens or cisterns if the property is in a targeted sewer overflow area.
- Nashville, Tennessee is promoting the installation of green roofs through a measure providing a \$10 reduction in a property’s sewer fees for every square foot of vegetative roof.
- In more suburban and low-density contexts, Montgomery County, Maryland, funds the Rainscapes Rewards Program that offers rebates of up to \$10,000 to property owners to install approved storm water management controls. In Anne Arundel County, Maryland, a Stormwater Management Tax Credit provides a property tax credit of 10 percent of the cost of an approved stormwater management practice, taken per year for 5 years, to a maximum of \$10,000.

Create A Green Infrastructure Fund

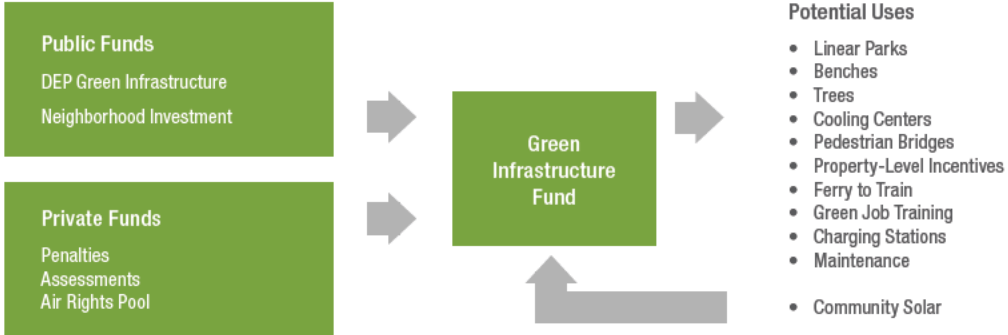
The panel recommended the creation of a Green Infrastructure Fund, funded through both public and private monies, that could then be used for green investments in Gowanus designed to offset UHI. This fund could be administered by the New York City Department of Environmental Protection (NYC DEP) to pay for a variety of UHI-mitigating measures. Private

revenue would be generated by a combination of requirements and incentives, including: assessments, penalties (for not fulfilling requirements), revenue from air rights purchases, and from a revenue pool generated from the purchase of additional FAR.

One precedent for a fund of this type is in Washington D.C., a city that boasts one of the country’s oldest sewage systems and where stormwater runoff and sewage flow into the rivers and eventually into the Chesapeake Bay Estuary, which presents a significant threat to the local waterways. Because of this, D.C. is one of the many communities across the country that is required by the federal government to invest in infrastructure to address the runoff and its associated pollution from Combined Sewer Overflow.

One facet of Washington’s stormwater management strategy was the launch of a Green Infrastructure Fund which included a \$1.7 million investment from Prudential Financial in joint venture with NatureVest and Encourage Capital. This fund will support the implementation of green infrastructure in response to and support of Washington’s new Stormwater Retention Credit (SRC) Trading System. The SRC system provides a mechanism for developers to invest in off-site green infrastructure such as green roofs and rain gardens within the city’s watershed by trading stormwater credits. This system provides developers an alternate means to reach stormwater mitigation requirements and creates an opportunity for the development of green infrastructure, and supporting installation and maintenance jobs, in underserved communities.

Washington D.C. also recently launched the first Environmental Impact Bond in the country, which was issued by D.C. Water. This tax-free bond will fund the construction of green infrastructure and stormwater management mechanisms. The bond follows the “Pay for Success” model pioneered in the social policy space, in which performance risks are shared by the public entity and investors. If green infrastructure leads to stormwater run-off reductions greater than 41.3 percent of the baseline, investors will receive an Outcome Payment from D.C. Water; conversely, if run-off is reduced by less than 18.6 percent of the measured baseline, investors will make a Risk Share Payment to D.C. Water.



Net savings from community solar can go back into the Green Infrastructure Fund.

A diagram showing how a Green Infrastructure Fund could work in Gowanus.

Credit: ULI Panel

Environmental Special District Example in Washington, D.C.

Washington, D.C. issues the first environmental impact bond in the country in September 2016. This is a tax-free bond issued by D.C.

Water for green infrastructure and stormwater management, that is modelled after Social Impact Bonds in the United Kingdom – a portion of payment to investors is dependent on an outcome of evaluations. D.C. Water will cover construction costs; performance risks are shared by D.C. Water and investors.

Source: <https://center.fuqua.duke.edu/case/2017/01/13/environmental-impact-bonds/>

	Year 1	Year 2	Year 3	Year4	Year5	
Financial Flows	\$25M Principal issues				\$25M principal repaid	If Green infrastructure Outperforms: Additional \$3.3M payment Performs as expected: No additional payment Underperforms: \$3.3M claw back from investors
	Interest payments @3.43%					
Core Project work (DC Water)	Flow meters inserted to develop baseline	Green infrastructure implemented (i.e., sites identified, interventions constructed)		Flow meters reinserted to measure impact	Evaluation validated to trigger payments	If Green infrastructure Outperforms: Accelerate scale/deployment Performs as expected: Continue original plan with confidence Underperforms: Scale back and deploy grey infrastructure instead

Based on diagram produced by Quantified Ventures

Requirements, Penalties and Incentives

In Gowanus, the study area’s two distinct districts – mixed-use and industrial – would have a series of requirements and incentives to support a private sector response to UHI. As stated earlier, these requirements and incentives differ for the mixed-use district versus the industrial district, due to the areas’ different characters and uses. The panel emphasized that it is important not to create too many or too burdensome a series of requirements and that there should be incentives in place to make it attractive for developers to implement UHI-offsetting and other environmental measures on their own.

For instance, in the mixed-use district, a building could be required to provide enough green space to meet a “green area ratio” – or the building could be penalized if it doesn’t. On the other hand, incentives could be offered for publicly accessible green roofs. In the industrial district, incentives could be provided for cool roofs, green roofs, and barge delivery of goods, as well as incorporation of vines or green walls.

The requirements (or penalties if not completed) would be part of the rezoning and apply to new development and could also apply to existing properties. Penalties for not complying with the requirements would go into the Green Infrastructure Fund.

A summary of the requirements and incentives that could be used for the two districts within the study area are summarized below:

Mixed-Use District – “Area of Respite”

Requirements (Or Penalties)

- Sky View Factor
- Green Area Ratio
- Building Envelope
- Natural Ventilation
- Green space alignment with prevailing winds
- Ground-Source Heat Pump

Incentives

- Parks
- Seating and amenities in the public realm, such as benches
- Publicly Accessible Green Roofs

An Introduction to Green Area Ratios (GARs)

Green Area Ratios, or GARs, encourage the layering of stormwater management mechanisms through the use of a score-based tool to increase runoff absorption capacity and create rich, green aesthetics. GAR programs require a certain percentage of a site be covered by green infrastructure, with different point values awarded for different interventions, and provide a menu of options for developers to reach compliance based on stormwater capture requirements. Seattle is the first city in the United States to adopt a GAR, known as the Seattle Green Factor.

Development projects must include a selection of green infrastructure elements to score points, which are then weighted by size, functionality, and aesthetics. For example, features like permeable pavement, green roofs, and bioretention mechanisms score higher than shrubbery, groundcover, and green lawns. Washington, D.C.’s GAR applies to all new buildings that require a certificate of occupancy, as well as any additions or renovation costs that exceed 100% of the building value within a 1-year period. Different zones within the district have varying GAR requirements that are in line with land-use expectations. Single-family homes and some buildings with historic designations are exempt.

Industrial District

Requirements (Or Penalties)

- Emission Reduction
- Green Area Ratio
- Cool Roofs

Incentives

- Provide % of rentable space at lower rents and long-term leases
- Green Roofs
- Barge Delivery

Thinking More About Incentives

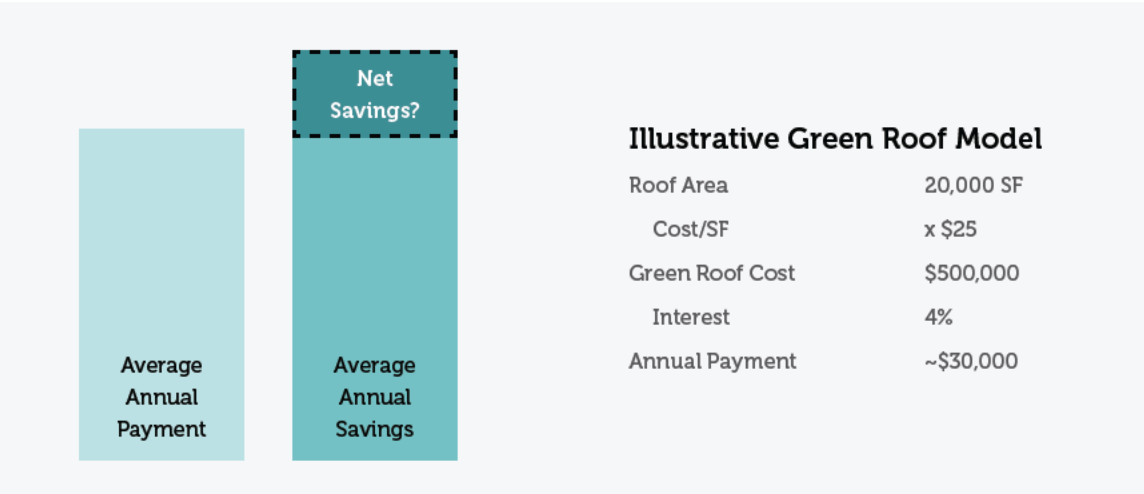
Green Roofs

In rezoning discussions, the Gowanus community could explore with DCP the possibility of introducing additional green roof incentives beyond those currently in place, such as expedited permitting or allowing greater FAR for buildings that add green roofs. Furthermore, if a building owner agrees to open its green roof fully or partially to the community—thereby increasing public green space—an even greater FAR might be available to property owners.

These incentives should also take into account the preferred locations of green spaces and corridors, including the paths of respite. Building footprints could respond to these locations, ensuring continuous green space while still developing to the same FAR.

Other cities have used incentives along these lines:

- A North American leader in green roof implementation, Chicago, Illinois offers a number of different incentives related to green roofs. The city’s zoning code offers an FAR bonus for green roofs that cover at least 50% of its area, or 2,000 square feet of contiguous roof area. Density bonuses are also available to buildings in their central business district that include green roofs. Expedited permitting programs ensure that applications with green roofs are managed within 30 days, a process that usually takes up to 3 months.
- Seattle, Washington’s original Green Streets policy offered a developer a bonus in exchange for construction of an approved streetscape. The bonus was limited to downtown Seattle.
- Portland, Oregon, gives FAR bonuses for providing “ecoroofs.”
- Austin, Texas, gives an FAR bonus for providing a green roof and an additional bonus for making them publicly accessible.



On-bill financing is a mechanism that can be used to incentivize existing owners or tenants to make improvements such as green roofs and other types of green or energy efficient investments, where the city or another entity (typically a utility) funds the energy efficiency upgrade upfront and is reimbursed over time. On-bill financing functions as a loan and the owner or tenant would pay an additional amount on their bill (e.g., utility bill) until the loan is repaid, while realizing a net savings due to increased energy efficiency.

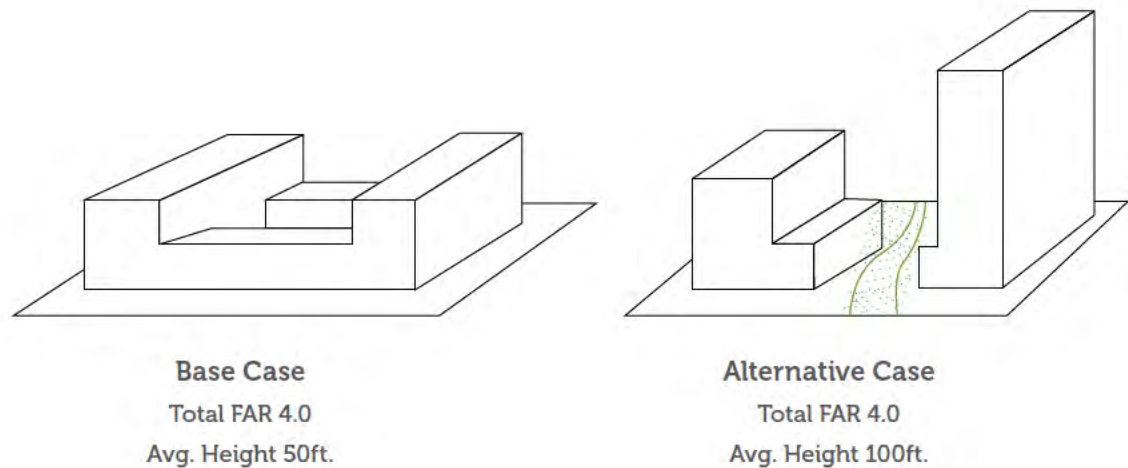
Credit: ULI Panel

Site Specific Bonus and Building Massing

Many of the panel’s recommendations for Urban Heat Island mitigation are site-specific in nature and therefore would require site-specific incentives, policies or bonuses. For example, specific sites are more suitable to the creation of a pocket park, a larger park, or the

daylighting of the streams that may run underneath the site, or green spaces along the paths of prevailing winds

The rezoning could respond to these site-specific needs with incentives or requirements related to building massing. It should be possible for buildings to achieve density and FAR goals on site while also creating more, strategically located open space on the site by utilizing greater allowed height limits.



The ULI panel recommended the creation of a site-specific zoning bonus for building massing that considers UHI mitigation, as the “alternative case” demonstrates. These illustrations indicate how two buildings with identical FAR (but allowing for a higher height) can either ignore or address UHI mitigation strategies.

Credit: ULI Panel

Assessments

Another approach to funding UHI-mitigation measures in Gowanus would be to have the City assess developers, and then use the assessment to provide certain UHI-mitigation investments or add to the Green Infrastructure Fund.

One example of this approach can be found in Chicago, Illinois, where the City of Chicago - through its Open Space Impact Fee - allocates fees that are applied to new residential developments to pay for land acquisition and park improvements in each of Chicago’s 77 community areas, with the goal of creating more public open space.

Air Rights and Bonus FAR

The panel also suggested that an FAR pool be created, in which owners or developers would need to comply with

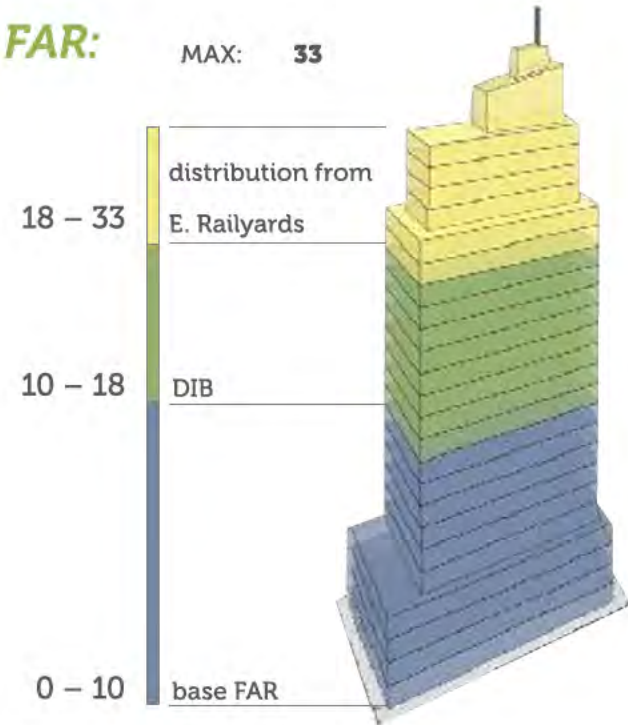
certain requirements (e.g., green infrastructure or other energy efficiency improvements) to purchase additional FAR. Revenue from the sale of this bonus FAR would be directed to the Green Infrastructure Fund. Another potential option could be to capture revenue from the sale of transferrable development rights (TDRs), also known as air rights, as another funding source.

The panel provided an illustrative example that was used in the rezoning of Hudson Yards on the West side of Manhattan, where developers of certain sites can purchase air rights from the MTA’s Eastern Rail Yard, or they can receive a zoning bonus upon making a District Improvement Bonus (DIB) payment to the Hudson Yards District Improvement Fund (DIF). These revenues are used by the City to help finance infrastructure improvements in the Hudson Yards Area. The panel suggested that this could serve as a model for Gowanus, with the revenues being directed into the Green Infrastructure Fund.

Illustrative Up-zoning Regime

1 st Tranche	2.0 FAR Base
2 nd Tranche	2.0 FAR from GIB
3 rd Tranche	1.0 Far for Deeper Affordability?

Est. GIB Proceeds
~\$100,000,000



Summary of Short-, Medium-, and Long-Term Urban Heat Island Mitigation Strategies

Urban Heat Island Mitigation: Short-Term Actions (0-3 years)	
Action	Party Responsible
Efficiency of Urban Systems: Transportation	
Increase transit service	MTA
Reduce traffic on 3 rd Avenue	NYCDOT
Review parking regs to provide more commercial loading space	NYCDOT
Implement safety improvements at key intersections	NYCDOT
Provide more bicycle parking	NYCHA, NYCDOT, Building owners & developers
Reserve more parking for hybrid vehicles and EV	NYCDOT, Building owners & developers

Urban Heat Island Mitigation: Short-Term Actions (0-3 years)	
Action	Party Responsible
Financing and Implementation	
Use Health Impact Framework to inform design and development decisions and consider Urban Heat Island	NYCDCP, NYCDOH, other parties involved in design and development process
Enact Gowanus Rezoning with Special Zoning District including Green Infrastructure Bonus	NYCDCP
Reboot Green Infrastructure Fund	NYCDEP
Amend CEQR process to address Urban Heat Island	Mayor's Office of Sustainability

Urban Heat Island Mitigation: Short-Term Actions (0-3 years)	
Action	Party Responsible
Efficiency of Urban Systems: Waste Heat & Construction Materials	
Create incentive programs for retrofitting existing buildings	NYCDEP, NYCDOB, Mayor's Office of Sustainability
Develop design guidelines for efficiency and methods of heat rejection for new buildings	NYCDEP, NYCDOB, Mayor's Office of Sustainability
Form, Layout and Vegetative Cover	
"Vining" of industrial and other walls – existing buildings	Building owners, NYC Small Business Services
"Vining" of industrial and other walls – new buildings	Building developers and owners
Implement cool roofs	NYC Small Business Services

Urban Heat Island Mitigation: Medium-Term Actions (3-7 years)	
Action	Party Responsible
Efficiency of Urban Systems: Transportation	
Increase transit connectivity	MTA
Reduce traffic impacts re: rezoning including providing parking maximums, design for land use mix, provide incentives for low-emission fleets, redesign 3rd Ave	NYC DCP, NYCT DOT
Efficiency of Urban Systems: Waste Heat & Construction Materials	
Retrofit existing buildings and systems considering heat rejection and the canal	NYCDEP

Urban Heat Island Mitigation: Medium-Term Actions (3-7 years)	
Action	Party Responsible
Form, Lay-out and Vegetative Cover	
Implement pop-up park and pop-up nursery	NYCDEP, NYCDPR
Implement "Paths of Respite"	NYCDOT, NYCDPR, Building developers & owners
Implement bioswales	NYCDEP, NYCDPR, NYCDOT
Establish training program for urban forestry/ green infrastructure maintenance	
Financing & Implementation	
Administer Green Infrastructure Fund	NYCDEP
Monitor and Implement Development Projects	NYCDOB, Building Developer and Owners

Urban Heat Island Mitigation: Long-Term Actions (7+ years)	
Action	Party Responsible
Efficiency of Urban Systems: Transportation	
Increase transit connectivity, including canal-based transit	MTA
Implement pedestrian improvements such as a pedestrian bridge	NYCDOT, Army Corps, potentially with private sector contributions
Consider new pavement designs and materials	NYCDOT
Efficiency of Urban Systems: Waste Heat & Construction Materials	
Coordinate different building owners into centralized heat and cooling network	NYCDEP, Building owners

Urban Heat Island Mitigation: Medium-Term Actions (3-7 years)	
Action	Party Responsible
Financing & Implementation	
Administer Green Infrastructure Fund	NYCDEP
Monitor and Implement Development Projects	NYCDOB, Building Developer and Owners

Urban Heat Island Mitigation: Long-Term Actions (7+ years)	
Action	Party Responsible
Form, Lay-out & Vegetative Cover	
Transition pop-up park to permanent park recreation facility	NYCDPR
Connect street network into Gowanus public way	GCC, NYCDCP, NYCDOT
Ensure proper maintenance for street trees	NYCDPR, private entities, community groups

Conclusion

Gowanus, Brooklyn is a rapidly-changing neighborhood, home to diverse and rooted communities, including many New York City Housing Authority residents. Well-known as the home of New York City's first Superfund site, the neighborhood also has other environmental challenges beyond contamination. Notably, it is amongst the most at-risk communities in New York City to Urban Heat Island (UHI) effect, the phenomenon of urbanized areas having higher temperatures than surrounding areas. UHI leads to many health impacts particularly for at-risk populations, such as children and the elderly, and low-income households who may lack air conditioning. The Fifth Avenue Committee (FAC), a leading Brooklyn-based community organization, invited the ULI New York TAP to study how UHI could impact Gowanus and

what tools could be used to mitigate UHI and improve the local environment, health and quality of life.

Gowanus is also very likely to see increased density and development in upcoming years, due to a likely rezoning through Mayor Bill de Blasio's PLACES initiative. This rezoning presents an opportunity to leverage the potentially tremendous real estate value created to proactively address Urban Heat Island risk and incorporate strategies for mitigation. Approaching the rezoning with proposals for specific tools and investments to mitigate UHI – which are outlined in this report – could improve the likelihood of implementation of such measures and, as a result, have a meaningful, positive impact on the neighborhood level.

Appendix

"Climate Change and Extreme Heat: What You Can Do to Prepare," October 2016, U.S. Environmental Protection Agency and the Centers for Disease Control and Prevention
<https://www.cdc.gov/climateandhealth/pubs/extreme-heat-guidebook.pdf>

"Heat Wave Was a Factor in 140 Deaths, New York Says," November 16, 2006, New York Times
<http://www.nytimes.com/2006/11/16/nyregion/16heat.html?mcubz=0>

"Climate Risk Information 2013: Observations, Climate Change Projections, and Maps," June 2013, New York City Panel on Climate Change
http://www.nyc.gov/html/planyc2030/downloads/pdf/npcc_climate_risk_information_2013_report.pdf

"Mayor Announces Program to Help Curb Effects of Extreme Heat," June 14, 2017
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<http://www.sciencedirect.com/science/article/pii/S1352231099003933>



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GOWANUS CANAL

COMMUNITY ADVISORY GROUP (CAG)

your local voice for Superfund

For more information: www.GowanusCAG.org

TO: NYS Department of Environmental Conservation Natural Resource Damages Section
c/o Alicia Pasos
625 Broadway, 14th Floor
Albany, NY 12233
E-mail: nrd@dec.ny.gov

RE: CAG Comments on the Gowanus Canal Natural Resources Damage Assessment Plan, 3/1/2024

Gowanus NRDA Trustee Council,

The U.S. Environmental Protection Agency (EPA) Gowanus Canal Community Advisory Group (CAG) thanks you for the opportunity to provide this community input for the Draft Natural Resources Damage Assessment Plan (NRDA) for the Gowanus Canal Superfund Site. We have reviewed the document and would like to provide further input on the matters of “what has been lost” as a result of the actions that lead up to the Superfund Listing and the remedies applied under the EPA Record of Decision. We also feel that the list of events/actions that caused these losses needs to be more expansive than the draft Damage Assessment document gives. Here are provided additional actions and events which are believed to have been pivotal in contributing to conditions described in the EPA Gowanus Feasibility Study. In addition, there needs to be a clearer understanding of the time frame defining the ‘baseline conditions’ which the Trust will be using as this process moves forward both for damage assessment and for restoration planning due to the longstanding contamination of the canal. Your consideration of the matters laid out below and those of other community members providing additional input is appreciated.

WHAT HAS BEEN LOST

DUE TO ACTIVITIES THAT RESULTED IN SUPERFUND DESIGNATION

Human Use / Community losses:

- lack of waterfront street end access;
- loss of air quality and non-malodorous air;
- loss of boating and water recreation;
- loss of visual access to the water from the upland areas.

Ecological Losses - Other species and their habitats:

- The 2003 Army Corps of Engineers’ Gowanus Wetland Restoration Study ([described in this document](#)) that examined the existing ecological conditions at that time and provided good background on ecological conditions should be included in this NRDA for Gowanus;
- shellfish habitat lost;

- loss of eelgrass habitats;
- loss of canal bottom sediment to serve fish feeding and breeding areas;
- loss of tree canopy directly triggered by Canal cleanup and redevelopment;
- current speed and flood surge speeds altered by canal bottom redesign impacting species needing variable bottom environments and lower water current speeds maintained by natural sedimentation process;
- jellyfish and shark have been observed trying to inhabit the canal area along with turtles, swans, shrimp, mussels, possums, migrating songbirds, cardinals, geese, crabs, turtles, apex predators such as hawks, and the residents of the Gowanus neighborhood (in addition to the numerous species outlined in the NRDA, e.g mollusks, eel, fish, heron, muskrat, double crested cormorant, black ducks, mallard ducks, wading birds, blue crab, raccoons, possum, and bats);
- loss of islands on the Canal have contributed to habitat loss for wildlife and sea life surface;
- two whales have been observed trying to live in the Gowanus area (as documented in the [New York Times, 2007](#) and by [John Kieran, A Natural History of New York City, 1959](#));
- loss of biomass with no support for trees or grass because of ongoing development and subsequent particulate matter and dust;
- Damage to and loss of prime bird fly zone. This is prime migration time, where many East Coast species fly over our area to head back North. Yet, when you look at the [Birding Club's map of Brooklyn](#) Birding spots, you can see that there are few locations where they could rest in Gowanus. The Community has lost the Gowanus and its (formerly greener) uplands as a stop-over for many bird species.

The migration route is called the [Atlantic Flyway](#).

Here is a list of birds that migrate along that route:

- [American Goldfinch](#)
- American Tree Sparrow
- [Baltimore Oriole](#)
- [Black-capped Chickadee](#)
- Blue Grosbeak
- [Blue Jay](#)
- Brown Thrasher
- Chipping Sparrow
- Common Redpoll
- [Dark-eyed Junco](#)
- Eastern Bluebird
- Eastern Meadowlark
- Eastern Towhee
- [Evening Grosbeak](#)
- Field Sparrow
- Hermit Thrush
- [House Finch](#)
- [Northern Cardinal](#)
- [Northern Flicker](#)
- [Orchard Oriole](#)



- Pine Grosbeak
- [Pine Siskin](#)
- Pine Warbler
- [Purple Finch](#)
- [Red-breasted Nuthatch](#)
- Red-winged Blackbird
- Ruby-crowned Kinglet
- [Ruby-Throated Hummingbird](#)
- [Song Sparrow](#)
- White-throated Sparrow
- Yellow-rumped Warbler
- loss of street trees have contributed to heat islands with only the buildings and concrete/asphalt remaining;
- The canal is not as wide as it was and is obviously no longer a marshland. Remediation and rehabilitation of these former habitats needs to extend beyond the current banks of the canal to encompass the full 100' width of the canal.
- Photos of observed Gowanus species are here:
<https://www.flickr.com/photos/51802375@N04/albums/72157629847297184/>

Superfund Remediation Impacts/Losses:

- New bulkheads, that are sealed to prevent remaining land contamination from entering the canal water, interfere with and diminish upland groundwater drainage to the low drainage point in the canal. Such drainage was engineered into the land under the 1849 New York State authorization of the Gowanus Canal;
- Development and remediation using non porous steel bulkheads has led to the covering and blocking of underground streams, and groundwater mounding, exacerbating inland flooding and sinking buildings and pavements;
- As of 2024, just under 1 acre (38,821 square feet) of Gowanus open water (marine habitat) has been landfilled with bulkhead encroachments into the public waters through bulkhead reconstruction prior to Superfund dredging;
- Specifically, Gowanus Canal navigable width of 100 feet has been improperly reduced to 65 feet width in worst case scenarios (Public Place); this change will impact the tidal exchange of water between the upper canal and the harbor;
- as well, 14.4 acres (627,448 square feet) of Gowanus open waterside basins were illegally landfilled by adjacent landowners over the last century - an oversight failure by the same federal agency that now must implement remediation because of lack of proper supervision of protected environments;
- New steel bulkheads have created impediments for natural succession ecologies due to lack of a more porous substrate for filtration and biodiversity;
- canal temperature changes triggered by conversion of banks from vegetated wood bulkheads to non life supporting steel;
- New steel bulkheads create impediments and safety issues for public uses of the water;

- New bulkhead heights, raised to address climate change, have removed and erased previously existing visual corridors of the waterway from the upland public ways which are protected under the NY State Public Trust Doctrine;
- Dredging has had a heavy impact on all pre-existing life (shellfish, algae, soil bacteria) and wiped out the majority, if not all, of it;
- the natural sedimentation accumulation process of the historic tidal marsh is now locked into a long-term cycle of life-disrupting dredging by current Superfund remediation planning;
- The work in the canal has both prevented and reduced the ability of the public to use the canal as a recreation resource.

HISTORIC EVENTS/ACTIONS WHICH CONTRIBUTED TO THE LOSSES

We ask that the NRDA report expand “*Exhibit 1-3: Timeline of Example Major Contamination & Remediation Events at Gowanus Canal*,” found on Page 6 of the report, to include other significant historic events listed below:

Industrial activity:

- any industrialization resulting in pollution of nearby areas like the uplands, the lower part of the harbor, bay, and area around Governor’s Island contribute to ongoing contamination of the Canal and should be considered in Canal remediation;
- Citizens Gas Works altered the grade and filled in the Gowanus at Fifth and Hoyt Streets, as evidenced in the below:



Municipal activity:

- The construction of the “Big Sewer” in 1892 which drained sludge into the head of the canal as part of a Brooklyn drainage plan;
- The failure of New York City to keep the Flushing Tunnel operational since the 1970s, allowing conditions in the canal to severely deteriorate for many decades before taking action;
- The failure of NYC to keep the sewer drainage pipes, designed to carry sewage away from the Gowanus, functioning and operating with designed capacities:
 - The original 30” sewer line which carried sewage from the head of the canal through the Flushing Tunnel towards Columbia Street was taken out of service for decades due to saltwater damage to the sewer. This increased the amount of combined Sewage Overflow (CSO) released into the upper canal for many decades.
 - The Bond-Lorraine sewer line was improperly repaired in the vicinity of Public Place in the 1970s, reducing the diameter of the sewer pipe and restricting drainage capacity. This increased CSO outputs into the Canal. This still has not been remedied.

- ongoing CSO events when rainwater overwhelms the sewer systems so untreated sewage is released directly into the canal. This disrupts water quality levels and reduces the ability for species to survive. It occurs frequently after rain and could be mitigated through the creation of more CSO tanks that collect rainwater to minimize rain entering sewer systems and causing CSO events in the Canal. Additional actions like sponge parks that collect water so less untreated water is released into the canal after rain would, to some extent, could mitigate this sewer overload that leads to CSO events in the canal.

MOVING FORWARD TO RESTORATION OF THE GOWANUS

In anticipation of this process moving forward into planning for restoration, the CAG notes that, 43 CFR § 11.83 (a)(1)(ii) states that the community should be provided with:

“the replacement and/or acquisition of equivalent natural resources capable of providing such services; and the compensable value of the services lost to the public through the completion of the baseline restoration, rehabilitation, replacement, and/or acquisition of equivalent natural resources.”

We would like it known at this time that the CAG’s expectations are that any *“restoration, rehabilitation, replacement, and/or acquisition of equivalent natural resources”* under this process take place in the Gowanus canal or on/along the banks of the canal. We believe that varying situations, from the head of the canal to the open harbor end, offer numerous opportunities for effective and sustainable habitat restoration through *rehabilitation, replacement and acquisition* in and along the Gowanus Canal.

The Trust must address the lower part of the harbor because any industrialization and development of nearby areas results in pollution. This includes the uplands, the lower part of the harbor, bay and the area around Governor’s Island. All of these areas will contribute to ongoing contamination of the Canal and should be considered in Canal remediation.

CAG SUGGESTED RESTORATION ACTIVITIES

- Develop a restoration approach that considers uplands beyond the canal itself and considers the broader Gowanus ecosystem, such as a watershed-wide restoration scope or MOSS (Metropolitan Open Space System) to reconnect species via greenways to the Gowanus Canal;
- provide a restoration that results in vertical variability for controlling the velocity of the waters as tidal flows occur, and for providing areas for wildlife to breed, shelter, and hunt;
- Provide shore-side surface rainwater filtrations such as the engineered sponge-park to collect water so less untreated water is released into the canal after rain;
- Plantings, including grass, reeds and trees (in addition to other plants), to increase green space that absorbs rain and reduces heat islands created from buildings/concrete/asphalt. The City of NY as a PRP should be made to fund this;
- Banks v. Bulkheads - the width of the built canal is 100'. The restorative actions should include the whole 100' with new set backs;
- Living breakwaters in Gowanus Bay to protect against storm surge;
- Sea weeds should be introduced to absorb pollutants;

- There are local organizations building habitat to recruit ribbed mussels back to the Canal post-cleanup, as their habitat has been lost through the Superfund process: example: Mighty Mussels – Gowanus Dredgers Canoe Club. <https://gowanusdredgers.org/mighty-mussels/> We would like to see programs such as this expanded.
- Support for Historic Recordation and public exhibition that marks the past history of Gowanus;
- A key component to restoration is the Canal bottom bathymetry design;
- NYS Department of Environmental Conservation (DEC) should not be permitted to waive Federally required water quality standards;
- DEC, EDC, and DOB should not approve development plans that do not provide public greenspace;
- The sewer systems must be repaired and enlarged to mitigate the effects of groundwater mounding and restricted drainage described above, as well as mitigate the risks to humans including the life-threatening human pathogens carried by sewage that include cholera, typhoid and dysentery. Other diseases resulting from sewage contamination of water include schistosomiasis, hepatitis A, intestinal nematode infections, and numerous others;
- The 2002 Army Corps of Engineers' Gowanus Wetland Restoration Studies proposed wetland design scenarios for the Gowanus turning basins. These should serve as a base for restoration work in the canal;
- Photos provided below showing the Gowanus Whole Foods site prior to its being built demonstrates how wetlands in the area are highly viable, given that wetland grasses sprouted throughout the area following the removal of septic-tanks from the site under the Brownfield program. The new wetlands created before development provided a habitat to nesting shorebirds and water birds.

Gowanus “Heron” photo by Susan Yung



Saltwater terrapin, the rare turtles, are now recolonizing the Brooklyn shoreline northwards from Jamaica Bay, given acceptable habitats:



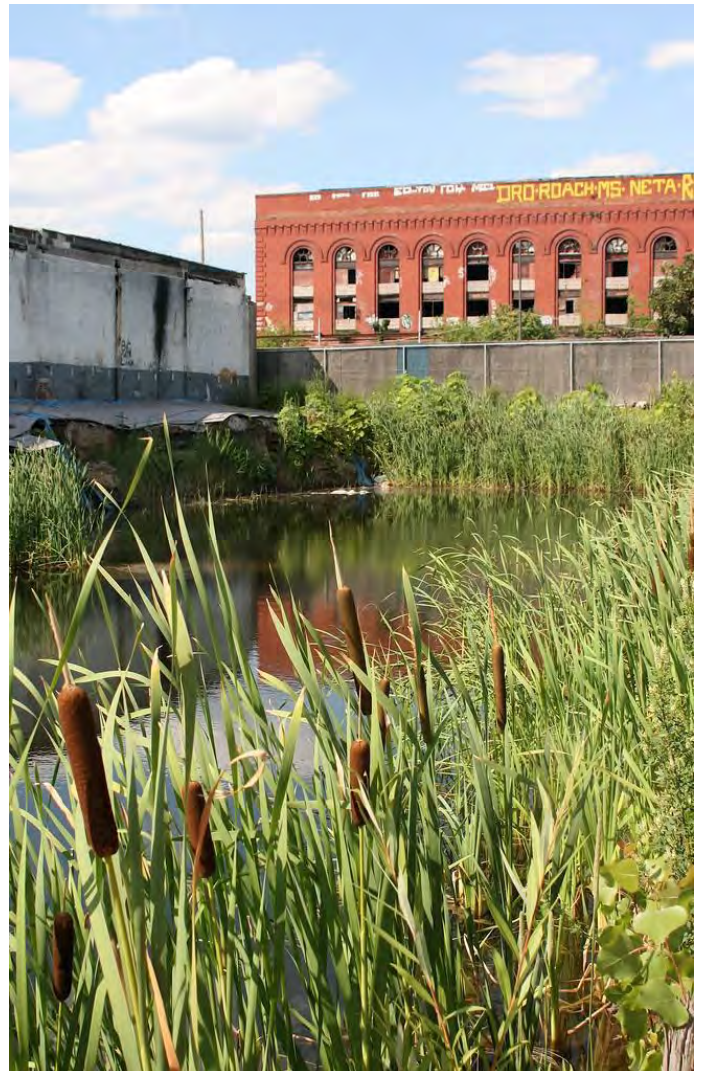
2013 June 29_ Gowanus Canal turtle at 2nd Street (Malaclemys terrapin) pic by Romy Mann / Gowanus Dredgers

A nice calming video of a local salt water terrapin (frame 2:35) at 36 Street by Bart Chezar

<https://m.youtube.com/watch?v=mivMA2VEoYg>

GOWANUS WETLANDS: Some photos of the urban adapted species that automatically came back during the excavation of the contaminated soil at Whole Foods

2007 July 10 - Gowanus Canal Whole Foods site (3rd Avenue & 3rd Street) freshwater wetlands emerging from historic Dentons' pond when toxic soil was removed - photo by Robert Gusskind





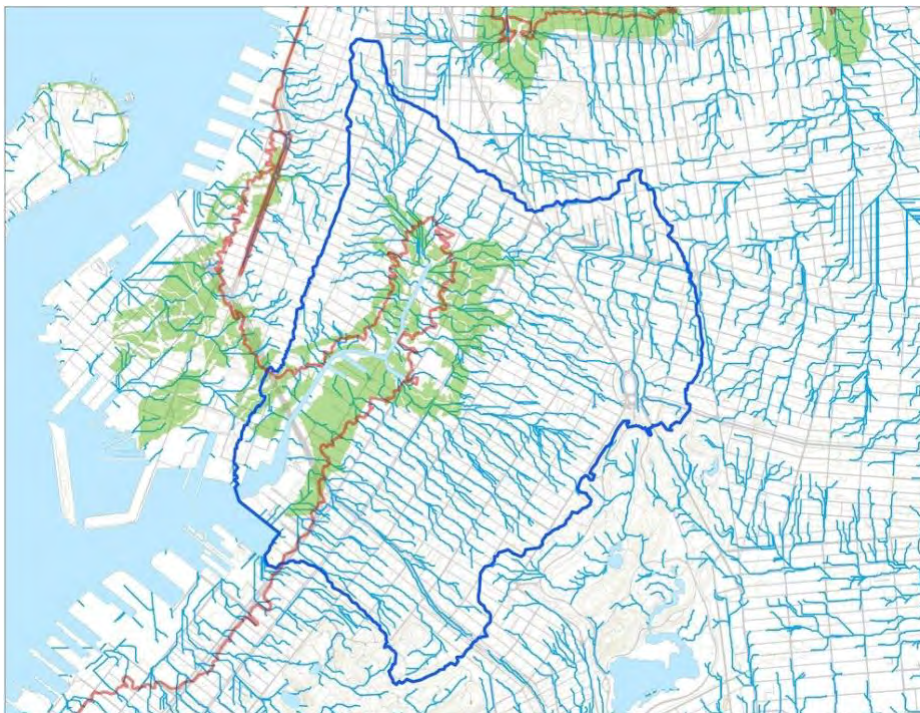
2009 - Gowanus Dentons Pond self healing - Whole Foods site during restoration with Paulownia (Empress tree), and bullrush - photo by Clayton Price

2009 - Whole Foods Site / Coignet Building area at 3 Av & 3 St - Wetlands growing in NYSDEC Brownfields / Dentons Ghost Pond excavation - photo by Nathan Kensinger

The blue watershed outline below is what should be used as the functional Gowanus Watershed NRDA restoration area

A Canal only NRDA focus is unscientific and ecologically meaningless in terms of how the Gowanus ecosystem works.

- Green shows the historical tidal wetland marsh (now buried).
- Red shows the Sandy storm surge flood limits. Obviously such a surge could reoccur. Consider the Sandy line as the functional Gowanus ecosystem flood zone.



- Thin blue lines represent storm water runoff that will eventually re-sediment the canal either through direct street runoff or through the combined sewer overflows.

Cc:

Hon. Charles Schumer, US Senator
Hon. Dan Goldman, US Congressperson
John Blasco, Deputy Chief of Staff for Congressman Daniel Goldman
Tevin Williams, Director of Community and External Affairs
Hon. Andrew Gounardes, NYS Senator
Hon. Jo Ann Simon, NYS Assembly Member
Susannah Pasquantonio, Chief of Staff for Assembly Member Simon
Antonio Reynoso, Brooklyn Borough President
Shahana Hanif, Councilmember, District 39
Alexa Aviles, Councilmember, District 38
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***Please direct responses and inquiries to Doug Sarno at [REDACTED]
Please acknowledge receipt of this communication.***



June 14, 2024

Via E-Mail: nrd@dec.ny.gov

NYS Department of Environmental Conservation
Natural Resource Damages Section
c/o Alicia Pasos
625 Broadway, 14th Floor
Albany, NY 12233

RE: Comments on the Gowanus Canal Draft Natural Resource Damage Assessment Plan

Dear Trustees:

Thank you for the opportunity to provide these comments on the Gowanus Canal Draft Natural Resource Damage Assessment Plan on behalf of Gowanus Canal Conservancy (GCC). GCC is dedicated to facilitating the development of a resilient, vibrant, open space network centered on the Gowanus Canal through activating and empowering community stewardship of the Gowanus Watershed. Since 2006, we have served as the lead environmental steward for the neighborhood through leading grassroots volunteer projects; educating students on environmental issues; and working with agencies, elected officials, and the community to advocate for, build, and maintain innovative green infrastructure around the Gowanus Canal.

The Gowanus neighborhood was once a system of tidal creeks winding through a vast salt marsh and fed by freshwater streams flowing from present day Park Slope and Carroll Gardens.¹ This rich brackish confluence fostered oysters the size of dinner plates, and was an important stopping ground for migratory birds. The footprint of the former salt marsh continues to assert itself through frequent flooding, unstable soils, and rich tidal ecology. Because of this ecological history, the challenges the neighborhood faces in a changing climate, the unique history and culture of Gowanus, and the rapid change of an extensive neighborhood remediation and redevelopment, it is imperative that the Natural Resources Damages Process is approached both comprehensively and creatively. Every effort should be made to coordinate restoration with the ongoing remediation and development in the neighborhood, in order to find efficiencies and maximize benefits to the communities that have lived for years adjacent to persistent contamination and degraded ecosystems.

¹ Lionel Pincus and Princess Firyal Map Division, The New York Public Library. Cartographer Bernard Ratzer "Plan of the city of New York in North America : surveyed in the years 1766 & 1767" The New York Public Library Digital Collections. 1776. <https://digitalcollections.nypl.org/items/510d47df-f437-a3d9-e040-e00a18064a99>

We appreciate the Trustees' efforts to formulate and conduct a comprehensive assessment of injuries to natural resources related to the Gowanus Canal Superfund Site, and respectfully submit the following comments on the Draft Gowanus Canal Natural Resource Damage Assessment Plan (the Assessment), with the intent of strengthening the study methodology and outcomes. In addition to GCC's comments in this letter, GCC supports the comments and requests made by the Gowanus Dredgers Canoe Club, Riverkeeper, and additional community partners. We call upon the Trustees to expand the scope of geographies, injuries and damages considered in the Assessment Plan, modify the Superfund Remedy to reduce injury, leverage opportunities for early restoration to maximize benefit, and meaningfully engage the community in planning for restoration. Our specific recommendations are below and further detailed on following pages:

The Trustees should expand the study to assess:

- at a minimum, PCBs, pesticides, metals and VOCs in order to fully assess the injury and potential injuries, in addition to PAHs
- groundwater impacts and the implications for other environmental media
- habitat loss in a broader area that includes both formerly connected tidal wetland areas and tidal wetland adjacent areas, 150' landward from the tidal wetland boundary, as defined by the NY State Department of Environmental Protection (DEC).²
- injuries and potential injuries to Intertidal, High Marsh, Maritime Meadow, and Shrubland habitats resulting from the Superfund Remedy
- injuries and potential injuries from remedial actions at Turning Basins 1 and 5
- injuries to natural resources and community facilities from remedial actions at the Salt Lot

The Trustees should work with EPA and the Potentially Responsible Parties (PRPs) to modify elements of the planned Superfund Remedy to support restoration and minimize damage:

- modify remedial design of Turning Basin 1 to promote biodiversity, water quality and access
- modify remedial design of Turning Basin 5 to increase restoration area and manage stormwater
- modify remedial design of Turning Basins 6, 7 and 11 to increase restoration area and improve water quality
- engage and coordinate with existing Mussel Habitat Project (GCC and Dredgers) to determine effective methods of adapting existing steel bulkheads to support habitat restoration

The Trustees should work with EPA, PRPs, City agencies and private property owners to leverage opportunities for early restoration to maximize benefits:

- support design and implementation of ecologically productive bulkheads in Remedial Target Areas (RTA) 2 and 3.
- purchase land in RTA 2 and 3 to restore habitat, manage flooding and provide water access.
- work with NYC and private property owners to install public bathrooms, boat launches, community gathering spaces, and educational facilities in new waterfront public spaces

² Compilation Of Codes, Rules And Regulations Of The State Of New York, 6 CRR-NY 661.9
<https://govt.westlaw.com/nycrr/Document/14ecd4454cd1711dda432a117e6e0f345?transitionType=Default&contextData=%28sc.Default%29>

EXPAND THE SCOPE

The Assessment defines the geographic scope of the assessment area to be “the area within which natural resources have been directly or indirectly affected by industrial and municipal-related oil and hazardous substances in Gowanus Canal”.³ However the planned study area is arbitrarily constrained to the aquatic habitat in the Canal. The contamination and Superfund remedy have injured and continue to injure natural resources beyond aquatic habitat. We urge the Trustees to expand the scope in order to fully assess injuries and potential injuries from contamination and the Superfund Remedy to intertidal, coastal, and upland habitat areas and to groundwater.



Proposed expanded geographic scope areas for assessment of groundwater (left) and habitat loss (right). The proposed Groundwater Geographic Scope overlays the historic salt marsh as documented in Ratzer’s “Plan of the city of New York in North America : surveyed in the years 1766 & 1767”⁴ with the present day Canal and street grid. The proposed Habitat Loss Geographic Scope includes additional areas beyond what is included in the Assessment Plan that have been impacted by both contamination and the Superfund Remedy itself: former tidal wetlands within Turning Basin 1 and 5, the Salt Lot, and tidal wetland adjacent areas 150’ landward from the tidal wetland boundary, as defined by the NYSDEC.⁵

Contaminants

The Assessment focuses on total PAHs as the primary contaminant of concern (COC) in the assessment, citing EPA’s focus on PAHs as a precedent.⁶ However, limiting the evaluation to discrete

³ Gowanus Canal Natural Resource Damage Assessment Trustee Council (NRDA Trustees), *Gowanus Canal Natural Resource Damage Assessment Plan Draft* (March 2024) p 14.

⁴ Ratzer “Plan of the city of New York in North America : surveyed in the years 1766 & 1767

⁵ Compilation Of Codes, Rules And Regulations Of The State Of New York, 6 CRR-NY 661.9 <https://govt.westlaw.com/nycrr/Document/14ecd4454cd1711dda432a117e6e0f345?transitionType=Default&contextData=%28sc.Default%29>

⁶ Gowanus Canal Natural Resource Damage Assessment Trustee Council, *Gowanus Canal Natural Resource Damage Assessment Plan Draft* (March 2024) p 20

constituents necessarily truncates the study findings from the outset. A robust assessment of all target analytes is required. The Assessment acknowledges that there are additional hazardous substances to which natural resources have been exposed as a result of discharges or releases into the Canal, including PAHs, PCBs, hazardous pesticides and a variety of metals.⁷ Each and every contaminant has a unique impacts on natural resources on an ecosystem scale - for example, heavy metals can increase stress on wetland ecosystems and impede habitat restoration⁸. **The scope of the study must be expanded to assess, at a minimum, PCBs, pesticides, metals and VOCs in order to fully assess the injury and potential injuries.**

Natural Resources

The Assessment focuses on sediment, surface water, and biological resources, and acknowledges that groundwater and air have been exposed to contamination but does not include them in the assessment.⁹ Notably, the injuries the actual remedial action is causing to groundwater are substantial and distinct. Installation of impermeable steel sheet pile bulkheads is leading to groundwater mounding landward of the shoreline and can exacerbate flooding in low lying areas throughout the neighborhood and potentially create new exposure pathways.¹⁰ **An assessment of groundwater impacts and the implications for other environmental media must be explicitly included in the assessment so that these impacts can be studied, quantified and mitigated.** The Trustees should assess groundwater impacts in the footprint of the historic salt marsh indicated in the map above, in coordination with ongoing monitoring and study of contaminant plumes from Fulton, Citizens and Metropolitan MGP sites, as well as the ongoing DEC Soil Vapor Intrusion Study. Studies should model how groundwater mounding will interact with increased precipitation and rising groundwater levels caused by ongoing climate change.

Intertidal and Upland Areas

The Superfund Remedy has and will continue to result in substantial injury beyond the proposed Assessment boundary. Replacement of old wooden bulkheads and rip rap edges with steel sheet pile bulkheads is eliminating water access and significant diverse intertidal habitat along the Canal. Construction of two large CSO retention tanks has removed additional areas of upland habitat and water access points. And excavation of two former turning basins removes existing areas of habitat, including numerous mature trees. **The Trustees should assess habitat loss in a broader area that includes both formerly connected tidal wetland areas and tidal wetland adjacent areas, 150' landward from the tidal wetland boundary, as defined by the NY State Department of**

⁷ Ibid.

⁸ Tabassum S, Kotnala CB, Salman M, Tariq M, Khan AH, Khan NA. [The impact of heavy metal concentrations on aquatic insect populations in the Asan Wetland of Dehradun, Uttarakhand](https://doi.org/10.1038/s41598-024-52522-5). Sci Rep. 2024 Feb 27;14(1):4824. doi: 10.1038/s41598-024-52522-5. PMID: 38413667; PMCID: PMC10899649.

⁹ Gowanus Canal Natural Resource Damage Assessment Trustee Council, *Gowanus Canal Natural Resource Damage Assessment Plan Draft* (March 2024) p 17

¹⁰ Hill, K., Hirschfeld, D., Lindquist, C., Cook, F., & Warner, S. (2023). Rising coastal groundwater as a result of sea-level rise will influence contaminated coastal sites and underground infrastructure. *Earth's Future*, 11, e2023EF003825. <https://doi.org/10.1029/2023EF003825>

Environmental Protection (DEC).¹¹ Formerly connected tidal wetland areas include additional parcels impacted by the Superfund Remedy at Turning Basins 1 and 5. The study should also be expanded to evaluate impacts to the Salt Lot, a site which previously provided significant natural resources and community uses that has been impacted by the CSO controls under the Superfund Remedy.



Map of Biodiversity Hotspots, 2019

iNaturalist community science application to document photographic evidence along with geolocation information within the [Gowanus map area](#). Observations were then vetted by others to reach a status of “research-grade.” Research-grade observations included a number of state-listed species of greatest conservation need, including the American black duck, Great egret, Great blue heron, Laughing gull, Yellow-crowned night heron, Black-crowned night heron, Cape May Warbler, American eel, Mummichog, Atlantic silverside, Northern pipefish, Salt-meadow grass, Five-angled dodder, Fragrant flat sedge, Willow oak, Annual saltmarsh aster, and Swamp darter.¹⁴ It is critical that the Trustees quantify habitat impacts to intertidal and coastal habitats that many of these species rely on.

Species and Communities

The Assessment anticipates quantifying ecological impacts only to aquatic habitat.¹² This narrow focus would miss the broader impacts of contamination and remediation to the interconnected habitats of the Gowanus estuary, including intertidal and coastal habitats, the urban forest, and migratory birds. GCC’s 2021 Gowanus Ecosystem Biological Survey Report¹³, based on surveys conducted between 2017 and 2020, identified 1,144 species living in and around the Gowanus Canal. The report identified a broad range of birds, marine animals, terrestrial invertebrates, fungi, lichen, mammals, and plants present in and around the Canal, relying on a wide variety of intertidal, coastal, and adjacent habitats. Many of these organisms beyond the aquatic habitat have been impacted by the Superfund Remedy, and should be considered when quantifying ecological injury.

Observations were made by scientists, community members, students, and other volunteers using the

¹¹ Compilation Of Codes, Rules And Regulations Of The State Of New York, 6 CRR-NY 661.9 <https://govt.westlaw.com/nycrr/Document/I4ecd4454cd1711dda432a117e6e0f345?transitionType=Default&contextData=%28sc.Default%29>

¹² Gowanus Canal Natural Resource Damage Assessment Trustee Council, *Gowanus Canal Natural Resource Damage Assessment Plan Draft* (March 2024) p 32.

¹³ Gowanus Canal Conservancy, [Gowanus Ecosystems Biological Survey Report](#), (April 2021)

¹⁴ GCC (2021) p 18

The Trustees must assess injuries and potential injuries to Intertidal, High Marsh, Maritime Meadow, and Shrubland habitats resulting from the Superfund Remedy

The Gowanus Canal is a brackish estuary with a tidal range of approximately 5', which consists of a variety of habitats defined as tidal wetlands under state tidal wetlands regulations, including both intertidal marsh and high marsh.¹⁵ Prior to the commencement of the Superfund clean up, a variety of riparian edges were surveyed along the Canal and documented in the Gowanus Ecosystems Biological Survey Report.¹⁶ Shorelines included rip rap edges, salt marsh, high marsh, maritime meadow, shrubland, mud flats, as well as wooden, concrete and steel bulkheads. These varied conditions and substrates supported a robust and diverse range of organisms described on the following pages, essentially all of which were or will be irreparably impaired by the Superfund Remedy.



Architectural Grille edge, 2017



A survey of the Union Wilds in 2019 inventoried Virginia creeper, Common milkweed, White mulberry, Princess tree, White snakeroot, Tall goldenrod and Canada goose.



6th Street Turning Basin, 2017



Powerhouse edge, 2017

¹⁵ Compilation Of Codes, Rules And Regulations Of The State Of New York, 6 CRR-NY 661.4(hh)
[https://govt.westlaw.com/nycrr/Document/I4ecd4445cd1711dda432a117e6e0f345?viewType=FullText&originationContext=documenttoc&transitionType=CategoryPageItem&contextData=\(sc.Default\)&bhcp=1](https://govt.westlaw.com/nycrr/Document/I4ecd4445cd1711dda432a117e6e0f345?viewType=FullText&originationContext=documenttoc&transitionType=CategoryPageItem&contextData=(sc.Default)&bhcp=1)

¹⁶ GCC (2021)

High marsh, Maritime Meadow, and Shrubland

High marsh is the upper tidal wetland zone located just above high tide elevation, as defined in state tidal wetlands regulations.¹⁷ Prior to the onset of remediation, these habitats were located at the Salt Lot and along most shorelines. These diverse habitats included a variety of herbaceous and woody plant species that provided habitat for wading and migratory birds, mammals, terrestrial invertebrates, fungi and lichen. GCC and partners have identified 61 species of birds in the area around the Canal, including 7 state listed species: American black duck, Great egret, Great blue heron, Laughing gull, Yellow-crowned night heron,

Black-crowned night heron, Cape May Warbler.¹⁸ Many of these species are considered vulnerable, imperiled, or critically imperiled in New York State and a number rely for survival on shoreline habitat and tree canopy that are currently or will be impacted by the removal of their habitats due to remediation. Laughing Gulls are ground nesters that require coastal habitats such as salt marshes, rocky islands, and sandy beaches. These habitats are ideal for breeding as long as there is enough vegetation for nesting, foraging, and protection from predators and high tides.



Yellow-crowned Night Heron observed in Gowanus in September 2019 during a BioBlitz conducted by Gowanus Canal Conservancy and Macaulay Honors College. Photo by Ken Chaya

Intertidal Marsh

Intertidal marsh is a tidal wetland zone located between low and high tide elevations, as defined in state tidal wetlands regulations.¹⁹ Prior to Superfund remediation, intertidal marsh existed along an edge near the Salt Lot and the dead end of 2nd Avenue (p 11). Many aquatic invertebrates and fish, including the locally-observed Northern Pipefish, rely on salt marshes and submerged aquatic vegetation for survival.

Marine Environment

A 2004 biological survey of the Gowanus Canal and Bay inventoried resident and migratory fish and invertebrate communities.²⁰ The study found primarily migratory fish populations and developing epibenthic and benthic communities. The study noted that improvements in environmental conditions could result in a broader diversity of species present. The Gowanus Flushing Tunnel, originally constructed in the early 1900s, was repaired in 1999 and resulted in increased dissolved oxygen levels in the Canal, and thus improved conditions for aquatic species.²¹ Since the 2004 survey, the Flushing Tunnel was upgraded in 2014 to increase the flow rate and screen CSO discharges. A range of marine

¹⁷ Compilation Of Codes, Rules And Regulations Of The State Of New York, 6 CRR-NY 661.4(hh) [6 CRR-NY 661.4NY-CRR](#)

¹⁸ GCC (2021), p.18

¹⁹ Compilation Of Codes, Rules And Regulations Of The State Of New York, 6 CRR-NY 661.4(hh) [6 CRR-NY 661.4NY-CRR](#)

²⁰ Lawler, Matusky and Skelly Engineers, LLP. "Gowanus Bay and Canal Ecosystem Restoration Studies Fish and Epibenthic Invertebrate Sampling Program Final Report", November 2004

<https://drive.google.com/file/d/18ADIH-x5jmvNUC2UPFuMg28RjE6ljHfn/view>

²¹ Ibid, 10 https://www.nyc.gov/html/dep/html/dep_projects/cp_gowanus_canal.shtml

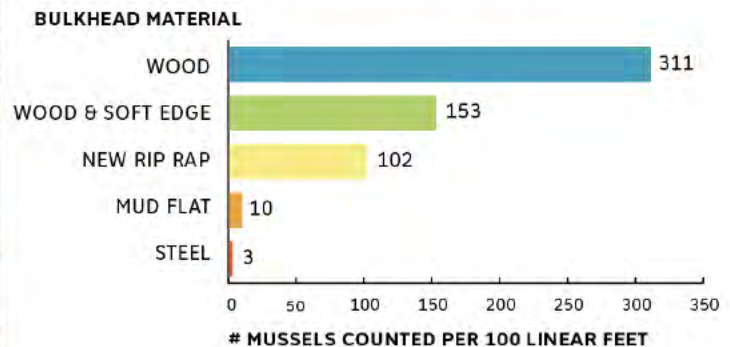
species have been observed in recent years in the water or through catch-and-release observations, including American eel, American gizzard shad, Banded killifish, Mummichog, Atlantic silverside, Atlantic menhaden, Atlantic tomcod, Striped bass, Oyster toadfish, Northern Pipefish, Cunner, and Eastern grass shrimp.²²



Atlantic ribbed mussels (*Geukensia demissa*) on the wooden bulkhead. Photo by Andrea Parker

TOTAL MUSSELS COUNTED: 4,129

MUSSEL COUNTS BY BULKHEAD MATERIAL



Constructed Shorelines

A series of biological surveys conducted by the Gowanus Dredgers and Gowanus Canal Conservancy inventoried Atlantic ribbed mussels along a number of shorelines along the Canal, documenting thousands of mussels along the edge. Atlantic ribbed mussels documented during distinct surveys included 4,129 in 2020 along the Salt Lot and 6th Street Basin,²³ 1,768 in 2022 near 19th Street,²⁴ 1,577 in 2023 along the Vane Brothers site at the mouth of the Canal near Court Street,²⁵ and 2,528 in 2023 in the 7th Street Basin.²⁶ Mussels were particularly concentrated in gaps between the timbers of wooden bulkheads, which supported over 300 times the number of mussels as steel bulkheads.

Surveys referenced above also identified a variety of species living in or near the intertidal zone and likely relying on this habitat for food and shelter. Species observed included: Eastern oyster, Blue mussel, Green crab, Mud snail, Sponges, Sturgeon scutes, Bay barnacle, Chain tunicate, Clam worm, Golden star tunicate, Atlantic blue crab, Fragile barnacle, Ghost Anemone, Orange-striped anemone, Pacific shore crab, Asian shore crab, Northern acorn barnacle, Northern sea squirt, Common periwinkle, Eastern mudsnail, Bristle (tube) worms, Grass shrimp, Oriental shrimp, Amphipods, Rockweed, Bladder wrack, Sea Grapes, and Sea lettuce.

²² GCC, Gowanus Ecosystems Biological Survey Report, 2021

²³ GCC, 2021

²⁴ Gowanus Dredgers, [Atlantic Ribbed Mussel Survey 19th Street Gowanus Dredgers Canoe Club Dock & Shoreline Survey Date: September 18th, 2022](#)

²⁵ Gowanus Dredgers, [Atlantic Ribbed Mussel - Gowanus Survey No. 3 Vane Brother's Rip-Rap Shoreline Survey Date: October 23, 2023](#)

²⁶ Gowanus Dredgers, [Atlantic Ribbed Mussel Survey Gowanus Canal- 7th Street Turning Basin Survey Date: November 4, 2023](#)

Assess injuries and potential injuries from remedial actions at Turning Basins 1 and 5

As part of the Superfund remediation, to mitigate the associated loss of surface water resulting from bulkhead encroachment on the Canal, the PRPs will be excavating and restoring approximately 475 feet of Turning Basin 1.²⁷ Prior to demolition to prepare for the Superfund Remedy, Turning Basin 1 provided coastal habitat for a number of trees and was a hotspot for wading birds, including Yellow-crowned and Black-crowned night herons. These birds were found perched along trees at the edge and wading along mudflats near the basin. The basin provided a distinct coastal habitat for these wading birds, which are commonly found along tidal edges where woody plants provide perches and cover for hunting their prey, primarily crustaceans.²⁸ A 2017 survey of the First Street Turning Basin conducted by B. Thayer Associates, inventoried 23 trees within the filled basin, with an estimated restitution value of \$297,697 assessed per the NYCDPR Tree Inventory Workbook.²⁹

Similarly to TB1, there is a significant area of upland habitat at TB5 that provides much needed shade and cooling along 3rd Avenue, and will need to be removed for the Superfund Remedy. These species and canopy cover should be assessed before removal.



Yellow-crowned night herons perch on a Princess tree branch and wade along the shoreline of Turning Basin 1, 2019



Large canopy trees that will be removed in order to excavate the former Turning Basin 5 currently provide valuable shade and cooling next to the Al-Madinah School on 3rd Avenue, June 2024

²⁷ EPA ROD, <https://semspub.epa.gov/work/02/692106.pdf>, pg 82

²⁸ <https://www.audubon.org/field-guide/bird/yellow-crowned-night-heron>

²⁹ B. Thayer Associates for NYCDDC Bureau of Infrastructure Design Division. *Preliminary and Final Design Services for Excavation and Capping of the Filled First Street Turning Basin, Gowanus Canal, Borough of Brooklyn*. Project ID: PW77GOWAN. (July 2017)

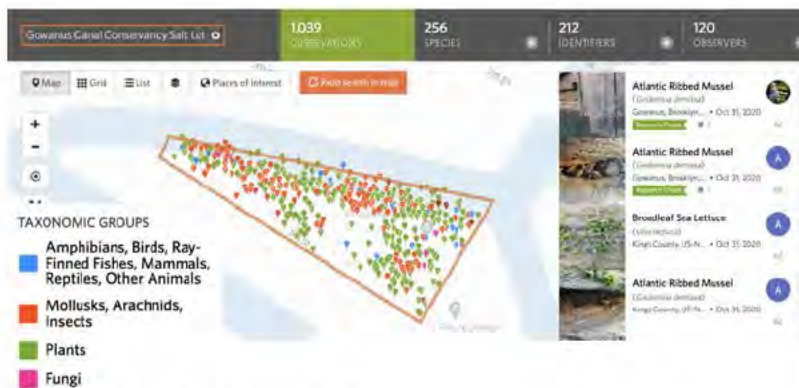
Assess injuries to natural resources from remedial actions at the Salt Lot

The Salt Lot is a 1.4 acre site that was demolished in 2022 to make way for the Owls Head combined sewer retention tank, a CSO Control under the Superfund Remedy. This demolition resulted in the loss of 17,000 square feet of intertidal and coastal habitat, including 282 species of plants and animals, along with facilities for community programming described below.



Salt Lot: Existing Conditions pre CSO Tank (Gowanus Canal Conservancy)

For over a decade, GCC planted thousands of native plants in gardens and restoration areas at the Salt Lot. This restoration work yielded one of the most high-performing and biodiverse sites along the Gowanus Canal. The planted areas improved Gowanus Canal water quality through erosion control and increased stormwater capture and filtration, managing an estimated 32,300 gallons per storm event. Native ecosystems previously found on site included a number of areas categorized as tidal wetlands by the Department of Environmental Conservation.³⁰ Visitors accessed these ecosystems along a pedestrian path that included viewing areas, water access, and interpretive signage.



Species Observations (iNaturalist)

GCC worked with scientists, students, and volunteers to document the biodiversity of the site during annual biological surveys, or bioblitzes, using iNaturalist and paper data sheets, collectively recording over 1,000 observations of over 250 species of plants, birds, fish, invertebrates, and mammals.³¹

³⁰ DEC Tidal Wetlands Categories, <https://www.dec.ny.gov/lands/5120.html>

³¹ iNaturalist observations, Gowanus Canal Conservancy Salt Lot https://www.inaturalist.org/observations?place_id=152219

Restoration areas and gardens at the Salt Lot spanned 17,000 sf and included:

- **Intertidal Marsh** (200 sf): Intertidal marsh is a tidal wetland zone located between low and high tide elevations, as defined in state tidal wetlands regulations.³² In 2012, GCC installed an intertidal and high marsh restoration along the northeast shore of the Salt Lot. At the time this was the only patch of *Spartina alterniflora* on the Gowanus Canal, and thrived at the edge of the site until removal in 2022 to make way for CSO Tank construction. Intertidal marsh species that once thrived here restored the historic ecology of the Gowanus creek and salt marsh, and provided habitat for mussels, crabs, fish, and a variety of shorebirds.³³



Existing Ecosystem: Emergent Marsh Rain Garden



Existing Ecosystem: Intertidal Marsh



Existing Garden: 2nd Avenue Garden



Existing Ecosystem: High Marsh

- **High marsh, Maritime Meadow, and Shrubland** (12,100 sf) High marsh is the upper tidal wetland zone located just above high tide elevation, as defined in state tidal wetlands

³² Compilation Of Codes, Rules And Regulations Of The State Of New York, 6 CRR-NY 661.4(hh) [6 CRR-NY 661.4NY-CRR](https://www.ccr.ny.gov/crr/661.4ny-crr)

³³ iNaturalist observations, Gowanus Canal Conservancy Salt Lot https://www.inaturalist.org/observations?place_id=152219

regulations.³⁴ High marsh on the Salt Lot included wetland species such as *Spartina patens*, *Iva frutescens*, and *Baccharis halimifolia*. A diversity of additional native maritime meadow and shrub species thrived in these areas, providing habitat for birds, pollinators and other wildlife. Notable species included *Rhus typhina*, *Prunus maritima*, *Panicum virgatum*, *Monarda fistulosa*, and *Schizachyrium littorale*.

- **Emergent Marsh Rain Gardens** (2,600 sf) Site stormwater was directed to and managed by two rain gardens planted with emergent marsh species that included *Juncus effusus*, *Asclepias incarnata*, *Iris versicolor*, *Cornus amomum*, and *Cephalanthus occidentalis*.
- **The 2nd Avenue Street End Garden** (2,100 sf) In 2012, GCC installed a garden where 2nd Avenue meets the Gowanus Canal, providing much needed public space for people to experience the Canal. The space featured native plantings, retentive stone structures, seating, and an informal boat launch and get down.

Assess injuries to community facilities from remedial actions at the Salt Lot

From 2010 to 2022, GCC, Big Reuse, and DSNY built and maintained a number of community facilities at the Salt Lot, which were displaced and/or destroyed by site investigation, demolition, and construction associated with the Superfund remediation. Between 2014 and 2017 the site saw a \$2 million renovation, spurred by an initial \$500,000 in funding from District 39 participatory budgeting.

- **Compost Facility** (10,000 sf) Big Reuse operated a compost processing facility and residential food scrap drop-off. The large scale multi-bay compost facility featured solar-powered aerated static pile technology, with an estimated annual throughput of 150 tons of organic material. GCC and Big Reuse distributed compost for public greening projects through compost pick-ups and giveback events. About 50% of the compost produced enriched tree pits and gardens in the Gowanus Watershed, improving plant growth and water retention.
- **Landscape Maintenance Facility** (1,200 sf) With a base of operations at the Salt Lot for over a decade, GCC deployed landscape maintenance personnel to care for on-site gardens as well as off-site street trees, bioswales, and gardens throughout the Gowanus Watershed, increasing permeability to decrease CSO. Personnel included full-time staff, youth green job trainees, and an annual average of 750 volunteers. Facilities include equipment and material storage.
- **Lowlands Nursery** (6,000 sf) GCC operated a native plant nursery, growing and distributing over 4,000 native plants each year, with over a third planted at the Salt Lot and in gardens and tree beds throughout the neighborhood. Facilities included outdoor growing areas, a shade structure, propagation tunnels, and storage.
- **Outdoor Classroom** (1,000 sf) GCC hosted over 500 local students and teachers annually at workshops and field trips to learn about environmental issues facing Gowanus and mitigation strategies. Facilities include seating and work stations for 30 students, water quality testing area, and equipment storage space.

³⁴ Ibid



Existing Program: Lowlands Nursery



Existing Program: Lowlands Nursery



Existing Program: Outdoor Classroom



Existing Program: Green Job Training

MODIFY THE SUPERFUND REMEDY TO REDUCE ADDITIONAL INJURY

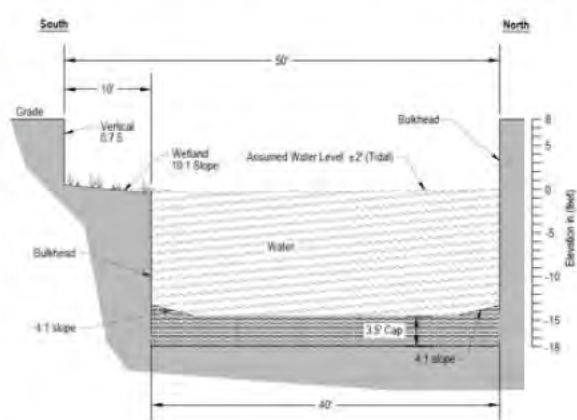
As stated above, there are significant areas of additional study needed to fully assess the scope of the injuries. However, there is a concurrent need for the Trustees to address and mitigate the continued degradation of natural resources caused by the Superfund Remedy. The Trustees must work with EPA and the Potentially Responsible Parties (PRPs) to modify elements of the planned Superfund Remedy to support resource restoration and minimize further damage, and to identify and implement additional early restoration opportunities to provide more efficient and timely restoration. Specific opportunities that the Trustees should address immediately are described below.

Modify remedial design of Turning Basin 1 (TB1) to improve biodiversity, water quality and access

The EPA Record of Decision stipulates that the PRPs excavate and restore Turning Basin 1 (TB1) to mitigate the associated loss of surface water resulting from bulkhead encroachment on the Canal.³⁵ The intent of this action, to compensate for the injury caused by the Superfund Remedy, is correct - however the current scope for this work will not produce the type of high functioning ecosystem that would adequately mitigate these damages.



*Turning Basin 1 Restoration Footprint
EPA Presentation to CAG, June 2016*



*Turning Basin 1 Cross Section - Schematic
EPA Presentation to CAG, June 2016*

Preliminary design drawings for this planned work were shared with the CAG in 2016, presented above. The design included full excavation of the former turning basin and construction of a wetland shelf. The plans show the footprint of the restored Turning Basin as fitting into existing property lines, terminating in a narrow 25' dead end. However, water quality data and ongoing observation have shown that the dead ends of turning basins along the Canal tend to be stagnant and have poor water quality. The wetland shelf shown in the cross section does not have enough change in cross elevation to support the range of salt marsh species that thrive at different elevations and to allow adaptive growth as the sea level rises. Finally, the full excavation of Turning Basin 1 will cut off potential access from north to south along the emerging public waterfront esplanade. Echoing these concerns, the

³⁵ EPA Record of Decision, <https://semspub.epa.gov/work/02/692106.pdf>, pg 82

Gowanus Superfund Community Advisory Group (CAG) passed a resolution in September 2016³⁶ requesting that the plan be adjusted to support a wider range of species; promote water flow and discourage stagnation; and provide for regular maintenance and performance monitoring.

The Trustees should promptly coordinate with the PRPs and EPA to support improving design to facilitate more resilient and varied ecosystems and water access, including creation of a much larger restoration area for marine, low marsh, and high marsh ecologies, flow of fresh water, cleaned through green infrastructure, into the turning basin to combat stagnation, and connection of the waterfront esplanades through a pedestrian bridge.



Rendering of potential TB1 Restoration includes a much more significant and varied wetland restoration area, as well as north-south access across TB1.

Chris Anderson, SUNY ESF MLA Capstone 2017

Esplanade at 420 Carroll, to be completed in Fall 2024, will provide access all along the north edge of TB1. The quality of this public space relies on a healthy salt marsh restoration in TB1, and would be greatly enhanced with the addition of a bridge or other way to access Powerhouse esplanade to the south. Domain Companies, SCAPE

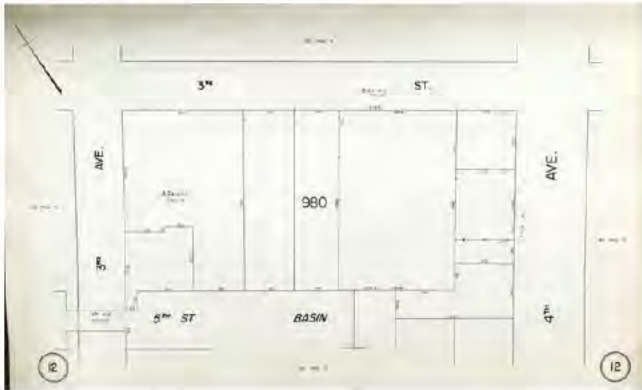
Modify remedial design of Turning Basin 5 to increase restoration area and manage stormwater

As noted above, the ROD stipulates that the PRPs excavate and restore approximately 25 feet of the Turning Basin 5 beginning underneath the 3rd Avenue bridge. “Excavate and restore the portion of the Turning Basin 5 beginning underneath the 3rd Avenue bridge and extending approximately 25 feet to the east and the installation of a barrier or interception system at the eastern boundary of the excavation.” However, the 25’ length was arbitrarily determined and does not adequately restore the injury. Furthermore, the barrier at the eastern boundary will cause flooding in adjacent buildings.

Turning Basin 5 was a public waterway as recently as the 1950, and there is no available legal documentation for how it became privately owned. Though the Army Corps, in 1950, did permit the

³⁶ [Gowanus Canal Community Advisory Group Resolution on the Canal's 1st Street Turning Basin](#), 2016

filling in of the basin, it is still mapped as water on numerous official maps, including those managed by DCAS, DOT and Army Corps.



1956 NYC Tax Lot Map showing the historic extent of the Turning Basin 5. The eastern 170 feet were filled in 1927, with the entire basin filled by 1951.



Turning Basin 5, circa 1876. Source: Northern Ecological Associates, Inc. et al., National Register of Historic Places Eligibility Assessment, Gowanus Canal, Revised December 2004

In a 2020 email to CAG members, EPA Project Manager Christos Tsiamis represented that “EPA arrived, for the purposes of the ROD, at an excavation/restoration length of 25 feet based on the location of a sampling well where high levels of contamination were detected during the Remedial Investigation (RI) of 2010. However, recognizing that the above determination was based on a limited amount of data, the ROD purposefully specified “**approximately 25 feet**” (highlighting is mine) implicitly recognizing that additional data collected at later stages (such as during the design stage) might reveal high levels of soil/groundwater contamination at a distance longer than 25 feet.” Subsequent site investigation reports for TB5 in 2016 and 2017³⁷ show additional contamination past the 25’ length. They also show there is a storm sewer that discharges into the former turning basin, and that the planned construction of an interceptor barrier will cause groundwater flooding in neighboring buildings.

The Trustees must coordinate promptly with the PRPs and EPA to improve the design by increasing the footprint of excavation and removing all contaminated material from the former Turning Basin 5, reclaiming the entire former footprint of TB5 for the public benefit, and rerouting the storm sewer through green infrastructure and into the restored basin to ensure that the Superfund Remedy doesn’t increase flooding in neighboring buildings. This would additionally provide fresh water flow into the 4th Street Basin to decrease stagnation.

Modify remedial design of Turning Basins 6, 7 and 11 to increase restoration area and improve water quality

³⁷ Geosyntec, Summary of Results, Turning Basin 5 Investigation, 2016

■ NationalGrid_TB5 Investigation Results 10 20 2016.pdf

As EPA and the PRPs finalize the design of Remediation Target Area 2, it is a critical time to ensure that the remediation of the turning basins is done in a manner supportive of long term ecological health. The existing turning basins along the Canal tend to be quite stagnant and to silt up easily and have the worst water quality in the Canal. As none of the turning basins has a water-dependent use along the shore they should be de-mapped as navigable waterways, in order to be restored as wetlands with access for small boats. Stormwater from adjacent sites should be cleaned and directed into the ends of the turning basins, to promote water flow and ecological health.

The 6th, 7th and 11th Street Turning Basins offer excellent opportunities for salt marsh restoration to be incorporated into the Superfund Remedy itself. During the remediation process, the turning basins should be re-graded and installed with salt marsh and intertidal habitat through planting tidal and coastal plant communities (see [Gowanus Lowlands Master Plan 2019](#), pg 129) Restoration of the 7th and 11th St Turning Basins should be complemented by funding for stormwater management on adjacent privately owned sites, in order to provide flow into the basin and reduce pressure on the combined sewer system. This ecological restoration should be complemented by installing pedestrian and boat access in the form of walkways, bridges and boat launches that restore community use and recreational access to the turning basins. Incorporating these features into the Superfund Remedy itself will be both cost effective and efficient at restoring natural resources and the public's access to them.

Engage and coordinate with existing Mussel Habitat Project (GCC and Dredgers) to determine effective methods of adapting existing steel bulkheads to support habitat restoration.

As noted above, the installation of steel bulkheads has decimated habitat for the Atlantic Ribbed Mussel population in the Canal - among other invertebrate species that inhabited the intertidal shoreline- and populations in Remedial Target Area 1, north of the 3rd Street Bridge, have been wiped out. As the Superfund Remedy continues, it is imperative that restoration of this habitat start early, so that the remaining mussel population can reseed the clean Canal.

Over the last three years, through a partnership with GCC and the Gowanus Dredgers, over 300 high school students from Brooklyn Collaborative Studies have been researching, building, and monitoring constructed habitats along steel bulkheads to support Atlantic ribbed mussels in the Gowanus Canal. Students visited the Canal to learn about mussels' habitat needs, then modeled their own designs back in the classroom. Some designs were fabricated in High Performance Concrete by the Gowanus Dredgers, then suspended from a steel bulkhead, near the 9th St bridge at the Lowlands Nursery. Students have monitored the habitats weekly each spring during mussel spawning season. No Atlantic ribbed mussel recruitment has occurred thus far, but BCS students and GCC staff have regularly observed invertebrates that took up residence on or in the constructed habitats, including Mummichog, American eel, Blue Mussel, Acorn Barnacle, Bristle (tube) worm, Sea Grapes, Clam worm, Grass shrimp, Oriental shrimp, Blue crab, European green crab, and Amphipods. Additional species that have been observed near or around the habitats include Atlantic menhaden, Banded killifish, and Atlantic tomcod.

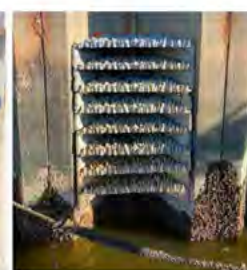
These experiments indicate that in order to successfully recruit Atlantic Ribbed Mussels, habitats need to be fixed, as opposed to suspended. There is a tremendous opportunity to affix habitat to bulkheads along the entirety of the Canal, and Gary Francis from the Gowanus Dredgers has successfully built a fixed habitat module on a bulkhead in Newtown Creek, pictured below. However, in conversations with property owners and their consulting engineers on the Gowanus Canal, there are significant barriers to such installations, primarily due to the need to monitor and maintain the integrity of the Canal and upland remedies, and associated liability issues.



Making a mold of a bulkhead



Habitat shelves made to fit bulkhead mold



Prototype installation in Newtown Creek

Mussel Installation by Gary Francis on Newtown Creek Photo: Nicole Vergalla

Process of Mussel Installation by Gary Francis Photo: Nicole Vergalla

The Trustees should support coordination with waterfront property owners and their consulting engineers to determine cost effective methods of affixing habitat that are protective of the Superfund Remedy. In particular, modules need to avoid interfering with regular and ongoing bulkhead inspection, which requires them to be moveable or placed and spaced from the bulkhead surface at distances that permit physical and visual inspection required. Piloting methods and strategies with engineering partners would enable faster deployment of successful methods at scale.

EARLY RESTORATION

The Assessment states that *“Trustees may identify and potentially implement early restoration opportunities, that is, chances to implement a restoration project before the previous assessment phases have been completed. These opportunities may be time sensitive, or there may be a benefit to early implementation (e.g., restoration of natural resources earlier than may otherwise be achieved).”* In addition to the modifications to the remedy described above, there are additional time sensitive opportunities that should be pursued as early restoration projects.

Support design and implementation of ecologically productive bulkheads in Remedial Target Areas 2 and 3.

As described above, it is difficult to retrofit bulkheads to support habitat restoration after the fact - it would be much more efficient and effective to design and install bulkheads that could support habitat restoration. This could be as simple as including metal mounting tabs that habitat modules can be attached to once the Superfund is complete, or more complex designs to integrate intertidal plantings and habitat substrates into the bulkhead design. Property owners in RTA 2 and 3 are currently working

through bulkhead designs in order to prepare for the next stages of Superfund dredging - the Trustees should engage with the PRPs and property owners to facilitate bulkheads that can support intertidal habitat restoration.

Purchase land in RTA 2 and 3 to restore habitat, manage flooding and provide water access.

The Lowe's and former Pathmark property includes the footprint of the Metropolitan former Manufactured Gas Plant, which has been partially remediated.³⁸ The shoreline of these properties, extending from 9th Street to Hamilton Avenue, sits at a low elevation with the majority occupied by large parking lots. The properties regularly flood, and in 2017 a portion of the bulkhead along the Lowe's property collapsed into the Canal.³⁹ With the continued remediation of these sites there is an opportunity to incorporate a coastal ecosystem buyout of low lying portions of the properties into the planned Superfund Remedy. Incorporating a buyout into the remedial design here would allow for bulkheads to be set back deeper into the site, making possible significant restoration of intertidal and high marsh habitats that may be more limited in other constrained sections of the Canal.

Work with NYC and private property owners to install public bathrooms and boat launches

In order to fully restore community use and access to the waterway, restoration projects should include much-needed social infrastructure, such as bathrooms, boat launches, community gathering spaces, and environmental education facilities. These features are critical components of an accessible waterway and currently lacking along the majority of the Canal. As design and construction of new public waterfront spaces is underway, this should be approached as an early restoration opportunity. Currently there is only one firm commitment to a public restroom, planned for the Salt Lot, within the approximately 20 acre network of public space envisioned along the Canal. With an influx of thousands of new residents expected, including these amenities in restoration projects would amplify the ability of restoration projects to provide for expanded enjoyment and use of the Gowanus Canal into the future.

³⁸ http://www.metropolitanmgpsite.com/proj_descr.html

³⁹ <https://pardonmeforasking.blogspot.com/2017/06/recently-huge-section-of-bulkhead.html>

APPENDIX

Gowanus NRDA Project Recommendations

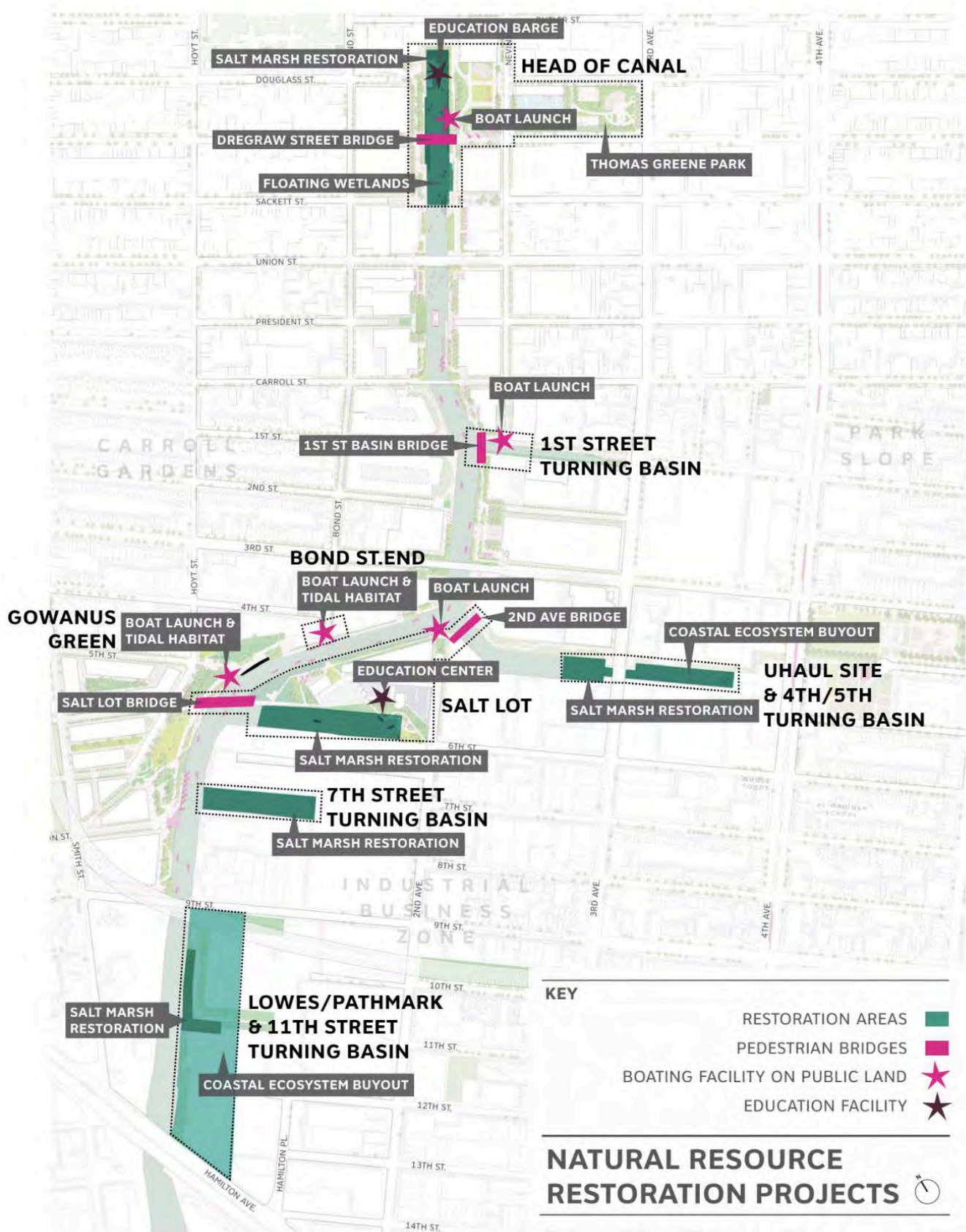
The following is a non-exhaustive list of potential restoration projects the Trustees should keep in mind as they seek to advance the case. We believe that the eventual selected projects should be determined through a robust public outreach process, and are eager to support the Trustees in that outreach.

Potential Projects

- **Head of Canal** - *Context: As part of the Superfund Clean-up, the head of the canal will see a new CSO detention tank (RH-034) and new public space will be installed on top of the tank. Thomas Greene Park will be remediated and rebuilt as part of the Superfund but only to match current conditions, without community-desired improvements.*
Project Components:
 - **Re-grading & Salt Marsh** - Provide salt marsh and intertidal habitat through re-grading the head of canal, so it gets shallower to the north, and planting tidal and coastal plant communities (see [Gowanus Lowlands Master Plan 2019](#), pg 129)
 - **Educational Barge & Floating Gardens** - Install an educational barge and floating gardens to provide access to the canal and K-12 education science learning.
 - **Moveable Pedestrian Bridge and Boat Launch at Degraw Street** - Provide a moveable pedestrian bridge, integrated with a Boat Launch, at Degraw St just south of the RH-034 tank.
 - **Thomas Greene Park** - Provide park improvements beyond currently planned remediation, which should include green infrastructure, public restrooms, a two story building including a community room and public restrooms, picnic areas, and improved recreational facilities.
- **1st Street Turning Basin Pedestrian Bridge and Boat Launch** - *Context: As part of the Superfund Clean-up, the former 1st Street Turning Basin will be excavated and include some wetland restoration. There is a need to provide accessibility across the basin to connect new waterfront public spaces to the north and south and to provide access to the water.*
 - **1st Street Basin Bridge & Boat Launch** - Provide a boat launch and new pedestrian bridge across the turning basin that is moveable or high enough to allow small boats to navigate below.
- **Salt Lot** - *Context: As part of the Superfund Clean-up, the Department of Environmental Protection (DEP) is planning to construct a combined sewer overflow (CSO) detention tank (OH007) at the Salt Lot, along with new public space, a small facilities building with restroom, a salt marsh at the tip of the peninsula, a boat launch at the end of the 6th Street Turning Basin, and a “get down” without a boat launch at the end of 2nd Avenue.*
Project Components:
 - **6th Street Turning Basin Salt Marsh Restoration** - Provide salt marsh in this turning basin while maintaining water access to the planned DEP boat launch.
 - **2nd Avenue Boat Launch** - Turn the planned “get down” at the end of 2nd Avenue into a boat launch, providing actual access to the water.

- Education Center - Expand upon the planned small facilities building to create an accessible Education Center and Field Station that provides indoor classroom and community space for K-12 and continuing education, workforce development, and community gatherings.
- Pedestrian Bridges connecting the Salt Lot to Gowanus Green and Whole Foods Esplanade - should be moveable or high enough to allow for navigation below
- **Uhaul Site & 4th/5th Turning Basin Restoration** - *Context: This turning basin, which currently terminates at 3rd Avenue, formerly extended east of 3rd Avenue by 575' but was filled in. The Superfund Clean-up currently includes the excavation and restoration of approximately 15' of the turning basin east of 3rd Avenue.*
 - **Project Components:**
 - 4th/5th St Basin Extension and Salt Marsh Restoration - Extend the excavation to the east by up to 560' through purchasing land from U-Haul in order to provide additional open water access, salt marsh and intertidal habitat, and an outlet for existing underground streams. Restoration should include a sloped basin that gets shallower to the east, planted with tidal and coastal plant communities (see [Gowanus Lowlands Master Plan 2019](#), pg 129).
 - Coastal Ecosystem Buyout at Uhaul Site - Purchase land from Uhaul site and restore coastal habitat and provide water access
- **7th Street Turning Basin Restoration Site**
 - 7th Street Turning Basin Salt Marsh Restoration - Provide salt marsh and intertidal habitat through re-grading the turning basin, so it gets shallower to the east, and planting tidal and coastal plant communities (see [Gowanus Lowlands Master Plan 2019](#), pg 129)
- **Bond Street End Boat Launch & Tidal Habitat** - *Context: As part of the Gowanus Rezoning, the City will "create a new passive waterfront open space with landscaping and potential green infrastructure to address local flooding" at the end of Bond Street (See [Gowanus Points of Agreement](#), pg 15).*
 - Boat Launch - Provide a boat launch in coordination with new public space
 - Intertidal Habitat - Provide intertidal habitat through terracing or floating gardens
- **Gowanus Green Boat Launch & Tidal Habitat** - *Context: As part of the Gowanus Rezoning, the City will build a park at Gowanus Green, also known as Public Place.*
 - **Project Components:**
 - Boat Launch - Provide a boat launch in coordination with new public space
 - Intertidal Habitat - Provide intertidal habitat through terracing or floating gardens
- **Lowes / Pathmark & 11th St. Turning Basin Restoration** - *Context: This site, mostly made up of parking lots near the water, is currently facing increasing coastal and stormwater flooding.*
 - **Project Components:**
 - 11th Street Turning Basin Salt Marsh Restoration - Provide salt marsh and intertidal habitat through re-grading the turning basin, so it gets shallower to the east, and planting tidal and coastal plant communities (see [Gowanus Lowlands Master Plan 2019](#), pg 129)

- Coastal Ecosystem Buyout - Purchase land and restore coastal habitat and provide water access
- **Canal-wide Constructed Habitat** - *Context - as part of the Superfund Clean-up, existing bulkheads and edges are being replaced with steel sheet pile that eliminates intertidal habitat for mussels, oysters, crabs, shorebirds, and other wildlife. There is an opportunity to retrofit bulkheads with constructed habitats as follows:*
 - Bulkhead Habitat Modules - Provide bulkhead modifications, such as facade modifications or hanging baskets that provide habitat for aquatic species including Atlantic Ribbed Mussels and Oysters.
 - Bottom of Canal Modifications - Install areas of sedimentation and/or e-concrete units along with eelgrass planting to provide aquatic habitat.
 - Floating Wetlands - Provide moveable floating wetlands in strategic locations along the canal bulkheads that do not interfere with navigation.
- **Lowland Flood Management** - *Context: Multiple sites throughout lowlying areas of the neighborhood, particularly the Industrial Business Zone, are subject to increasing flooding and sewer backups from rising groundwater and increased precipitation.*
 - Property Retrofit Grants - Fund Green roof and basement retrofits within floodplain
 - Inland Buyouts - Purchase land and provide stormwater management
 - Stream Daylighting - Daylight underground streams to help manage stormwater
- **Upland Stormwater management** - *Context: Impermeable upland neighborhoods contribute stormwater to lowlying Gowanus neighborhood, exacerbating flooding*
 - Green Infrastructure Grants - Fund green infrastructure on private property throughout watershed
 - Right of Way Rain Gardens - Fund additional DEP Rain Gardens throughout watershed





June 14, 2024

Via E-Mail to nrd@dec.ny.gov

NYS Department of Environmental Conservation
Natural Resource Damages Section
c/o Alicia Pasos
625 Broadway, 14th Floor
Albany, NY 12233

Dear Gowanus Canal Natural Resource Damages Assessment Trustees Council,

Thank you for the opportunity to provide comments on the The Gowanus Canal Draft Assessment Plan released on March 1, 2024.

The Gowanus Dredgers have been canoeing on the Gowanus Canal for 25 years, helping New Yorkers to build stronger community relationships with the Canal and the rest of the New York–New Jersey estuary. Our not-for-profit 501(c)3 organization provides free, public access to engage directly with the water and on-water recreation opportunities to thousands of individuals each season, along with environmental education, citizen science research, placemaking and other community development activities year round.

We are an all-volunteer organization, and we have been strong advocates for the cleanup of the canal for many years, both prior to its designation as a Superfund site and, in recent years, as an active member of the Gowanus Canal Community Advisory Group and the Citizen's Water Quality Monitoring Program. We collaborate with community groups, elected officials, and public agencies to advance safe, healthy access to both the canal and the wider New York Harbor. We also offer free, public boating programs in Red Hook, Staten Island, and Long Island City; and we regularly lend our expertise and organizational capacity to new boating programs and events throughout the city.



The Gowanus Canal remains at the heart of our activities, and over 25 years, we have observed the significant, ongoing impact of contamination on our community, as well as the more recent reductions in habitat, wildlife, ecosystem services, and water access that have occurred due to the Superfund cleanup. The NRDA has the potential to ensure that these damages are fully accounted for and provide adequate funding for restoration that will benefit the environment and the community going forward.

We join our friends and partners at Riverkeeper, the Gowanus Canal Conservancy, the Gowanus Canal Community Advisory Group, and Billion Oyster Project in urging the Trustees to expand the scope of the NRDA Plan to consider additional resources and injuries in the Assessment, correctly identify the designated use of the canal for primary contact, expand the inclusion of community knowledge in shaping the Plan, and ensure that meaningful restoration efforts directly benefit the canal and the adjacent communities. We also urge the Trustees to begin identifying restoration activities within the Gowanus neighborhood immediately, as active development in the context of a recent neighborhood rezoning provides an opportunity to accelerate cost-effective strategies for managing stormwater, creating habitat, improving access and use, and increasing the resiliency of both Gowanus and the wider region.

Expand The Scope	2
Expand the Assessment Area	3
Include Air and Groundwater in the Assessment	4
Include Additional Contaminants of Concern	5
Assess Human and Recreational Uses of the Canal	6
The Gowanus is a Primary Contact Waterway	6
Assessing Impact on Human Uses	8
Historic Contamination Has Limited Public Use & Enjoyment	8
Remedial Activity is Severely Limiting and Affecting Recreational Use.	10
Additional impacts from remedial activity	14
Habitat and Species Impacts	15
Observed Remedial Activity Impacts	16
Restoration Opportunities	19



Expand The Scope

The Gowanus Dredgers have reviewed the NRDA plan in detail, and we find that the scope of the assessment is too narrow to properly account for the impact of the historic pollution on our community and the waterway. As regular users of the waterway and residents of the neighborhood, we have first-hand knowledge of and exposure to the conditions in the canal, including existing wildlife, habitat conditions, water quality, access and community perception.

Expand the Assessment Area

In the Plan's history of the canal, the Trustees acknowledge that "Gowanus Canal and the adjacent area were once part of Gowanus Creek, a brackish tidal creek and tributaries surrounded by lowland marshes and meadows." This history is an important factor in understanding the damages to natural resources from the historic pollution; Marshlands play a significant role in filtering and slowing water moving through the landscape in and around the Canal, and provide significant habitat for a wide range of species.

The channelization and bulkheading of the Canal have impaired this ecology, but the tidal nature of the canal and the flow of freshwater streams into the Gowanus through the adjacent landscape have not changed. We continue to observe tidal cycles, freshwater flows into the canal, and wildlife use that are consistent with this history. In multiple bioblitzes, academic and student research efforts, and casual field observations we have documented the presence of Atlantic Ribbed Mussels, marsh grasses, fish, and wading birds that are typical of tidal and marshland environments in the canal.

Undisturbed, flooded areas of the canal (with certain grade conditions) typically return to natural Gowanus wetland conditions. As Eymund Diegel notes in his submitted comments, the Gowanus Canal had a flourishing *Spartina patens* and *alterniflora* tidal wetland installed by Gowanus Canal Conservancy in 2012 at the 2nd Street Salt Lot; a naturally occurring *Juncus gerardii* (saltmarsh rush) wetland at the Carroll Street drawbridge area; and naturally occurring phragmites



wetlands on the Citizens MGP site at Smith Street. (Remedial activity has since eradicated all three.)

Limiting the proposed Assessment Area to only the 32 acres of aquatic habitat within the canal is inappropriate as it falls short of evaluating the entire environmental impact that the NRD process is meant to address. Adjacent habitat areas have been impacted by contaminants and are being disrupted by the remedy that requires replacement of bulkheads and riprap in some areas.

Restoring habitats, groundwater drainage and community access throughout and following the remedy will be crucial to re-establish functional ecosystems and clean water that provide all of the benefits and uses our local communities deserve. **For these reasons, the Assessment Area should be expanded to include the intertidal zone, marsh areas, shoreline areas, and additional upland areas.**

Our colleagues at Riverkeeper have also noted that “the Assessment Area proposed in the NRDA Plan for the Newtown Creek Superfund site does include the intertidal zone.”¹ The Trustees anticipate quantifying ecological service losses to representative resources for intertidal and subtidal aquatic habitat in Newtown Creek. The Trustees must do the same for Gowanus Canal. Intertidal habitats were historically documented in the canal and have been both directly and indirectly affected by oil and hazardous substances and the remediation of this Superfund Site.” We agree.

Include Air and Groundwater in the Assessment

The Trustees acknowledge that the scope could be expanded to include air and groundwater resources, in the future. However, these resources should be included from the outset of the Assessment, as there is significant evidence to suggest meaningful impacts, including existing analyses from the EPA in the

¹ Newtown Creek Natural Resource Damage Assessment Trustee Council, Newtown Creek Natural Resource Damage Assessment Plan (March 2024), p. 17, https://www.fws.gov/sites/default/files/documents/draft_newtowncreek_assessment-plan_03.01.2024.pdf



Record of Decision and New York State's Department of Health and Human Services.

Air: As frequent, recreational users, we have particular interest in ensuring that air quality impacts from the contamination are considered. The [Gowanus Canal Remedial Investigation Report](#) found that volatile organic compounds (VOCs) and polycyclic aromatic hydrocarbons (PAHs) were found in air samples along the canal, and noted that levels were “significantly higher at canoe level.”

“A statistical comparison was performed which indicated no significant differences between the concentrations of PAHs in air at canoe level and those at street level during Round 2 (when the aeration system was operational). In Round 1, concentrations of three PAHs (anthracene, phenanthrene, and pyrene) were significantly higher at canoe level than at street level. However, the concentrations are generally within the same order of magnitude.”²

We are not alone in our potential exposure, however; local residents and workers with regular proximity to the Canal may all become exposed to hazardous chemicals through contact with contaminated air.

Groundwater: In addition to the impact of historic pollution, the impact of the remedial activity on groundwater needs additional study and observation. The Superfund remedy includes watertight bulkheads, intended to stabilize the shore for dredging and limit the flow of upland contamination into the Canal. This work has had meaningful implications for local groundwater flows; as local residents with a regular presence on the canal, we have seen increased flooding in the neighborhood, likely linked to the construction of the bulkheads as part of remedial action, and this concern has been exacerbated by more intense, climate change-linked storms.

It is also important to note that bulkhead replacement along the Canal has not been subject to the normal process of state review and public comment. Bulkhead construction along the Gowanus has only been subject to review by the

² Gowanus Canal Remedial Investigation Report, (January 2011), Vol 1. p. 4-33, <https://gowanussuperfund.com/wp-content/uploads/2021/09/Gowanus-Canal-Remedial-Investigation-Report-V.-1-DRAFT.pdf>



Environmental Protection Agency, which has limited authority to weigh in on the impact of its remedial actions on other environmental issues, including natural resources. In correspondence with the EPA, the Dredgers have raised concerns about the impact of the new bulkheads on public access, safety, flooding, and other issues.

In an email dated May 8, 2024 (attached as an Appendix to this comment), the EPA confirmed that:

“EPA's selected ROD [record of decision], as well as its rezoning comments, do not address bulkhead height or whether ground level grades are changed. While these issues are important to current and future land use, flooding is not a remedy concern to EPA [...]. Flooding concerns, while important, do not impact the integrity of the in-canal capping and dredging, nor recontamination, as a result of the measures noted above.”

However, these issues do have significant implications for the NRDA. We strongly urge the Trustees to include groundwater in their assessment, including both the impact of historical industrial pollutants and the impact of the remedy on groundwater in the assessment area.

The letter further states that, in certain cases where the bulkheads are expected to potentially cause groundwater mounding, the EPA has required that groundwater discharge “vents,” including treatment units, be built into the sealed bulkheads at Fulton MGP and Citizens MGP barrier walls. The EPA says it “is not aware that there have been any unacceptable changes in groundwater levels as a result of bulkhead construction,” but we urge the Trustees to study this issue along with the impact of historic contamination, as local experience suggests otherwise.

Include Additional Contaminants of Concern

As the Draft Plan indicates, a long list of contaminants of concern are part of the Superfund cleanup, but the Assessment focuses only on PAHs. As regular paddlers of the canal, we have regular exposure to the entire range of contaminants within the canal. We urge the Trustees to study the impact of



long-term exposure to the entire set of COCs, including Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo[a]anthracene, Benzo[a]pyrene, Copper, Dibenzo(a,h) anthracene, Indeno(1,2,3-cd) pyrene, Lead, Polychlorinated biphenyls (PCBs), and Polycyclic aromatic hydrocarbons (PAHs).

Assess Human and Recreational Uses of the Canal

The Gowanus Dredgers have been providing public water access, including free, walk-up public paddling, guided tours, on-water fitness classes, and marine skills training (paddling technique, marine radio use, knot tying courses), for 25 years. We often partner with fishing and birding groups around Brooklyn on nature-based educational programming, as well. On shore, our boathouse, launch location, and shore public walkway locations are home to a wide range of events and activations, including concerts, dance performances, poetry readings, stand-up comedy events, weekly music jams, community meetings for the local Gowanus Mutual Aid group, art shows, hands-on science workshops, lecture events, and more. We can speak with authority on the past, current and future uses of the canal, both on and off water, based on this extensive experience.

The Gowanus is a Primary Contact Waterway

We join our colleagues at Riverkeeper in noting that the draft Plan incorrectly identifies the waterbody classification of the Gowanus Canal.

The draft Plan states that “upstream of Hamilton Avenue Bridge, NYSDEC designated Gowanus Canal Class SD, that is, appropriate for fishing (NYSDEC 2022). Downstream of Hamilton Avenue Bridge, Gowanus Canal is designated Class I, meaning appropriate for secondary contact recreation (e.g., canoeing and kayaking) and fishing as well as suitable for fish propagation and survival (NYCDEP 2015).” Although the majority of Gowanus Canal is designated as a Class SD waterbody, the NYSDEC has determined that the Gowanus Canal does not support the designated use of fishing and the Canal has been on the Clean Water Act Section 303(d) list of impaired waterbodies since 1998. This status should be reflected in the draft Plan.

The draft Plan must also be corrected to acknowledge that the entirety of the Canal is designated for primary contact recreation. As explained by EPA Region



2 Clean Water Division Director Javier Laureano, New York State Department of Environmental Conservation promulgated, and EPA approved, the recreational use in 2015 and 2016, respectively:

On February 24, 2016, the U.S. Environmental Protection Agency (EPA) received the New York State Department of Environmental Conservation (NYSDEC) revisions to New York State's water quality standards (NYSWQS). These revised water quality standards (WQS), adopted by the NYSDEC on November 4, 2015, amended the designated uses of Class I and Class SD saline surface waters [including Gowanus Canal] to include a designated use of primary contact recreation (6 NYCRR §§ 701.13 and 701.14). Additionally, these revised WQS amended the water quality criteria for Class I and Class SD saline surface waters (6 NYCRR Part 703). In a letter dated May 9, 2016, the EPA approved, pursuant to Section 303(c) of the Clean Water Act (CWA), 33 U.S.C. §1313(c), the revised designated uses of Class I and Class SD saline surface waters at 6 NYCRR Part 701.

For the purposes of federal law, and for actions taken pursuant to and especially the Clean Water Act and Comprehensive Environmental Response, Compensation, and Liability Act, the Trustees must incorporate the designated use of primary contact.

The Dredgers vigorously oppose any suggestion that the waters of the Gowanus Canal have been “permanently damaged.” There is no “permanent” state in a natural ecosystem – only an objective assessment of its successional ecology restoration pathways over time, and how they can be encouraged. There are numerous examples of urban waterways where such a transformation has occurred. In Chicago, Baltimore, and Portland, Ore., among others, community groups such as ours host annual swim/float parties to celebrate the revival of their once-toxic urban rivers and to raise awareness of the success of cleanup and restoration efforts such as those enabled by a robust NRDA process, and effective application of the Citywide Long-Term Control Plan and the federal Clean Water Act.



In 2021, the Gowanus Dredgers partnered with local organization Pioneer Works — an artist- and scientist-led nonprofit cultural center in Red Hook, Brooklyn — to bring Erin Johnson’s video work *Lake* to both projection screens and building façades along the canal. The piece displayed aerial drone footage of people floating on a dark watery background. Nearly 100 participants attended the event, walking (and some paddling) to projection sites and engaging in conversations about the future of a swimmable Gowanus. Our community wants the Gowanus to be clean enough for swimming.

Assessing Impact on Human Uses

In partnership with other community organizations, the Dredgers invited local residents to share their experiences, concerns, hopes and wishes for the restoration of the canal. As you will see from those comments — submitted as individual postcards but also attached to this comment in digital form — the public has frequently limited their access to the Canal over many years, due to health and safety concerns, fears about air quality and toxic fumes related to the noxious odors from the canal, and limited access to boating facilities, walking paths, fishing locations, and other opportunities to engage.

In recent years, the remedial activities on the canal have further diminished recreational and access opportunities, through canal closures to recreational boating, reduction in boating opportunities from our organization, the loss of both formal and informal access points along the canal, and an increase in noises, odors, and dust that limit their enjoyment of the Canal as a natural place.

The Assessment Plan acknowledges that human uses of the canal have been harmed by its contamination, but it contains limited information about how such an assessment will be made. We request that the Trustees provide more detailed insight into the methods and data they intend to use before adopting a final Assessment plan. Below we have provided some data and details from our own experience, and we are available to work with the Trustees on gathering additional information. We have been grateful for your responsiveness to past outreach and encourage you to proactively seek out additional community input on this and other issues.



Historic Contamination Has Limited Public Use & Enjoyment

We appreciate the Trustees' awareness of current limitations on fishing and fish consumption when such fish are in the canal. However, the Canal is not a closed ecosystem, and fish that are caught in the Gowanus are part of the larger estuary. The impacts of contamination within the Gowanus on fishing for recreation and consumption should be evaluated within the context of the entire ecosystem. Riverkeeper has provided additional detail in their comments on this issue, and we support their recommendations. Additionally, while public health reports have given the go-ahead for boaters using the waterway, citing low impact of contamination on non-submersion recreation, the impairment of the waterway continues to have a significant chilling effect on actual usage and enjoyment.

The Gowanus Canal is a uniquely suitable waterway for human-powered boaters, particularly beginners, due to its relatively narrow width, gentle current, and protection from larger wind. It is among the safest places in the New York Harbor to paddle, and our organization has helped thousands of people get out on the water, despite its degraded environmental condition.

However, it has much more potential than is currently realized, due to the ongoing contamination.

- **Water quality** has a significant impact on both the availability and desirability of recreational activities, including boating, swimming, and fishing.³ The long-term contamination of the canal has made the canal less desirable for many local residents as a site for these activities, and frequent CSO events can often limit paddling activity. The [2014 Public Health Assessment](#) discourages swimming at all times and emphasizes the risks of boating following CSO events, in particular.

Our experience also affirms that water quality has affected public perception of the Canal as appropriate for human use: We regularly receive astonished remarks from pedestrians, who shout concerns for our

³ Curtis, John et al. "Recreational boating site choice and the impact of water quality." Heliyon vol. 3,10 e00426. 17 Oct. 2017, doi:10.1016/j.heliyon.2017.e00426



safety or marvel at the oddity of people choosing to recreate on such a filthy waterway.

In the many comment postcards submitted to the Trustees through our outreach efforts with partners in the neighborhood, residents noted that they look forward to boating on the Gowanus — when it's cleaner.

- **Water access** is an important resource for the current and future community of boaters; soft and low shorelines, dock infrastructure, and public access points along the canal enable fishing, boating, and other recreational uses. Access on the canal has been largely limited to informal/undeveloped access/egress points on public street ends, including 2nd St., 2nd Ave., Huntington St., 11th St., and a ladder located between the Douglass and Degraw street ends. During the early 2010s, the Gowanus Dredgers built and operated a public-use dock off the end of 2nd St., which was replaced in 2016-2017, as part of the development of the 365/363 Bond St. residential buildings.

Water access is an essential piece of activating the entire shoreline for community use, as well, not just the Canal itself. We have seen the direct impact of water access on the use of the shore public walkway near our boathouse over the past several years. The more on-water programming we operate, the more activation and participation we have seen on the shoreline for off-water activities, as well. An actively used waterway creates an active shoreline, too.

It is difficult to estimate the number of lost recreational and educational trips on the Gowanus due to its historic state of contamination and limited access, but there is ample evidence that cleaner water and greater access would have resulted in increased public enjoyment and use of the Canal over the many decades prior to the Dredgers efforts.



Remedial Activity is Severely Limiting and Affecting Recreational Use

Despite the Canal's poor water quality and limited access, we have seen growing interest and engagement with recreational activity, supported by our efforts to improve both water quality and access to and through the water. Unfortunately, remedial activity has further limited recreational use and enjoyment of the canal.

Losses: Access and Egress

The remedial action began in the fall of 2020, and the Remediation Team closed the 2nd St dock adjacent to the Dredgers Boathouse — located within RTA-1 — and closed the canal to all recreational boating above 9th St.

Construction of new bulkheads along the canal has eliminated or reduced access and egress points throughout the entire canal, as well.

- **Access at 2nd St., the only formal public dock along the Gowanus Canal, has been closed since October 2020**, and the Remedial Team has not indicated when it will be returned to service, despite requests to expedite this access.
- **The 2nd Ave. Street end, adjacent to the Salt Lot/the Owl's Head CSO tank site, was a long-time access point for canoes, kayaks, and small fishing vessels.** This area, located outside RTA-1, has also been subject to closures since 2021.
 - Access at 2nd Ave. may be restored during development of the CSO tank facility, but the proposed site design eliminates use for larger boats such as those used by anglers and has eliminated a former soft shoreline where kayaks and canoes could land and launch in low to mid-tide conditions.
 - A new, accessible floating dock is proposed for the 6th St. turning basin, but final plans have not been approved and hours of operation are likely to be more limited due to site location.
- **The Huntington Street end previously offered safe landing and launching from a soft edge shoreline.** Due to construction on the adjacent site, this access is currently being removed, despite public



testimony during the Department of City Planning land use review (ULURP) process. While this removal is not directly related to the remedy, it is a clear example of the need for restoration efforts to begin immediately, as the pace and scale of local development efforts are actively shaping the future conditions in ways that may further injure the Canal's natural resources without intervention.

- **New bulkhead construction has reduced access and safe egress.** Bulkhead heights along the upper portion of the canal have increased, and the new, non-climbable sheer steel bulkheads are replacing wood and rock shorelines that previously acted as “get down” locations and permitted emergency egress. New bulkheads also lack safety ladders or other lifesaving equipment, increasing risks to boaters.

We recently heard from a boater who capsized in the canal in 2023 and was forced to swim with their capsized boat approximately 300 meters in order to find a landing/egress point, due to the new bulkheads and lack of egress; the length of the swim might not have been feasible for all boaters, and this particular individual suffered gastrointestinal issues for 14 days following extended immersion in the canal.

- **Replacement bulkhead construction along the Canal between 9th St. and 11th St. (along the Lowe's Esplanade) removed a soft shoreline access point and introduced new fencing that prohibits entry to and emergency access from the water.** This site was a frequent boat launch and access point for recreational boaters, and a regular access/egress point for larger work vessels and fishing boats in the canal, until the bulkhead was replaced in 2023. Access was removed at this point, despite requests from the Dredgers and support from the EPA for inclusion of a boat ramp or other access infrastructure.
- **A ladder previously located on the western bulkhead between Douglass St. and Degraw St. has been removed,** along with higher bulkheads; there is no longer any safe egress point between the head of the canal and the Carroll St. bridge.



- **Many of the new bulkheads have encroached on the navigable channel of the canal, as well, reducing water access *within* the Canal.** Gowanus Dredgers member Eymund Diegel has provided additional comments on this point, and his analysis estimates that just under 1 acre of open water has been landfilled due to the construction of new bulkheads. In some places, the 100-foot channel has been reduced to just 65 feet, a 35% reduction in the width of the federally protected navigation channel.

Losses: Boat Trips

The Gowanus Dredgers estimate that the remedial activity has resulted in at least 8,200 fewer individual canoe trips between October 2020 and March 2024. This only includes Gowanus Dredgers programming, and does not account for lost trips not affiliated with our club, including the regular community of anglers, kayakers, power boaters, and sailors who have also made use of the canal in the past. In addition, we estimate a total reduction in related shoreline activity participation of at least twice this number. As noted elsewhere, on-water canoe activity encouraged on-shore participation by passersby, non-canoeing companions, and other local residents.

We also anticipate that the work performed during RTA-2 and RTA-3 will have additional impacts that will further reduce recreational use.

The October 2020-March 2024 time period represents three full seasons of public programming in which public access was prohibited or programming was otherwise limited by dock closures and explicit restrictions from the Remedial Team.

- 2021
 - Estimated program size without restrictions: 2,500 trips
 - Actual program size: <100 trips
 - Paid membership, which enables members to access Dredgers equipment for solo voyages outside regular programming, fell by 67% between 2020 and 2021, from 93 to 28.
- 2022
 - Estimated program size without restrictions: 3,000 trips



- Actual program size: ~100 trips
 - Paid membership: 45
- 2023
 - Estimated program size without restrictions: 3,500 trips
 - Actual program size: 675 trips
 - Paid membership: 51

Future impacts

- During RTA-2, the Dredgers have already received advance notice of boating limitations within the entire length of the canal during certain periods, potentially causing us to cease all free, public walk-up programming during those dates.
- During the entirety of RTA-2, closures will impact programming at both dock locations, requiring additional equipment and volunteer management, despite reduced program operations.
- During RTA-3, access to the Bay from the Canal, and visa-versa will be closed, with no local bay access for boaters in the Gowanus area.
- No bulkhead designs for street ends in RTA-2 and RTA-3 have taken into account community requests for access.

How we estimated impacts

Our estimates are based on past performance and trends. All past trip numbers are as reported to the Hudson River Foundation for its 2018 State of the Estuary report. More recent numbers are taken directly from participant waiver counts, which are required of all participants using Gowanus Dredgers equipment (canoes, paddles, life jackets, etc.):

- In 2010, when the Canal was placed on the National Priorities List, our decade of efforts to grow community awareness and activity was paying off: we reported 3,000 paddling trips that year.
- During the 2014-2016 construction of the building at 365 Bond, the Gowanus Dredgers had limited access to our boat launch from the foot of 2nd St.; this reduced our annual number of trips from as many as 2,000 reported in 2012 to 300 during the construction years. Our programming returned in 2017, with the opening of our boathouse, and we logged 1,000 trips in 2017.



- Our program popularity continued to grow in subsequent years, with programming and participation climbing to more than 2,000 paddling trips in 2020, when canoeing presented a unique, COVID-safe way to get outside during the COVID-19 pandemic. The Gowanus Canal provided a much-needed green space for exercise, safe socializing, and community gathering.
- We were on track to have our biggest season yet in 2021; based on historical patterns expected to see annual growth of 500+ trips per year.
- In 2021 and 2022, the Dredgers were limited by remedial activity and the closure of the 2nd st dock to offering guided tours and special events that could depart from the collapsed bulkhead of the 11th St turning basin.

In August/September 2022, the Remedial Trust reimbursed the Gowanus Dredgers for the direct expenses of constructing a new dock within RTA-3, at the end of 19th St. The site was secured with the support of the EPA team. This new location allows greater access to the harbor for experienced boaters, but requires a higher degree of supervision and volunteer support for public programming:

- It is only accessible for beginners / public programming in a narrow range of conditions.
- The location is outside the sheltered channel of the Canal, with greater exposure to wind, currents, and commercial traffic.
- The location is adjacent to both the Southwest Brooklyn Marine Transfer Station, with 24-hour tug-and-barge traffic operations and Vane Brothers tugboat operations.
- Regular barge traffic in the channel serves the Hamilton Asphalt Plant and Benson Scrap Metal.
- The location is further from residential users and the adjacent neighborhood has poor pedestrian infrastructure; accessing the site also requires users to navigate an industrial truck route and warehouse district.

As a result, we currently operate just 2 public walk-up paddles per month, down from 8 prior to remediation.

Additional impacts from remedial activity



Enjoyment

Our outreach to the public about this comment period has also highlighted the significant impact that remedial activity has had on use and enjoyment of the shoreline by neighbors. The development of the CSO tanks, the remediation of upland sites, and bulkhead installation have disrupted the local neighborhood through an increase in fumes, dust, vibration, and noise. Monitoring agencies and authorities have not found that these impacts have regularly exceeded legal levels, but the continuous complaints from residents at Community Advisory Group meetings, Community Board meetings, Town Halls, and many other public forums, indicates that there has been a significant loss of enjoyment.

Input on Community Design

As noted throughout this comment, the bulkheads have had a significant impact on the community's experience and enjoyment of our neighborhood. Existing state and local laws require bulkhead designs to be designed to preserve access, address climate-change and flooding concerns, and all such designs are supposed to be presented for public comment and review if they have impacts on these issues or alter the bulkhead line in any way. All of the remedial bulkheads meet this standard, but within Gowanus, this process has not been followed. Members of the Gowanus Canal Community Advisory Group reported at the April 2024 meeting that the EPA had used its authority to waive this requirement.

The Dredgers have not been able to confirm the history of the public review waiver, but we do know that bulkhead designs have not been presented for community comment. We and many other members of the community have repeatedly asked for input into the design process for bulkheads, providing feedback on appropriate designs to support future water access. Some stakeholders have granted informal input into their process, but community feedback has not been consistent, required, nor inspected beyond EPA's certification that bulkheads meet certain technical requirements.

Assess Habitat and Species Impacts

The Gowanus Dredgers have been regular observers of the canal for 25 years, and many of our members have made close observations of the wildlife, habitat, and conditions over that time. Across that time, we know that the Canal's condition — despite its contamination and impairment — has been one with



increasing ecosystem diversity, with collapsing wooden bulkheads providing softer shorelines teeming with life. These collapsed wooden bulkheads, overgrown with trees and plants, provided significant habitat for birds, animals, and aquatic life. Cleanup activities, including dredging, capping and the installation of new steel bulkheads destroyed these habitat areas.

Our colleagues at Riverkeeper and the Gowanus Canal Conservancy are including detailed remarks and observations on the ecological damage of historic pollution and remedial activity. As some of the most active, on-the-ground observers of canal life, we want to underscore these concerns. Based on our own observations of life in and around the canal, the current draft takes an overly limited view of the diversity of species in the canal and risks a significant undervaluation of the Canal's pre-remediation wildlife population, if additional references and data sources are not considered.

In the Draft Plan, the Trustees anticipate quantifying ecological service losses to representative resources for aquatic habitat. The Trustees state that these resources may include benthic invertebrates, fish and birds. The Trustees must quantify the ecological service losses to these resources and must also expand the scope of ecological injury quantification to also include mammals. We want to ensure that all species present in Gowanus Canal are properly evaluated as part of the NRDA process. To achieve this goal, the Trustees should review the Biological Survey Report prepared by the Gowanus Canal Conservancy in 2021 to ensure injuries to biological resources are appropriately and sufficiently evaluated.

Healthy ecosystems are composed of an extensive assemblage of organisms, all interacting with themselves and their abiotic environment. Such dynamic interactions and trophic relationships have been destroyed by years of contamination. The Trustees must consider such impacts when quantifying ecological service losses.

Below, we share some specific observations conducted by the Gowanus Dredgers during the recent period of remedial activity to highlight the significant harms done to the Canal's natural resources.



Observed Remedial Activity Impacts

The remedial activity — especially bulkhead design and replacement, as well as dredging and capping activities, have significantly reduced habitat and contributed to abiotic conditions in the canal, through reduced oxygenation, reduced natural filtration, and a reduction in freshwater flows into the canal.

Water Quality & Fish Population

The Gowanus Dredgers have seen a significant reduction in water quality over the past year, as new bulkheads have been installed, freshwater streams have been diverted, filter-feeding mussel populations have been eliminated, the flushing tunnel has been turned off, and dredging and capping activity may contribute to increased sediment in the water column.

Since July 2023, the Dredgers have performed regular water quality testing and analysis to provide better visibility into real-time conditions in the waterway. This testing began after visitors to a City of Water Day event on July 15 witnessed a mass fish die-off, with thousands of juvenile bunker floating in the canal.

Readings from a Duro UAS Field Sonde showed dissolved oxygen levels of about 1.0 mg/L, a level considered hypoxic. This reading occurred in a context of hot temperatures, rainfall and likely combined sewer overflow event on July 14. It proved difficult to obtain timely data collected by EPA, DEP, or the Gowanus Remediation Team. In response to public questions, the Dredgers began testing water quality.

The Dredgers team analyzed the data from a two month period (September-October 2023) and found concerning key water quality metrics. “Dissolved oxygen, pH, and ORP values were often shockingly low. Dissolved oxygen was lower than 5mg/L, a level the EPA considers stressful for fish, on 33 out of 38 days (87%) at the Douglass Street testing site. Values of pH were lower than 6.9 on 27 out of 38 days (71%), meaning the water was acidic.”⁴

⁴ Gowanus Dredgers Canoe Club, Monitoring Water Quality in the Gowanus Canal: A Superfun(d) Community Science Initiative (November 2023), NY-NJ HEP State of the Estuary Conference, New York.

https://drive.google.com/file/d/15Z_GwvL3skxH-7FVeGyln6LC7DnZVv1P/view?ts=666b386e



Currently, we anticipate a large number of potential die-off events in Summer 2024, which is projected to see record breaking heat; until the CSO tanks are completed,⁵ the flushing tunnel is turned on, and natural ecosystems are restored, we do not anticipate improvement in these metrics.

However, more data is needed to properly assess the impact of the remedial activity on water quality and habitability. The Gowanus Dredgers urge the Trustees to work with the Remedial Team and the City of New York to provide consistent, real-time data on water quality metrics to the public, to establish a clearer understanding of conditions and the impact of ongoing remedial activity. Current GRT reports are helpful in reporting dissolved oxygen and turbidity, but are only published online 3-6 weeks after collection. The Department of Environmental Protection has not updated its site sampling dataset online since 2021, despite community member observations that the data continues to be collected. The Trustees should access this data to better understand the causes of worsening conditions in the canal during the RTA-1 activity.

Atlantic Ribbed Mussels

As noted above, the new bulkheads being installed on the Gowanus Canal have not been sufficiently evaluated for the harm caused to natural resources within the project area, including the near total loss of in-water habitat, loss of water access and safe egress points for the adjacent neighborhoods, and loss of significant amounts of plant life and shade tree cover along the shoreline associated with their construction. This is in addition to previously raised concerns about the groundwater impacts of the bulkheads.

The Dredgers have, since 2018, focused on one key resident of those bulkheads: the Canal's sizeable population of Atlantic Ribbed Mussels.⁶ These native bivalves are tolerant to a wide range of water temperatures, salinities, and hardy against pollution. They can filter 6.8 liters of estuarine water an hour, and are able to efficiently remove a wider-range of sizes of particulate organic material than many of their bivalve kin.

⁵ Gowanus Dredgers Canoe Club, Community Science in the Gowanus Canal: What's Lurking Under the Surface? (May 2024), Billion Oyster Project Scy-Posium, New York.

https://drive.google.com/file/d/1gUPO1ffkR51BTxMkE_XCf10Ufcviifsi/view?ts=666b3860

⁶ Gowanus Dredgers Canoe Club, Mighty Mussels (2023),

<https://gowanusdredgers.org/mighty-mussels/>



In 2020, the Gowanus Dredgers and the Gowanus Canal Conservancy partnered to survey Ribbed Mussel populations along the shoreline of the Salt Lot, which consisted of multiple bulkhead surface types, including wood, older steel bulkhead, and rip rap. The study⁷ showed that the wooden bulkheads that previously dominated the Canal landscape provided significant habitat for mussels — an estimated 311 mussels/100 linear-feet. This is more than 100X the capacity of steel bulkhead, which makes up nearly the entirety of the new shorelines. Additional surveys conducted along the rip-rap shoreline at the mouth of the canal in 2023 revealed a very high-density of Atlantic Ribbed Mussels embedded in the sloped shoreline. Based on sampled counts, we estimate that there are more than 362,000 mussels living in the 601 feet of shoreline near our 19th St. boat launch.

The wholesale loss of these populations, along with their habitat, represents a significant injury to the natural resources of the canal, including the mussels, their habitat, and the ecosystem services they provide.

Furthermore the steel bulkhead that has been placed, and the ongoing need for bulkhead inspection and Superfund monitoring, presents specific challenges for proposed modular habitat, including questions about the weight, biofouling, adhesion, penetration, and moveability of proposed units. We have provided additional detail below in our discussion of potential restoration projects.

Many birds have been impacted by the pollution and the remedy. The Draft Assessment doesn't capture the full breadth of this impact.

Our regular Birding by Canoe events, and casual observation by Gowanus Dredgers members has shown an astonishing variety of birds using the canal. Birding remains America's most popular pastime, and the Gowanus is a frequent location for observations by our members and others. [Observations from the Gowanus Canal logged on e-Bird](#) should be part of the Trustee's analysis of impacted species.⁸

⁷ Gowanus Canal Conservancy, 2021 Gowanus Ecosystems Report (June 2021), p 13., <https://gowanuscanalconservancy.org/wp-content/uploads/2020/04/2021-Gowanus-Ecosystems-Report-Draft-210611-optimized.pdf>

⁸ eBird, Recent Checklists: Gowanus Canal (Butler St. to Gowanus Bay), accessed Jun 13, 2024. <https://ebird.org/hotspot/L16323445/recent-checklists>



Remedial action has resulted in tree removal along the bulkhead line, which has reduced nesting habitat along the shoreline for some birds, and reduced resting locations for migratory populations. The above-mentioned water quality impacts have also put pressure on fish populations in the Canal, limiting food for many birds that previously fished in the canal.

Although the draft plan notes that wading and diving birds are “occasional” — we find that they have had a consistent, widely experienced presence within the canal, and that their presences increases with improved conditions. Blue, green, and night herons, as well as egrets and cormorants, are regularly seen wading, diving and fishing in the canal by our members. We have also seen osprey and peregrine falcon pairs (a federally protected species) nesting within the area of the canal. Species — including birds — that have been limited or extirpated from the Canal deserve to be included in your analysis, as well.

Restoration Opportunities

We look forward to an ongoing dialogue with the Trustees about restoration opportunities for the Canal in the future, and we will continue to share recommendations and evidence to support this activity going forward.

We also urge the Trustees to begin implementation of these efforts immediately, rather than waiting for remedial action to be complete. Time is of the essence to ensure that the active development happening in the Gowanus neighborhood supports natural resource restoration efforts now, rather than hindering those efforts later. This is a cost-effective approach that will limit further injury to our local natural resources.

Public outreach must be part of a sound restoration plan. The Trustee’s outreach for this comment period was insufficient. Our organization has had the opportunity, through our participation in the Superfund CAG, to communicate with the Trustees previously. However, communication with the CAG alone is not enough for a Plan with such a sizeable impact on the neighborhood; the Trustees should prioritize additional outreach in the future. We appreciate the extension of the comment deadline, but that time should have been used to conduct additional outreach and education with the community about the meaning and implication of



the proposed Assessment. The Dredgers provided (perhaps the only) public education and outreach sessions on this topic, but there were many questions about the Plan that only the Trustees could have answered — and hearing them would have better informed your understanding of the comments you're receiving. Next time, we invite you to come on down to the Dredgers boathouse and present your revised plan to the public!

The ongoing construction of bulkheads along the Canal represent a significant restoration opportunity that the Trustees could begin immediately, addressing multiple concerns and reducing the cost of restoration activity. The EPA has repeatedly voiced its support for reduced bulkhead heights along the length of the canal, and has said that integration of ecological features, soft edges, and boat access would be unlikely to have any impact on the remedy, if designed correctly. The Trustees should support the inclusion of designing and constructing additional features that benefit habitat and human use within original bulkhead design, rather than waiting until after the remediation work is complete to re-do the shoreline edges.

Restoration efforts should also include support for social infrastructure such as public bathrooms, docks, and community gathering space. The social infrastructure provided by our organization — including public docks and community gathering space — has been critical to the resiliency of this neighborhood during a global pandemic, significant local changes in land use, increased flooding, and citywide budget cutbacks. Investment in public access and public space is an investment in the ability of the community to thrive amid the future changes planned for this neighborhood as remediation and restoration activities reshape the landscape.

New development in the neighborhood presents an active opportunity to ensure that shore public walkways include public boat access, public bathrooms, and community gathering spaces that will enable greater use and engagement in the future. Currently, none of the private or public developments planned for the Waterfront Esplanade being developed alongside the Gowanus Canal has included any such amenities in their proposed or approved designs. The City Council-appointed, volunteer Gowanus Oversight Task Force has been working



with landowners to address this issue, but the Trustees could significantly tip the scales in favor of such improvements.

Support efforts to enable recreational boating to resume in the Canal during the remedial period on nights and weekends, unless active work is occurring. The entire New York Harbor is a shared-use waterway, with recreational, commercial and industrial vessels sharing space. There are existing practices and protocols, including radio communication, right-of-way, and common sense that allow human-powered boats to safely navigate waterways alongside tug and barge traffic. The mere presence of moored barges and tugs in the canal is not a risk to the safety of boaters.

The Gowanus Dredgers have a track record of operating safe, popular public programs in multiple New York waterways. We have protocols in place to cancel programs for unsafe weather and operating conditions, provide on-water support for paddlers, and offer regular training in marine safety (First Aid, CPR, radio skills, etc.) to ensure participants in our programs remain happy and healthy. Concerns from the Remediation Team that boaters are unable to safely navigate in the Canal during remedial activity are unfounded. Access should be the rule, not the exception, and communication of work schedules in the weekly First Coast Guard District Local Notice to Mariners and via radio should be acceptable forms of risk reduction.

Support pilot projects for novel habitat design within the Canal. There are many locations along the canal where a water-tight steel bulkhead is required by the remedy. As noted above, the Dredgers have an existing collaboration with the Gowanus Canal Conservancy aimed at designing and installing habitat for Ribbed Mussels on the surface of these bulkheads. The Trustees should support the development of programs such as this and consider funding a pilot study of the Mussel habitat program in particular. Discussions with partners in the Canal suggest a need to fund additional pilot studies on modular habitat that look at a variety of issues raised by engineering partners. Some of the specific barriers and opportunities for pilot study that should be supported by the NRD process:

- Affixing modules to the bulkhead would be more easily done if metal mounting tabs were included in the original design, rather than being



included after the fact, where additional adhesives or penetrating mounts need to be assessed for impacts on bulkhead longevity. This would require coordination with the Remediation Team ahead of bulkhead installation.

- Modules need to avoid interfering with regular and ongoing bulkhead inspection, which requires them to be moveable or placed and spaced from the bulkhead surface at distances that permit physical and visual inspection required. Piloting methods and strategies with engineering partners would enable faster deployment of successful methods at scale.
- This pilot study could be conducted immediately, enabling restoration efforts to begin prior to the completion of remedial action.

Support green infrastructure investments locally and throughout the Gowanus watershed. In particular, we support recommendations from the Gowanus CAG that direct the Trustees to:

- Develop a restoration approach that considers upland areas beyond the canal itself and considers the broader Gowanus ecosystem, such as a watershed-wide restoration scope or MOSS (Metropolitan Open Space System) to reconnect species via greenways to the Gowanus Canal;
- Provide shore-side surface rainwater filtrations such as the engineered sponge-park to collect water so less untreated water is released into the canal after rain;
- Provide additional native plantings along the canal, including grass, reeds and trees (in addition to other plants), to increase green space that absorbs rain, reduces heat islands created from buildings/concrete/asphalt, and improves aesthetic enjoyment;
- Repair and enlarge sewer systems to mitigate the effects of groundwater mounding and restricted drainage

Additional Projects

In December 2023, the Gowanus Dredgers, the Gowanus Canal Conservancy, and Riverkeeper shared recommendations about other potential restoration efforts that could be prioritized. We are including that letter as an appendix and summarize its recommendations here:



Ensure that remediation and reconstruction of Thomas Greene Park includes community-desired improvements, including intertidal habitat, floating gardens, a boat launch, public restrooms, and other features

- Create boat launch, pedestrian bridge, and other accessibility features as part of the 1st St Turning Basin excavation and wetland restoration work.
- Enhance the CSO detention tank facility on the Salt Lot site by supporting salt marsh restoration within the 6th St turning basin and restore a full boat launch to the end of 2nd Ave, in place of the planned “get down,” adding pedestrian access, and extending the community space.
- Extend the 4th/5th turning basin restoration work by acquiring an additional 560 feet of land, in order to provide additional open water access, salt marsh and intertidal habitat, and an outlet for existing underground streams.
- Provide salt marsh and intertidal habitat within the 7th St. turning basin
- Support the development of a boat launch and intertidal habitat at both the end of Bond St. and at the Public Place/Gowanus Green site.
- Address coastal and stormwater flooding at the Lowes Esplanade/11th St. Turning Basin through a buyout of the land, the construction of salt marsh, intertidal and coastal habitat, to provide a resilient landscape with public water access.
- Retrofit bulkheads with constructed habitats as follows:
 - Bulkhead Habitat Modules - Provide bulkhead modifications, such as façade modifications or hanging baskets that provide habitat for aquatic species including Atlantic Ribbed Mussels and Oysters.
 - Bottom of Canal Modifications - Install areas of sedimentation and/or e-concrete units along with eelgrass planting to provide aquatic habitat.
 - Floating Wetlands - Provide moveable floating wetlands in strategic locations along the canal bulkheads that do not interfere with navigation.
- Fund Green roof and basement retrofits within the floodplain, purchase land and provide stormwater management, and daylight underground streams to address increasing flooding and sewer backups from rising groundwater and increased precipitation.
- Fund green infrastructure on private property and additional DEP Rain Gardens throughout the watershed to address flooding impacts of



impermeable surfaces within the upland neighborhoods surrounding low-lying Gowanus.

We thank the Trustees for your attention to these comments. The history of the Gowanus Canal's contamination does not need to be its future. We believe that the Canal could serve as a vital resource for the community. We have seen first-hand the way that engagement with the canal increases community connection, cohesion, and civic engagement, as well as increases awareness of environmental issues locally and globally. Restoration efforts here could improve the resiliency, health and ecological vibrancy of our neighborhood — and our city, region and planet. Achieving this vision requires that the NRDA properly account for the full range of injuries that we have suffered and invests in meaningful, local restoration efforts.

Respectfully yours,
The Gowanus Dredgers

[Redacted Signature]

Gary Francis, Captain
Josh Prol, First Mate
Nicole Vergalla, Secretary
Ashley Privett, Treasurer

David Berreby, Trustee
Eymund Diegel, Trustee
Ted Gruber, Trustee
Celeste LeCompte, Trustee
Annette Pierce, Trustee

Canal Bulkhead Heights

Carr, Brian

Wed, May 8, 2024 at 5:05 PM

To:

Celeste,

I believe that you asked at the April 2024 CAG meeting for EPA to set forth in writing its position on the height of bulkheads along the canal.

Under the Superfund law, in order to ensure that EPA can implement cleanups without the federal government being by other agencies, states or municipalities, Congress granted EPA an exemption from the need to obtain permits for cleanup-related work, provided that EPA determines that it is complying with the substantive requirements of any applicable cleanup-related laws.

As we have discussed with the CAG over the years, particularly in the context of commenting on the proposed rezoning, there are many issues, including potential legal requirements for land use, that do not relate to EPA's implementation of the cleanup. Such issues are outside of EPA's cleanup authority.

As a result, during the rezoning comment process, EPA did not comment on the City's proposals for the land use, density and many other issues. Instead, EPA did an assessment of what impacts the proposed rezoning might have on EPA's selected cleanup. If EPA had determined that the rezoning proposal was going to negatively impact the cleanup, EPA could have sought to enhance the selected remedy, or recommend that NYC make adjustments to offset such impacts. Instead, EPA concluded that the rezoning would not impact the cleanup provided that the City complied with EPA's range of requirements for controlling CSOs and stormwater, including constructing the CSO tanks. EPA has required all new developments along the canal to separate and treat stormwater for discharge to the canal, and street end stormwater separation and treatment. This is intended to reduce CSO loadings and ensure that as much water, including stormwater, goes into the canal and is treated.

EPA's selected ROD, as well as its rezoning comments, do not address bulkhead height or whether ground level grades are changed. While these issues are important to current and future land use, flooding is not a remedy concern to EPA, as hazardous substance exposure pathways will be controlled once the dredging, capping and other cleanup measures are completed. Flooding concerns, while important, do not impact the integrity of the in-canal capping and dredging, nor recontamination, as a result of the measures noted above.

In order to implement the dredging, EPA is of course overseeing the replacement of the majority of bulkheads along the canal. EPA's permit substitution review is limited to several issues. Will the new bulkhead support the dredging and capping operations and provide adequate support for current or future buildings? Does the bulkhead need to be sealed in order to prevent recontamination, typically coal tar, from going into the canal? When that is required, EPA reviews whether the sealed bulkhead will cause unacceptable mounding of groundwater behind the bulkhead. If so, EPA has required that groundwater discharge "vents," including treatment units, be built into the sealed bulkheads. In particular, this has been done at the Fulton MGP and Citizens MGP barrier walls. EPA is not aware that there have been any unacceptable changes in groundwater levels as a result of bulkhead construction. It should be noted that EPA is not seeking to control groundwater discharges to the canal, as these are generally diluted. EPA's requirements to seal certain bulkheads is to prevent discharges of highly concentrated NAPL, not groundwater, which is not concentrated enough to impact EPA's recontamination standards.

Bulkhead heights for new bulkheads that EPA has been approving are generally being determined by the property owners building them, or by the owners in consultation with the PRP group when the PRPs are building the new bulkhead. EPA has encouraged property owners to include eco-friendly intertidal bulkhead features and public access where possible, but we cannot require this as part of the cleanup. It does not address the existing or future contamination, so it is outside of our authority.

EPA has no restriction on whether bulkhead heights are increased or lowered post-cleanup. If that is required by the City, the property owner's use, or some other need, the bulkheads can potentially be modified after the cleanup. As you may be aware, there are some proponents for raising bulkheads for flood control, and other proponents for lowering them for intertidal and access purposes. EPA believes these issues should be addressed through city agencies handling zoning, building or other issues.

Apologies if the answer is overly long. Please also see my January 2024 email below on Task Force-related issues.

EPA has encouraged the City and the Trust to make the bulkheads and street ends as eco-friendly as possible, and to incorporate the community's input on these issues. We remain willing to facilitate on these issues with the GOTF and the community.

Please let me know if you have any further questions.

Regards,

Brian E Carr
Assistant Regional Counsel
United States Environmental Protection Agency
Region 2
Office of Regional Counsel
[290 Broadway, 17th Floor](#)

New York, NY 10007

From: Carr, Brian [REDACTED]
Sent: Wednesday, January 3, 2024 2:51 PM
To: Celeste LeCompte [REDACTED]; David Briggs [REDACTED]
Cc: Sanbury, Walter [REDACTED]; Ben Margo [REDACTED]; Benjamin Ratner [REDACTED]
[REDACTED]; Kwaku Addo-Atuah [REDACTED]; Isabella Conway [REDACTED]
Pohmajev [REDACTED]; Dana Gruberg [REDACTED]; Lisa L [REDACTED]; Candace Mas [REDACTED]
Chris Papamichael [REDACTED]
Subject: Re: GOTF Bond Street street end

Hi Celeste and everyone,

Happy new year to you all.

Thanks for your follow up email.

In sum, I advised the Trust in December that the GOTF was planning a community meeting in early 2024 in order to get local input on the design of the Bond Street end, an issue which EPA understands is among the City's community commitments as part of the rezoning.

I indicated that EPA encourages the Trust to facilitate with any such community input as appropriate. Such coordination is potentially similar to how the Trust has been working on the Salt Lot bulkhead design to accommodate the plans of DEP and other city entities.

Please let Walter and me know once you sort out when your community meeting is so we can continue to try to facilitate with everyone.

Bearing in mind that the City agencies, rather than the Trust, are really the parties with rezoning commitments, it may be most efficient to have your meeting with the community and those agencies first on this topic. As we discussed during our call, many aspects of the street end improvement are beyond the Trust's mandate to provide structural support for the dredging, so the bulk of the community discussion will likely not involve the Trust. This suggestion is made with a mind to avoid having multiple Trust experts incur the cost of si which are beyond their scope.

A targeted meeting with the Trust could follow, potentially through the City agencies, after the community input has been synthesized to discuss with the Trust whether any structural modifications are needed to facilitate the City's potential street end upgrades.

Please let us know if you have any questions or thoughts.

regards,

Brian E. Carr
Assistant Regional Counsel
United States Environmental Protection Agency
Region 2
Office of Regional Counsel
290 Broadway, 17th Floor
New York, NY 10007

From: Celeste LeCompte [REDACTED]
Sent: Wednesday, January 3, 2024 2:20 PM
To: David Briggs [REDACTED]
Cc: Carr, Brian [REDACTED]; Sanbury, Walter [REDACTED]; Ben Margo [REDACTED]; Benjamin Ratner [REDACTED]; Kwaku Addo-Atuah [REDACTED]; Isabella Conway [REDACTED]; Dana Gruberg [REDACTED]; Lisa L [REDACTED]; Candace Mas [REDACTED]; Pohmajev [REDACTED]; Chris Papamichael [REDACTED]
Subject: Re: GOTF Bond Street street end

Caution: This email originated from outside EPA, please exercise additional caution when deciding whether to open attachments or click on provided links.
Hi Brian,

Any updates after meeting with the Trust about the bulkhead design?

Thanks,
Celeste

On Thu, Dec 7, 2023 at 10:18AM David Briggs [REDACTED] wrote:
Thank you!

Dave

David Briggs AIA LEED AP CPHD

Principal | Founding Partner
Loci Architecture

Sent from my phone so please excuse any typos

On Dec 7, 2023, at 9:16AM, Carr, Brian wrote:

David,

Thanks for your email.

EPA just scheduled a bulkhead meeting with the Trust for next week.

We will advise them of your request and encourage them to participate.

regards,

Brian E. Carr
Assistant Regional Counsel
United States Environmental Protection Agency
Region 2
Office of Regional Counsel
290 Broadway, 17th Floor
New York, NY 10007

From: David Briggs
Sent: Monday, December 4, 2023 6:28 PM
To: Carr, Brian; Ben Margolis; Benjamin Ratner; Samsbury, Walter; Kweku Addo-Atuah; Isabella Conway; Dana Groberg; Celeste LeCompte; Candelaria Mas Pomajev; Lisa L.; Chris Papanichae
Subject: GOLF Bond Street street end

Caution: This email originated from outside EPA, please exercise additional caution when deciding whether to open attachments or click on provided links.

Hi Brian,

Thank you for the very helpful conversation a couple of weeks ago. We are trying to organize a community session about the design of the Bond Street street end. I've reached out to all the players except the Trust. Any chance you could apply some gentle pressure on them to get community feedback sooner rather than later? We are hoping to hold a meeting in early 2024.

Thank you.

Dave

David Briggs AIA LEED AP CPHD
Principal | Founding Partner
Loci Architecture PLLC



**Please note the dates listed below reflect upcoming office wide closures

November 23rd – November 24th in observance of Thanksgiving. Office will reopen on Monday, November 27th.

December 25th – January 1st, 2024 for end-of-year holidays. Office will reopen on Tuesday, January 2nd, 2024.

Please be assured that your emails will be answered as soon as we return to the office.**

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Celeste LeCompte

December 6, 2023

Gowanus Canal Conservancy
Gowanus Dredgers
Riverkeeper

Gowanus NRDA Project Recommendations

The following is a non-exhaustive list of potential restoration projects that our organizations believe the Trustees should keep in mind as they seek to advance the case. We believe that the eventual selected projects should be determined through a robust public outreach process, and are eager to support the Trustees in that outreach.

Goals

- Ecology: Establish salt marsh, intertidal habitat, and increase canopy within urban context
- Water Access: Provide access through the water and to the water
- Connection: Create community connectivity, cohesion and equity to access - enhance conditions for existing residents and businesses including through workforce development and local stewardship
- Stormwater Management: increase retention upland and detention lowland
- Climate Change Mitigation: Address urban heat island and flooding impacts

Potential Projects

- **Head of Canal** - *Context: As part of the Superfund Clean-up, the head of the canal will see a new CSO detention tank (RH-034) and new public space will be installed on top of the tank. Thomas Greene Park will be remediated and rebuilt as part of the Superfund but only to match current conditions, without community-desired improvements.*

Project Components:

- Re-grading & Salt Marsh - Provide salt marsh and intertidal habitat through re-grading the head of canal, so it gets shallower to the north, and planting tidal and coastal plant communities (see [Gowanus Lowlands Master Plan 2019](#), pg 129)
- Educational Barge & Floating Gardens - Install an educational barge and floating gardens to provide access to the canal and K-12 education science learning.
- Moveable Pedestrian Bridge and Boat Launch at Degraw Street - Provide a moveable pedestrian bridge, integrated with a Boat Launch, at Degraw St just south of the RH-034 tank.
- Thomas Greene Park - Provide park improvements beyond currently planned remediation, which should include green infrastructure, public restrooms, a two story building including a community room and public restrooms, picnic areas, and improved recreational facilities.

- **1st Street Turning Basin Pedestrian Bridge and Boat Launch** - *Context: As part of the Superfund Clean-up, the former 1st Street Turning Basin will be excavated and include some wetland restoration. There is a need to provide accessibility across the basin to connect new waterfront public spaces to the north and south and to provide access to the water.*
 - 1st Street Basin Bridge & Boat Launch - Provide a boat launch and new pedestrian bridge across the turning basin that is moveable or high enough to allow small boats to navigate below.

- **Salt Lot** - *Context: As part of the Superfund Clean-up, the Department of Environmental Protection (DEP) is planning to construct a combined sewer overflow (CSO) detention tank (OH007) at the Salt Lot, along with new public space, a small facilities building with restroom, a salt marsh at the tip of the peninsula, a boat launch at the end of the 6th Street Turning Basin, and a “get down” without a boat launch at the end of 2nd Avenue.*

Project Components:

 - 6th Street Turning Basin Salt Marsh Restoration - Provide salt marsh in this turning basin while maintaining water access to the planned DEP boat launch.
 - 2nd Avenue Boat Launch - Turn the planned “get down” at the end of 2nd Avenue into a boat launch, providing actual access to the water.
 - Education Center - Expand upon the planned small facilities building to create an accessible Education Center and Field Station that provides indoor classroom and community space for K-12 and continuing education, workforce development, and community gatherings.
 - Pedestrian Bridges connecting the Salt Lot to Gowanus Green and Whole Foods Esplanade - should be moveable or high enough to allow for navigation below

- **Uhaul Site & 4th/5th Turning Basin Restoration** - *Context: This turning basin, which currently terminates at 3rd Avenue, formerly extended east of 3rd Avenue by 575’ but was filled in. The Superfund Clean-up currently includes the excavation and restoration of approximately 15’ of the turning basin east of 3rd Avenue.*

Project Components:

 - 4th/5th St Basin Extension and Salt Marsh Restoration - Extend the excavation to the east by up to 560’ through purchasing land from U-Haul in order to provide additional open water access, salt marsh and intertidal habitat, and an outlet for existing underground streams. Restoration should include a sloped basin that gets shallower to the east, planted with tidal and coastal plant communities (see [Gowanus Lowlands Master Plan 2019](#), pg 129).
 - Coastal Ecosystem Buyout at Uhaul Site - Purchase land from Uhaul site and restore coastal habitat and provide water access

- **7th Street Turning Basin Restoration Site**
 - 7th Street Turning Basin Salt Marsh Restoration - Provide salt marsh and intertidal habitat through re-grading the turning basin, so it gets shallower to the

east, and planting tidal and coastal plant communities (see [Gowanus Lowlands Master Plan 2019](#), pg 129)

- **Bond Street End Boat Launch & Tidal Habitat** - *Context: As part of the Gowanus Rezoning, the City will “create a new passive waterfront open space with landscaping and potential green infrastructure to address local flooding” at the end of Bond Street (See [Gowanus Points of Agreement](#), pg 15).*
 - Boat Launch - Provide a boat launch in coordination with new public space
 - Intertidal Habitat - Provide intertidal habitat through terracing or floating gardens
- **Gowanus Green Boat Launch & Tidal Habitat** - *Context: As part of the Gowanus Rezoning, the City will build a park at Gowanus Green, also known as Public Place.*

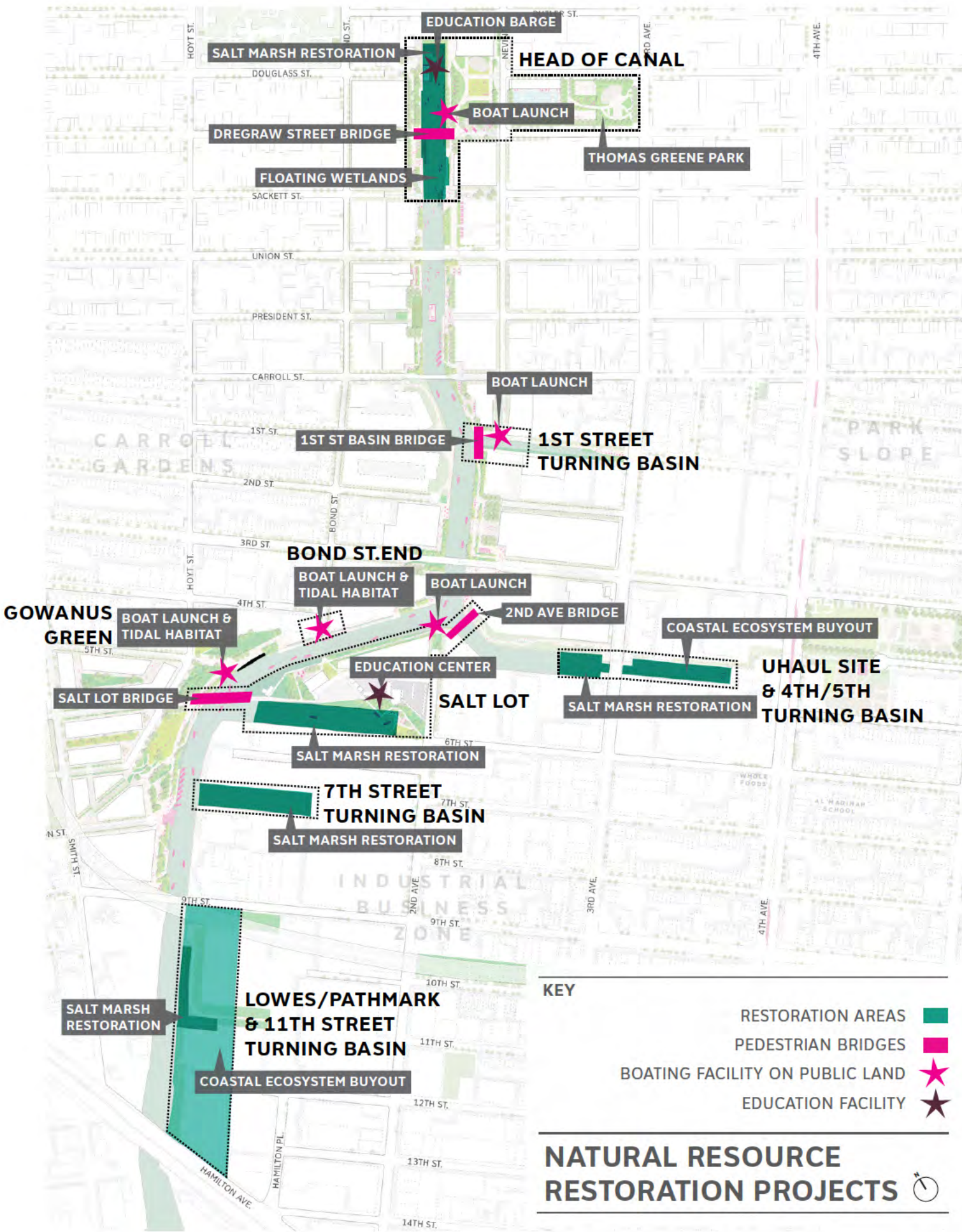
Project Components:

 - Boat Launch - Provide a boat launch in coordination with new public space
 - Intertidal Habitat - Provide intertidal habitat through terracing or floating gardens
- **Lowes / Pathmark & 11th St. Turning Basin Restoration** - *Context: This site, mostly made up of parking lots near the water, is currently facing increasing coastal and stormwater flooding.*

Project Components:

 - 11th Street Turning Basin Salt Marsh Restoration - Provide salt marsh and intertidal habitat through re-grading the turning basin, so it gets shallower to the east, and planting tidal and coastal plant communities (see [Gowanus Lowlands Master Plan 2019](#), pg 129)
 - Coastal Ecosystem Buyout - Purchase land and restore coastal habitat and provide water access
- **Canal-wide Constructed Habitat** - *Context - as part of the Superfund Clean-up, existing bulkheads and edges are being replaced with steel sheet pile that eliminates intertidal habitat for mussels, oysters, crabs, shorebirds, and other wildlife. There is an opportunity to retrofit bulkheads with constructed habitats as follows:*
 - Bulkhead Habitat Modules - Provide bulkhead modifications, such as facade modifications or hanging baskets that provide habitat for aquatic species including Atlantic Ribbed Mussels and Oysters.
 - Bottom of Canal Modifications - Install areas of sedimentation and/or e-concrete units along with eelgrass planting to provide aquatic habitat.
 - Floating Wetlands - Provide moveable floating wetlands in strategic locations along the canal bulkheads that do not interfere with navigation.
- **Lowland Flood Management** - *Context: Multiple sites throughout lowlying areas of the neighborhood, particularly the Industrial Business Zone, are subject to increasing flooding and sewer backups from rising groundwater and increased precipitation.*
 - Property Retrofit Grants - Fund Green roof and basement retrofits within floodplain

- Inland Buyouts - Purchase land and provide stormwater management
- Stream Daylighting - Daylight underground streams to help manage stormwater
- **Upland Stormwater management** - *Context: Impermeable upland neighborhoods contribute stormwater to lowlying Gowanus neighborhood, exacerbating flooding*
 - Green Infrastructure Grants - Fund green infrastructure on private property throughout watershed
 - Right of Way Rain Gardens - Fund additional DEP Rain Gardens throughout watershed



KEY

- RESTORATION AREAS
- PEDESTRIAN BRIDGES
- BOATING FACILITY ON PUBLIC LAND
- EDUCATION FACILITY

NATURAL RESOURCE RESTORATION PROJECTS

List of images

Page 2: Set 1, Side A (rear comments)

Page 3: Set 1, Side B (front illustrations). All cards from Side A shown in same grid location.

Page 4: Set 2, Side A (rear comments)

Page 5: Set 2, Side B (front illustrations). All cards from Side A shown in same grid location.

Page 6: Set 3, Side A (rear comments)

Page 7: Set 3, Side B (front illustrations). All cards from Side A shown in same grid location.

Page 8: Set 4, Side A (rear comments)

Page 9: Set 4, Side B (front illustrations). All cards from Side A shown in same grid location.

Page 10: Set 5, Side A (rear comments)

Page 11: Set 5, Side B (front illustrations). All cards from Side A shown in same grid location.

Page 12: Set 6, Side A (rear comments)

Page 13: Set 6, Side B (front illustrations). All cards from Side A shown in same grid location.

Page 14: Set 7, Side A (rear comments)

Page 15: Set 7, Side B (front illustrations). All cards from Side A shown in same grid location.

Page 16: Set 8, Side A (rear comments)

Page 17: Set 8, Side B (front illustrations). All cards from Side A shown in same grid location.

Page 18: Set 9, Side A (rear comments)

Page 19: Set 9, Side B (front illustrations). All cards from Side A shown in same grid location.

Comments for the Draft Gowanus NRDA Plan

Name: *Marc F.*
Zip Code: *11209*

I am a recreational boater, and paddling on the Gowanus Canal, I have enjoyed:

I am a Brooklyn native and have never boated on the Canal. I would love to experience boating on the Canal. It is improved w/ natural resources, trees, pathways, shading, etc...

By raising bulkhead heights and removing water access points, the remedial action has reduced my ability to paddle safely in the canal. The NRDA should account for reduced water access, and restoration should reduce bulkhead heights, restore safe egress points, and make expanded water access available to more community members as the canal gets cleaner. Thank you for listening!

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c/o Alicia Pasos
625 Broadway, 14th Floor
Albany, NY
12233



Comments for the Draft Gowanus NRDA Plan

Name: *Elena Kim*
Zip Code: *10023*

I am a recreational boater, and paddling on the Gowanus Canal, I have enjoyed:

The changing urban views along the canal.

By raising bulkhead heights and removing water access points, the remedial action has reduced my ability to paddle safely in the canal. The NRDA should account for reduced water access, and restoration should reduce bulkhead heights, restore safe egress points, and make expanded water access available to more community members as the canal gets cleaner. Thank you for listening!

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Comments for the Draft Gowanus NRDA Plan

Name: *Maggie Hummel*
Zip Code: *11215*

I am a recreational boater, and paddling on the Gowanus Canal, I have enjoyed:

I'm a Brooklyn resident and would visit the Canal if it were less industrial and had more mature plantings, shade, wildlife, and walkways.

By raising bulkhead heights and removing water access points, the remedial action has reduced my ability to paddle safely in the canal. The NRDA should account for reduced water access, and restoration should reduce bulkhead heights, restore safe egress points, and make expanded water access available to more community members as the canal gets cleaner. Thank you for listening!

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Comments for the Draft Gowanus NRDA Plan

Name: *Joanquin*
Zip Code: *11217*

I am a recreational boater, and paddling on the Gowanus Canal, I have enjoyed:

I haven't enjoyed it yet, but having the possibility would make my life as a neighbor much enjoyable.

By raising bulkhead heights and removing water access points, the remedial action has reduced my ability to paddle safely in the canal. The NRDA should account for reduced water access, and restoration should reduce bulkhead heights, restore safe egress points, and make expanded water access available to more community members as the canal gets cleaner. Thank you for listening!

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Comments for the Draft Gowanus NRDA Plan

Name: *Melissa Chua*
Zip Code: *11109*

I am a recreational boater, and paddling on the Gowanus Canal, I have enjoyed:

*with hopefully
A CANAL FULL OF HOPE AND DREAMS, WILD LIFE AND HEALTHY FLORA*

By raising bulkhead heights and removing water access points, the remedial action has reduced my ability to paddle safely in the canal. The NRDA should account for reduced water access, and restoration should reduce bulkhead heights, restore safe egress points, and make expanded water access available to more community members as the canal gets cleaner. Thank you for listening!

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Comments for the Draft Gowanus NRDA Plan

Name: *Kellie Kovac*
Zip Code: *11217*

I am a recreational boater, and paddling on the Gowanus Canal, I have enjoyed:

My husband & I have worked here for almost a decade. Keep Gowanus would be great to see some more green spaces if anything. Gowanus is home!

By raising bulkhead heights and removing water access points, the remedial action has reduced my ability to paddle safely in the canal. The NRDA should account for reduced water access, and restoration should reduce bulkhead heights, restore safe egress points, and make expanded water access available to more community members as the canal gets cleaner. Thank you for listening!

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Comments for the Draft Gowanus NRDA Plan

Name: *Kelsey*
Zip Code: *11238*

I am a recreational boater, and paddling on the Gowanus Canal, I have enjoyed:

strolling the waterfront with a scoop from Ample Hills

By raising bulkhead heights and removing water access points, the remedial action has reduced my ability to paddle safely in the canal. The NRDA should account for reduced water access, and restoration should reduce bulkhead heights, restore safe egress points, and make expanded water access available to more community members as the canal gets cleaner. Thank you for listening!

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Comments for the Draft Gowanus NRDA Plan

Name: *John Ottara*
Zip Code: *11109*

I am a recreational boater, and paddling on the Gowanus Canal, I have enjoyed:

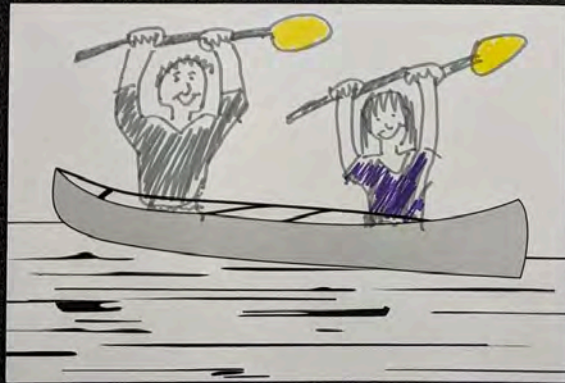
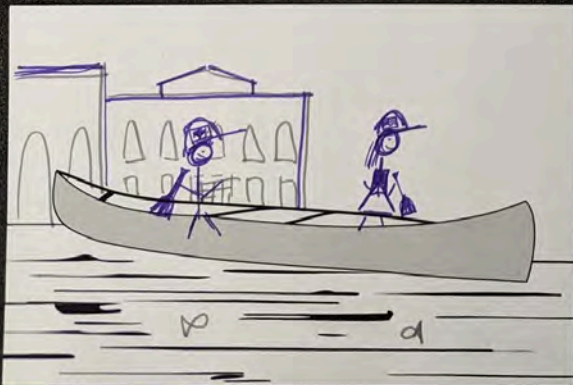
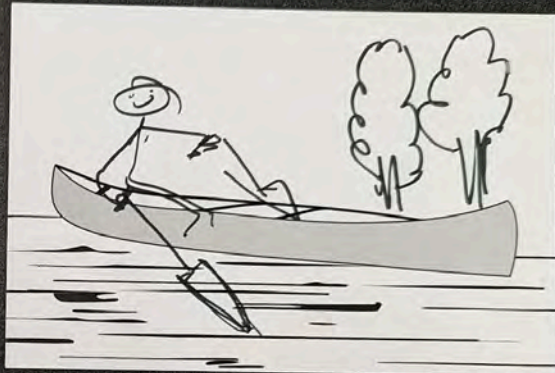
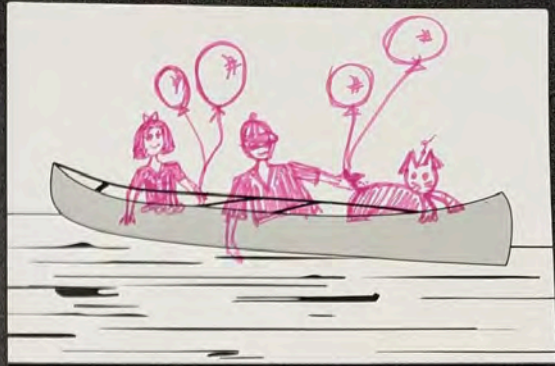
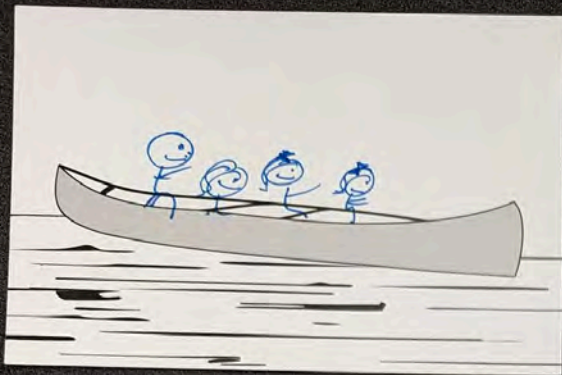
The architecture, the wildlife, the serenity & the history.

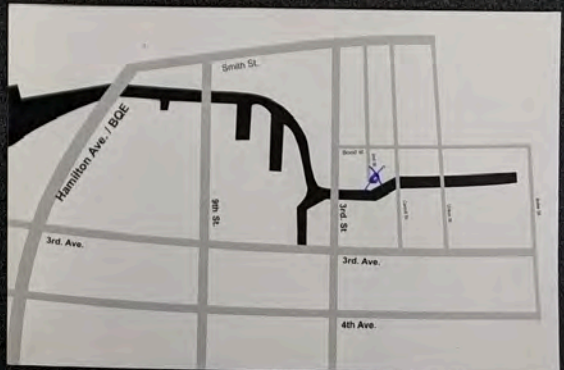
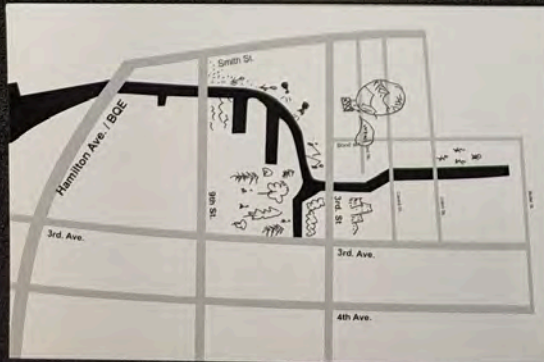
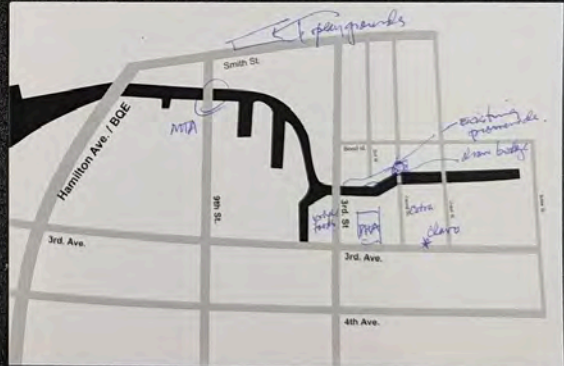
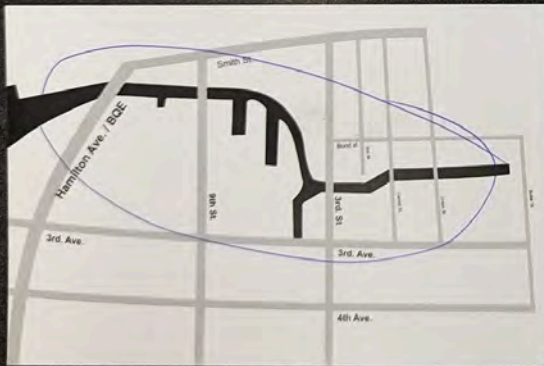
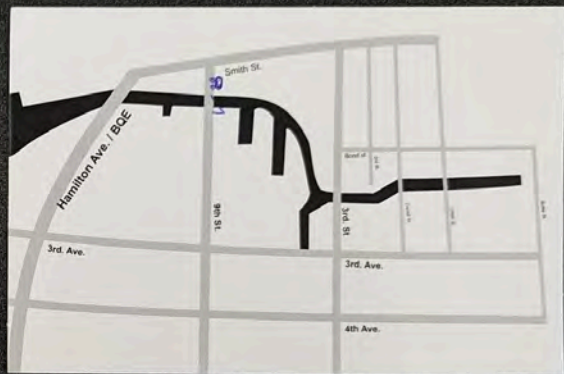
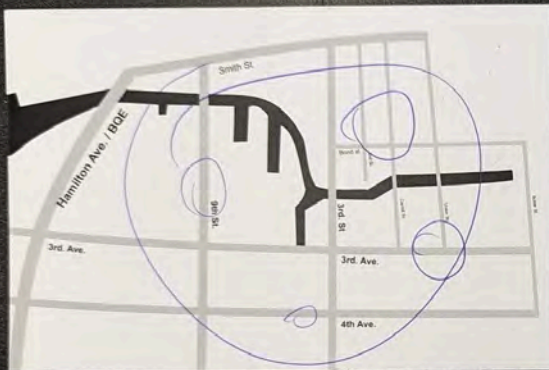
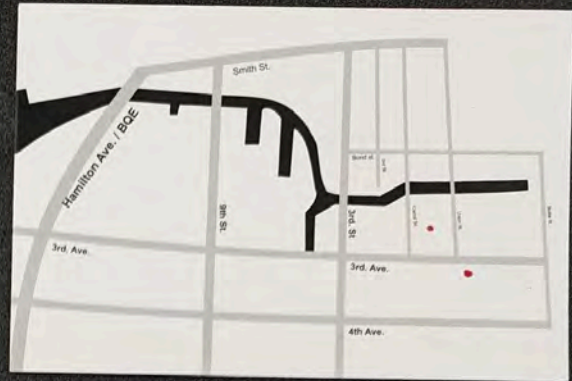
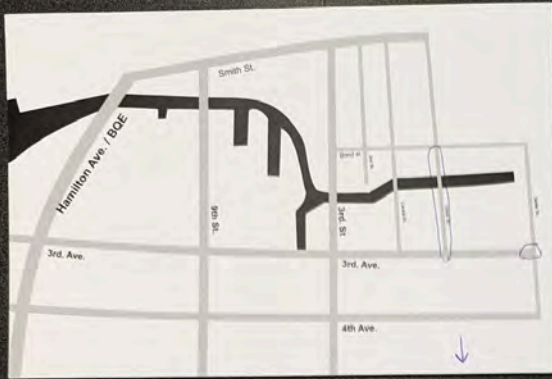
By raising bulkhead heights and removing water access points, the remedial action has reduced my ability to paddle safely in the canal. The NRDA should account for reduced water access, and restoration should reduce bulkhead heights, restore safe egress points, and make expanded water access available to more community members as the canal gets cleaner. Thank you for listening!

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Set 1, Side B (front illustrations). All cards shown in same grid location.





Comments for the Draft Gowanus NRDA Plan

Name: *Ken Galt*
Zip Code: *11238*

I have spent a lot of time exploring the Gowanus Canal as a

On the front of this card, I have shown the locations of

*expand public access
clean up the sludge*

The NRDA plan should:

Thanks for listening!

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Comments for the Draft Gowanus NRDA Plan

Name: *Tierney Curren*
Zip Code: *11217*

I have spent a lot of time exploring the Gowanus Canal as a

On the front of this card, I have shown the locations of

biking around the water

The NRDA plan should: *Promote more boating in the community.*

Taking care of the water and habitats it creates would make me + friends come and spend more time boating here.

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Comments for the Draft Gowanus NRDA Plan

Name: *Sandy Renz*
Zip Code: *11215*

I have spent a lot of time exploring the Gowanus Canal as a

On the front of this card, I have shown the locations of

ingreen flora + fauna growing along the banks - lovely gardens as well as natural survivors.

in red boating access

The NRDA plan should:

be aware there is abundant wildlife, flora + fauna included. keep environment clean for this - air, water, earth/soil.

Thanks for listening! *More access to canal!!!*

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Comments for the Draft Gowanus NRDA Plan

Name: *CARL HUEBNER*
Zip Code: *11201 / 11207*

I have spent a lot of time exploring the Gowanus Canal as a

On the front of this card, I have shown the locations of

- WALKS I'VE TAKEN, PLACES I'VE EXPLORED

The NRDA plan should:

- TAKE INTO ACCOUNT LOCAL OBSERVATIONS FROM PEOPLE LIKE ME.

- OFFER BETTER ACCESS TO PROJECTS TAKE PLACE LOCALLY.

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Comments for the Draft Gowanus NRDA Plan

Name: *N.P. Austin*
Zip Code: *11211*

I have spent a lot of time exploring the Gowanus Canal as an

On the front of this card, I have shown the locations of

cultural happenings - concerts, films, pop-up plays and art happenings.

The NRDA plan should:

improve physical access for borders.

If there's better access, much more and many more types of cultural engagement could happen here.

Thanks for listening!

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Comments for the Draft Gowanus NRDA Plan

Name: *Christian Linsey*
Zip Code: *11215*

I have spent a lot of time exploring the Gowanus Canal as a

On the front of this card, I have shown the locations of

Tall walls that prevent access for kayakers + canoes.

The NRDA plan should:

- Assess the wildlife holistically.

- Consider public access to the water

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Comments for the Draft Gowanus NRDA Plan

Name: *Cornelia Smith*
Zip Code: *11201*

I have spent a lot of time exploring the Gowanus Canal as a

On the front of this card, I have shown the locations of

- I love biking over here

- would be cool if there were waterfront activities

- STOP HIGH RISE APARTMENTS

The NRDA plan should:

preserve the local community + ecology

Thanks for listening!

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Comments for the Draft Gowanus NRDA Plan

Name:
Zip Code:

I have spent a lot of time exploring the Gowanus Canal as a

On the front of this card, I have shown the locations of

We got stuck in the middle and couldn't get back w/o a rescuer!

We used to play on the old submerged (partially) wooden ships.

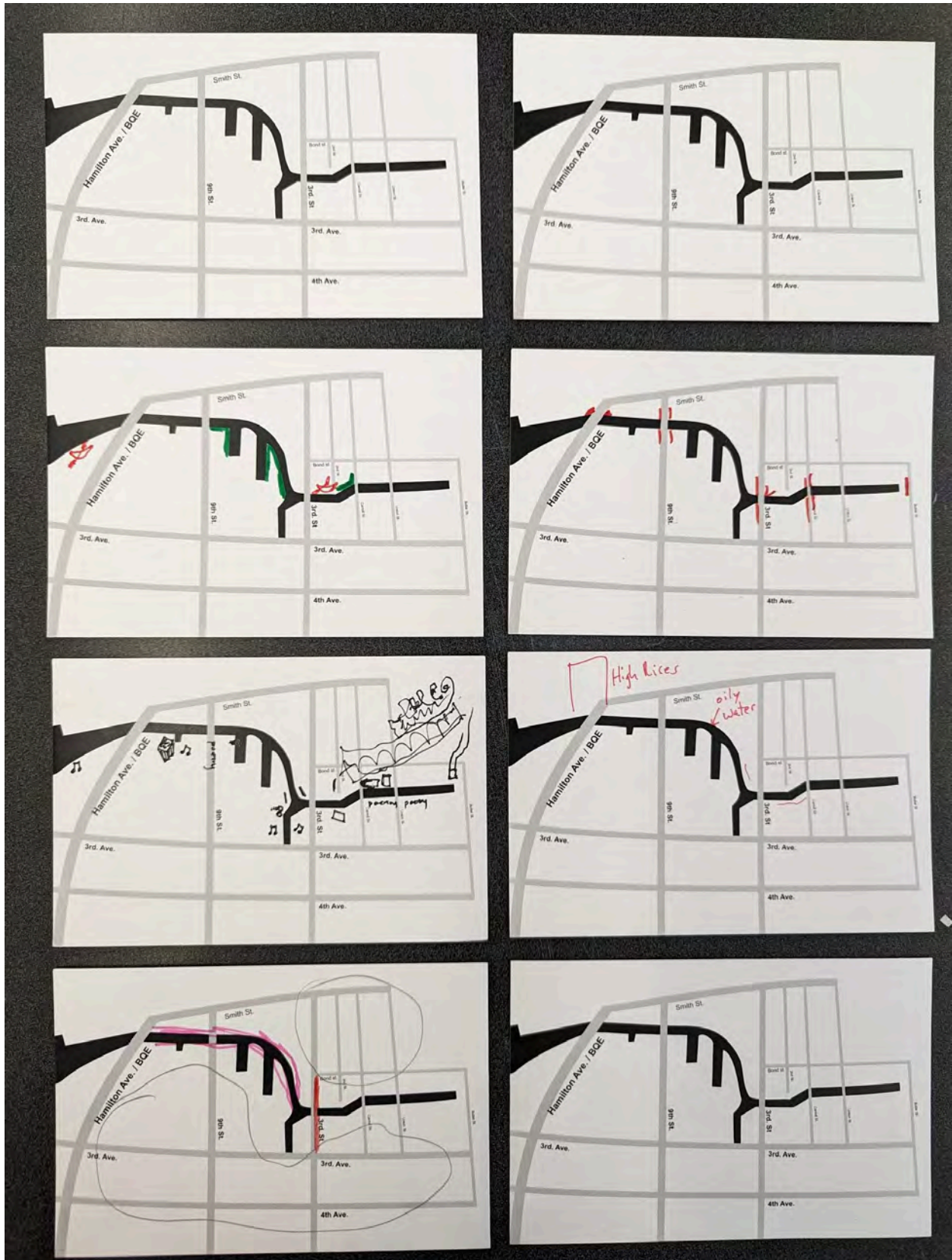
The NRDA plan should:

Vinny D.

I remember some of the prickly plants, such!

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Comments for the Draft Gowanus NRDA Plan

Name: *KEISSA LONG*
Zip Code: *11217*

I am a recreational boater, and paddling on the Gowanus Canal. I have enjoyed

*THE ARCHITECTURE +
COMMUNITY GATHERING
INFRASTRUCTURE
AROUND THE WATER*

By raising bulkhead heights and removing water access points, the remedial action has reduced my ability to paddle safely in the canal. The NRDA should account for reduced water access, and restoration should reduce bulkhead heights, restore safe egress points, and make expanded water access available to more community members as the canal gets cleaner. Thank you for listening!



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Comments for the Draft Gowanus NRDA Plan

Name: *Nicholas Fitzgerald*
Zip Code: *11231*

I am a recreational boater, and paddling on the Gowanus Canal. I have enjoyed

working the canal. I would love to see the Gowanus canal flourish like the canals in London, with people and wildlife coexisting.

By raising bulkhead heights and removing water access points, the remedial action has reduced my ability to paddle safely in the canal. The NRDA should account for reduced water access, and restoration should reduce bulkhead heights, restore safe egress points, and make expanded water access available to more community members as the canal gets cleaner. Thank you for listening!



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Comments for the Draft Gowanus NRDA Plan

Name: *Mina Agarwal*
Zip Code: *11213*

I am a recreational boater, and paddling on the Gowanus Canal. I have enjoyed

a place in the city to go and enjoy nature. Currently a disconnect between the new development and the beauty of the canal. Need to bring community at canal together and appreciate it. Keep it clean, safe, and open.

By raising bulkhead heights and removing water access points, the remedial action has reduced my ability to paddle safely in the canal. The NRDA should account for reduced water access, and restoration should reduce bulkhead heights, restore safe egress points, and make expanded water access available to more community members as the canal gets cleaner. Thank you for listening!



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Comments for the Draft Gowanus NRDA Plan

Name: *Frederick Amstutz*
Zip Code: *11221*

I am a recreational boater, and paddling on the Gowanus Canal. I have enjoyed

A nice, relaxing time on the water. We even heard some classical music out there!

By raising bulkhead heights and removing water access points, the remedial action has reduced my ability to paddle safely in the canal. The NRDA should account for reduced water access, and restoration should reduce bulkhead heights, restore safe egress points, and make expanded water access available to more community members as the canal gets cleaner. Thank you for listening!



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Comments for the Draft Gowanus NRDA Plan

Name: *Danielle Butler*
Zip Code: *11215*

I am a recreational boater, and paddling on the Gowanus Canal. I have enjoyed

that it gives me perspective on my city. I see where the trash goes and how good some things from the city are. I see so much wildlife! Birds, fish, crabs...

The water is a spectacular resource that people should have more access to.

By raising bulkhead heights and removing water access points, the remedial action has reduced my ability to paddle safely in the canal. The NRDA should account for reduced water access, and restoration should reduce bulkhead heights, restore safe egress points, and make expanded water access available to more community members as the canal gets cleaner. Thank you for listening!



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Comments for the Draft Gowanus NRDA Plan

Name: *ERIK ALVAR*
Zip Code: *11215*

I am a recreational boater, and paddling on the Gowanus Canal. I have enjoyed

Seeing the layers of Brooklyn in the bulkheads of the canal. Wildlife using the waterway - the calm of the water

By raising bulkhead heights and removing water access points, the remedial action has reduced my ability to paddle safely in the canal. The NRDA should account for reduced water access, and restoration should reduce bulkhead heights, restore safe egress points, and make expanded water access available to more community members as the canal gets cleaner. Thank you for listening!



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Comments for the Draft Gowanus NRDA Plan

Name: *SARAH KENZ*
Zip Code: *11215*

I am a recreational boater, and paddling on the Gowanus Canal. I have enjoyed

an amazing glorious fall moon paddle as well as daytime paddling.

By raising bulkhead heights and removing water access points, the remedial action has reduced my ability to paddle safely in the canal. The NRDA should account for reduced water access, and restoration should reduce bulkhead heights, restore safe egress points, and make expanded water access available to more community members as the canal gets cleaner. Thank you for listening!



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Comments for the Draft Gowanus NRDA Plan

Name: *CJ Brennan*
Zip Code: *11225*

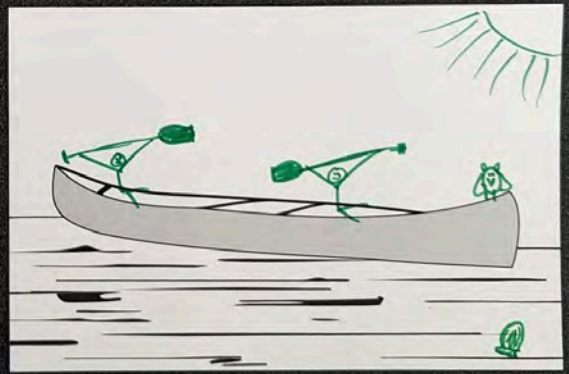
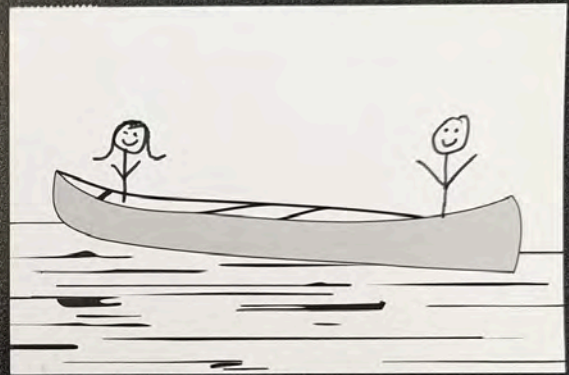
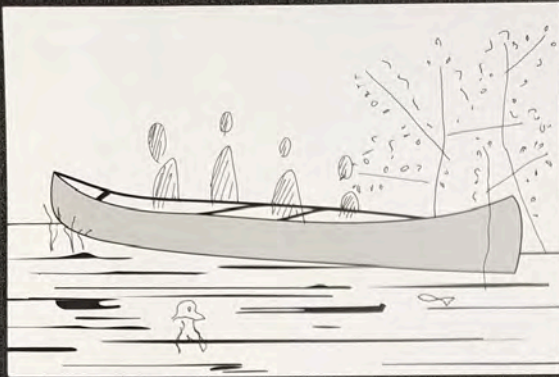
I am a recreational boater, and paddling on the Gowanus Canal. I have enjoyed

learning about CSO becoming a better boater connecting with the community events along the canal

By raising bulkhead heights and removing water access points, the remedial action has reduced my ability to paddle safely in the canal. The NRDA should account for reduced water access, and restoration should reduce bulkhead heights, restore safe egress points, and make expanded water access available to more community members as the canal gets cleaner. Thank you for listening!



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Comments for the Draft Gowanus NRDA Plan

Name: *Faine Francis*
Zip Code: *11218*

I am a recreational boater, and paddling on the Gowanus Canal, I have enjoyed:

All the years of paddling with my dad Gary and with family

By raising bulkhead heights and removing water access points, the remedial action has reduced my ability to paddle safely in the canal. The NRDA should account for reduced water access, and restoration should reduce bulkhead heights, restore safe egress points, and make expanded water access available to more community members as the canal gets cleaner. Thank you for listening!



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Comments for the Draft Gowanus NRDA Plan

Name: *Talia Keersky*
Zip Code: *11215*

I am a recreational boater, and paddling on the Gowanus Canal, I have enjoyed:

Canoing & paddling past greenery & wildlife - grateful for the Gowanus Dredgers!

By raising bulkhead heights and removing water access points, the remedial action has reduced my ability to paddle safely in the canal. The NRDA should account for reduced water access, and restoration should reduce bulkhead heights, restore safe egress points, and make expanded water access available to more community members as the canal gets cleaner. Thank you for listening!



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Comments for the Draft Gowanus NRDA Plan

Name: *Dana Mardler*
Zip Code: *10030*

I am a recreational boater, and paddling on the Gowanus Canal, I have enjoyed:

Imagining a cleaner future with my dear friend Talia.

By raising bulkhead heights and removing water access points, the remedial action has reduced my ability to paddle safely in the canal. The NRDA should account for reduced water access, and restoration should reduce bulkhead heights, restore safe egress points, and make expanded water access available to more community members as the canal gets cleaner. Thank you for listening!



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Comments for the Draft Gowanus NRDA Plan

Name: *Claire Gorge & Adeline Berger*
Zip Code: *11215*

I am a recreational boater, and paddling on the Gowanus Canal, I have enjoyed:

Seeing local birds, having access to the water, and building my community bonds.

By raising bulkhead heights and removing water access points, the remedial action has reduced my ability to paddle safely in the canal. The NRDA should account for reduced water access, and restoration should reduce bulkhead heights, restore safe egress points, and make expanded water access available to more community members as the canal gets cleaner. Thank you for listening!



New York State Department of Environmental Conservation, Natural Resource Damages Section
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625 Broadway, 14th Floor
Albany, NY 12233

Comments for the Draft Gowanus NRDA Plan

Name:
Zip Code:

I am a recreational boater, and paddling on the Gowanus Canal, I have enjoyed:

Spending time enjoying the water, the scenery & smiling faces of other canoers!

By raising bulkhead heights and removing water access points, the remedial action has reduced my ability to paddle safely in the canal. The NRDA should account for reduced water access, and restoration should reduce bulkhead heights, restore safe egress points, and make expanded water access available to more community members as the canal gets cleaner. Thank you for listening!



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Comments for the Draft Gowanus NRDA Plan

Name: *R. MERRIN*
Zip Code: *11215*

I am a recreational boater, and paddling on the Gowanus Canal, I have enjoyed:

Kayaking! Bulkheads and litter.

By raising bulkhead heights and removing water access points, the remedial action has reduced my ability to paddle safely in the canal. The NRDA should account for reduced water access, and restoration should reduce bulkhead heights, restore safe egress points, and make expanded water access available to more community members as the canal gets cleaner. Thank you for listening!



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Comments for the Draft Gowanus NRDA Plan

Name: *Aly Brown*
Zip Code: *11218*

I am a recreational boater, and paddling on the Gowanus Canal, I have enjoyed:

- the calming waters*
- the different perspective*
- the physical activity*
- the unique way to explore the city*

By raising bulkhead heights and removing water access points, the remedial action has reduced my ability to paddle safely in the canal. The NRDA should account for reduced water access, and restoration should reduce bulkhead heights, restore safe egress points, and make expanded water access available to more community members as the canal gets cleaner. Thank you for listening!



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Comments for the Draft Gowanus NRDA Plan

Name: *Isabella Sorio*
Zip Code: *11232*

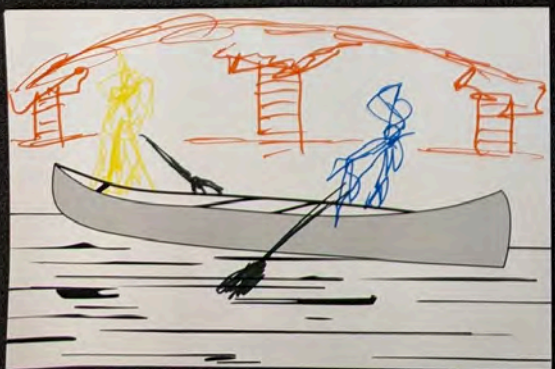
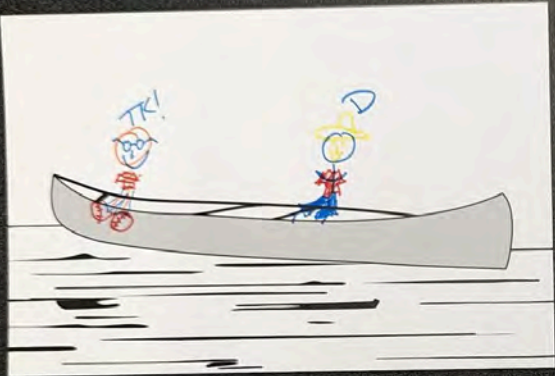
I am a recreational boater, and paddling on the Gowanus Canal, I have enjoyed:

Exploring the local community via waterway, engaging with the area's biodiversity while seeing more of the area.

By raising bulkhead heights and removing water access points, the remedial action has reduced my ability to paddle safely in the canal. The NRDA should account for reduced water access, and restoration should reduce bulkhead heights, restore safe egress points, and make expanded water access available to more community members as the canal gets cleaner. Thank you for listening!



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Comments for the Draft Gowanus NRDA Plan

Name:
Zip Code:

I have spent a lot of time exploring the Gowanus Canal
as a resident/walker/biker

On the front of this card, I have shown the locations of

Streets I often bike or
walk on

The NRDA plan should:

Keep access open for people
Make sure restoration projects
happen locally

Thanks for listening!



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Comments for the Draft Gowanus NRDA Plan

Name:
Zip Code:

I have spent a lot of time exploring the Gowanus Canal
as a

On the front of this card, I have shown the locations of

I have seen fish and
ward love to see more

The NRDA plan should:

Please expand scope to
include all types
of wildlife

Thanks for listening!



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Comments for the Draft Gowanus NRDA Plan

Name:
Zip Code:

I have spent a lot of time exploring the Gowanus Canal
as a Walker - visitor from Maine

On the front of this card, I have shown the locations of

general walking along the
canal -

The NRDA plan should:

expand to include more
species -
This is a wonderful resource -
should be clean &
available

Thanks for listening!



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Comments for the Draft Gowanus NRDA Plan

Name:
Zip Code:

I have spent a lot of time exploring the Gowanus Canal
as a supporter of local business

On the front of this card, I have shown the locations of

businesses I've supported

The NRDA plan should:

protect & restore natural habitat
and vegetation to provide a
natural oasis for flora/fauna
and humans

Thanks for listening!



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Comments for the Draft Gowanus NRDA Plan

Name: Henry Finnegan
Zip Code: 11216

I have spent a lot of time exploring the Gowanus Canal
as a Employee in the neighborhood

On the front of this card, I have shown the locations of

MY WORK
MY PARTNERS WORK
MY FAVORITE HANGS

The NRDA plan should:

Include lots of greenspace for
the neighborhood to enjoy!
This project is so important to
our neighborhood!

Thanks for listening!



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Comments for the Draft Gowanus NRDA Plan

Name: Alexia Zelnick
Zip Code: 11238/11217

I have spent a lot of time exploring the Gowanus Canal
as a climbing gym employee

On the front of this card, I have shown the locations of

my gym!
my partner's workplace!
Many valued members of my community!

The NRDA plan should:

Reflect the fact that people live, work,
and spend significant time around the
Canal, and deserve to be close to
healthy, vibrant waterfronts.

Thanks for listening!



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Comments for the Draft Gowanus NRDA Plan

Name: Christina Van Housen
Zip Code: 11232

I have spent a lot of time exploring the Gowanus Canal
as a citizen, neighbor, leader, and caregiver

On the front of this card, I have shown the locations of

I have walked or rode my
transit to shops, small businesses
and events held by the
community despite environmental
issues.

The NRDA plan should:

- Ensure that the environment
is prioritized over profits
and land use.

Thanks for listening!



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Comments for the Draft Gowanus NRDA Plan

Name: Mindy Steffen
Zip Code: 11221

I have spent a lot of time exploring the Gowanus Canal
as a artist. My studio is here.

On the front of this card, I have shown the locations of

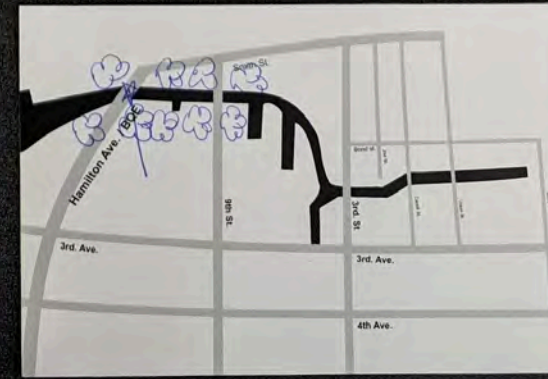
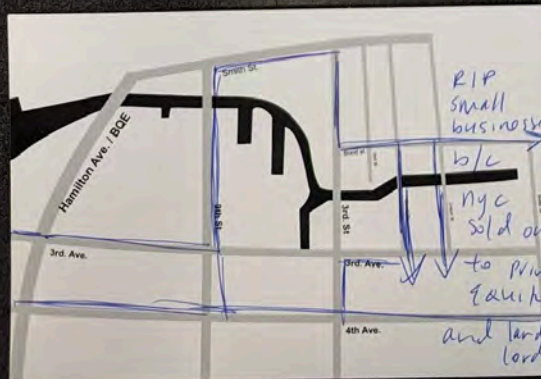
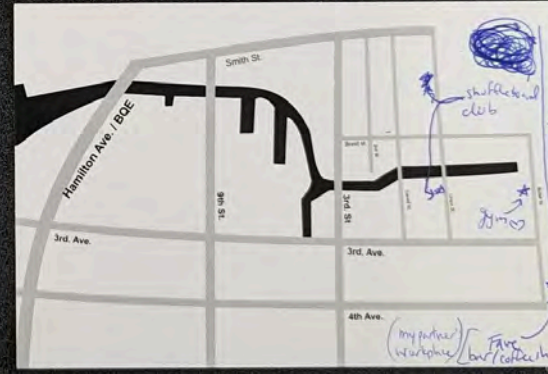
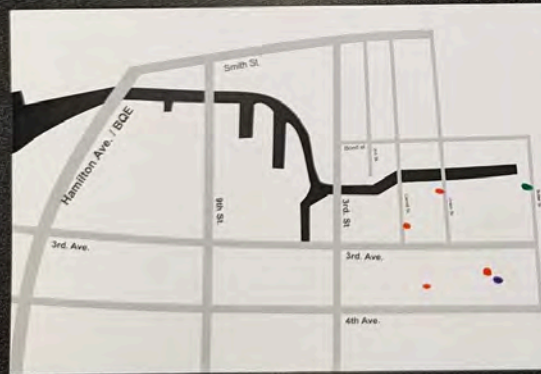
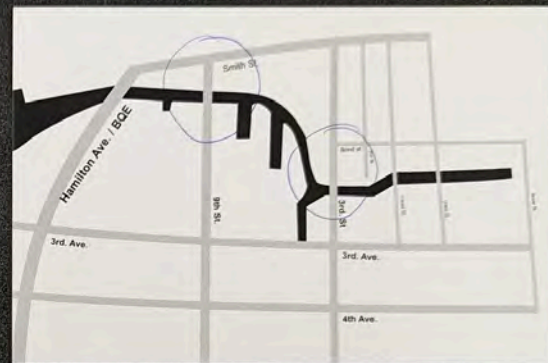
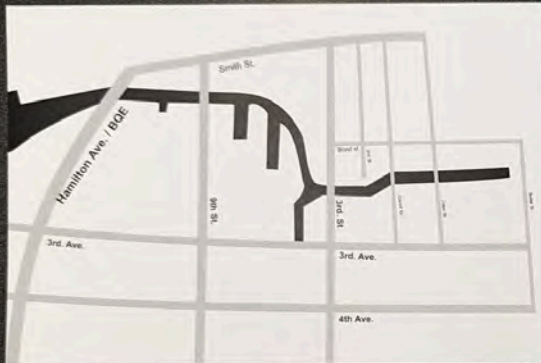
Make walking underneath
the BQE less creepy!
More green spaces!
The oil slicks are rainbowy
but gross.
Plant more trees + plants
Less construction

The NRDA plan should:

Thanks for listening!



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Comments for the Draft Gowanus NRDA Plan

Name: **HARVEY KEMAL**
Zip Code: **11215**



I am a recreational boater, and paddling on the Gowanus Canal, I have enjoyed:

**-THE SENSE OF COMMUNITY
F-R ALL PEOPLE OF ALL BACKGROUNDS
-THE OPPORTUNITY TO LEARN
ALL SORTS OF THINGS**

By raising bulkhead heights and removing water access points, the remedial action has reduced my ability to paddle safely in the canal. The NRDA should account for reduced water access, and restoration should reduce bulkhead heights, restore safe egress points, and make expanded water access available to more community members as the canal gets cleaner. Thank you for listening!

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Comments for the Draft Gowanus NRDA Plan

Name: **AARON GREEN**
Zip Code: **11231**



I am a recreational boater, and paddling on the Gowanus Canal, I have enjoyed:

**THE FRIENDS I'VE
MADE WHILE ON
THE WATER!**

By raising bulkhead heights and removing water access points, the remedial action has reduced my ability to paddle safely in the canal. The NRDA should account for reduced water access, and restoration should reduce bulkhead heights, restore safe egress points, and make expanded water access available to more community members as the canal gets cleaner. Thank you for listening!

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Comments for the Draft Gowanus NRDA Plan

Name: **JAC FINE**
Zip Code: **11201**



I am a recreational boater, and paddling on the Gowanus Canal, I have enjoyed:

**He may be
city has used this as a
jumping ground. My family
has been in this part of BK
for over 100 years.**

By raising bulkhead heights and removing water access points, the remedial action has reduced my ability to paddle safely in the canal. The NRDA should account for reduced water access, and restoration should reduce bulkhead heights, restore safe egress points, and make expanded water access available to more community members as the canal gets cleaner. Thank you for listening!

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Comments for the Draft Gowanus NRDA Plan

Name:
Zip Code:



I am a recreational boater, and paddling on the Gowanus Canal, I have enjoyed:

**I would like to be a
recreational boater when the
Gowanus Canal is clean.**

By raising bulkhead heights and removing water access points, the remedial action has reduced my ability to paddle safely in the canal. The NRDA should account for reduced water access, and restoration should reduce bulkhead heights, restore safe egress points, and make expanded water access available to more community members as the canal gets cleaner. Thank you for listening!

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Comments for the Draft Gowanus NRDA Plan

Name: **Stephanie**
Zip Code: **11238**



I am a recreational boater, and paddling on the Gowanus Canal, I have enjoyed:

**we would love to make peace
with my ferrets down
the gowanus canal.
we would love to see some
cool fish.**

By raising bulkhead heights and removing water access points, the remedial action has reduced my ability to paddle safely in the canal. The NRDA should account for reduced water access, and restoration should reduce bulkhead heights, restore safe egress points, and make expanded water access available to more community members as the canal gets cleaner. Thank you for listening!

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Comments for the Draft Gowanus NRDA Plan

Name: **MICHAEL ANGI**
Zip Code: **11231**



I am a recreational boater, and paddling on the Gowanus Canal, I have enjoyed:

**I have been afraid to go
anywhere near the water &
question the air around
the canal.**

By raising bulkhead heights and removing water access points, the remedial action has reduced my ability to paddle safely in the canal. The NRDA should account for reduced water access, and restoration should reduce bulkhead heights, restore safe egress points, and make expanded water access available to more community members as the canal gets cleaner. Thank you for listening!

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Comments for the Draft Gowanus NRDA Plan

Name: **KAT JAGGI**
Zip Code: **11210**

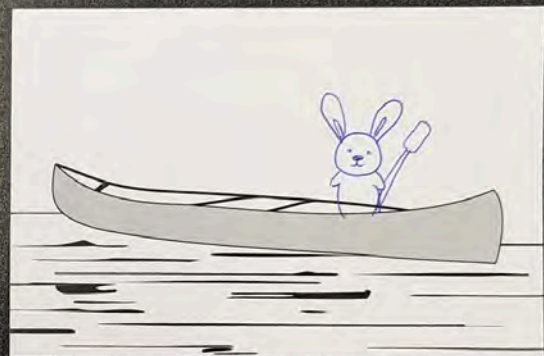


I am a recreational boater, and paddling on the Gowanus Canal, I have enjoyed:

I have never gone boating before. I would like to go. I am part of the Hudson community but this is the first time I would feel safe to go. I would like to see the canal clean enough to paddle boat here in my home neighborhood.

By raising bulkhead heights and removing water access points, the remedial action has reduced my ability to paddle safely in the canal. The NRDA should account for reduced water access, and restoration should reduce bulkhead heights, restore safe egress points, and make expanded water access available to more community members as the canal gets cleaner. Thank you for listening!

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Comments for the Draft Gowanus NRDA Plan

Name: Jonathan Cootilla
Zip Code: 11204

I have spent a lot of time exploring the Gowanus Canal

as a Community Member
On the front of this card, I have shown the location(s) of

The NRDA plan should:

more wild life and greenery -
would love for the canal to be
more accessible to the community

Thanks for listening!

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Comments for the Draft Gowanus NRDA Plan

Name:
Zip Code:

I have spent a lot of time exploring the Gowanus Canal

as a local business supporter
On the front of this card, I have shown the locations of
I've lived in BK for 15 yrs &
never saw the canal as
something accessible - it was
always something to avoid -

The NRDA plan should: It should be a
place for nature to thrive
a feature of the
neighborhood

Thanks for listening!

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Comments for the Draft Gowanus NRDA Plan

Name:
Zip Code:

I have spent a lot of time exploring the Gowanus Canal

as a Public Citizen
On the front of this card, I have shown the location(s) of
Public Citizen

The NRDA plan should: Public Citizen
extendable housing

Thanks for listening!

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Comments for the Draft Gowanus NRDA Plan

Name:
Zip Code:

I have spent a lot of time exploring the Gowanus Canal

as a 30 year resident
On the front of this card, I have shown the locations of
WHERE I LIVE

AND POSSIBLE PLACES FOR
PUBLIC ACCESS AND FOOT
BRIDGES TO BETTER CONNECT
TO THE CANAL
The NRDA plan should:
MAKE CLOSE ACCESS TO THE
CANAL AS THE PARK SPACE
PUBLIC WALKWAYS. ALSO MAKE
FOOT BRIDGES FOR EASY ACCESS
ACROSS.

Thanks for listening!

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Comments for the Draft Gowanus NRDA Plan

Name: Jacob Best
Zip Code: 11225

I have spent a lot of time exploring the Gowanus Canal

as a Brooklynite who loves seeing all parts of the city!
On the front of this card, I have shown the location(s) of

a spot that I walk past at
least 3x/week that could
be so much cleaner and safer.

The NRDA plan should: have a sustainable
solution so that wildlife can
coexist with NY'ers and our
children don't make jokes about the toxicity of the water!

Thanks for listening!

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Comments for the Draft Gowanus NRDA Plan

Name: Harry Luber
Zip Code: 11542

I have spent a lot of time exploring the Gowanus Canal

as a commuter
On the front of this card, I have shown the location(s) of

The NRDA plan should:

clean up the area, reduce
traffic, make it more safe

Thanks for listening!

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Comments for the Draft Gowanus NRDA Plan

Name:
Zip Code:

I have spent a lot of time exploring the Gowanus Canal

as a PROFESSOR + RESIDENT
On the front of this card, I have shown the location(s) of

THE LOCATIONS I FREQUENT,
VISIT, & LOOK FORWARD TO
IMPROVING

The NRDA plan should:
HAPPY NOW. WE NEED FOOTBRIDGES,
BOAT LANCHES, DOCKS, MUSSELS,
& THE TOTALITY OF NATURAL
REINVESTMENT!

Thanks for listening!

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Comments for the Draft Gowanus NRDA Plan

Name:
Zip Code:

I have spent a lot of time exploring the Gowanus Canal

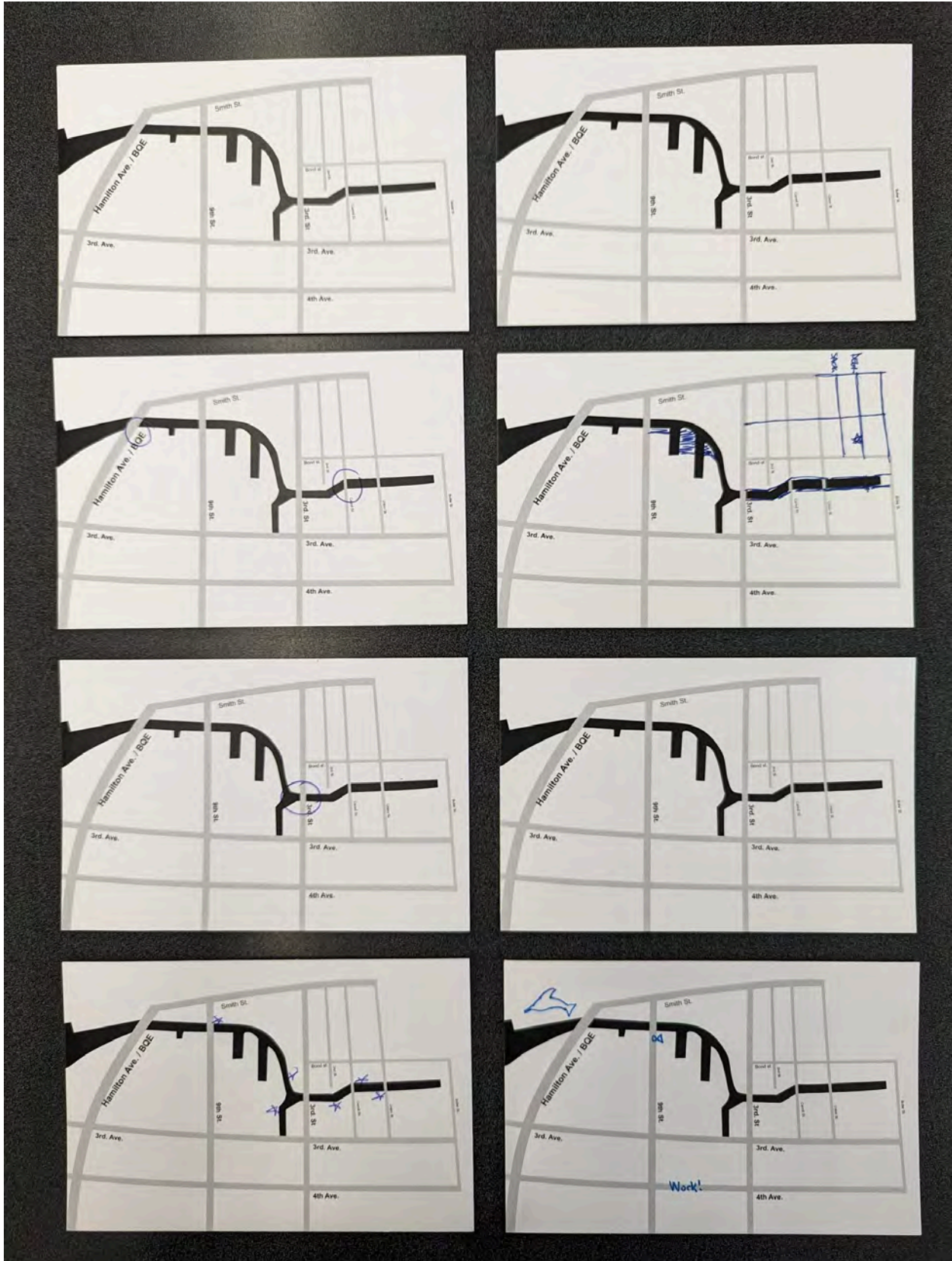
as a My work
On the front of this card, I have shown the location(s) of

- My work
- Some of the Striper migrations I have
seen
- A tiki bar
- Water quality capable of hosting dolphins.

Thanks for listening! • Dolphins operating a tiki bar

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Comments for the Draft Gowanus NRDA Plan

Name: **Kayci Bjornson**
Zip Code: **11231**

I have spent a lot of time exploring the Gowanus Canal as a **resident**

On the front of this card, I have shown the locations of **work**

The NRDA plan should:

- **clean, odorless water**
- **able to be boated on**
- **I would like to be a recreational boater**

Thanks for listening!

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Comments for the Draft Gowanus NRDA Plan

Name: **Madison**
Zip Code: **11201 + 11217**

I have spent a lot of time exploring the Gowanus Canal as an **employee nearby!**

On the front of this card, I have shown the locations of **my workplace, place of recreation, favorite place to spend time right next to the canal! The (L)ife (now Movement) Gowanus, (L)inking (L)ym!**

The NRDA plan should:

- **include air quality testing especially near construction**
- **create more outdoor public space for the vibrant Gowanus community! I love Gowanus and hope it becomes a safe & welcoming neighborhood for all!!**

Thanks for listening!

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Comments for the Draft Gowanus NRDA Plan

Name: **Sam Dallas**
Zip Code: **11238**

I have spent a lot of time exploring the Gowanus Canal as a **new resident of Brooklyn**

On the front of this card, I have shown the locations of **Places we looked out on the Gowanus Canal**

The NRDA plan should:

- **include efforts to place more benches near the water**

Thanks for listening!

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Comments for the Draft Gowanus NRDA Plan

Name: **Sam Dallas**
Zip Code: **11238**

I have spent a lot of time exploring the Gowanus Canal as a **musician at the Canal-side Jam**

On the front of this card, I have shown the locations of **kids learning to ride bikes, musical community forming every week, the most outside time I get all week**

The NRDA plan should:

- **allow for expanded water access & park space**
- **protect the local environment!**

Thanks for listening!

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Comments for the Draft Gowanus NRDA Plan

Name: **Miguel NGVI**
Zip Code: **11231**

I have spent a lot of time exploring the Gowanus Canal as a **RESIDENT & BUSINESS OWNER**

On the front of this card, I have shown the locations of **where I have viewed from afar or close to the Canal including the current presence of debris!**

The NRDA plan should: **ENSURE AIR QUALITY WHILE WORKING, BUT RESTORATION FIRST ESPECIALLY GIVEN NEW & CURRENT RESIDENCE. ENSURE OPEN ACCESS FOR ALL.**

Thanks for listening!

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Comments for the Draft Gowanus NRDA Plan

Name: **Jean Salome Rodriguez**
Zip Code: **11231**

I have spent a lot of time exploring the Gowanus Canal as a **resident since 1989 & my family since the 1950s**

On the front of this card, I have shown the locations of **where I live, where I used to see fish + crabs + ducks + swans + herons + even jellyfish! Not to mention raccoons + possum.**

The NRDA plan should:

- **Bring the wildlife back, please! Bring back the trees, the marshgrass, please! Reeds, Dragonflies!**

Thanks for listening!

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Comments for the Draft Gowanus NRDA Plan

Name: **Tayia Santiago**
Zip Code: **11231**

I have spent a lot of time exploring the Gowanus Canal as a **resident!**

On the front of this card, I have shown the locations of **my home**

- **I wish this was public access**
- **open & water front access**
- **plus green space**
- **where wildlife should live!**

The NRDA plan should:

- **include LOCAL restoration**
- **account for biodiversity in the surveys**
- **improve recreational waterfront access**

Thanks for listening!

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Comments for the Draft Gowanus NRDA Plan

Name: **Charissa**
Zip Code: **11231**

I have spent a lot of time exploring the Gowanus Canal as a **resident**

On the front of this card, I have shown the locations of **Parks + Water access that I'd like to see**

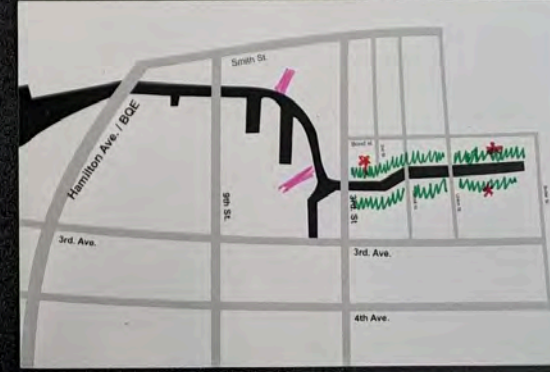
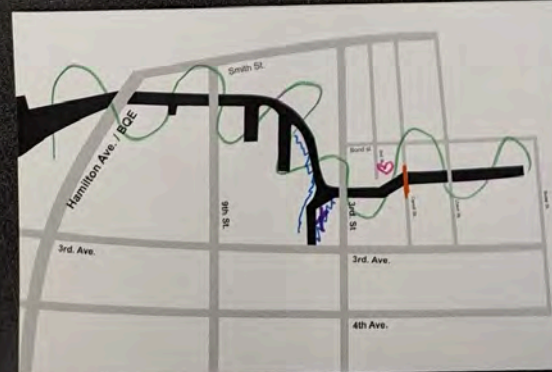
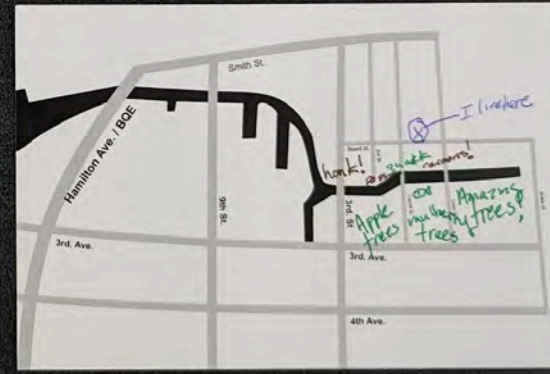
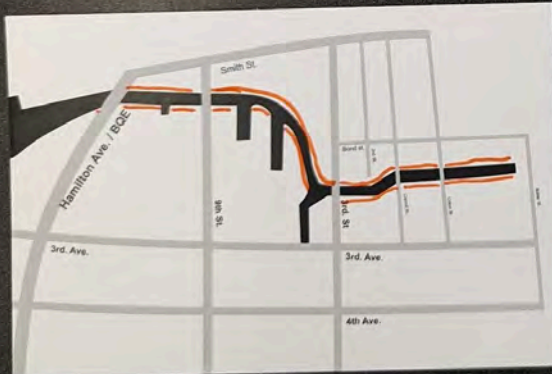
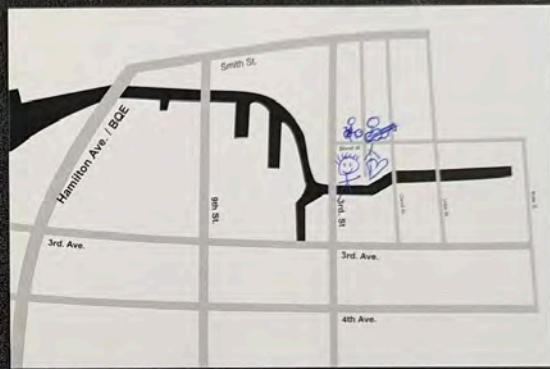
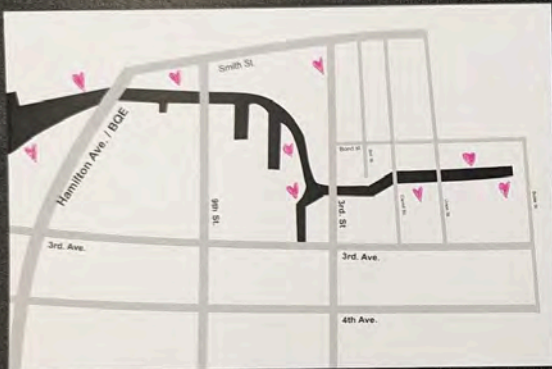
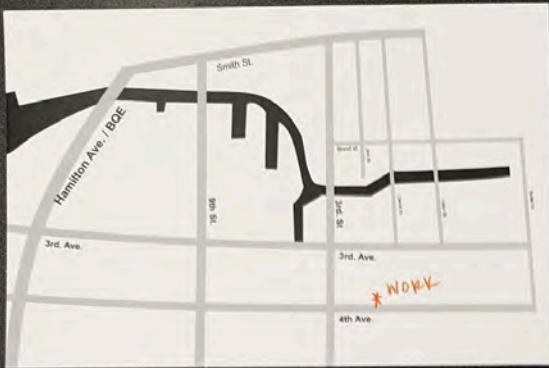
The NRDA plan should:

- **Accounting for losses of water access and ensure more is added! Restoration projects happen in the neighborhood!**

Thanks for listening!

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My Huynh

From: David J. Miller [REDACTED]
Sent: Saturday, June 15, 2024 10:09 AM
To: dec.sm.nrd
Subject: RE: Gowanus Canal NRDA Plan Comments

Follow Up Flag: Follow up
Flag Status: Flagged

You don't often get email from [REDACTED]. [Learn why this is important](#)

ATTENTION: This email came from an external source. Do not open attachments or click on links from unknown senders or unexpected emails.

Good morning:

Please be advised of the following correction to the below-referenced comment document: the reference to "n.30" in the first full paragraph on page 15 should read "n.68".

Thank you for your time and attention to this matter.

Sincerely,

David J. Miller

Shareholder | **Giordano, Halleran & Ciesla, PC**
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From: David J. Miller
Sent: Friday, June 14, 2024 12:00 PM
To: 'NRD@DEC.NY.GOV' <NRD@DEC.NY.GOV>
Subject: Gowanus Canal NRDA Plan Comments

Dear Ms. Pasos:

Please accept the attached comments with respect to the Gowanus Canal Natural Resource Damage Assessment Plan dated March 1, 2024. These comments are submitted on behalf of the Gowanus Canal Tiny Parties Group the individual members of which are listed at Exhibit A to the attached document. Please advise if you have any issues accessing the document.

Thank you.

Sincerely,

David J. Miller

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DAVID J. MILLER
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ALSO ADMITTED TO PRACTICE IN NY & PA

Please Reply To:

June 14, 2024

VIA EMAIL (NRD@DEC.NY.GOV)

New York State Department of Environmental Conservation
Natural Resource Damages (NRD) Section
c/o Alicia Pasos
625 Broadway, 14th Floor
Albany, NY 12233

RE: Gowanus Canal Natural Resource Damage Assessment Plan

Dear Gowanus Canal Natural Resource Damage Assessment Trustee Council:

Please accept the comments below concerning the Gowanus Canal Natural Resource Damage Assessment Plan (the “Plan” or “NRDA” or “NRDA Plan”) on behalf of the Gowanus Canal Tiny Parties Group (“TPG”), an unincorporated group of alleged potentially responsible parties (“PRPs”) at the Gowanus Canal Superfund Site (“Site”). A list of the TPG members joining in these comments is available at **Exhibit A**. In addition to the TPG’s comments, a technical report prepared by Roux Environmental Engineering and Geology (“Roux Report”) concerning the Plan is attached. *See* **Exhibit B**.

I. INTRODUCTION

As set forth herein and detailed in the Roux Report, the Plan suffers from several fundamental flaws which undermine the ability of the Gowanus Canal Natural Resource Damage Assessment Trustee Council (the “Trustees”) to perform a defensible analysis of any damages to natural resources related to the Gowanus Canal (the “Canal”).

First, the Plan does not indicate the “baseline” against which natural resource damages would be assessed. In order to accurately assess the baseline condition of natural resources in the Canal—and quantify damages to natural resources—the circumstances surrounding the Canal’s creation, historic use and operations, and the use of the proximate (and now extinguished)

New York State Department of Environmental Conservation

June 14, 2024

Page 2

Gowanus Creek, must be fully considered.¹ As set forth further herein, the Plan does not appear to account for the original industrial purpose of the Canal in determining baseline. Instead, the Plan states—inaccurately—that “[be]cause site-specific historical data applicable to establishing baseline have not been located for Gowanus Canal, the Trustees plan to use, in order of priority, data from reference areas/control groups² and/or relevant literature.³ However, there are numerous sources of historical information regarding the Canal and its environs from even before it was completed, and this information must be used to establish the “baseline” from which the assessment of natural resource damages, if any, must be determined.

The determination of a baseline should take into account conditions in an assessment area that were caused by human activity beyond the release of contaminants.⁴ This would put the baseline in 1868, the year the Canal’s construction was completed and prior to the introduction of any of the primary contaminants of concern, including coal tar. As outlined herein, the Canal has undergone substantial development and redevelopment across its history, including prior remedial efforts, and was, at its inception, a human-made feature designed specifically for industrial waste and sewage disposal uses. Accordingly, any baseline approach to natural resource damages (“NRD” or “NRDs”) in the Canal must consider that even before the Canal was completed, and continuously thereafter, it was used as a sewer and suffered from significant contamination.

Thus, this is an atypical site for a natural resources damages assessment because the waterway’s entire purpose is for industrial use. The Trustees must revisit the Plan to account for the unique nature and characteristics of the Canal, while factoring in the Canal’s historic use, and come to a more practical and appropriate methodology for assessing natural resource damages, if any.

Second, the Plan does not provide sufficient information regarding the proposed methodologies that would be used to measure NRD once a baseline is chosen. The information that is provided indicates that the proposed methodologies are flawed. These shortcomings are fatal to the draft Plan and must be remedied before proceeding.

Finally, and critically, there is a single category of contributors of waste driving natural resource damages in the Canal: manufactured gas plants (“MGPs”) and the resulting coal tar. The Trustees must quantify the MGPs’ contamination contribution, which will establish that the coal

¹ See 43 C.F.R. § 11.72(c) (directing the analysis of historical data for an assessment area to be used for baseline assessment where available and applicable).

² 43 C.F.R. § 11.72(d).

³ 43 C.F.R. § 11.72(c)(2).

⁴ See 42 U.S.C.A. § 9607(a)(4)(C); 43 C.F.R. § 11.72(b) (baseline data should “tak[e] into account both natural processes and those that are the result of human activities”).

New York State Department of Environmental Conservation

June 14, 2024

Page 3

tar-related PAH released from the MGPs is substantially responsible for any loss of services at the Canal.

II. HISTORY OF THE GOWANUS CANAL

The Gowanus Canal is a tidally influenced, human-made waterway located in the Borough of Brooklyn, New York, with a 1.8-mile-long channel roughly oriented north-south with three smaller extensions (the turning basins) along its east bank situated between 3rd Street to the north, and 9th Street to the south. The Canal was constructed over a twenty-year period by bulkheading and dredging a tidal creek and wetland. Even years before the Canal was completed, Brooklyn constructed sewers that discharged raw sewage into the Canal area. Completed in 1868, it immediately became one of the nation's busiest industrial waterways, servicing industries that included MPGs, coal yards, cement manufacturers, tanneries, paint and ink factories, machine shops, chemical plants, and oil refineries, among others.

Prior to the Canal's development, the surrounding area had consisted of the Gowanus Creek, its tributaries, and lowland marshes. For over two decades, the Gowanus Creek was used as a *de facto* open sewer and industrial waterway for the surrounding area, receiving large quantities of untreated sewage and industrial waste.⁵ As a result of the absence of environmental practices and the overarching purpose of constructing the Canal—which was to serve as a sewer and industrial waterway—large quantities of untreated wastes were discharged directly into the Canal.⁶

In 1846, Brooklyn began filling in the Gowanus marshes and creating a tidewater canal that would be used for sewage and damming the Gowanus Creek in order to harness tidal flows for powering adjacent mills.⁷ That same year, Brooklyn crafted a plan to create the Canal as a means for conveying untreated sewage to New York Bay which ultimately would include a flushing system (which was not completed until 1911) to better flush raw sewage and industrial wastes out of the Canal into New York Bay.⁸ Just two years later in 1848, the State of New York

⁵ 2013 Record of Decision (“ROD”) at 2 (“By the mid-1840s, Brooklyn was rapidly growing, and the Gowanus marshes were considered to be a detriment to local development. In 1848, the State of New York authorized construction of the Gowanus Canal to open the area to barge traffic, flush away sewage, receive stormwater and fill the adjacent lowlands for development.”).

⁶ Roux Report at 8 (“New York City discharged untreated sewage to the Canal continuously from the Canal’s construction in 1868 through 1987”)

⁷ Hunter Research, Inc. Report (“HRI Report”) at 2-48 (“The Gowanus Canal served as an open sewer even before it was completed for navigation purposes, with the City of Brooklyn laying out sewers emptying into the canal as early as 1858.”). See **Exhibit C**.

⁸ *Id.* at 2-21.

New York State Department of Environmental Conservation

June 14, 2024

Page 4

authorized construction of the Canal to facilitate barge traffic, flush sewage, and drain wetlands.⁹ The New York Legislature issued a decree in 1849 which allowed the Canal to be deepened for use as a commercial waterway connected to Upper New York Bay.¹⁰ Between 1855 and 1866, the City obtained an amendment to the 1849 Canal Act (Ch. 431, Laws of 1855), which allowed for the appointment of commissioners and funding of canal construction.¹¹ A complicating factor for industrial barge traffic was that so much untreated sewage was discharged to the Canal that shoals and bars of sewage solids were created in the Canal that disrupted maritime traffic.¹² By the late 1870s, sewers entering the Canal carried a combination of household waste, industrial effluent from the MGPs and other industries, and storm water runoff. Between the late 1870s and early 1950s, untreated sanitary and industrial wastewater and storm water from the regional drainage area continued to be directed to the Canal.¹³

In the 1880s and 1890s, relief sewers with overflow discharges to the Canal were constructed to improve drainage and increase water circulation in the Canal.¹⁴ Due to the increase of sedimentation during this period, the City increased the frequency of dredging in the Canal from once every 10 to 12 years, as originally planned, to every two and a half years by 1898.¹⁵ Thereafter, reports in the 1920s and 1930s demonstrated that dredging had increased to once every year and subsequently slowed to once every three years by 1949. The last known date of dredging in the upper reach was no later than 1980.

The Canal was added to the National Priorities List by the United States Environmental Protection Agency (“USEPA”) in 2010. A remedial investigation was completed in 2011 and a Record of Decision was signed by USEPA in 2013. In 2014, USEPA issued Administrative Orders to thirty-one (31) alleged potentially responsible parties. On March 24, 2014, USEPA issued a Unilateral Administrative Order to twenty-seven (27) parties directing them to perform remedial design work. To date, the Canal remains under active remediation by various Gowanus Canal Superfund Site PRPs, including Brooklyn Union Gas Company d/b/a National Grid New York (“National Grid”).

⁹ *Id.* at 2-16.

¹⁰ *Laws of New York, THE BROOKLYN DAILY EAGLE* (1867), available at <https://bklyn.newspapers.com/image/50505834/?terms=gowanus%2Bcanal%2C%2B%22legislature%22>.

¹¹ HRI Report at 2-24.

¹² *Id.*

¹³ Roux Report at 7.

¹⁴ 2013 ROD at 5.

¹⁵ Roux Report at 6.

New York State Department of Environmental Conservation

June 14, 2024

Page 5

III. LEGAL FRAMEWORK

The Comprehensive Environmental Response, Compensation, and Liability Act (“CERCLA”) authorizes the United States, states, and Indian tribes to recover damages “for injury to, destruction of, or loss of natural resources” resulting from releases of hazardous substances.¹⁶ Through an action under Section 107(a)(4)(C) of CERCLA, natural resource damages may be recovered from liable parties.¹⁷ Federal, state, and tribal officials may be appointed as natural resource trustees and tasked with the assessment of NRD.¹⁸ In an action seeking NRDs, the trustees must determine the physical, chemical and biological baseline condition and associated baseline services provided by the injured resources.¹⁹

Generally, the determination of a baseline should consider data that “reflect[s] [the] conditions that would have been expected at the assessment area had the discharge of oil or release of hazardous substances not occurred, taking into account both natural processes and those that are the *result of human activities*”, and considering where available “historical data for the assessment area.”²⁰ As detailed here, the Plan does not establish a baseline or indicate that a baseline will be determined that accounts for the significant history of human activity at the Canal; does not provide appropriate methodologies for measuring any NRD; and does not sufficiently focus on the appropriate sources of contamination impacting the Canal.

IV. TPG COMMENTS ON NRDA PLAN

A. The Plan Does Not Appropriately Identify the Baseline Condition of Natural Resources in the Canal and Ignores the Facts that Support Establishing a Baseline as of 1868.

The draft NRDA Plan correctly states the baseline should be established at a time prior to the introduction of the “primary contaminants of concern”: polycyclic aromatic hydrocarbons (“PAHs”), taking into account human activities not connected with the release of the contaminants,

¹⁶ 42 U.S.C.A. § 9607(a)(4)(C).

¹⁷ *Id.*

¹⁸ See 42 U.S.C.A. §§ 9607(f)(2)(A) and (B).

¹⁹ 43 C.F.R. § 11.72(a); see also *Ohio v. Dep't of the Interior*, 880 F.2d 432, 452-54 (D.C. Cir. 1989) (the primary measure for calculating damages is the cost of the actions needed to restore or replace injured natural resources after taking into account the beneficial effects of response actions selected by USEPA).

²⁰ 43 C.F.R. § 11.72(b)(1) (emphasis added); 43 C.F.R. § 11.72(c); see also *Coeur D'Alene Tribe v. Asarco Inc.*, 280 F. Supp. 2d 1094, 1101 (D. Idaho 2003) (stating that, proper perspective in an NRD case requires a court to consider, *inter alia*, site history, prior problem solving efforts, legislative and governmental involvement, the impact of urbanization, forest fires and floods, and the observations and experiences of the people who live in affected area).

New York State Department of Environmental Conservation

June 14, 2024

Page 6

which nonetheless had a profound effect on any extant natural resources. In establishing the baseline, the Trustees must consider that public authorities constructed the Canal as a sanitary and industrial sewer, and that “human activity” facilitated the then-ongoing release of contaminants. The completion date of the Canal, 1868, is a logical point of time to assess the baseline because it not only conforms to the regulatory definition in 43 C.F.R. § 11.72(b)(1), but also provides a reliable and realistic assessment point, prior to which the Canal in its current form did not even exist. Thus, the completion of the Canal both coincides with public acknowledgement that the Gowanus Canal was constructed to provide a means for conveying untreated sewage and industrial wastes in New York Bay and precedes the release of significant amounts of PAHs generally and particularly from Manufactured Gas Plants.²¹ 1868 also predates alleged releases of hazardous substances by the members of the TPG or their predecessors.²²

Taking into account the history of the Canal and Gowanus Creek detailed above, the appropriate baseline for the NRDA is an industrial/municipal facility constructed to both facilitate the disposal of untreated sewage and industrial wastes and to provide a means for marine traffic to access municipal and industrial facilities on and near the Canal as depicted in Figure 1.



Plate 2.3. Gowanus Canal Assessment of Eligibility: View of an unidentified section of the Gowanus Canal. *Circa 1877.* Taken within about a decade of completion of the main canal, this view suggests the rapid industrial growth along the waterway. Most of the canal walls shown appear to be cribwork with timber fenders, but those at left may be timber sheet piling. Source: Brooklyn Public Library.

Figure 1²³

²¹ Roux Report at 15.

²² *Id.*

²³ Hunter Research, Inc. Report at 2-32.

New York State Department of Environmental Conservation

June 14, 2024

Page 7

As indicated, “baseline” is defined as “the condition or conditions that would have existed at the assessment area had the discharge of oil or release of the hazardous substance under investigation not occurred.”²⁴ The “Trustees plan to focus on total PAHs as the primary contaminants of concern ... for assessing ecological injury...”, NRDA at 20, because the baseline can and should “tak[e] into account both natural processes and those that are the result of human activities.”²⁵ The Canal completion date takes account of those human activities and affords consideration of ensuing release of PAHs.

The current draft Plan appears to endorse this approach reflecting the Department of the Interior’s regulations stating that “[t]he baseline condition of natural resources reflects natural processes and *changes that result from human activities that are not contaminant-related* (e.g., structural alterations to Gowanus Canal).”²⁶ However, to call the creation of the Gowanus Canal a mere “structural alteration” entirely misses the fact that it was created with the *sole intent* of serving as a sewer and navigational waterway for industry.²⁷ The subsequent pollution was not a consequence of bad management or mishap but was the fulfillment of the Canal’s purpose.

Given this regulatory framework and the historical facts, the Trustees should establish the baseline in 1868, the year the Gowanus Canal was completed and prior to the beginning of the release of the primary contaminant of concern, particularly coal tar, into the Canal as the MGPs took advantage of the industrial function of the Canal. This date will take into account the advanced industrialized state of the waterbody, which was the result of human activities, including the introduction of non-CERCLA stressors such as raw sewage, CSO solids, and bacteriological contamination.²⁸ The Canal and its predecessor waterbody provided a predominantly industrial service to the neighboring communities and the baseline should reflect that ongoing industrialized character, which was the ultimate goal of the Canal’s design rather than an accidental byproduct.

²⁴ 43 C.F.R. § 11.72(c)(2).

²⁵ 43 C.F.R. § 11.72(b)(1) (“Baseline data should reflect conditions that would have been expected at the assessment area had the discharge of oil or release of hazardous substances not occurred, taking into account both natural processes and those that are the result of human activities.”).

²⁶ Draft NRDA Plan, Section 4.1, at 31 (emphasis added).

²⁷ Roux Report at 5, 6.

²⁸ While the phrasing “contaminant related” does not appear in 43 C.F.R. § 11.72(b)(1), CERCLA § 107(a)(4) provides that “any person who accepted any *hazardous substance* for transport to disposal or treatment facilities, incineration vessels or sites selected by such person, from which there is a release, or a threatened release which causes the incurrence of response costs, of a *hazardous substance*, shall be liable for . . . damages for injury to, destruction of, or loss of natural resources” (emphasis added). 42 U.S.C. § 9607(a)(4). CERCLA § 101(14) defines “hazardous substance” as any substance designated pursuant to § 307(a) and § 311(b)(2)(A) of the Federal Water Pollution Control Act, § 102 of CERCLA, § 3001 of the Solid Waste Disposal Act, § 112 of the Clean Air Act, or any imminently hazardous chemical substance or mixture for which the USEPA has taken action pursuant to § 7 the Toxic Substances Control Act. 42 U.S.C. § 9601(14).

New York State Department of Environmental Conservation

June 14, 2024

Page 8

The 1868 date for the baseline reflects the conditions that would have existed had PAHs, including coal tar-related PAHs, not been released and recognizes the contaminated state of the industrialized Canal.²⁹

Part of this damages assessment requires the Trustees to identify the baseline services offered by a given natural resource (specifically the physical, chemical, or biological baseline data) and estimate the reduction in services that resulted from the discharge or release.³⁰ The goal is to restore or rehabilitate the injured natural resources “to a condition where they can provide the level of services available at baseline.”³¹ However, almost all of the injuries occurred prior to 1868 and the release of PAHs, including coal tar. As the Trustees acknowledge, “[p]roperly functioning . . . surface water [is] essential for a healthy ecosystem.”³² But if it was not properly functioning from the beginning because it was a sewer (as was the Creek the Canal replaced), the Canal could not support the types of natural resources that Trustees typically hope to restore. The Plan acknowledges this, stating that “natural resources have likely been exposed to and injured by contaminants since at least the 1870s,”³³ which corresponds to the opening of the Canal, as it exists today and prior to the significant release of PAHs from MGPs and other sources.³⁴ However, as previously stated, there were extensive natural resource damages prior to the operation of MGPs and the facilities operated by members of the TPG or their predecessors. Pollutants added after the completion of the Canal would have caused damage that was *de minimis* and incremental because the environmental degradation had already occurred. Decades of releases of raw sewage, among other effluents, were more than sufficient to degrade the benthic macroinvertebrates and other aquatic and avian resources.

The City’s historical attempts to remedy the “dead” body of water that the Canal had become illuminates the absence of natural resources by the time the Canal had been completed. Since the initial development of the Canal, it has experienced low freshwater inputs and poor circulation with the downstream Bay along with continual direct and indirect sources of pollution, which “have contributed to a low oxygen, nutrient rich environment in the Gowanus Canal.”³⁵ The

²⁹ 43 C.F.R. § 11.72(b)(1).

³⁰ 43 C.F.R. § 1.7(a).

³¹ *Id.* § 11.81(1)(i)-(ii).

³² Draft NRDA Plan, Section 2.3, at 17.

³³ *Id.* at Section 4.4, at 33.

³⁴ The Metropolitan Manufactured Gas Plant opened in 1871. See <http://www.metropolitanmgpsite.com/index.html>. The Fulton Municipal Gas Plant operated from 1879 to the early 1930s. See [National Grid:Fulton \(fultonmgpsite.com\)](http://www.fultonmgpsite.com). Finally, the Citizens Manufactured Gas Plant operated from the 1860s to the early 1960s along the Gowanus Canal. citizensmgpsite.com/index.html.

³⁵ TRUSTEES, PREASSESSMENT SCREEN, GOWANUS CANAL SUPERFUND SITE, KINGS COUNTY, NEW YORK (“PREASSESSMENT SCREEN”) at 3, available at <https://pub-data.diver.orr.noaa.gov/admin-record/6834/Gowanus%20PAS%20Final-Signed.pdf>.

New York State Department of Environmental Conservation

June 14, 2024

Page 9

19th century remedy was to construct a flushing tunnel to bring water from the East River. However, the first flushing tunnel was not finalized until 1911, when the City connected the Canal to the Buttermilk Channel in Upper New York Bay.³⁶ Prior to this (and during numerous periods of disrepair), “in the absence of an operational flushing tunnel, dissolved oxygen levels throughout most of the Canal can fall below the 3.0 mg/L water quality standard for class SD waters.”³⁷

Significant amounts of organic matter (e.g., human excreta, kitchen waste, and industrial waste) have led to higher levels of BOD₅ (Biochemical Oxygen Demand measured over five days) in the Canal, causing a depletion of dissolved oxygen, which “can be harmful or fatal to aquatic life.”³⁸ In fact, “low levels of dissolved oxygen are responsible for many of the fish kills reported and tracked by resource agencies.”³⁹ A toxicological evaluation of the Gowanus Canal sediment, which was conducted in 2010 as part of the Phase 3 Remedial Investigation, found that survival, reproduction, and growth for *L. plumulosus*, a cornerstone estuarine amphipod species, was “impaired in almost all Gowanus Canal sediment samples, when compared with results from the control sediment.”⁴⁰ These concentrations and rates reflect some amount of remedial efforts and the installation of a flushing tunnel that would not have been present in the mid-nineteenth century, when conditions were entirely unmitigated. The principal pollutants in combined and/or sanitary sewer overflows are microbial pathogens, oxygen depleting substances, and floatables.⁴¹ Any resources existing at the baseline would be highly polluted and lack any substantial natural resource value – or, at the very least, exhibit highly impaired resources.

The Trustees also propose to evaluate the loss of non-biological services by focusing on the possible recreational use of the Canal. It is highly unlikely that recreational services were ever extensive in the area. There is no record of recreational uses of the Canal, and it would be highly unlikely that fishing, crabbing, canoeing or swimming would take place among the high levels of human sewage and industrial navigation of this narrow waterway.⁴²

The discussion in the Plan of the baseline is woefully short and opaque. An appropriate description to establish the baseline would acknowledge that, unlike other Superfund sites, this

³⁶ ROD at 3.

³⁷ *Id.* at 3.

³⁸ REPORT TO CONGRESS ON IMPACTS AND CONTROL OF COMBINED SEWER OVERFLOWS AND SANITARY SEWER OVERFLOWS FACT SHEET at 4-5 (“CSO REPORT”) (“The consequences of high BOD₅ concentrations are the same as those for low dissolved oxygen: aquatic organisms become stressed, suffocate, and die.”), available at https://www.epa.gov/sites/default/files/2015-10/documents/csosortc2004_full.pdf.

³⁹ *Id.* at 4-4 - 4-5.

⁴⁰ PREASSESSMENT SCREEN at 21.

⁴¹ CSO REPORT at 5-5. Furthermore, “Oxygen-depleting substances in SSOs (sewer spills) can reduce in-stream dissolved oxygen to levels that are insufficient to support aquatic life.” *Id.* at 5-19.

⁴² Roux Report at 11.

New York State Department of Environmental Conservation

June 14, 2024

Page 10

baseline is not a greenfield. The draft NRDA contains the problematic declaration: “[b]ecause site-specific historical data applicable to establishing baseline have not been located”, the Trustees will use data from other sites. There are two egregious problems associated with this approach. The first is that the draft NRDA does not specify the date of the baseline, so it is difficult to understand if an adequate inquiry has been made. The second point is that documentation of the Canal’s condition does exist as indicated above, which should provide an adequate starting point for ascertaining the true baseline conditions.

The most disturbing and inadequate aspect of the draft NRDA is that it does not acknowledge the unique nature of the Canal, which existed as an industrial waterway, long before the introduction of the primary contaminants of concern. The Trustees must take into consideration the Canal’s life as an open sewer in the decades leading up to completion of the Canal.⁴³ This more accurate baseline comports with the Department of the Interior’s controlling regulations, which take into account human activities that stripped the Canal of its natural resources long before the introduction of significant amounts of the contaminants of concern—oil, including coal tar-related PAHs—and acknowledges that the Canal at baseline existed entirely for sewage/industrial purposes.

B. The Plan Does Not Include an Appropriate Methodology for Quantifying Natural Resource Damages.

The process for quantifying the amount of NRD as proposed in the draft Plan is flawed for three main reasons. First, and most fundamentally, the Plan is incomplete because it provides little information about how the Trustees actually intend to quantify NRD. Second, as discussed above, the appropriate baseline is 1868, at which time the natural resources of the Canal were already significantly degraded.⁴⁴ Using that year as a baseline would allow the Trustees to recover, at most, a *de minimis* amount of NRDs, but more likely no damages.

Third, the Plan lists potential efforts to quantify NRDs that likely would require the expenditure of significant funds. Because the amount of expected NRDs is *de minimis*, the costs of the assessment set forth in the NRDA Plan would not be reasonable in proportion to the expected amount of NRDs, as required by applicable regulations.⁴⁵

⁴³ Roux Report at 5, 6.

⁴⁴ Roux Report at 10.

⁴⁵ See 43 C.F.R. 11.83(a)(3); 43 C.F.R. § 11.14(ee) (defining “reasonable cost” as “the anticipated cost of the assessment is expected to be less than the anticipated damage amount”); see also 43 C.F.R. § 11.14(j) (“Cost-effective or cost-effectiveness means that when two or more activities provide the same or a similar level of benefits, the least costly activity providing that level of benefits will be selected.”).

New York State Department of Environmental Conservation

June 14, 2024

Page 11

1. The Plan Lacks Sufficient Detail.

The Trustees seek NRDs for (1) the costs of restoring supposedly injured natural resources at the Canal to their condition at baseline; and (2) the value of the lost use of those resources from the baseline date until the time of their restoration.⁴⁶ Both types of NRDs must be quantified in comparison to the baseline.⁴⁷

As detailed earlier, the Plan fails to articulate any baseline against which injury will be measured. Additionally, the Trustees do not indicate the methodologies they would use to measure NRDs, once a baseline is chosen. The Trustees also indicate that they might—or might not—develop a Restoration and Compensation Determination Plan (“RCDP”).⁴⁸ However, an RCDP is mandatory for a Type B NRDA.⁴⁹ An RCDP must, among other things, list the methodologies that are intended to be used to value NRDs.⁵⁰ While an RCDP may be developed at various stages of the NRDA process, it provides an important opportunity for public comment.⁵¹ Instead of listing proposed methodologies to assess NRDs, the Plan discusses “potential types of analyses and studies” and states that “this Plan provides a starting point from which the Trustees can prioritize study efforts and implement the NRDA.”⁵² The Plan also indicates, in general terms, that there will be “a series of iterative analyses”, and that the Trustees will “undertake additional review and analysis of existing data, synthesize pertinent literature information, and/or potentially conduct primary studies.”⁵³ These gestures fall flat and require more specificity.

2. At most, the Trustees can obtain *de minimis* NRDs.

As discussed, the appropriate baseline for the Canal is 1868. At that point, the Canal was already significantly contaminated and there was already an absence of ecological resources. Accordingly, the costs for restoring any injured natural resources in the Canal to their baseline conditions would be *de minimis*. Similarly, the value of lost uses since the baseline would be *de minimis*.

⁴⁶ See Plan at ES-1, 7.

⁴⁷ See Plan at 31; 43 C.F.R. § 11.80(b).

⁴⁸ Plan at 9.

⁴⁹ See 43 C.F.R. § 11.81(a)(1); Plan at 7 (indicating that Trustees have elected to conduct a “Type B” NRDA).

⁵⁰ See 43 C.F.R. § 11.81(c).

⁵¹ See 43 C.F.R. § 11.81(d).

⁵² Plan at 34.

⁵³ *Id.*

New York State Department of Environmental Conservation

June 14, 2024

Page 12

i. NRDs for the costs of restoring natural resources.

Under applicable regulations for a Type B NRDA, NRDs may be sought for, among other things, “the cost of (i) restoration . . . of the injured natural resources to a condition where they can provide the level of services available at baseline.”⁵⁴ An appropriate baseline of 1868 would result in, at most, a *de minimis* reduction in the services provided now compared with the services provided at baseline.⁵⁵ More likely however, is that services have increased since the baseline as a result of the reduction in untreated sewage discharges and the permitting requirement for industrial discharges.

ii. NRDs for Lost Use of Natural Resources.

Under a Type B NRDA, NRDs also may be sought for “the compensable value of all or a portion of the services lost to the public for the time period from the discharge or release until the attainment of the restoration” of baseline conditions (“Lost Use”).⁵⁶ Like with NRDs for restoration, quantifying NRDs for Lost Use requires an identification of “the uses made of the resource services” at baseline and “the change from the baseline resulting from injury to a resource.”⁵⁷

“Purely speculative uses of the injured resource are precluded from consideration in the estimation of damages.”⁵⁸ Further, only “committed uses” may be used to quantify NRDs for Lost Use. *Id.* A “[c]ommitted use means either: a current public use; or a planned public use of a natural resource for which there is a documented legal, administrative, budgetary, or financial commitment established before the discharge of oil or release of a hazardous substance is detected.”⁵⁹

At most, the Trustees may recover *de minimis* NRDs for Lost Use at the Canal. Given the unique nature of the Canal as detailed above, the Trustees cannot establish “committed uses”, i.e.,

⁵⁴ 43 C.F.R. § 11.80(b); accord 43 C.F.R. § 11.82(b); see also 43 C.F.R. § 11.14(l) (defining “Restoration” as, *inter alia*, “actions undertaken to return an injured resource to its baseline condition”); 43 C.F.R. § 11.14(nn) (defining “Services” as, *inter alia*, the physical or biological functions performed by the resource including the human uses of those functions”).

⁵⁵ Roux Report at 7 (“It is clear from the historical record that the baseline condition of the Canal after the flushing tunnel ceased operations – that of an open air sewer – was functionally identical to the conditions in 1868 when the Canal was constructed”).

⁵⁶ 43 C.F.R. § 11.80(b); accord 43 C.F.R. § 11.83(c)(1).

⁵⁷ 43 C.F.R. § 11.83(b).

⁵⁸ 43 C.F.R. § 11.84(b)(2).

⁵⁹ 43 C.F.R. § 11.14(h).

New York State Department of Environmental Conservation

June 14, 2024

Page 13

recreational or similar public uses, at baseline.⁶⁰ Absent such committed uses at baseline, there are likely few if any demonstrable lost services.⁶¹ Further, to the extent there are current public uses of the Canal, those uses may not have been reduced from baseline. As noted above with respect to restoration of the Canal, it is possible that public uses of the Canal have increased since the baseline. That is because the discharge of untreated sewage and industrial wastes have been curtailed since the origins of the Canal.

Additionally, in quantifying Lost Value, the Trustees “should incorporate estimates of the ability of the public to substitute resource services or uses for those of the injured resources.”⁶² To the extent any uses of the Canal were lost, those uses may have been replaced by the public use of other resources.

3. The Costs of the NRDA Would Not Be Reasonable.

The methods to quantify NRDs must “be performed at a reasonable cost” and be “cost-effective.”⁶³ Trustees are authorized to recover “the reasonable costs of assessing” NRDs.⁶⁴ The Plan describes potential efforts to quantify NRDs that likely would require the expenditure of significant funds. Those potential efforts include sampling and laboratory studies; developing expert opinions; conducting interviews, focus groups, and surveys; and conducting “equivalency analyses” to determine NRDs to ecological resources and benefit transfer-based analyses to determine NRDs for Lost Value.⁶⁵

The costs of the efforts described above could easily dwarf the *de minimis* (at most) amount of NRDs that the Trustees can be expected to recover. Accordingly, the significant efforts to assess NRDs that the Trustees are contemplating would require more than a “reasonable cost” and would not be “cost-effective” when compared to conducting much more limited assessment efforts.

⁶⁰ The Trustees identify several potential varieties of lost uses, including “lost and diminished recreational fishing trips”; “lost community connections to Gowanus Canal”; “crab and fish consumption advisories”; and “boating, birding, and wildlife observation”. Plan at 19, 31-33.

⁶¹ See 43 C.F.R. § 11.84(b)(2) (speculation not allowed); see also 43 C.F.R. § 11.84(d) (NRDAs must account for “significant uncertainties concerning the assumptions made” in the assessment process).

⁶² 43 C.F.R. § 11.84(f).

⁶³ 43 C.F.R. 11.83(a)(3); see 43 C.F.R. § 11.14(ee) (defining “reasonable cost” as “the anticipated cost of the assessment is expected to be less than the anticipated damage amount”); 43 C.F.R. § 11.14(j) (“Cost-effective or cost-effectiveness means that when two or more activities provide the same or a similar level of benefits, the least costly activity providing that level of benefits will be selected.”)

⁶⁴ 42 U.S.C.A. § 9607(a)(4)(C).

⁶⁵ Plan at 32-40.

New York State Department of Environmental Conservation

June 14, 2024

Page 14

C. The Trustees Must Evaluate the Impact of Coal Tar-Related PAH Beneath and Adjacent to the Canal.

The ROD establishes that hazardous substances, including coal tar-related polycyclic aromatic hydrocarbons (“PAHs”), are located in the Canal, adjacent to the Canal, and under the Canal. Both the ROD and the Plan isolate coal tar-related PAHs as the primary contaminant of concern. The Trustees have acknowledged that they plan to focus on PAHs (of which non-aqueous phase liquid (“NAPL”) is a subset) “as the primary contaminant of concern.”⁶⁶ The majority of the PAH related contamination was caused by the previously-mentioned MGPs, the Metropolitan Gas Works, the Fulton Municipal Gas Works and the Citizens Gas Works, operated by National Grid’s predecessor companies since the 1870s, if not before.⁶⁷ The contamination from the manufactured gas plants is extensive.⁶⁸

The approved remediation approach for the adjacent properties is for the NAPL on the adjacent properties to be investigated and cleaned up under NYSDEC supervision.⁶⁹ Until those sites are cleaned up “contaminants from them will continue to be transported into the Gowanus Canal primarily by the migration of nonaqueous phase liquid (NAPL) through subsurface soils and groundwater discharge of dissolved-phase contaminants.”⁷⁰

To complete the NRDA, the Trustees must determine whether there is an injury, quantify the injury, and then assess damages.⁷¹ Next, the Trustees must quantify the injuries they have identified “for use in determining the appropriate amount of compensation.”⁷² The NRD regulations mandate that the extent of the injury “shall be measured” to allow the Trustees to assess

⁶⁶ *Id.* at 20.

⁶⁷ See metropolitanmgpsite.com/index.html; fultonmgpsite.com/index.html; citizensmgpsite.com/index.html; ROD at 4.

⁶⁸ “The NAPL from the three former MGP facilities is, primarily, coal tar waste. Some of this waste was discharged directly into the canal during the periods when the MGPs were operating. ... Native sediments along nearly the entire length of the canal above the Gowanus Expressway became contaminated with coal tar. In some areas, this NAPL has moved downward to substantial depths below the canal and laterally into the banks of the canal. Additional coal tar NAPL can be found in the subsurface soils near the former MGP facilities. This is tar which escaped from the subsurface structures at the former MGP facilities and seeped into the surrounding soils. Very high levels of coal tar contamination have been found at all three of the former MGP facilities. ... It is clear that in some cases, this tar is either still mobile or could be mobilized in the future by relatively minor subsurface disturbances. ... Deep borings installed in the canal adjacent to the Public Place [Citizens] former MGP facility by National Grid in 2010 indicate that NAPL contamination extends to a depth in excess of 50 feet below the sediment surface. Adjacent land-based borings on the former MGP facility contained visible NAPL at depths of more than 100 feet.” See ROD at 21-22.

⁶⁹ ROD at 4.

⁷⁰ *Id.*

⁷¹ 43 C.F.R. § 11.13(e).

⁷² *Id.* § 11.70(b).

New York State Department of Environmental Conservation

June 14, 2024

Page 15

the extent the resource may recover and the loss in services occasioned by the discharge.⁷³ Those measurements are to capture, among other things, the extent of the injury and the change from baseline “attributable to the discharge or release.”⁷⁴ Particularly pertinent to the NAPL contamination that exists in the adjacent properties and beneath the Canal is the specific requirement for measurement of the “volume of geologic resources that may act as a source of toxic leachate.”⁷⁵

As explained above (see n.30), extensive volumes of contamination will be capped and left in place. In other words, those resources are not being restored. The Trustees in such cases will have to make a determination that “restoration will not be technically feasible,” which requires the Trustees to document “the reasoning and data on which [the] decision is based.”⁷⁶

Once the extent of NRD injury is quantified, the Trustees may proceed to calculation of damages.⁷⁷

The importance of fully understanding the scope of coal tar-related PAH contamination remaining at and in the vicinity of the Canal cannot be understated. Failure to properly evaluate contamination can result in judicial rejection of any proposed natural resource damages settlement by a court. In *State of Utah v. Kennecott Corp.*, the court rejected a proposed NRD consent decree even though the decree allocated over \$100 million in damages based on a calculation of groundwater damage in excess of 100,000-acre feet and included future injury.⁷⁸ It was not enough. The *Kennecott* court found that:

the area of contamination is not now nor in the future will continue to be neatly contained within [the defined] Mining Impact Area. There is no physical barrier to prevent the contaminated waters from spreading or moving. Because of the dynamic nature of the plumes in question, it is likely that the area of contamination will shift, spread out and continue to grow larger.⁷⁹

The court was also concerned that the proposed decree did not consider “additional possible damages such as loss of the aquifer”, the “costs of preventing the plumes from spreading and contaminating the remaining unspoiled portion of the aquifer,” or the costs of “further source

⁷³ *Id.* § 11.70(c), (d).

⁷⁴ *Id.* § 11.71(b)(1), (2).

⁷⁵ *Id.* § 11.71(k)(3).

⁷⁶ *Id.* § 11.73(b).

⁷⁷ *Id.* §§ 11.80-84.

⁷⁸ 801 F. Supp. 553, 556, 572 (D. Utah 1992).

⁷⁹ *Id.* at 563.

New York State Department of Environmental Conservation

June 14, 2024

Page 16

control.”⁸⁰ The court faulted the State [trustee] for “fail[ing] to adequately study possible alternatives” which resulted in a proposed settlement that did not “capture fully all aspects of the loss.”⁸¹

Thus, the Trustees’ investigation of the Canal must go beyond the actual water in the Canal. Groundwater is present and is passing through the NAPL-contaminated adjacent soils and soils and sediments beneath the Canal. NAPL dissolving into the groundwater creates a toxic leachate that must be understood.⁸² The Trustees are obligated to provide adequate data on contamination that they conclude is infeasible of remediation.⁸³ Further, we know that even today, NAPL is continuing to enter the Canal. As reported by National Grid’s contractor:

In September 2023, the Trust performed above-water visual inspections of the area and identified NAPL sheens and blebs in the gap between the old concrete wall and new sheet pile wall located along the western bulkhead and immediately south of the Flushing Tunnel opening at Douglass St. end. The observed impacts appeared to be originating from the old concrete wall, entering the gap between the old concrete wall and new sheet pile wall, then entering the main Canal through a small opening between the new closure sheet and the old concrete wall.⁸⁴

Inadequate understanding of contamination and its effects on an uncontaminated aquifer is ground for rejection of any NRD settlement.⁸⁵

This robust and required investigation not only permits the Trustees to quantify the future damages that will arise from the MGPs and the contamination in, adjacent and beneath the Canal, but a thorough investigation will also allow the Trustees to establish the minimum volume of contamination created by the MGPs over their history of operation because the MGP wastes were not remediated until the present Superfund cleanup (besides some minimal dredging).⁸⁶

This is significant. The NAPL wastes were poisonous. The toxic leachate that derived from the wastes would have killed benthic organisms, stunted plant growth, and otherwise harmed the

⁸⁰ *Id.* at 571.

⁸¹ *Id.* (quoting *Ohio*, 880 F.2d at 463).

⁸² See 43 C.F.R. § 11.71(k)(3).

⁸³ *Id.* § 11.73(b).

⁸⁴ B&B Engineers & Geologists, Memorandum re: Investigation of Sediment Accumulation and NAPL Observations in RTA1 at 7 (Apr. 17, 2024).

⁸⁵ See *Kennecott*, 801 F. Supp. at 572.

⁸⁶ Roux Report at 13.

New York State Department of Environmental Conservation

June 14, 2024

Page 17

environment. The graph shown below provides a representation of the impact of the introduction of such poisons:

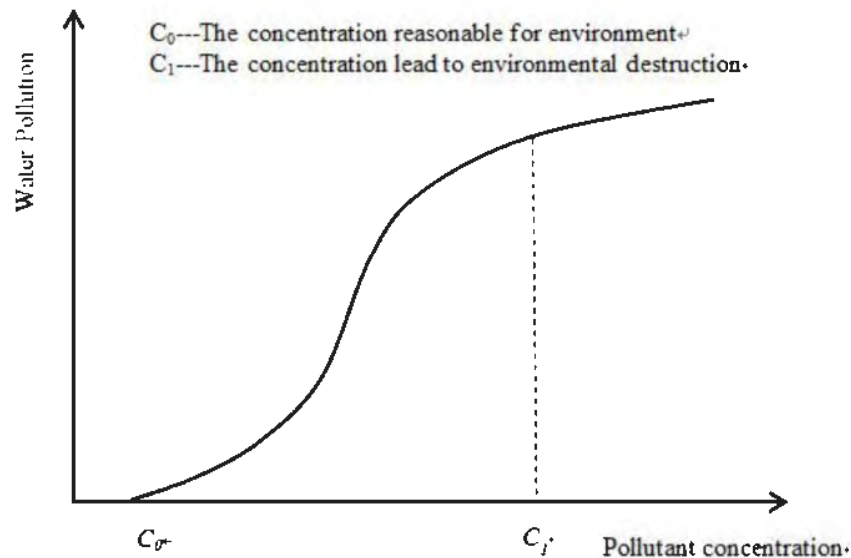


Figure 2⁸⁷

Figure 2 shows a timelapse of water pollution. Following the initial introduction of the toxic substance, organisms are harmed but can survive. The harm sustained increases exponentially as each unit of poison is incrementally added. Finally, when the concentrations of poison have increased to very high levels, as is the case at the Canal's baseline, the addition of more poison does not have any effect. No further harm can be sustained because all of the harm has already occurred.

It is submitted that either the Canal was “dead” at the time of the baseline in 1868, or it succumbed shortly afterwards when the MGPs came online and began their uncontrolled discharges to the environment that continued for decades.⁸⁸ Thus, the Trustees could determine the loss of services through their knowledge of the disposal of MGP wastes, which they are

⁸⁷ See https://www.researchgate.net/figure/The-relationship-curves-between-pollutant-concentration-and-water-pollution-losses_fig2_300796769.

⁸⁸ Roux Report at 7 (“It is clear from the historical record that the baseline condition of the Canal after the flushing tunnel ceased operations – that of an open air sewer – was functionally identical to the conditions in 1868 when the Canal was constructed”).

New York State Department of Environmental Conservation

June 14, 2024

Page 18

required to calculate. The later release of contaminants by others effected no impairment of the already-dead resource.

Accordingly, the Trustees must recognize that, fundamentally, to the extent that there has been a degradation of natural resources since the baseline, the MGPs are the source of that natural resource degradation and the associated NRD at the Canal. Quantification of the MGPs' contamination contribution—as the Trustees are required to do—will establish that the coal tar-related PAH released from the MGPs is the cause of substantially all of the loss of services at the Canal.

Considering the foregoing, the Trustees should apply a divisibility framework when calculating any natural resource damages. The Plan does not discuss this important framework. This analysis is appropriate when a party can demonstrate that apportionment is practicable even if the harms from each discrete source of hazardous substances has caused a single harm.⁸⁹ Alternatively, the Trustees may have the burden to prove that one source's release is more than a *de minimis* contributor and that without that entity's contribution, at least some of the injury would not have occurred.⁹⁰ The Trustees would need to demonstrate that the various PRPs' releases were each contributing factors to the NRD beyond a *de minimis* amount. If the Trustees rely on the divisibility framework, the TPG members can and have provided a reasonable basis to determine proportional contributions and assign the weight accordingly.

Alternately, the Trustees would need to demonstrate that the TPG members' contributions amounted to more than a *de minimis* release. Either approach will demonstrate that the TPG members bear responsibility for little to no natural resource damage, especially since the Trustees have already submitted that the focus of the NRDA is on coal tar-related PAH, which was primarily contributed by National Grid. Equitable factors and transactional incentives support assigning proportional responsibility based on “some acceptable measure of comparative fault,”⁹¹ and also a

⁸⁹ See *APL Co. Pte. Ltd. v. Kemira Water Solutions, Inc.*, 999 F. Supp. 2d 590, 624 (S.D.N.Y. 2014); *U.S. v. Alcan Aluminum Corp.* (“*Alcan III*”), 315 F.3d 179, 186 (2d Cir. 2003) (“In order to avoid the imposition of joint and several liability under CERCLA, the [defendant] must (1) demonstrate that the harm caused by its emulsion was 'distinct' from the harm caused by other contributors at [the sites] or (2) proffer a reasonable basis for determining the proportional contribution of its emulsion to what may be conceived of as a single harm at each site.”).

⁹⁰ See *Coeur D'Alene Tribe v. Asarco Inc.*, 280 F. Supp. 2d 1094, 1124 (D. Idaho 2003) (“As for the NRD claims, the causation standard is a contributing factor test.”); see also *United States v. Montrose Chem. Corp.*, No. CV 90-3122, 1991 U.S. Dist. LEXIS 10128, at *2 (C.D. Cal. March. 29, 1991) (holding that that trustees must “show that a defendant's release of a hazardous substance was the *sole or substantially contributing cause* of each alleged injury to natural resources”).

⁹¹ *United States v. Kramer*, 19 F. Supp. 2d 273 (D.N.J. 1998) (quoting *United States v. Atlas Minerals and Chems.*, 851 F. Supp. 639, 653 (E.D. Pa. 1994)).

New York State Department of Environmental Conservation

June 14, 2024

Page 19

desire to expedite environmental remediation.⁹² Both factors weigh in favor of minimal to no natural resource damages assigned to the TPG members.

V. CONCLUSION

As set forth above, the draft Plan does not provide an adequate mechanism for assessing the extent of any damages to natural resources in the Gowanus Canal due to its failure to specify a methodology for determining the true baseline condition of the Canal and failure to capture the sources of NAPL that will continue to affect the Canal's natural resources. For these reasons, the TPG requests the Trustees revisit the draft Plan to account for the unique nature and characteristics of the Canal, while factoring in the Canal's historic use and situation, and come to a more practical and appropriate methodology for assessing natural resource damages.

Thank you for your consideration of these comments.

Respectfully submitted,



DAVID J. MILLER



MARC D. POLICASTRO

Enclosures

⁹² *New York v. SCA Servs.*, No. 83 Civ 6402, 1993 U.S. Dist. LEXIS 2265, at *11 (S.D.N.Y. Feb. 26, 1993) (holding that the consent judgment reached between the parties did not fairly allocate liability and that there must be procedural and substantive fairness in the CERCLA settlement context, which would “address[] the basic principle that ‘a party should bear the cost of the harm for which it is legally responsible.’” (quoting *United States v. Cannons Engineering Corp.*, 899 F.2d 79, 87 (1st Cir. 1990)).

Exhibit A

Gowanus Canal Tiny Party Group Members Joining in Comments on the Gowanus Canal Natural Resource Damage Assessment Plan

- Ballantyne Legacy Holdings, LLC, as successor to SPX Corp.
- The Brink's Company
- The Dun & Bradstreet Corporation
- Kraft Heinz Food Company
- MRC Holdings, Inc., for itself and on behalf of Citigroup, Inc.
- Northville Industries Corp.
- Puget Sound Commerce Center, Inc.
- Rexam Beverage Can Company
- Stauffer Management Company
- TDA Industries, Inc.
- Verizon New York, Inc.

Exhibit B

**Comments in Response to the Draft Gowanus Canal Natural Resource
Damage Assessment Plan prepared by Roux Associates, Inc.**



Comments in Response to the Draft Gowanus Canal Natural Resource Damage Assessment Plan

Gowanus Canal Superfund Site
Brooklyn, New York

June 14, 2024

Prepared for:

**Counsel to the Gowanus Canal Superfund Site
Tiny Parties Group**

Prepared by:

Roux Associates, Inc
200 Summit Drive, Suite 500
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Table of Contents

Introduction.....	2
Insufficient Plan Details	3
Baseline.....	5
The Gowanus Canal has Never Been a Natural Water Body.....	5
Non-CERCLA Stressors.....	8
Maritime and Industrial Uses of the Gowanus Canal.....	9
Reference Sites	10
Future Impacts	12
Cumulative Impacts.....	15
PAH and NAPL Source Considerations	17
Incorporation of Baseline Ecological Risk Assessment Findings.....	19
Human Use Injury Quantification and Damage Determination	22
Inadequacy of Proposed Assessment Studies and Analysis	22
Feasibility of the Proposed Benefits Transfer Analysis	22
Focusing on FCAs May Lead to Unreasonable Assessment Costs	23
Basis for Potentially Including Other Forms of Human Use Damages	24
Equivalency Analysis Should Apply to Human Use Damages Determination	24
Specific Comments	26
Preliminary Estimate of Damages.....	26
Temporal Scope of the Assessment	26
Preliminary Determination of the Recovery Period.....	26
Scope of Additional Sampling	26

Introduction

On behalf of the Tiny Parties Group (TPG), Roux Associates, Inc. (Roux) assessed the Gowanus Canal Natural Resource Damage Assessment Plan (Plan) released for public comment on March 1, 2024 by the Gowanus Canal Natural Resource Damage Assessment Trustee Council (Trustees). The TPG requested that Roux evaluate the Plan's adequacy, identify likely major drivers of natural resource damages (NRD) in the Gowanus Canal, and provide guidance on NRD assessment (NRDA) approaches in the Gowanus Canal.

An overarching concern is that the Plan lacks sufficient details for stakeholders to understand the planned NRDA scope and assessment approaches, and therefore, to effectively participate in the open comment process and to evaluate engaging cooperatively with the Trustees. Perfunctory language permeates every aspect of the Plan, and it lacks the basic details required for its compliance with the statutory requirements of plans using type B assessment procedures for NRDA under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

The greatest concern is the lack of the Plan's detail for establishing baseline resource conditions from which injuries are quantified, despite the abundance of historical information on which a baseline can be based. From the Canal's inception in 1868, its capacity to sustain functions of natural resources has been intensely degraded due to causes unrelated to CERCLA hazardous substance releases. Not only did the Canal's construction result in the catastrophic loss of natural resources and their services, but its simultaneous use as a sewer and a passage for industrial maritime traffic made it continuously inhospitable to both the establishment and survival of an aquatic food web and human uses of the Canal. NRD are only for the marginal increase in degradation of the Canal caused by CERCLA hazardous substances, if any, relative to the baseline and the Plan is not sufficiently detailed for evaluating whether baseline and the reference site approach proposed by the Trustees is even viable.

The remainder of this document details Roux's comments on the Plan including the above-noted lack of detail and concerns about baseline, lack of establishment of reference areas/conditions, lack of consideration of future impacts from ongoing combined sewer overflow (CSO) discharges, failure to specify methods for quantifying ecological injury and human recreation losses, overlooking services gained from restoration projects, impacts of non-aqueous phase liquid (NAPL), impacts and assessment of manufactured gas plant (MGP)-derived polycyclic aromatic hydrocarbons (PAHs) as opposed to other PAH sources, and additional specific comments.

Insufficient Plan Details

The Plan is characterized by an overall lack of specificity regarding data and methods the Trustees intend to use for damages evaluation and lacks details required for type B NRDA. For example, Chapter 5 “Studies and Analysis,” states that the Trustees’ work to date has “enabled the Trustees to identify preliminary data gaps” and that “this Chapter describes efforts the Trustees are presently undertaking or considering to fill these data gaps.” This general statement is not supported by the identification of any specific gaps, or by description of any specific efforts the Trustees are presently undertaking or planning in order to address these identified data gaps. Instead, Chapter 5 provides only lists of non-specific “information that may be needed.”

Importantly, these missing details are required of assessment plans using type B procedures. *Exhibit 5-1: Potential Assessment Studies & Analyses* presenting “the potential studies and analyses that the Trustees are considering as part of an injury assessment” is representative of the perfunctory language in the Plan that fails to comply with 43 C.F.R. § 11.31(a)(2).¹ For example:

- “Collect Gowanus Canal sediments, as needed, to complement studies of benthic invertebrate and fish exposure and toxicity and pathway,” fails to specify “sampling locations” and “the numbers and types samples to be collected.”
- “Organize and implement interviews and focus groups with recreationists to gain information and insights into outdoor recreational use,” fails to provide the “sample and survey design.”
- “Analyze contaminant concentrations in Assessment Area sediments and corresponding physical parameters, as compared to reference site sediments,” fails to specify “analyses to be performed.”

These generalizations are unreasonable, statutory requirements notwithstanding. Notably, other than switching the location name and the contaminants of concern (COCs) of focus, Chapter 5 in the Plan is identical to the Newtown Creek Draft NRDA Plan submitted by the same Trustees on the same date. Most other sections of the two plans, including the entire Executive Summaries, are identical. It is clear therefore that the Gowanus Canal Plan is simply a boiler-plate formality with little or no development to date of a genuine NRDA plan specific to the Gowanus Canal.

Where the Plan does provide details, they are sometimes inaccurate or incomplete. For example, Exhibit 1-3, which purports to provide a timeline of examples of major contamination events, lists “Municipal sewage and industrial effluent from MGPs and other facilities” as an event occurring in the “Late 1870s,” obscuring the fact that these impacts began before then and continued for many decades and that sewage inputs continue to the present day (and will continue into the future).²

In its current state, the Plan is unable to meet the statutory requirements to “serve as a means for evaluating whether the approach used for assessing the damage is likely to be cost-effective and meets the definition of reasonable cost” 43 C.F.R. § 11.31(a)(2). At a minimum, any studies or analysis designed to address the *known and existing* data gaps should already be developed to the level of detail required of type B

¹ “In addition, for type B assessments, the Assessment Plan shall include the sampling locations within those geographical areas, sample and survey design, numbers and types of samples to be collected, analyses to be performed, preliminary determination of the recovery period, and other such information required to perform the selected methodologies.”

² This submission is not intended to identify all historical inaccuracies or inadequacies in the Plan, and silence here about any particular item presented as historical fact in the Plan should not be construed as agreement or a commentary on that item’s accuracy; however, this example is provided to point out that all historical information provided in the Plan should be reviewed for completeness, accuracy, and transparency while preparing an updated Plan.

assessments.³ Revising the Plan to adequately detail and specify all proposed assessment approaches is necessary for effective stakeholder evaluation and to facilitate engagement in discussions of a cooperative assessment process.

³ "Previous efforts, such as the Trustees' Preassessment Screen (DOI et al. 2014) and reports related to EPA's remedial process, documented existing information on Gowanus Canal. This enabled the Trustees to identify preliminary data gaps regarding the exposure of natural resources to PAHs (and other contaminants) and corresponding effects on ecological and human use services." See Plan, at page 34.

Baseline

The baseline condition of Gowanus Canal resources against which natural resource damages will be quantified is one of the most critical issues in the Plan. Chapter 4 of the Plan defines baseline in a general sense but provides no specific information as to how baseline will be established for the Gowanus Canal NRDA or what conditions will be necessary in reference sites against which the Gowanus Canal will be evaluated. The absence of a clear explanation of baseline conditions prevents the stakeholders from providing detailed feedback on the planned methodology to establish baseline conditions and the expected outcomes from the evaluation of the baseline condition.

The Trustees state they have been unable to locate site-specific historical data for establishing baseline for the Gowanus Canal and will default to data from reference areas and control groups. Although the Plan correctly states that “baseline data should reflect expected conditions in the Assessment Area had the release of the contaminants not occurred” and “the baseline condition of natural resources reflects natural processes and changes that result from human activities that are not contaminant-related,”⁴ the Plan provides no framework to explain what factors the Trustees will use to establish baseline and attempt to identify suitable reference locations.

At a minimum, the Trustees must address the following issues in the revised Plan to adequately develop a baseline condition against which the impacts of hazardous substances on the Gowanus Canal can be measured:

1. The Gowanus Canal has never been a natural water body.
2. Non-CERCLA stressors drive impairment of human use and ecological services, independent of chemical discharges to the Canal.
3. Maritime and onshore industrial uses of the Gowanus Canal impact human use and ecological services, independent of chemical discharges to the Canal.

It is only against a baseline condition that considers all these impacts that a reasonable assessment of natural resource damages attributable to hazardous substances can be calculated. Failure to correctly address these factors will result in an inadequately defined baseline and will result in an inaccurate and potentially inequitable determination of natural resource damages.

Each of these factors is described in more detail below, followed by a discussion regarding the use of a reference location to establish the baseline for the NRDA of the Gowanus Canal.

The Gowanus Canal has Never Been a Natural Water Body

The NRDA needs to acknowledge that the Gowanus Canal has never been a natural water body and the baseline for the damages associated with CERCLA hazardous substances is the open-air extension of a municipal sewer system.

The State of New York authorized construction of the Gowanus Canal, completed by 1868, to fill the adjacent lowlands for development while leaving an open area to flush away sewage, receive stormwater, and permit barge traffic. In fact, “the Gowanus Canal served as an open sewer even before it was completed for

⁴ Roux presumes that the Trustees use “contaminant” in the phrase “not contaminant-related” to mean CERCLA hazardous substances. “Contaminants” other than CERCLA hazardous substances should be a component of the baseline.

navigational purposes, with the City of Brooklyn laying out sewers emptying into the canal as early as 1858.”⁵ As required by the regulations, these “changes that result from human activities that are not contaminant-related” must be included as part of the baseline. A Gowanus Creek historically existed, although mostly not in the same location as the Canal, and this creek and associated wetlands were already dammed and largely filled prior to authorization of the Canal construction.⁶ Thus a pristine Gowanus Creek and associated areas cannot be the baseline against which the impact of hazardous substances is measured.

The first forty years of the Canal's existence were characterized by foul, stagnant water, and the accumulation of sewage/stormwater/industrial wastes throughout the Canal. The Canal in the late 1800's and early 1900's was described as follows:

“By the late 1870s, sewers entering the canal on Bond, President, Sackett, and Centre Streets were creating shoals or bars which disrupted traffic, and the combination of household waste, industrial effluent from gas works and other industries, and material washed into the canal after heavy rains made for increasingly bad water quality as well as widespread aromas which gained regional fame for their foulness. The canal's sewerage was regarded as a public health hazard as well as a navigational issue. Canal-side landowners noted that the city never had the authority to run sewers into the canal, as legislation enabling canal construction referred only to the use of the canal to carry off surface drainage.”⁷

“The surface of the canal is covered with scum. In the upper portion ... this is characteristic of domestic sewage, such as grease and slime, partially disintegrated human [feces], and other organic matter. The lower portion of the canal from the Bond Street sewer outlet to Gowanus Bay is covered with unsightly patches of floating rubbish which have been accumulated by the action of the tugboats, wind, and tide. These patches consist largely of brown and yellow oily substances, which spread out in thick layers on the water surface and seem to gather up all the other floating debris, such as waste paper, fecal matter, melon rinds, banana skins, kitchen refuse, tin cans, broken boxes, coal dust and other matter... Not only is the discharge of the sewers greater than that of the factories, but its amount and its offensive character are shown by the bad condition of that part of the canal into which it discharges.”⁸

While the industrial wastes in the early years of the Canal likely contributed hazardous substances, the vast majority of the impairment of the Gowanus Canal appears to be related to stormwater and the discharge of sewage that caused ecological and human health impacts that should be a component of the baseline condition.

In 1911, the City of New York constructed the flushing tunnel to facilitate a more effective operation of the Gowanus Canal by improving water flow and removing waste that was accumulating in the Canal, thereby improving the flooding and aesthetic impacts to the surrounding community. Sediment accumulation in the Canal around the turn of the 20th century was limiting the usefulness of the Canal. The City of New York had to dredge the Canal once every two-and-a-half years rather than once every 10 to 12 years as was originally

⁵ Hunter Research, Inc. May 2004. Draft Report, National Register of Historical Places Eligibility Evaluation and Cultural Resources Assessment for the Gowanus Canal, Borough of Brooklyn, Kings County, New York in Connection with the Proposed Ecosystem Restoration Study. Page 2-48.

⁶ CH2M Hill. December 2011. Feasibility Study, Gowanus Canal. Page 1-4.

⁷ Hunter Research, Inc. May 2004. Draft Report, National Register of Historical Places Eligibility Evaluation and Cultural Resources Assessment for the Gowanus Canal, Borough of Brooklyn, Kings County, New York in Connection with the Proposed Ecosystem Restoration Study. Page 2-49.

⁸ Charles Breitzke, “Investigation of Sanitary Condition of Gowanus Canal,” Technology Quarterly 21, no. 3 (September 1908) as cited in Historical Research Associates, Inc. October 2016. New York City Contributions to Gowanus Canal Conditions. Page 27.

anticipated.⁹ The accumulation of sediments caused flooding impacts, foul odors, and unsightly conditions in the Canal. Although construction of the flushing tunnel in 1911 had some small positive impacts on marine life until the flushing tunnel ceased operation in the 1960s, it is clear from the record that the intent associated with construction of the flushing tunnel had nothing to do with marine life.¹⁰

Even with the flushing tunnel operating, “pollution and siltation problems in the canal remained severe due to the continued inflow of waste and storm water, and to the relative absence of canal dredging.”¹¹ The Canal was described in 1963 as follows:

*The sludge rots in warm weather and from it gas-filled bubbles as big as basketballs continually surge to the surface. Dredgemen call them sludge bubbles. Occasionally, a bubble upsurges so furiously that it brings a mass of sludge along with it. In midsummer, here and there in the harbor, the rising and breaking of sludge bubbles makes the water seethe and spit. People sometimes stand on the coal and lumber quays that line the Gowanus Canal and stare at the black, bubbly water.*¹²

The flushing tunnel operated until the mid-1960s when it fell into disrepair. Following cessation of flushing tunnel operation, the Canal “reverted to pre-1911 conditions with dissolved oxygen levels of zero and extremely high bacterial counts.”¹³ It is clear from the historical record that the baseline condition of the Canal after the flushing tunnel ceased operations – that of an open air sewer – was functionally identical to the conditions in 1868 when the Canal was constructed. In 1999, the flushing tunnel was repaired and restarted. It ran until 2010, when it was taken offline for repairs.

The Gowanus Canal continued to receive direct sewage discharges until the last of New York City’s major sewer treatment plants, the Red Hook Water Pollution Control Plant, was finished in 1987.¹⁴ Even after the cessation of direct dry weather discharges, the Gowanus Canal continued to receive CSO discharges (and will continue to receive CSO discharges into the foreseeable future). As of 2013 there were ten active CSO discharges to the Canal, with four CSOs contributing 95% of the flow and the largest CSO (RH-034) contributing 121 million gallons of flow to the Canal annually.¹⁵ As described by the United States

⁹ Historical Research Associates, Inc. October 2016. New York City Contributions to Gowanus Canal Conditions. Page 17.

¹⁰ The Trustees should use caution construing historical improvements related to the Gowanus Canal as having any purpose beyond making the system operate more effectively as a sewer system. For example, the Plan states that “In 1911, the City of New York constructed and operated the Gowanus Flushing Tunnel system to address serious water quality issues in Gowanus Canal by improving circulation, flushing aerated water from Upper New York Bay into the canal (NYCLPC 2019). The goal was to create conditions necessary to sustain marine life, improving parameters such as dissolved oxygen.” This appears to indicate that the intent *in 1911* was to “create conditions necessary to sustain marine life.” However, the document cited by the Trustees clearly indicates that such an intention was not introduced until almost a century later, in 1999: “The city’s Department of Environmental Protection reactivated the flushing tunnel *in 1999* at which time it reversed the tunnel’s flow to bring aerated water from Buttermilk Channel into the canal in an effort to create the conditions necessary to sustain marine life in the Gowanus Canal” [emphasis added]. (New York City Landmarks Preservation Commission. June 25, 2019. Gowanus Flushing Tunnel Pumping Station and Gate House. Page 2.)

¹¹ Hunter Research, Inc. May 2004. Draft Report, National Register of Historical Places Eligibility Evaluation and Cultural Resources Assessment for the Gowanus Canal, Borough of Brooklyn, Kings County, New York in Connection with the Proposed Ecosystem Restoration Study. Page 2-52.

¹² Joseph Mitchell, “The Bottom of the Harbor,” New Yorker, January 6, 1951, as reprinted in Hearings Before a Subcommittee of the Committee on Government Operations on Water Pollution Control and Abatement, 81st Cong., 1st sess., May 29, 1963, as cited in Historical Research Associates, Inc. October 2016. New York City Contributions to Gowanus Canal Conditions. Page 27.

¹³ Hazen and Sawyer, P.C., “Gowanus Canal 201 Facilities Plan, Volume 3, Water Quality Study,” prepared for the New York City Department of Environmental Protection, December 1983, as cited in Historical Research Associates, Inc. October 2016. New York City Contributions to Gowanus Canal Conditions. Page 27.

¹⁴ Hunter Research, Inc. May 2004. Draft Report, National Register of Historical Places Eligibility Evaluation and Cultural Resources Assessment for the Gowanus Canal, Borough of Brooklyn, Kings County, New York in Connection with the Proposed Ecosystem Restoration Study. Page 2-56.

¹⁵ EPA. September 2013. Record of Decision. Page 5.

Environmental Protection Agency (EPA), “CSO discharges result in point source loading of high-organic-content solids and associated hazardous substances to the canal.”¹⁶

A failure to understand that the Gowanus Canal was designed to operate as a sewer system and has operated as such for its lifespan could cause the Trustees to inadequately define the baseline condition and unfairly assign responsibility for the ecological impacts and human use impacts of historical operations to the incorrect sources (i.e., hazardous substances). The Trustees are referred to the historical documents cited herein for a more comprehensive assessment of the historical uses of the Gowanus Canal.

Non-CERCLA Stressors

Non-CERCLA stressors have caused and will continue to cause substantial impairment to the ecological health and human uses of the Gowanus Canal. The impact of these stressors needs to be incorporated into the baseline conditions against which the impacts of hazardous substances are measured.

The following provides a non-exhaustive list of non-hazardous substance stressors that must be explicitly acknowledged and accounted for in the revised Plan:

- **Raw sewage:** New York City discharged untreated sewage to the Canal continuously from the Canal’s construction in 1868 through 1987. Untreated sewage discharge has continued intermittently after 1987 as CSO discharges, occurring dozens of times per year through current day. Independent of the constituents of the sewage (e.g., fecal coliform bacteria discussed below), the mere presence of raw sewage creates a deterrent effect on human uses that needs to be accounted for in the development of a baseline condition. This is particularly important because some CSO discharges, including untreated sewage, will continue into the foreseeable future.
- **Pathogens:** Fecal coliform bacteria are a substantial problem in modern times, and were likely much more significant in the past when the loadings to the Canal of untreated sewage were more substantial. According to the New York State Department of Health’s 2014 Public Health Assessment, “water in the Gowanus Canal periodically contains levels of fecal coliform bacteria that indicate an increased risk of illness from recreational contact with the water”¹⁷ and “water from the Gowanus Canal contains microorganisms, such as coliform bacteria, and likely contains viruses and parasites (protozoa) that can make a person ill if they enter the body. There is increased risk of contracting diseases through swallowing or skin contact with these disease-causing agents.”¹⁸ Fecal coliform bacteria are indicators of many other types of pathogenic impacts. These pathogenic impacts may create direct harm to ecological and human receptors, and their presence in the Gowanus Canal may also have a deterrent effect on human uses.
- **Low Dissolved Oxygen:** Historically, low dissolved oxygen within the Gowanus Canal is attributable to the high organic loading from sewage sludge. Depleted dissolved oxygen then constrains the ecological diversity of the system and consequently impacts human uses. For example, when the flushing tunnel was discontinued in the mid-1960s the Canal “reverted to pre-1911 conditions with dissolved oxygen levels of zero and extremely high bacterial counts.”¹⁹
- **Floatables and Debris:** New York City’s Long Term Control Plan includes many modern-day measures to attempt to control floatables originating from CSO discharges. These floatables – human feces, garbage, plastic bottles, plastic bags, etc. – create visual evidence of the impairment

¹⁶ EPA. September 2013. Record of Decision. Page 5.

¹⁷ New York State Department of Health Center for Environmental Health and The U.S. Department of Health & Human Services Agency for Toxic Substances and Disease Registry. Public Health Assessment, Gowanus Canal, City of New York, Borough of Brooklyn, Kings County New York. EPA Facility ID: NYN000206222. February 1, 2014. Page 1.

¹⁸ New York State Department of Health. February 1, 2014. Public Health Assessment (Public Comment Draft). Page 1.

¹⁹ Hazen and Sawyer, P.C., “Gowanus Canal 201 Facilities Plan, Volume 3, Water Quality Study,” prepared for the New York City Department of Environmental Protection, December 1983, as cited in Historical Research Associates, Inc. October 2016. New York City Contributions to Gowanus Canal Conditions. Page 27.

of the Canal. The historical record includes ample evidence that the Canal has been impacted by floating garbage and debris since its inception in 1868, including: “[g]arbage and rubbish of all kinds are found in the canal; dead cats and dogs are common in its waters; on one inspection a large dead hog was found floating out with the tide; from canal boats having stables for their horses or mules the straw and manure are thrown into the water”²⁰ and “the lower portion of the canal from the Bond Street sewer outlet to Gowanus Bay is covered with unsightly patches of floating rubbish which have been accumulated by the action of the tugboats, wind, and tide. These patches consist largely of brown and yellow oily substances, which spread out in thick layers on the water surface and seem to gather up all the other floating debris, such as waste paper, fecal matter, melon rinds, banana skins, kitchen refuse, tin cans, broken boxes, coal dust and other matter.”²¹

- **Sediment Accumulation:** The historical literature explains that the accumulation of sediment (independent of its chemical characterization) has been a problem since the inception of the Gowanus Canal. Even with the flushing tunnel operating, sediment accumulations were problematic. When the flushing tunnel was not operating, there were even greater sediment accumulations, often remedied by dredging the Canal. The accumulation of sediment may bury and harm ecological receptors and vegetation, harming the ecological diversity of the system and subsequent human uses (e.g., fishing) that are based on a robust ecological system.
- **Odors:** References to foul odors are prolific in the historical literature. The Record of Decision (ROD) describes the soft sediment odors as including “organic,” “septic-like,” “sulfur-like,” and “hydrocarbon-like.”²² Many of these odors are likely attributable to non-CERCLA hazardous substances.

There is extensive evidence that these non-CERCLA stressors impact the uses of the Canal. For example, the Gowanus Canal Remedial Investigation (RI) states “Swimming or diving in the canal, although reported to occur, is rare due to the general conditions of the canal, which are associated largely with the CSO discharges.”²³ The Plan needs to specifically identify the methods that will be used to resolve the impacts from the non-CERCLA stressors.

Maritime and Industrial Uses of the Gowanus Canal

There are significant human use impacts in the Gowanus Canal arising from its use as an industrial waterway that are independent of the chemical composition of the water and sediments in the Gowanus Canal. Maritime traffic has been identified as a significant hazard to Canal users and the baseline against which the impacts of hazardous substances is measured needs to account for the impacts to users from these uses. For example, New York State’s Public Health Assessment states that “[New York State Department of Health] and [the U.S. Department of Health & Human Services Agency for Toxic Substances and Disease Registry] concluded that recreational boating in the Gowanus Canal is not expected to harm people’s health, although there may be some physical hazards, such as large commercial boats”²⁴ and “large commercial boat traffic

²⁰ Walter H. Kent, Chemist, to the Gowanus Canal Commission, “Report on the Pollution [sic] of the Gowanus Canal,” September 7, 1889, as cited in Historical Research Associates, Inc. October 2016. New York City Contributions to Gowanus Canal Conditions. Page 27.

²⁰ Historical Research Associates, Inc. October 2016. New York City Contributions to Gowanus Canal Conditions.

²¹ Charles Breitzke, “Investigation of Sanitary Condition of Gowanus Canal,” Technology Quarterly 21, no. 3 (September 1908) as cited in Historical Research Associates, Inc. October 2016. New York City Contributions to Gowanus Canal Conditions. Page 27.

²² EPA. September 2013. Record of Decision. Page 15.

²³ HDR and CH2M Hill. January 2011. Gowanus Canal Remedial Investigation Report. Page 5-3.

²⁴ New York State Department of Health Center for Environmental Health and The U.S. Department of Health & Human Services Agency for Toxic Substances and Disease Registry. Public Health Assessment, Gowanus Canal, City of New York, Borough of Brooklyn, Kings County New York. EPA Facility ID: NYN000206222. February 1, 2014. Page 30.

and in some places high bulkheads (marine retaining walls) represent physical safety concerns for swimming and other water recreation.”²⁵

The maritime use of the Canal has evolved significantly over time, and that evolution must be factored into the definition of baseline. More than 10,000 vessels per year were traversing the Gowanus Canal prior to 1953, with a maximum of around 25,000 vessels per year in the 1920s.²⁶ As of 2000, approximately 1,000 vessels per year traversed the Canal. In 2000, there were five waterside industries using the Canal to handle oil, stone, and other building materials.²⁷

In addition to barge traffic within the Canal that is not conducive to human uses and may impact ecological receptors, there are upland non-water-dependent industrial operations along the shores of the Gowanus Canal that may impact human uses. For example, New York City has operated the Hamilton Avenue Asphalt Plant since approximately 1925. In the early 2000s automobile repair shops, a laboratory, three heated asphalt aboveground storage tanks, and a crushing unit were added to the plant. The sights, sounds, and odors associated with such an operation – independent of hazardous substances that may have been discharged from such a facility – are expected to have substantial impacts on human uses of the Gowanus Canal.

The baseline condition needs to include the impairments to ecological receptors and human uses arising from maritime and industrial uses of the Canal in order to accurately measure the unique impacts associated to such a system arising from hazardous substances.

Reference Sites

The Plan states that “the Trustees plan to use, in order of priority, data from reference areas/control groups (43 CFR § 11.72(d)) and/or relevant literature” to define baseline. This is unlikely to succeed, and unnecessary. As described above, there is sufficient information to determine the baseline based on the conditions of the man-made Canal beginning in 1868 – an open-air extension of a municipal sewer system with little-to-no human use or ecological function. To repeat the standard, the baseline must include “changes that result from human activities that are not contaminant-related.”

Should the Trustees, however, conclude in the face of all the contemporaneous evidence that they must look to a “reference/control” location, they must account for the likely conclusion that such an approach will not work for the Gowanus Canal. The ideal reference/control location would have all the characteristics described above that began in 1868, including:

- The Canal was man-made and was intended to serve as a sewer and commercial pathway.
- No aesthetic value as the Canal was an open sewer, and smelled and appeared as such.

²⁵ New York State Department of Health Center for Environmental Health and The U.S. Department of Health & Human Services Agency for Toxic Substances and Disease Registry. Public Health Assessment, Gowanus Canal, City of New York, Borough of Brooklyn, Kings County New York. EPA Facility ID: NYN000206222. February 1, 2014. Page 31.

²⁶ Hunter Research, Inc. May 2004. Draft Report, National Register of Historical Places Eligibility Evaluation and Cultural Resources Assessment for the Gowanus Canal, Borough of Brooklyn, Kings County, New York in Connection with the Proposed Ecosystem Restoration Study. Page 2-43.

²⁷ Hunter Research, Inc. May 2004. Draft Report, National Register of Historical Places Eligibility Evaluation and Cultural Resources Assessment for the Gowanus Canal, Borough of Brooklyn, Kings County, New York in Connection with the Proposed Ecosystem Restoration Study. Page 2-43.

- No recreational value because it was a severely polluted commercial waterway navigated by literally hundreds of vessels; and the Trustees fail to produce data supporting that swimming, boating and fishing were viable.
- Extremely limited ecological value because the high organic load resulted in substantially depleted oxygen levels that ultimately led to the waterway's impaired status.

It is highly unlikely that such a reference location that has these characteristics but is not impacted by hazardous substances exists.

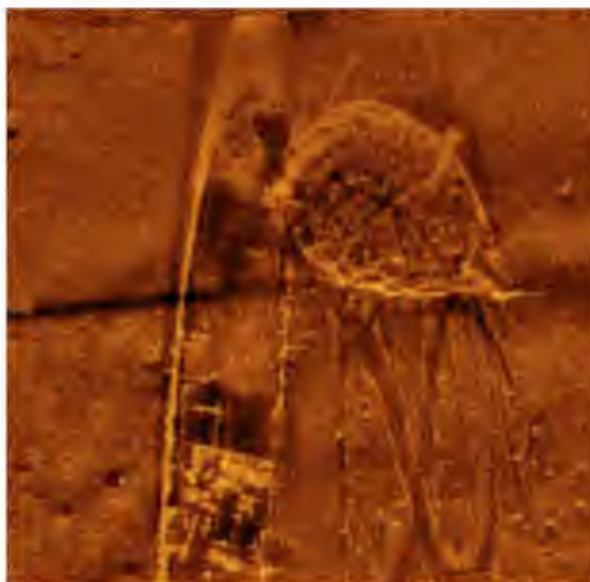
The Trustees need to revise the Plan to account for the likelihood that no suitable reference location exists. For example, it would be inequitable to compare changes in recreational fishing behavior between a canal that did not receive CSO inputs and the Gowanus Canal because the presence of fecal material, pathogens, debris, garbage, and foul odors are likely to negatively impact fishing behavior, regardless of whether or not hazardous substances are present in the location. To the extent the Trustees plan to utilize reference locations without all the associated baseline conditions, the Plan must be revised to explain how the Trustees plan to adjust injury calculations to account for incomplete impacts in the reference locations.

Future Impacts

Throughout the Plan (e.g., Sections 3.5 and 4.4), the Trustees generally explain that future impacts to natural resources will be accounted for in the NRDA. However, the Trustees only loosely acknowledge that remedial efforts currently being undertaken “may” improve natural resources, and fail to acknowledge that ongoing discharges from certain sources will introduce both hazardous substances and non-CERCLA hazardous substances to the Gowanus Canal after remediation is complete.

The remediation of the Gowanus Canal will involve the removal of the soft sediment layer. The soft sediment is comprised primarily of sediments that are directly contributed to the Gowanus Canal from CSOs. These CSO-derived sediments are inhospitable to many ecological receptors (e.g., drive low dissolved oxygen, contain pathogens)²⁸ regardless of the hazardous substances present within them and they significantly contribute to the limited human uses of the Canal. The removal of the soft sediments will improve not only the ecological exposures to CERCLA hazardous substances, but also the ecological exposures to non-CERCLA stressors. After remediation, the upper sediment layer in RTA1 will consist of a habitat layer designed to facilitate benthic recolonization, which will not have the various non-hazardous substance impacts to ecological receptors and human uses that existed in the soft sediments prior to remediation.²⁹ RTA2 and RTA3 are also expected to have habitat layers to facilitate ecological recolonization. The replacement of a habitat layer consisting of CSO solids with a habitat layer consisting of clean material should be credited in the NRDA as a substantial improvement to the Gowanus Canal that is attributable to the parties conducting the remedial action, but that is not itself entirely driven by the presence of hazardous substances. The Trustees must also recognize that the dredging of the soft sediments will remove all contributions of hazardous substances previously made to those sediments. Any future contribution to NRD can only come from either material left in place (the dense non-aqueous phase liquid [DNAPL] contaminated native sediments) or ongoing discharges of hazardous substances to the Canal (DNAPL migration from the adjacent properties or the native sediments, or continued CSO discharges).

Remediation is also removing the large quantity of debris in the Gowanus Canal, leading to a substantial improvement in the ecological and human uses of the Canal unrelated to the remediation of hazardous substances. It was estimated that 3.5% to 5% of the total dredge material removed during the TB4 pilot study was debris, including a 60-foot long sunken vessel and “industrial equipment from the early 20th century.”^{30,31} Removal of this debris should be credited in the NRDA as a substantial improvement to the Gowanus Canal



Sonar Scan of Sunken Ship Removed from Gowanus Canal During Pilot Study

²⁸ “Sewage indicators, such as fecal coliform (GEI, 2011a, 2012a and 2012b) and steroids (Kruge et al., 2007), are found consistently in the surface sediment in the canal.” EPA. September 2013. Record of Decision. Page 28.

²⁹ B&B Engineers & Geologists. July 2020. RTA1 100% Remedial Design Report. Page 66.

³⁰ B&B Engineers & Geologists. July 2020. RTA1 100% Remedial Design Report. Pages 9-11.

³¹ EPA. Undated. Community Update: 4th Street Turning Basin Debris Removal Pilot Project.

that is attributable to the parties conducting the remedial action, but that is not itself driven by the presence of hazardous substances.

Remediation of the upper reach of the Gowanus Canal is ongoing in RTA1 and will likely be completed relatively soon, and the design of downstream remedies for RTAs 2 and 3 are progressing. The response actions required by the ROD to address CSO inputs are occurring on a different timeline and will not be completed before the Gowanus Canal sediment is fully remediated. For example, the construction of a four-million gallon tank to control CSO discharges from outfall OH-007 will not be completed until 2030, which is long after portions of the Gowanus Canal remediation for hazardous substances will be complete.³² Furthermore, even when complete, the CSO tanks that are planned to manage CSO discharges to the Gowanus Canal will only capture a portion of the CSO discharges. According to NYC, the CSO tanks will reduce CSO overflows from 40 events per year to 12 to 13 events per year³³ and the ROD estimates that CSO solids coming from outfall RH-034 (one of the two large CSO outfalls, along with OH-007) will be reduced by 58 to 74 percent.³⁴

As a result of the ongoing CSO discharges, hazardous substances and other non-hazardous constituents of CSO discharges will impact the Gowanus Canal after remediation associated with the currently existing hazardous substances is complete. Although the planned CSO discharge reduction is expected to decrease the quantity of hazardous substances released by CSO discharges and the mean chemical concentrations in sediments are predicted to be below preliminary remediation goals (PRGs),³⁵ this improvement has yet to be implemented. Even after discharge reduction is implemented, CSOs will continue to discharge hazardous substances. The only remedy for halting CSO discharge of hazardous substances to the Canal is full capture of CSO flow, which is not currently planned. In addition to the CERCLA hazardous substances from CSOs, the human waste, garbage, and other undesirable components of CSO discharges, as well as the ecologically damaging components of those discharges (pathogens, high biological oxygen demand, sediment), will continue to be released to the Gowanus Canal on a regular basis and may undermine the ecological and human use benefits associated with the remediation that is currently taking place. Consequently, the Plan should state that following remedy completion the expected continuing adverse conditions from non-CERCLA CSO stressors will be considered part of the baseline against which future damages from expected continuing discharges of CSO hazardous substance releases are quantified.

CSO inputs are not the only potential source of future impacts to the Canal for which the Trustees need to account. Historical MGP operations left a legacy of DNAPL contamination in the uplands around the Canal, and in both the soft and native sediments present within the Canal. According to EPA, “data from the former MGP facilities show that NAPL elevations are above the sediment elevation and that NAPL seep migration is occurring.”³⁶ The soft sediment column will be removed as part of remediation, but the native sediment remedy is specifically designed to account for the MGP DNAPL that will remain in the native sediment/porewater and is characterized by EPA as a principal threat waste.³⁷ Furthermore, the upland MGP properties are actively being remediated to address mobile contamination on their properties.

³² Hazen and Sawyer & Brown and Caldwell Associates. August 2021. Final Basis of Design Report – OH-007. Table 1-2.

³³ The City of New York Department of Environmental Protection Bureau of Wastewater Treatment. June 2015. Combined Sewer Overflow Long Term Control Plan for Gowanus Canal. Page ES-27 and Table 6-3.

³⁴ EPA. September 2013. Record of Decision. Page 54.

³⁵ CH2M Hill. December 2013. Feasibility Study Report Addendum, Preliminary Estimate of Solids Reductions Needed to Achieve Remediation Goals Section. Page 4.

³⁶ EPA. September 2013. Record of Decision. Page 30.

³⁷ EPA. September 2013. Record of Decision. Page 70.

To the extent the native sediment and upland remedies at the MGPs do not fully address the mobility of MGP NAPL and associated PAHs, or the remedies do not occur in a timely fashion that aligns with the CERCLA sediment remedy, the MGPs may cause future damages to natural resources in the Canal. The Plan should be revised to not just acknowledge that migration has historically occurred and may occur in the future (e.g., Section 3.3.2 of the Plan), but rather to prepare a detailed plan to measure these future impacts.

Cumulative Impacts

The impact of the initial contributions of sewage and PAHs to the health of the Canal (i.e., the pollution level of the Canal) is significant. Although the Plan is focused on establishing the total NRD associated with hazardous substances in the Gowanus Canal, the Trustees should also consider, even in the planning phase of the NRDA, the information and data needs required to apportion damages among sources of COCs and the individual parties responsible for their releases.

The MGPs have been impacting remaining resources in the Canal since their construction, which was at approximately the same time that the Gowanus Canal was constructed. The Citizens MGP began operating in 1861 (i.e., before the Canal was constructed in 1868);³⁸ the Metropolitan MGP began construction in 1872 and began operations shortly thereafter;³⁹ and the Fulton MGP was incorporated in 1879 and began operations shortly thereafter.⁴⁰ Early in their operation these plants were regarded as the primary driver of industrial pollution to the Canal – according to a 1908 report, of the industrial polluters along the Canal, “the gas works are doubtless the chief offenders.”⁴¹ That same report noted the gas works on the Canal had private sewers emptying into the Gowanus Canal with outlets with diameters between 8 and 12 inches and that these outlets “continually discharge a yellow-brown liquor,” causing “the tarry incrustation of the posts and bulwarks of the canal.”⁴² There is an extensive body of historical literature and numerous reports that detail the MGPs’ impact on the Canal.

The result of these operations was direct discharges to the Canal during MGP operations (which ceased in the mid-1960s) and substantial upland contamination with MGP DNAPL that extends hundreds of feet below the properties and has historically migrated into the Canal. According to EPA in the 2011 ROD, “Until these sites [the three MGPs] are remediated, contaminants from them will continue to be transported into the Gowanus Canal primarily by the migration of nonaqueous phase liquid (NAPL) through subsurface soils and groundwater discharge of dissolved-phase contaminants. PAHs are the primary contaminants of concern (COCs) from these sources.”⁴³ Upland remediation at these sites is ongoing and the CERCLA remedy for the sediment in the Canal involves installation of a multilayer cap specifically designed to address mobile DNAPL and associated PAHs in native sediment originating from the MGPs.⁴⁴

While other COCs are present within the Canal, NAPL from MGPs and associated PAHs drive the selected CERCLA remedy. For example, the ROD requires the removal of all soft sediments. This provides benefits due to removal of metals and PCBs co-located with the PAHs in soft sediment, but the principal reasons given by EPA for full soft sediment removal relate to the presence of NAPL and PAHs in the soft sediment and the need to protect the reliability of the cap over the native sediment. EPA stated that removal of the soft

³⁸ Historical Research Associates, Inc. October 2016. National Grid Manufactured Gas Plants on the Gowanus Canal. Page 15 and citations therein.

³⁹ Historical Research Associates, Inc. October 2016. National Grid Manufactured Gas Plants on the Gowanus Canal. Page 16 and citations therein.

⁴⁰ Historical Research Associates, Inc. October 2016. National Grid Manufactured Gas Plants on the Gowanus Canal. Page 17 and citations therein.

⁴¹ Charles F. Breitzke, “An Investigation of the Sanitary Condition of the Gowanus Canal, Brooklyn, New York,” Technology Quarterly and Proceedings of the Society of Arts, Vol. XXI, no. 3 (September, 1908) as cited in Historical Research Associates, Inc. October 2016. National Grid Manufactured Gas Plants on the Gowanus Canal. Page 50

⁴² Charles F. Breitzke, “An Investigation of the Sanitary Condition of the Gowanus Canal, Brooklyn, New York,” Technology Quarterly and Proceedings of the Society of Arts, Vol. XXI, no. 3 (September, 1908) as cited in Historical Research Associates, Inc. October 2016. National Grid Manufactured Gas Plants on the Gowanus Canal. Page 50.

⁴³ EPA. September 2013. Record of Decision. Page 4.

⁴⁴ EPA. September 2013. Record of Decision. Page ii.

sediment is “the most appropriate approach to address the principal threat waste (i.e., NAPL present within the accumulated sediments)” and will provide a better base for the cap, prevent storm-related or navigation-related damage to the cap, and minimize the risk of ebullition resulting in NAPL transport.”⁴⁵ Ultimately, the MGPs are the primary contributors of hazardous substances to the Canal and as such the Trustees are right to focus their NRDA on the PAHs that originate from the MGPs.

New York City sewage and stormwater discharges are the next largest source of hazardous substances to the Canal. The ROD states that “results of wet weather CSO water samples indicate that CSOs containing VOCs, PAHs, PCBs, pesticides and metals are discharged to the canal during wet weather events,” “[s]ampling results for residual CSO sediments collected from within sewer pipes indicate that, if mobilized during wet weather events, these will discharge VOCs, PAHs, PCBs, pesticides and metals to the canal,” and that these contaminants have “impacted almost the entire canal bottom.” These discharges are above-and-beyond the impacts from sewage discharges that form the baseline against which the impact of hazardous substances are measured.

The impacts to the Canal from baseline conditions, combined with the hazardous substances contributed from the MGPs and sewage inputs, has created a system that has historically had no human uses and little ecological function. The Trustees must recognize, even in the planning stages of the NRDA, that they will be asked to assign responsibility for NRD to COCs and to parties. The equitable assignment of NRD responsibility to parties other than National Grid (responsible for the MGPs) and New York City (responsible for sewage and CSO discharges) must recognize that it is possible – and even highly likely – that the additional hazardous substances contributed from other sources beyond National Grid and New York City had no impact on the human uses and ecological function of the Canal because the system was already so intensely degraded from non-CERCLA impacts and New York City/MGP hazardous substances that any marginal addition of hazardous substances had no marginal impact on the natural resources of the system. In other words, the system could not be degraded further. Although strictly speaking this is outside of the scope of the Plan, the Trustees should consider this ultimate endpoint and collect data during Plan implementation that allows for the equitable allocation of NRD.

⁴⁵ EPA. September 2013. Record of Decision. Pages 79-80.

PAH and NAPL Source Considerations

Given that PAHs will be a main focus of the NRDA, and that the Trustees must assign responsibility for NRD, the specific nature of PAHs in different PAH sources can serve as a tool to assist in NRD attribution. For example, the concentration of total PAHs in MGP DNAPL is approximately 100 times greater than in petroleum LNAPL and 10,000 times greater than in typical urban runoff.⁴⁶ Therefore, allocation of damages should consider that the historical impact of PAHs in the Gowanus Canal would predominantly have been the result of the MGP releases with the exception of locations near CSO outfalls upstream of the MGP facilities, where PAHs from CSOs are likely the dominant PAH source.

PAH fingerprinting can be a powerful tool to attribute PAH sources, however the Trustees should exhibit caution utilizing this tool. For example, a pervasively repeated error in PAH forensic source assessment, likely stemming from an early citation, is that pyrogenic PAH sources, including MGP tar/NAPL, are more heavily weighted in high molecular weight (4 to 6 ring) PAHs while petrogenic PAH sources such as diesel and lubricating oil are more heavily weighted in low molecular weight (2 to 3 ring) PAHs. This fallacy is of particular concern because it is repeated in the RI without citation.⁴⁷ In fact it is very well established in the scientific literature that unweathered and moderately weathered MGP DNAPL predominantly consist of low molecular weight PAHs and that the most abundant compound in unweathered MGP NAPL is the 2-ring PAH, naphthalene.⁴⁸ The physical protection provided by saturated or near saturated NAPL and low dissolved oxygen in Gowanus Canal sediments would likely retard environmental weathering processes that preferentially deplete 2- and 3-ring PAHs in all PAH sources.⁴⁹ It would therefore be incorrect to try to reduce responsibility for MGP waste in the Gowanus Canal based on the argument that sediment samples dominated by 2 to 3 ring PAHs are not attributable to MGP releases.

In addition to a focus on PAHs, the Plan should include NAPL itself from MGPs as a driver of NRD. Widespread distribution of NAPL occurs in Gowanus Canal sediments, predominantly originating from the three former MGPs. The MGP NAPL, while more common in native sediments below the soft sediments, was found at all depths in some locations, including in surface sediments.⁵⁰ The Gowanus Canal RI states that NAPL was characterized with “field observations using the following three categories: (1) no visual evidence of NAPL; (2) presence of MGP NAPL coatings, stains, sheens, or blebs; and (3) MGP NAPL

⁴⁶ e.g., A.E. Bence, K.A. Kvenvolden and M.C. Kennicutt 1996. Organic geochemistry applied to environmental assessments of Prince William Sound, Alaska, after the Exxon Valdez oil spill – a review. *Organic Geochemistry*, vol 24, pp. 7-42; EPRI, 2000. Chemical Source Attribution at Former MGP Sites. Prepared for EPRI by META Environmental, Inc. 1000728. December 2000; EPRI, 2003. Identifying PAHs from Manufactured Gas Plant Sites. Prepared for EPRI by Battelle Memorial Institute: Coastal Resources and Environmental Management. 1005289. March 2003; Stout, S.A., A.D. Uhler, and P.D. Boehm, 2001. Recognition of and Allocation Among Multiple Sources of PAH in Urban Sediments. *Environmental Claims Journal* 13(4):141-158; Stout, S.A., A.D. Uhler, and S.D. Emsbo-Mattingly, 2004. Comparative Evaluation of Background Anthropogenic Hydrocarbons in Surficial Sediments from Nine Urban Waterways. *Environmental Science & Technology* 38(11): 2987-2994; Galperin, Y. and I.R. Kaplan, 2008. “Forensic Environmental Geochemistry in Dispute Resolution—Case History 2: Differentiating Sources of Diesel Fuel in a Plume at a Fueling Station”. *Environmental Forensics* 9(1):55-62. Total PAHs as defined in the Gowanus Canal RI is the sum of the 16 priority pollutant PAHs.

⁴⁷ HDR and CH2M Hill. January 2011. Gowanus Canal Remedial Investigation Report. Page 6-6.

⁴⁸ P.D. Boehm 2006. Polycyclic Aromatic Hydrocarbons *In* R.D. Morrison and Murphy, B.L. Editors *Environmental Forensics, Contaminant Specific Guide*. Elsevier. New York. 579 pp.; and e.g., see PAH data in EPRI (2000, 2003); Stout et al. (2001); Derick G. Brown, Lovleen Gupta, Tae-Hyung Kim, H. Keith Moo-Young, Andrew J. Coleman, Comparative assessment of coal tars obtained from 10 former manufactured gas plant sites in the Eastern United States, *Chemosphere* 65 (2006) 1562–1569.

⁴⁹ EPRI (2000); Boehm (2006); Uhler, A.D., and S.D. Emsbo-Mattingly, 2006. Environmental Stability of PAH Source Indices in Pyrogenic Tars. *Bulletin of Environmental Contamination and Toxicology* 76(4): 689-696.

⁵⁰ HDR and CH2M Hill. January 2011. Gowanus Canal Remedial Investigation Report; and “Data from the former MGP facilities show that NAPL elevations are above the sediment elevation and that NAPL seep migration is occurring” from EPA. September 2013. Record of Decision. Page 30.

saturation (i.e., pore spaces completely filled with NAPL). MGP NAPL samples were not collected and submitted to a laboratory for analysis.”⁵¹ Importantly, the lack of MGP NAPL samples indicates that chemistry data is not available in places where MGP NAPL impacts (categories 2 and 3) were observed in the sediments in the field. This is a critical data gap that must be addressed by the Plan. MGP NAPL-associated hydrocarbon concentrations, including PAHs, would likely be extremely high in these locations and physical impacts for biota in contact with NAPL may also have occurred.

In general, if the allocation approach utilized by the Trustees takes relative chemistry of PAHs sources into account, this can be a powerful tool for understanding and assessing damages, but it must be used carefully.

⁵¹ HDR and CH2M Hill. January 2011. Gowanus Canal Remedial Investigation Report. Page 4-7.

Incorporation of Baseline Ecological Risk Assessment Findings

Trustees intend to build upon “existing information” to show injury has occurred or is likely to have occurred to ecological resources using contaminant concentrations in exceedance of regulatory criteria or literature-based adverse effects thresholds and site-specific toxicity testing results. The Plan indicates that the focus will be on “ecological resources in Gowanus Canal including sediment, surface water, and biological resources such as invertebrates, fish, birds and aquatic-dependent mammals.” The Plan further states that “additional research and analysis of existing information, as well as primary studies, may be conducted to further determine injury to natural resources.” However, the Plan does not specify which components of existing information will be used as part of the assessment nor does the Plan describe the tools and techniques anticipated to occur to further supplement the existing ecological datasets required to make the assessment site-specific.

Regulatory criteria and literature-based adverse effects thresholds were exceeded and toxicological effects were identified within the study area as documented in the 2009 Ecological Investigation Report (EIR) and the 2011 Ecological Risk Assessment (ERA) (Appendix K of the Remedial Investigation Report). However, these results are not necessarily indicative of ecological injury.

Regulatory criteria are identified as “criteria” because they are generally predictive of a potential ecological risk. Exceedance of regulatory criteria do not necessarily indicate an injury, especially in the case of sediment. Regulatory criteria serve as a screening benchmark tool to help assess the need for more advanced ecological exposure risk techniques such as toxicity testing and collection of site-specific information such as tissue concentrations to build wildlife dietary models representative of receptors expected to inhabit and forage with designated study areas. Toxicity tests provide further insight into the exposure risks due to direct contact with sediment and surface water. However, the dose response is often not easily deciphered in environments where a multitude of contaminant mixing occurs without the application of more advanced chemical analysis beyond routine bulk chemistry work as conducted as part of the Ecological Risk Assessment of the Gowanus Canal. Additional work to decipher if the bioavailable fraction of bulk sediment concentrations is critical to truly understanding the risk drivers of contaminants of potential ecological concern (COPECs) identified in sediment and to establish the cause of effects exhibited in sediment toxicity tests.

The Plan says it will draw on sediment toxicity test information regarding growth, survival, and reproduction (i.e., toxicological effects) of biological resources in conjunction with the abiotic chemistry data to demonstrate the impact on the ability of these resources to provide ecological services to the habitat within the Gowanus Canal. Paired sediment chemistry and toxicity test results are not good indicators of biological structure in a system. The determination of the cause and environmental effect/response to benthic organisms was established using paired sediment bulk chemistry and sediment toxicity test results without consideration of the more bioavailable fraction of the contaminants which is present in the interstitial pore water. The science supports that the relationship between sediment chemistry and toxic effects on the benthic community is governed by the freely dissolved chemicals in the interstitial water that has not been investigated or measured as part of the existing breath of work conducted as part of the EIR and ERA. The Trustees should especially consider the effects of reintroduced PAHs from the CSOs and MGPs on porewater chemistry and the potential for future impacts associated with those unresolved contaminant sources.

The physical habitat requirements are not readily present in the Gowanus Canal to allow biological resources to thrive. The lack of suitable physical habitat is not due to the presence of contaminant sources, but rather the urbanized nature of the system as it was designed to handle barge traffic and flush away waste and sewage. The existing base of toxicity work, biological survey data and abiotic investigation data included in the EIR and ERA suggests that other confounding factors, including the lack of oxygen and presence of waste and sewage rather than chemical impacts are drivers for the lack of abundance and species richness in benthic macroinvertebrate and aquatic vertebrate communities.⁵²

The most significant impacts (mortality) of benthos as identified in the sediment toxicity testing were localized to the central portion of the Gowanus Canal where PAHs and PCB impacts were greatest in sediment. Although the central portion of the Gowanus Canal is the furthest from oxygenated sources of water (i.e., flushing tunnel on the north end and Gowanus Bay on the south end), the biological surveys completed as part of the 2009 EIR demonstrated a relationship between the presence of PAHs in sediment and impairment (lack of diversity) in the benthic community⁵³.

The ERA further suggests potential risk to aquatic herbivores (black duck) from exposure to PAHs in sediment which is driven by incidental sediment ingestion while eating plants and invertebrates. However, the lack of a natural shoreline and sufficient food resources (rooted aquatic vegetation) suggests that the Canal does not provide viable foraging habitat for aquatic herbivorous birds. Therefore, risk to aquatic herbivorous species is an unrealistic exposure scenario in this environment given the lack of preferred food items in this setting and should be omitted from consideration as part of any future NRDA.

Additionally, the ERA concluded potential risk to avian omnivores (represented by heron) from exposure to mercury. Mercury was the only metal that was frequently detected at elevated concentrations in fish and crab tissues, and that was also detected onsite (in sediments) at concentrations above those detected in offsite locations. Total inorganic mercury, rather than methylmercury (organic mercury), the more toxic, bioaccumulative form of this mercury in the aquatic environment, was analyzed in sediment and tissue and subsequently factored into the dietary models. In contrast, methylmercury was the basis for the toxicity reference value (TRV) used in the dietary modeling for the heron. Methylmercury tends to represent a small fraction of the total mercury (i.e., approximately 10% of the total, although this varies by location) and is a more realistic indicator of bioaccumulation. Therefore, the measure of total mercury sediment and tissue and its use in the food chain models results in a conservative, overestimate of risk to omnivorous birds from this metal due because its being compared to a threshold criteria represented by organic mercury.

The Plan discusses the concept of maximizing the use of existing data and filling in data gaps with additional studies as needed. However, the Plan does not provide specifics on the types of studies to be conducted to supplement the existing information to support the injury assessment. Based on our review of the current investigation information related to ecological resources, including the EIR and ERA as discussed above,

⁵² The Plan states, "Several studies comparing community structure in Gowanus Canal to areas in the New York Harbor system indicate that Gowanus Canal exhibits a lower species richness than reference areas (Adams et al. 1998 and Iocco et al. 2000, as cited in GEI Consultants, Inc. 2009). This change in the benthic community can reduce the quality and quantity of food for predators and affect the energy cycle within the aquatic food web." Although benthic species diversity and richness are low, the ERA did not quantify a pre-existing condition that would suggest a "change in the benthic community" within the Gowanus Canal. This language is inaccurate as documented.

⁵³ GEI. December 2009. Gowanus Canal Ecological Investigation Report. Page 45.

supplemental studies necessary to properly determine injury and associated sources have not been completed and should likely include the following:

1. Given the history of operations (manufactured gas plant operations and combined sewage effluent from the expanding industrial and residential communities) along the Gowanus Canal, the source, and forms of organic carbon in the sediment should be investigated and pore water studies should be given further consideration to better assess and understand the bioavailability of the chemicals present in sediment within the Gowanus Canal and subsequently their potential to cause injury to the benthic community.
2. The risk to omnivorous birds associated with the presence of mercury in sediment and fish tissue should be verified through further sediment and fish tissue sampling and analysis of methylmercury, so as not to overestimate risk to mercury.
3. Given the lack of wadable habitat with the Gowanus Canal, the models used to reassess risk to aquatic herbivorous birds should also be refined using more realistic exposure scenarios than those presented in the ERA (i.e., area use factors less than one) before an injury determination for ecological resources is finalized.

Human Use Injury Quantification and Damage Determination

The proposed approach for assessing human use damages is another example of deficiencies that prohibit use of the Plan for evaluating whether an assessment can be implemented for a reasonable cost. Rather than describe a specific plan, the Trustees describe how an assessment *could* be developed.

Inadequacy of Proposed Assessment Studies and Analysis

It is unclear if the proposed studies or analysis for assessing recreation damages will address baseline factors contributing to recreation service losses. The Trustees plan to “[r]eview existing public information on and awareness of contamination in the Assessment Area, including via consumption advisories and guidelines, news reports, and community information sources,” but that appears to focus entirely on chemical contamination. Similar information must be collected for non-CERCLA stressors that impair recreational use and ecological function of the Canal. Examples include awareness of “Wet Weather Discharge Point” signage warning against recreation use due to sewage releases,⁵⁴ newspapers articles regarding the degraded condition of the Canal (e.g., a 2007 New York Daily News article regarding gonorrhea and “aggressive” strains of bacteria in Canal surface water samples), and information underlying the Canal’s Clean Water Act (CWA) Section 303(d) listing in 1998 as an impaired waterbody for fishing use due to low dissolved oxygen and sewage.^{55,56,57}



The Trustees also plan on using interviews and focus groups to understand the Canal’s recreational use and community connections without disclosing the information about sampling locations, study design, and frequency and scope required for type B assessments. Survey methods are vulnerable to generating biased findings without proper context and it is unclear if these biases can attenuate (to the extent possible) without the “sample and survey design” (See 43 C.F.R. §11.32(a)(2)). For example, many reports describe “CSO solids,”⁵⁸ “floatables,” “pathogens,” “dry weather discharges,” and other such terms whose meaning is opaque to the public. Surveys seeking to ascertain the factors influencing respondent’s recreation behavior should utilize more easily understood language like “human waste,” “feces,” “untreated sewage,” “fecal bacteria,” and “debris from streets,” or depict these through imagery.

Feasibility of the Proposed Benefits Transfer Analysis

The Plan does not demonstrate that benefits transfer analysis to quantify recreational fishing and crabbing damages arising from fish consumption advisories (FCAs) is feasible or can be completed at a reasonable

⁵⁴ See, for example, the photograph taken by Historical Research Associates, Inc. near the Carrol Street Bridge in 2014. Historical Research Associates, Inc. October 2016. New York City Contributions to Gowanus Canal Conditions. Figure 21.

⁵⁵ New York Daily News. October 5, 2007. Gowanus Canal sick with germs, City Tech professors say.

⁵⁶ Markrayev. April 23, 2017. “It Came from the Gowanus.” <https://eportfolios.macaulay.cuny.edu/braine17/category/favorites/gowanus-walk/page/2/>

⁵⁷ See “Preassessment Screen for the Gowanus Canal Superfund Site,” p. 5.

⁵⁸ See, for example, the Record of Decision, which differentiates between “CSO solids” and “CSO sediment” as “Contaminated CSO solids are the particles that are discharged to the canal during overflow events, whereas CSO sediment is the residual material found in the sewer pipes.” (HDR and CH2M Hill. January 2011. Gowanus Canal Remedial Investigation Report. Page 28.)

cost.⁵⁹ Although the Trustees “anticipate that existing data on angler effort and relevant economic values may be adequate,” the Plan neither identifies specific data nor specifies criteria for evaluating its adequacy. The existence of a valuation study (or studies) “from a similar location” is foundational for attempting to transfer values that reflect angler preferences under the same set of baseline conditions at Gowanus Canal. Thus, the Plan should identify valuation studies of recreational fishing in industrial waters with entirely developed shorelines that are subject to maritime traffic and biophysical habitat limitations due to the non-CERCLA stressors detailed previously.

The Plan does not describe the proposed type and form of value transfer (i.e., akin to “sample or survey design” See 43 C.F.R. § 11.31(a)(2)). Benefits transfer analysis can involve the direct transfer of estimated monetary unit values (either marginal or average) or indirect transfer of a unit value function. These may derive from either a specific selected study (or studies) identified as comparable to the subject site, or a meta-analysis of many studies that attempts to achieve comparability through statistical adjustments.^{60,61} That information is critical to assessing reasonableness, because design alternatives can further influence accuracy—the difference between transferred values and those from primary studies can differ anywhere from a few percent to 100 percent.⁶² To that end, the Plan should define the planned metric(s) and the method(s) and their thresholds for identifying the “significant sources of uncertainty” that would warrant considering a more costly primary study.⁶³

Focusing on FCAs May Lead to Unreasonable Assessment Costs

The Plan explicitly cites consumption advisories as the source of recreational fishing and crabbing losses in the Canal, but the evidence suggests their contribution to any discernable injury was marginal, and therefore, the assessment costs may be unreasonable.⁶⁴ First, although the advisories for Upper New York Bay encompass the Gowanus Canal, fishing is an impaired use of Upper New York Bay due to hazardous substances, whereas oxygen demand, odors, and sewage—all deriving from non-CERCLA stressors—are cited as impairments to fishing use of Canal waters.⁶⁵ Second, the Plan states that observed total PAH concentrations in Canal sediments exceeded literature-based adverse effect levels for fish.⁶⁶ That is important both because PAHs do

⁵⁹ The Trustees identify crab and fish consumption advisories (FCAs) as evidence of injury and compensable losses and propose to quantify damages based on “lost and diminished recreational fishing and crabbing trips.” See Plan, at 32-33.

⁶⁰ U.S. Environmental Protection Agency. 2010 (r. 2014). Guidelines for Conducting Economic Analyses. EE-0568. Chapter 7. Analyzing Benefits. EPA 240-R-10-001. Washington, DC: EPA Office of the Administrator.

⁶¹ Also unclear is whether the benefits transfer analysis subsumes the injury quantification and damages determination assessment phases. The statement “...estimates of recreational fishing and crabbing in the Assessment Area are combined with existing valuation research [...] to develop a damage estimate” (See Ibid.) implies combining (i.e., multiplying) total trips and the willingness-to-pay per trip to avoid a change in recreational quality, whereas the statement “damages related to recreational losses would be quantified based on [...] lost and diminished recreational fishing and crabbing trips [...]” (See Plan, at 33) seemingly implies direct quantification of lost trips from in response to diminished recreational quality.

⁶² Rosenberger, Randall S., T.D. Stanley. 2006. “Measurement, generalization, and publication: Sources of error in benefit transfers and their management.” *Ecological Economics*, 60(2): 372-378.

⁶³ See Plan, at 33.

⁶⁴ “The presence of the crab and fish consumption advisories described previously constitute an injury under the CERCLA NRDA regulations and suggests that there has been, and will continue to be, associated compensable losses.” See Plan, at 32.

⁶⁵ “Although the Gowanus Canal is designated as a Class SD waterbody, the NYSDEC has determined that the Gowanus Canal does not support the designated use of fishing and the Canal has been on the Clean Water Act Section 303(d) list of impaired waterbodies since 1998. The cause of the 303(d) listing was/is floatables, odors, and oxygen demand due to urban and storm runoff and CSOs. The Gowanus Canal remains on the 303(d) list as of 2012 [...]. The Gowanus Canal discharges to Upper New York Bay, which is also currently on the USEPA Clean Water Act 303(d) list of impaired waters due to polychlorinated biphenyls (PCBs) and other toxics that may include mercury, dioxins/furans, polycyclic aromatic hydrocarbons (PAHs), pesticides, and other heavy metals...” See Preassessment Screen for the Gowanus Canal Superfund Site, p. 5.

⁶⁶ “The potential for injury to fish is demonstrated by two lines of evidence: (1) Sediment PAH concentrations exceed levels reported to cause adverse effects on fish. [...] Ninety-eight percent of surface sediment samples from Gowanus Canal contained total PAH concentrations greater than 4 ppm, suggesting that fish are exposed to PAH concentrations at or above the thresholds linked to

not trigger FCAs and because any fish able to survive in the Canal were exposed to PAH releases from MGP operations and their contaminated uplands for more than a century before FCAs were first established in the 1980s. Therefore, any response to the FCAs should have been marginal in the context of impaired fishing quality of the Canal, yet the proposed benefits transfer analysis seems focused on quantifying and valuing the effects of FCAs on recreational fishing.

Basis for Potentially Including Other Forms of Human Use Damages

The Plan should provide an assessment of the “existing information” about other forms of recreation before implementing “targeted qualitative research” to determine if continued evaluation is warranted. Existing data may suggest that baseline trips for these other uses is minimal, such that any contribution from hazardous substance releases would be marginal and the costs of further data collection unreasonable.⁶⁷ For example, the New York Department of Health identified “large commercial boat traffic” as a physical hazard to boating and catch-and-release fishing recreation.⁶⁸

Community connections to the Gowanus Canal are not identified in the Preassessment Screen as potentially affected services (See 43 C.F.R. § 11.25(e)(1)) and the Plan fails to identify any measure of community connection services for assessment. A metric should be defined before the Trustees conduct background research, focus groups, and interviews and evaluate if the outcomes “reveal a basis for pursuing related service losses and damages.”

Equivalency Analysis Should Apply to Human Use Damages Determination

The Plan proposes using “value-to-cost” restoration scaling approaches for human use damage determination.⁶⁹ This is contrary to approaches taken at other New York Superfund sites, including Onondaga Lake, and typically overstates damages. Value-to-cost scaling approaches, such as economic valuation methods, determine the direct monetary value of lost services and spend that amount on restoration. This ignores benefits of from the restoration projects and leads to biased damages unless they are exactly to the restoration project cost.⁷⁰ “Value-to-value” scaling approaches, such as equivalency analysis, are unbiased because damages equal the cost of restoration projects that are sized to produce the quantity of lost services so that the damages amount depends on the benefits of services gained through restoration.

Equivalency analysis approaches should be the default approach for recreation damages as it is for ecological. Although equivalency analysis was born of the necessity to simplify damages determination for ecological service losses, the conceptual and theoretical bases are equally applicable to recreation losses.⁷¹ The Trustees can consider findings by Byrd and Dunford (2017) and Byrd and Tomasi (2021) addressing their commonly voiced concerns for restoration-based scaling, including that gains from outdoor recreation

adverse effects in the literature. This indicates likely injury to fish due to PAHs, and (2) Fish consumption advisories recommend restrictions on eating fish from the Upper New York Bay, including Gowanus Canal (Exhibit 3-5). These advisories have been issued with varying levels of severity since the early 1980s and are driven by contaminants such as PCBs.” See Plan, at 28.

⁶⁷ See previous discussions about marine traffic and restrictions from sewage releases.

⁶⁸ The Gowanus Canal Public Health Assessment identifies “large commercial boat traffic” as physical hazards to recreational boating and catch-and-release fishing in concluding these activities are not a risk to human health. See New York State Department of Health Center for Environmental Health and The U.S. Department of Health & Human Services Agency for Toxic Substances and Disease Registry. Public Health Assessment, Gowanus Canal, City of New York, Borough of Brooklyn, Kings County New York. EPA Facility ID: NYN000206222. February 1, 2014.

⁶⁹ See Plan, at 31.

⁷⁰ Economic valuation approaches determine the monetary value of lost services from price responses observed in markets, and that amount is spent on restoration.

⁷¹ The equivalency metric becomes fishing trips instead of ecological measures such as habitat acres, fish and bird biomass, etc.

restoration more often outweigh the costs.⁷² Further, the proposed benefits transfer analysis framework mitigates the Trustees typical concerns about feasibility, additional costs, and an introducing more uncertainty into the restoration side of the equation, as does the focus on a single recreation type in fishing and crabbing assuage concerns that restored trips will be of a different type and nature than lost trips.

⁷² See Byrd, H., and R. Dunford. 2017. "The Role of the Benefits Transfer Methodology in Scaling Human Use Restoration Projects under the Oil Pollution Act." Presented at the United States Society for Ecological Economics 9th Biennial Conference. *See also* Byrd, H., and T. Tomasi. 2021. "Damages to Recreation from an Oil Spill: Why Current Assessments Typically are Wrong and What can be Done to Fix Them. Presented at the 2021 International Oil Spill Conference."

Specific Comments

Preliminary Estimate of Damages

The Plan neither contains nor is accompanied by the Preliminary Estimate of Damages (PED). A PED is required by statute when performing a type B assessment for “for reference in the scoping of the Assessment Plan to ensure that the choice of the scientific, cost estimating, and valuation methodologies expected to be used in the damage assessment fulfills the requirements of reasonable cost” (43 C.F.R. § §11.38(a),(b)). Unless the existing data are insufficient, the PED should precede issuance of the Assessment Plan (43 C.F.R. §11.38(d)(2)) and the Plan has provided no such justification.

Temporal Scope of the Assessment

Section 4.4 of the Plan includes the following language:

“In accordance with the promulgation of CERCLA in 1980, to the extent injuries pre- and post-CERCLA are distinguishable, the Trustees would quantify injury after the enactment of CERCLA. Where injuries are not distinguishable, injury would be quantified for all years that injury occurred in the past and is expected to occur in the future.”

The Plan should define, using examples, injury that *is* and *is not* distinguishable pre- and post-CERCLA enactment and clarify that the damages clock starts with CERCLA’s enactment (i.e., on December 11, 1980) regardless of whether a continuing injury started pre-enactment.⁷³ To that end, costs to quantify injury for “all years that injury occurred in the past” are unreasonable.

Preliminary Determination of the Recovery Period

Section 4.4 of the Plan also states, “[a]ll injury quantification calculations will include losses through the reasonable expected recovery of resource services,” but without providing the “preliminary determination of the recovery period” for *any* resource services, as the NRDA Regulations require of type B assessment plans (See 43 C.F.R. § 11.31(a)(2)).

Scope of Additional Sampling

Exhibit 5-1 of the NRDA anticipates examining Exposure Pathways by “collect[ing] Gowanus Canal soil, overland surface water runoff and/or groundwater...” and “...analyz[ing] physical characteristics and COC concentrations in these media to assess connections between hazardous contaminant sources and Assessment Area natural resources.” Notably missing from this scope of sampling, if additional sampling is required to fill data gaps, is CSO discharges. The NRDA should be amended to note that CSO discharges will need to also be sampled to adequately characterize impacts to natural resources. CSO discharges will need to be sampled at multiple temporal scales: (1) during individual CSO discharge events, samples will need to be collected throughout the discharge cycle of the CSO, focusing particularly on the first flush of CSO discharges; and (2) over the course of the CSO improvements planned by NYC (i.e., before the planned CSO storage tanks are constructed and after they are constructed). This sampling should consider both hazardous substances and non-hazardous substances in the CSO discharges that may impact natural resources.

⁷³ “...the retroactive liability for natural resource damages extends only to the date of CERCLA’s 1980 enactment.” See Bowers, Kate. “Liability Under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).” *Congressional Research Service*. March 21, 2021. <https://crsreports.congress.gov/product/pdf/IF/IF11790>

Exhibit C

May 2004 Hunter Research, Inc. Report

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2004



NEA

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**DRAFT REPORT
NATIONAL REGISTER OF HISTORIC PLACES
ELIGIBILITY EVALUATION
AND
CULTURAL RESOURCES ASSESSMENT
FOR
THE GOWANUS CANAL, BOROUGH OF
BROOKLYN, KINGS COUNTY, NEW YORK IN
CONNECTION WITH THE PROPOSED
ECOSYSTEM RESTORATION STUDY**

Contract Number: DACW51-01-D-0017

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MAY 2004

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MANAGEMENT SUMMARY

This report describes an evaluation of the eligibility for inclusion in the National Register of Historic Places and a cultural resources assessment for the Gowanus Canal and Bay, Brooklyn, New York. The work was undertaken in support of a feasibility study of ecosystem restoration of Gowanus Canal and Bay (formerly Gowanus Creek). The scope of work included background research, acquisition of historic maps, field investigations, data analysis and report preparation. These investigations were mandated under Section 106 of the National Historic Preservation Act of 1966, as amended, and as implemented by 36 CFR 800, the Advisory Council on Historic Preservation's Procedures for the Protection of Historic and Cultural Properties. This work was undertaken for the New York District, Corps of Engineers under Contract No. DACW51-01-D-0017, Delivery Order No. 0027. Work was performed by Hunter Research, Inc., and Raber Associates. Hunter Research served as the principal cultural resource consultant reporting to Northern Ecological Associates, Inc., the overall project prime consultant.

The Gowanus Canal, created in the middle of the 19th century by bulkheading and dredging a tidal creek and wetland, quickly became a busy arm of New York harbor, the destination for building materials and fuel that went into the blocks of new houses built on the filled land behind it. It was also the final resting place for tons of household and industrial waste, and before the end of the century the public was clamoring for it to be filled. Instead, a pumping station at the head of the canal and a flushing tunnel under Degraw Street, completed in 1911, sent canal water into the Upper Bay until the pump was disabled in 1960. Because of its role in the development of Brooklyn from rural backwater to major city, the Gowanus Canal is recommended as eligible for inclusion in the National Register as an historic district. In addition to the waterway itself, two bridges and six buildings adjacent to the canal contribute to its significance and are considered part of the district.

Ecosystem restoration projects, specifically bank softening and habitat creation, have the potential to adversely affect the eligible resource. Adverse effects, if unavoidable, can be mitigated by a combination of photographic recording and archaeological excavation and/or monitoring.

TABLE OF CONTENTS

	<i>page</i>
Management Summary	i
Table of Contents	iii
List of Figures	v
List of Plates	vii
List of Tables	ix
Acknowledgments	xi
 1. INTRODUCTION	
A. Methods	1-4
B. Criteria Considerations	1-5
C. Definition of Terms	1-5
D. Assessment of Effects and Adverse Effects	1-6
E. Previous Research.....	1-7
F. Principal Information Sources	1-8
 2. BACKGROUND RESEARCH	
A. Environmental Setting	2-1
B. Prehistoric and Proto-historic Background of the Project Area	2-1
C. History of the Project Area Before the Gowanus Canal	2-2
D. Design and Construction of the Gowanus Canal	2-16
 3. FIELD RESULTS	
A. Field Methods.....	3-1
B. Analysis and Integrity of the Gowanus Canal as a Waterway	3-1
 4. INTERPRETATIONS	
A. Gowanus Canal and Associated Historic Industrial Resources	4-1
B. Project Effects.....	4-8
 5. RECOMMENDATIONS	5-1
 REFERENCES	R-1
 APPENDICES	
A. Resumes	A-1
B. Scope of Work	B-1
C. Interim Report	C-1
D. Project Administrative Data.....	D-1

LIST OF FIGURES

	<i>page</i>
1.1. General Location of Study Area	1-2
1.2. Detailed Location of Study Area	1-3
2.1. Plan of the Town of Brooklyn...,1767	2-5
2.2. Faden's Map of the Battle of Long Island, 1776	2-7
2.3. Detail of Gordon's Map of New Jersey, 1833	2-10
2.4. Historic creek, marsh, and mill pond environment of Gowanus Canal	2-11
2.5. Detail from the Map of the Estate of Jordan Coles, 1836	2-14
2.6. Detail from Colton's <i>Topographical Map of the City and County of New York</i> , 1836	2-17
2.7. Detail from U.S. Coast Survey. <i>Map of New York Bay and Harbor...</i> ,1844	2-18
2.8. Douglass 1847 Plan For Canal From Gowanus To Wallabout Bays	2-19
2.9. Richards 1848 Plan.....	2-22
2.10. Map of Gowanus Canal and its Industries, 1945	2-28
2.11. Sanborn's Fire Insurance Map showing location of tunnel under canal (1938)	2-29
2.12. Relief Sewers Entering Gowanus Canal, 1904	2-50
2.13. Gowanus Canal and Flushing Tunnel	2-53
2.14. Mechanical Details Under Pump House and Gate House at End Of Flushing Tunnel	2-54
3.1. Aerial Photograph Showing Existing Wall Conditions	3-3
3.2. Historic Sites and Structures and Existing Wall Conditions	3-25
4.1. Map of Other Historic Waterways in the New York City Region	4-3

LIST OF PLATES

	<i>page</i>
1.1. Current Aerial Photograph of Study Area	1-5
2.1. Benson Lossing, "Brower's Mill" in 1850.....	2-8
2.2. View of Gowanus Bay at mid-century	2-15
2.3. View <i>circa</i> 1877 of Unidentified Section.....	2-30
2.4. View Northwest of 5th St. Basin, 1876	2-32
2.5. View Southwest of Union Street Bridge Nearing Completion <i>circa</i> 1905	2-33
2.6. View Northwest of Carroll Street Bridge Tracks, 1912.....	2-35
2.7. View Southeast of Carroll Street Bridge Tracks, 1912	2-36
2.8. View Southeast of Third Avenue Bridge	2-37
2.9. Aerial View North of Upper Half Of Gowanus Canal, <i>circa</i> 1960	2-44
2.10. View Southwest of Gowanus Canal Traffic Near Hamilton Avenue, 1940.....	2-45
2.11. Aerial View North of Uppermost Gowanus Canal, <i>circa</i> 1945	2-46
2.12. View of Covered Barges In Gowanus Canal, 1928	2-47
2.13. View Southeast of Storm Sewer Outlet At Degraw Street.....	2-51
2.14. View Northwest at End Of Canal, 1911	2-55
3.1. View South of Recent Bulkhead at 14th St-	3-8
3.2. View Southeast of 11th Street Basin	3-9
3.3. View Northeast of Intact Timber Cribwork Bulkhead.....	3-10
3.4. View East Towards Head of 6th Street Basin	3-11
3.5. View Southeast of 6th Street Basin	3-12
3.6. View Northeast at Bond Street.....	3-13
3.7. View East of Steel Sheetpile Bulkhead	3-14
3.8. View North of Deteriorating Timber Cribwork	3-15
3.9. View Northwest of Intact Timber Cribwork	3-16
3.10. View Northeast at End of Canal.....	3-17
3.11. Carroll Street Bridge.....	3-18
3.12. View Southeast of Third Avenue Bridge	3-19
3.13. View Northeast of Gowanus Canal, 1952	3-20
3.14. View Northeast Near 11th Street Basin	3-21
3.15. View North Of Former Bowne Stores	3-22
3.16. Oblique Aerial Photograph, 1988.....	3-23
3.17. Site of Denton's Mill	3-27
3.18. Site of Freeke's Mill	3-28
3.19. Brooklyn Improvement Company Office Building	3-30

LIST OF PLATES (CONTINUED)

	<i>page</i>
3.20. Burns Bros. Coal Pockets.....	3-31
3.21. Burns Bros. Coal Pockets.....	3-32
3.22. Former Brooklyn Rapid Transit Power House.....	3-34
3.23. View west of Foreman Blades Lumber	3-36
3.24. View North of S. W. Bowne Grain Storehouse	3-37

LIST OF TABLES

	<i>page</i>
2.1. Maritime Industry & Traffic Numbers, Gowanus Canal Between Hamilton Avenue and Ninth Street Bridge Crossings.....	2-39
2.2. Maritime Industry & Traffic Numbers, Gowanus Canal Between Ninth Street and Third Street Bridge Crossings	2-39
2.3. Maritime Industry & Traffic Numbers, Gowanus Canal Between Third Street and Carroll Street Bridge Crossings.....	2-39
2.4. Maritime Industry & Traffic Numbers, Gowanus Canal Between Carroll Street and Union Street Bridge Crossings	2-41
2.5. Maritime Industry & Traffic Numbers, Gowanus Canal Upstream Of Union Street	2-41
3.1. Gowanus Canal Bulkhead Conditions, 2003	3-7

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Chapter 1

INTRODUCTION

The New York District, U.S. Army Corps of Engineers (ACOE) is currently conducting a feasibility study that focuses on ecosystem restoration of Gowanus Bay and Canal (formerly Gowanus Creek), located in the Upper Bay of New York Harbor (Figures 1.1 and 2.1). The overall study area includes Gowanus Canal from Gowanus Bay to its inland terminus at Butler Street in Brooklyn, New York; the canal's six-square-mile watershed area; and Gowanus Bay, from Bay Ridge Channel to the Gowanus Canal.

This report presents the results of a study focused on a part of that project. It was conducted to assess the eligibility of the Gowanus Canal for inclusion in the National Register of Historic Places. These investigations were mandated under Section 106 of the National Historic Preservation Act of 1966, as amended, and as implemented by 36 CFR 800, the Advisory Council on Historic Preservation's Procedures for the Protection of Historic and Cultural Properties. This work was undertaken for the New York District, U.S. Army Corps of Engineers (ACOE) under Contract No. DACW51-01-D-0017, Delivery Order No. 0027. Work was performed by Hunter Research, Inc., and Raber Associates. Hunter Research served as the principal cultural resource consultant reporting to Northern Ecological Associates, Inc., the overall project prime consultant.

The Gowanus Canal, created in the 19th century from the main channel and tidal wetlands formerly known as Gowanus Creek, is an arm of the Upper Bay of New York Harbor (Figures 1.1 and 1.2; Plate 1.1). The canal's sole function is transportation (as opposed to providing power). From its mouth to the upstream dead-end at Butler Street its total length is less than a mile and a half.

The area encompassed by this study is smaller than that of the ecosystem restoration feasibility study. Originally the study area consisted of the main channel of the canal and its basins from its upper terminus at Butler Street to 15th Street, with limited investigation of the potential for submerged resources from 15th Street to Bay Ridge Channel. Research in the course of the study showed that historically the canal can be considered to extend to about 1,100 feet below Hamilton Avenue (approximately opposite Percival and 17th Streets). Canalside sites and structures were also taken into account in assessing the eligibility of the resource as a whole, to a minimum of 20 feet from the waterway.

No specific locations or tasks associated with the Gowanus Canal ecosystem restoration have been selected, pending completion of ongoing studies. However, projects could include:

Selective and careful removal of undesirable fill and sediments from the channel;

The restoration of water flow to enhance aquatic habitat and water quality;

The integration of ecosystem restoration with local plans;

The re-establishment of greenway and buffer areas;

The re-contouring of the canal bottom to create natural creek depths; and

Habitat creation and restoration.



NATIONAL REGISTER OF HISTORIC PLACES ELIGIBILITY ASSESSMENT
GOWANUS CANAL, BOROUGH OF BROOKLYN, KINGS COUNTY, NEW YORK

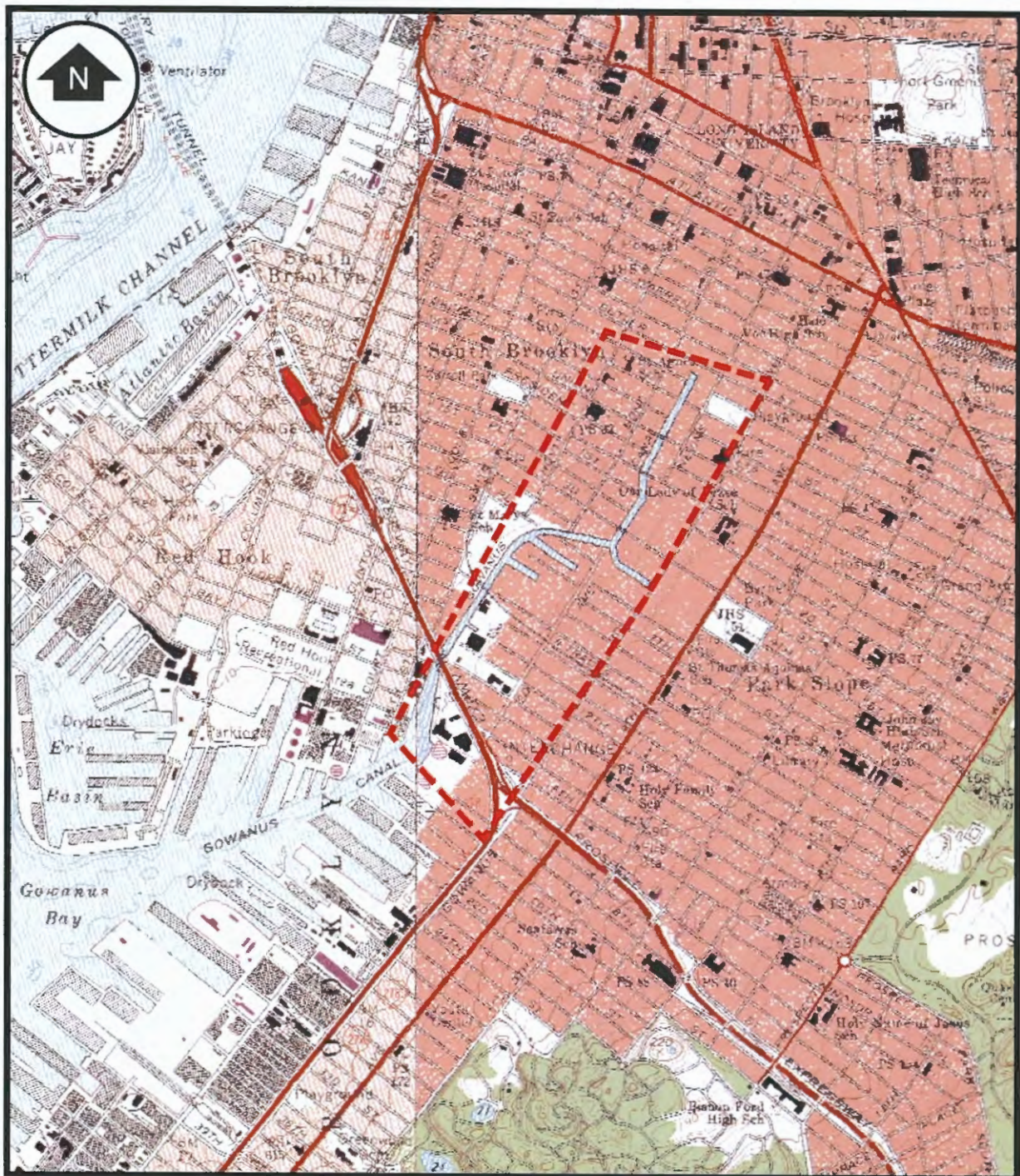


Figure 1.2. Gowanus Canal Assessment of Eligibility: Detailed Location of Project Site (high-lighted). Scale: 1 inch= 2000 feet. Source: USGS 7.5' Topographic Series, Brooklyn, N. Y. (1967 [photorevised 1979]) and Jersey City, N.J. -N. Y. Quadrangles (1967 [photorevised 1981]). Project area indicated.

There is the potential for the canal to be dredged from the northern end, at Butler Street, into the Bay. Canal banks may be "softened" in selected areas which would require the removal of bulkheads and limited quantities of fill. There is also the potential that basins, most which contain considerable deposits of sediment, be considered for habitat creation. This work would entail capping the basins with clean fill and planting vegetation.

A. METHODS

This study consisted of background research, field investigation, data analysis, and preparation of this report.

The goal of the background research was to obtain historic maps, photographs, and primary and secondary source material related to the study area before, during and after the canal's construction, as well as information on any previous studies. Research was conducted at the following repositories:

New York Public Library (physical and on-line)

New York State Historic Preservation Office, Peebles Island

Brooklyn Public Library on-line (notably the *Brooklyn Daily Eagle*)

Library of Congress (on-line)

Brooklyn Historical Society

Brooklyn Public Library

Historic maps were emphasized in order to relate the canal's alignment to the pre-existing landscape. Several maps were located showing the location of the creek and the street grid before the canal was built,

and modern maps show the canal, but no suitable map was found showing all three. Accordingly, a composite map was generated by Raber Associates by overlaying the canal onto an earlier map (see below, Figure 2.4).

The Scope of Work also called for digital copies of Sanborn fire insurance maps for the canal and vicinity. Accordingly, a compact disc accompanying this report contains Sanborn maps for 1886, 1904, 1915, 1938, 1950, 1969, 1977, 1986 and 1996.

Fieldwork was conducted in two parts. Because some canal features (most notably the bulkheads) are best observed from the water, a low-water inspection by boat trip took place on November 5, 2003 to view and photograph the canal and proximate resources from the water. Staff from ACOE, Hunter Research and Raber Associates participated. Digital and film photographs were taken for use in the analysis and report phases. Canalside resources were the subject of a pedestrian field survey of canal margins and proximate resources on January 9, 2004, during which field notes and digital photographs were taken.

Analysis

The information generated by this study was considered in terms of the criteria for evaluation outlined by the U. S. Department of the Interior, National Register Program. The criteria are found at 36 CFR 60.4 and are as follows:

The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and

(a) that are associated with events that have made a significant contribution to the broad patterns of our history; or



Plate 1.1. Gowanus Canal Assessment of Eligibility: Aerial photograph showing existing conditions on the Gowanus Canal and environs. 2003. Source: U.S. Army Corps of Engineers.

(b) that are associated with the lives of persons significant in our past; or

(c) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

(d) that have yielded, or may be likely to yield, information important in prehistory or history.

B. CRITERIA CONSIDERATIONS

Ordinarily cemeteries, birthplaces, or graves of historical figures, properties owned by religious institutions or used for religious purposes, structures that have been moved from their original locations, reconstructed historic buildings, properties primarily commemorative in nature, and properties that have achieved significance within the past 50 years shall not be considered eligible for the National Register. However, such properties will qualify if they are integral parts of districts that do meet the criteria of if they fall within the following categories:

(a) A religious property deriving primary significance from architectural or artistic distinction or historical importance; or

(b) A building or structure removed from its original location but which is significant primarily for architectural value, or which is the surviving structure most importantly associated with a historic person or event; or

(c) A birthplace or grave of a historical figure of outstanding importance if there is no appropriate site or building directly associated with his productive life.

(d) A cemetery which derives its primary significance from graves of persons of transcendent importance, from age, from distinctive design features, or from association with historic events; or

(e) A reconstructed building when accurately executed in a suitable environment and presented in a dignified manner as part of a restoration master plan, and when no other building or structure with the same association has survived; or

(f) A property primarily commemorative in intent if design, age, tradition, or symbolic value has invested it with its own exceptional significance; or

(g) A property achieving significance within the past 50 years if it is of exceptional importance.

C. DEFINITION OF TERMS

The following definitions are from the Department of the Interior, National Register of Historic Places (36 CFR 63):

1. A "district" is a geographically definable area, urban or rural, possessing a significant concentration, linkage or continuity of sites, buildings, structures, or objects which are united by past events or aesthetically by plan or physical development. A district may also be comprised of individual elements which are separated geographically but are linked by associations or history.

2. A "site" is the location of a significant event, or prehistoric or historic occupation or activity or a building or structure whether standing, ruined, or vanished where the location itself maintains historical or archaeological value regardless of the value of any existing structures.

3. A "building" is a structure created to shelter and form of human activity such as a house, barn, church, hotel or similar structure. "Buildings" may refer to a historically related complex, such as a courthouse and jail or a house and barn.

4. A "structure" is a work made up of interdependent and interrelated parts in a definite pattern or organization. Constructed by man, it is often an engineering project large in scale.

5. An "object" is a material thing of functional, aesthetic, cultural, historical, or scientific value that may be, by nature or design, movable yet related to a specific setting or environment.

D. ASSESSMENT OF EFFECTS AND ADVERSE EFFECTS

Effects are discussed at the conclusion of this report. In that discussion, assessments of effects and adverse effects are based upon the following criteria contained in 36 CFR 800.5 (a)(1) and (2), as follows:

(a)(1) *Criteria of adverse effect.* An adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Consideration shall be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for the National Register. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative.

(2) *Examples of adverse effects.* Adverse effects on historic properties include, but are not limited to:

(i) Physical destruction of or damage to all or part of the property;

(ii) Alteration of a property, including restoration, rehabilitation, repair, maintenance, stabilization, hazardous material remediation, and provision of handicapped access, that is not consistent with the Secretary's standards for the treatment of historic properties (36 CFR part 68) and applicable guidelines;

(iii) Removal of the property from its historic location;

(iv) Change of the character of the property's use or of physical features within the property's setting that contribute to its historic significance;

(v) Introduction of visual, atmospheric or audible elements that diminish the integrity of the property's significant historic features;

(vi) Neglect of a property which causes its deterioration, except where such neglect and deterioration are recognized qualities of a property of religious and cultural significance to an Indian tribe or Native Hawaiian organization; and

(vii) Transfer, lease, or sale of property out of Federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property's historic significance.

Recommendations are discussed in detail at the end of this report. In general terms, the canal and a small number of buildings comprise a historic district. Some of the potential work items proposed as part of the ecosystem restoration study have the potential to adversely affect the district.

E. PREVIOUS RESEARCH

Previous studies have identified several historic sites and a prehistoric site in the vicinity of the Gowanus Canal. These are discussed below.

The New York State Museum site files contain an entry (#3606) for a site mentioned in the *New York State Archaeological Bulletin* of September-October, 1920 (p. 582). With no location given, the site is described thus: "Camp site. A barren sand hill in Brooklyn in 1826 was covered with vitrified and decomposed stones. From 1 ½ to 4 feet below the surface was a layer of ashes and cinders with broken clay pipes, coarse pottery and arrowheads." Accompanying this is a map of Kings County with no scale and showing little detail, but the "Camp site" is shown in the general vicinity of the upper reaches of Gowanus Creek. While the exact location cannot be pinpointed, dead reckoning based on physical features such as the coastline suggests that the site as mapped is on the order of a mile from the canal.

A New York State Archaeological Survey form (04701.014947) exists for a possible Revolutionary War burial ground near 426 Third Avenue. The form contains little data other than an article from the *New York Times* of May 26, 1998 concerning the halting of demolition at a fire site because of concerns expressed by the New York City Landmarks Preservation Commission that burials may be nearby. The address is near 7th Street, about 500 feet south of the 4th Street basin.

The Carroll Street Bridge over the canal, the oldest of three surviving retractile bridges in the country, was built in 1889 by the New Jersey Iron & Steel Company. It was designated a New York City Landmark in 1987 and has received an opinion of eligibility for inclusion in the National Register from the New York State Historic Preservation Office. It was

rehabilitated in 1989. It is within the study area and is discussed in more detail below.

Several historic architectural resources are listed in the National Register in this part of Brooklyn, but these generally are located on the high ground at some distance from the creek/canal. These include the Park Slope, Cobble Hill and Carroll Gardens Historic Districts; Green-Wood Cemetery; Litchfield Villa in Prospect Park; Old First Reformed Church, 729 Carroll Street; Public Bath No. 7, 227 Fourth Avenue; St. Paul's Protestant Episcopal Church, 199 Carroll Street; South Congregational Church Complex, President and Court Streets; Prospect Hall, 263 Prospect Avenue; the William B. Cronyn House, 271 9th Street; the Weir Greenhouse, 750-751 Fifth Avenue; and the John Rankin House, 440 Clinton Street.

Two cultural resources studies have been conducted in the immediate vicinity of the canal. A Stage I archaeological survey was conducted along Nevins Street from Butler Street to President Street in 1977 by Ralph S. Solecki, Ph.D. in conjunction with the Red Hook water pollution control project. The study discussed Freeke's and Denton's mills, the construction of the canal (and the resulting fill adjacent to it), and the possibility of prehistoric resources nearby. Dr. Solecki's research, citing earlier sources, identified a Native American village—"the village of Werpos"—at Hoyt Street between Butler and Warren Street, about .2 miles from the head of the canal. He concluded that the Nevins Street work would not affect the archaeology or history of the area (Solecki 1977).

In 1978, the Army Corps of Engineers commissioned a cultural resources survey of the Gowanus Creek Channel in conjunction with a proposed dredging project (including spoil disposal at two upland sites). This study was largely documentary in nature, since the area to be dredged is by definition inaccessible. Pedestrian surveys were undertaken at the disposal

sites, some distance from the present study area. The dredging and disposal were expected to have no effect on significant cultural resources (Kopper and Black 1978).

F. PRINCIPAL INFORMATION SOURCES

A principal source on Brooklyn up to 1870 is the three-volume *History of the City of Brooklyn* by Henry R. Stiles. The *Brooklyn Daily Eagle* online, covering the years 1841 to 1902, proved to be a major research tool; it was the source of much of the information in Chapter 2 on the evolution of the canal and contemporary reactions to it.

Brooklyn was well mapped, particularly toward the end of the 19th century as it developed into a thriving city. Beginning in 1880, atlases were published about every five to seven years, and Sanborn fire insurance map coverage began in 1886 (and continuing through the 20th century). These provided valuable information on the development of the neighborhood around the canal and its basins.

Finally, historic photographs on file at the Brooklyn Public Library illustrate dramatically the information conveyed by text and atlases. While photographic coverage is somewhat sparse in the late 19th century, photographs taken in the early 20th century convey the character of the canal at its peak far better than words can, and have been included here at length.

Chapter 2

BACKGROUND RESEARCH AND HISTORIC CONTEXT

A. ENVIRONMENTAL SETTING

The project site is located on the present-day coastal margin of western Long Island, just north of the terminal moraine that defines the furthest limit of the Wisconsin ice sheet. The terminal moraine survives today as a linear landform of low irregular hills with two principal ridges (referred to as the Ronkonkoma and Harbor Hill ridges) that runs from southwest to northeast along the spine of Long Island. The moraine was deposited at the limit of the advancing ice sheet and has subsequently provided the dominant geomorphological structure for Long Island into the modern era (Cressey 1977:43).

At the time of the ice sheet's maximum extent, *circa* 18,000 B.C., the Atlantic shoreline lay some 50 miles further to the east, thus leaving exposed a vast portion of the Continental shelf. The Gowanus Creek vicinity would not have been tidal marshland during this period and most likely would have existed as a wooded coastal plain coursed by meandering rivers and home to migratory herds of megafauna, numerous smaller animal species and a rich plant environment. As the ice receded, increased meltwaters caused the sea level to rise and the shoreline gradually moved westward, inundating and foreshortening the coastal plain environment. Roughly 5,000 to 6,000 years ago (*circa* 3,000 to 4,000 B.C.), the shoreline lay some 25 miles to the east; by around A.D. 500 to 1000, less than 1,500 years ago, the coastline began to roughly resemble that of the present day, and the Upper Bay and its neighboring drainages will have been largely tidal (Edwards and Merrill 1977; Kraft 1986).

The Gowanus Canal vicinity—today commonly thought of as an urban neighborhood—was, when Europeans arrived, a lush saltwater marsh about $\frac{3}{4}$ of a mile wide, drained by a meandering tidal stream. Until the mid- to late 17th century, land use would have consisted largely of seasonal fishing and shellfish gathering by bands of Native Americans. The arrival of European pioneers was followed in turn by farmers, townspeople, suburbanites, real estate speculators, and bulk materials shippers (all of which is discussed in detail below). Land uses today are typical of a major post-industrial urban area. Several tracts are vacant or underutilized. Low-rise housing is interspersed with large, underutilized buildings originally engaged in activities such as warehousing, coal storage, or manufacturing, all of which is constrained by the city's street grid.

B. PREHISTORIC AND PROTO-HISTORIC BACKGROUND OF THE PROJECT AREA

Throughout the Paleo-Indian, Archaic, and Early Woodland periods (12,000 to 2,000 years ago), the Native American life style was predominantly one of hunting, gathering and fishing. The population was organized into mobile bands whose movements in the landscape were strongly influenced by the migratory patterns of game and fish, the seasonal availability of plant resources, and the locations of lithic raw materials. Few sites of these periods are known in western Long Island, in part because of the intensity of historic period land use prior to the early 20th century, when notice began to be taken of archaeological resources.

From the Middle Woodland period onwards (circa AD 500), the population base appears to have expanded steadily and become increasingly sedentary. By around AD 1250, incipient agriculture was being practiced and semi-permanent settlements become visible in the archaeological record of the Lower Hudson valley. Coastal areas and back bay environments like Gowanus Creek came to play an important role in the seasonal round as Native American groups followed well worn trails to the shore where shellfish, chiefly clam and oyster, could be harvested (Ceci 1980; Brennan 1977).

Towards the end of the Late Woodland period, continuing into the 17th century when contact with Europeans was occurring on a regular basis, the Native American population of Long Island begins to come more clearly into focus as a part of recorded history. The Brooklyn area was inhabited by a people known as the Canarsee, a branch of the Algonquian-speaking Lenape, a series of loose-knit and semi-sedentary tribes spread across much of the area between the Delaware and Lower Hudson Rivers and extending east into Long Island. In the 17th century, the Canarsee participated in a complex web of trading relationships involving the Lenape, other Native American peoples further to the west and north, the Dutch and eventually the English. The two key commodities traded by the Canarsee for European goods were furs and wampum (polished shell beads used for jewelry and as currency), the latter being of particular importance in view of the abundance of shellfish in and around Gowanus Creek. In the 1630s and 1640s, however, the Canarsee began to lose their hold over land on Long Island, ceding property to Dutch farmer-settlers. By century's end, their numbers, probably never more than a few thousand, were severely reduced as a result of disease, conflict (notably Kieft's War of 1643-46) and the general dislocation visited upon them by Europeans. Over the course of the 18th

century, the surviving Canarsee moved west and out of the Hudson Valley altogether (Salwen 1978; Black 1981; Becker 1984).

C. HISTORY OF THE PROJECT AREA BEFORE THE GOWANUS CANAL

1. Early Settlement

European settlement in the vicinity of New York City began with Dutch and English farmers and traders. Generally, well-organized congregations and companies of English settlers began towns on eastern Long Island and at Gravesend. The Dutch settlements around New Amsterdam, on the other hand, grew and developed in a rather piecemeal fashion (Howard 1893:41; Stiles 1867:48). In 1636, Jacob Van Corlaer, an official in the Dutch colonial administration, made the first recorded purchase from the Gowanus Indians in present Kings County. (Gowane was the name of a leader of the Canarsee at that time, and his name was corrupted by the Dutch into the familiar—and probably unique—Gowanus.) Before the year was out, four other individuals—including Wouter Van Twiller, Director of the Province of New Netherland—owned some 15,000 acres. This huge tract was located in what is now Flatlands and Flatbush, with Van Twiller's land including all of Red Hook and Governor's Island. Although these purchases occurred without the consent or knowledge of the Directors of the Dutch West India Company in Holland, in 1638 the Company granted Van Twiller the right to occupy and use Red Hook until the Company required its return. The Company granted Van Twiller a patent for this land in 1643 (Ment 1979: 12; Stiles 1867: 60, 23).

While these large, early purchases may have been motivated by speculative concerns, agricultural development began almost at once on an individual basis. The patroonship system of settlement, under which

the Dutch West India Company granted large tracts of land to companies that organized and transported fifty or more settlers to New Netherland, failed completely on Long Island. In response, the Amsterdam chamber of the West India Company issued a proclamation in 1638 which attempted to encourage individual settlement, offering free passage and other inducements to farmers deemed "respectable." Every emigrant, after signing a pledge of obedience to the local representatives of the Company, was to be provided, in exchange for an annual payment of a quit-rent, "according to his condition and means, with as much land as he and his family can properly cultivate." By assuring colonists legal and inheritable estates, this change in policy resulted in a slow but steady increase in the number of settlers. By the early 1640s, Dutch farmers settled on much of the land along the Brooklyn shore south of what is today Fulton Street, although there was some squatting prior to purchase and some absentee ownership (Stiles 1867: 27, 23; Ment 1979:11-13).

Warfare between the Dutch and local Delaware groups from 1643-45, precipitated by Governor William Kieft's abysmal management and his massacre of friendly Delaware near present-day Jersey City, soon disrupted Dutch settlement south of Gowanus Creek. The early farmsteads were destroyed. Renewed settlement began after a 1645 peace agreement. Breukelen received a town charter in 1646, for an area that encompassed what is now the Brooklyn Heights Landmark Historic District. To the south, Red Hook remained in the hands of the now ex-governor Van Twiller until 1652, when the Dutch West India Company—concerned over the amount of land held by past and current Company officials—revoked Van Twiller's patent for this and other tracts of land. Governor Stuyvesant, Van Twiller's successor, transferred title to Red Hook to the town of Breukelen in 1657 (Stiles 1867: 52, 60; Sherman 1965:4; Ment 1979:15; Ment and Donovan 1980:50-51).

The area was visited in 1679 by Jasper Danckaerts, a Dutch missionary searching the East Coast for a suitable site for a settlement who kept a detailed journal of his travels. The fecundity of the country is illustrated by a few often-quoted passages:

It is not possible to describe how this [the Upper] bay swarms with fish, both large and small, whales, tunnies and porpoises, whole schools of innumerable other fish, which the eagles and other birds of prey swiftly seize in their talons when the fish come up to the surface, and hauling them out of the water, fly with them to the nearest woods or beach, as we saw (Dankaerts 1913 [1680]: 36).

His description of a visit to a house in the neighborhood provides a glimpse of the region's natural and cultivated abundance:

We proceeded on to Gouanes, a place so called, where we arrived in the evening at one of the best friends of Gerrit, named Symon. He was very glad to see us, and so was his wife. He took us into the house, and entertained us exceedingly well. We found a good fire, half-way up the chimney, of clear oak and hickory, which they made not the least scruple of burning profusely. We let it penetrate us thoroughly. There had been already thrown upon it, to be roasted, a pail-full of Gouanes oysters, which are the best in the country. They are fully as good as those of England, and better than those we ate at Falmouth. I had to try some of them raw. They are large and full, some of them not less than a foot long, and they grow sometimes ten, twelve and sixteen together, and are then like a piece of rock. Others are young and small. In consequence of the great quantities of them, everybody keeps the shells for the purpose of burning them into lime. They pickle the oysters in small casks, and

send them to Barbados and the other islands. We had for supper a roasted haunch of venison, which he had bought of the Indians for three guilders and a half of *seewant*, that is, fifteen stivers of Dutch money, [thirty cents] and which weighed thirty pounds. The meat was exceedingly tender and good, and also quite fat. It had a slight spicy flavor. We were also served with wild turkey, which was also fat and of a good flavor; and a wild goose, but that was rather dry. Everything we had was the natural production of the country. We saw here, lying in a heap, a whole hill of watermelons, which were as large as pumpkins, and which Symon was going to take to the city to sell. They were very good, though there is a difference between them and those of the Caribbee Islands; but this may be owing to its being late in the season, and these were the last pulling (*Ibid.*: 53-54).

The larger tracts of the early settlers were long and narrow, more or less perpendicular to the shore. This configuration featured use of multiple environments by domestic agrarian economies: the west edge of the plots fronted on the bay, an important market route to Manhattan; the marsh grass at the shore made good cattle fodder; above the shore were fine pasture lands; and further inland, sloping upwards to a long ridge which crested at what is today Sixth Avenue, the wooded terrain became woodlots for the early inhabitants.

2. Early Mills

The Dutch settlements near Gowanus Creek, and their exploitation of its resources, were governed by the location of the creek and its adjacent lowlands, illustrated by a map made in 1767 (Figure 2.1). Gowanus Creek and its numerous small tidal tributaries dominate the landscape; roads run generally near the edge of the fastland, including one south of the creek

labeled "Road to the Narrows." Scattered farms with cleared fields and orchards are shown along the roads. Upon very close examination, the most striking aspect of the map is the relatively large number of mills, at least five in just the small area shown in the figure, including two on Gowanus Creek. Each has its associated dam and pond. The more downstream mill on the Gowanus, at the mouth of the larger pond, was Denton's Mill (also known as the Yellow Mill). Farther upstream, with a smaller pond, was Freeke's (or Freek's) Mill, also called the "old Gowanus Mill." Denton's Mill, built in 1709 by brothers Adam and Nicholas Brower, was between what is now Third Avenue and the canal, between Carroll Street and the now-filled First Street Basin. Denton's house was nearby, on the south side of Carroll Street between Second and Third Avenues; it burned down in 1852. Freeke's Mill, described as "probably the oldest in the town of Breukelen," was extant in 1661; it stood just north of Union Street, possibly on what is now the east bank of the canal or within the canal itself (Stiles vol. 1 pp. 99-100). Freeke's dam also provided the only crossing of the creek.

Because the Gowanus drainage was (and is) tidal, with virtually no head available, both mills were tide mills (as undoubtedly were the others in Figure 2.1). Unlike more traditional water-powered mills that rely on a falling stream or river for their power, tide mills literally harness the unlimited free power of the moon. They operate by storing the incoming tidal flow behind a dam by means of one-way tide gates; when the tide ebbs, the miller opens sluice gates, directing the water to the mill wheel as it flows back to the sea. The principle was known in Europe in the Middle Ages, and is suited for locations with little topographic relief and significant tidal range (i.e., a sizable difference between the height of low and high tides). Historically tide mills were numerous on the East Coast, particularly in New England where the tidal range tends to be greater than in Middle Atlantic states

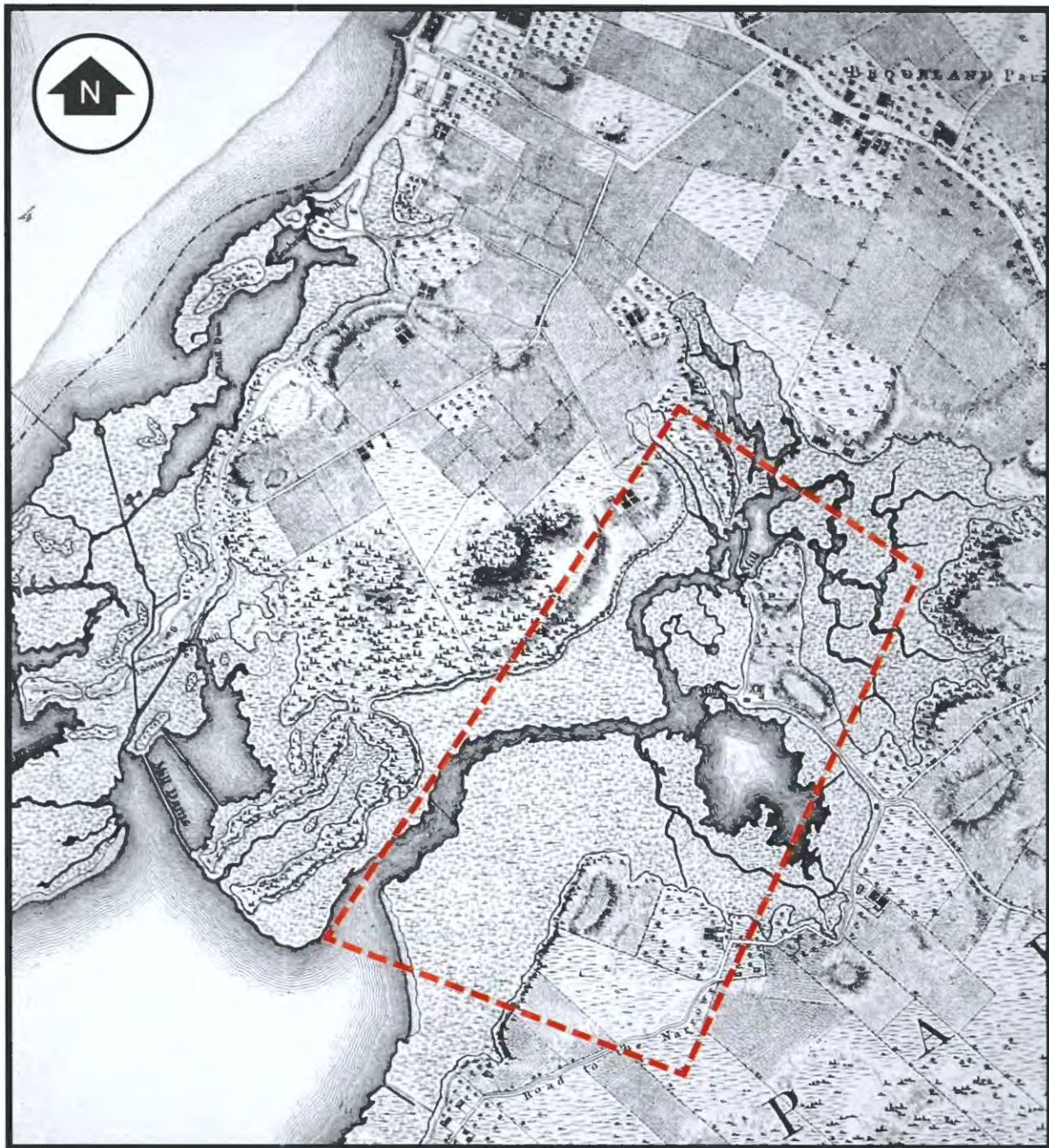


Figure 2.1. Gowanus Canal Assessment of Eligibility: Ratzer, Lt. Bernard. *Plan of the Town of Brooklyn and part of Long Island. 1767.* Scale: 1 inch= 1230 feet (approximately). Project area indicated. The meandering Gowanus Creek and its associated lowlands dominate the landscape. Both Denton's and Freeke's mills are shown.

(due in part to the higher latitude). A small number survive, including the Van Wyck-Lefferts Tide Mill in Lloyd Harbor, New York.

While tide mills have the advantage of an unfailing and cost-free water source, unlike riverine mills, they have several disadvantages: First, although immune to droughts and less susceptible to freezing, they are only able to operate from the time when the tide has receded sufficiently to create a usable difference in height between the stored water and the outgoing tide, until the next incoming tide again reduces this difference. In other words, the mills could only grind for part of the two daily tides. The restored Eling Mill in England, as an example, grinds in two five-hour shifts per day. Furthermore, since the daily tide cycle is about 25 hours, each day's usable times are an hour later than the previous day's, regardless of whether these times are convenient for the miller.

Nehemiah Denton, proprietor of Denton's (or Yellow) Mill, was near the forefront in adopting modern milling technology. In 1812 he paid \$240 to Oliver Evans of Philadelphia "to construct and use patented machines and patented improvements in the art of manufacturing flour and meal...For grain elevation and meal and conveying same from one part of the mill to another and for cooling the meal and attending the bolting hoppers." Denton's license was applicable to his mill "...consisting of one waterwheel driving not more than two pair of millstones at the same time" (Rakos 2004). Oliver Evans (1755-1819) was a native of Delaware who profoundly affected American industry with the publication in 1795 of his *Young Mill-Wright & Miller's Guide*. This volume described his design of the first automatic flour mill, in which the grain is elevated, cleaned, ground, cooled, sifted and packed by mechanical equipment driven by the mill's water wheel. Two men could do work that had previously employed four men and a boy, since the

grain, meal and flour no longer had to be moved manually. Evans obtained a patent in 1790, the third issued by the new Patent Office (Evans 1990 [1795]).

3. The Revolutionary War

The Gowanus Creek drainage was the scene of part of the Battle of Long Island on August 27, 1776. American troops fleeing northward ahead of the British crossed Gowanus Creek at the Freeke's mill dam, and the mill and the bridge were burned by the Americans. The scene of the battle is shown in Figure 2.2, a detail from a map drawn shortly after the battle: the blue rectangles represent the American forces, and the dotted line across "the Swamp" toward "Gen'l Putnam's Camp" (behind a fortified line) shows the Americans' route. Denton's millpond is also discernible, below the word "Swamp."

It is worth noting that, although not strictly within the present study area, American battle dead were reportedly buried nearby: "There was then in the vicinity a sort of island rising from the marsh, and there these gallant young soldiers' mangled bodies were interred. This place was but an acre in extent and is now inclosed by the lines of Third avenue, Seventh and Eighth streets, and was afterward used as a negro cemetery" (*Brooklyn Eagle* 1891). This is the same burial that was the subject of the *Times* article in May, 1998 (*op. cit.*).

The site of the battle was visited by Benson Lossing in 1850, at which time he sketched the rebuilt Freeke's Mill "before it was destroyed" (Plate 2.1). Lossing's own caption describes the scene: it is "...a view of the old mill on the site of that of the Revolution," as seen..."from the west side of Gowanus Creek, looking southeast. In the extreme distance is seen the 'Yellow Mill'...The upper [i.e., Old Gowanus] mill was fired by Captain Ward on the 27th (Lossing 1860, note 17 to vol. 2, Chapter 55).

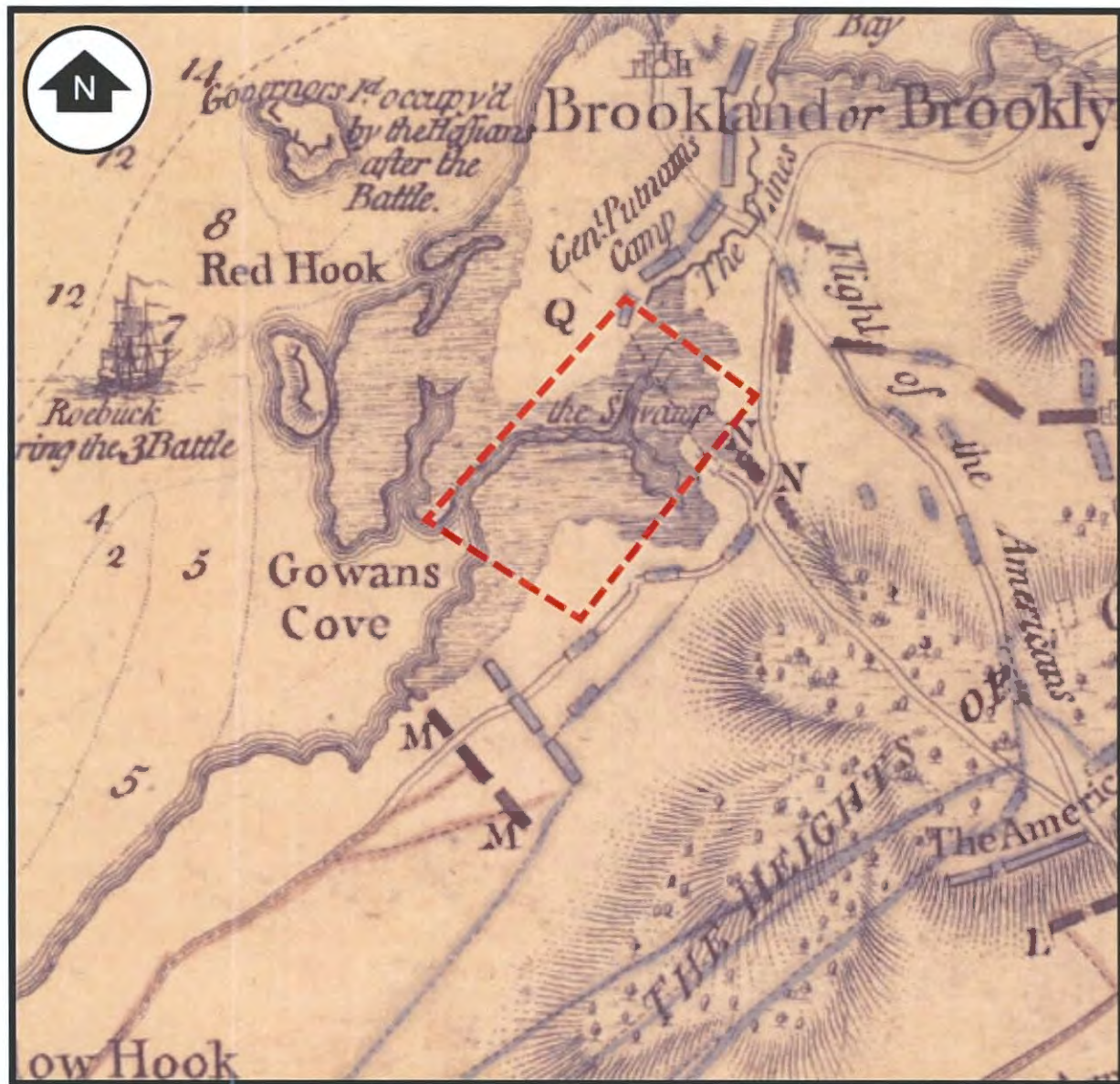


Figure 2.2. Gowanus Canal Assessment of Eligibility: Faden, William. *A Plan of New York Island, with part of Long Island, Staten Island & east New Jersey...* 1776. Scale: 1 inch= 2650 feet (approximately). Project area indicated. This map, drawn after the Battle of Long Island, shows the role the creek and its wetlands played in the course of the battle. The dotted line indicates the location of Freeke's mill dam where the retreating Americans crossed the creek.

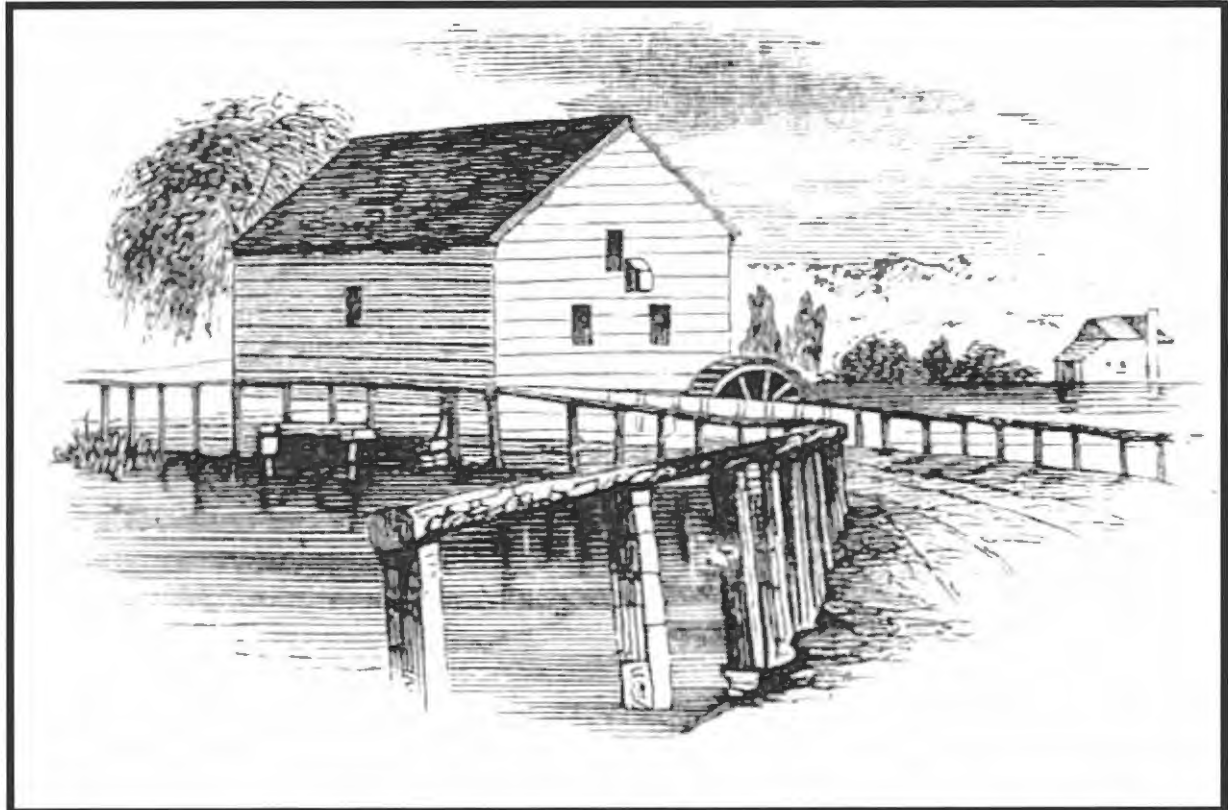


Plate 2.1. Gowanus Canal Assessment of Eligibility: Lossing, Benson J. "Brower's Mill". The structure in the foreground is the mill built to replace the one burned in August of 1776 during the Battle of Long Island. In the distance is Denton's mill. Source: *Pictorial Field Book of the Revolution* (Volume II), 1860.

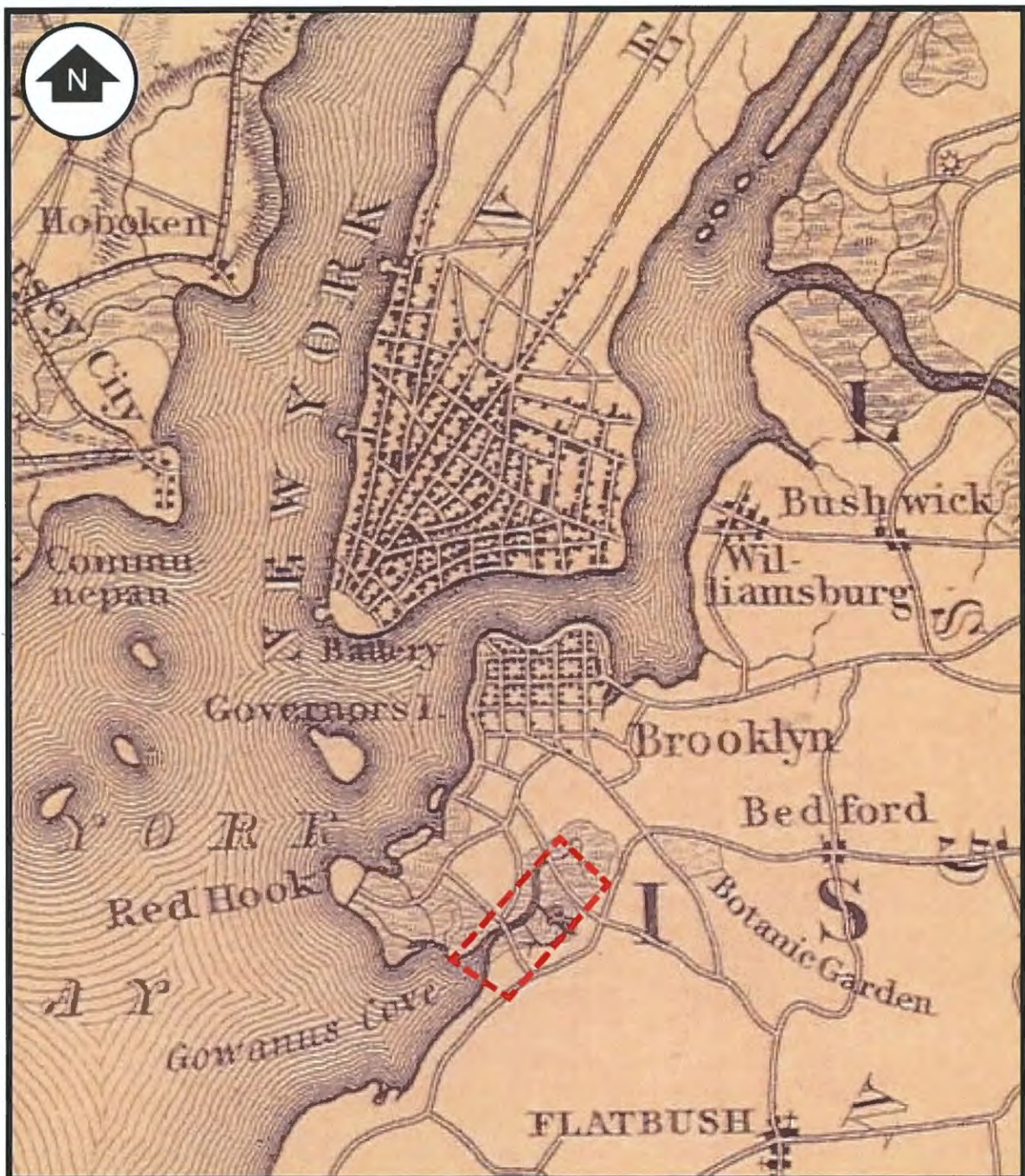


Figure 2.3. Gowanus Canal Assessment of Eligibility: Gordon, Thomas. Detail from *Map of the State of New Jersey...* 1833. Scale: 1 inch= 1 mile (approximately). Project area indicated. Although Brooklyn was a growing town with a neat grid of streets, the Gowanus area remained rural, two centuries after Dutch settlement began.

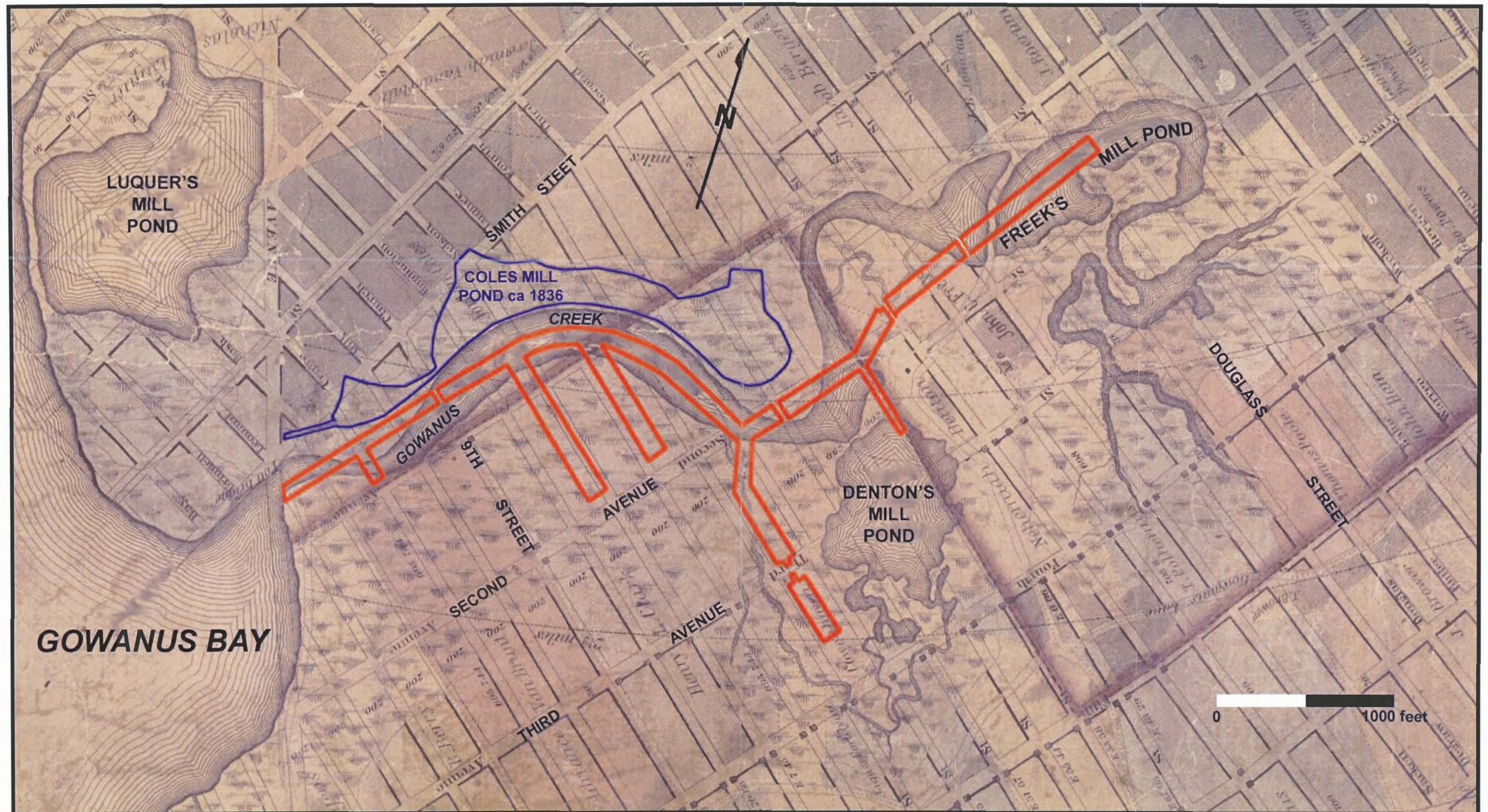


Figure 2.4. Gowanus Canal Assessment of Eligibility: Historic Creek, Marsh, and Mill Pond Environment of the Gowanus Canal (base map: Colton 1849; Coles mill pond from Bleecker 1836; canal outline in red from U.S. Army Corps of Engineers 1942). Base map notation indicates it was probably prepared ca.1839, and prior to completion of the first Hamilton Avenue bridge over Gowanus Creek. The detailed street grid, very close to the urban landscape actually created later, makes this map especially useful for understanding the route taken by canal engineers. The apparently rapid disappearance of Coles mill pond from the landscape after circa 1836 suggests the ephemeral nature of ponds created in salt marsh environments.





Figure 2.5. Gowanus Canal Assessment of Eligibility: Bleeker, J. Detail from *Executor's Sale of Property belonging to the Estate of Jordan Coles Dec'd. 1836*. Scale: 1 inch= 140 feet. Gowanus Creek is at the bottom of the figure.

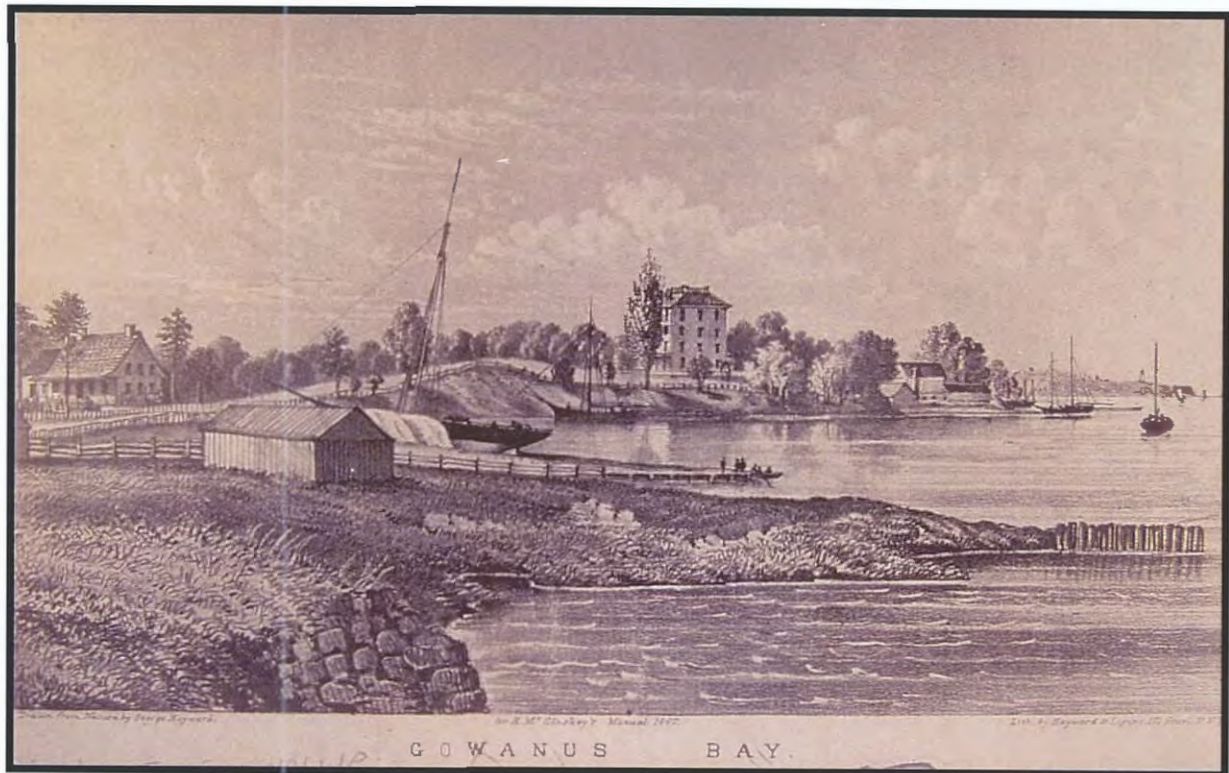


Plate 2.2. Gowanus Canal Assessment of Eligibility: Hayward, George. "Gowanus Bay". A view of Gowanus Bay in the early- to mid 19th century. Source: Brooklyn Public Library.

Coles' holdings, also illustrates the near absence of built streets. The core of the property was located on the north side of Gowanus Creek in the vicinity of Smith, Centre, Mill and Hall Streets, but the improvements on the property bear no relationship to the overlying grid of paper streets. Three major structures are mapped: a house on what is now the western corner of Smith and Mill Streets; a "Mansion" in the middle of Hall Street between Smith Street and the creek; and a mill at the foot of Hall Street, at the mouth of a large millpond separated from the creek by a narrow berm. The tide gate is clearly visible as a break in the berm just upstream from the mill. There are also three subsidiary structures, unlabeled as to function. Neither the mill nor the pond appeared on the 1767 map, the last map with sufficient detail to show them had they existed.

Cole's millpond was shown and labeled on a city map published the same year (Figure 2.6), although no streets in the immediate vicinity were shown except Smith Street. Streets—undoubtedly existing in plan only—were, however, shown throughout the wetlands that extended from "Freeke's Mill Pond" all the way to the bay, even though the only high ground was a hillock below Denton's pond and the other higher places where the old roads still ran. The Hamilton Avenue bridge had become the second crossing of the Creek.

The absence of most of the streets is made even more evident by a U. S. Coast Survey map published in 1844 (Figure 2.7). Intended principally for use by mariners, it shows topography and development in great detail to aid in coastal navigation. Clearly, in spite of the grandiose urban aspirations implied by the two 1836 maps, there were still virtually no streets near the creek, other than the old road to the Narrows and the Hamilton Avenue bridge crossing the creek at its mouth. More farmsteads were appearing along these roads, and cleared fields are distinguishable from marsh and forest. Freeke's, Denton's and Cole's

mill ponds are shown, and for the first time, Gowanus appears as the name of a place, not just a bay and a creek.

D. DESIGN AND CONSTRUCTION OF THE GOWANUS CANAL

1. Planning *circa* 1847-1849

By 1846, the Gowanus marshes were perceived as a hindrance to local development, but also as a possible solution to a by-product of Brooklyn's rapid growth nearby: lack of adequate drainage for sewerage and storm water. The first plans for the marshes called for using them as a glorified sewer with commerce a secondary consideration, but the city government quickly shifted the emphasis towards filling the marshes for development and creating a tidewater canal that would somehow cleanse itself of urban wastewater. For over two decades beginning in the late 1840s, real estate and related commercial interests drove development in the marshes through a combination of private interest and public authority. Use of the canal as a sewer proceeded as an unplanned, increasingly noxious by-product of this development, and was only addressed after decades of public outcry.

At the direction of the Brooklyn Common Council, the initial plan for using the waterway as a drain was devised in 1846-1847 by Maj. David B. Douglass (1790-1849). A West Point-trained engineer who had been in charge of several canal projects including supervision of the Morris Canal inclined planes *circa* 1829-1831, Douglass was involved in early plans for Croton River water supply to New York City *circa* 1833-1835 and laid out Brooklyn's Greenwood Cemetery in 1838 (Wilson and Fiske, eds., 1887-1889; Kalata 1983). He prepared two variants of a plan calling for collection of Gowanus Creek tidewater in a large basin equipped with one or more sluice gates at the head of the creek, from which controlled



Figure 2.6. Gowanus Canal Assessment of Eligibility: Colton, J. H. Detail from *City and County Of New - York*. 1836.
Scale: 1 inch= 1210 feet (approximately). Project area indicated.

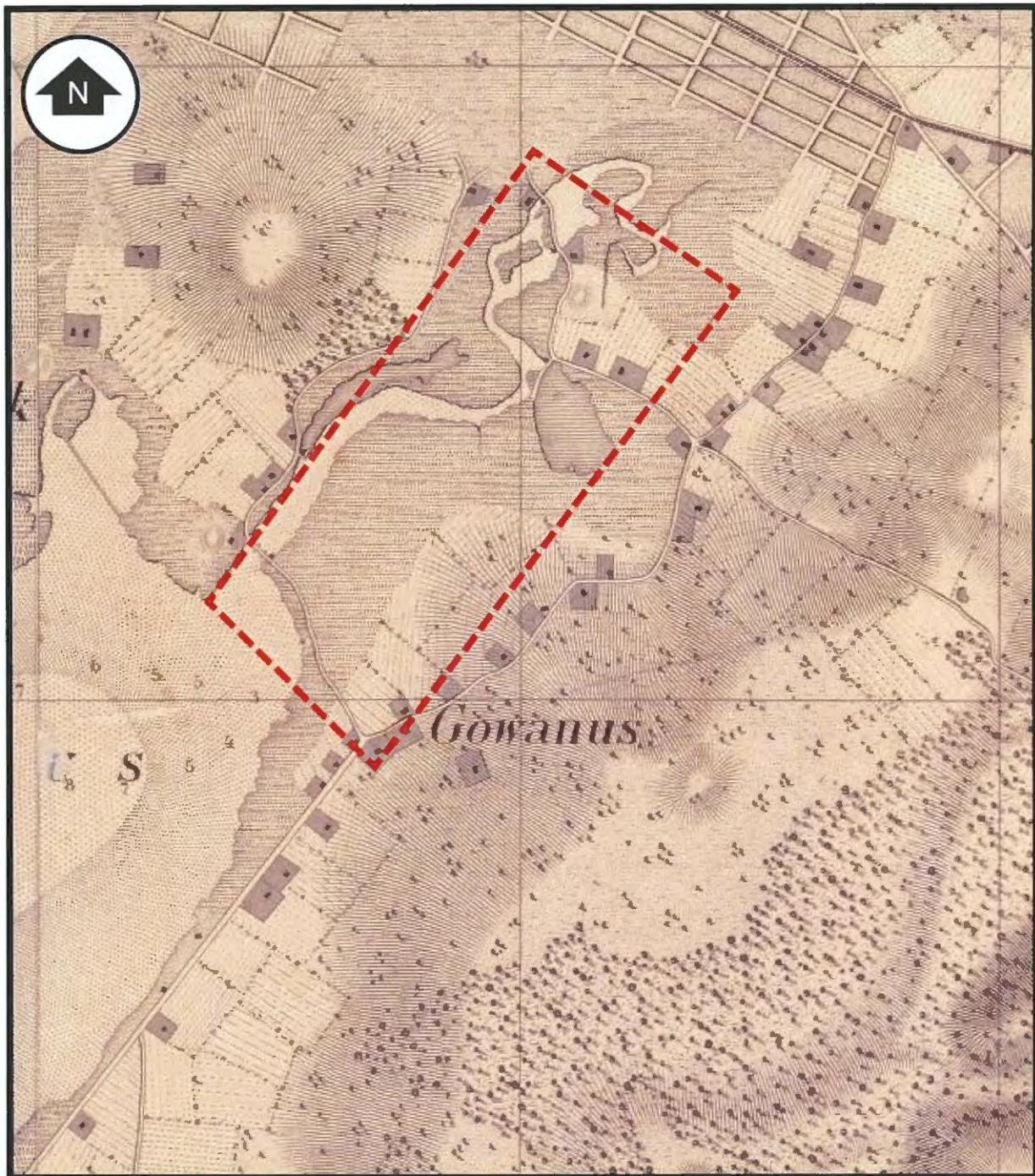


Figure 2.7. Gowanus Canal Assessment of Eligibility: U.S. Coast Survey. Detail from *Map of New-York Bay and Harbor...* 1844. Scale: 1 inch= 1325 feet (approximately). Project area indicated. Although intended to guide mariners, the chart nonetheless shows landforms and improvements in great detail. While most of the area in the immediate area of Gowanus Creek was still vacant lowland, much of the adjacent high ground was under cultivation.



Figure 2.8. Gowanus Canal Assessment of Eligibility: Douglass, Maj. D.B. Plan for Canal from Gowanus to Wallabout Bays. 1870. Scale: 1 inch= 870 feet (approximately). Project area indicated. This is a reprint of the second of Maj. D.B. Douglass' plans for a canal system in Gowanus Creek, including a canal from Wallabout Bay to flush out the Gowanus Creek canal. Dark line around creek and mill ponds is border between marsh areas and slightly higher fast land. Although the Gowanus Canal was not built to this or Douglass' other 1847 plan prepared for the City of Brooklyn, his work presaged the flushing system built in the early twentieth century.

release of water into an excavated channel would flush away sewerage deposited into the channel rather than the basin. His basin was planned for the approximate location of the end of the canal as later built, and was anticipated as a commercial center for barge traffic. One variant called for using only the Gowanus Creek drainage, through which he proposed two parallel canals—one for intake and one for release of tidewater, each with lift locks as gates to accommodate barge traffic into the basin. The second variant involved excavating a smaller single channel through the meadows and flushing it out with water from Wallabout Bay, to which a canal about a mile long would be built. With hindsight, Douglas' second idea was more effective as a flushing system and was similar to the solution to Gowanus Canal pollution built in the early 20th century. He implied the Wallabout Bay variant was less feasible, however, because of deep cuts involved and the need for thirteen bridges in heavily-developed urban areas. The flushing system completed in 1911, discussed below, used a tunnel rather than an open cut. Lack of any municipal action on Douglas' plan may reflect the fact that his proposed channels through the meadows had prismatic-section open cuts with sloped earthen banks, and that he also proposed lowering the grade of the meadows to reduce embankment heights. Focused almost entirely on upland drainage and initial costs, Douglass wanted to avoid the expense of timber-and-stone cribwork walls, which he believed could be built by future commercial interests (*ibid*; cribwork structures are discussed below in Chapter 3). Lowering meadow grades and leaving all wharf construction to private development probably inhibited any support for these plans by large landowners who hoped to convert the meadows into usable real estate. At least one of his plans, for the canal to Wallabout Bay, also contemplated excavation along a straight line through the meadows, with minimal use of Gowanus Creek. Despite his low proposed canal sides, such a plan probably seemed more expensive than maximizing

use of the available natural channel (Figure 2.8; *Brooklyn Daily Eagle* 1847a, 1847b; Stiles, ed., 1884: 643).

Within about a year of Douglas' proposals, one of the city's most prominent landowners and developers introduced a plan for a canal which would drain the meadows and allow them to be filled, using as much of the creek as possible. Daniel Richards, chief proponent and builder of Atlantic Basin, also served as an alderman, and in this capacity he worked with the city surveyor, Willard Dey, to present the Common Council with a route for a 5,400-foot-long, 100-foot-wide canal approximately 14 feet deep, excavated to five feet below mean low water with walls at four feet above mean high water. This plan, adopted by the Common Council by early 1849, defined the alignment of the main canal as later completed, and clearly called for raising adjacent land above the saltmarsh elevations. (Assuming today's average 4.4-foot tidal range at the Battery applies to Gowanus Creek, these specifications would have put Richards' canal walls at least 6.5 feet above what was then mean sea level. Current canalside elevations appear to be eight to ten feet above mean sea level, which seems to confirm the overall conformity of the Richards plan with the main line of the canal as completed *circa* 1870).

Probably to avoid the expense of cribwork, Richards evidently proposed timber sheet piling to retain vertical canal banks, which as discussed below proved insufficient. He also planned a publicly-constructed basin at the head of the canal and projected a number of other privately-built basins. While the former basin was never built, several of the others shown on his plan closely anticipate the locations (although not the dimensions) of the private basins completed during the 1870s (Figure 2.9; Richards 1848; *Brooklyn Daily Eagle* 1849).

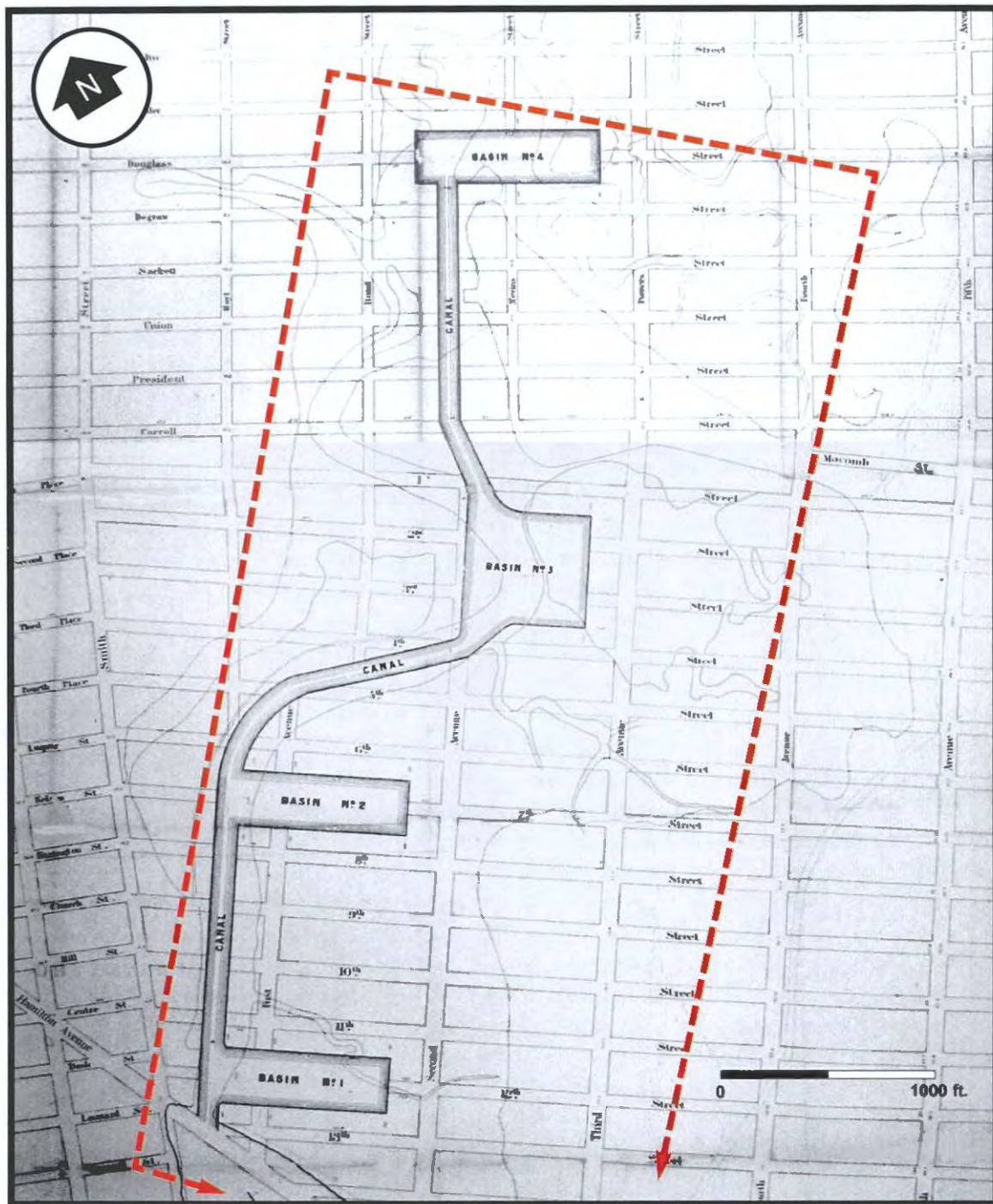


Figure 2.9. Gowanus Canal Assessment of Eligibility: Richards, Daniel. *Gowanus Canal Plan*. 1848. Project area indicated. Daniel Richards plan, prepared for the City of Brooklyn, defined precisely the alignment of the Gowanus Canal's main section as approved in 1849 by the State of New York, and as built in several episodes between 1853 and 1870.

**NATIONAL REGISTER OF HISTORIC PLACES ELIGIBILITY ASSESSMENT
GOWANUS CANAL, BOROUGH OF BROOKLYN, KINGS COUNTY, NEW YORK**

The canal alignment was conspicuous for its curved, multi-angled course. The southern half ran almost entirely within the tidal channel to 4th Street and Second Avenue, minimizing dredging requirements, from where it cut across two meanders in three different straight alignments to end within the former Freek's mill pond. The street grid converging on the meadows from the uplands met at an angle about where these straight cuts through saltmarsh began, and it can be surmised that the northern half of the canal was laid out to conform to the grid and allow for rectilinear lot development along the new waterfront. One later source claims that the creek only ran to 4th Street, which would also explain why the sharp change in direction was taken (*Brooklyn Daily Eagle* 1868b; Figures 2.4 and 2.9).

The canal was intended not only to drain the meadows, but to receive waste and storm water run-off from the nearby fast land. Contemporary description of the Richards plan heralded a variety of potential benefits:

The great object to be attained in making this important work, is the removal of the marsh miasma which hangs about Prospect Hill and other portions of the city, making them liable to intermittent fevers and other diseases; and thus shutting them out from improvement. [The plan] would also lay the lands open to use, and make that portion of the city valuable for purposes of commerce and the mechanic arts...The expense of filling up the Gowanus meadows to a reasonable height of grade would...probably not be accomplished in a hundred years, and any plan which can at once—as this canal would—do away their pestiferous miasmata by draining the marshy grounds, ought to be hailed with enthusiasm by all whose property is within their influence (*Brooklyn Daily Eagle* 1849).

The same article addressed the expected

...accumulation of filth from the high grounds [which] would take place in the canal and basins sufficiently to make their vicinity unhealthy and [the problem] that the low lands should be filled up and the drainage effected through underground sewers...

with the assurance that

...the vicinity of bodies of salt water is never unhealthy; and the supposition that such accumulations of filth must be exceedingly slow, as at every flood tide five feet of good clean water would be carried up from the bay, which would return with sufficient velocity to carry off most of the deposits that may take place.

To pay for construction, shortly after he secured city approval Richards arranged for an act of the state legislature (Ch. 79, Laws of 1849) authorizing property assessments of lots along the canal and the approximately 1,700 acres expected to be drained. Running sewerage into the canal was not sanctioned under this act. Of more immediate significance, neither this act nor Common Council actions evidently created a mechanism for administering or executing construction. Richards, whose primary personal enterprises were in deepwater coastal and international shipping facilities, soon parted company with the meadows' owners when he attempted to build a pier across Gowanus Bay to create a large basin. This design would have diminished the value of canalside lands or canal basins, and the owners of these projected lots defeated his plans in the legislature. He appears to have had no further involvement with the canal he planned (Stiles, ed., 1884: 578; *Brooklyn Daily Eagle* 1878b).

The only public improvement in the vicinity of the proposed canal between the time of Richards' plan and the earliest work on the waterway was the 1849 construction of a bridge over Gowanus Creek at 9th Street, a drawbridge built by or in association with the Coney Island Plank Road Company. The 30-foot draw was likely required because of the creek's status as a canal. The Brooklyn City Railroad Company used this bridge *circa* 1854 and rebuilt it by 1861, when it was abandoned in an open position (Parsons Brinckerhoff Quade & Douglas, Inc. 2003).

2. Initial Construction *circa* 1853-1854

Land sales along or near the proposed canal quickened even before any work was done on the waterway, and it was one or more optimistic landowners who financed the earliest waterway improvements. The most prominent buyer was Edwin C. Litchfield (1815-1885), a lawyer rich from work with railroads, who in 1852 acquired nearly a square mile of land southeast of the canal from the Cortelyou estate including about 1,000 feet of designated canal frontage between 5th and 1st Streets. Half this area was marsh, and of little value without the canal (*Brooklyn Daily Eagle* 1869a; Stiles 1870: 583). Another nearby landowner, "Mr. Fisk,"—possibly Edward W. Fiske, a prominent local politician at the time—funded some or all of the poorly-documented initial attempt to improve the waterway, from about May 1853 through perhaps 1854; a description of the work fifteen years later claimed several owners were involved. A dredge and gangs of (probably Irish) laborers evidently created a 100-foot-wide channel to about the present end of the canal, stimulating attempted sales of some canalside lots in late 1854 with a 16-to 20-foot wide "timber and stone dock" which was probably cribwork. Most of the 1853-1854 canal work was evidently of more speculative than navigational value, however, creating a few feet of draft at low water. The waterway in most places had no finished walls, or was lined with timber

sheet piling which could not withstand stormwater washing mud into the canal (*Brooklyn Daily Eagle* 1853, 1854, 1868b). The situation of Irish squatters along the canal in 1856, living in one-room shanties "...about eight feet below the curb stone.." subject to frequent tidal inundation, clearly indicates minimal modifications to the marsh along the creek (*New York Times* 1856).

3. Gowanus Area Development and Authorization of Canal Improvements *circa* 1855-1866

The principal administrative problem with the work in the early 1850s was the absence of any agency to design, fund, or build a usable waterway. Despite the city's 1849 authority to assess property owners, the Common Council evidently made no immediate attempts to direct canal improvements. In 1855, the city secured an amendment to the 1849 canal act (Ch. 431, Laws of 1855) allowing for appointment of commissioners to direct canal work and fund it with city-issued bonds paid by property assessments. Private owners could reduce their assessments by completing necessary canal work—probably wharf construction—on their own (*Brooklyn Daily Eagle* 1878b). Public improvements made by special commissions, often composed of interested landowners, were common in this period of Brooklyn's history, but no commission to improve the canal was formed until 1866 (Stiles 1870: 583). While not well documented, this lack of action may reflect landowners' resistance to paying for a canal when their adjacent or nearby properties were not suitable for sale or immediate canal benefits. A burst of enthusiastic private activity near the meadows in the early 1850s, reflected in the land sales noted above, evidently did not create adequate political conditions for significant canal work. Beginning *circa* 1853, landowners like Edwin Litchfield improved streets on upland tracts near the meadows, and ran some streets across the meadows

and to the canal. West of the canal, these private efforts before 1860 sometimes involved cutting down hills, which had the dual development advantage of creating level grades on the upland and filling the lowland. Prior to the late 1860s, however, the only apparent development along the canal was the plant of the Citizens Gas Light Company (later the Brooklyn Union Gas Company), opened in late 1859 along about 700 feet of waterfront between 4th and 7th streets on the west side of the canal (*Brooklyn Daily Eagle* 1853, 1859b; Stiles 1870: 583).

In a long prelude to creation of a canal commission, there was a series of improvements in street, landfilling, sewer, and bridge conditions by municipal or special commission action *circa* 1857-1865. These actions drained much of the meadows and imposed more of the street grid on the original lowlands. The earliest municipal involvement in this period was a requirement that lots along privately-developed streets through the meadows be filled to within three feet of street grades, possibly to reduce hazards along elevated earthen causeways through the wetlands (*Brooklyn Daily Eagle* 1857, 1858). The city graded Hamilton Avenue from the canal to Third Avenue and completed a new wooden swing bridge on that road in 1859. Late in 1858, the Board of Sewer Commissioners began to lay out sewers into the canal, which by *circa* 1878 included lines along Bond, President, Sackett, and Centre streets. Although of uncertain legal status relative to the canal, the sewers drained much of the expanding upland. In 1860, a 3rd Street Commission spearheaded by Edwin Litchfield was established under state authority (Ch. 741, Laws of 1860) to widen and improve that road from Smith Street to Ninth Avenue, including construction of a bridge over the canal. Bonds for the work were backed by assessments of adjacent property owners, a majority of whom had to approve the work. The new 80-foot-wide street was to have a grade 20 feet above the meadow, although this elevation was probably not reached in all places. Completed *circa* 1864, the 3rd

Street Bridge was a pipe-truss swing structure about five feet above the water. The first poorly-documented bridge at Carroll Street, built privately, was completed by the early 1860s. Thus four of the five eventual street crossings of the canal (all but the one at Union Street) were first built before the major canal improvements. Although these four were swing or draw structures to accommodate canal traffic which was extremely limited in this period, the fact that the street grades at these crossings pre-dated most of the canal construction had significant effects on later canal and street traffic, as discussed below (*Brooklyn Daily Eagle* 1859a, 1860, 1861, 1862b, 1865; 1869a, 1878b; Stiles 1870: 583; Parsons Brinckerhoff Quade & Douglas, Inc. 2003).

By 1866, landowners in the shrinking meadows had several somewhat conflicting reasons to complete the canal. The improvements of the preceding decade had created more accessible land for development, but also provided better access to South Brooklyn where the on-going construction of Prospect Park (built 1866-1874) sparked speculative interest as well as the promise of public recreation. Some argued that the Gowanus section would be better served if the canal were filled and the whole meadows available for residential development (e.g., *Brooklyn Daily Eagle* 1866; Stiles 1870: 619-19; White and Willensky 1978: 436). The canal-area landowners probably realized that development in Gowanus and in South Brooklyn could not proceed quickly without cheap water access for fuel and building materials, and that they could no longer wait if public disapproval of the small waterway and its remaining marshes might grow. In April 1866, they secured state approval for public and private entities to complete the main canal as proposed by Daniel Richards, and to build several private basins. The Gowanus Canal Improvement Commission, whose members included the mayor of Brooklyn and the Kings County treasurer, was empowered to create a channel approximately 6,000 feet long from Douglass Street at the north to Percival

Street about 600 feet outshore of Hamilton Avenue, and was placed in charge of all bridges over the canal. The commission's work, whose cost under a series of 1867-1869 state amendments was not to exceed \$450,000, was financed by bonds backed by assessments on properties within 200 feet of the waterway. The fact that the area subject to assessment was much smaller than the 1700 acres evidently proposed for assessment under the act of 1849 probably contributed to political support for the 1866 commission. At the same time, the private Brooklyn Improvement Company, headed by Edwin Litchfield, was incorporated to build docks or basins along the canal and adjacent areas. Working more or less simultaneously, the commission and the company completed the canal and four of its eventual six basins *circa* 1866-1870; other local owners completed a fifth basin *circa* 1872-1874 (Brooklyn Daily Eagle 1867a-c, 1869a, 1870b; 1872b; Stiles 1870: 583-4; Stiles, ed., 1884: 643).

4. Gowanus Canal Improvement Commission Work *circa* 1866-1870

By 1868, seven state-sanctioned commissions had been created to make improvements in Brooklyn. Despite their ties to municipal authorities, commissions such as the one authorized for the canal were agents of the state and subject to limited local accountability. Their sometimes secretive means of operation, and resistance to public complaints, led to investigations spearheaded by State Senator Henry C. Murphy and to the closing by 1870 of most Brooklyn commissions including the one for the canal (Brooklyn Daily Eagle 1868c, 1869d, 1870a). Before turning over responsibility for the canal to the city, the canal improvement commission appears to have completed the following work under the general engineering authority of L.N. Vibbard:

- ❖ A channel 100 feet wide between Hamilton Avenue and Douglass Street, and 300 feet wide from Hamilton Avenue to Percival Street, was created with low-water depths ranging from seven feet at the north end to 12 feet at Percival Street. Much of the dredging was probably done by the dock contractors noted below. The commission evidently did some channel deepening in Gowanus Bay more than 4,000 feet beyond Percival Street, but, as discussed below, local interests appealed to the federal government for channel maintenance in the bay by the 1880s (Brooklyn Daily Eagle 1868b, 1873b).
- ❖ At least inshore of Hamilton Avenue, the commission built canal walls where none existed previously or were not being built by private interests. Some landowners such as Edwin Litchfield built cribwork walls along their own frontages, often using these walls to fill extensive areas away from the canal. While the authors have found no explicit descriptions of commission-built walls, existing conditions strongly suggest that the commission walls built 1866-1870 were also cribwork, based in part on the poor performance of sheet pile structures in the marsh environment. The commission employed dock contractors including J.B. Wood & Co. and William H. Beard. Beard is best known as the chief builder of Erie Basin *circa* 1855-1880, where he erected what were then the largest crib-retained breakwaters and piers in the port. The clay bottoms of the Gowanus Creek marshes and the absence of nearby fill material, which challenged Litchfield's work with the Brooklyn Improvement Company, would have also made the commission's wall construction difficult. Some earlier Gowanus Canal bulkheads remained in place, one of which evidently collapsed by 1878 (Plate 2.3; Brooklyn Daily Eagle 1868b-c, 1878a; Raber *et al.* 1984).

- ❖ The first bridge at Union Street, an iron pipe-truss swing structure with a central stone pier, was completed in 1868 (*Brooklyn Daily Eagle* 1868a, 1868d; Parsons Brinckerhoff Quade & Douglas, Inc., 2003).

By 1868, before channel work was complete, perhaps a half dozen businesses operated along the canal despite the still-limited navigability of the waterway. Canal traffic prior to creation of full canal depths created unaddressed problems which angered the public and probably contributed to the calls for the commission's retirement. With navigation effectively limited to a few hours a day, boats using the canal swarmed the bridges waiting for opportunities to travel, requiring long periods of bridge openings which greatly inhibited street traffic. Although the state legislature authorized raising the canal bridges five feet to allow most craft to pass under without opening a crossing, the canal commission refused to proceed with such a program as it would have required raising street approaches and nearby building lots. Public opposition to movable bridges became intense, as the Brooklyn Improvement Company found when it built basins past Third Avenue, discussed below. Completion of the main canal minimized bridge openings when depths were maintained, but existing street grades and the need for movable bridges created continual demands for municipal bridge work which continue today (*Brooklyn Daily Eagle* 1868b, 1868d; Parsons Brinckerhoff Quade & Douglas, Inc., 2003).

The canal commission intended to stop sewerage deposits into at least one point on the canal, and the city's sewerage board planned to run all lines into the East River rather than the canal. These projects were never completed, with long-term consequences for canal navigation and water quality (*Brooklyn Daily Eagle* 1868a). During the canal commission's work, the city also succeeded in running a number of public streets without canal crossings from Fifth Avenue to the waterway, including 1st Street, 8th Street, and

Second Avenue. State-authorized street commissions improved Union Street and Fourth Avenue, in addition to the work noted above for 3rd Street. Although in places opposed by canalside landowners who feared loss of warehouse space, public streets laid out on the east side of the canal benefited those interested in the ambitious plans of the Brooklyn Improvement Company (*Brooklyn Daily Eagle* 1868a, 1868e, 1869f).

5. Private Basin Construction circa 1868-1874

The Brooklyn Improvement Company, most or all of whose work was intended to develop Edwin Litchfield's personal holdings in the meadows, filled extensive areas adjacent to four 100-foot-wide basins the company built off the east side of the canal between 8th and 4th Streets. Totalling over 2,600 feet in length exclusive of a controversial crossing of Third Avenue, these channels were later known as the 7th, 6th, 4th, and 5th Street basins, with the latter two in a continuous angled line from the main canal at 4th Street to a point about 400 feet southeast of Third Avenue (Figure 2.10). Although the company's contractor(s) and engineer(s) remain unidentified, there are more detailed descriptions available for this work than for that of the canal commission, which probably differed somewhat in method. Charged only with channel dredging and channel wall construction in the main canal, J.B. Wood & Co. and William Beard would most likely have used floating bucket dredges to excavate from Gowanus Creek (e.g., Raber et al. 1996: 107). The Brooklyn Improvement Company drove piles into clay deposits in large continuous arrays at 11-foot centers except within the proposed basins, and used the piles to support movable railway systems on which dredges (probably bucket types) were mounted. The dredges removed mud from the basin channels and dumped it in the surrounding areas to be filled, providing about two thirds of the fill.

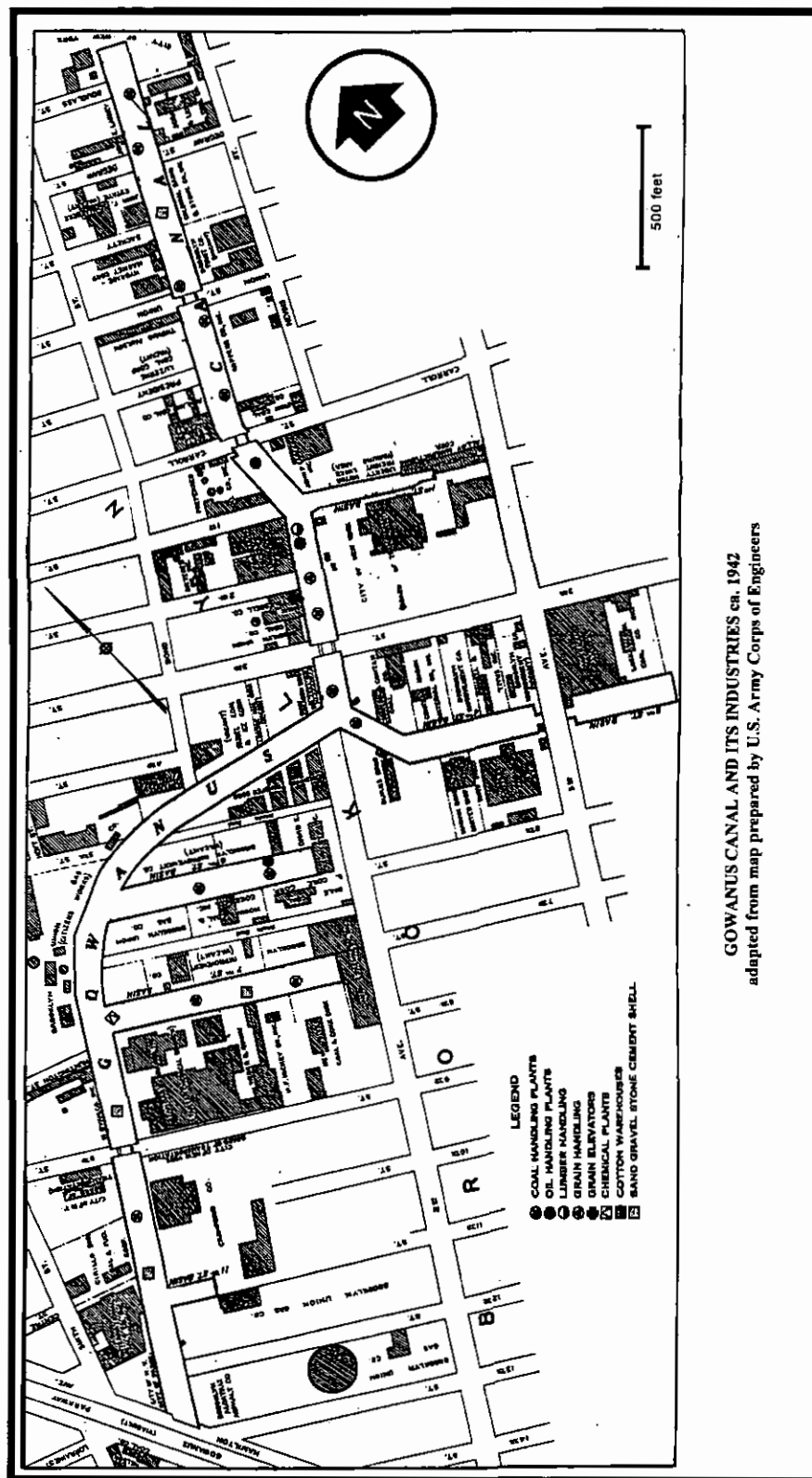


Figure 2.10. Gowanus Canal Assessment of Eligibility: U. S. Army Corps of Engineers. *Map of Gowanus Canal and its Industries.* 1942.

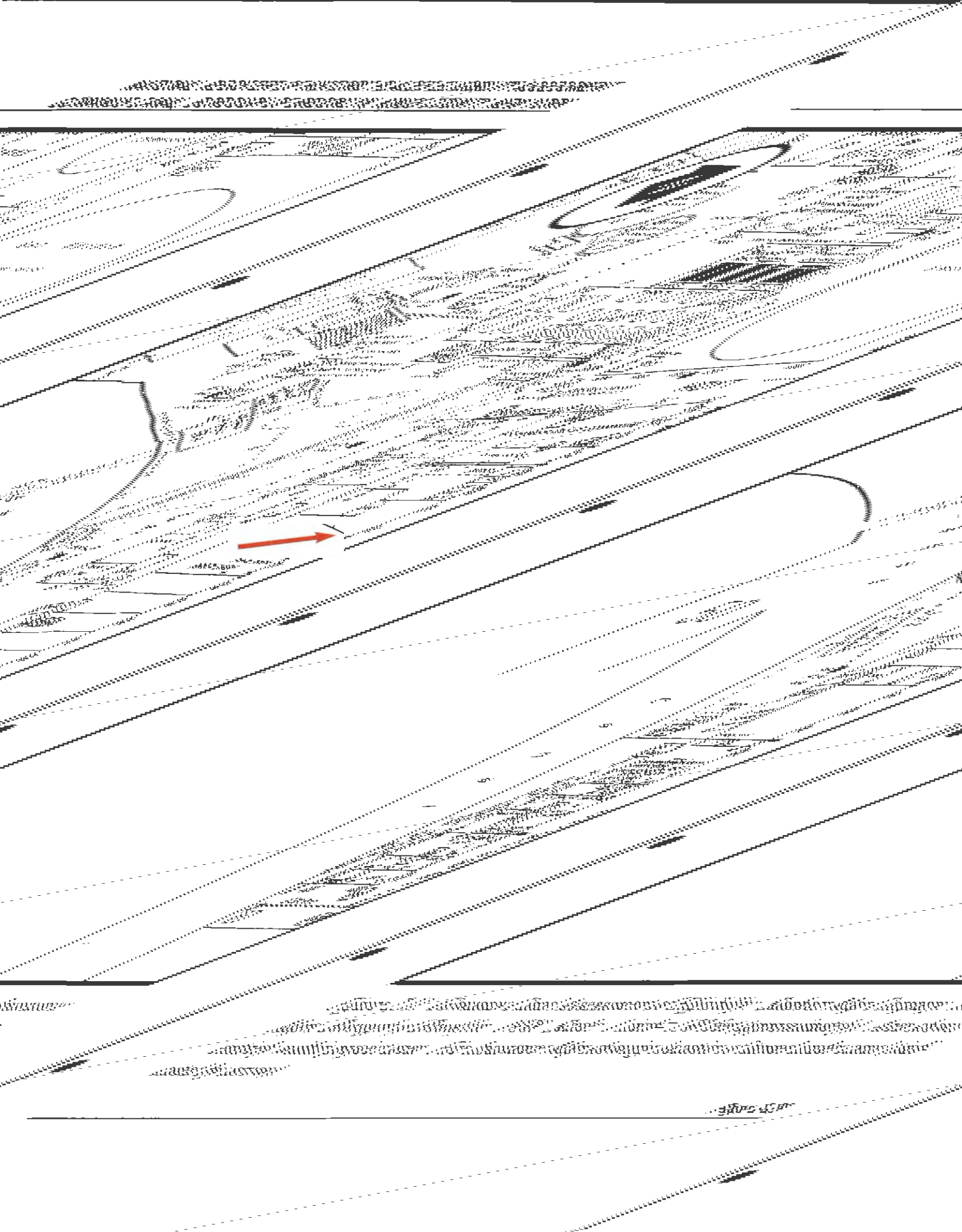




Plate 2.3. Gowanus Canal Assessment of Eligibility: View of an unidentified section of the Gowanus Canal. *Circa 1877.* Taken within about a decade of completion of the main canal, this view suggests the rapid industrial growth along the waterway. Most of the canal walls shown appear to be cribwork with timber fenders, but those at left may be timber sheet piling. Source: Brooklyn Public Library.



Plate 2.4. Gowanus Canal Assessment of Eligibility: View northwest of 5th Street Basin and Third Avenue. *Circa 1876.* Water beyond the bridge is the 4th Street basin, along which stood the large shed of the New York & Long Island Coronet Stone Company (left). The Brooklyn Improvement Company's office (right) still stands at the southwest corner of Third Avenue and 3rd Street. Source: Brooklyn Public Library.

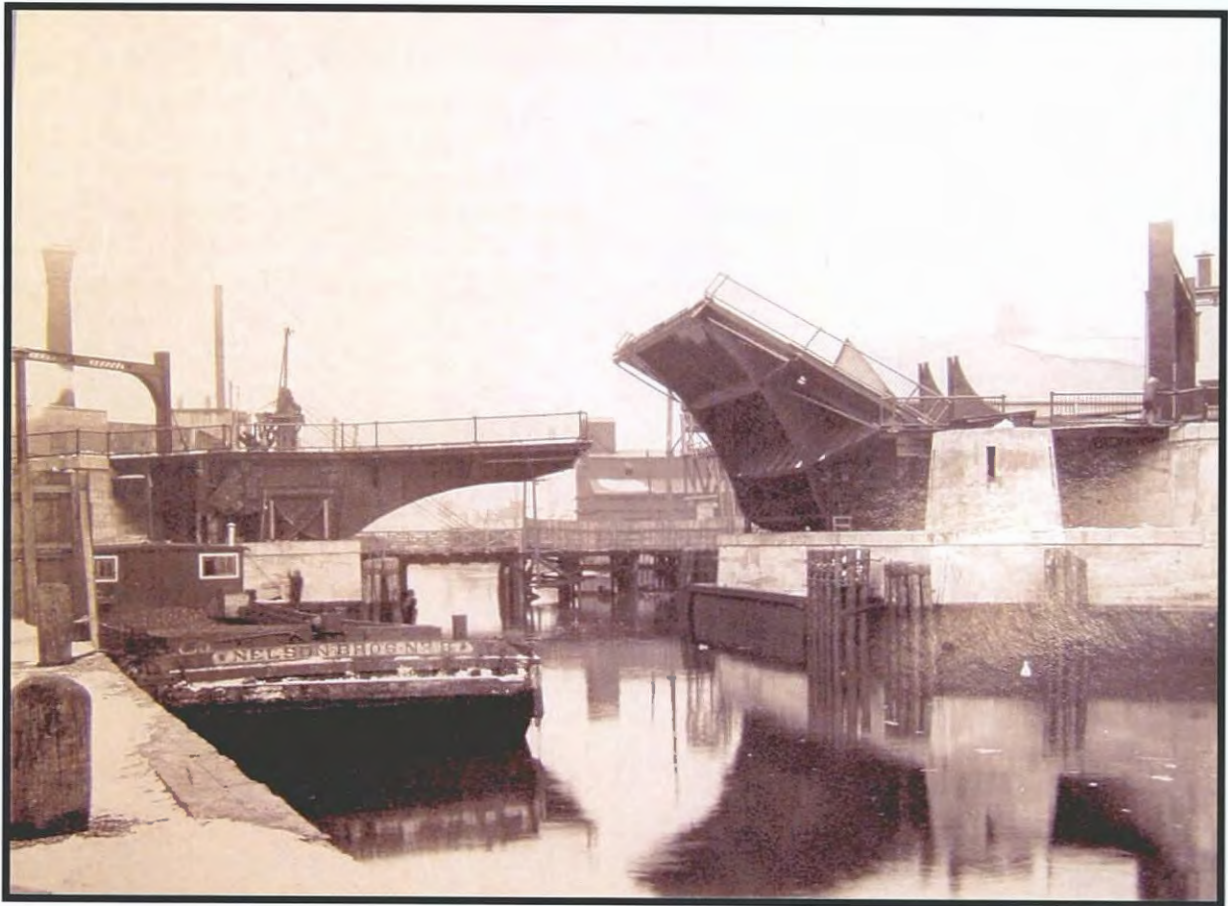


Plate 2.5. Gowanus Canal Assessment of Eligibility: View southwest of the Union Street Bridge nearing completion. *Circa 1905.* The Carroll Street Bridge is visible beyond. Source: Brooklyn Public Library.

been replaced over the last century although the abutments retain most of their 1905 fabric. Of the movable bridges, only the one at Carroll Street, replaced in 1872 as an iron swing bridge and then in 1889 in its present retractile steel-plate girder-type form with a timber deck and steel I-bar stays, retains any historical significance. The one-lane, two-span structure is approximately 105 feet long. The movable span slides along steel rails at a skew to the longitudinal axis to allow for the passage of canal traffic. The last major replacement of components was in 1915, when new tracks and track foundations were installed (Plates 2.6 and 2.7). After a long period of deterioration that resulted in the bridge being kept in the open position from 1985 to 1989, the Carroll Street Bridge was rehabilitated in time for re-opening on its centennial birthday on September 25, 1989. It remains one of only four surviving retractile bridges in the United States and, as noted earlier, is a New York City Landmark and has been found eligible for inclusion in the National Register (Parsons Brinckerhoff Quade & Douglas, Inc. 2003).

The City of Brooklyn rebuilt and enlarged the Third Avenue Bridge between the 4th and 5th Street basins in 1889, installing a 65-foot-long, 70-foot-wide plate girder deck with a clearance of 13 feet above mean high water. The navigable distance between abutments remained 36 feet, but the 1870 abutments were evidently raised and rebuilt for a total length of approximately 120 feet. The 1889 structure remains in place (Plate 2.8; Sanborn Map Company 1904, 1915; City of New York 1949-1958: 1954, pages 154-5).

Work on the main canal was probably not complete when the Gowanus Canal Improvement Commission resigned and the state transferred the commission's duties to the city. The city continued some repairs to walls completed by the commissioners into the early 1870s under an 1871 state law (Ch. 839, Laws of 1871; *Brooklyn Eagle* 1878b), but soon established

that it had no responsibility for canal walls fronting private property. In the mid-1870s, walls along the frontage of the Brooklyn Saw Mill Company collapsed, in a section evidently left undone by the commission. The company's suit against the city failed, partly in the face of an 1862 state law under which "...Brooklyn is not responsible to private parties for the ...malfeasance of her agents," but more significantly because the Court of Appeals held that city authorities succeeding the canal commission were state agents and not acting for the city. The work represented by the canal walls "...did not of right belong to it as a corporation [and] the improvement of the canal was performed not for the benefit of the city but for that of private owners..." (*Brooklyn Daily Eagle* 1878a). While the municipal governments of Brooklyn and the consolidated City of New York did some maintenance dredging and other work related to canal water quality, discussed below, it does not appear that any additional public canal wall construction or repair occurred except at the ends of streets or along city-owned parcels. Some bulkheads remained insubstantial sheet piling, subject to collapse or to stormwashed sediments deposited into the canal, into at least the mid-1890s (U.S. Army 1872-1950: 1894, i, pp. 91-2).

The Brooklyn Saw Mill Company, earlier known as the New York and Brooklyn Saw Mill & Lumber Company, had a sawmill at the west end of 10th Street and appears to have occupied the canal frontage between 11th and 9th Streets from sometime before 1873 to *circa* 1881-1886 (Boyd's 1873; Bromley and Robinson 1880; U.S. Army 1872-1950: 1881, i, 637; Sanborn Map and Publishing Company 1886). The break in their wall, which may have been an older section of sheet piling erected in the 1850s not far from the mouth of the canal, may also have represented the first phase of what became the canal's last basin. While an 1880 atlas shows no breaks in canal walls, an 1886 insurance map shows the same frontage vacant with a break in the wall at 11th Street and an

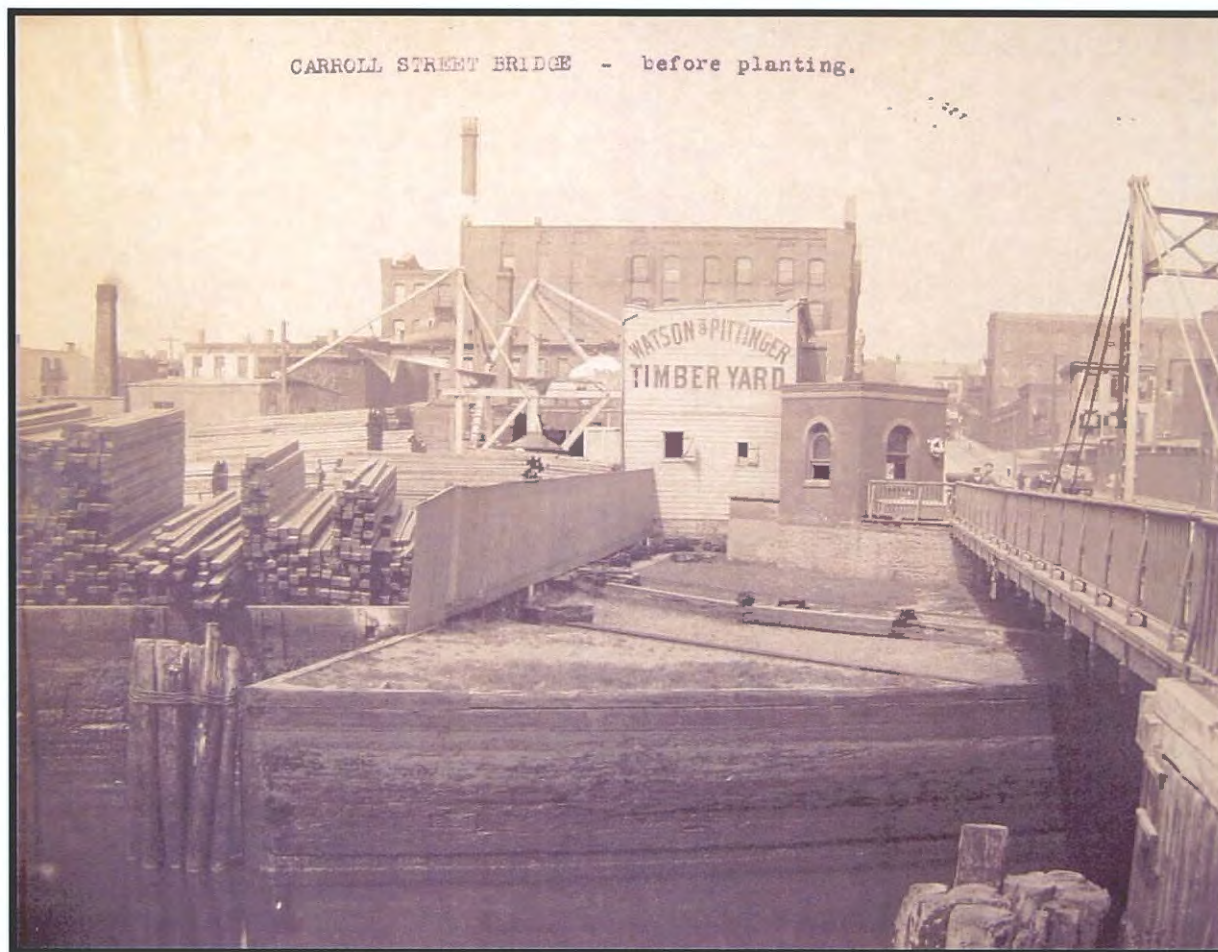


Plate 2.6. Gowanus Canal Assessment of Eligibility: View northwest of the Carroll Street Bridge tracks and the adjacent lumber yard. 1912. Source: Brooklyn Public Library.



Plate 2.7. Gowanus Canal Assessment of Eligibility: View southeast of the Carroll Street Bridge tracks. 1912. The Brooklyn Rapid Transit Railroad powerhouse complex is at the right of the view, across the Gowanus Canal. Source: Brooklyn Public Library.



Plate 2.8. Gowanus Canal Assessment of Eligibility: View southeast of Third Avenue Bridge. The filled 5th Street basin is visible in the background (Photographer: Thomas Flagg, November 2003) [Source: Raber Associates].

Table 2.1. Maritime Industry & Traffic Numbers, Gowanus Canal Between Hamilton Avenue and Ninth Street Bridge Crossings.

Industry Types	1880	1893	1907	1924	1932	1942	1953	1965	1978	1986	1998
Lumber	2	1	1								
Building Materials		2	3	2	2						
Coal	1	1	1			1					
Coal for Powerhouse				1	1						
Manufactured Gas	1	1	1	1	1						
Stone, Sand & Gravel				1	1	1	1	1	1	1	1
Oil	1	1					1	1	1	1	1
General Lighterage				1	1						
Other	1	1	2	1	1	1	1				
Total Industries	6	7	8	7	7	3	3	2	2	2	2
Vessel Numbers	NA	NA	1600*	27,050*	21,500*	18,000*	10,100*	NA	NA	524*	<900*

Table 2.2. Maritime Industry & Traffic Numbers, Gowanus Canal Between Ninth Street and Third Street Bridge Crossings.

Industry Types	1880	1893	1907	1924	1932	1942	1953	1965	1978	1986	1998
Lumber	1			1	1			1			
Building Materials		1	6	6	5		1	1			1
Coal	1	1	6	11	15	5	2				
Manufactured Gas	1	1	1	1	1	1	1				
Stone, Sand & Gravel	1			4	3	3	2	1	1	2	1
Oil			2			1	2				
General Lighterage			1	1	1		1				
Other	2	5	8	6	5	5	3	7			
Total Industries	6	8	24	30	31	15	12	10	1	2	2
Vessel Numbers	NA	NA	11,220*	11,100*	8900*	9900*	6500*	NA	NA	NA	NA

Table 2.3. Maritime Industry & Traffic Numbers, Gowanus Canal Between Third Street and Carroll Street Bridge Crossings.

Industry Types	1880	1893	1907	1924	1932	1942	1953	1965	1978	1986	1998
Lumber	1			1							
Building Materials			2								
Coal	1				1	1					
Coal for Powerhouse		1	1	1	1						
Stone, Sand & Gravel			2	2	2						
Oil		1	1	2	2	2	1				
Other	1	1	2	2	2	1		1			
Total Industries	3	3	8	8	8	4	1	1			
Vessel Numbers	NA	NA	6250*	3200*	1780*	2300*	NA	NA	NA	NA	8

Table 2.4. Maritime Industry & Traffic Numbers, Gowanus Canal Between Carroll Street and Union Street Bridge Crossings.

Industry Types	1880	1893	1907	1924	1932	1942	1953	1965	1978	1986	1998
Lumber	1	1	2								
Building Materials	1	1	1	1	1						
Coal			2	2	3	2	1				
Other				1	1	1	1	2			
Total Industries	2	2	5	4	5	3	2	2			
Vessel Numbers	NA	NA	650*	1000*	2300*	1500*	428	NA	NA	NA	14

Table 2.5. Maritime Industry & Traffic Numbers, Gowanus Canal Upstream Of Union Street.

Industry Types	1880	1893	1907	1924	1932	1942	1953	1965	1978	1986	1998
Lumber		1		1	1						
Building Materials	2	2	2								
Coal	2	1	3	4	4	3	1				
Manufactured Gas	1	1	1	1							
Stone, Sand & Gravel						1					
Oil								1	1	1	1
Other			1	1	1						
Total Industries	5	5	7	7	6	4	1	1	1	1	1
Vessel Numbers	NA	NA	7300*	4650*	3500*	2300*	1106	NA	NA	918*	121

Notes to Tables 2.1-2.5:

Industry types and locations from Bromley and Robinson 1880, G.W. Bromley & Co. 1893, E. Belcher Hyde 1907, U.S. Army Corps of Engineers 1926-1988.

* = estimated vessel numbers. Vessel numbers are total trips between bridge crossings, taken from City of New York 1898-1958 and 1998 NYCDOT logs. Vessel numbers assume all vessels made round trips, and upstream counts are subtracted from downstream counts to isolate estimated use between crossings. There are no federal vessel traffic data for the Gowanus Canal. Recreational traffic is not distinguished in these data, but until recently has been limited.

NA = information not available.

established by *circa* 1890 included gas and electric utilities requiring coal and coke, and a small number of other manufacturers.

The largest coal user was probably the Brooklyn Rapid Transit Company, which in 1896 took over the operations of the Atlantic Avenue Railway Company and its powerhouse at Third Avenue and 1st Street, along with other street railway systems. Improvements in electrical generation and transmission technology, and the fast-growing BRTC system, led to the 1902 completion of a new central station on the canal. Coal delivered from the canal fueled thirty-boilers in a two-story boiler house, adjacent to a power house with eight 4000-hp vertical cross-compound condensing steam engines. The engines were arrayed in four pairs direct connected to 2700-kw AC and DC generators. The power house survives today and discussed in Chapter 3 below (*Power* 1903; Murray 1910: 113-38).

Industrial use of the canal peaked in the period *circa* 1900-1932, when between 50 and 60 operations used the waterway with about 65-75% of these in bulk products (Tables 2.1-2.5). The number of active waterway sites dropped approximately 50% by World War II, stabilized at between 15 and 20 until the mid-1960s, and then fell to just five operations by 2000 (Plates 2.9-2.11; see also Figure 2.10). There is little summary data available on causes of the decline, but the most likely factors were diminishing marine access conditions, completion of pre-World War II urban development in the canal vicinity and decreased demand for building materials, declining use of coal fuel and manufactured gas production, and increased use of trucks. Siltation in the canal, associated with pollution and flushing problems discussed below, limited marine operations to less cost-effective small vessels. Increased use of trucks for products such as fuel oil began in the 1930s, and the completion of the Gowanus Expressway in 1964 provided highway access to canalside industries for the first time (Seaton

1986). The five waterside industries active in 2000 handled oil, stone, and other building material. Three have been in continuous operation under different owners since the 1950s and 1960s, and the other two began by the mid-1970s.

In the absence of federal data on Gowanus Canal-specific vessel traffic, there is little available summary information on historical maritime activity other than the number of vessels recorded passing through or under the five movable crossings. Freight type and tonnage entering Gowanus Bay cannot be distinguished for canal operations (U.S. Army Corps of Engineers 1950-1997). From the time the canal opened into the early 20th century, and probably until the Great Depression, a wide variety of vessels used the waterway including schooners, sloops, sail and steam lighters, tugboats, barges hauling coal and sand, and canal boats (e.g., U.S. Army 1881; City of New York 1900; Plate 2.12). At the apparent peak period of traffic in the 1920s, the number of recorded vessel trips at the crossings indicates that perhaps 23,000 to 25,000 vessels per year used the waterway (Tables 2.1-2.5). Today, there are perhaps 1,000 commercial round trips in the canal by tugs and barges, with slowly increasing recreational traffic as the canal evolves into a somewhat cleaner attraction for local residents and tourists.

8. Maintenance Dredging and Gowanus Creek Channel

When the City of Brooklyn took over canal maintenance in 1870, completed dredging included the 100-foot-wide canal upstream of Hamilton Avenue, a channel perhaps 300 feet wide to Percival Street, and poorly-documented work for over 4,000 feet beyond Percival Street (*Brooklyn Daily Eagle* 1868b, 1873b). Within a decade, navigation conditions within the canal deteriorated, due primarily to inflows from city-built sewers and from stormwater deposits through



Plate 2.9. Gowanus Canal Assessment of Eligibility: Aerial view north of the upper half of the Gowanus Canal. *Circa 1960.* From bottom, bridges shown at 3rd, Carroll, and Union Streets. Burns Bros. Coal pockets visible at lower left, which survive today, are near the head of the 4th Street basin (visible at bottom of view). The limited number of visible vessels is in striking contrast to earlier views, reflecting the declining commercial use of canal. Source: Brooklyn Public Library.



Plate 2.10. Gowanus Canal Assessment of Eligibility: View southwest of Gowanus Canal traffic near Hamilton Avenue. 1940. In this view from the 1933 rapid transit trestle over 9th Street, Hamilton Avenue Bridge is in the background and the 11th Street basin is at left center. On north side of canal (right), the Devoe & Reynolds paint factory next to bridge is under demolition; Independent Salt Company structures are at right center, and part of the B.Goetz & Bro. masons' materials yard is at right. Vessels on the north side from left to right include a covered barge and two hold barges. A tug pulls a sand barge through the center of the canal. Another sand barge and part of another covered barge are visible on the south side of the canal. Source: Brooklyn Public Library.



Plate 2.11. Gowanus Canal Assessment of Eligibility: Aerial view north of the uppermost section of the Gowanus Canal. *Circa* 1945. Carroll Street Bridge in the foreground, Union Street Bridge is at upper right center. Most vessels at lower left are tugboats, probably used to haul oil barges to the adjacent Preferred Oil Company terminal for transshipment to trucks. Source: Brooklyn Public Library.

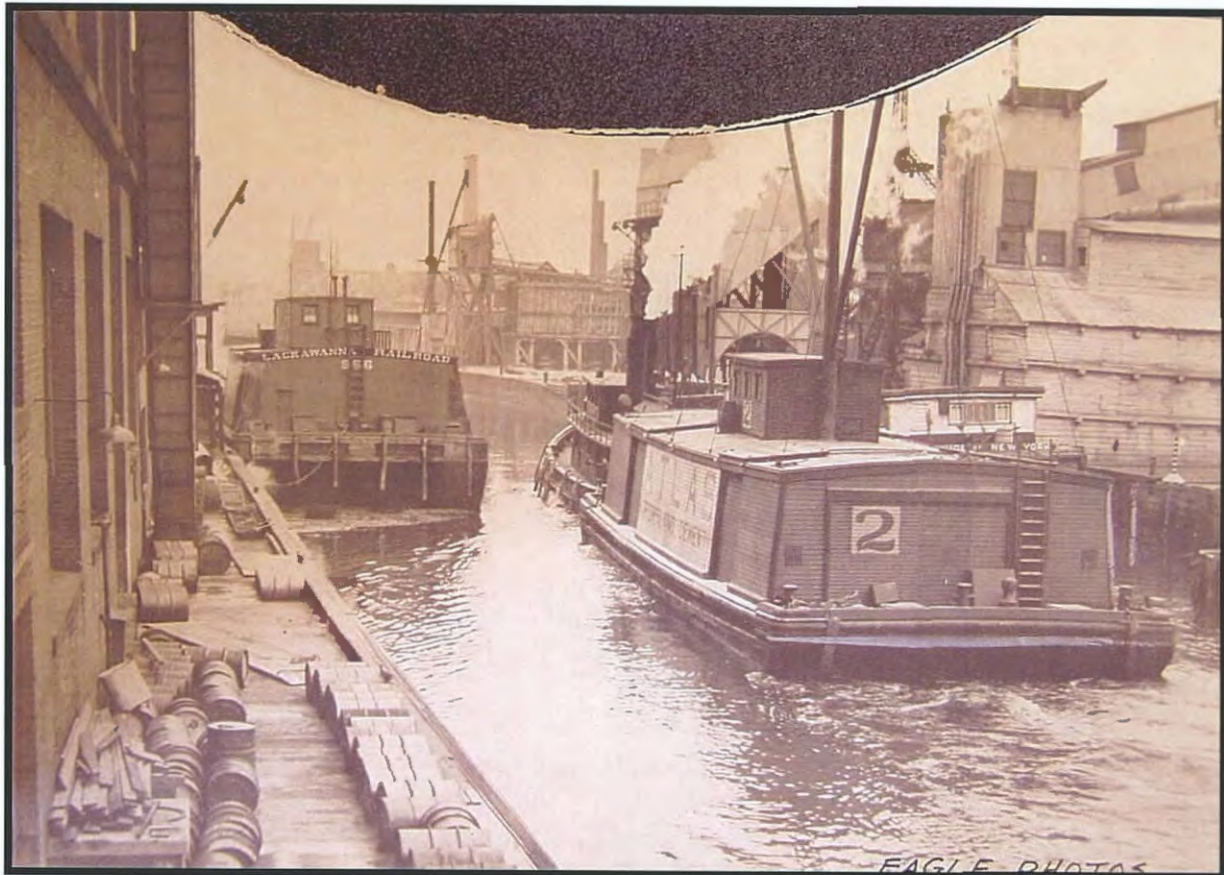


Plate 2.12. Gowanus Canal Assessment of Eligibility: View of covered barges in the Gowanus Canal. 1928. View appears to be to southwest around 10th Street. Source: Brooklyn Public Library.

some poorly-built canal walls. At least initially, municipal funding for dredging "and for any wall maintenance" was supposed to come from assessments on canal-side property owners. Many owners joined forces to extend the assessment district into the bay, through the channel completed beyond Percival Street, thus vitiating the amounts assessed on canal-side land and transferring costs to the city or other owners of property that was primarily under water. The City of Brooklyn delayed maintenance dredging until sufficient funds could be raised from these assessments, inhibiting navigation and exacerbating sewerage problems discussed below (*Brooklyn Daily Eagle* 1872a, 1874, 1884). The history of maintenance dredging within the canal, by the cities of Brooklyn and New York or by private owners, remains incomplete but appears to be one of irregular or very occasional work, concentrated around the outlets of public sewers and leaving other dredging to private parties. One public official complained that "[t]he dredge cannot be used successfully as the filth slides from the shovel back into the water as soon as it is displaced" (*Brooklyn Eagle* 1877a).

Federal channel dredging programs under the U.S. Army Corps of Engineers, an important component of maritime commercial growth throughout much of the Port of New York, did not apply to virtually all of the canal. Upstream of Hamilton Avenue, restrictions against work between piers along a wharf eliminated the eligibility of the narrow waterway for federal support (U.S. Army 1872-1950: 1884, i, 713-14). At the urging of local interests using Gowanus Bay and the canal by *circa* 1880, however, the Corps was authorized as early as 1881 to improve channels in the bay. Although the initial authorization called for work as far inshore as Hamilton Avenue, for approximately seventy years no work was done beyond Percival Street. While never so stated in published Corps documents, it is likely that the state-authorized canal construction from Douglass to Percival streets in the 1860s became a basis for federal reluctance to work

within an area supposedly under local dredging authority. By 1889, federal work in the Gowanus Creek Channel to Percival Street created a channel at that point 21 feet deep at mean low water, extending into the bay with a wider and deeper profile about 2,900 feet to 28th Street. The City of Brooklyn by this time disclaimed responsibility beyond Hamilton Avenue, with the result being a bar with a low-water depth of only seven feet between Hamilton and Percival by the mid 1890s. This bar, and the federal channel beyond, were continually worsened by deposits flowing out of the Gowanus Canal. An 1895 attempt by local congressional representatives to extend the dredging to Hamilton Avenue did not succeed, but may have influenced an 1896 authorization for a 26-foot-deep channel from 28th to Percival Streets. Completed in 1904, this project created a channel narrowing from 300 to 200 feet in width, linked directly to the Bay Ridge and Red Hook channels. Only in 1952 was federal work to Hamilton Avenue authorized, with a 100-foot-wide, 18-foot-deep channel from there to Sigourney Street, deepening to 30 feet from Sigourney to Percival Streets, and continuing from Percival to 28th Streets at this depth with a channel widening from 200 to 500 feet (U.S. Army 1872-1950: 1881, i, 634; 1889, i, 78-9; 1894, i, 91-2; *New York Times* 1895; Smith, ed. 1919: 66; U.S. Army Corps of Engineers 1988: 14).

9. Gowanus Canal Pollution and the Flushing Tunnel

The Gowanus Canal served as an open sewer even before it was completed for navigation purposes, with the City of Brooklyn laying out sewers emptying into the canal as early as 1858. The 1848 Richards plan upon which all canal construction was based made no provisions for flushing out wastes other than by natural tidal action. This turned out to be wishful thinking. Landfilling and bulkheading contributed directly to shoaling and siltation by reducing channel widths and

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ભાગ્યવંતઃ૦૪૬૦૯૦૦

annexes

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“*ឯកសារបែបនេះត្រូវបានរកឃើញនៅក្នុងប្រព័ន្ធគណនេយ្យរបស់យើង។ វាបង្ហាញពីការប្រើប្រាស់ប្រព័ន្ធគណនេយ្យរបស់យើង។*”

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2017年12月25日

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1. The Commission shall be composed of the following members:

1995-1996

procurar, de notificar a câmbio, o credenciar a pagar, e a pagar, em nome do titular, a favor de quem o crédito for devido.

comprised, during the survey, as people and entities with the capacity of the control of the company.

11. *Urgent* - something that must be done immediately. *Urgent* - something that must be done immediately.

to identify them with those of the common Atlantic Ocean community living at 800-900 m.

การดำเนินงานตามแผนปฏิบัติการประจำปี ๒๕๖๑-๒๕๖๒

and the following are the results of the regression analysis:

http://www.elsevier.com/locate/jmb

1990-1991

İstanbul: İstanbul Kültür Varlıklarını Koruma Bölge Kurulu, 2007.

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1. *Explain the importance of the following factors in the development of a country's economy:*

Brassica napus L.

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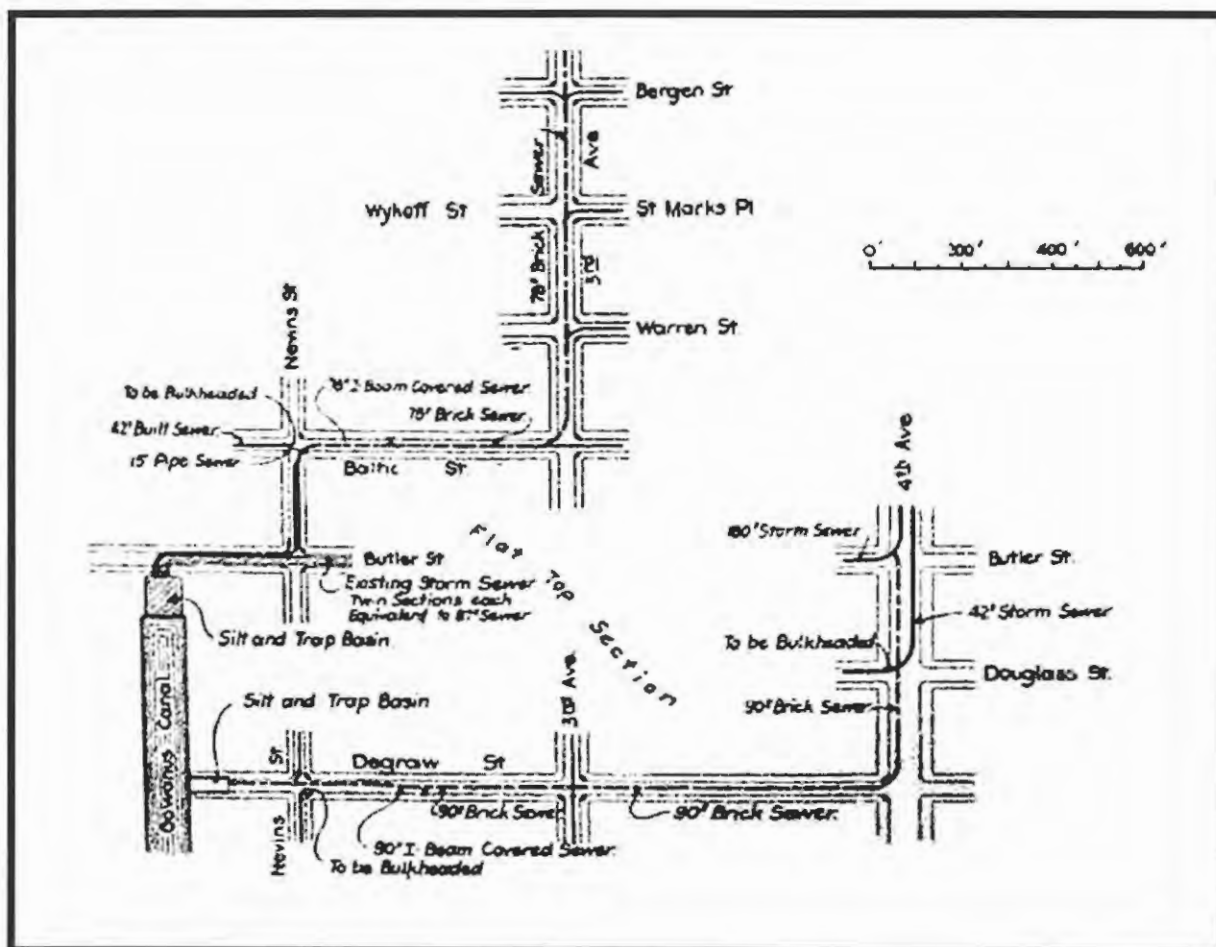


Figure 2.12. Gowanus Canal Assessment of Eligibility: Relief sewers entering Gowanus Canal in 1904. Source: *Engineering Record*, 1904.

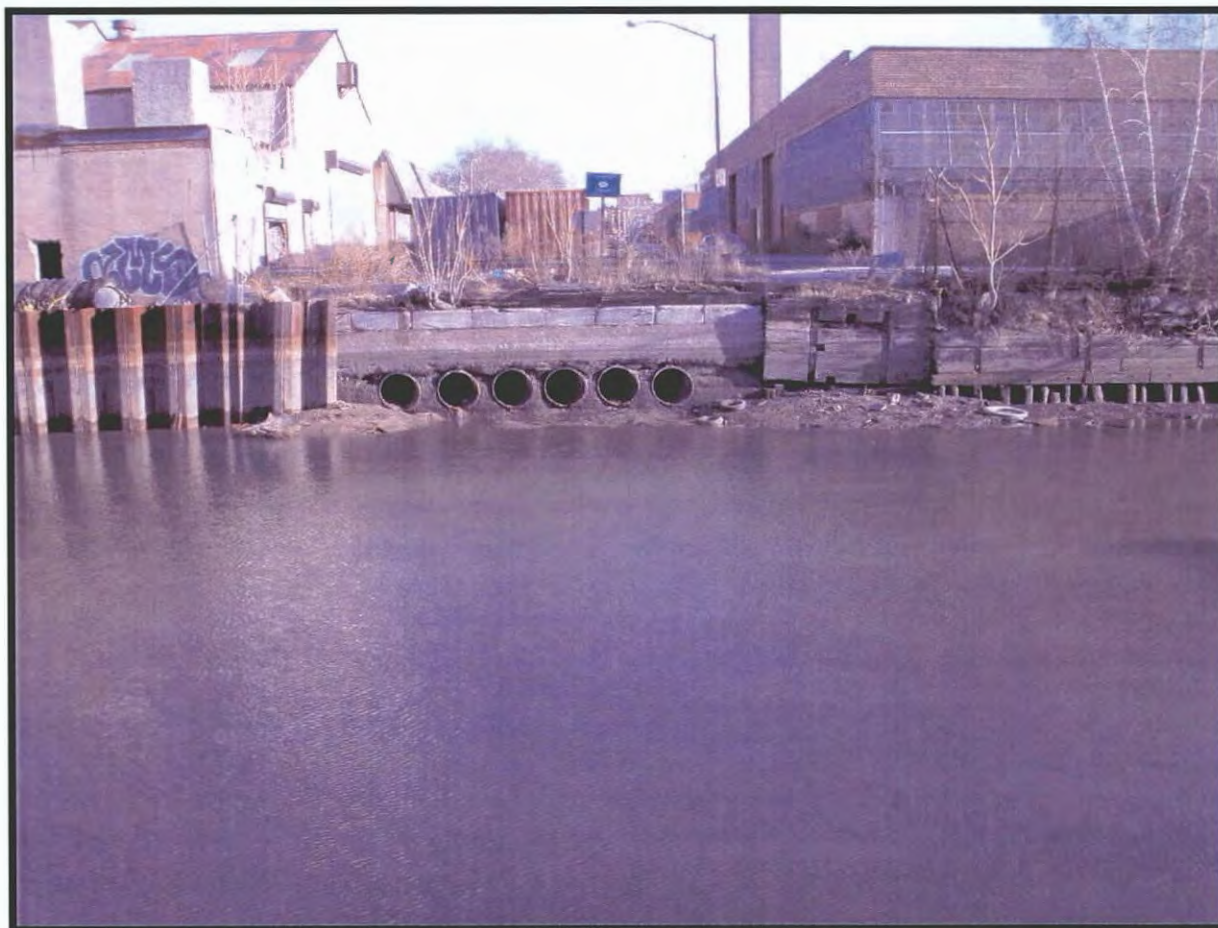


Plate 2.13. Gowanus Canal Assessment of Eligibility: View southeast of storm sewer outlet at Degraw Street (Photographer: Charles Ashton, January 2004) [HRI Neg.# 03070 D3-31].

canal bulkhead wall, which was rebuilt in concrete with a new total of 36 pipe outlets (Plate 2.14; *Engineering Record* 1904).

The work completed in 1904 also failed to flush the canal to any beneficial extent, and the borough's chief sewer engineer Edwin J. Fort immediately began a six-year period of study and construction to create an entirely new flushing system. After reviewing flushing systems used in Milwaukee and Chicago, Fort and his staff recommended removing sewer outlets into the canal and building a flushing tunnel to Upper New York Bay in Buttermilk Channel. Once again, the new work was completed but the sewer outlets remained in place, although storm sewer flow was somewhat reduced by diverting some of the Greene Avenue sewer system into a new Gold Street sewer. The flushing system, built 1905-1911, had two main components: a 6,280-foot-long brick tunnel and a pumping station. After some debate, borough engineers decided to pump water from the canal to the bay, largely to minimize the dispersal of pollutants towards the mouth of the canal and to create a current working to the advantage of loaded barges that almost always moved upstream. The flow direction, as well as the tunnel route, differed from Maj. Douglas' 1847 flushing plan, but Fort and his staff designed the pumping arrangements to allow for reversal of flow if desired (Figure 2.13; *Engineering Record* 1908, 1911).

The tunnel, built through sand by the John Pierce Company and consulting engineer E.C. Moore with a 12-foot internal diameter and 1.33-foot-thick walls, runs primarily under Degraw Street on a flat gradient, with the invert approximately 16 feet below mean sea level and the top of the tunnel nine to 50 feet below the surface (*Engineering Record* 1908). As originally built, the pumping station built by Henry E. Fox had electric-powered equipment and included the following major components (Figure 2.14; *Engineering Record* 1911; Rakos 2002):

- ❖ A 400-hp Westinghouse AC induction motor direct-connected on an eight-inch-diameter steel shaft to a nine-foot-diameter, four-blade, cast-steel propeller. Running at 120 rpm, the propeller was designed to move at least 500 cfs of canal water. The 29-foot-internal-diameter motor pit reached an elevation 10 feet below mean sea level (about 15 feet below the surface), with an outer shell of steel sheet piling almost two feet thick and a two-inch-thick inner lining of concrete. The motor pit center was 44.33 feet from the center of the brick wheel pit, in which the propeller was set in a cast-iron casing. At Fox's suggestion, the propeller casing was installed in a narrowed tunnel section to enhance flow. Propeller blades were removable, allowing for replacement and for reversal of flow if required in the future.
- ❖ In the tunnel, which curved at the pumping station to accommodate the propeller drive shaft, two electric-motor-operated vertical gate valves were installed to cut off the wheel pit if needed. The tunnel between the valves could be drained through a 12-inch pipe connected to a submerged-type centrifugal pump, with the pump in a drainage well that discharged into the canal through a six-inch line (Figure 2.14).
- ❖ A high one-story 67-by-63-foot brick pump house, with a truss-supported gable roof, was built over the motor pit, drainage well, and the northern gate valve. A low one-story, 26-foot-square brick gate-house was built over the wheel pit and the southern gate valve.

Although the flushing system operated more or less continuously until 1960, pollution and siltation problems in the canal remained severe due to the continued inflow of waste and storm water, and to the relative absence of canal dredging. The propeller drive shaft was disabled in that year when an employee dropped an access manhole cover into the operating system.

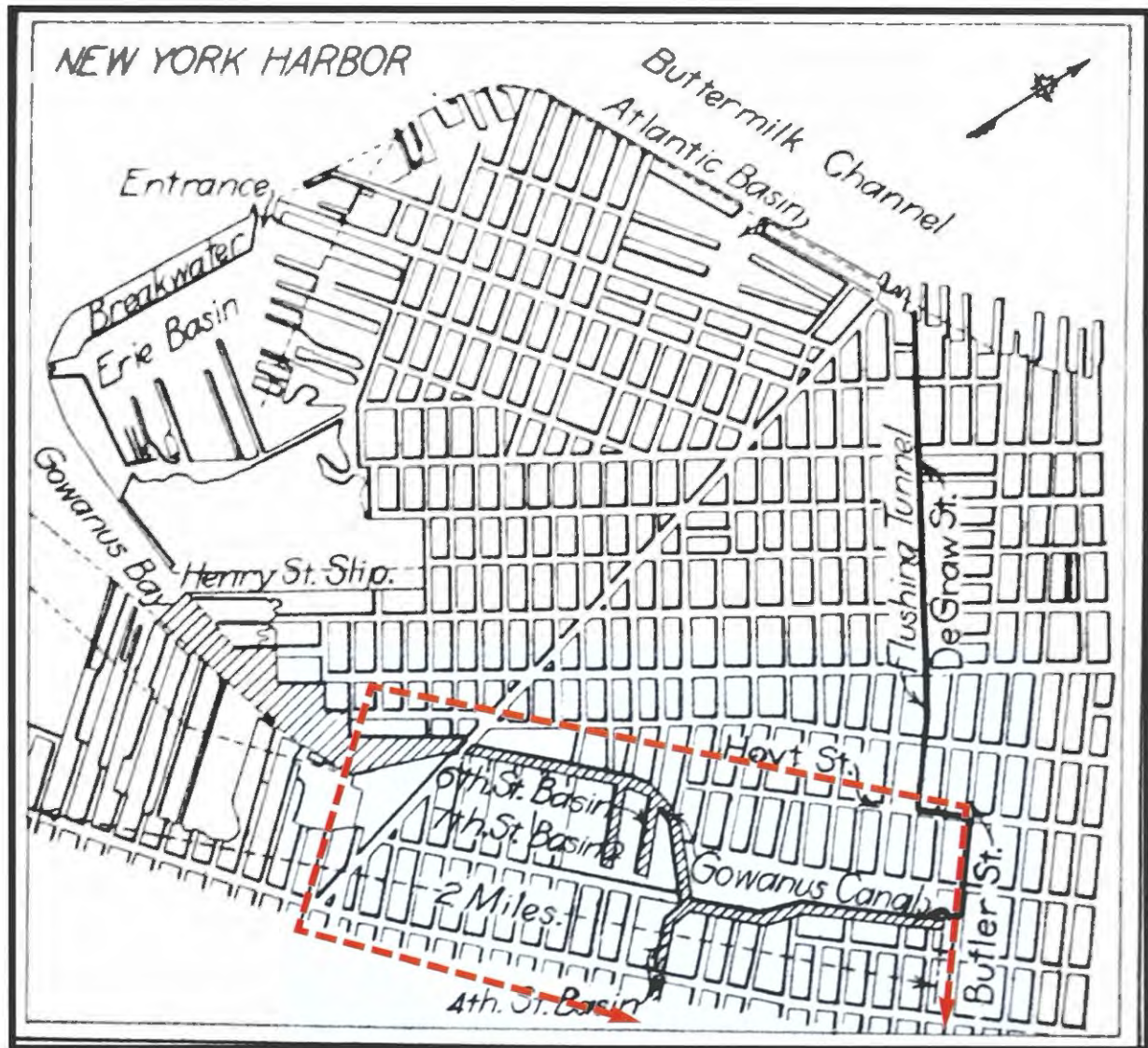


Figure 2.13. Gowanus Canal Assessment of Eligibility: Gowanus Canal And Flushing Tunnel. Scale: 1 inch= 1550 feet (approximately). Project area indicated. Source: *Engineering Record*, 1911.

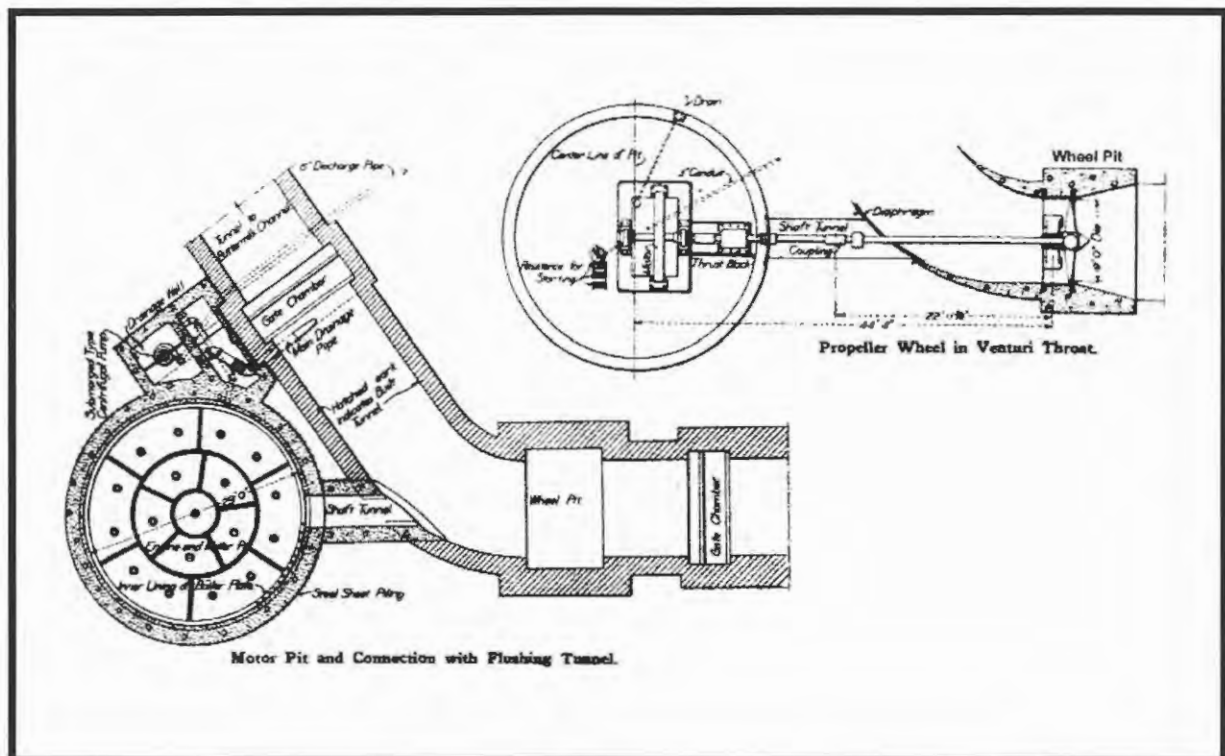


Figure 2.14. Gowanus Canal Assessment of Eligibility: Mechanical Details Under Pump House And Gate House At End Of Flushing Tunnel. Source: *Engineering Record*, 1904. Pump house sits above motor and pump at left; gate house sits above wheel pit at right.

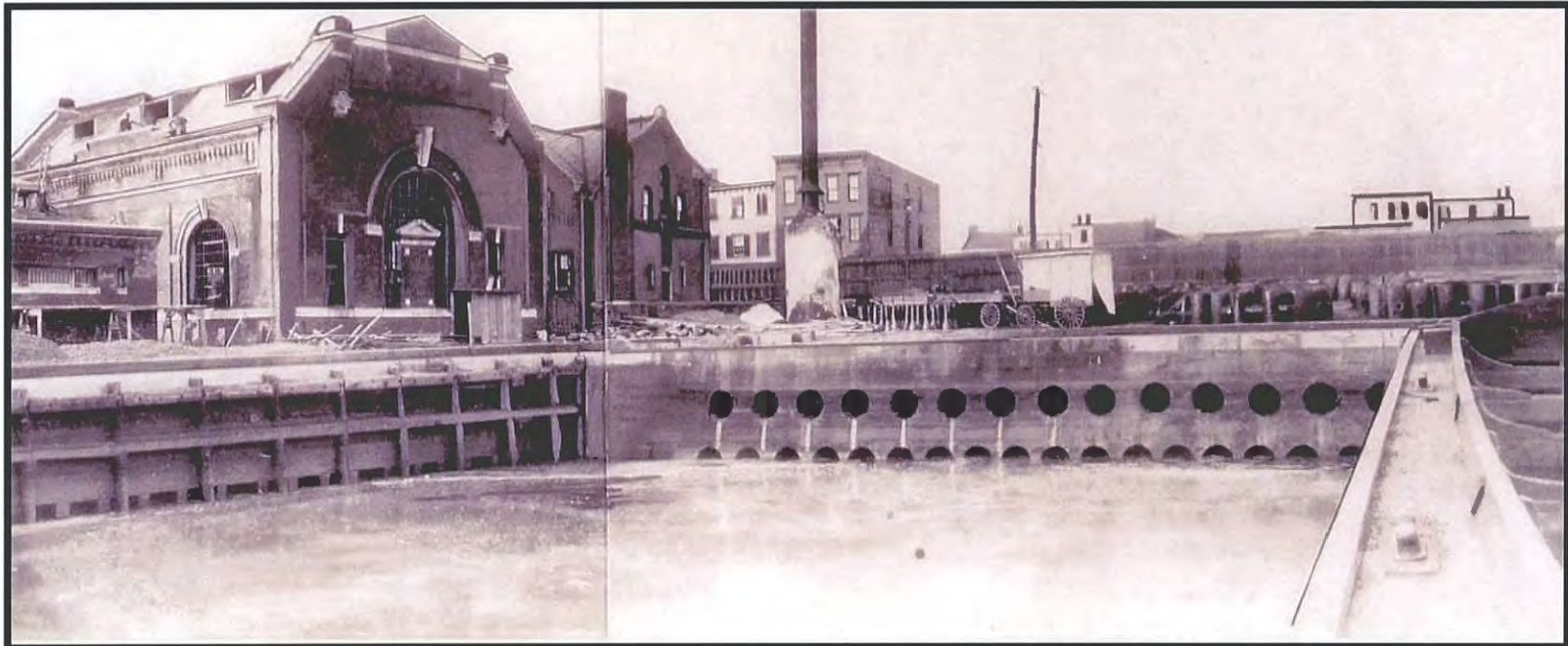


Plate 2.14. Gowanus Canal Assessment of Eligibility: View northwest at the end of the Gowanus Canal, with the Flushing Tunnel Pumping Station nearing completion. 1911. Canal end wall at the center of the view was rebuilt as an outlet for the relief stormwater sewer *circa* 1891-99 and 1904 . Source: Brooklyn Public Library.

The city delayed any repairs, anticipating that a proposed Red Hook Water Pollution Control Plant would finally eliminate wastewater deposits in the canal. The plant did not open until 1987, so that the declining industrial neighborhood around the canal remained plagued by the area's infamous water and odors, and even when in operation the new plant did nothing to restrict the continued inflow of water during heavy storms. The New York City Department of Environmental Protection began designing a flushing system reconstruction in 1992, completing the work between 1995 and 1999. Much of the original operating equipment was removed or refurbished. With very limited canal traffic and more controls over polluted water inflows, the principal 1904 rationales for flushing water from the canal no longer applied, and the new system pumps an average of 200 million gallons a day from Buttermilk Channel into the canal. About 2,000 cubic yards of polluted sediment was removed from the head of the canal before reactivating the system, to preclude dispersing the material into the waterway. Since stormwater continues to flow into the head of the canal at Degraw and Butler street, a boom was set across the canal just downstream of these outlets and the surface is periodically skimmed of floatable debris. The 100-foot-wide outlet at the innermost canal wall was rebuilt sometime in the 20th century with more restricted flow (*New York Times* 1995; City of New York 1999; Rakos 2002).

The reconstruction of the flushing system, and the decline of canalside industry, has somewhat ironically revived one of Maj. Douglas' plans after more than 150 years, with relatively clean seawater maintaining water quality in a waterway which functions more as a surface drainage system than a transportation canal. As discussed in Chapter 3, much of the historic industrial character of the canal remains intact despite these changes.

Chapter 3

FIELD RESULTS AND RESOURCE INTEGRITY

A. FIELD METHODS

The study area was visited twice in the course of this investigation. On November 5, 2003 staff from Hunter Research, Raber Associates and the U. S. Army Corps of Engineers traveled the entire navigable length of the main canal at low tide on the Corps vessel *Hocking*, as far as a floating boom north of Union Street. The less navigable 4th Street basin was also inspected to its terminus at the Third Avenue bridge in a Corps Boston whaler. The canal, its related features such as bridges, and canal-side environs were recorded with field notes and approximately 150 digital and 35mm. photographs.

This field visit was complemented by a land-based survey on January 9, 2004 by Hunter Research, accompanied by Corps staff. The purpose of this visit was to inspect and photographically record those buildings having direct historical links to the Canal and its role in the development of South Brooklyn. A total of seven sites emerged from this two-pronged survey approach, discussed below in section C.

B. ANALYSIS AND INTEGRITY OF THE GOWANUS CANAL AS A WATERWAY

Field data and a recent aerial photograph were used to compile a graphic inventory of existing canal conditions (Figure 3.1). Comparison of this inventory to historical maps, information on canal construction discussed in Chapter 2, and available information on comparable bulkhead structures allowed for a detailed appraisal of canal integrity.

1. Canal Alignments

The canal can, somewhat arbitrarily, be divided into three types of alignments which have different degrees of integrity:

- ❖ Outshore of Hamilton Avenue, the canal channel extended approximately 1100 feet to a point opposite Percival and 17th streets, and widened from 100 to 300 feet. Although it is difficult to determine the nature and extent of bulkheading in this section by 1870, when the Gowanus Canal Improvement Commission ceased work, historical maps suggest that bulkheads totaling approximately 2,150 linear feet were in place by 1880 (Bromley and Robinson 1880; Sanborn Map and Publishing Company 1886). Except for a 200-foot-long section of shoreline cut back on the east side of the channel *circa* 1980-1995, the outer canal channel configuration remains intact. For the present study, review of bulkhead conditions in this section began at about 16th Street, and included a total of approximately 1,460 linear feet which retains historical alignments.
- ❖ The main section of canal, completed by 1870 from Hamilton Avenue to a point between Douglass and Butler streets, retains all of its original alignment and 100-foot wide channel. The channel is approximately 5,470 feet long and includes 11,200 linear feet of bulkhead.
- ❖ The six private basins, built off the east side of the main canal *circa* 1868-1915, originally had channels totaling approximately 2,800 feet in length with about 6,200 linear feet of bulkhead. The 1st and 5th Street basins were filled in *circa* 1953-

1965, leaving approximately 1,990 feet of channel and 4,365 linear feet of bulkhead, or about 70% of the original basins (see above, Figure 2.10; U.S. Army Corps of Engineers 1953, 1965).

Over 90% of the original Gowanus Canal alignments thus remain open as waterways, although navigability varies considerably within these channels. The 4th Street basin is the least navigable section.

2. Canal Bulkheads

There appear to be three principal types of canal bulkheads, in varying conditions:

- ❖ Timber cribwork, in many places with upper sections deteriorated, replaced with concrete, and/or covered with rip-rap;
- ❖ Concrete bulkheads or relieving platforms, including all five bridge abutments; and
- ❖ Sheet piling of timber or steel

Although canal history reviewed in Chapter 2 indicates timber sheet piling was common from the earliest period of construction in the 1850s into the early 20th century, it appears that timber cribwork was the preferred and principal type of Gowanus Canal bulkhead beginning in the mid 1860s, and probably replaced most of the early sheetpile construction. All or virtually all of the present timber sheetpile walls appear to be of 20th-century vintage. As summarized below, cribwork comprises over 70% of remaining bulkheads, even where modified or not visible at low water.

a. Timber Cribwork Context

From the colonial period until *circa* 1930, much bulkhead construction throughout the Port of New York involved timber cribwork. When timber was relative-

ly inexpensive, cribwork was a cheap form of bulkhead requiring only hand tools after any dredging phases. Until perhaps the second quarter of the 19th century, timber bulkhead construction was diverse, and remains incompletely documented with no well-defined regional patterns. Fill materials occasionally included wooden vessels (e.g., Louis Berger & Associates, Inc., 1990). By the mid-19th century, there was probably more design standardization. Cribwork construction of the mid-19th century and later involved spiking together logs in alternating perpendicular rows forming square or rectangular cells. Arranged in lines or grids, these cells commonly measured five to eight feet on a side, and from about seven to eight feet in height. Empty cribwork units could be floated into place and sunk as fill was added. Some cells, probably at the bottoms of cell units, had plank flooring to hold enough fill material to sink the structure; builders added more fill once the cells were in place to form a solid bulkhead. Cribwork often reached to between 20 and 25 feet below mean low water, and extended to about 10 feet above this elevation. In section, cribs below mean low water typically extended to widths of 20 to 25 feet, sometimes tapering on the exterior or both faces as they rose. Above mean low water, crib widths in section narrowed to about 15 feet. These dimensions apply to average traffic and harbor bottom conditions; some railroad piers carrying heavier loads included cribwork 55 feet wide at bottom, 40 feet wide at top and over 40 feet high. Fill material in cribwork bulkheads extended behind the timbers to the height of the bulkhead, and aside from dredged sand and silt could include demolition debris and stone. Being very open sided, cribwork construction worked best with coarse fill. Square timbers, spiked or bolted together in a smooth, continuous face and fitted onto notched cribwork logs, formed the outer face of the bulkhead above mean low water in most cases. Stone faces were far less common. The upper horizontal surface of the bulkhead varied from packed earth to timber or stone. Although this study found limited documentation of Gowanus Canal timber bulkheads, the chronol-



KEY TO BULKHEAD TYPES

TC-I	Timber Cribwork with Intact Faces above mean low water	TC-CON	Timber Cribwork with Concrete replacement/infill above mean low water
TC-N	Timber Cribwork with New/Recent sections above mean low water	RIP	Rip-rap slope, probably on timber cribwork collapsed above mean low water
TC-D	Timber Cribwork with Deteriorating but visible sections above mean low water	CONC	Concrete wall or relieving platform
TC-C	Timber Cribwork with Collapsed sections above mean low water	SSP	Steel Sheet Piling
		TSP	Timber Sheet Piling

Figure 3.1. Gowanus Canal Assessment of Eligibility: Aerial Photograph Showing Existing Wall Conditions on the Gowanus Canal. Source: U.S. Army Corps of Engineers, 2003

ogy of canal construction and surface inspection suggest the canal's timber cribwork walls followed the typical designs outlined above. Cribwork installed for some of the private basins were reported as being 20 feet wide at bottom, reaching five feet above mean high water (*Brooklyn Eagle* 1870b; Greene 1917: 52-56; Raber *et al.* 1983: 46-51). Repairs to Gowanus Canal cribwork above mean low water during the last half century have included infill with concrete blocks or poured concrete.

It is usually difficult to date cribwork bulkheads without documentary evidence or archaeological recovery of some types of fill (e.g., demolition debris). For the era prior to more standardized designs, variations in timber joining methods have been identified as sources of potentially significant information (Louis Berger & Associates, Inc., 1990). For all periods, cribwork bottoms should also be regarded as especially important. Cribwork bulkheads were most secure when fitted to bedrock or other very hard bottoms. If not soundly installed—as was often the case with smaller private waterfront development projects—cribwork in bulkheads or in block-and-bridge piers tipped or sank. Building in sand or silt bottoms, where bedrock or clay was more than about 25 feet below mean low water, required dredging and other construction bottom surface preparations to counteract these problems, steps usually characteristic of only larger commercial or industrial ventures. Piles driven below cribwork sometimes sufficed in deep or soft bottoms, as did continuous rows of logs across the bottom of the cribwork. Cribwork bottoms are highly variable, poorly documented, and tend to remain well preserved under water. By contrast, periodic replacement of all components subject to decay above mean low water complicates any identification of extant cribwork bulkheads with particular decades, and minimizes the significance of these upper elements (Greene 1917: 52; Raber *et al.* 1983: 46-51). All available accounts of Gowanus Canal wall construction, including some for concrete bulkheads, indicate

that the canal walls rested on piles driven into clay below silty marsh deposits (e.g., *Brooklyn Eagle* 1869a; Stiles 1926). Dredging may have accompanied some of this construction.

b. Concrete and Steel Bulkheads

In some places, low-water surface inspection was inconclusive as to whether visible concrete walls were resting on cribwork foundations or were entirely concrete bulkhead resting on piles. In many parts of the Port of New York, concrete bulkheads were relieving platform designs, first developed in this region shortly after 1900 by some of the railroads and perhaps derived from the masonry river walls of the Department of Docks. A major advantage of this form was its fire resistance, since timber elements above mean low water were replaced by concrete and fill material. Typical examples consisted of pile-supported timber and/or concrete sub-decks below mean low water, above which concrete block formed the bulkhead face and supported the outer edge of an upper concrete deck or paving; the space between the two decks was earth fill. In some areas, such as the Brooklyn waterfront south of Fulton Street repaired by the New York Dock Company *circa* 1915-1950, concrete bulkheads were appended to older cribwork in several ways. The new work generally extended beyond the old about 20 feet, and often included riprap in front of the cribwork and among the new piles to preclude cribwork slumping. For cribwork bulkhead repair, there were varied means of actually tying the new work to the old. The new piles could be driven in front of the cribwork, or through it, with some or all of the relieving platform resting on cribwork remains. Later in this period, steel sheet piling driven behind the new piles gave added stability to the interface, with the steel piling tied back to concrete blocks at the rear of the upper deck. Steel piling tended to replace the timber pile supports and the subdecks completely after World War II, in the form of inner

NATIONAL REGISTER OF HISTORIC PLACES ELIGIBILITY ASSESSMENT
GOWANUS CANAL, BOROUGH OF BROOKLYN, KINGS COUNTY, NEW YORK

Table 3.1. Gowanus Canal Bulkhead Conditions, 2003.

BULKHEAD TYPES	MAIN CANAL	BASINS	HAMILTON AVE-- 16th STREET	TOTALS
TIMBER CRIBWORK: INTACT OR NEW	4800 ft (42%)	2420 ft (55%)	340 ft (23%)	7560 ft (44%)
TIMBER CRIBWORK: COLLAPSED OR DETERIORATING	1340 ft (12%)	1350 ft (31%)		2690 ft (16%)
TIMBER CRIBWORK: CONCRETE INFILL/ REPLACEMENT ABOVE MEAN LOW WATER	1310 ft (12%)		200 ft (14%)	1510 ft (9%)
RIP-RAP ON PROBABLE DETERIORATED TIMBER CRIBWORK	180 ft (2%)		520 ft (36%)	700 ft (4%)
SUBTOTAL: KNOWN/PROBABLE TIMBER CRIBWORK	7630 ft (68%)	3770 ft (86%)	1060 ft (73%)	12,460 ft (73%)
CONCRETE/BRIDGE ABUTMENTS	1580 ft (14%)	75 ft (2%)		1655 ft (10%)
TIMBER OR STEEL SHEET PILING	1990 ft (18%)	520 ft (12%)	400 ft (27%)	2910 ft (17%)
TOTALS	11,200 ft (100%)	4365 ft (100%)	1460 ft (100%)	17,025 ft (100%)



Plate 3.1. Gowanus Canal Assessment of Eligibility: View south of recent bulkhead at 14th Street, with concrete face above possible cribwork cut off at the mean low water mark (Photographer: Thomas Flagg, November 2003).

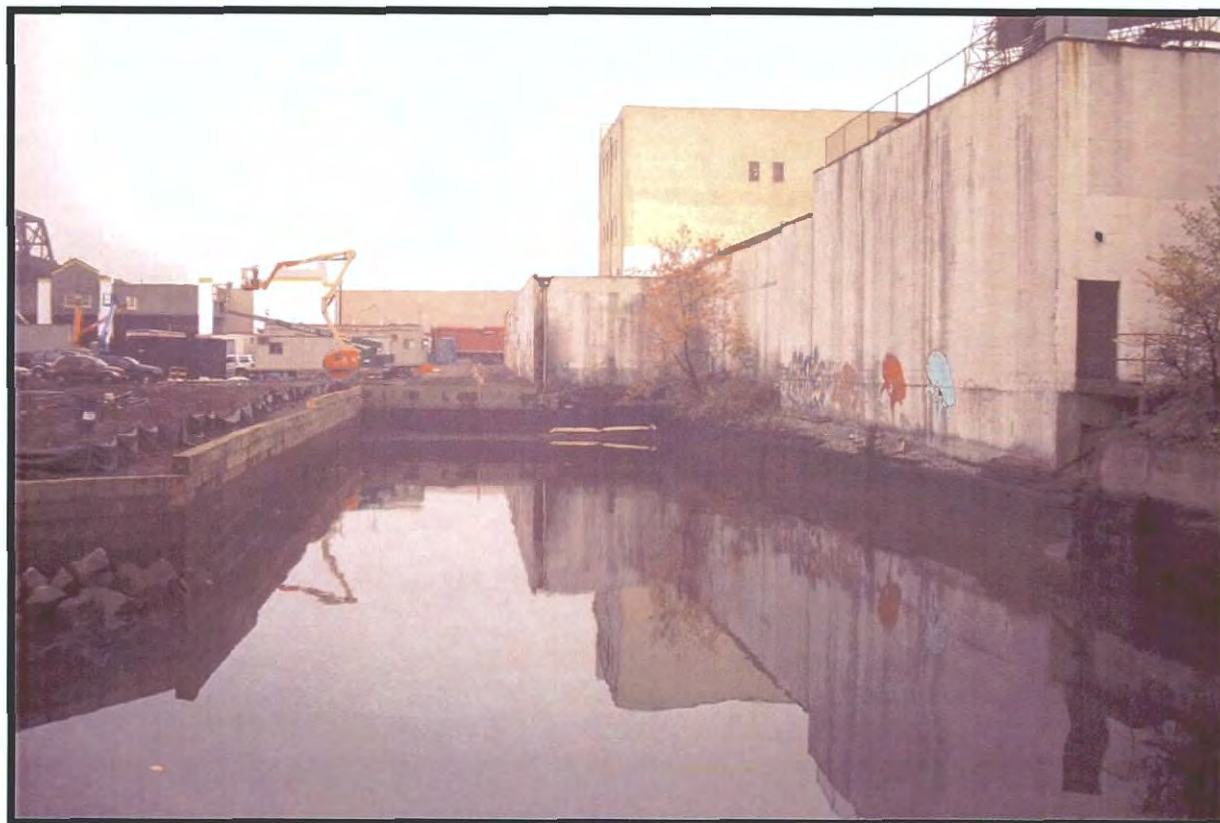


Plate 3.2. Gowanus Canal Assessment of Eligibility: View southeast of the 11th Street basin (Photographer: Thomas Flagg, November 2003) [Source: Raber Associates].

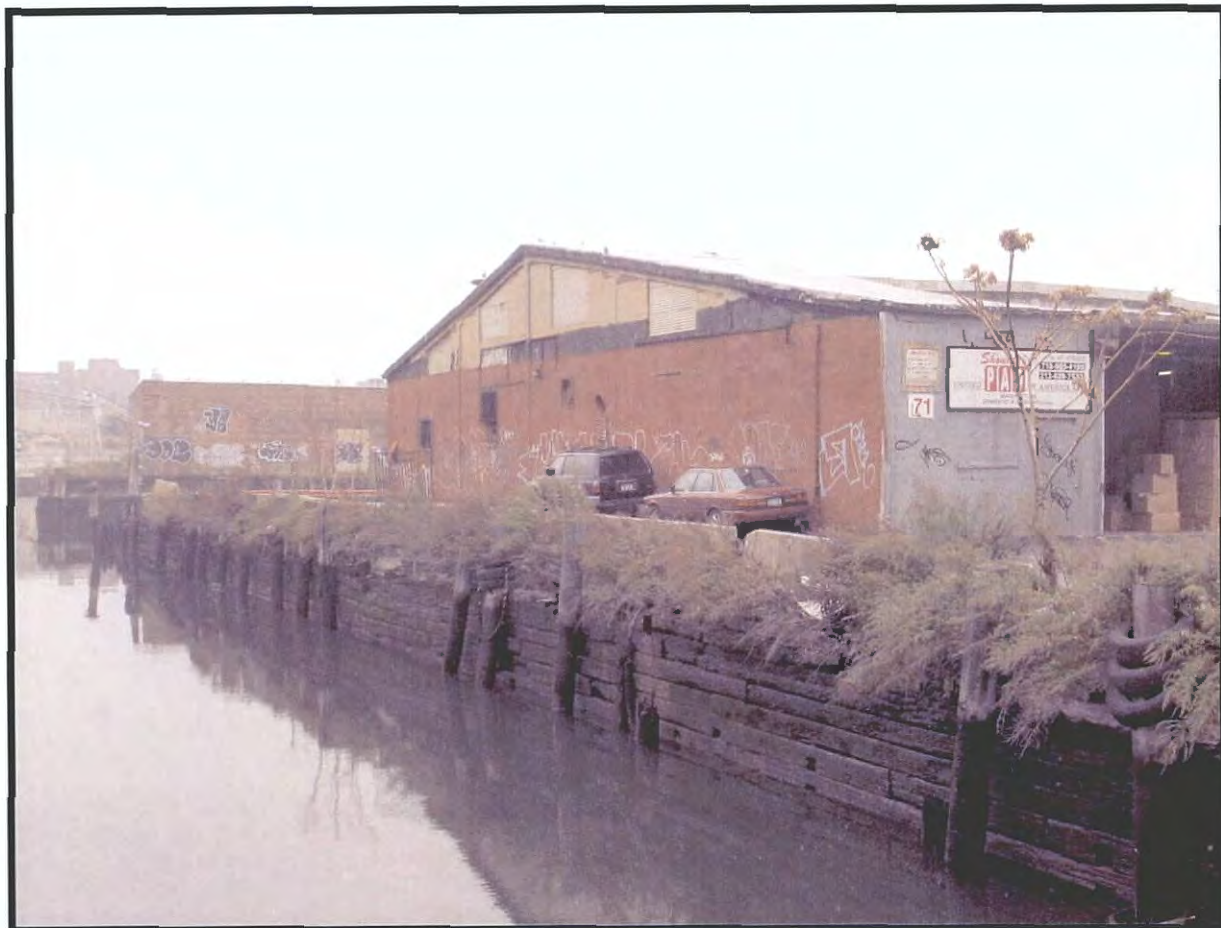


Plate 3.3. Gowanus Canal Assessment of Eligibility: View northeast of intact timber cribwork bulkhead near the head of the 7th Street basin (Photographer: Thomas Flagg, November 2003) [Source: Raber Associates].

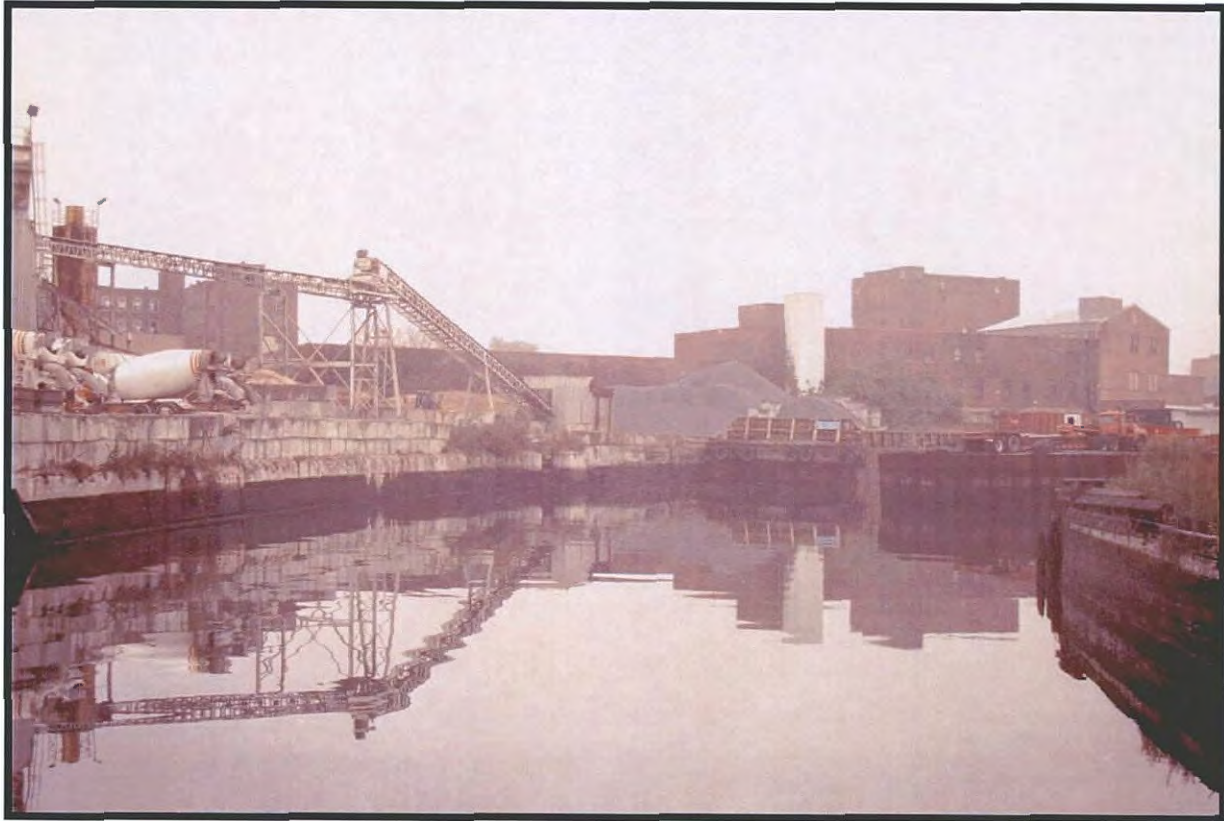


Plate 3.4. Gowanus Canal Assessment of Eligibility: View east towards the head of the 6th Street basin (right of view) and Bond Street (right background), with concrete bulkhead and gas pipe tunnel crossing (left of view) and intact timber cribwork bulkhead (right of view) (Photographer: Thomas Flagg , November 2003) [Source: Raber Associates].



Plate 3.5. Gowanus Canal Assessment of Eligibility: View southeast of the 6th Street basin. A steel sheetpile bulkhead is seen at the right of the view, with a collapsing timber bulkhead visible beyond (center right of view). An intact timber bulkhead (center left of view) and a steel bulkhead (left) can also be seen (Photographer: Thomas Flagg , November 2003) [Source: Raber Associates].



Plate 3.6. Gowanus Canal Assessment of Eligibility: View northeast at Bond Street, showing several types of concrete bulkheads of concrete additions to timber cribwork bulkheads. The circa 1900 building at the center of the view was formerly used by an ice company and a brewery, but probably not serviced by the canal (Photographer: Thomas Flagg November 2003) [Source: Raber Associates].



Plate 3.7. Gowanus Canal Assessment of Eligibility: View east of steel sheetpile bulkhead and crushing plant at the junction of the main canal (left of view) and the 4th Street Basin (Photographer: Thomas Flagg , November 2003) [Source: Raber Associates].

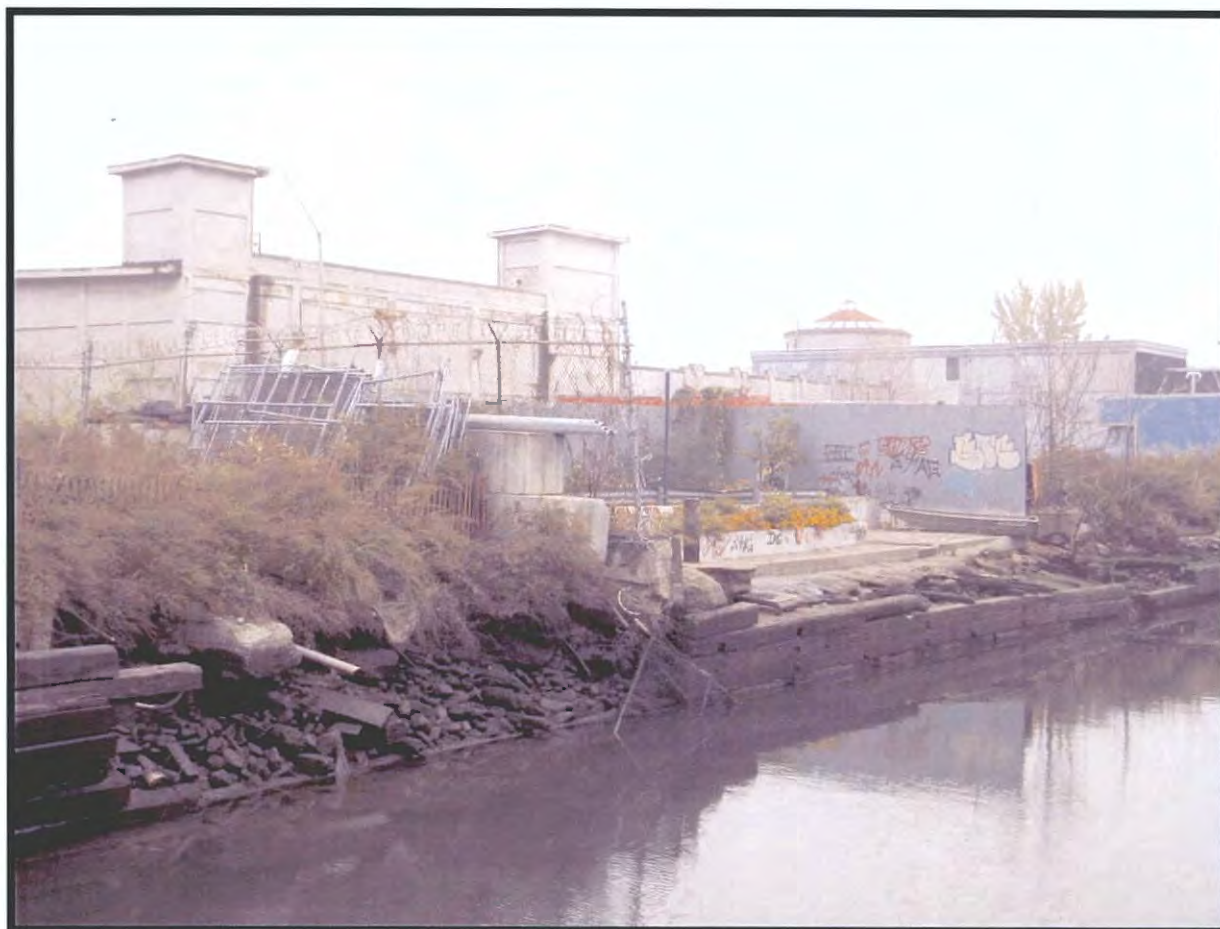


Plate 3.8. Gowanus Canal Assessment of Eligibility: View north of deteriorating timber crib-work bulkheads at the end of 2nd Street, with the surviving component of the circa 1918-21 Foreman Blades Lumber complex visible in background (Photographer: Thomas Flagg , November 2003) [Source: Raber Associates].



Plate 3.9. Gowanus Canal Assessment of Eligibility: View northwest of the intact timber crib-work bulkhead at the end of 1st Street, with a 1916 concrete oil terminal structure (Photographer: Thomas Flagg, November 2003) [Source: Raber Associates].



Plate 3.10. Gowanus Canal Assessment of Eligibility: View northeast towards the end of the canal, with timber sheetpile (right) and steel sheetpile (left center) bulkheads, and concrete bulkhead at the end of the canal (left) (Photographer: Thomas Flagg, November 2003) [Source: Raber Associates].



Plate 3.11. Gowanus Canal Assessment of Eligibility: View north of the Carroll Street Bridge (Photographer: James Lee, November, 2003)[HRI Neg. # 03070 D1-46].

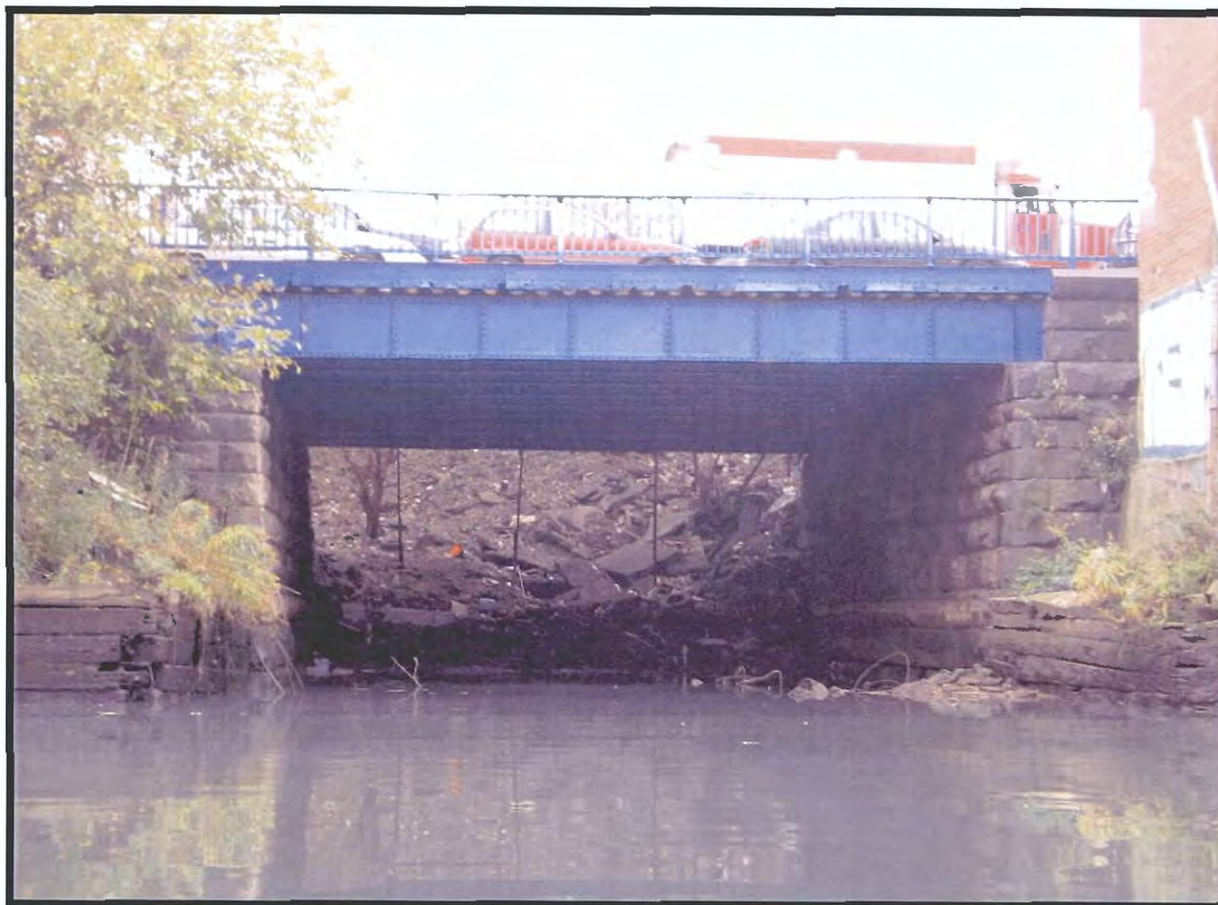


Plate 3.12. Gowanus Canal Assessment of Eligibility: View southeast of Third Avenue Bridge. The filled 5th Street Basin is visible in the background (Photographer: Thomas Flagg, November 2003) [Source: Raber Associates].



Plate 3.13. Gowanus Canal Assessment of Eligibility: View northeast of the Gowanus Canal, 9th Street bridge and the trestle for the F and G Trains. 1952. Taken from the new Gowanus Expressway overpass, this view also includes the Cirillo Bros. Coal & Fuel Co. at left, Cranford Co. concrete & asphalt plant at left just beyond covered lighter in 11th Street Basin and a number of tugboats, covered lighters, and hold barges. Source: Brooklyn Public Library.



Plate 3.14. Gowanus Canal Assessment of Eligibility: View northeast near the 11th Street basin showing concrete additions to the cribwork bulkhead face (left) and new timber face on cribwork bulkhead (right). The New York Transit Authority trestle is visible in the background (Photographer: Thomas Flagg , November 2003) [Source: Raber Associates].



Plate 3.15. Gowanus Canal Assessment of Eligibility: View North of the former S.W. Bowne grain warehouse (Photographer: James Lee, November 2003) [HRI Neg. # 03070 D1-02].



Plate 3.16. Gowanus Canal Assessment of Eligibility: Oblique aerial view looking east of the lower portion of the canal. The New York Transit Authority trestle is at center (Photographer: Thomas Flagg, 1988) [Source: Raber Associates].

cribwork, with portions below mean low water most likely dating to canal construction beginning *circa* 1866 and ending sometime in the early 20th century. The general design, materials, and workmanship of the canal walls through the waterway's industrial history retain much integrity from this era. The substantially intact 1904-1911 flushing system, although not a complete success during the industrial period of canal history, contributed to canal operations and maintenance of local health. Two bridge crossings, at Carroll Street and Third Avenue, retain most or all of their integrity from the period of active canal industrial use. The other four local bridges no longer have this character, and the two high-level crossings have limited direct association with the canal except as part of a more general set of construction obstacles within the former Gowanus Creek drainage.

C. HISTORIC SITES AND STRUCTURES ALONG THE CANAL (FIGURE 3.2)

1. Site of Denton's Mill (Yellow Mill)

Denton's Mill was mapped as late as 1849 (and sketched in 1850) just before it was engulfed by onrushing development. It was about a half-block east of the main stem of the canal, south of Carroll Street.

The site today is occupied by a modern, three-story metal-sided building (Plate 3.17). Fire insurance maps show that by 1886 the site was occupied by the Watson and Pittinger Lumber Yard (whose facility also occupied the opposite bank of the canal, below Carroll Street) and the "Philp" (*sic*) Paper Mill, the latter named in 1889 by the Gowanus Canal Commission as the canal's sixth greatest polluter. By 1904, the paper mill had been replaced by the Loomis lumberyard; in 1915 this company also occupied what had been Watson and Pittinger's. The 1938 map shows what appears to be the present building on the Watson and Pittinger's site, its occupant engaged in the manufacture of printing ink, and the paper mill site

held a sand and stone dealer. By 1950 the sand and stone dealer was gone. The 1969, 1977, 1986 and 1996 maps show a plastics company in the ink manufacturer's building.

Given the site's history of redevelopment, not surprisingly no surface indications of the mill or dam were noted. The building on the site is architecturally undistinguished.

2. Site of Freeke's Mill (Old Gowanus Mill)

By reference to the maps discussed in the previous chapter, and information provided by 19th century historians, Freeke's Mill is believed to have stood just north of Union Street, probably either where the canal main stem now flows and/or on the east bank. The site is shown in Plate 3.18.

The mill was standing at the time of Lossing's visit in 1850, but he refers to its destruction in the past tense. The site was mapped in 1886 as "Adams' Lime, Brick and Lath Yard," virtually devoid of buildings. By 1904 there were buildings on the site set back from the canal; the immediate bank held "lumber in piles." Additional detail on the 1915 map reveals this to have been a packing case manufacturer. The 1950 fire insurance map shows a "Beverage Warehouse" on the canal bank; this is apparently the structure still on the site.

As is the case at the site of Denton's Mill, no surface indications of the former presence of Freeke's Mill were noted. The structure is an undistinguished brick building, approximately two stories, with a band of steel-framed windows.

Page 3-27



Plate 3.18. Gowanus Canal Assessment of Eligibility: View Northeast approximately at the site of Freeke's Mill (Photographer: James Lee, November 2003) [HRI Neg.# 03070 D1-57].



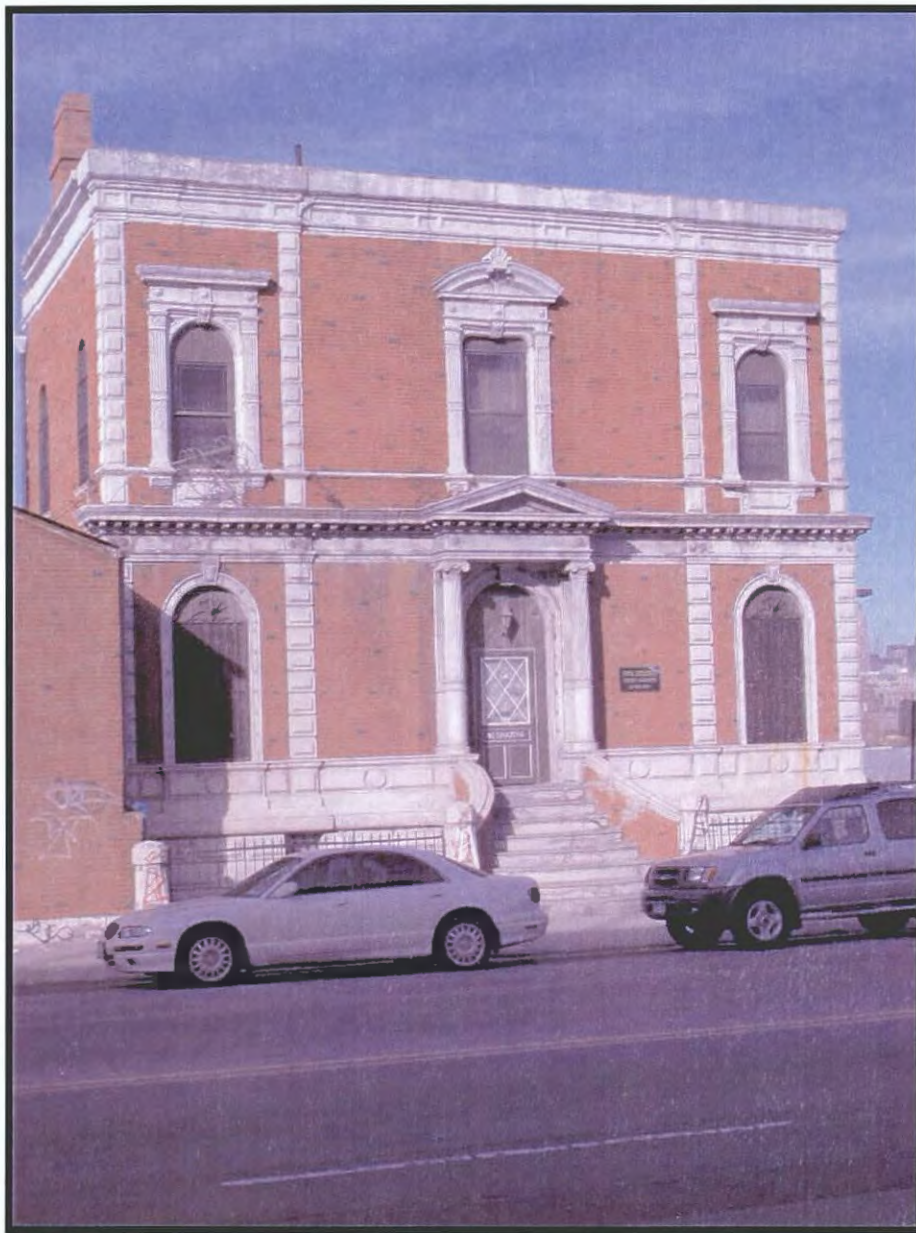


Plate 3.19. Gowanus Canal Assessment of Eligibility: View North of Brooklyn Improvement Company Office Building. (Photographer: Charles Ashton, January 2004) [HRI Neg.# 03070 D3-09].

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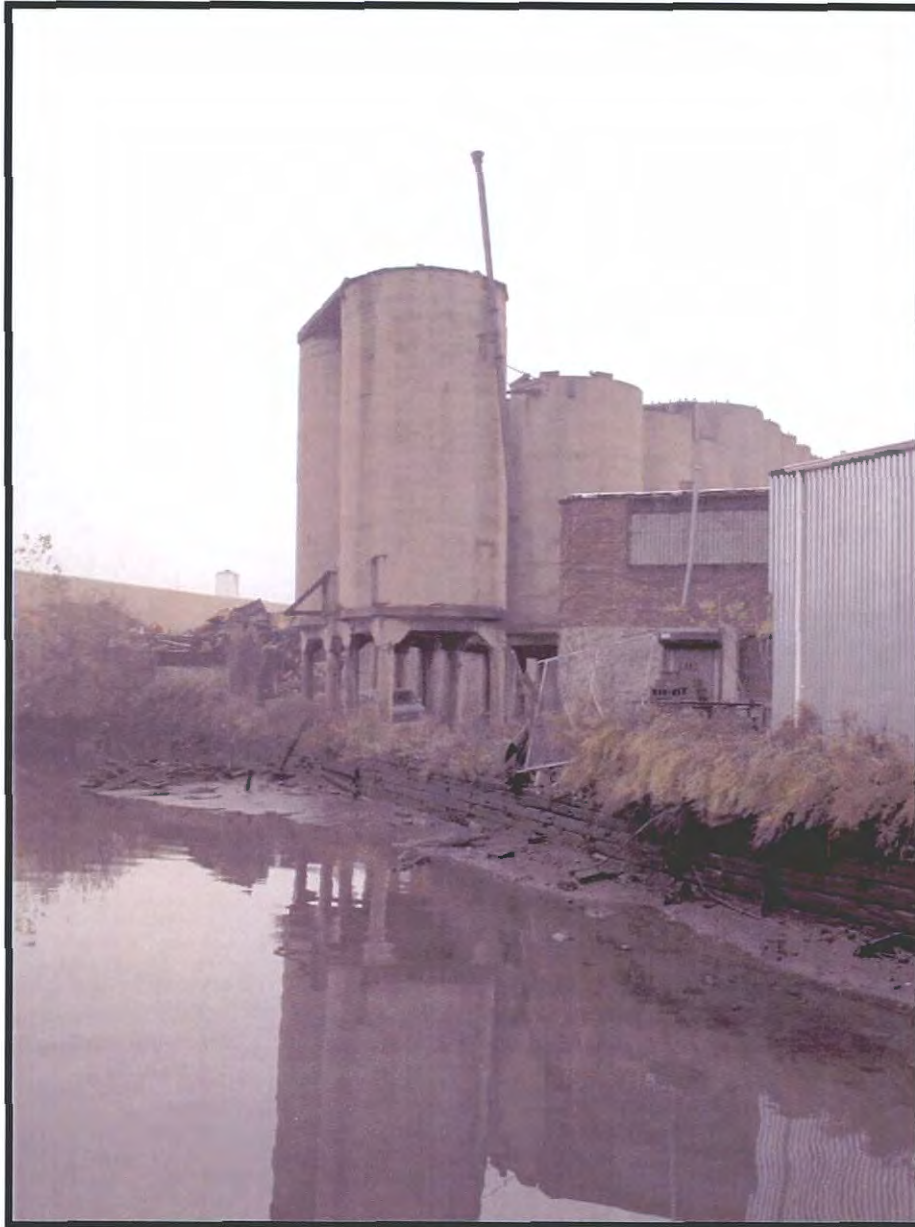


Plate 3.20. Gowanus Canal Assessment of Eligibility: View southeast of Burns Bros. Coal Pockets (Photographer: James Lee, November 2003) [HRI Neg.# 03070 D1-32].

3.20.



Plate 3.21. Gowanus Canal Assessment of Eligibility: View southwest of Burns Bros. Coal Pockets and timber cribwork bulkhead near the head of the 4th Street Basin (Photographer: Thomas Flagg, November 2003) [Source: Raber Associates].



Plate 3.22. Gowanus Canal Assessment of Eligibility: View East of Former Brooklyn Rapid Transit Power House (Photographer: Charles Ashton, January 2004) [HRI Neg.# 03070 D3-07].

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to become the five boroughs. It also is related to the bulk shipment, handling and use of coal, one of the canal's principal freights. It is also, with the Litchfield Office Building, one of the more interesting buildings architecturally in the study area.

6. Foreman Blades Lumber, west side of the canal between First and Second Streets (Plate 3.23)

Although architecturally not as striking as the BRT Power House, Foreman Blades Lumber appears to retain its integrity and is associated with another of the canal's major freights.

Its first appearance on fire insurance maps is in 1938, when the entire block bounded by the canal, 1st, 2nd and Bond Streets was indicated as "Standard Oil Co. of N. Y." A number of buildings were occupied by tenants. Standard Oil had been indicated as the owner of the northern half of the block in 1904 and 1915; the southern half was occupied by a dealer in building materials as early as 1886. By the time the 1938 map was published, Standard had the entire block, and it had been virtually cleared and redeveloped from its 1915 appearance. The Bond Street side of the property had an "Auto Ho.", storage and a garage; Foreman Blades Lumber was the tenant on the canal side. A building no longer extant was directly at the edge of the canal, used for lumber storage (Sanborn 1886, 1904, 1915, 1938).

The building that survives today was identified on the insurance maps as having been built in two sections, the more southerly in 1918, the northern in 1921. Their uses were, respectively, lumber storage and as a lumber warehouse. By 1950 the Foreman Blades parcel was occupied by Phillips Paper products, and the building were being used for paper box manufacturing and a paper warehouse. The canal-side building was

gone by 1969, and the two rear buildings were labeled simply "Loft." This label persists up to the 1996 map (Sanborn 1950, 1969).

Like the Burns Bros. coal pockets, the Blades and Foreman building is associated with one of the canal's primary uses, the bulk movement of materials that were directly associated with the growth of Brooklyn. Its utilitarian function is reflected in its design: it is a simple rectilinear concrete frame with brick curtain walls, free of ornament.

7. S. W. Bowne Grain Storehouse, west side of the canal between Bay and Creamer Streets (Plate 3.24)

This massive 4-story, 200-by-80-foot brick building is an end-gabled structure with a central transverse fire-wall and eight bays on its long side, most of which have round-arched window openings. A monitor runs the full length of the building's roof peak. Although the storehouse's interior was not inspected, it was almost certainly a wood-framed structure, with 12-foot ceiling heights as later reported (e.g. U.S. Army Corps of Engineers 1988). The Bowne storehouse can be dated with some precision to 1886, as the Sanborn insurance map published that year labeled it as "Grain Ware Ho. Being Built." Into the early 20th century, the storehouse was part of a two-block-long complex of hay, feed, and grain processing facilities from Creamer to Sigourney streets, including south of Bay Street a feed mill removed *circa* 1904-1915 and a large 1912 hay and feed storage building (Sanborn Map Company 1904, 1915).

As originally operated, the storehouse was associated with a grain elevator on the bulkhead opposite the storehouse's south end. The elevator, for which limited information is available, was probably equipped with grain legs to transship grain from Erie Canal barges into the storehouse, where a grain elevator at



Plate 3.23. Gowanus Canal Assessment of Eligibility: View North of Forman Blades Lumber building (Photographer: James Lee, November 2003) [HRI Neg.# 03070 D1-34].

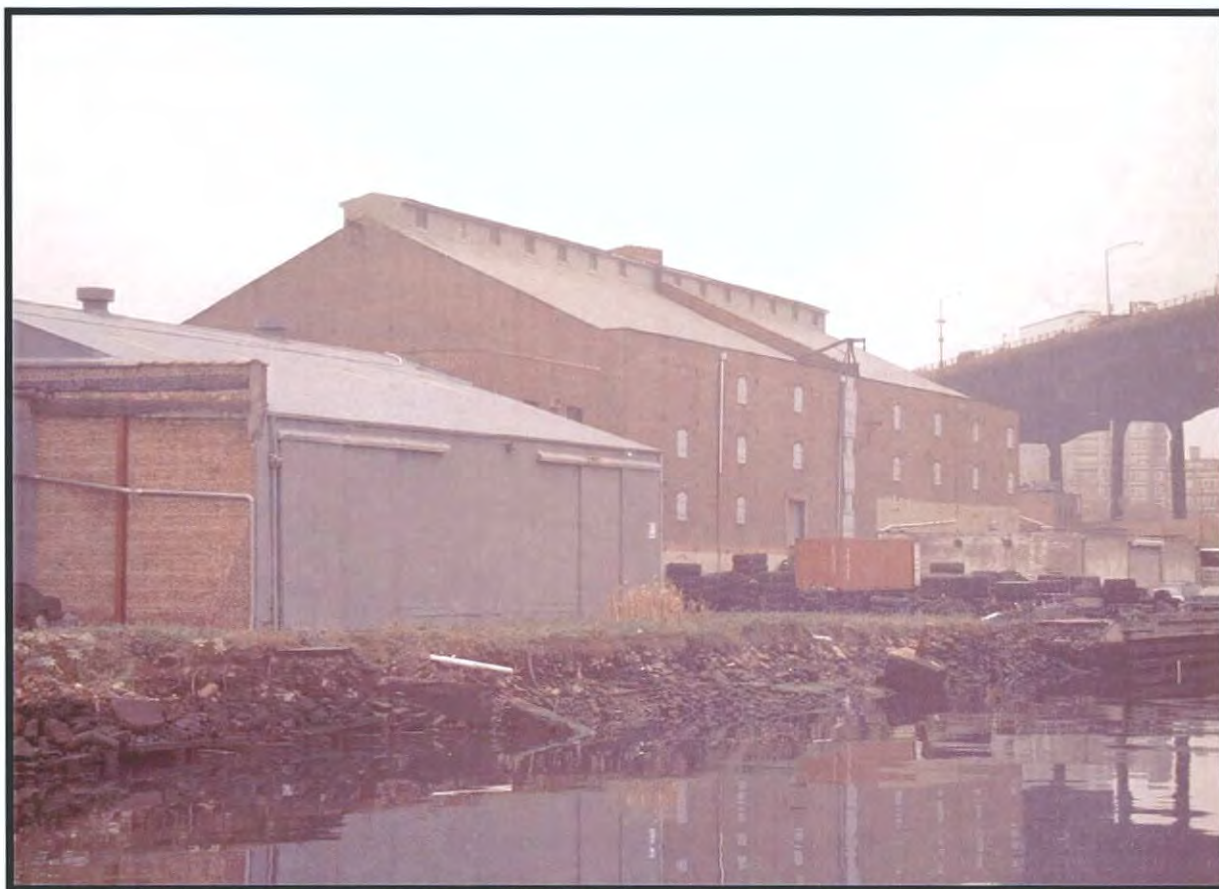


Plate 3.24. Gowanus Canal Assessment of Eligibility: View north of the former Bowne Stores (Photographer: Thomas Flagg, November 2003) [Source: Raber Associates].

UPC el

the southeast corner probably helped move grain to a conveyor in the monitor for distribution to storage bins. The storehouse probably served for local distribution and for on-site milling. Transshipment from the storehouse to ships for export, once an important component of Brooklyn waterfront traffic as discussed below, seems less likely here because of the limited draft available in this section of channel as reviewed in Chapter 2. A horizontal conveyor between the canalside elevator and the storehouse evidently entered the latter at the fourth floor southeast corner above the windows in that bay; the present blocked-in opening at this spot may represent the former conveyor access (Sanborn Map Company 1904, 1915; Plate 3.25).

The waterside elevator stood until *circa* 1950-1969, but by 1938 had been converted to part of a general warehouse facility along with the rest of the complex. Demand for hay and grain had declined significantly, as cars and trucks replaced horses in the city and the port's role in regional grain distribution declined. The two-block Bowne Company was now part of a larger "Bowne-Morton's Stores, Inc.", an "approved public warehouse." The firm had another building on the west side of Smith Street, and the entire north side of Bay Street from Smith Street to Court Street. There was no mention of hay, grain, or milling in any of the building labels on the 1938 fire insurance map; the grain warehouse was no longer in specialized use, it had apparently become a general-use warehouse. By 1950, the southern part of the Bowne complex, below Bay Street, was engulfed in later buildings associated with cargo and stevedoring companies. North of Bay Street, a one-story warehouse was built between the canal and the northern part of the grain warehouse before 1950. Now gone, the eastern façade of the grain warehouse shows signs of its former location, visible from the canal (Sanborn Map Company 1938, 1950, 1969; U.S. Army Corps of Engineers 1932, 1942, 1953, 1965, 1978, 1988).

The Bowne storehouse is an unusual, probably unique example of a 19th-century Brooklyn storehouse adapted for grain handling. Brooklyn dominated the handling of bulk products in the Port of New York from the 1840s until the firm establishment of container traffic by *circa* 1970. For most of this period, bulk products on much of Brooklyn's waterfront were transhipped and stored at small terminals consisting of narrow finger piers with or without piersheds, bulkheads retaining wide marginal wharf space, and masonry storehouses lining the wharves. Evolving from earlier 19th-century storehouses in Manhattan and Brooklyn, most of the classic Brooklyn storehouses were built *circa* 1850-1880 between Main Street and Erie Basin, with a smaller number on Smith Street and the latest examples built at Bush Terminal *circa* 1895-1905. They were especially notable from Atlantic Avenue to Main Street, once forming a nearly unbroken wall except around the Fulton Ferry. Typically, the storehouses were flat-roofed structures four to six stories high, 150 to 200 feet long, and 50 to 80 feet wide with three to five bays of round-arched windows on the short sides facing the water and the streets. Timber-framed with longitudinal arrays of square columns generally 15 to 18 feet apart transversely, the storehouses had timber floors, brick exteriors and party walls often made of rubble stone. The most intact examples include the Empire Stores in the project area, the former Merchants or Governors Stores on Pier 41 at the foot of Van Dyke Street, the Beard Stores (Warehouse Pier) in Erie Basin at Van Brunt Street, a smaller block of stores in Erie Basin at Richard Street, the Bowne Stores, and the brick storehouses at Bush Terminal. Less intact examples include the Tobacco Warehouse west of Empire Stores and parts of the former New York Dock Company Cold Storage Building. The Bowne storehouse, which falls within the size range of other Brooklyn stores and has the familiar round-arched window, is the only gable-roofed example in this class of building, and

also the only one oriented with the long side—and all windows—facing the bulkhead (Raber Associates 1984; Beyer Blinder Belle 1990; Parrott 2002).

The gable roof at the Bowne complex was clearly adapted to grain handling, and was in some ways a retention of a slightly earlier form of warehouse more widespread until the mid-19th century, when the dominant flat-roofed form emerged (Parrott 2002). Unlike large grain elevators built later in the 19th century to accommodate rail and marine traffic, the Brooklyn grain facilities were somewhat idiosyncratic, sometimes combining general warehouse forms with grain handling functions largely intended for export traffic, and sometimes including highly specialized structures with little resemblance to typical storehouses. Until the repeal of the British Corn Laws in 1846, export of unmilled grain remained a relatively minor feature of port activity. There were few if any specialized storage or handling facilities for grain before the Corn Laws repeal immediately quadrupled grain exports through the port, and made grain traffic to Britain a major component of transatlantic trade (Albion 1939:76-94; Anonymous n.d.). All of the port's grain facilities developed between *circa* 1846 and 1922, serving either railroad car or canal boat. The Brooklyn facilities all received grain from canal boats in bulk. Three types of facilities eventually handled grain at the port, in various combinations and sequences: private grain stores (almost all in Brooklyn) with stationary wharfside grain elevators; floating grain elevators which transferred product from canal boats to ships; and grain elevators at railroad terminals. The grain stores and floating elevators appeared as soon as the Corn Laws disappeared, while the railroad elevators did not start to rise above the port's shores until the late 1870s. The grain stores disappeared by *circa* 1915 after the virtual disappearance of the canal grain traffic which supported the grain stores, and the sharp decline in the port's share of export grain traffic. The railroad and floating elevators retained the remaining traffic. The New York

State Barge Canal grain elevator completed in 1922 in Gowanus Bay was part of an attempt to re-direct the port's grain traffic, and was something of an anomaly in being a large grain elevator designed for canal traffic. Early 20th-century changes in overseas grain shipping patterns highlighted a fundamental lack of grain handling development that had been a growing problem in the Port of New York for a quarter century. With essentially no improvements in grain facilities after 1922, competition from other ports significantly reduced grain traffic following a relatively brief surge of Canadian grain exports through the Port of New York during and after World War I (Anonymous n.d; see Raber et al. 1984: 95-104 for discussion of Brooklyn export grain facilities).

Located where ship traffic was probably made difficult by limited dredging efforts, the Bowne complex was most likely used only for local distribution, as noted above. This may explain its orientation parallel to the nearest street, to facilitate wagon loading rather than marine transshipment.

Today the building is one of the few distinctly 19th-century structures on the canal banks. It retains its brick exterior with shutters at the few wall openings, and no major additions or alterations are visible from the exterior. The former Bowne Grain Warehouse typifies the canal's role in importing bulk goods into the city, and was built just as the canal was nearing its peak. The company's fortunes followed those of the urban hay and feed trade, but today the warehouse is one of the most visually intact canalside structures linked to the canal's role in the growth of Brooklyn.

[illegible]

with deepwater channels to the ocean. The harbor is the drowned Hudson River estuary, which gives the region a sheltered location near the Atlantic Ocean, and water access to the interior via the Hudson and several other rivers. There were deep natural channels into the harbor and through many of its waterways, some significant tidal estuaries like Gowanus and Newtown Creeks and the aboriginal Harlem River, and seven bays with over 100 square miles of safe anchorage including Lower New York Bay, Newark Bay, and Upper New York Bay. The harbor includes the mouths of four rivers (the Hudson, Raritan, Passaic, and Hackensack), and three major tidal straits linking some of the bays with each other or Long Island Sound (the East River, the Arthur Kill between western Staten Island and New Jersey, and the Kill Van Kull between Upper New York and Newark Bays). All these waterways surrounded and separated three large islands (Manhattan, Long Island, and Staten Island) and continental real estate with shorelines totaling over 770 miles, split about 60:40 between New York and New Jersey (Raber 2002)

The port's complex waterways provided easy boat access to much of the region, but generally served as barriers to railroads and highways. Until recent decades, local freight and passenger transport involved harbor craft to a degree not seen in most American ports. Even at the height of rail traffic in the port, lighters and barges delivered much of the freight, and the railroads transferred cargoes from waterfront terminals to navies of tugboats, towed vessels, and steam lighters which made the port's waters a kind of belt line serving the metropolitan region (Flagg 1988, 2000: 5-12). Before highways and trucks reached all parts of the region's cities, tidal creeks provided access to areas otherwise hard to reach. Development of these interior waterways was basically a variant of river navigation assisted by channel clearance and dredging. Unlike most other river navigation projects,

however, those in the metropolitan New York region were for very local traffic, and usually dead-ended well downstream of original marshy headwaters.

The Gowanus Canal was one of at least seven developed interior waterways in the port, all of which were on the New York side of the harbor (Figure 4.1). Most, including the original Gowanus Creek, were tidal estuaries feeding salt marshes, with limited navigability. The other estuaries included Newtown Creek, Bronx River, Eastchester Creek (Hutchinson River), Westchester Creek and two separate waterways (Harlem River from the East River, and Spuyten Duyvil from the Hudson) later channelized as the modern Harlem River. With perhaps less than three feet of water available at low tide (*Brooklyn Eagle* 1868), Gowanus Creek was probably the least navigable of these streams aboriginally. Despite this limitation, Gowanus Creek's proximity to a fast-growing urban area in the early 19th century made it the earliest fully developed interior waterway in the region, and the largest of the port's waterways improved almost entirely without federal assistance. The Gowanus Canal's history, design and construction were also unlike those of the other industrialized estuaries, which generally had some waterside development prior to channel improvements.

Newtown Creek

Newtown Creek, the largest and most aboriginally navigable of the industrialized tidal estuaries, had up to 17 feet available at low tide for perhaps two miles, and was accessible to small ships and steamboats (cf. Randel 1814, U.S. Coast Survey 1844). After a long history as a local highway for small farming communities and as a tidemill power source beginning in the 17th century, parts of the creek were bulkheaded and adjacent marsh areas filled *circa* 1850-1860 for prospective real estate development and for some noxious industries attracted by the creek's relative

NATIONAL REGISTER OF HISTORIC PLACES ELIGIBILITY ASSESSMENT
GOWANUS CANAL, BOROUGH OF BROOKLYN, KINGS COUNTY, NEW YORK

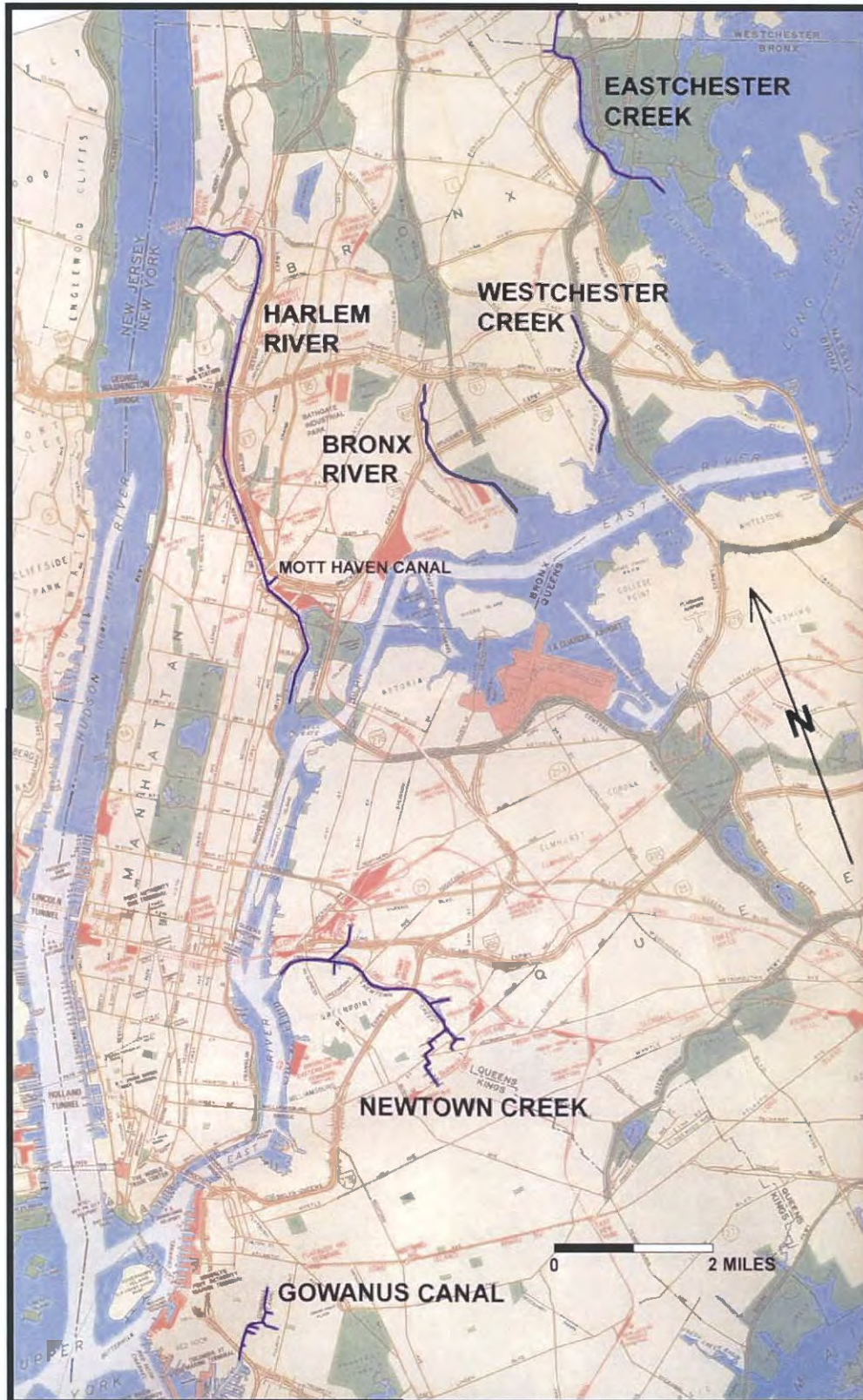


Figure 4.1. Gowanus Canal Assessment of Eligibility: Map of Waterways in the New York Vicinity (Base map source: The Port Authority of New York and New Jersey, n.d.).

remoteness. Between 1860 and 1880, Newtown Creek became a national center of refined petroleum product manufacture, stimulated in part by the 1861 completion of nearby Long Island Railroad facilities. These decades saw more nearby urban growth, construction of two short canals for delivery of building materials, increased shipments of coal and lumber, and the first local demands for federal channel improvements of this creek. U.S. Army Corps of Engineers dredging *circa* 1880-1900 encouraged additional industries requiring sea-going vessels, including major copper refinery and chemical production facilities. The Corps created channels 20 to 23 feet deep at low water and 100 to 150 feet wide, with some work not completed until the Great Depression. With increased industrial growth, most of the creek and its tributaries was bulkheaded by 1900. By 1910, Newtown Creek was one of the busiest waterways in the world of its size, with about 70 manufacturing, fuel and bulk materials firms. Manufacturing and bulk products growth continued until after World War II, peaking at some 85 firms. Probably the most important interior waterway in the port at one time, Newtown Creek was not a canal, but rather a small river that developed with the assistance of federal dredging projects. Shoreline bulkheading was done gradually, to provide stable wharves rather than as part of channel enlargement as was the case with the Gowanus Canal (Stiles 1869, 1884; U.S. Army 1872-1950; W.W. Munsell & Co. 1882; Brown and Ment 1980; Seyfried 1984; Flagg 1991).

Eastchester Creek, Westchester Creek, and Bronx River

Eastchester and Westchester Creeks were minor waterways whose improvement followed demands of nearby urban areas developed late in the 19th century for delivery of fuel and building materials. Extending into Westchester County through the Bronx, marshy Eastchester Creek was navigable for about 1.5 miles

above Eastchester Bay, with four to nine feet of water at low tide. U.S. Army Corps of Engineers dredging *circa* 1877-1895 created a channel 75 to 100 feet wide with a nine-foot low-water depth, and extended navigation upstream another 1.5 miles, reaching north of the Boston Post Road. As many as 15 terminals developed for receipt of coal and building materials, most near the northern end of the waterway including some located along an 800-foot-long private canal dredged west of the channel in 1894 just north of the Post Road. Eastchester Creek traffic in oil, sand and gravel remains fairly active.

Westchester Creek into the early 20th century had a 2.5-mile long, 60-to 80-foot-wide navigable channel about 3.5 to 6.5 feet deep at low water. Except for some local sloop and steamboat traffic, there was evidently limited use of this waterway until U.S. Army Corps of Engineers dredging *circa* 1914-1920 created a 60-to 100-foot-wide channel with an eight-foot depth at low water. By 1919, 16 terminals received oil shipments by barge. A later project deepened the channel to 12 feet but marine traffic dropped sharply after *circa* 1970 (U.S. Army 1872-1950; Jenkins 1912; Smith 1919; Hermalyn 1982; U.S. Army Corps of Engineers 1950-1997).

The 30-mile-long Bronx River provided waterpower to some small colonial mills on its upper reaches, but also had little navigation before the 20th century. The tidal, lowermost 2.5 miles was marshy, with no more than five feet of water at low tide and many shoals. Several coloring or dyeing mills operated just north of the tidal limits from the early 19th century until the lower river was urbanized beginning late in that century. Municipal parkland purchases -inspired by the success of Central Park- led to the closure of the mills *circa* 1887-1890. Several U.S. Army Corps of Engineers projects *circa* 1897-1950 dredged channels four to ten feet deep and 50 to 200 feet wide, allowing the development of up to 18 terminals for marine receipt of coal, oil and building materials. Except for

a few oil terminals, there is now little commercial use of the waterway (U.S. Army 1872-1950; Jenkins 1912; Hermalyn 1982; U.S. Army Corps of Engineers 1950-1997).

Harlem River and the Mott Haven Canal

As a waterway linking the Hudson and East rivers, the Harlem River is a project completed by the United States at different times between 1888 and 1938. Unlike federal work on other interior waterways in the port, this project was designed as a canal to create a shortcut between the East and Hudson Rivers that would strengthen port commerce and allow for ship traffic. The waterway originally consisted of two tidal estuaries at the north end of Manhattan Island, flowing in opposite directions between north-south ridges, from a tidal divide near Fordham Landing, just north of the present University Heights Bridge. The aboriginal Harlem River was an East River estuary with a channel 300 to 1500 feet wide, with original depths at mean low water diminishing from about 10 feet at the East River to seven feet at the former Fordham Landing. Several tributary streams met the Harlem River, which was bordered by wetlands in places south of Fordham Landing. Small craft could navigate upriver from the landing towards the upper reaches of Spuyten Duyvil. The latter estuary followed a sinuous course around the bedrock of Marble Hill, running southwest from about 230th to 215th streets before turning northwest and west around the Riverdale Ridge along the Hudson. Spuyten Duyvil broadened from about 150 to 1000 feet towards the Hudson, and was generally four feet deep at mean low water below Kingsbridge Avenue into the mid- to late 19th century. The main elements of the canal plan approved in 1886 included dredging a 400-foot-wide channel from the East River to the present Broadway canal crossing with a 15-foot depth at mean low water, and cutting a nearly straight channel from Broadway to the Hudson. Most of this work was accomplished

by 1895, with at least a 15-foot depth achieved along the new 7.6-mile waterway, but the Johnson Ironworks (operated *circa* 1853-1920 on the north side of Spuyten Duyvil) obstructed a planned cut that was not completed until 1938. As with the other federal projects in the port, the Harlem River work involved channel clearance and dredging without bulkhead construction (U.S. Army 1872-1950; Whitford 1905-06: 1410-11; Jenkins 1912; Tieck 1968; Smith 1919: 73-6).

The history of marine traffic, rail and industrial use, and the numerous bridge crossings on the Harlem River is complex and need not be detailed here to assess the significance of the Gowanus Canal. Aside from small tide mills operated in the early 19th century, the only significant waterside pre-canal industries were the ironworks on Spuyten Duyvil established by Isaac G. Johnson, and another ironworks opened by Jordan L. Mott in 1841 on the north side of the Harlem River, just upriver from Third Avenue and south of the bridge of the newly-opened New York and Harlem Railroad. Mott established the community of Mott Haven nearby, and created the Mott Haven Canal described below to provide more water access to the ironworks. While Harlem River land use greatly intensified *circa* 1895-1932, with active waterfront sites rising from about 19 to 85, most of this development involved a proliferation of general freight handlers including more rail terminals, some municipal or utility operations, and dealers in coal, building materials including lumber and masons' supplies, and sand and gravel. The opening of the canal and the raising of many bridges facilitated lighter, barge and carfloat traffic associated with these operations. It appears, however, that the principal cause of waterside development was the contemporary urbanization of northern Manhattan and the Bronx, driven by immigration and the growth of automobile and commuter railway infrastructure. Before the canal opened, marine freight was increasing substantially, and landfill to create new piers and wharves narrowed the Harlem

River south of High Bridge. Rail marine operations north of Willis Avenue also expanded significantly on the Bronx side of the waterway between 1898 and 1927. Very few manufacturers other than the ironworks used the waterway, with most of the nearby construction associated with housing and roadways (Robinson and Pidgeon 1884; G.W. Bromley & Co. 1893, 1910, 1911; E. Belcher Hyde 1900, 1901, 1912; Jenkins 1912; U.S. Army Corps of Engineers 1926-1988; Tieck 1968; Pearce 1989a, 1989b).

Most of the marine traffic accompanying this growth would probably have occurred without the federal project. City and federal data clearly indicate that the vast majority of traffic *circa* 1895-1958 ran up the Harlem River from the East River to at least Macomb's Dam Bridge, and that relatively little of the traffic consisted of vessels large enough to require bridge openings. This pattern is consistent with the waterway land use history, in which terminals handling general freight, coal, sand and gravel, and building materials were most frequently served by tugboats moving carfloats, barges and tankers in tows able to pass under the bridges. The same data also suggest that most waterway traffic was intraport, or involved tows moving up the East River from coastal or interior points. At all the crossings, the percentages of vessels requiring bridge openings also dropped steadily through time. This seems to reflect not only changes in vessel types used to move freight, but the failure of the improved waterway to fulfill its intended purpose as a ship canal. Trips made by sailing ships, probably carrying lumber or coal, dropped from over 5,400 in 1895 to about 2,400 in 1909, thereafter diminishing to almost none by the end of World War I. This trend was part of a regional drop in schooner and schooner barge traffic, caused by the advent of steam-powered colliers and diminished coal demand by some Atlantic coast industries during depressed economic conditions. Harlem River steamship trips are harder to enumerate in the federal data, but appear to have dropped sharply in the same period, virtually disappearing by

circa 1950 except for oil tankers serving local waterway terminals. It appears that the unfinished sections of the canal after 1895 inhibited passage of larger vessels north of the Macomb's Dam Bridge, and that by the time these sections were completed the improvements remained insufficient to warrant passing ten movable bridges. For most through traffic between the East River and the Hudson, it was evidently faster to pass around lower Manhattan than to use the Harlem River. The principal benefactors of the federal project were local businesses, railroads, municipal operations and recreational vessels, for whom the raised bridges created smooth passages. Like all the region's other interior industrialized waterways, the Harlem River saw a significant decline in commercial traffic by World War II, with virtually none today (U.S. Army 1874-1937; City of New York 1898-1958; U.S. Army Corps of Engineers 1950-1997; Whitford 1922).

Jordan Mott's private canal off the Harlem River was apparently one of the closest analogs to the Gowanus Canal in the region, although it is not well documented. Created *circa* 1850 by channelizing a small marshy tributary to the river, it served barge traffic to his ironworks and several other industries. The bulkheaded canal ran approximately a half mile from the river to present 144th Street in the Bronx, and was about 50 feet wide for most of its length north of 135th Street. There was a lock gate or guard lock at 135th Street which made the canal a tidal basin, an idea proposed elsewhere in the port including early plans for Gowanus Creek, but rarely if ever executed. Below the lock, the canal was about 85 feet wide to the river, probably serving as a basin for barges awaiting high tide movement into the canal, and facilitating rail marine transfers at the Harlem Transfer Company's terminal immediately upstream. An 1869 drawbridge carried 138th Street over the canal. New York City began attempts to fill in most of the canal in 1890 from the bridge inland in 1890, and succeeded in doing so *circa* 1901-1903. The short remaining por-

tion was used for coal deliveries until the 1930s, but almost all of the remaining canal was filled *circa* 1935-1965. Portions may remain intact under fill, but it has none of the Gowanus Canal's visual integrity (Mielatz 1891; Jenkins 1912; U.S. Army Corps of Engineers 1926-1988; Bronx County Historical Society 1984).

b. Surviving Industrial Setting and Associated Resources

In addition to the waterway itself, several structures are related directly or indirectly to the canal, and help to illustrate the history of the canal's construction, evolution and operation.

The Pumping Station at the head of the canal (and the associated tunnel under Butler, Hoyt and Degraw Streets) was built as a direct consequence of the canal and the pattern of its use for its first half-century of existence (i.e., as a destination for household and industrial waste). Because it was built specifically to reduce pollution in the canal, it can be considered as an element of the canal itself, as much so as are the bulkheads. Remarkably, it still serves the purpose for which it was designed and built.

Of the several bridges crossing the canal, two have retained integrity and are significant. The Carroll Street bridge, built in 1889 by the New Jersey Iron & Steel Company, is a retractile bridge, a nearly extinct bridge type. It was designated a New York City Landmark in 1987 and has received an opinion of eligibility for inclusion in the National Register from the New York State Historic Preservation Office.

The significance of the Third Avenue bridge derives from its association with the canal rather than from its intrinsic engineering merits. It was the subject of much debate when it was built in 1889, fueled by citizens' frustration with the numerous movable bridges

over the canal that frequently blocked street traffic. To avoid contributing to traffic congestion, it was specifically built as a high-level (for its time and place) fixed span.

The structures at the Burns Bros., Foreman Blades and S.W. Bowne properties are associated with the canal's role as a conveyor of bulk materials (coal, lumber and grain respectively) into Brooklyn. As would be expected of structures built for utilitarian functions, they have virtually no decorative or stylistic characteristics, other than what their uses demanded, but their significance derives from their historical functions rather than from their appearance. Perhaps better than any other surviving structures, they typify the dozens of structures of similar uses which once lined the canal.

The office of the Brooklyn Improvement Company, at the corner of Third Avenue and 3rd Street, is linked to the canal less directly, but the association exists nonetheless. Edwin Litchfield, head of the Brooklyn Improvement Company, was an early purchaser of swampland bordering Gowanus Creek, and as detailed in Chapter 2, built walls and basins to create usable (i.e., marketable) waterfront. He also created real estate where none had existed by filling behind the walls up to the height of the adjacent fast land. The Brooklyn Improvement Company had a major role in the creation of the canal and the neighborhood that surrounds it, and it is extraordinary that this small structure has survived.

Finally, the former Brooklyn Rapid Transit Power House is associated with the canal as a surviving (albeit tenuously) former industrial user of some of the coal arriving via the canal. It also presages the modern era of mass transit; it was built during a time when smaller transit companies were being consolidated into a transit system, all of which was driven by electricity. The location of the power station on the canal was dictated by the need to receive, handle and

store vast quantities of coal to power its boilers. It is also a striking architectural landmark in the canal neighborhood.

2. Criterion D and Archaeological Issues

a. Canal Bulkheads

The Gowanus Canal and its surviving basins include over two miles of timber cribwork bulkheads in various states of preservation (Table 4.1), most or all of which probably have timber pile footings driven into silty marsh deposits. Some of these footings may include undocumented dredging operations. Cribwork bottoms could include new information on vernacular adaptations of a well-established bulkhead form to marsh conditions. It is also possible that fill material in cribwork bulkheads might allow for relative dating of bulkhead sections, and for additional information on fill material sources. The only information on this topic uncovered by this study, summarized in Chapter 2, was a newspaper account of basin construction using, in part, sand from hills cut down south of Fifth Avenue. Given the relative distances of the canal from rock or demolition debris sources at the time of most initial construction, there may be significant variations in fill material used here from material used in similar bulkheads elsewhere in the region. The potential for new information on an important regional form of bulkhead construction appear to make Gowanus Canal timber bulkheads eligible for the National Register under Criterion D.

The narrowness of the canal precluded installation of concrete relieving platforms in front of older cribwork during 20th-century repairs, but as discussed in Chapter 3 it is possible that relieving platforms were installed on older cribwork bases. Although the general forms or types of concrete wall construction in the canal appear well-documented, there may be undocumented variations in these forms directly associated

with the canal. This possibility, as well as the association of the concrete walls with a waterway which appears eligible for the National Register, make at least some of the concrete wall sections contributing components of the eligible resource under Criterion D.

b. Submerged Resources

As discussed in Chapter 2, a wide variety of vessels used the Gowanus Canal probably until the Great Depression, including schooners, sloops, sail and steam lighters, tugboats, covered barges, barges hauling coal and sand, and canal boats. There are no visible remains of such craft in the canal, or in the Gowanus Bay Channel section of the project area southwest of the canal. There is a wide range of information available on these types of vessels, of varying degrees of completeness, based on study of hundreds of derelict vessels along the shores of the Port of New York (e.g., Raber et al. 1996, 1999; Panamerican Consultants 1999). Given the federal dredging in the Gowanus Bay Channel, and the irregular dredging in the Gowanus Canal, it is not likely that better-preserved examples of these vessels will survive in the project area. In much of the canal, any surviving submerged vessel components may also lie in contaminated sediments which would make any data recovery extremely expensive. We do not believe that any submerged resources in the project area would be eligible for the National Register under Criterion D.

3. Summary of Eligible Resources

In terms of National Register nomenclature, the Gowanus Canal and its associated resources comprise a historic district (defined by the National Park Service as "a geographically definable area, urban or rural, possessing a significant concentration, linkage

or continuity of sites, buildings, structures, or objects which are united by past events or aesthetically by plan or physical development"). The boundaries of the district are defined by the bulkheads lining the main stem of the canal and the four extant 11th, 7th, 6th and 4th Street basins, from the terminus of the canal at Butler Street to a line created by extending the alignment of Percival Street across the canal.

The sites of filled basins (1st Street, 5th Street) do not contribute to the eligibility of the canal. The structures enumerated above (the pumping station, the Carroll Street and Third Avenue bridges, the structures at the former Burns Bros., Foreman Blades and Bowne properties, the Brooklyn Improvement Company office building and the former Brooklyn Rapid Transit Power House) all contribute to the Gowanus Canal Historic District. The boundary definition enlarges where needed to encompass these contributing resources.

fill materials from timber bulkheads may lead to loss of potentially significant industrial archaeological data.

Habitat creation— capping the basins with clean fill and planting vegetation—would adversely affect the canal by filling contributing elements. While other basins have been filled in the past without destroying the canal's eligibility, the loss of additional historic features would diminish it further. Adding fill to a basin without completely obliterating it (i.e., filling to below the tops of the bulkheads) would be less severe but would still require mitigation.

B. PROJECT EFFECTS

Among the presently-anticipated project actions outlined in Chapter 1, two have the potential to possibly affect eligible resources. The first is "bank softening," which would remove bulkheads to unknown depths. Given the general integrity of Gowanus Canal bulkheads, their major role in defining the historic visual character of the waterway, and their potential for significant new information, bulkhead removal would in most places be an adverse effect on a resource eligible for the National Register of Historic Places. The relative severity of such an effect will depend on the bulkheads being removed, and the horizontal extent of removal. In some places where the visible bulkhead consists of concrete blocks replacing former upper components of timber bulkheads, less visual character will be lost. Removal of 19th- or early 20th-century

Chapter 5

CONCLUSIONS AND RECOMMENDATIONS

The Gowanus Canal from Butler to Percival Streets, along with selected associated bridges and industrial buildings, is recommended as being eligible for inclusion in the National Register of Historic Places as a historic district.

Possible "bank softening" project actions could have an adverse effect on this resource. For any canal sections subject to such action, the following steps are recommended:

- ❖ detailed photographic documentation at low-water conditions to the standards of the Historic American Engineering Record or other standards acceptable to the New York State Historic Preservation Office and the Army Corps of Engineers;
- ❖ review of project plans to identify the potential for loss of significant information on fill materials or bulkhead components; and
- ❖ archaeological identification and recovery of significant data in bank softening project areas, either by limited pre-construction excavation, or by in-construction monitoring.

Bank softening at locations adjacent to contributing buildings (the pumping station, the three bulk material handlers, and the former power generating station) would diminish their settings and is best avoided if possible. If avoidance is not feasible, mitigation activities should be expanded to include photographic documentation of the contributing building, emphasizing its relationship to the adjacent bulkhead.

Habitat creation (capping the basins with clean fill and planting vegetation) has the potential to adversely affect part of the eligible resource by eliminating or visually compromising basins, depending on the height of the fill with respect to the bulkheads. As

above, any such work should be preceded by detailed photographic documentation of the entire basin and its bulkheads at low-water conditions to the standards of the Historic American Engineering Record or other standards acceptable to the New York State Historic Preservation Office and the Army Corps of Engineers.

Provision should be made for a program of historic interpretive signage at public access points along the canal. These signs should be developed in consultation with the New York State Historic Preservation Office, the Army Corps of Engineers and other interested parties.

Finally, it will be recalled that while the approximate locations of Denton's and Freeke's mills are known, the presence and/or integrity of any buried remains is not. Any work involving excavation in these areas should be accompanied by archaeological monitoring during construction.

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- 1868b The Gowanus Canal Improvement. February 17, 1868, p. 2.
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Appendix A
RESUMES

Charles H. Ashton
Architectural Historian, M. S.

EDUCATION

M. S., Historic Preservation, Columbia University, New York, New York, 1977

B. A., American Studies, Colby College, Waterville, Maine, 1974

EXPERIENCE

2002-present Architectural Historian
Hunter Research, Inc., Trenton, NJ

Technical and managerial responsibilities for survey, evaluation and recording of selected Historic Architectural projects. Participation in:

- Historic structures survey and evaluation
- Overall site direction and day-to-day management
- Oversight of historical and archival research for all company projects
- Report and proposal preparation

2001-2002 Independent Historic Preservation Consultant

- Research, writing, photography
- Desktop publishing
- Contractual oversight of publicly-funded preservation projects

1985-2001 Principal Environmental Specialist
New Jersey Department of Transportation, Trenton, New Jersey

Ensured that highway projects (in one of six DOT regions) complied with state and federal laws and regulations protecting historic and prehistoric resources.

- identification and evaluation of potentially significant resources
- coordination with federal officials, project managers, engineers and interested citizens in evaluations of historic significance and in efforts to avoid or mitigate projects' effects
- project manager of statewide consultant survey to identify historic bridges

1985 Historian
National Park Service, Philadelphia, Pennsylvania

Designed and implemented Oracle database management system to track projects qualifying for Federal tax incentives for restoration of historic buildings. Temporary position.

1980-1985 Director of Surveys
Heritage Studies, Inc., Princeton, New Jersey

Conducted and/or directed evaluations and inventories of historic resources for public and private clients.

- Client liaison
- Recruiting and supervising field staff

- Research, photography, report writing and production.
- Preparation of nominations to the National Register of Historic Places
- Project manager for award-winning statewide survey of historic railroad stations and inventory of historic buildings of Ocean County, New Jersey.

1977-1980

Director of Surveys and Registration
Vermont Division for Historic Preservation, Montpelier, Vermont

Directed full-time and seasonal staff of up to 15 in statewide inventory of historic buildings.

- Recruiting, training, assigning work, reviewing completed assignments.
- Researched and wrote and/or assigned and reviewed nominations to the National Register of Historic Places.
- Public liaison

MICHAEL S. RABER

Skills

Design, implementation, and administration of cultural resource management surveys, preservation and interpretation plans, and archival recordings

Primary historical research and archaeological documentation

Writing, editing, and professional report preparation

Cartographic & aerial photographic analysis; map production

Social profiling, ethnographic survey research, collection and analysis of demographic and socio-economic data

Research Experience

- 1978-present Principal or co-principal investigator, and primary report author, for approximately 300 cultural resource assessments, master plans, archaeological surveys/excavations, preservation management plans, evaluations/ nominations for the National Register of Historic Places, and archival recordings in southern New England, New York, New Jersey, Ohio, and Virginia.
- 1973-1978 Doctoral dissertation research on Mormons in central Utah. Ethnographic and historic analyses included 20 months of fieldwork 1974-76 in agricultural town of 500 people. Research included: collection & linkage of genealogical data for 5000 individuals, living and dead; use of all probate and land tenure data 1870-1976; interviewing and participant observation; field/aerial photographic survey of 50 miles of irrigation ditch networks.
- 1967-1969 22 weeks archaeological training at field schools in England, Iowa, and California in basic excavation and surveying.

Education

- 1978 Ph.D., Anthropology. Yale University.
- 1974 M.Phil., Anthropology. Yale University.
- 1970 B.A., *magna cum laude*, Archaeology. Yale College.

Employment History

- from 1980 Owner, Raber Associates. Sole proprietor of consulting firm active in cultural resource management, historic preservation, and industrial archeology and history.
- 1979-1980 Partner, Davis & Raber, New Haven, CT and New Orleans, LA, a consulting firm in cultural resource management.
- 1971-1972 Administrative Assistant, Muscular Dystrophy Associations of America, New York, NY.
- 1970 Production Engineer, Perkins & Will Architectural Associates, White Plains, NY.

Publications

- in progress *"A Model Establishment..": Springfield Armory and Military Small-Arms Making, 1794-1916.* New York: Oxford University Press (with C.C. Cooper, R.B. Gordon, and P.M. Malone).
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- 1985 Domestic Life and Rural Society in Spring City, Utah: The Basis of Order in a Changing Agrarian Landscape, in J.L. Embry and H.A. Christy, eds., *Community Development in the American West: Past and Present Nineteenth and Twentieth Century Frontiers*, pp. 125-62. *Charles Redd Monographs in Western History* No. 15. Salt Lake City: Signature Books.
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Appendix B
SCOPE OF WORK

**Scope of Work
National Register of Historic Places Eligibility Evaluation
And Cultural Resources Assessment for
For the Gowanus Canal and Bay
Borough of Brooklyn
Kings County, New York
in connection with the
Proposed Ecosystem Restoration Study**

I. INTRODUCTION

The New York District, Army Corps of Engineers (Corps) is currently conducting a feasibility study that focuses on ecosystem restoration of Gowanus Bay and Canal (formerly Gowanus Creek), located in the Upper Bay of New York Harbor. The overall study area includes (1) the two mile length of the Gowanus Canal from Gowanus Bay to its inland terminus at Butler Street in Brooklyn, (2) the canal's six square mile watershed area, and (3) Gowanus Bay, which extends eastward from Bay Ridge Channel to the beginning of the Gowanus Canal. The area under study for cultural resources is more limited and is described below.

The preliminary assessment of water resource problems and needs in Gowanus Bay and Canal identified extensive habitat loss and degradation that has greatly reduced the functional and structural integrity of ecosystems within the study area. Development induced impacts on the environment include: modifications to the natural hydrologic regime resulting from channelization and other navigation improvements, the creation of fast land in former aquatic habitats, shoreline hardening and other alterations, and the overall increase in impervious area throughout the watershed. Adverse impacts on aquatic habitats have been exacerbated by the degradation of water and sediment quality resulting from extensive pollution loading, and from reduced flow and flushing rates in the canal. The purpose of the feasibility study is to analyze aquatic ecosystem problems and opportunities throughout the entire Gowanus Bay and Canal.

The primary goal of this cultural resource study is to assess the eligibility of the Gowanus Canal for the National Register of Historic Places (NRHP). The information gathered will be incorporated into the design of the current project as it is developed. The information will also be used in developing the scope and level of effort needed to undertake further work, as required and to prepare a Memorandum of Agreement and mitigation measures, should they be required for the canal as a whole. A second goal is to develop a preliminary evaluation of the potential for cultural resources within the study area as a whole. It is anticipated that historic maps will be the main source of data for this part of the study and that it will result in a gazetteer of locations and the type of resource that might be encountered there, degree of sensitivity and suggestions for further study, if required. A third element of this work is to obtain copies of all available historic maps,

particularly fire insurance maps. Other project delivery team members will use these maps for environmental analyses.

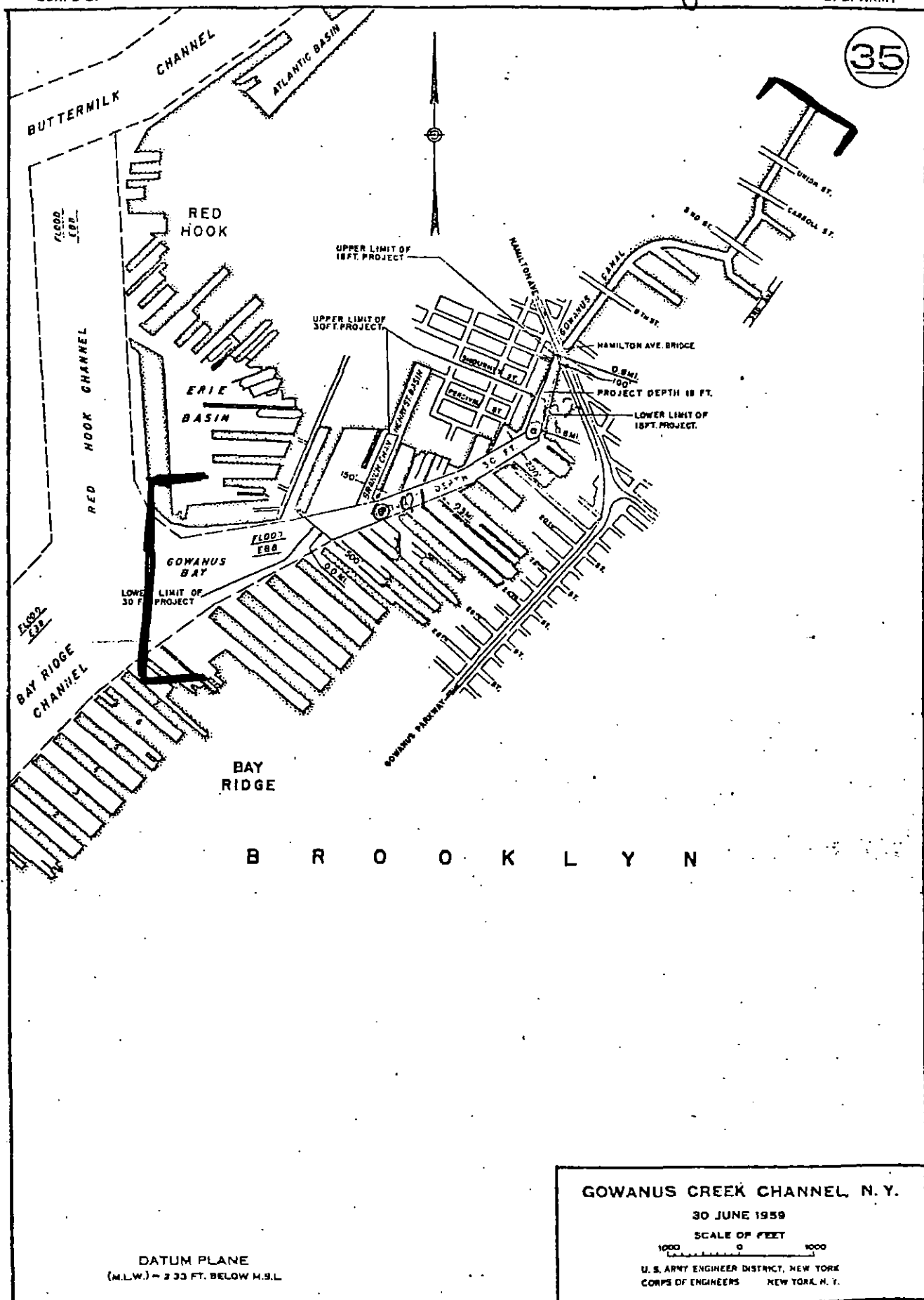
The study area for the cultural resources evaluation will include the canal and its channel in its entirety from Butler Street to the eastern edge of the Bay Ridge Channel (Figure 1). The study area will extend from the canal banks to 20 feet inland along the canal itself (Butler to 15th Street). The remaining portion of the channel will be evaluated for the potential for submerged resources. The pump house and flushing tunnel will be included in that they could be contributing elements to a designation should the canal be determined eligible. For the historic maps, the project area will consist of the Gowanus Canal from Butler Street to its mouth at Gowanus Bay, at approximately 21st Street (Figure 2). The map coverage should extend from the canal bank landward 100 feet.

The Canal was created over the course of several decades in the mid-19th century. The canal was once a tidal creek that flowed through the extensive wetlands of south Brooklyn. Several tidal mills were built along the creek and the Battle of Brooklyn took place along its shores. As the city of Brooklyn expanded so did the need for land and through a variety of private and public means the canal was created by filling in the marshland and hardening the stream's banks. The canal is at sea level and there are no locks on the waterway. Five moveable road bridges cross the canal as does an elevated subway line and the elevated viaduct of the Gowanus Expressway. The Carroll Street Bridge is eligible for the National Register of Historic Places and is a New York City Landmark. To move the stagnant waters of the canal, a flushing tunnel and pump house were built in 1911 at the head of the waterway. The pump broke in the 1960s and was not repaired until 1999. The pump house and tunnel are potentially eligible for the NRHP but no determination has been made.

II. PROPOSED PROJECT PLANS

The Gowanus Canal and Bay Ecosystem Restoration Feasibility Study was recently initiated and on-going studies will determine the direction of future work. As such, no specific locations along the canal have been identified for future work. Recommendations that may come from studies could include:

- Selective and careful removal of undesirable fill and sediments from the channel
- The restoration of water flow to enhance aquatic habitat and water quality
- The integration of ecosystem restoration with local plans
- The re-establishment of greenway and buffer areas
- The re-contouring of the canal bottom to create natural creek depths
- Habitat creation and restoration





U.S. AIR FORCE - EASTERN DISTRICT
GOWANUS BAY & CANAL
AERIAL PHOTOGRAPHY STUDY
BROOKLYN
NEW YORK



0 100 200 300 400 Feet
1:50,000 Scale
U.S. AIR FORCE - EASTERN DISTRICT
GOWANUS BAY & CANAL
AERIAL PHOTOGRAPHY STUDY
BROOKLYN
NEW YORK

There is the potential for the canal to be dredged from the northern end, at Butler Street, into the Bay. Canal banks may be "softened" in selected areas which would require the removal of bulkheads and limited quantities of fill. There is also the potential that turning basins, most of which contain considerable deposits of sediment, be considered for habitat creation. This work would entail capping the basins with clean fill and planting vegetation.

III. PREVIOUS WORK

A cultural resources study was conducted in 1978 for the Corps as part of a study for dredging the federal navigation channel. The federal channel runs from Gowanus Bay as far as Hamilton Street (Kopper and Black 1978). This report is of limited value. A report with better content was the result of a sewer line study for Nevins Street, one block east of the canal (Solecki 1977). The Corps will supply these reports to the consultant. A recent study was conducted for New York City Department of Environmental Protection in connection with an upgrade of the pump house facility. The report was limited to the archeological potential for the pump house property and offered no eligibility assessment of the pump house or flushing tunnel (Boesch 2003, personal communication).

IV. CONTRACTOR SERVICES AND REQUIRED INVESTIGATIONS

A. The general services to be provided under this portion of the contract are those required to conduct research and fieldwork to determine the eligibility of the Gowanus Canal itself and also evaluate the potential for cultural resources within the project area as a whole. The report shall include recommendations on the need for further cultural resource work. Copies of historic maps will also be obtained and provided to the Corps.

The work must be conducted in the timetable, area and manner described below. The Contractor must furnish one interim report as well as draft and final professional quality reports of the investigations. Failure to fully meet the fieldwork and reporting requirements of this scope of work may be cause for termination of work for default of contract, or for an evaluation of unsatisfactory upon completion of the contract.

B. The scope of work requires the completion of the following tasks:

Task 1a – Background Research

The contractor shall conduct research at local and state repositories. Copies of maps, plans, drawings and photographs shall be obtained, as practicable, through photography or photocopy. Engineering surveys and underwater inspections of the canal may be completed by the time the cultural resources report is prepared and any relevant information contained therein shall be incorporated into the final report.

Information concerning the design, planning, construction and modification to the canal shall be solicited from various sources which may include, but not be limited to, the following:

- New York State Archives
- New York Public Library
- Brooklyn Public Library
- Brooklyn Historical Society

A number of local individuals are very familiar with the canal and its history and should be consulted. The Corps will provide these contacts.

The information gathered during archival research shall be synthesized and used to build a historical context within which the circumstances surrounding the construction and use of the Gowanus Canal can be objectively understood and an evaluation of its NRHP eligibility can be evaluated.

It is anticipated that historic maps will be used to develop a preliminary evaluation of the potential for cultural resources within the study area as a whole. Of primary concern in this portion of the study is the potential for encountering significant resources when dredging the canal, softening the canal banks by removing bulkheads and fill and creating habitat in the turning basins. This task will result in a gazetteer of locations and the type of resource that might be encountered there, degree of sensitivity and suggestions for further study, if required.

Task 1b - Historic Maps

The Corps has in-house a full set of Sanborns from the years 1886/88, 1904 and 1915 that cover the entire Gowanus Canal area. Please acquire copies of any earlier fire insurance map, if available, one set from the mid 1890s; and a set for every 7 to 10 years from 1920 until the late 20th century. The coverage should extend landward from the banks at least 100 feet. Copies of the maps in the Corps files will be provided to the consultant. Full Gowanus coverage is approximately 15 sheets per published year. The maps shall be scanned and provided to the Corps on CD in a .jpg format.

Task 2 – Field Investigations

The consultant shall walk the canal, as practicable, to examine the above-water construction elements on the canal banks, bridges, and on shore canal related structures. A boat trip will be arranged with the Corps and the consultant using a Corps-supplied vessel. The fieldwork will serve to document current conditions and to supplement descriptive information gathered from documentary research. Black and white photographs shall be taken of pertinent views as determined necessary by the consultant but shall include views which depict the overall

setting of the canal and individual features, such as bridges, determined relevant by the consultant. Digital photos may also be taken.

Task 3: Data Analysis

This analysis should be aimed at developing an historic context for all potential resources identified. An evaluation of the potential for significant resources should be made based on background research and the pedestrian survey. Recommendations for further work, if required, shall be developed. The results of the analysis should be presented in a draft cultural resources report.

Task 4: Report Preparation

The Contractor shall prepare interim, draft and final reports. The final report will incorporate all comments received from the Corps and other reviewing agencies.

The reports produced by a cultural resource investigation is of potential value not only for its specific recommendations but also as a reference document. To this end, the report must be a scholarly statement that can be used as a basis for any future cultural resources work. It must meet both the requirements for cultural resource protection and scientific standards of current research as defined in 36 CFR Part 800 and the Council's Handbook.

The report shall include a discussion and synthesis of all data gathered to evaluate the NRHP eligibility of the Gowanus Canal and shall include a description of the structure and its history. The eligibility of the structure shall be discussed with reference to appropriate eligibility criteria. The contractor may wish to consult the National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation.

The report shall provide a description of the Gowanus Canal and its various structural components, and may include:

- General and specific design elements;
- Dimensions, materials, and sources;
- Equipment or innovative technologies used during construction;
- Use and operation

The documentation shall provide a historical background to the construction and use of the Gowanus Canal utilizing appropriate contextual and site-specific information. Such information may include, but not be limited to:

- Dates of construction, operation, alteration and additions;

- Information about engineers, architects, planners, manufacturers, contractors, foremen, suppliers, operators, etc. associated with construction;
- Source of labor force;
- Significant events or figures in the structure's history;
- The economic, transportation, natural resource, power source, topographic and other considerations in the selection of the building site;
- Sources of funds for construction;
- Governmental, corporate, etc. involvement in construction;
- Comparisons of the structure to other properties of its era and type in the region.
- Associated environmental features

1. One copy of each interim report will be submitted to the Corps, according to the time schedule established in Section VI "Project Schedule", below. The interim report will provide a brief summary of the work conducted to date and the work yet to be completed. It shall present any preliminary results of the research and field effort.

2. Four (4) copies of the draft report will be prepared and submitted to the Contracting Office according to the schedule established in Section VI "Project Schedule", below. The draft report will be reviewed by the Corps, NYSOPRHP and NYCLPC. All comments of the reviewing agencies and will be transmitted to the Contractor prior to the submission of the final report.

3. Eight (8) copies of the final report shall be submitted to the Contracting Office according to the schedule established below in Section VI "Project Schedule". The final report shall address all comments made on the draft report.

Task 5: Project Management

Project management will ensure that all requirements of this Scope are fulfilled and that there is timely submission of all deliverables. The Project Manager and the Principal Investigator shall consult with the Corps archaeologist, as required. As directed by the Corps, the consultant will coordinate with personnel at Lawler, Matusky and Skelly Engineering, the prime consultant on the overall Hudson-Raritan Estuary Project. This shall not require more than 2 meetings.

V. CULTURAL RESOURCES REPORT FORMAT AND CONTENT

A. The draft and final reports shall have the following characteristics:

- Information about engineers, architects, planners, manufacturers, contractors, foremen, suppliers, operators, etc. associated with construction;
- Source of labor force;
- Significant events or figures in the structure's history;
- The economic, transportation, natural resource, power source, topographic and other considerations in the selection of the building site;
- Sources of funds for construction;
- Governmental, corporate, etc. involvement in construction;
- Comparisons of the structure to other properties of its era and type in the region.
- Associated environmental features

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3. Eight (8) copies of the final report shall be submitted to the Contracting Office according to the schedule established below in Section VI "Project Schedule". The final report shall address all comments made on the draft report.

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V. CULTURAL RESOURCES REPORT FORMAT AND CONTENT

A. The draft and final reports shall have the following characteristics:

1. The draft and final copies of the cultural resources report shall reflect and report on the work outlined in Section IV (Required Investigations) above. They shall be suitable for publication and be prepared in a format reflecting contemporary organizational and illustrative standards of professional archaeological journals. The draft report will be revised to address all review comments.

2. The report produced by a cultural resources investigation is of potential value not only for its specific recommendations, but also as a reference document. To this end, the report must be a scholarly statement that can be used as a basis for any future cultural resources evaluation. It must meet both job requirements for cultural resources protection and scientific standards as defined in 36 CFR Part 800 and in the "The Treatment of Archeological Properties: A Handbook" (1980) published by the Advisory Council on Historic Preservation.

3. All interim, draft and final copies of the report shall reflect and report on the work required by this scope.

B. PAGE SIZE AND FORMAT. Each report shall be produced on 8 1/2" x 11" archivally stable paper, single spaced with double spacing between paragraphs. The printing of the text should be letter quality. Most figures should not exceed 11 inches in height or 17 inches in length under most circumstances, unless plan sheets are being submitted. All text pages, including figures, tables, plates and appendices must be consecutively numbered.

C. Final copies of the report shall be submitted in a hard-covered binder suitable for shelving.

D. The **TITLE PAGE** of the report shall include municipalities, counties, states, the author(s) including any contributor(s). The Principal Investigator should be identified and is required to sign the original copies of the report. If the report has been written by someone other than the contract Principal Investigator, then the cover of the publishable report must bear the inscription "*Prepared Under the Supervision of (NAME), Principal Investigator*". The Principal Investigator in this case must also sign the original copies of the report.

E. A **MANAGEMENT SUMMARY** or **ABSTRACT** shall appear before the **TABLE OF CONTENTS** and **LIST OF FIGURES**. It should include a brief project description including the location and size of the project area, the methods of data collection, the results of the study, evaluations and identification of impacts and recommendations. It should also include the location of where copies of the report are on file and, if applicable, the location of the curation facility.

F. The **TABLE OF CONTENTS** will include a list of all figures, plates and tables presented in the report.

G. The **INTRODUCTION** will state the project's purpose and goals as defined by the scope of work and will include the applicable regulations for conducting this work and will contain a general statement of the work conducted and the recommendations proposed.

H. The **BACKGROUND RESEARCH** must be sufficient to enable the evaluation of National Register eligibility by providing historic contexts for identified sites. For historic sites, the background research should be sufficient to identify associations with significant people and events. This section should include a summary of the existence of sites and a description of previous work conducted in the area. The following information should be presented and discussed briefly:

1. the **ENVIRONMENTAL SETTING**, including topography, soils, hydrology and geology.

2. the **SUMMARY** of paleoenvironment, present climate and current vegetation.

3. **PAST AND PRESENT LAND USES** and current conditions.

4. an **OVERVIEW** of prehistoric and historic culture history of project locale, including the surveyed area. This section should provide contexts for research questions, survey methods, site evaluations and recommendations for further work.

5. a **REVIEW** of known sites, previous investigations and research in the project area and vicinity and information provided by local collectors and archaeological societies.

6. **PRIMARY DOCUMENTARY RESEARCH** for the project area, may include historic maps, deeds, or other pertinent information. Detailed individual property title searches may be appended.

I. A **RESEARCH DESIGN** will outline the purpose of the investigation, basic assumptions about the location and type of cultural resources within the project area and the rationale for the methods employed in the investigation. The following shall also be included:

1. **RESEARCH OBJECTIVES** and **THEORETICAL CONTEXT**

2. specific **RESEARCH PROBLEMS** or questions.

3. **METHODS** to be employed to address the research objectives and questions.

4. a **DISCUSSION** of the expected results, including hypotheses to be tested.

J. A **METHODS** section shall include:

1. a **DESCRIPTION OF FIELD METHODS** employed, including rationale, discussion of biases and problems or obstacles encountered.

2. a **DEFINITION** of site used in the survey.

K. **FIELD RESULTS** shall include a clear description of all areas investigated, a description of each identified site, including structural features and maps, figures and photographs as appropriate.

L. **INTERPRETATIONS AND RECOMMENDATIONS.** A discussion of the results in terms of the background cultural context, research design, goals and research problems with reference to historic contexts and potential research questions. This section should also include an evaluation of National Register eligibility, project effects and recommendations and should be explicit for each reach. National Register eligibility should reference the four National Register criteria. Recommendations should indicate why a site is or is not eligible for the National Register. The following should be included:

Each resource identified should be evaluated in terms of known information and research potential within the context of current broad questions in anthropological and historical theory. The eligibility of each resource should be assessed for its potential for listing in the NRHP, using the National Register criteria for evaluation. The factors considered in making the assessment should be fully described.

2. Appropriate recommendations for each site identified, including no further work, additional investigations, data recovery or avoidance shall be explained in full. These recommendations shall be specific for each site or groups of sites.

3. If sites are eligible for the NRHP under criterion D, specific statements regarding the sorts of new information that will be gained must be included.

4. Site evaluations must be presented within the context of known sites relevant to the resource potential of the site.

M. A **REFERENCES CITED** section will list all references and citations located within the text, including all figures, plates or maps, and within any appendices. All sources (persons consulted, maps, archival documentation, etc.) maybe listed together. This list must be in a format used by professional archaeological journals, such as *American Antiquity*.

N. **APPENDICES** shall include, but not be limited to:

1. **QUALIFICATIONS** of the Principal Investigator and any other key personnel used.

2. final SCOPE OF WORK.

3. INTERIM REPORT.

O. PHOTOGRAPHS will be glossy black and white prints no smaller than 5" x 7". Photographic illustrations should be securely mounted by use of an archivally stable mounting medium. Photograph captions for site overviews must include direction or orientation. Photographs of features should include a scale, title board and orientation. At a minimum, captions should identify feature or location, direction, photographer and date of exposure. All photographs should be fully captioned on the reverse of the photograph in case they should be removed from the report. Photographs should be counted as "Figures" in a single running series of illustrations, plates, etc.

P. GRAPHIC PRESENTATION OF THE RESULTS.

1. All pages, including graphic presentations, will be numbered sequentially.
2. All graphic presentations, including maps, charts and diagrams, shall be referred to as "Figures". All figures must be sequentially numbered and cited by number within the body of the text.
3. All figures, plates and tables should be incorporated into the text on the page following their citation. They should not be appended.
4. All tables shall have a number, title, appropriate explanatory notes and a source note.
5. All figures shall have a title block containing the name of the project, county and state.
6. All maps, including reproductions of historic maps, must include a north arrow, accurate bar scale, delineation of the project area, legend, map title and year of publication.
7. The report must include the project area accurately delineated on a U.S.G.S. 7.5' topographic map and a county soils survey map, if available for that area.

VI. PROJECT SCHEDULE

A. All reports should be submitted in a timely manner as stipulated below:

1. One interim report will be submitted six (6) weeks after receipt of notice to proceed from the Corps. The draft report shall be submitted twelve (12) weeks after the notice to

proceed is received. The draft report will be submitted by the Corps to the agencies for review and comment.

2. The agencies shall have four (4) weeks to review the report and submit comments. All comments received will be submitted to the Contractor for incorporation in the final report. All copies of the final report will be submitted to the Corps four (4) weeks after the receipt of comments.

B. The number of copies of each report should be submitted according to the above schedule, as follows:

1. One (1) copy of the interim report.
2. Four (4) copies of the draft report; one of the copies shall include original photographs.
3. Eight (8) copies of the final report; three (3) of these copies shall contain original photographs and one of these copies shall be unbound. All bound copies of the report shall be provided in a hardcover binder suitable for shelving. A copy of all photographic negatives with a list identifying each shot will be submitted with the final report. If digital images are used, please include a CD of images in a pocket bound to the report in the three (3) bound copies. Captions for the digital images must also be included. Two copies of the CD containing the scanned historic maps shall be submitted. Files on the CD must clearly be labeled as to source and date.

Scheduled completion date for the work specified in this scope is nine (9) months after date of award.

VII. ADDITIONAL CONTRACT REQUIREMENTS

A. Agencies, institutions, corporations, associations or individuals shall be considered qualified when they meet the minimum criteria given below. As part of the supplemental documentation, a contract proposal and appendices to the draft and final report *must include vitae* for the **PRINCIPAL INVESTIGATOR** and **MAIN SUPERVISORY PERSONNEL** in support of their academic and experiential qualifications for the research, if these individuals were not included in the original contract proposal. Personnel must meet the minimum professional standards stated below:

1. Principal Investigator (PI). Persons in charge of a cultural resource project or research investigation contract, in addition to meeting the appropriate standards for the discipline, must have a doctorate or equivalent level of professional experience as evidenced by a publication record that demonstrates experience in project formulation, execution, and technical monograph reporting. Suitable professional references may

also be made available to obtain estimates regarding the adequacy of prior work. If prior projects were of a sort not ordinarily resulting in a publishable report, a narrative should be included detailing the proposed project director's previous experience along with references suitable for to obtain opinions regarding the adequacy of this earlier work.

2. Standards for Consultants. Personnel hired or subcontracted for their special knowledge and expertise must carry academic and experiential qualifications in their own fields of competence. Such qualifications are to be documented by means of vitae attachments to the proposal or at a later time if the consultant has not been retained at the time of proposal.

B. Principal Investigators shall be responsible for the validity of the material presented in their reports. In the event of a controversy or court challenge, Principal

Investigators shall be required to testify on behalf of the government in support of findings presented in their reports.

C. Neither the Contractor nor his representatives shall release any sketch, photograph, report or other data, or material of any nature obtained or prepared under this contract without the specific written approval of the Contracting Officer prior to the time of final acceptance by the government.

D. The Contractor shall furnish all labor, transportation, instruments, survey equipment, boats and other associated materials to perform the work required by this Scope of Work.

E. The Contractor shall return all copies of reports provided by the Corps when the final report is submitted.

VIII. FISCAL ARRANGEMENTS

A. Partial payments of the total amount allocated shall be dispersed upon the receipt of invoices. Invoices shall be submitted with the interim reports and with the draft report and shall reflect the amount expended. The total amount of all monthly invoices shall not total more than 90% of the agreed work order amount. The remaining 10% of the agreed work order amount shall be paid upon the receipt and acceptance of the final report, all reports provided by the Corps, etc. and receipt of the final invoice. **No invoice payments shall be made if it does not include an accompanying interim or draft report.**

B. Invoice payments shall be made pursuant to the "Prompt Payment" clause of the contract.

IX. REFERENCES

Kopper, J. Steven and Frederick R. Black

1978 Cultural Resources Reconnaissance Gowanus Creek Cannel , Brooklyn, New York

Solecki, Ralph S.

1978 Stage I Archaeological Survey, Nevins Street, Butler to President Street, Contract 3F, Red Hook
Water Pollution Control Project, Brooklyn, New York.

Appendix C
INTERIM REPORT



Maine Office:
451 Presumpscot Street
Portland, ME 04103

New York Office:
Village Square, 33 Church Street
Fredonia, NY 14063

Pennsylvania Office:
134 Broad Street
Stroudsburg, PA 18360

**NATIONAL REGISTER OF HISTORIC PLACES
ELIGIBILITY EVALUATION AND CULTURAL
RESOURCES ASSESSMENT FOR THE
GOWANUS CANAL AND BAY BOROUGH OF
BROOKLYN, KINGS COUNTY, NEW YORK IN
CONNECTION WITH THE PROPOSED
ECOSYSTEM RESTORATION STUDY**

**Contract Number: DACW51-01-D-0017
Delivery Order No. 0027**

Prepared for:

**U.S. Army Corps of Engineers
New York District
26 Federal Plaza
New York, New York 10278-0090**

Prepared by:

**Hunter Research, Inc.
Raber Associates
Northern Ecological Associates, Inc.**

NOVEMBER 2003

TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
1.0 Project Background and Scope-of-Work	1
2.0 Work Conducted to Date	1
3.0 Work Yet to be Completed	3
4.0 Preliminary Results	3

1.0 Project Background and Scope-of-Work

The following Interim Report summarizes the work conducted to date and provides a preliminary discussion of project results with respect to an evaluation of the eligibility for inclusion in the National Register of Historic Places and a cultural resources assessment for the Gowanus Canal and Bay, Brooklyn, New York.

The work has been undertaken in support of a feasibility study of ecosystem restoration of Gowanus Canal and Bay (formerly Gowanus Creek). The scope of work includes background research, acquisition of historic maps, field investigations, data analysis and report preparation.

These investigations were mandated under Section 106 of the National Historic Preservation Act of 1966, as amended, and as implemented by 36 CFR 800, the Advisory Council on Historic Preservation's Procedures for the Protection of Historic and Cultural Properties. This work was undertaken for the New York District, Corps of Engineers under Contract No. DACW51-01-D-0017, Delivery Order No. 0027. Work was performed by Hunter Research, Inc., and Raber Associates. Hunter Research served as the principal cultural resource consultant reporting to Northern Ecological Associates, Inc., the overall project prime consultant.

2.0 Work Conducted to Date

Background Research:

Research has been conducted using the following sources:

- New York Public Library (physical and on-line)
- New York State Historic Preservation Office, Peebles Island
- Brooklyn Public Library on-line (notably the *Brooklyn Daily Eagle*)
- Library of Congress (on-line)

Highlights of background research to date include:

Copied all pertinent non-insurance maps c1767-1920, and all Army Corps of Engineers (ACOE) Port Series maps; digital copies of all or relevant parts of the following historic maps are in hand:

Ratzer, B. *Plan of the Town of Brooklyn and part of Long Island* (1767)
Colton, J. H. *Topographical Map of the City and County of New York* (1836)
United States Coast Survey. *Map of New York Bay and Harbor and the Environs.* (1844)
Butt, Richard, *Map of the City of Brooklyn...*(1846)
Colton, J. H. *Map of the City of Brooklyn...*(1849)
Beers, J. B. *Brooklyn* (1874)
Parsons. *The City of Brooklyn* (1879 [birds eye view])
Bromley, G. W. & Co., pub. *Atlas of the City of Brooklyn* (1880)

Robinson, E. *Robinson's Atlas of the City of Brooklyn* (1886)
Bromley, G. W. & Co., pub. *Atlas of the City of Brooklyn* (1893)
Hyde, E. Belcher, pub. *Atlas of the Brooklyn Borough of the City of New York...*(1898)
Hyde, E. Belcher, pub. *Atlas of the Brooklyn Borough of the City of New York...*(1903-07)
Hyde, E. Belcher, pub. *Atlas of the Brooklyn Borough of the City of New York...*(1920)
U.S. Army Corps of Engineers *The Port of New York, N.Y. and N.J.* Port Series No.5 (1942).

Obtained recently-completed summaries of the histories of the bridges crossing the canal (including State Historic Preservation Office eligibility opinions);
Identified (and began photocopying) historic engineering articles 1904-11 on canal sewerage and pump station;
Reviewed all published local histories with respect to the canal and its history;
Reviewed and summarized canal traffic and industrial history c1880-2000 using historic maps, ACOE Port Series data, and records of NYC bridge openings;
Compiled first draft of References;
Reviewed and/or copied ± 40 pertinent articles in *Brooklyn Eagle* c1845-1880;
Began review of NY Times articles, specifically on the pump station and flushing tunnel;
Reviewed ACOE annual reports on federal dredging projects for data on canal traffic;
Obtained information on previously identified or designated resources nearby at NY State Historic Preservation Office, Peebles Island.

Historic Maps:

Sanborn fire insurance maps of the canal and vicinity have been obtained on CD (.tif files) for 1938, 1950, 1969, 1977, 1986 and 1996. We plan to scan the maps of 1886, 1904 and 1915 (already in the ACOE's possession) and include them on the CD which will ultimately be provided to the ACOE. We are not aware of any Sanborn maps published between 1920 and 1938.

Field Investigation:

A full day boat trip took place on November 5, 2003 to view and photograph the canal and proximate resources from the water. Staff from ACOE, Hunter Research and Raber Associates participated. Digital and film photographs were taken for use in the analysis and report phases.

Data Analysis:

Potential pre-WWII structures have been identified on ACOE 1942 Port Series map by comparison with earlier fire insurance maps and atlases. Ongoing.

Report Preparation:

To be initiated.

3.0 Work Yet to be Completed

Pedestrian field survey of canal margins and proximate resources, including landside photography.

Research at Brooklyn Historical Society and Brooklyn Public Library, specifically for historic photographs. Scheduled for November 21, 2003.

Research on specific landside historic buildings that may contribute to the canal's significance. To be identified during pedestrian survey.

Finish copying historic engineering articles 1904-11 on canal sewerage and pump station.

Detailed analysis.

Report preparation.

4.0 Preliminary Results

Work conducted to date emphasizes the major role played by the canal in the development and maturation of Brooklyn. Conversion of Gowanus Creek to a navigable waterway created large areas of fast (i.e., buildable) land from what had previously been swamps, and the result--including over three miles of new and commercially valuable waterfront--was a veritable artery thrust into the heart of the city. In 1853, Brooklyn looked forward to the completion of the canal, at which time (according to the *Brooklyn Eagle*) "...that part of the city will be thrown open to navigation with facilities for the erection of docks, for the establishment of markets, lumber and brick yards, and the innumerable advantages always accruing from an extensive water front. Property will increase in value and new life be infused into the entire neighborhood." The young city's future was bright. Ultimately, tons of building materials were barged in to canalside terminals, followed by the fuels consumed by the flood of new residents. The canal also proved to be an attractive location for industry.

Unintentionally the canal also became a menace to public health with which Brooklyn (and then New York) grappled for decades because of the ease with which waste of all descriptions could be discharged into its waters. As early as 1877, a headline in the *Brooklyn Eagle* called it "Very Vile...A Nuisance Which is Seriously Affecting the Health of South Brooklyn People." A mass meeting in 1893 called for the canal to be filled in. The solution ultimately arrived at, however, is another facet of its significance: the 1911 pump station and flushing tunnel today are integral to the canal's operation. Put another way, the pump station and flushing tunnel are as much a part of the canal as the bulkheads and fill that created it, although they were built much later than the canal.

That the canal has had a significant role in the history of Brooklyn is evident. Identifying the boundaries of the eligible resource will be problematic and has not yet been attempted, but the resource can be expected to include associated features such as the

Carroll Street bridge and the pumping station/flushing tunnel complex. It appears unlikely that the two high-level bridges, carrying the Gowanus Expressway and the MTA over the canal, will be considered to contribute to the canal's significance because of the absence of historical association with the canal. Establishing the canal's period of significance is also expected to be challenging.

There are other, less obvious potential areas of significance which will be pursued during the analysis phase, including:

- the Dutch settlements which predated the 19th century urbanization of Brooklyn, specifically Denton's, Freeke's and Cole's tide mills on Gowanus Creek, and whether their associated features (i.e., dams, ponds, races) influenced the design of the canal;
- the network of colonial roads that predated the imposition of the city street grid; and
- the Battle of Brooklyn and the possible existence of a mass grave of Colonial soldiers in the vicinity of Third Avenue and 7th and 8th Streets.

November 20, 2003

Appendix D

PROJECT ADMINISTRATIVE SUMMARY

APPENDIX D

Project Administrative Summary

HUNTER RESEARCH, INC.

PROJECT SUMMARY

Project Name: National Register of Historic Places Eligibility Evaluation and Cultural Resources Assessment for the Gowanus Canal and Bay, Borough of Brooklyn, Kings County, New York

Level of Survey: n/a

HRI Project Reference: 03070

Date of Report: May 2004

Client: USACOE, New York District

Address:

Review Agency: NYSOPRHP

Agency Reference:

PROJECT CHRONOLOGY

Date of Contract Award: 9/9/2003

Notice to Proceed: 9/9/2003

Background Research: October 2003-April 2004

Fieldwork: November 2003 and January 2004

Analysis: n/a

Report Written: April and May 2004

PROJECT PERSONNEL

Principal Investigator(s): Charles Ashton and Michael Raber (Raber Associates)

Background Researcher(s): James Cox and Thomas Flagg (Raber Associates)

Field Supervisor(s):

Field Assistant(s):

Analyst(s):

Draftperson(s): Michael Murphy and Thomas Flagg

Report Author(s): Charles Ashton and Michael Raber

My Huynh

From: Brad V [REDACTED]
Sent: Friday, June 14, 2024 11:40 PM
To: dec.sm.nrd
Subject: Comments of Brad Vogel on Gowanus Canal Superfund NRDA

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ATTENTION: This email came from an external source. Do not open attachments or click on links from unknown senders or unexpected emails.

Good evening,

I write regarding the NRDA for the Gowanus Canal superfund site. As someone who knows the waterway and neighborhood intimately, I will focus on things that may not be covered by others:

1. No Habitat or Water Access Restoration Beyond Gowanus Proper - I know offsets are sometimes conceived as being sufficient when they are not in the area affected. Please do not use that model in Gowanus; the habitat and water access restoration should be in Gowanus.
2. Expand the Fifth Street Basin Excavation Work to expand the realm of habitat restoration of salt marshes; 25 feet under the ROD is not enough. Excavate the whole thing - bring back navigable water and salt marsh space, as well as flood absorption capacity.
3. Water Access for Recreational Boating has suffered a major blow due to the polluted state of the canal for over a century and due to superfund cleanup; provide massive funding for more docks, piers, and functional get-downs to allow people to engage directly with and on the water.
4. Count ALL the biota losses; what about the massive multitudes of mud snails, barnacles, extremophiles (see articles with Henaff, 2015, etc), fish known only by eDNA (see Rockefeller university studies referenced in Dredgers instagram), invasive plant life holding soil and sequestering carbon, occasional rare birds like the green heron and Atlantic Ribbed mussels. The amount of life is staggering, and the losses over the full century and a half of pollution - and the losses that remain inchoate going into a future with continuing pollution - are almost impossible to count, but the mitigation and offset and restoration should be robust and borderline incredible to make up for this marathon of loss.
5. Retain the canal's navigability in full even while restoring habitat; no bridge on the main channel of the canal should ever be "fixed" or non-movable; vessels should have free navigation to the head of the canal, it is an essential characteristic of the waterway. And does not preclude recreational human-powered watercraft use of habitat restoration.
6. The old wooden bulkheads we are losing rapidly provided not just apparent surface area facing the waterway, but also a honeycomb warren of spaces inside for mussels, crabs, and more - the interior

spaces were rife with life, massively multiplying, like the riprap and silted up sediments in other areas (clams in the Hamilton Avenue arch mud that few know about, for example) - the total amount of habitat that needs to be offset.

7. Offset funding needs to be provided to a wide wide range of entities and not just big formally staffed ones with budgets; Gowanus is best stewarded by the rather informal orgs, the Gowanus Dredgers Canoe Club, Voice of Gowanus, etc.

8. Gowanus habitat restoration efforts should start several years ago. It is crazy that so much harm to the biota of the canal has happened during an EPA-directed cleanup; sheer steel bulkheads that inimical to marine life now dominate the waterway. The damages are staggering when looking at the past, present, and future of the waterway. It may be worth convening panels of locals, of experts, and of marginalized folks to further count the costs.

There are many, many more damages that should be cataloged and offset. I am happy to elaborate on my comments as needed from my experiences canoeing the canal for years, capturing the flora and fauna in writing and imagery, serving on the CAG and many other local bodies relevant to the canal and cleanup, and living in close, real proximity to the waterway on a daily basis. I strongly encourage you to make the Gowanus NRDA less formulaic and mundane, less cookie cutter.

This is a uniquely maligned waterway that deserves a profound, extensive, and unique response. Anything less will not do it - and the flora, fauna, organisms, and people of the past, present, and future - full justice.

Cordially from along the canal,

Brad Vogel
Gowanus



My Huynh

From: Celeste LeCompte [REDACTED]
Sent: Friday, June 14, 2024 11:53 PM
To: dec.sm.nrd
Subject: Gowanus Canal NRDA Draft Plan Comments

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Alicia,

Thanks so much for fielding our comments about the proposed Gowanus NRDA draft. I have included the majority of my comments on the specifics of the plan as a board member of the Gowanus Dredgers Canoe Club and an active partner with many other community groups.

I am writing to add a few personal observations from my experience over the past several weeks of engaging with the greater Gowanus community about the NRDA Plan. Along with my colleague Lillian Ruiz, another Gowanus resident, I hosted a pair of workshops helping local residents understand the purpose, scope, and implications of the proposed draft plan and spoke with many community members in other contexts. Consistently, anyone with personal experience of the Canal was opposed to the Trustees' proposal to limit the scope of the assessment, specifically the exclusion of groundwater and air resources, the failure to recognize the area as a former tidal marsh, the exclusion of the shoreline, upland areas and turning basins were consistently criticized. Participants, passersby, and residents of all tenures in the neighborhood spoke movingly about their desire to have a vibrant greener neighborhood, and their concerns about flooding, sewage, air quality, and the growing threats of a changing climate.

I share these concerns, and I believe the NRDA is a vital tool for addressing them. I also think that there is a significant opportunity for the trustees to show that sensible, thoughtful ecosystem restoration -- all within the scope of a plan aimed at righting the wrongs of industrial contamination -- is both possible in an urban environment and will pay dividends in the form of greater resilience to climate change. I believe the current plan squanders that opportunity.

I have only lived in Gowanus since 2016, but the Canal has been a life changing place for me. I was struck by how many people I spoke with over the past months told me (and wrote in their postcards to you) that the Canal has played an important role in shaping their life. It isn't just another feature of the neighborhood. It's a place that shapes people's lives, childhoods, friendships, health, and perspective on public life. Your plan has the potential to do the same.

Thank you for listening, and I look forward to working with you and the whole team going forward.

Celeste LeCompte



My Huynh

From: Clayton Gordon [REDACTED]
Sent: Friday, June 14, 2024 2:45 PM
To: dec.sm.nrd
Subject: Gowanus

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Thank you for all of your valiant efforts to clean up for than two centuries of misuse and disregard for the natural environment surrounding the Gowanus Canal.

I have two comments. One is the walls on both sides of the Gowanus. I have heard criticism that they may be too considered too tall. They're a little reminiscent of the cement canal walls for diverted water from the Colorado River in Phoenix. Tall headwalls are not exactly habitat friendly, even though they're probably in place to minimize migration of pollutants from the adjacent soil. What about terraced or sloping banks with natural vegetation to a low height head wall? A sloping bank would be better for holding more water in case of another Sandy like storm surge and it allows for introducing more natural vegetation. High vertical head walls seems like an attempt to wall off nature—a separation.

Second point, with thousands of new people moving to the Gowanus area in the next couple of years as those large residential buildings come online, they're going to need a place to exercise—walk, run, and bike. This might be out of the realm of this study, but the aesthetics of the area could have a great impact on the desirability of living in the neighborhood. It would seem that pathways that run along sloped banks of the Gowanus with lots of vegetation would make for a more desirable area—and make people proud to live there. Also, you need to consider connecting the Gowanus pathways to future pathways that might be developed in Red Hook, which would be connected. to the Brooklyn Bridge Park, making the entire waterfront of Brooklyn a model of a highly desirable city to live in. NYC needs housing but we can't just trade off the Gowanus warehouses of the past (for concrete, lumber, oil, and the like) for warehousing humans. It's got to be done right so that the next generation is stuck correcting the problems we failed to address when we had the chance to do so.

Clayton Gordon
[REDACTED]

My Huynh

From: Corinne B [REDACTED] >
Sent: Friday, June 14, 2024 12:36 AM
To: dec.sm.nrd
Subject: Comments on the Draft Assessment Plan for Gowanus Canal

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To the Gowanus Canal Natural Resource Damages Assessment Trustees Council,

I am writing to submit comments on the Gowanus Canal Draft Assessment Plan released on March 1, 2024.

As context for my experience of the ecological and human use services of the canal, I first became aware of the Canal in 2014 when I was the stage manager of a theatrical performance that took place in boats and on the shoreline spaces around the canal (New York Times review of "The Dreary Coast" here: <https://www.nytimes.com/2014/10/31/theater/the-dreary-coast-on-the-banks-of-the-gowanus-canal.html>).

Prior to taking on this role, I had no awareness of the Canal as a body of water; that it had been a naturally-occurring waterway as a low-lying area topographically, was still active for commercial and recreational boating, and had been polluted by industrial byproducts like coal tar and heavy metals, as well as through CSOs. As unlikely as it seems, being involved in a play where the Canal stood in for the river to Hades in a Greek myth turned out to be an extremely effective way to become informed.

After learning how much fecal matter and contamination was in the water, my concerns at the time included the logistics of getting actors and audience members in and out of watercraft safely, on cue, and without touching the water and risking illness. Additionally, the rocky shoreline and wooden bulkheads, presence and appearance of different types of trees and foliage, and presence of animals like birds, raccoons, fish, mussels, and crabs were noted at the time since they served as set dressing or obstacles to be avoided as the tide rose and fell.

The informal dock at the end of 2nd street, the boat launch at the end of 2nd Avenue, and the ends of Huntington Street and 11th street were all useful to the performance as ways of providing launch points, visible areas for parts of the performance, and destinations in case of emergency. Over a month of performances, approximately 630 audience members, the cast, and crew also learned about the contents of the Canal, and experienced navigating from 2nd street, north to the Carroll Street bridge, and south to the Huntington Street bridge.

In a survey we ran following the performance, 43% of 158 total responses agreed that participating in The Dreary Coast made them feel connected to the Gowanus area in a new or unique way. A majority (125, or 80%) of respondents reported they probably or definitely will come back to the bars, restaurants, and businesses in the area in the future. A majority (123, or 79%) of respondents reported that cleaning up the Gowanus canal was very or extremely important, in their opinion. As one respondent put it, "I didn't realize how nice the neighborhood is surrounding the canal. I also didn't realize how dirty the canal is... I know that now from The Dreary Coast."

Over the next decade, I remained aware of the Canal. I became a visitor to the Gowanus Dredgers' open paddling events, and eventually a member and volunteer; I attended programs at the Gowanus Canal Conservancy; I attended events run by Arts Gowanus and many other local organizations.

These experiences inform my comments on the draft.

Injury to Natural Resources and Human and Recreational Use

- Human uses of the canal have been harmed by its contamination. The Canal's reputation limits peoples' ability to even imagine that access to the water is possible.
- The sights and smells that accompany CSO, including debris in the water, the cloudiness of the water, as well as the rainbow sheen of petroleum byproducts bubbling up to the surface of the water, concern people and further limit human use.

Injury Caused by Remedial Action

- The impact of the remediation on the Canal has been large. The sheer steel bulkheads are dangerous for people who intentionally or unintentionally find themselves in the Canal. People do drown in the waters around NYC due to lack of access to egress (emphasis mine). <https://gothamist.com/news/man-dies-after-falling-east-river-domino-park>
"Allie Wills, an architect who was playing volleyball in the park at the time of the incident, recalled the chaotic scene after the man fell into the river, as bystanders tried to find help.
"We ran to the edge and saw him swirling around in the current," Wills told Gothamist. "There was just confusion. **There's no access to the water, no safety buoys or supports under the pier that you can grab onto.** It was a helpless thing to watch."
- Before I had been invited to navigate the canal as part of an organized event, I had no awareness how to access the water. I have experience how visible access points have a huge impact on peoples' perceptions of waterways.
- Past human and recreational uses of the Canal are more extensive than this draft acknowledges.
- With the recent redevelopment around the Canal, it is more visible and top-of-mind to people than ever. Not designing for primary contact would be a mistake.
- The current or planned changes have all limited access at the end of 2nd street, the boat launch at the end of 2nd Avenue, and the ends of Huntington Street and 11th street. Each of these locations were historically important to providing access to the water.
- The Gowanus Dredgers Canoe Club lowers barriers to access by providing canoes and PFDs, volunteer staffing and safety training, and programming dozens of events on the water and shoreline, but the remediation has limited the club's ability to run open paddle and other events.
- Further, the sheer steel bulkheads replace softer shorelines and surfaces like rock pilings and wooden bulkheads that served as a habitat for plant and animal life I observed in 2014. Tides cause the water level in the Canal to change by as much as six feet; the intertidal zone supports a wide diversity of life. Organisms like blue mussels help filter the water. Any design which can accommodate such organisms would be an improvement to the overall health of the Canal.

Thank you for your attention to these comments,
Dr. Corinne Brenner

To:
NYS Department of Environmental Conservation
Natural Resource Damages Section
c/o Alicia Pasos
625 Broadway, 14th Floor
Albany, NY 12233
E-mail: nrd@dec.ny.gov

June 14, 2024

Dear NYS Department of Environmental Conservation:

Thank you for the opportunity to submit public comments in regards to the Gowanus Canal Natural Resource Damage Assessment Plan. My name is Erica Eliason, and I live less than two blocks from the Gowanus Canal. I have been involved in various community groups that advocate for restoring and improving the condition of the Gowanus Canal.

Through my experience as a neighborhood resident and as an active participant in discussions around Gowanus Canal remediation, I would like to offer the following information for consideration for the Gowanus Canal Natural Resource Damage Assessment Plan:

In July 2023 last summer, tens of thousands of fish were killed in the Gowanus Canal. The Environmental Protection Agency has pointed to [1\) the Flushing Tunnel being off and 2\) heavy rain causing combined sewer overflow \(CSO\) events](#) as main reasons for this fish die off. These factors may have contributed to low dissolved oxygen in the Gowanus, which were too low to support life for these fish. As these are two major contributors to the Canal's ability to support life and sustain biodiversity, they must be considered in the review of information affecting the health of the Gowanus Canal.

Despite the recognized importance of the Flushing Tunnel, it is still not regularly in operation, including right now. It is crucial that the Flushing Tunnel be invested in so that it can remain fully operational so that the Canal is not routinely re-polluted. As the Flushing Tunnel is not currently active, it is imperative that all necessary steps be taken to prioritize re-activating the Flushing Tunnel as soon as possible. Until the Flushing Tunnel is turned back on, we can expect worse water quality conditions in the Gowanus, with negative ecosystem consequences and a reduced ability of the Canal to support fish and biodiversity. The Flushing Tunnel must be in active operation for any restoration of natural resources in the Canal to be maintained.

In addition, the Natural Resource Damage Assessment Plan currently states that the Trustees will consider the contribution of wastewater from CSO events for contaminating the Canal. It is very well known that CSO events regularly pollute the Gowanus Canal, and that CSO tanks can help reduce these events by capturing excess water during rainfall, thereby preventing the sewer system from being overwhelmed and reducing the release of untreated water and sewage into the Canal. However, [multiple factors have led to delays in the construction of CSO tanks](#) for the Gowanus. Construction of CSO tanks cannot be considered sufficient for preventing CSO events, especially with these unacceptable continuous delays. Additional activities that prevent CSO

events need to be invested in, such as creating areas for rainwater (e.g., flood parks, street creeks) and increasing permeable surfaces in the neighborhood (e.g., increase plantings, develop sponge parks) that can absorb water and reduce the overwhelming of the sewage system. As the Natural Resource Damage Assessment will include injuries resulting the CSO discharges, please consider how the ongoing delays of the CSO tanks will continue to result in untreated sewage being released into the Canal. The effects of the substantial delays of the CSO tanks need to be taken seriously and constructing these CSO tanks needs to be of the utmost priority for the health of the Gowanus Canal to be restored.

Thank you for the consideration of my comments.

Sincerely,

Erica Eliason

Eymund Diegel

to

NYS Department of Environmental Conservation / Natural Resource Damages Section

c/o Alicia Pasos

625 Broadway, 14th Floor, Albany, NY 12233 / E-mail: nrd@dec.ny.gov

June 13 2024

**RE: COMMENTS ON THE GOWANUS CANAL NATURAL RESOURCES DAMAGE
ASSESSMENT PLAN (NRDA) FROM EYMUND DIEGEL**

Dear Ms. Pasos,

My name is Eymund Diegel, a resident of the Gowanus neighborhood for over 25 years.

During that time, I have watched our neighborhood go through a series of cleanup changes and redevelopment, including your now welcome NRDA Study.

I have worked with various community groups advocating for the environmental restoration of the canal, including the Gowanus Dredgers Canoe Club, the Gowanus Canal Conservancy and the Gowanus Canal Superfund Community Advisory Group, among others.

From conversations with those neighbors and friends, shared unique insights have emerged about the history of our backyard, including specialized environmental knowledge.

This dialogue discussed opportunities for improving the Canal's as well as the City's environmental future and resiliency.

I am presenting here some comments on the NRDA Plan, including historical data and potential restoration sites that are relevant to your Assessment.

Though the material presented here is inspired by community discussions, the thoughts and restoration sites presented here are purely my own interpretation.

Thank you for the opportunity to contribute local data and ideas to the restoration process.

Sincerely,



Eymund Diegel

Cc: Gowanus Canal Superfund Community Advisory Group

For reference, an electronic copy of the NRDA Plan is available at:

U.S. Fish and Wildlife Service website <https://www.fws.gov/media/gowanus-canal-nrda>

NYSDEC website <https://dec.ny.gov/regulatory/nrd/major-ongoing-nrd-assessments>

EYMUND DIEGEL 13 JUNE 2024 COMMENTS ON THE GOWANUS CANAL NATURAL RESOURCES DAMAGE ASSESSMENT PLAN



Marine Life - via [Gotham Unbound, an Ecological History of Greater New York](#) by Ted Steinberg

A BRIEF INTRODUCTION THE GOWANUS CANAL SUPERFUND SITE

After more than a half century of community activism to improve the Gowanus Canal heavily polluted industrial zone, the Canal neighborhood started being cleaned up in 2010 by the US Environmental Protection Agency's [Superfund Program](#) and the New York State's Brownfields program.

With substantive progress having been achieved in dredging the canal of contaminated sediments by 2022, and the beginnings of upland restoration of the polluted coal tar sites, 2024 has introduced restoration scenario discussions under the Natural Resources Damages Assessment Plan of what a restored Gowanus natural habitat and human recreation space could look like.

These comments address **what the community and natural systems damages have been**, and put forwards some natural restoration sites and processes for compensating for those damages.

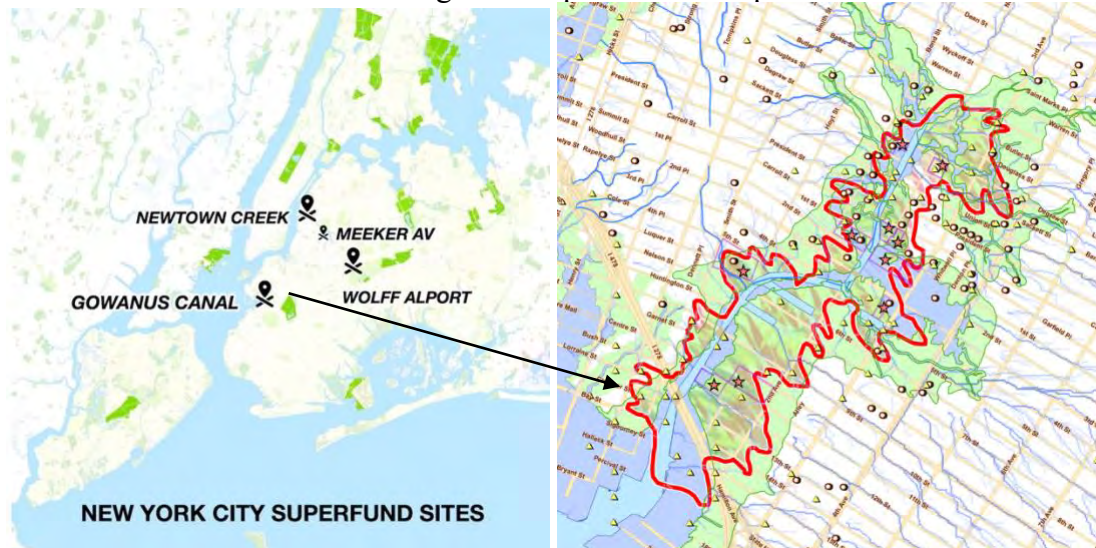
More importantly, these comments go beyond just the immediate local neighborhood damages and puts forwards opportunities for addressing city wide climate change challenges of extreme heat and flooding - where the NRDA Gowanus planning can be part of a strategy for urban survival and resiliency.

*"There is something infinitely healing in the repeated refrains of nature
- the assurance that dawn comes after night, and spring after winter."*

Rachel Carson, The Sense of Wonder

WHERE & WHAT IS THE GOWANUS CANAL SUPERFUND SITE?

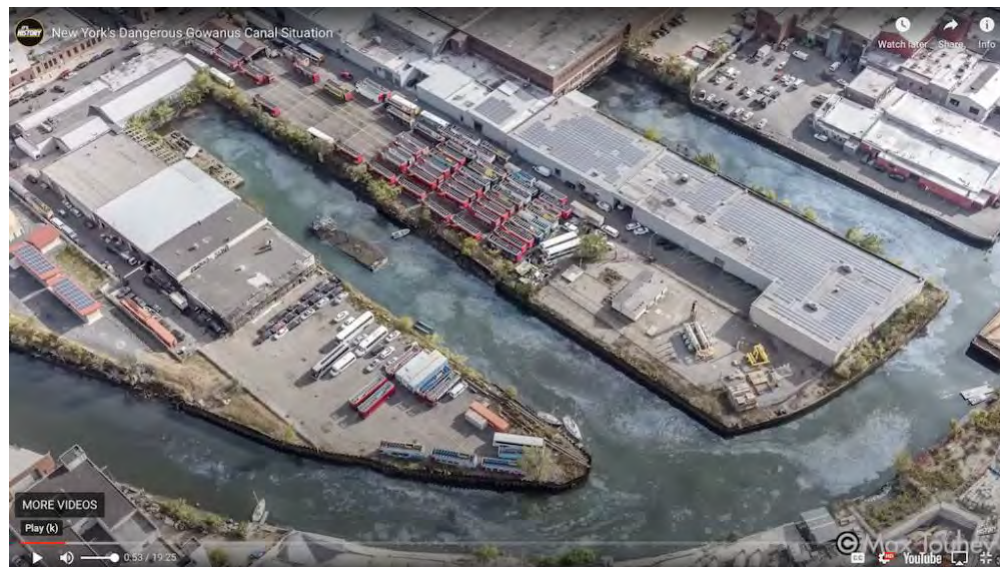
The Gowanus Canal is one of 4 designated Superfund cleanup sites within New York City



Eco Gowanus Sanborn Maps Industrial Use Toxic Waste Plume Study – Cullinan et al, Columbia University

THE PROBABLE GOWANUS POLLUTION REMEDIATION AREA: Red outlines in the map above shows the 178 acres of landfilled Gowanus tidal marsh contaminated by over a century of industrial dumping of toxic waste. Various ongoing State Brownfield upland cleanup activities are shown as triangles, with dots representing development projects. This map was prepared in 2011, with many further projects proposed since then as the canal waters continue being remediated under the Federal Superfund program in 2024.

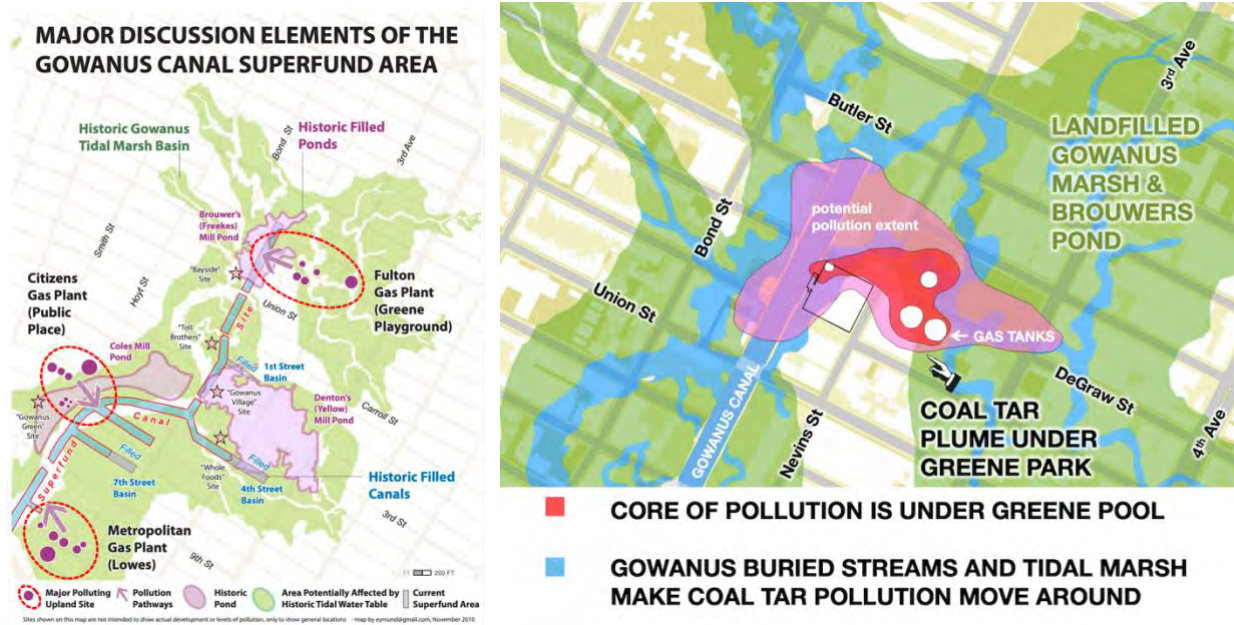
The primary toxin being remediated, along with heavy metals discharged by the City's combined sewer overflows, is **coal tar**, a byproduct of coal baking by gas companies - a tar that has seeped deep into the buried stream beds and marshes. This is an example of its impact on water habitats:



Gowanus Canal 7th Street Basin Coal Tar photography by Max Touhey from the 2024 Gowanus History video by Ryan Socash

<https://www.youtube.com/watch?v=Pr2ZWgk5I7Y>

The schematic maps below show the Gowanus neighborhood areas affected by coal tar plumes



The Canal has also been the site of illegal dumping of boats, cars, garbage, human bodies and e-waste by US Army military contractors.

WHAT THE CANAL WAS FOR MARINE SPECIES



2010 (circa) - Coal Tar Plumes and sunken boats in the Gowanus Canal 7th Street Basin
photo by Max Touhey



2023 / 07 / 15 - Juvenile Bunker fish on the Gowanus 7th Street Basin sunken barge at low tide, from a mass fish kill event caused by zero Dissolved Oxygen level **water quality violations** directly related to **Superfund Cleanup Dredging Activities** photo via Eymund Diegel

WHAT THE CANAL STILL IS FOR MARINE SPECIES – AN ECOLOGICAL DESERT A 150 YEARS OF INDUSTRIAL POLLUTION...



2017 / 40 / 30 What Happens in Gowanus Stays in Gowanus
Circuit Board Mining Expedition.

photo via Eymund Diegel

Circa 1950s Radio telecommunication circuit boards being collected from the Gowanus Canal by Dredger's Canoe Club members at the First Street Basin landfill. The e-waste was stamped with Amperex Corp, a Brooklyn military contractor working in the Brooklyn Navy Yard

HOW CAN THE COMMUNITY & THE CANAL'S LIFE SYSTEMS BE RESTORED?

OVER 15 ACRES OF “[OPEN WATERS OF THE US](#)” HAVE BEEN ILLEGALLY LANDFILLED IN THE GOWANUS CANAL UNDER THE SUPERVISION (OR LACK THEREOF) OF THE AGENCIES MEANT TO PROTECT THOSE WATERS

HISTORY OF THE IMPACT OF URBANIZATION ON ECOLOGICAL HABITATS & SUBSEQUENT SUPERFUND IMPACTS ON THE SURVIVING HABITATS

As per the original wetlands shown of the British Army Ratzer survey of 1766, from 1850 onwards, approximately **610 acres of critical fish spawning and breeding spartina wetlands was destroyed** by garbage dumping, landfilling and shoreline hardening for the booming shipping industry. This urbanization wiped out 95% of the species habitat values which were famous as fishing and food resources. For comparison, the habitat value of **the historic 357 acre Gowanus spartina tide marsh** and the 253 acre Red Hook marsh can be compared to the current surviving 800 acres of spartina wetlands in the whole of Jamaica Bay Wildlife Refuge.

"We found a good fire, half-way up the chimney, of clear oak and hickory, which they made not the least scruple of burning profusely. We let it penetrate us thoroughly. There had been already thrown upon it, to be roasted, a pail full of Gouanes (Gowanus) oysters, which are the best in the country."

Sept 30, 1679 an excerpt from [Jasper Danckaerts journal](#)



2018 – “Mr. Big” - just [Big to friends](#), a 8.66 inch long oyster found by Riverkeeper
Mr. Big says he owes it all to Gowanus, where the locals were fabled to reach 14 inches
Photo by Michelle V. Agins for the New York Times

HOW MUCH WAS LOST TO THE SUPERFUND RESTORATION PROCESS ?

The post 2020 Superfund Restoration, caused further wetland destruction with just under **1 acre of open water landfilling** from new bulkheads – effectively wiping out the remaining 5 % of surviving marine habitat and residual feral pockets as canal bottom remedial capping proceeded.

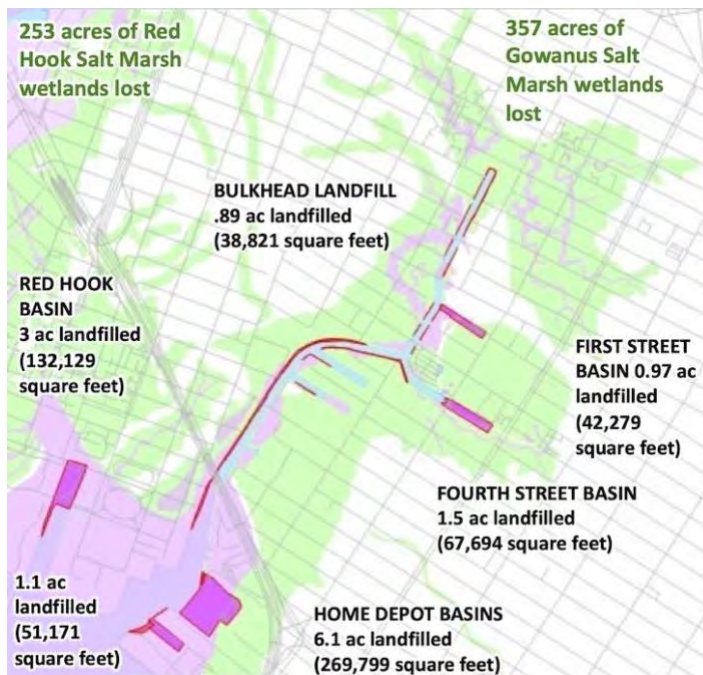
REMEDICATION THAT HAPPENED

The primary remedy implemented during 2023 and 2024 has been the lining of the canal with steel bulwarks, dredging out coal tar contaminated soil, and **capping the canal bottom with an impermeable barrier** to reduce coal tar infiltration into Canal waters. Because of landfilled artesian streams now blocked by steel barriers, and consequent continual sub surface pollution movement, the EPA and State remediation teams are testing collection wells behind the steel barriers to stop further coal tar infiltration into the canal and upland basements.

This remedy, while welcome in reducing the toxic waste health threats in the short term has now resulted in the **100% elimination of all previous natural habitats within Canal** – an effective **ecological Year Zero** for the species that lived there.

14 ACRES + LOST TO GOWANUS LANDFILLING OVER LAST CENTURY

Around 627,448 square feet (14.4 acres) of Gowanus Canal side basins were illegally landfilled between 1924 to 2012 / 2024, in violation of Clean Water Act and New York State Permitting Procedures.



NEARLY ONE ACRE OF OPEN WATER LOST TO SUPERFUND REMEDY

Gowanus Superfund required **steel bulkhead landfilling** caused the loss of 38,821 square feet (or .89 acre) of open water from 2012 to March 2024.

Additionally, the now lost shoreline mussel sediment filtering habitats have led to a dramatic increase in water turbidity. The loss of **SHORELINE SURFACE HABITAT VALUES** – several acres of **WOOD BULKHEAD CRACK HABITATS** – must be included in the Damages Assessment restoration calculations.



A KEY RESTORATION GOAL IS THE RESTORATION OF FLOOD MANAGEMENT FUNCTIONS PERFORMED BY THE NOW LANDFILLED FORMER STREAM BEDS & SIDE CANALS & TO RESTORE THE SHORELINE'S SEDIMENT FILTERING CAPACITIES



2016 / 7 / 20 - Contaminated runoff from NYCDEP High Level Third Ave High Level Sewer at OH-005 Gowanus St Carroll St Bridge outfall. This outfall is one block away from the landfilled First Street Basin which so far, the City has ignored as a sediment filtering opportunity. photo by Eymund Diegel / Gowanus Dredgers.

A KEY RESTORATION GOAL SHOULD BE THE RESTORATION OF THE GOWANUS CANAL’S LANDFILLED SIDE BASINS TO ACT AS STORMWATER RUNOFF SEDIMENT FILTERING HABITATS. (See Project 2 for details)

The NYC DEP has established this water quality filtering technology in the [Staten Island Bluebelt Plan](#), and the same [MS4](#) Water Quality compliant standard should be implemented in the environmental restoration of the currently landfilled First Street basin.

35% OF THE INDUSTRIAL NAVIGATION CAPACITY OF THE GOWANUS CANAL HAS BEEN LOST TO INCREMENTAL STEEL BULKHEADING

EXAMPLE: The original 1853 Canal 100 feet wide navigable water at the “Gowanus Green / Citizens MGP” remediation site (Smith St & Huntington St) was reduced to 73 feet wide by 2013 and to 65 feet wide by 2024 – **a 35% reduction of the width of a federally protected navigable waterway from new Superfund Remediation bulkheads.**



2024 - 8 March Nearmap aerial of bulkheads expanded into Canal at 5th Street (Public Place)

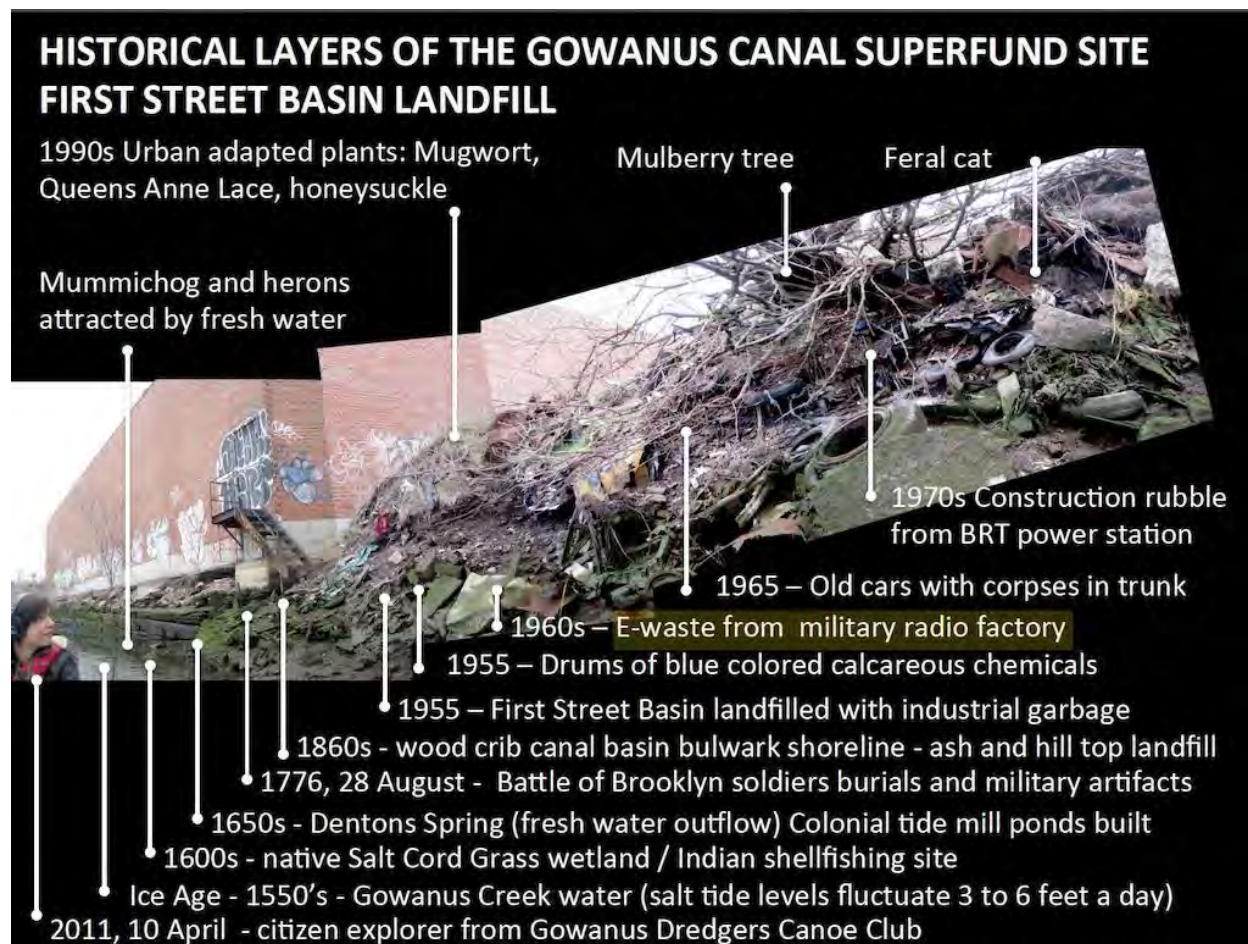
These illegal “Takings” of protected navigable waterways should be included in the damages assessments, and legally justify the compensatory excavations of the currently landfilled First and 4th Street Basins in the public interest. This compensatory excavation and remediation would meet climate change flooding and habitat restoration goals.

WHAT SHOULD ENVIRONMENTAL RESTORATION GOALS BE FOR A CENTURY OF SHORELINE POLLUTER ACTIVITIES AND SUPERFUND CANAL CLEANUP DAMAGES ?

While it is acknowledged that history cannot be reversed to restore the lost Lenape Gowanus Salt Marsh Wetlands, **the future can be reengineered** to match reasonable climate change and flood resiliency already being implemented in Germany, Holland, France, England, Singapore, and China. [Sponge Cities](#), [Flood Parks](#) and [Street Creeks](#) should be considered as restoration engineering goals.

WHAT WAS THE GOWANUS CANAL FILLED WITH?

The landfill historic levels below show the **State Permitting Violations** that must be remediated by peeling back the layers to a more sustainable future for **all** the Canal's species



On the positive side, the layers of extremophile algae, trees, and urban adapted plants show the capacity of even the most damaged landscapes to start regrowing and healing.

As follows is an overview of some of the areas of the Canal the NRDA experts should consider for potential restoration sites.

SUMMARY MAP OF GOWANUS CANAL AREA POTENTIAL RESTORATION SITES

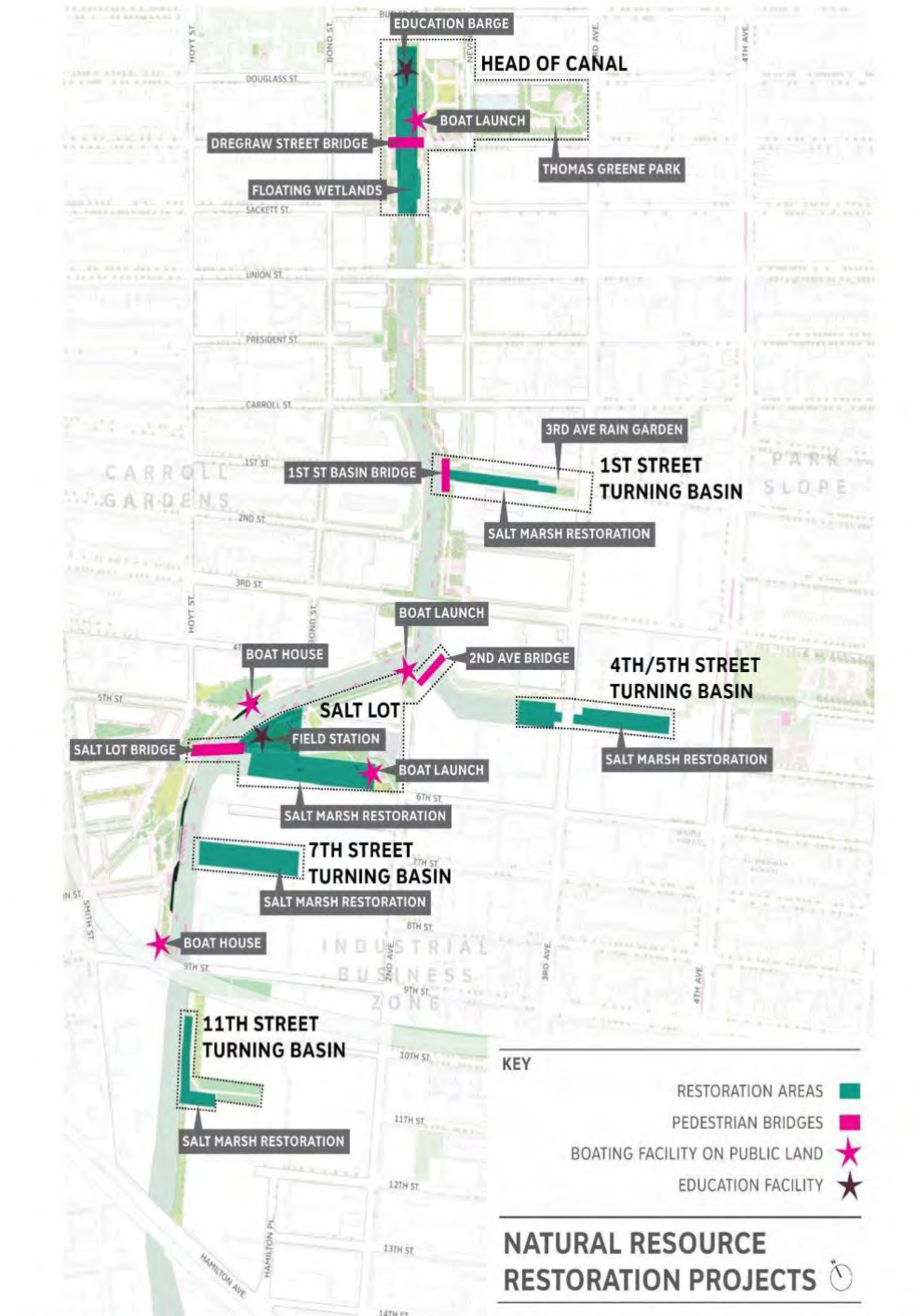


Prepared by Eymund Diegel, 13 June 2024 from Gowanus Conservancy, Dredgers and CAG potential NRDA project discussions
8 MARCH 2024 NEARMAP AERIAL BASE

see site specific project descriptions from page 29 onwards for more details,

2019 GOWANUS CANAL CONSERVANCY CONSIDERED PROJECTS

- Draft map included to show community workshop discussed detailed site locations
- Defer to Gowanus Canal Conservancy comments and plans for prioritized sites



THE NRDA PLAN SHOULD CONSIDER RESTORATION AT A WATERSHED SCALE

By “Watershed” is meant the landform elevation topography, historic streams, ponds, and marshes, and the current rainwater runoff patterns that historically defined the Gowanus creeks ecosystem biomes – and today's Gowanus Canal. Still to this day fresh water inflows from Park Slope and Carroll Gardens determines what trees and plants will grow where along the brackish / salt water canal.

On the watershed map below, the green area represents the historic Gowanus tidal salt marsh. These wetlands have since been landfilled with around 8 to 18 feet of fill.

Even buried, the ghost marsh is still very much there - The red line represents the **2012 Sandy Hurricane flood line** as mapped by FEMA (Federal Emergency Management Agency)

If you landfill a tidal marsh – **you will flood**. Like the [Everglades Restoration Plan](#), this key fact should be used for strategic ecosystem rebuilding and planning.

Any Natural Resources Damage Assessment will be meaningless without including a clear understanding of the natural landscape flow patterns and flooding histories that govern the Gowanus ecosystem, along with the tidal and **storm surge patterns** of its adjacent bay.

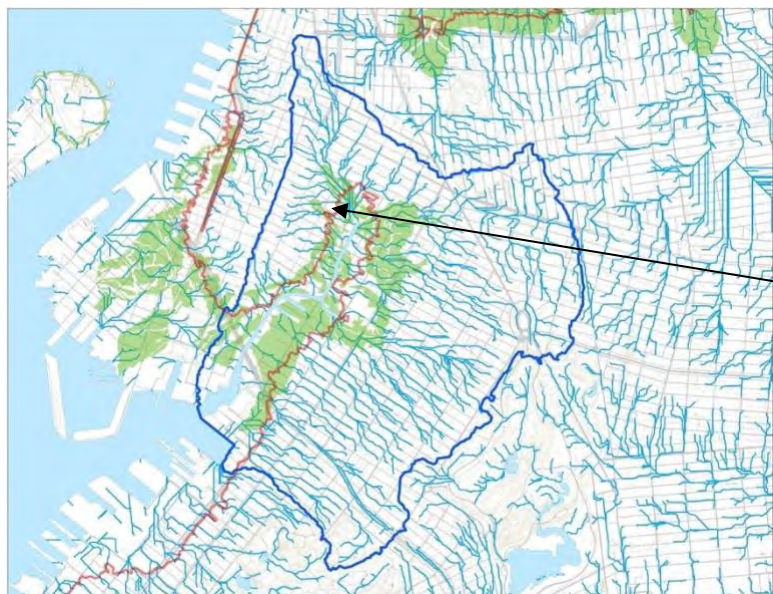


Photo and map from Eymund Diegel, Creek Scene Investigation (CSI) studies

The photo from 5 August 2017 Gowanus Conservancy BioBlitz Surveys showing a white heron at the Gowanus First Street Basin illustrates this key **Water Pattern = Habitat Type** data point.

The white mulberry tree is growing on top of the fresh water spring outflow of Denton's spring. This fresh water in turn attracts mummichog fish, which attracts waterfowl. These water runoff “Life Points” are mapped for the Canal shoreline and are useful for planning restoration sites

GOWANUS CANAL STORMWATER RUNOFF POINTS & HISTORIC TIDE MARSH



The Google Earth water outflow layers, historic ecosystems and equivalent GIS mapping formats are available for NRDA researchers via this Google Drive link:

https://drive.google.com/drive/folders/1mxjz-d6nvWWpH1rF1ofsy2XwyiJKnJEq?usp=share_link

The blue dots on map above show where surface stormwater generally wants to enter the canal based on current surface topography.

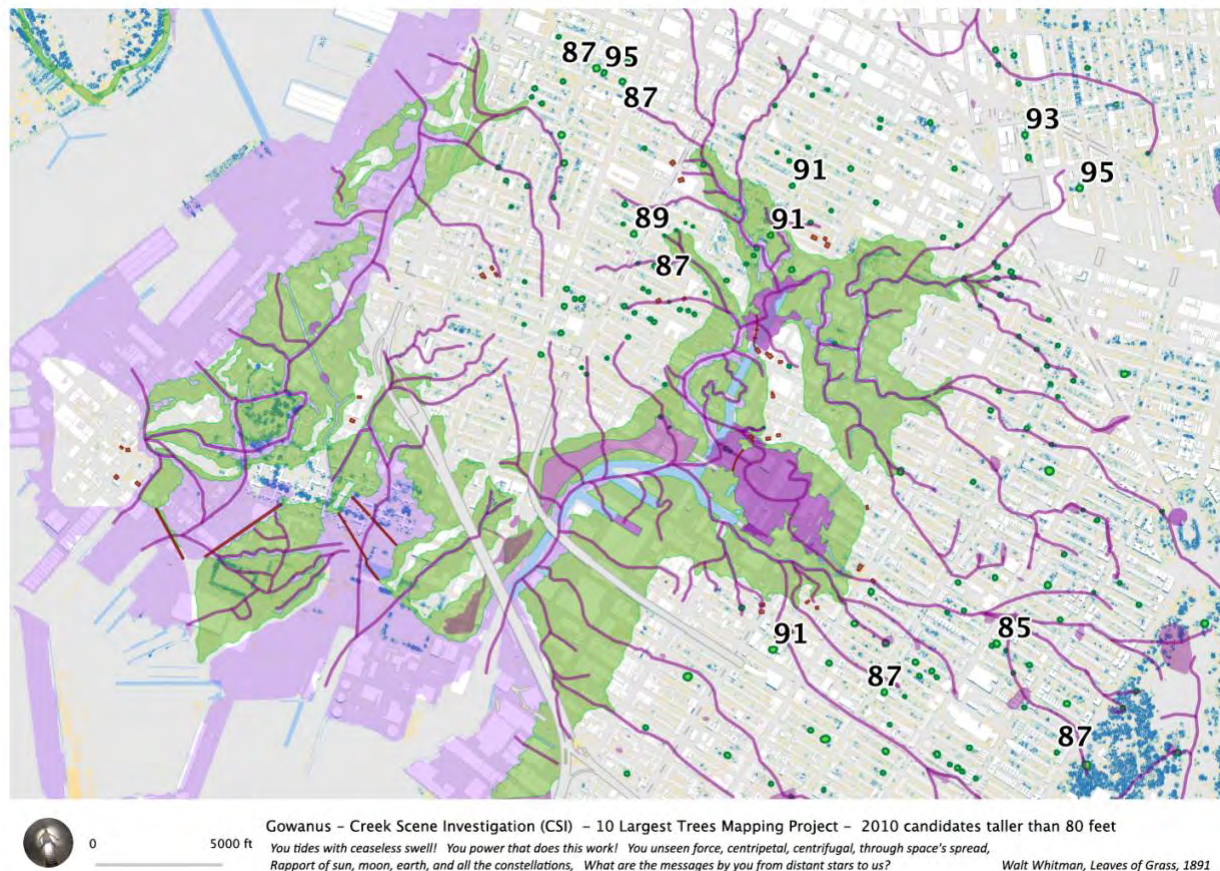
These flow lines and points provide a good clue as to historic stream bed patterns, as well as likely sediment scouring points of the Canal bottom where storm water may enter the canal.

These would be spots to considered for shallower water habitat reconstruction wetland areas that can help protect the remedial cap and catch incoming sediment.

TALL TREES = BURIED STREAMS & SPRINGS

The relevance of historic water patterns is illustrated in this 2010 study map, looking at the relationship between the tallest and largest biomass trees around the Gowanus watershed overlaid on historic streams as mapped by the 1766 Ratzer and [1782 Stevens](#) British Headquarters Maps.

There is a direct correlation between how well trees grow and their proximity to historic stream beds.



The 2010 Tree Height data is available on New York City Open data:

https://data.cityofnewyork.us/Environment/Landcover-Raster-Data-2010-3ft-Resolution/9auy-76zt/about_data

In terms of a bench mark of total biomass lost between 2010 to 2024, this Tree canopy map can be referred to – it shows trees damaged by saline intrusion by the 2012 Sandy Hurricane flooding <https://redhookwaterstories.org/items/show/914>

A comparison with 2024 aerials will show the **dramatic deforestation that occurred along the Gowanus Canal** edges once the Superfund cleanup was initiated.

KEY IS TO INTEGRATE GOWANUS NRDA PROCESS INTO THE CITY'S OVERALL SUSTAINABILITY PLANNING

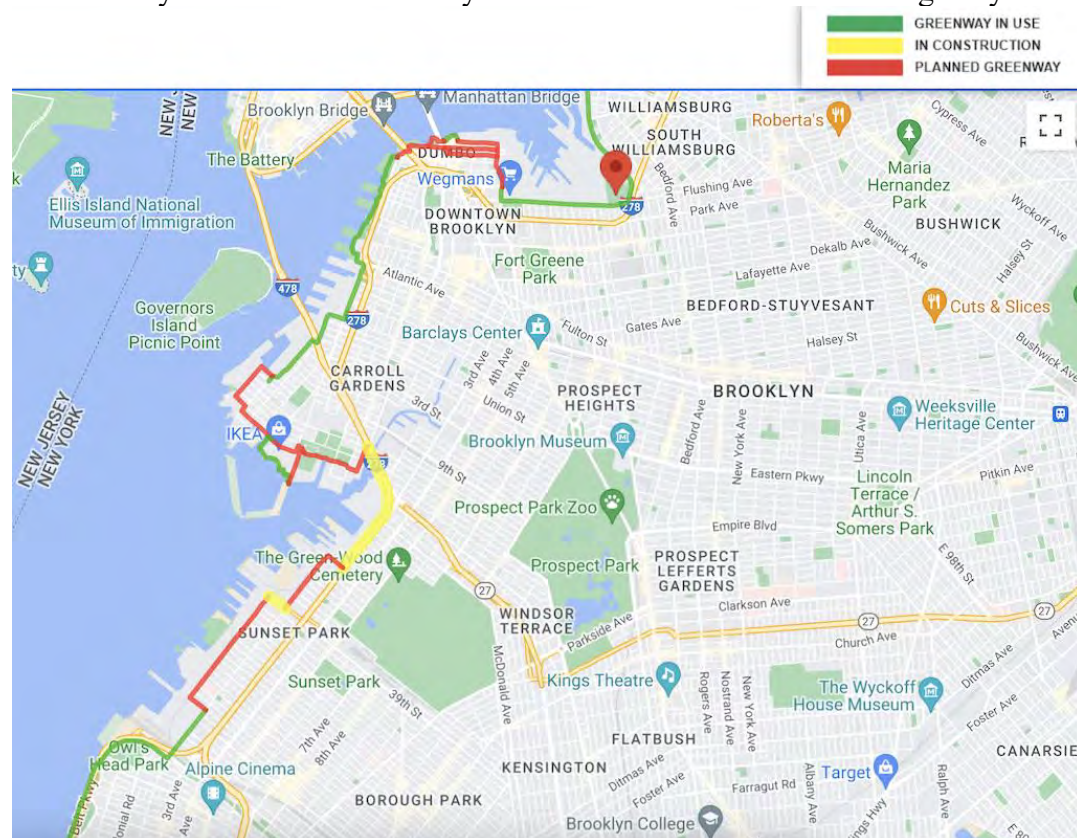
While it is critical to act locally, the restoration should think globally. Restoration actions should connect to broader watershed, harbor and urban sustainability goals. That being said, any **“off site” restoration possibilities allowed by law should be opposed**, with any mitigation instead invested *in* the Gowanus watershed where they will have direct long-term benefits for the Superfund cleanup. Key city-wide strategic planning initiatives to consider are the Brooklyn Waterfront Greenway Initiative & Gowanus Canal Conservancy Lowlands Plan.

<https://www.brooklyngreenway.org>

<https://gowanuscanalconservancy.org/gowanuslowlands/>



The Brooklyn Waterfront Greenway & Lowlands Plan should be strategically linked.



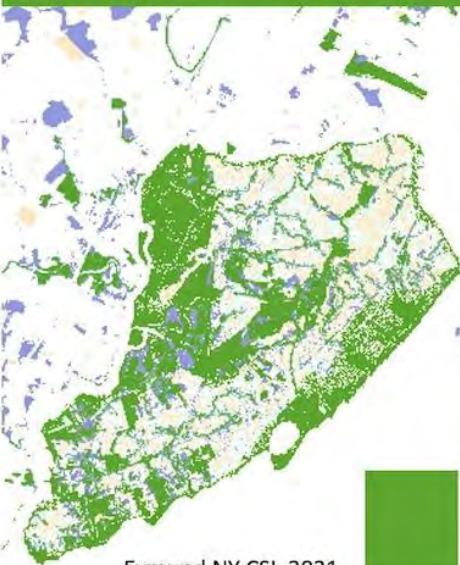
The Brooklyn Waterfront Greenway focuses on human recreational amenities. These should be tempered with the Park's Department's Natural Resources Group's aims to reconstruct "Forever Wild" Greenways focused on **increasing species diversity** within an urban context.

The NRDA Remediation goals should study ways of connecting any projects with a Metropolitan Open Space System (MOSS) in a way that balances integrated recreational and ecological networks.

Certain "MOSS" Greenway networks prototypes have been tested on Degraw Street, 6th Street and 3rd Street by the Gowanus Canal Conservancy, with further greening opportunities along the MTA 9th Street Corridor and Union Street.



**RESTORING URBAN
POLLINATOR HABITATS**



Eymund NY CSI 2021



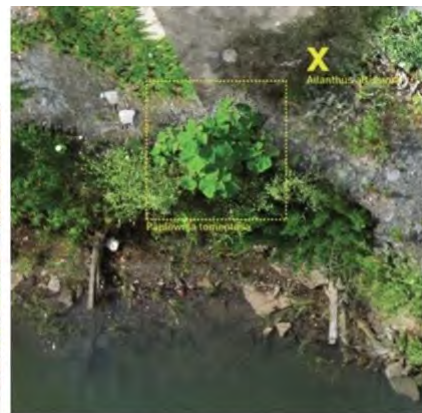
New York City Metropolitan Open Space System (MOSS) based on historic streams and existing open space networks

The NRDA should identify “No Disturbance” sites where urban adapted vegetation can allow insect and bird habitats to develop naturally **without human intervention**. This includes developing Gowanus specific maintenance guidelines along NYC Dept of Transportation controlled bridges and road verges, **currently routinely cut or sprayed with herbicides**, with related contaminated runoff into the Canal. The city has already changed many of its toxic procedures, [banning the use of Roundup herbicides](#), but more remains to be done.



2016 / 12 / 26 - An example of **Crack Ecology** Life Recovery - Gowanus Mullein (*Verbascum thapsus*) and mosses on concrete near Smith and Creamer St - photo by Eymund Diegel
Life comes back – from “[Future Boy Conan](#)” a post apocalyptic science fiction manga by director Hayao Miyazaki, 1978

DIY Aerial Photography to map the plant species in our neighborhood

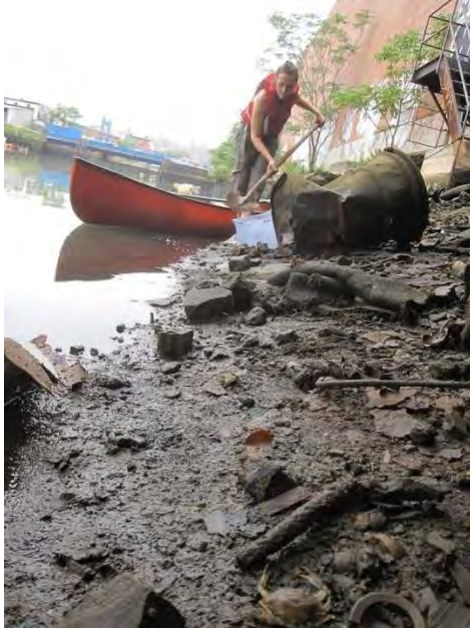


7 July 2012 – Plant Mapping of the Gowanus Canal Salt Lot at 2nd Avenue – Gena Wirth & GLAM RELEAF Balloon Photography Team

2012 / 7 / 7 Gowanus Canal 2nd Ave Salt Lot Vegetation Mapping by Public Lab Gowanus Conservancy Balloon Mapping Team – photo stitching by Gena Wirth

WHAT IDEAS CAN INSPIRE THE RESTORATION PROCESS?

REBUILDING A SUCCESSION ECOLOGY FRAMEWORK DESTROYED BY REMEDIATION



2012 - 27 July - Artist and toxicologist Jenifer Wightman collecting Prussian blue calcaric material from the Gowanus Canal First Street Basin landfill while observed by a crab. Early Gowanus industries used Lenape shell mound middens and [human and animal bones](#) for calcium beds for filtering chemical impurities from gas and dyes.



Gowanus Life Bacteria Painting using Superfund sludge, chemical wastes and airborne bacteria, algae and molds – courtesy of Jenifer Wightman (http://www.audiblewink.com/portraits_NYC.html)

The calcaric industrial residue soils and “black mayonnaise” sludges dumped in the canal were used by Jenifer to nurture extremophile life species, illustrating **the power of life and succession ecology** to restore even the most adverse environments.

WHAT KIND OF ENVIRONMENTS SUPPORT LIFE? WHAT DO WE HAVE TO WORK WITH?



2024_03_13_View of Gowanus Canal USEPA steel bulwarks from Union St Bridge by Oscar Fock
compared to 1991 – Judgment Day Storm Canal with Arnold Schwarzenegger and John Connor in Terminator 2

WHAT THE GOWANUS CANAL IS NOW – WHAT COULD IT BE ?

What can be done to restore to restore the Canal's now **life hostile environment**?

As in the Judgment Day image above, the **cracks** and edges where **urban plants** are already growing, give a hint for siting the primary self-healing restoration opportunities.

WHAT SPECIES HAD ADAPTED TO GOWANUS CANAL HISTORICALLY?



2007 / 07 / 10 – Gowanus Canal Whole Foods site at 3 Av & 3rd St; freshwater bullrush wetlands
at historic Dentons pond which reappeared when toxic soils were dug out
– photo by Robert Gusskind

2014 / 03 / 3 – Ailanthus altissima or Tree of Heaven ([A Tree Grows In Brooklyn](#)) growing on
Gowanus Canal wooden bulkhead cracks
– photo courtesy of Dlandstudio Weintraub Diaz Powerhouse Landscaping Study

SOME KEY GOWANUS CANAL REFERENCES FOR INVENTORYING SPECIES & THEIR HABITAT RESTORATION IMPROVEMENTS

2020 GOWANUS CANAL CONSERVANCY SPECIES DIVERSITY REPORT

<https://gowanuscanalconservancy.org/wp-content/uploads/2020/04/2021-Gowanus-Ecosystems-Report-Draft-210611-optimized.pdf>

2004 GOWANUS BAY & CANAL ECOSYSTEM RESTORATION STUDIES – FISH & EPITHENTIC INVERTEBRATE SAMPLING PROGRAM

<https://drive.google.com/file/d/18ADIH-x5jmvNUC2UPFuMg28RjE6IjHfn/view?usp=sharing>

2012 NEW YORK CITY PARK'S DEPT. GOWANUS CANAL NATIVE SPECIES LISTS

https://drive.google.com/file/d/0B4O3GQXzVz6taEdtYm5PNm9FVzQ/view?usp=share_link&resourcekey=0-oF1h669c4PM6_RAVIAUu6Q

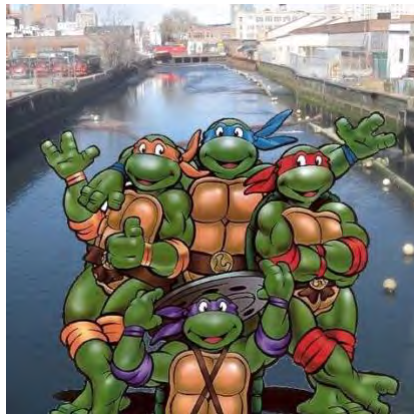
2016 PROTEUS GOWANUS PHOTO INVENTORY OF OBSERVED CANAL SPECIES

<https://www.flickr.com/photos/51802375@N04/albums/72157629847297184/>

The following comments focus on potential sites to assist the NRDA in identifying the most suitable areas for the recolonization of life within the ecologically devastated Gowanus Canal.

THE GOAL: FROM NINJA TURTLES TO SUSTAINABLE REAL ECOSYSTEMS

The Gowanus Canal – mythical birthplace of the Mutant Ninja Turtles (courtesy of Nickolodeon)



TO



2013 - Jamaica Bay migrating Diamond Backed Terrapin and barnacles on Gowanus Canal oxygenation tube at 2nd Street – pic by Romy Mann / Gowanus Dredgers

HOW CAN WE MAKE THE GOWANUS CANAL TURTLE FRIENDLY AGAIN?

WHAT CAN BE DONE TO RECONNECT THE JAMAICA BAY WILDLIFE REFUGE & NEW YORK HARBOR WITH THE GOWANUS CANAL RESTORATION PLAN?

*“Men fought and died here as part of our American Revolution.
To date, we have honored them with our sewage.*

*We can as a nation do better than that and I sincerely hope that this subcommittee will give serious consideration to **including at least a few hundred acres of land around the former creek bed in the Gateway National Recreational Area**”*

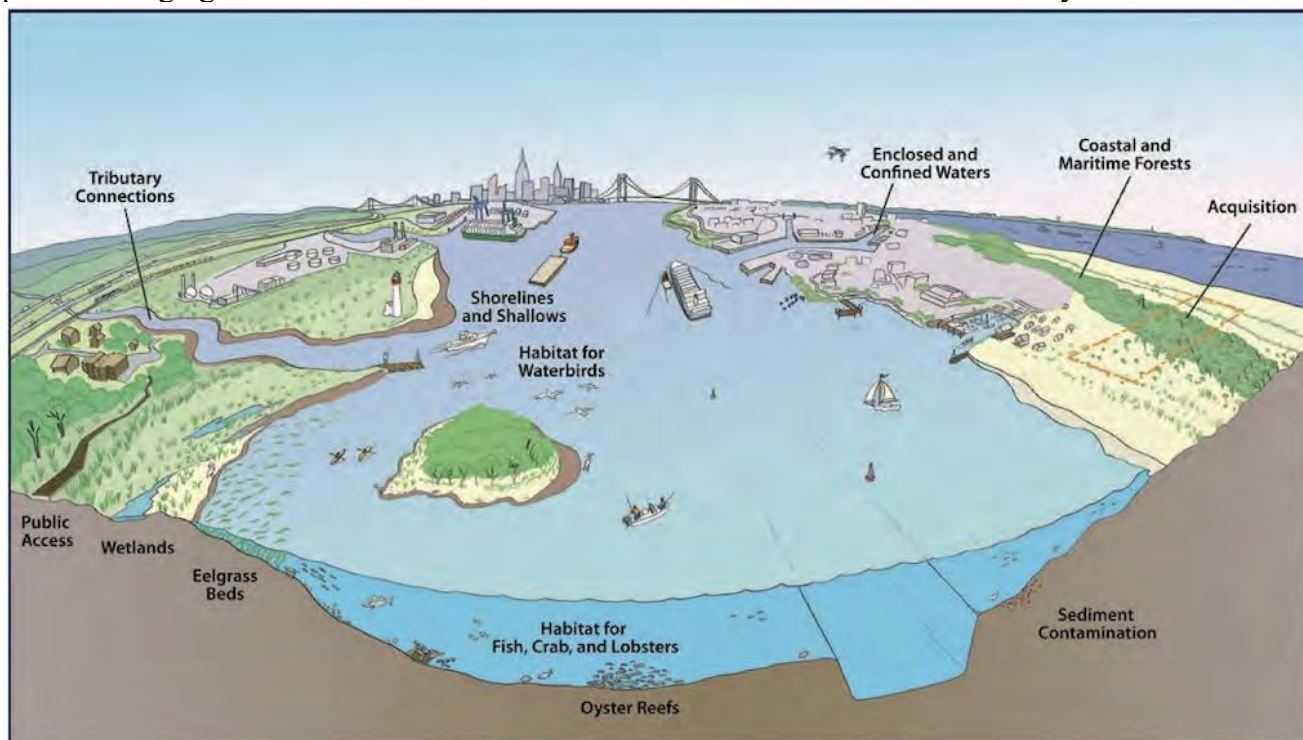
John H. Lindenbush, executive director, Long Island Historical Society, 1972

at the Hearings before the Subcommittee on National Parks and Recreation of the Committee on Interior and Insular Affairs, House of Representatives 92nd Congress, First Session on H.R. 1370 and H.R. 1121 and Related Bills (1972, p. 160)

THINK AT A HARBOR WIDE SCALE

The NRDA’s studies and planning need to be integrated with the goals of the [Comprehensive Restoration Plan for the Hudson Raritan Estuary](#).

This is relevant as the image of the 2013 diamond backed terrapin turtle on Gowanus sewage pipes and [underwater video](#) (frame 2:35) of the turtles at Bush Terminal Park (43rd St) indicates that there is a pattern of **species colonization** from the Gateway Wildlife Refuge northwards as harbor waters are gradually cleaned by City and State efforts. The NRDA process can help provide bridging habitats to reconnect the Gowanus with the harbor’s broader ecosystem.



2016 Harbor Estuary Restoration Plan, via US Army Corps of Engineers

THE PROBLEM: THE GOWANUS AS BROOKLYN'S GARBAGE PAIL

A century of disregard for the Gowanus Canal's habitat system and ecological assets



2014 / 7 / 17 - Vechtes Brook Outflow at end of Fourth Street Basin through Gowanus coal tar
- pic by Eymund Diegel – The Vechte's Brook watershed covers Park Slope up to Prospect Park
1872 (circa) - Landfill and garbage dumping on Brooklyn's mill ponds
– photo by George Bradford Brainerd via Brooklyn Museum

THE HOPE

Working with the landscape's **environmental DNA** (what the land wants to be) the NRDA projects would assist the Gowanus Canal's natural self-healing processes.

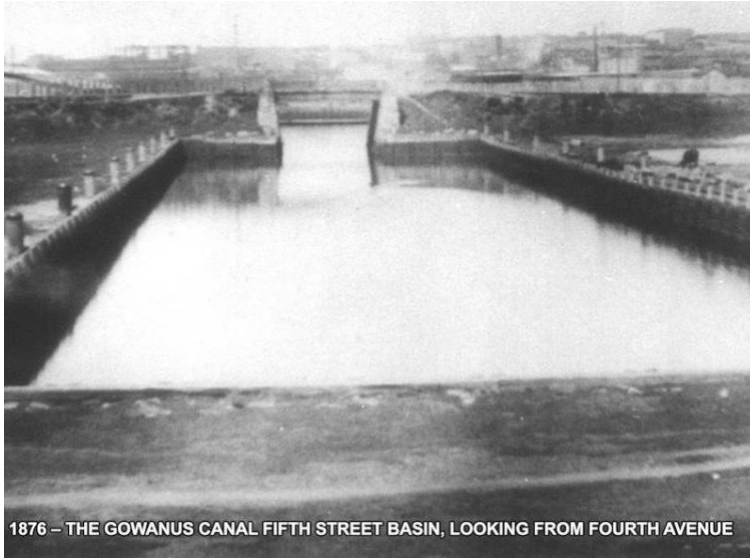


2012 13 July - Mussels at Gowanus Canal and 2nd Street and at 2nd Ave Coal Tar slicks – the mussels filter up to 70 gallons per day of polluted water and helping reduce sediment load and water toxicity for other species

2014_5_10 - [Empire Dragon Boat](#) Flushing Bay cleanup crew with mussel reef,
Photo from Eymund Diegel

Flushing Bay has worse sewer discharges than the Gowanus Canal, (6 % of NYC total discharges) yet mussel reefs have still reestablished themselves given correct tidal water levels

THE PROBLEM: A SYSTEMATIC DISREGARD FOR COMMON SENSE



1876 – THE GOWANUS CANAL FIFTH STREET BASIN, LOOKING FROM FOURTH AVENUE



Gowanus Canal 4th Street (also called 5th Street Basin) Landfilling. This landfilling of the former course of Vechte's Brook now causes massive flooding on 4th Avenue

Environmental Protection Agency and the State and City regulatory agencies legal failure to maintain Clean Water Act Provisions and state shoreline statutes has led directly to financial costs to adjacent upland owners via flooding.

These flooding impacts by law need to be compensated for, including imposed costs on future generations. Repairing improperly filled flood control basins is the way to do so.



2007 FLOOD – FOURTH AVE & UNION ST

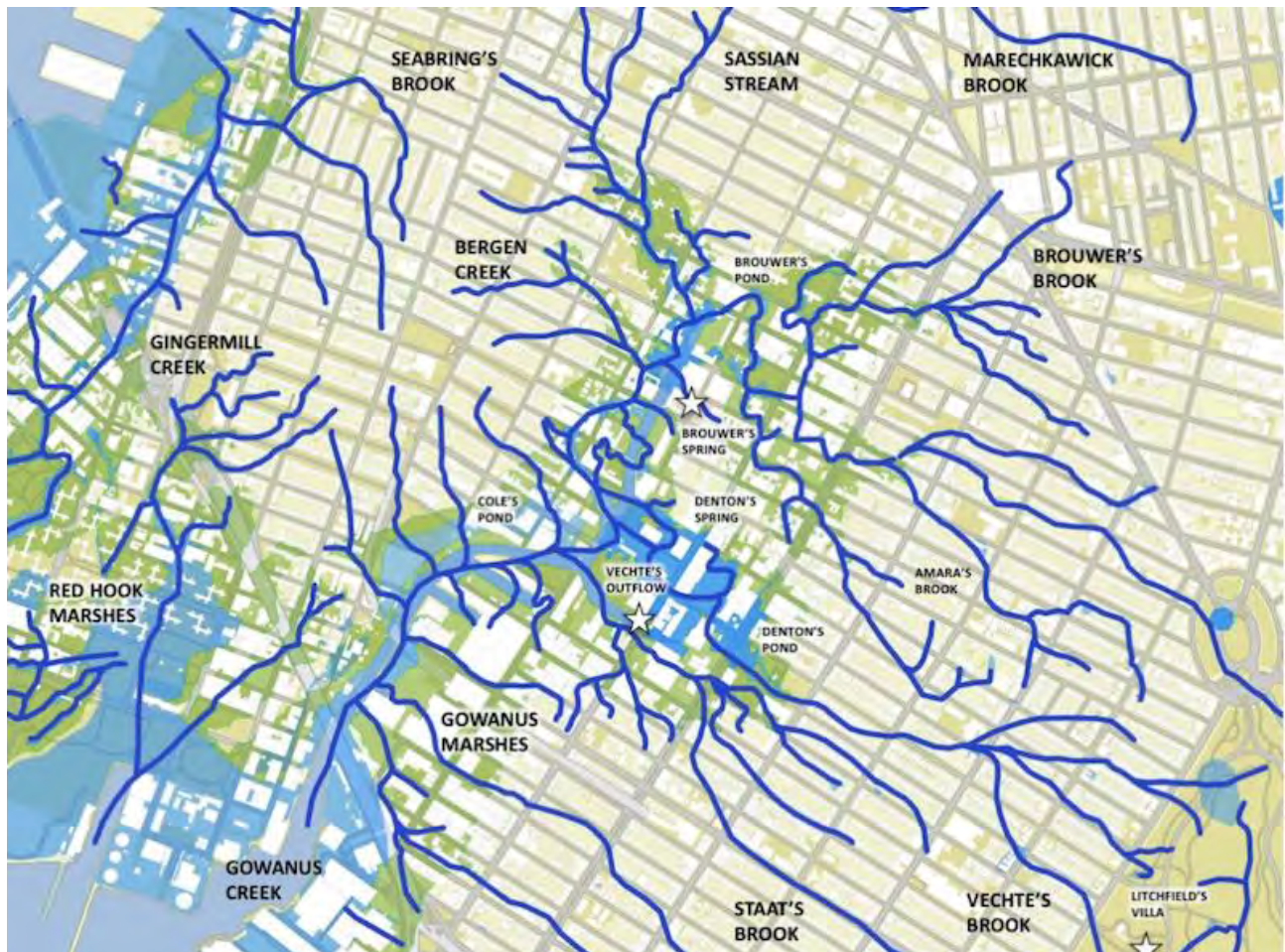
HOW DID HUMAN DEVELOPMENT & SUBSEQUENT BULWARK REMEDIATION AFFECT THE CANAL'S SPRINGS & STREAMS?

The **Superfund remediation interrupted the natural course of aquifer springs** that flowed into canal. The new bulkheads now divert the backed up artesian clean spring water to basement sump pumps that direct that aquifer water to the overloaded combined sewers overflows, increasing CSO events.

“All water has a perfect memory, and is forever trying to get back to where it was.”

Toni Morrison , Nobel Prize in Literature, 1993

MAP OF THE HISTORIC STREAMS OF THE GOWANUS WATERSHED



Prepared by Creek Scene Investigations (CSI Gowanus) / Eymund Diegel

FIRST HUMAN ALTERATIONS OF GOWANUS MARSHES NATURAL HABITATS

1782 Tide Mill Pond Map by Mark Borton, of the [Tide Mill Institute](#)

The map below shows the first human interventions to control flooding patterns and to use water pressure forces to power tide mills at certain strategic outflow points.



The red spots on map above (2,3,4) show where the post 2020 installed **steel bulwark may fail** first due the chemical interactions of saline and fresh waters from buried stream outflow water pressures.

2022 surveys of the impact of steel bulwarks by Dredger's canoers showed **extensive oxidation rusting on Superfund team installed bolts at the historical stream outflow points.**

This rusting phenomenon, photographically documented below will require [further study](#), with potentially, revised design of steel bulwarks **cut down to the historical low tide line** to reduce risk of failure for the Superfund remedy.



2022 / 07 / 04 – Denton’s Spring ***Rusting Out Superfund Bulwark Bolts*** near Carroll and First Street – photo by Eymund Diegel

2022 / 07 / 04 - Inspecting spring ***water backups in basements*** at Union Street and Nevins caused by stream beds and springs now blocked by new remediation bulwarks – photo by Ashley Sanders

The NRDA should conduct a study of where the backed-up spring water is affecting local Gowanus upland properties, and define appropriate compensatory damages measures.

HOW LONG WILL STEEL SUPERFUND BULWARKS LAST?



2017 / 4 / 29 – The rusted marine grade steel bulwarks installed at Floyd Bennett Field airport in Jamaica Bay circa 1940. Photo by Lynley Kemp

Eighty years later this is what steel bulwarks look like.

The EPA has rated the bulwarks for “a 100 years”. What actual engineering testing proof does the agency have of this longevity, given that the technology is less than a 100 years old ?

HOW CAN NATURAL SYSTEMS BE DESIGNED TO COMPENSATE FOR THE POTENTIAL FAILURE OF THE STEEL REMEDIAL SOLUTION?

ARE MUSSEL FRIENDLY BIOCONCRETES A VIABLE ALTERNATIVE IF INSTALLED WITH COAL TAR DIVERSION WELLS?

Given the eventual failure of the steel bulwarks, the use of marine friendly eco concretes and other **soft edge alternatives** should be studied as part of proposed habitat damage mitigations. References are included below to further research already carried out by the Gowanus Dredgers and Gowanus Conservancy mussel habitat research teams.

<https://gowanusdredgers.org/mighty-mussels/>
https://en.wikipedia.org/wiki/Roman_concrete
<https://econcretetech.com>

HOW WILL THE NRDA PROCESS INCORPORATE ART & CULTURAL HERITAGE INTO ITS ENVIRONMENTAL PLANNING \?

This is an example of such bioconcrete technology being used for Art, with implications for the Brouwers Bridge 1776 project, and African slave and Lenape monuments discussed further below.

Creative applications of environmental technology can be explored here:

<https://underwatersculpture.com/>



Underwater Life sculptures by Jason deCaires Taylor

*"The trees that sing are cut and dried.
And the serene mountains become plains.
But the song of water is an eternal thing"*

Federico Garcia Lorca, poet

NRDA RESTORATION PROJECTS

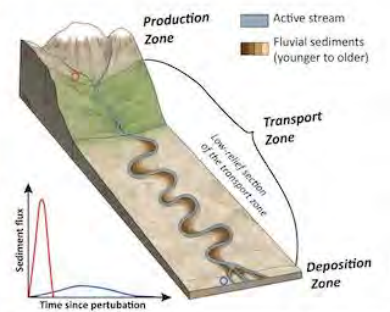
WITH PROJECT PRIORITY RANKING, SPECULATIVE COSTS, LEGAL OBSTACLES, & POLITICAL PARTNERS. (hypothetical estimates / feasibility rankings for example only)

(*) Suitable for early restoration of injured resources status (pg. 9 of NRDA plan)

	COST	DIFFICULTY
1 - WATERSHED RESTORATION PLAN	\$\$\$	HIGH
2 – FIRST STREET BASIN *	\$	LOW
3 – FOURTH STREET BASIN	\$\$	MEDIUM
4 – GREENE FLOOD PARK	\$\$\$	LOW
5 – MUSSELS SOFT EDGES*	\$	LOW
6 - STORM SURGE LIVING REEFS	\$\$	LOW
7 - CANAL BOTTOM HABITAT RESTORATION*	\$	LOW
8 - BOND STREET SEWER BOTTLENECK*	\$\$\$	MEDIUM
9 – STREAM FLOW RESTORATION POINTS	\$	LOW
10 – UPLAND SLOW WATER PROJECTS	\$\$	HIGH
11 – FLOATING HABITATS*	\$	LOW
12 – WATER ACCESSIBLE STREET ENDS	\$	LOW
13 – 19 ST DOCK MUSSEL WETLANDS*	\$	LOW
14 – SMITH STREET WETLANDS	\$	LOW
15 – 4 TH ST BASIN BEND WETLANDS	\$	LOW
16 – NEVINS ST SPRING RESTORATION*	\$	LOW
17 – PARK SLOPE SPRING DIVERSIONS	\$\$	MEDIUM
18 – BQE HEAT ISLAND SPONGE FOREST	\$	LOW
19 – BUTLER ST STORM TUNNEL COMPLETION	\$\$	HIGH
20 - WATERFRONT RECREATION SPACE*	\$	LOW
21 – WATERFRONT LEGAL REVIEW*	\$\$	MEDIUM

PROJECT 1 - OVERALL WATERSHED RESTORATION PLAN

ADDRESSING THE ONGOING COMBINED SEWER FLOW IMPACTS IN DIRECT VIOLATION OF THE 1972 CLEAN WATER ACT AND THE 2013 SUPERFUND RECORD OF DECISION



FLUVIAL SEDIMENT DEPOSITION PATTERNS
May 2022 - *Journal of Geophysical Research*
graphic by Mashe Armon

OBSERVED SEWER OVERFLOW SEDIMENT DEPOSITION PATTERNS AT THE REMEDIATED GOWANUS CANAL SUPERFUND SITE

8 March 2024 New York City Nearmap aerial with
sewer discharges color enhanced for pattern clarity by
Eymund Diegel

The EPA has consistently (and erroneously) argued that Sewer Design and the heavy metal dispersals via Sewer Overflows (CSOs) into the Canal only partially falls under the EPA's cleanup responsibilities. This is despite their Remedial Investigation Report noting that cadmium discharges from CSO's have consistently violated permissible federal safety standards. As well, as of May 2024, The EPA Dredging team has already had to remove contaminated sediment from the clean canal bottom protective cap.

As such, it is imperative that the Trustees consider **Watershed Upland Remediation** sites for reducing overflow contamination into the canal. These sites, largely city owned, are highlighted on watershed map below as blue raindrops, along with potential restoration planning corridors linking them to the Canal.

Such integrated planning thinking by the trustees will help support the City's overall Storm Surge and Climate Change planning goals

This is a hypothetical example of where **Watershed Planning Projects** could go.

The blue raindrop points all indicate former landfilled ponds, now largely city owned playgrounds or parking lots where Green Infrastructure projects could help **reduce sediment and toxin loads** into the Gowanus Canal habitat system.



[Playpumps](#) are an idea where children pump out water that is stored in playgrounds after heavy storms. They would be combined with holding cisterns in the now excavated historic pond areas.



2013 Battery Park City merry go round from Eymund / 2012 Cistern photo from Ate Atema

Wetland & Spawning Habitat Restoration / Flood Mitigation and Stream Restoration Projects

PROJECT 2 - 4th Avenue Basin Landfill Excavation



2023 - Copenhagen Denmark Sponge Park storm run swale example of what the ecologically restored “Safe Walk to School” 4th Street Basin could look like – photo via der Spiegel

The Gowanus Canal receives **rapid flash flooding runoff from 1959 acres** of a largely impervious (concrete and asphalt) watershed

Additionally, approximately an averaged **million gallons a day** of sewage pour into the canal via periodic sewer overflows from the city’s imported Catskills drinking water system This excludes several million gallons from historic springs, streams and industrial artesian wells that are now largely diverted into the combined sewers, and contribute to overloading the undersized system.

Given the century old sewer pipe diameters - the system is grossly overloaded for the rainwater and sewage it handles.

As such any NRDA project that can help divert surface and stream water from these sewers will have a huge impact on the Canal’s marine life quality.

The First and Fourth Street Basins in the image above (historically Brouwer’s and Denton’s Creek) drain approximately 500 acres or 25% of waters entering the Canal.

As such these 2 sites should be the focus for strategic NRDA restoration engineering to help reduce pollutant loading and habitat stressors to the Canal

Both incrementally landfilled as illegal garbage dumps from the 1940s onwards, these sites should be excavated and restored to their storm management functions as **habitat greenways and Safe Walk to School parks.**



2013 - Wonderland Creek Underpass Greenway, Boulder, CO - picture via Loris and Associates
 1776 - Captain Samuel Smith Marylanders into the Gowanus marsh (now 3 Av underpass)
 Painting via Norman Goldstein, Military History Magazine, 2016

Prior to being a garbage dump for American flags, the Fourth Street Basin was ironically **one of the most important Revolutionary War sites in American History**. Had American soldiers not successfully retreated through the Vechte's Creek marshes and the Dentons Mill dam, now the Fourth Street Basin - **there would be no America**. There is a restoration funding opportunity here for NRDA trustees working with [America 250](#) commemorative interests.

Staat's Brook (above) is another watercourse connecting with the Fourth Street Basin.

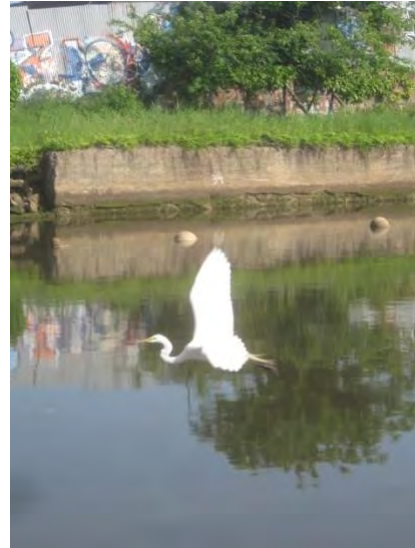


2014 / 6 / 5 - Staats Brook outflow during rain into the Gowanus 4th Street Basin – via Eymund
 2021 / 09 / 08 - Staat's Brook spring / sinkhole at 8th Street and 3 Av - via Samuel Robinson

A study of City 311 complaints about street potholes and sinkholes will show that there is a direct correlation between buried spring locations and our most frequent (and expensive) road infrastructure failures. The sinkhole below is directly on top of Brouwer's Spring, as depicted in historic paintings. NRDA's strategic Gowanus site selection for more rational Canal edge stream daylighting will benefit Gowanus tax payers financially by reducing potholes and flooding.

PROJECT 3 - First Street Basin / 3rd Ave High Level Storm Sewer Outflow Connector

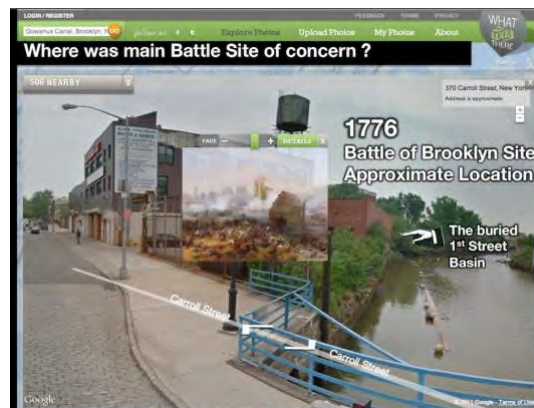
The First Street Basin, currently filled with military e-waste could serve as a sediment filtering bed for **3rd Ave High Level Storm Sewer Reconnection** which currently discharge toxins at the Carroll Street Bridge. This BlueBelt basin would have habitat value for local species.



2012 - Feral habitat pocket of adapted plants growing on First Street basin dump of Brooklyn Navy Yard E-waste in landfilled First Street basin

2011 / 05 / 30 Heron at 2nd Street Moss Garden – pics by Eymund Diegel / Gowanus Dredgers

This would be part of a general plan to rebuild **adapted urban feral pockets** at all side canal street ends – a pollution reduction strategy as successfully prototyped with the [Bluebelt Plan](#).



2013 - Jamaica Bay migrating Diamond Backed Terrapin and barnacles on Gowanus Canal oxygenation tube at 2nd Street – pic by Romy Mann / Gowanus Dredgers

1776 – Alonzo Chappel's 1858 painting of the Battle of Brooklyn at Denton's Mill located at First Street Basin where the First Battle of the American Revolution actually happened.

THE FIRST STREET BASIN SHOULD BECOME A NATIONAL MONUMENT

The battle site of Dentons Mill should be reconstructed as a tourist attraction at the now restored Gowanus Canal. This would have a similar structure to the [Benjamin Franklin home](#) in Philadelphia.

As the 1776 site of the First Battle of the US Continental Army, this is the only known occurrence of a Revolutionary War battleground site directly on top of a Superfund site. Because of the impending 2026 [anniversary of the American Revolution](#) this site qualifies for expedited NRDA restoration status.



Restoration solution:

Rebuild a commemorative Gowanus Museum framework as part of a 1776 Brooklyn Greenway trail connected to the [Old Stone House](#).

Rebuild eel grass tidal terrapin habitat in side basins as successfully prototyped at the 43rd St [Pier 6 Street Gowanus Bay Restoration project](#)

PROJECT 4 - Thomas Greene Park / Brouwers Mill Pond Restoration Site / Superfund Coal Tar Excavation Site / Flood Park Restoration

This is an example of a “win / win“ scenario for the Thomas Greene Park users, as the park is excavated to remediate the underground coal tar plume under the park.

Rather than landfilling it again – tax payers funds would be better used to connect it to floodable public access walkways and boat ramps to the Gowanus canal. This would allow more frequent predicted storm surges to be directed to the now restored ponding function of the old Brouwer’s Mill Pond and reduce property damages to adjacent park neighbors.



Fig. 25. The water square during dry periods (ca. 90 % of the year).

Fig. 26. During medium rainfall, the water square serves as water playground (approx. 30 times a year).

Fig. 27. Only the heaviest and longest rainfalls raise the level of water to one meter (once a year).

Fig. 25 – 27. Rendering of the pilot water square with different water levels (© De Urbanisten).



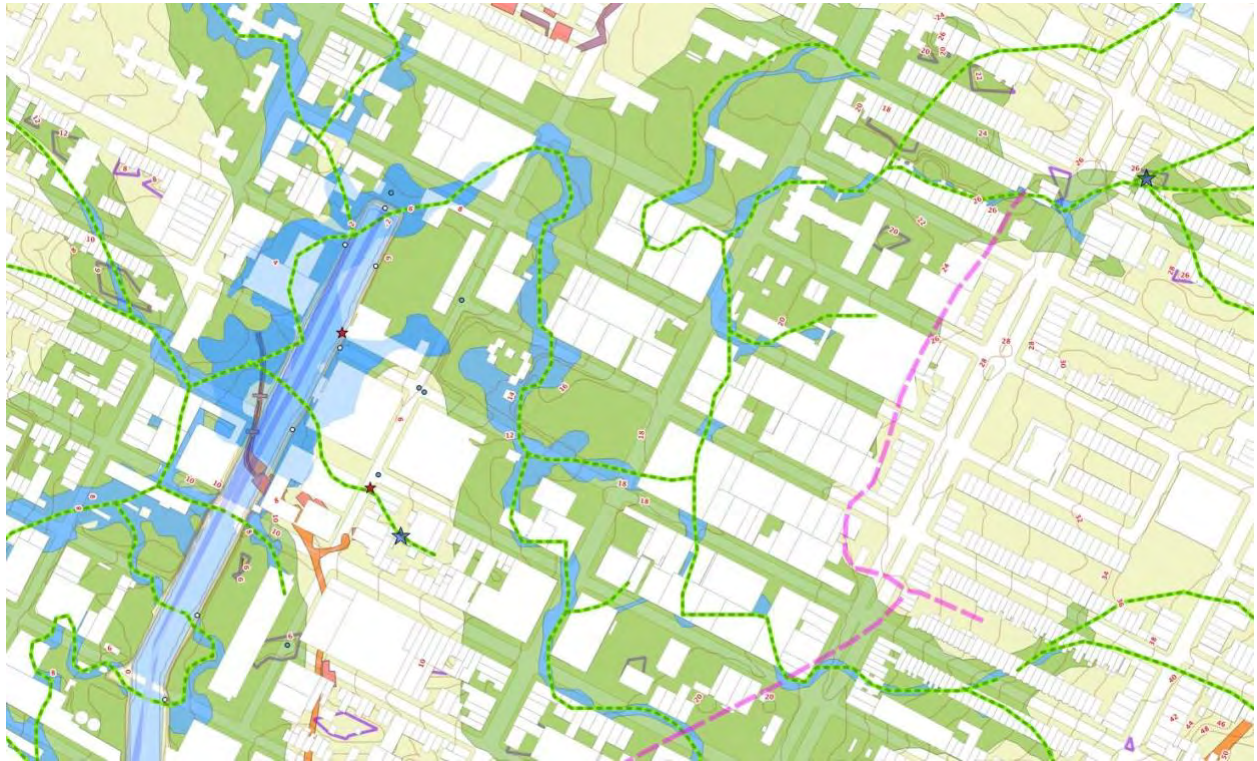
Fig. 28. Top view of the pilot water square - during dry periods, medium rain, and heavy storms (left to right) (© De Urbanisten).



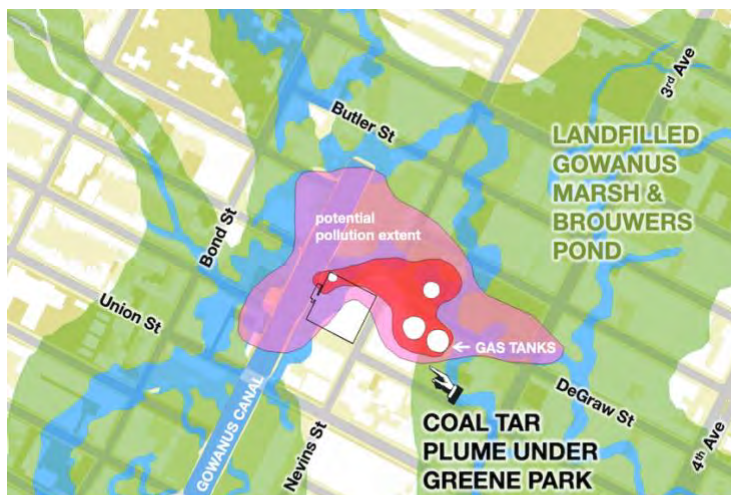
REBUILD OUR WATERFONT
FLOOD PARKS !

19 March 2018 - Canoeing the wilds of Brouwers Pond
(also known as the Thomas Greene Park / Brooklyn Gowanus Superfund Site)

Based on the 1766 Ratzer Military Survey Map, this is the course of Gowanus Creek and Brouwer's Brook as it runs underneath Thomas Greene Park, and the Fulton Manufactured Gas Plant Coal Tar Plume.



The Superfund excavation of the coal tar plume should consider restoring the historical depths of Brouwer's Mill Pond to act as a flood reception area.



- CORE OF POLLUTION IS UNDER GREENE POOL
- GOWANUS BURIED STREAMS AND TIDAL MARSH MAKE COAL TAR POLLUTION MOVE AROUND

PROJECT 5 - Gowanus Shoreline Rip Rap Restoration / Mussel Filter Habitat restoration

The Gowanus Canal Dredgers Canoe Club and the Gowanus Canal Conservancy have both developed in Canal prototypes for mussel restoration programs. The goal is not edible mussels, but **functional mass filtering shell banks to help improve water quality** towards eventually safe fishing. Resources related to those prototypes can be found here:

<https://gowanusdredgers.org/mighty-mussels/>

The NRDA should work with these local community groups to test best filter habitats that maximize the renewable life cycle of shellfish filter feeders.



Professor Michael Judge - Fuzzy Rope monitoring on June 18th 2013

BLUE MUSSEL DENSITIES		
COUNTS PER LINEAR FOOT		
Single Strand on June 19, 2013 (Furthest single strand to the west launched in March)		
Rope Type	Distance above cinder block (feet)	Count
Nylon	0-1	3
Nylon	1-2	3
Nylon	2-3	4
Nylon	3-4	2
Fuzzy	4-5	17
Fuzzy	5-6	22
Fuzzy	6-7	14
Fuzzy	7-8	6
Fuzzy	8-9	0
Fuzzy R. Tail	4	20
Fuzzy R. Tail	4	11
Fuzzy R. Tail	4	10

Fuzzy Rope monitoring on June 18th 2013

SPECIES LIST*		
Single Strand launched in the Fall	Common name	Scientific name
Amphipods	Gammarid amphipod	Family Gammaridae
Red algae	Brushy red weed	<i>Cystodinium purpureum</i>
Barnacles - Ivory barnacle	Ivory barnacle	<i>Balanus eburneus</i>
Hydroids	Campanulidian	<i>Bougainvillea</i> spp
Blue mussels	Blue mussel	<i>Mytilus edulis</i>
Sea Squirts	Sea grapes	<i>Mogula manhattensis</i>
Colonial tunicates	Golden star tunicate	<i>Botryllus schlosseri</i>
Nereis- Sandworm relative	Nereid polychaete	<i>Nereis</i> spp
Mudcrab	Black-fingered mud crab	<i>Dyspanopeus sayi</i>
Single Strand launched in the Spring (March)		
Barnacles - Balanus with calcified base	Ivory barnacle	<i>Balanus eburneus</i>
Blue mussel	Blue mussel	<i>Mytilus edulis</i>
Tunicates	Sea grapes	<i>Mogula manhattensis</i>
	Golden star tunicate	<i>Botryllus schlosseri</i>
Hydrozoan / Hydroids	Campanulidian	<i>Bougainvillea</i> spp
Amphipods	Gammarid amphipod	Family Gammaridae
Red Algae	Brushy red weed	<i>Cystodinium purpureum</i>
Subtidal panel launched in the Spring (March)		
Green Crab	Green crab	<i>Carcinus maenas</i>
Colonial and solitary tunicates	Sea grapes	<i>Mogula manhattensis</i>
	Golden star tunicate	<i>Botryllus schlosseri</i>
Blue Mussels	Blue mussel	<i>Mytilus edulis</i>
Barnacles	Ivory barnacle	<i>Balanus eburneus</i>
Caprellid amphipod	Caprellid amphipod	Family Caprellidea
Amphipods	Gammarid amphipod	Family Gammaridae
Filamentous red algae	Brushy red weed	<i>Cystodinium purpureum</i>
Hydrozoans	Campanulidian	<i>Bougainvillea</i> spp
Mud snail eggs (on cinder block)	Mud snails	<i>Ilyanassa obsoleta</i>
Mud crab	Black-fingered mud crab	<i>Dyspanopeus sayi</i>

*ID performed as visual assessment without microscopic examination

2014 Gowanus Bay Syms Facility (29th St at Gowanus Bay) species found on
[Gowanus Bay prototype mussel nets](#) picture via Kate Orff

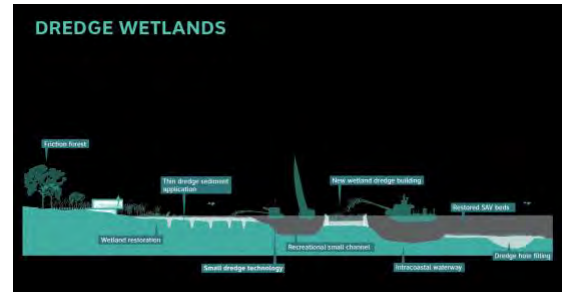
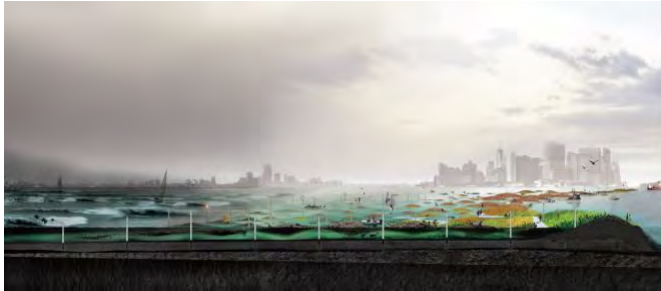
If each mussel can filter between 50 to 70 gallons per day of contaminated sediment, the NRDA should calculate and set aside the corresponding amount of filter habitat acreages to meet the averaged **million gallons per day** of Gowanus sediment CSO overflows.

At a minimum, this should replace the lost crack ecology habitats provided by the original Gowanus wooden bulkheads.

PROJECT 6 – STORM SURGE BARRIERS & LIVING REEFS

For Gowanus Bay, equivalent filter feeder and hurricane barrier prototypes have been proposed as part of the [MOMA On the Water / Palisade Bay](#) storm surge management project.

The “Living Breakwater” concept focuses on restoring the shell banks that historically protected the Gowanus shoreline from the now more frequent storm surges as seen during the Sandy and Ida flood events.



2012 graphics via Scape Landscape Architects

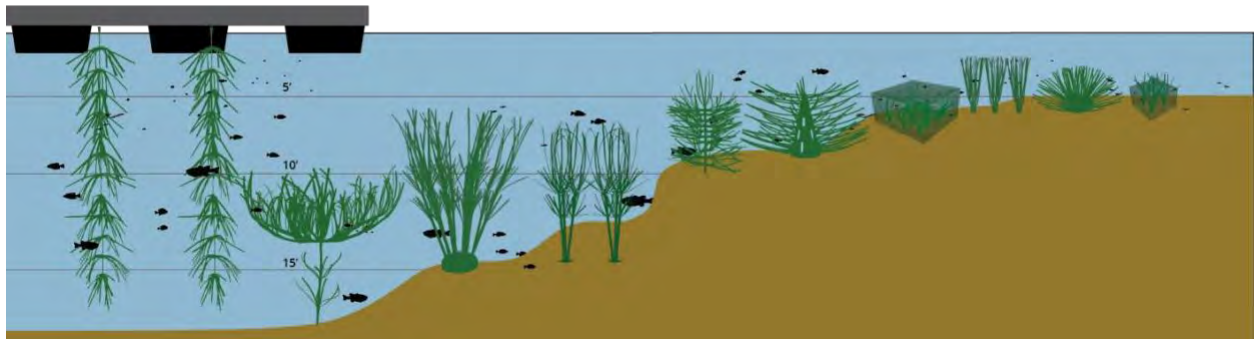


PROJECT 7 - GOWANUS BOTTOM HABITAT RESTORATION

As reported by Nicola Twilley in [Edible Geography](#), “an analysis of food remains at three sites in Lower Manhattan showed that the kinds of fish eighteenth-century New Yorkers ate changed significantly over time: social archaeologist [Nan Rothschild](#) found that “early New Yorkers consumed sheepshead (71% of all fish bones), with striped bass second (24%). By 1760, only 4% of the fish bones came from sheepshead, and a bit more from striped bass; the new leaders were sea bass and scup.”

Rothschild speculates that the reason for the disappearance of sheepshead and the triumph of scup is linked directly to the city’s physical growth. Apparently, while “sheepshead live close to shore, preferring uneven bottom surfaces,” scup prefer “smooth river bottoms,” which means that as **New Yorkers reshaped the topography of their riverbeds with landfill, they were inadvertently redesigning their diets as well.**

This makes it critical to vary species diversity within the Canal with a **variable height sediment and rock bottom** to provide a wide range of habitat types.



Create variable mound height habitats position at roughly 100 feet module on eastern sediment deposition side of Canal

graphic by [Garrett Lee / Pond King](#)



2021 / 10 / 14 / Mussels Sediment Filtering Mounds

Photo by Roger Tabor – USFWS - Xerces Society for Invertebrate Conservation

This **varying of the Gowanus Canal bottom** can be coupled with Art projects celebrating the waterway as a unique historic site.

For example, the Brouwers Bridge **1776 Path to Freedom Underwater Habitat Memorial** could be coupled with underwater bio concrete sculptures to celebrate the soldiers lost in the American Revolution. This project would be located just north of what is now Union St Bridge.



A 1776 inspiration could be Underwater Life sculptures by [Jason deCaires Taylor](#)



photo: Daniel Barry, New York Times

Underwater Ghost Concept: Eymund Diegel

Other similar cultural history projects would be **Lenape Oyster Midden Mound Project**, a 5000 years old, ten foot deep pile of oyster shells, historically at the Carroll Street Bridge Area.

Another complex Memory Marker would be the [Harry Washington Monument](#), George Washington's personal slave who fought against him on the British side in Gowanus. Brooklyn's Africans largely fought on the Loyalist side, building many of the fortifications around Gowanus. These could be rebuilt as **strategic storm surge barriers**, to remind us of the complexities of the word "freedom".

HOW WILL THE CANAL SEDIMENT LEVELS CHANGE OVER TIME?

These maps are provided to help better understand Gowanus Canal sedimentation patterns

BATHYMETRY MAPS

Butler Street (2010)



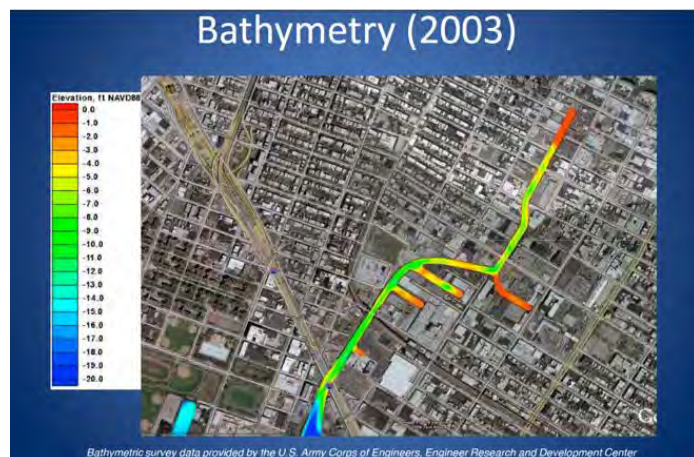
Third Street (2010)



2010 Gowanus Bathymetry Survey



2003 Gowanus Canal Bathymetry Depths

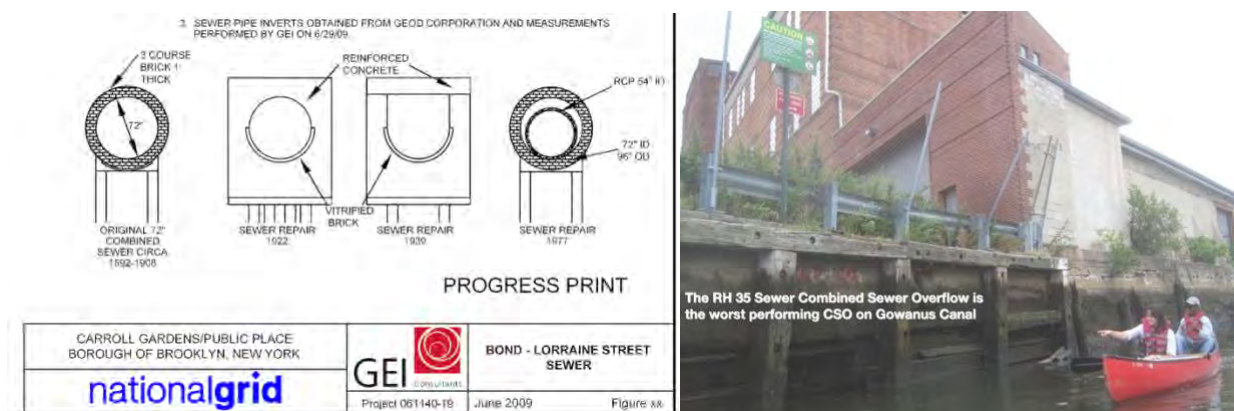


PROJECT 8 - THE BOND STREET SEWER BOTTLENECK AS AN ENVIRONMENTAL RESTORATION PROJECT

It should be noted that Potentially Responsible Parties (PRPs) are historically directly responsible for mechanical damage to the City's Gowanus Sewer Mains. The example case is the **Bond Street Sewer bottleneck**, where a 1922 sewer main collapse caused by PRP Industrial activities is a direct legally traceable cause of combined sewer overflows into the Canal. GEI Consultants prepared a damaged pipe survey for National Grid in June 2009, establishing this with the key problem site being a 1977 illegal 54" (which should be 72" per code minimum) roughly 400 foot section of sewer pipe at the intersection of Bond and 4th Street.



1922, 30 March – **overloading of coal piles** at 5th Street and Gowanus Canal causes the shoreline New York City Bond Lorraine Sewer Line to collapse. **Inadequate repairs** (sub-standard pipe sizes) have caused a century of environmental impact harm and public health impacts. Photo courtesy of National Grid Historic Archives.



2011- 10 September - Our then most popular Gowanus Superfund Tourism destination - the Bond Street End RH-35 CSO Sewer Outlet. The NYC DEP and National Grid have stated that the above sewer pipe violation is "repaired". **In fact, it never was.**

As such, **repair and expansion of the Bond Street pipe bottleneck will have a direct beneficial impact** on reducing the dissolved oxygen water quality violations that cause the frequently observed fish kills



2019_07_30 [Biocitizen](#) students being given an inspection tour of the Gowanus RH 35 tunnel to study the “Gowanus Milkshake” impact of sewage emulsifiers on fish habitat quality.

PROJECT 9 – Bulwark Outflow Points,



The problem of rust corrosion caused by block streams was noted on page 27. It may be solved with **cutting down steel bulwarks to the historic low tide line**, where for millennia the historic stream has wanted to flow. This would largely not contribute to coal tar dispersal, as the plumes are not directly on the mapped springs.

The NRDA should study this issue with Superfund engineers to come up with a reasonable technical solution. The siting of probable bulwark problem areas was identified on the Tidal Sluice Gate Map, Page 26.

PROJECT 10 – PARK SLOPE UPLAND POND RESTORATION / FLOOD DEATH PREVENTION SWALES

The 2021 Ida Hurricane killed 13 people, who drowned trapped in flooding basements. **These deaths could have been prevented.** They will happen again as “atmospheric rivers” become more frequent climate change events.

An analysis of the flooded basement locations showed that they were all directly on buried stream beds, downstream from large asphalted parking lots. These parking lots had historically been wetlands or ponds where water collected during downpours.



The City and State should develop rapid storm runoff guidelines that **all parking lots and playgrounds have down slope storm catchment swales** to prevent the Ida style flash flooding fatalities from occurring.

A preliminary list of Flash Flooding prevention sites is identified on the Watershed Study (page 31). While not directly within the Gowanus Superfund area, these sites clearly contribute to the damage assessments within the Canal proper and qualify as mitigation sites.

PROJECT 11

Gowanus Human Recreation & Species Habitat Restoration Docks, Boating Access Points, Bridges and Rafts to maximize habitat value



2013_July 11_view of Conservancy Herons Rain Garden Water Test Site at 2nd Ave and Gowanus Canal_pic by Eymund_Gowanus Dredgers

2010 / 10 / 30 – Gowanus Floating Habitat Garden – w juvenile green herons (Butorides) photo by Adam Katzman

[The RETI Center](#) / Blue Cities Center, the Gowanus Conservancy and other groups have been experimenting with floatable habitats to reintroduce wildlife habitat support systems into the Canal. The NRDA Plan should study **floating and platformed structures** for habitat values



2020 (circa) Nesting Ospreys on constructed tower at Gowanus Bay's Bush Terminal Park (43rd Street) – photo by Charles via Bart Chezar

A key issue with the success of these habitats is to locate them **far from human disturbance**. The NRDA Trustees should create **zoned human activity buffers** around species reintroduction cores, with most sensitive habitats located furthest from human recreational nodes.

PROJECT 12 - Gowanus Canal Street Ends Restoration Sites

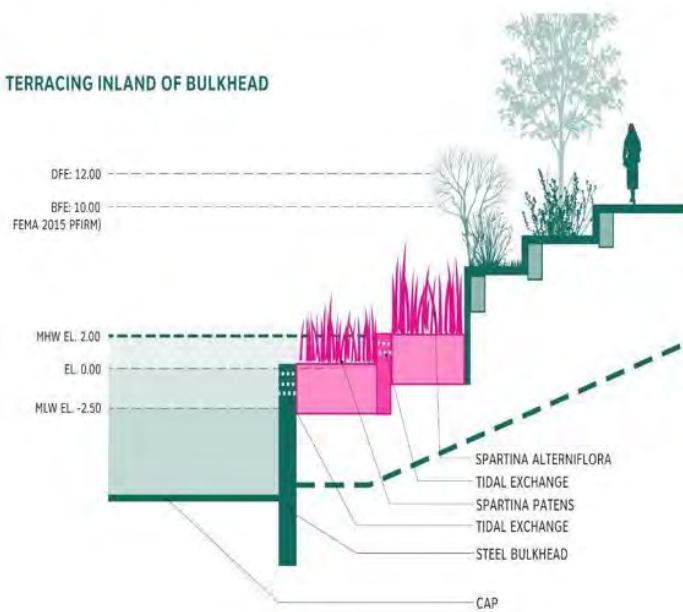
The Gowanus Canal Conservancy has developed prototypes for street end water pollution measures. A prototype has in fact been built at the end of Second Street by [Dland Studios](#).

These street end MS4 compliant habitats should be studied for their weaknesses and strengths and the program expanded to all Gowanus Canal street ends.

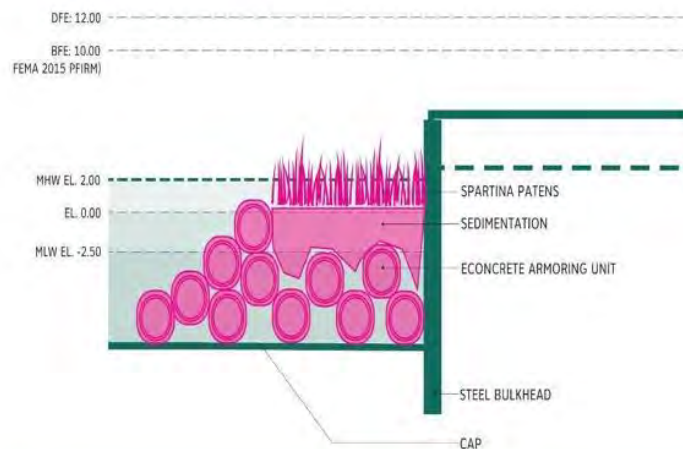
BULKHEAD HABITAT MODIFICATIONS

Steel bulkheads required under the Superfund will eliminate intertidal and aquatic habitat on the Gowanus Canal. The sections below present ideas for reconstructing the lost habitat.

TERRACING INLAND OF BULKHEAD



SEDIMENTATION IN TURNING BASINS



PROJECT 13 - 19 Street Mussel Bed Restoration Site

The Gowanus Dredgers Canoe Club has developed successful free public access canoeing programs at 2nd Street and now at 19th Street.



March 2024 aerial

Both the 19th Street and Smith Street Gowanus Bay sites are at bends in the shoreline, meaning that over time they would naturally resediment and revert to spartina wetlands and beach horseshoe crab habitat. Both these sites should be studied as deposition areas for dredge sediment to reestablish tidal flushing levels for salt marsh and mussel bed habitat.

PROJECT 14 - Smith Street Wetlands Restoration Site



2015 / 10 / 17 - Christopher Swain completes the Gowanus Canal Swim emerging at **Best Place To Dump a Gowanus Body Site** (and ideal Wetland Restoration Site) at Smith Street and Gowanus Bay – pic by Kevin C Downs for New York Daily News

PROJECT 15 - Gowanus Canal Bend Restoration Sites

A study of Bathymetry Maps over time by the NRDA will indicate which sites have a tendency to accumulate sediment over time. From personal observation canoeing the canal, these are often at end points within the canal, and where canal has bends or nooks.

Another new factor is that the steel bulwarks - because of their higher radiant heat - are changing canal water temperatures. One solution is to require that 24" of the bulwark top side be left unconcreted for landscaping. This will allow urban adapted plants such as native Virginia creeper (*Parthenocissus quinquefolia*) to grow and naturally shade the steel. This foliage will increase habitat value of the currently sterile steel bulwarks.



2024 / 06 - Amsterdam Creeper Vegetated Steel Bulwark Canal Edge - pic via Katia Kelly

PROJECT 16 - Nevins Street Springs Diversions



2014 - sump pump for Brouwers Spring at 543 Union Street sending a continuous stream of clean spring water into Nevins Street combined sewer overflows - pic by Cindy Regalado

Restoration solution: connect all identified springs to overland street creek flows directly to canal to reduce sewer overflows



From expensive problem to sustainable marketing opportunity...

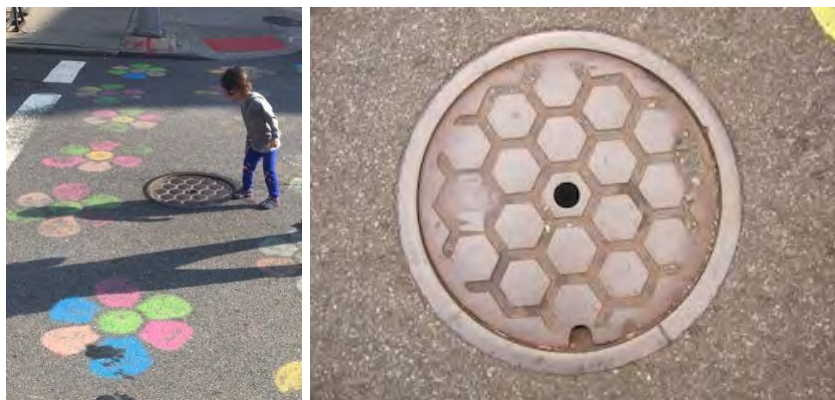
BROUWERS SPRING RESTORATION GREEN INFRASTRUCTURE GRANT

Preliminary siting issues for discussion

eymund @ gmail.com, December 2014

PROJECT 17 - 2nd Street and 5 Av School Playground Spring Diversion Site & 7 Ave & Garfield Place Spring Diversion Site

All around the Gowanus Canal watershed are springs in basements that are being diverted into the combined sewer system causing Superfund Site sewage overflows. These need to systematically mapped and where possible diverted out of the combined sewers into tree irrigation systems and Street Creeks, NYC Dept of Transportation has established successful prototypes of porous streets at 5 Av & 5th Street, at the Washington Park Farmers Market



2019 / 04 / 14 - Child listening to the sounds of Vechte's Brook at 2nd Street and 5th Ave
Pic by Eymund Diegel

PROJECT 18 - Heat Island Zones & Traffic Dust Plumes Tree Canopy Restoration

Extensive Gowanus diesel truck and heating oil operations around the Canal are major air pollutant contributors that should be included in damages assessment.

The NRDA assessment should include **air pollution** PAH's and PM 2.5 contaminants (fine airborne dust) generated by ongoing high intensity traffic over the Gowanus Canal via its bridges. Though not always directly generated by Gowanus land uses, the plumes are connected to them, and these pollutants are the major variable in the areas elevated asthma rates.



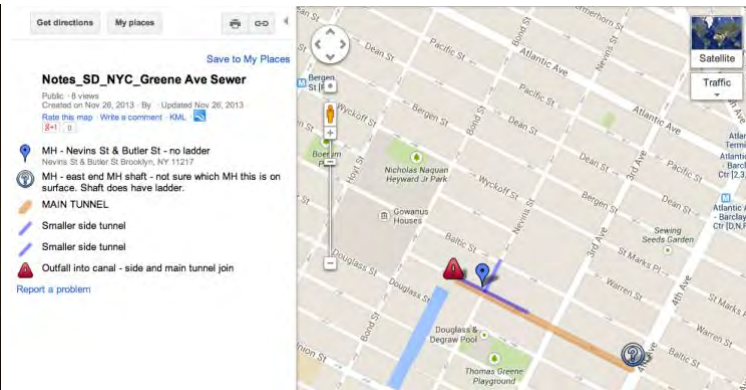
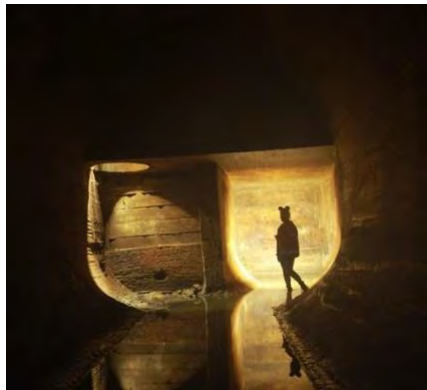
2009 [New York City Community Air Survey](#) PM 2.5 Traffic Flow **Gowanus Dust Bowl Map**
2011 / 03 31 - Gowanus 2nd Street Truck Yard with diesel particulate pollutant release patterns

Several acres of tree canopy acreage were destroyed by the Superfund Canal cleanup and related subsequent redevelopment

A 2013 Sandy Flood saline impacted tree survey by the NYC Parks Department shows a baseline of tree canopy prior to Superfund impacts (<https://redhookwaterstories.org/items/show/914>)

The NRDA team should study areas most likely to benefit from **green dust sponges**, and work with the City's Million Tree Program and the [New York Restoration Project](#) to prioritize the most affected areas for **heat sink mitigation** and shade replanting

PROJECT 19 --Restoration of the Butler Street Stormwater Tunnel



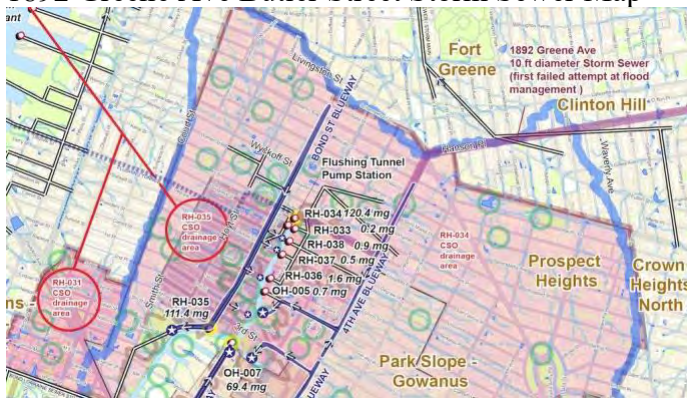
2013 / 09 / 13 - Gowanus Butler Street Sewer / Green Ave Storm Tunnel, pic by Steven Duncan

The Great Storm Sewer

The 1892 Green Avenue Storm Main was hailed by Scientific American as a marvel of civil engineering. This image shows the tunnel's 15 foot diameter at Fourth Avenue and Butler Street. It was the City's first attempt to deal with the pollution of the Gowanus Canal by trying to flush it out with the natural cleaning flows of rainwater.

The tunnel was originally designed to help reduce flooding problems in Fort Greene (the Atlantic Yards / Barclays Stadium area) and parts of Bedford Stuyvesant by improving runoff drainage. **The plan never worked, mainly because it was never completed.** The lateral connection, which were meant to redirect waters from flooding basements along it to the "Great Storm Sewer" **were never built.** The Greene Storm Sewer was eventually merged into the City's combined sewer system. Under the City's "Dilution is the Solution" Mechanized Flushing Tunnel Plan, the former storm sewer's **raw sewage overflows will now be increased by 5% at the Butler Street head of the Gowanus Canal.** Overall, sewer overflows will be reduced by a third in the rest of the Canal. The Flushing Tunnel, rebuilt in 2014, will now pump 252 million gallons of East River water into the Canal to improve water quality.

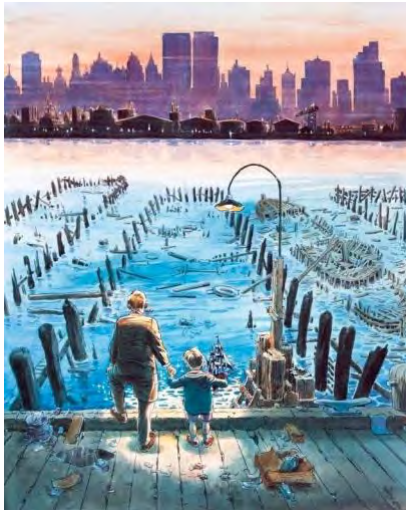
1892 Greene Ave Butler Street Storm Sewer Map



The NRDA Team should study the feasibility of **using the abandoned Butler Street tunnel** to complement the undersized NYCDEP Sewage Holding Tanks currently under construction.

NRDA MITIGATION FOR HUMAN SOCIAL IMPACTS OF POLLUTION & SUPERFUND RESTORATION IMPACTS TO COMMUNITY WELL BEING

PROJECT 20 - RESTORING BROOKLYN'S LARGEST HUMAN RECREATION WATERFRONT SPACE



Will Eisner – On the Waterfront

LOST HUMAN RESOURCES – EXAMPLES OF HUMAN SPECIES WATER HABITAT INTERACTIONS TO HELP GUIDE RESTORATION GOALS

4 YEARS OF LOST WATER RECREATION, EDUCATION & DIRECT CANAL ACCESS OPPORTUNITIES NEED TO BE COMPENSATED FOR

Community Recreation Events



2010/ 10 / 7 - Swimming Cities Art Fish Raft on Gowanus pic by Oceans of Blood Collective
2019 / 06_08 / Dredgers annual Gowanus Challenge canoe race at Second Street Canoe Dock and Club House. This core facility has been unusable since 2020. A backup dock on 19th Street was provided by Superfund Team, but with restricted amenities and no Canal access, and ecological habitat values reduced to ZERO within Canal limiting visitor attraction.

SCHOOL ENVIRONMENTAL EDUCATION OPPORTUNITIES - NOW LOST

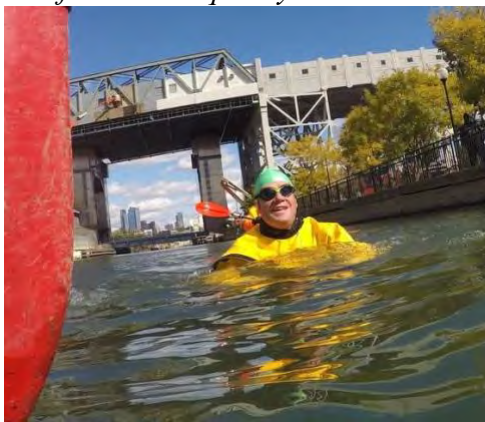
Sites of Interest now need to be reconstructed



2017 / 06 / 24_ *Gowanus Dredgers youth program canoers on Gowanus Canal*
2019 / 07 / 30_ *BioCitizen Gowanus Dredgers canoe outing to First Street Basin*
Water Quality swimming education events



2012 / 3 / 25 – *Gowanus Canal Water Quality Hackathon – installing citizen science CSO overflow water quality monitors*



2015 / 10 / 17- *Gowanus Swim Team – First Swim of the Century event - pics by Eymund*
2012 / 03 / 25 – *Citizen scientists with water sample at the Gowanus Canal 2nd St Dock*

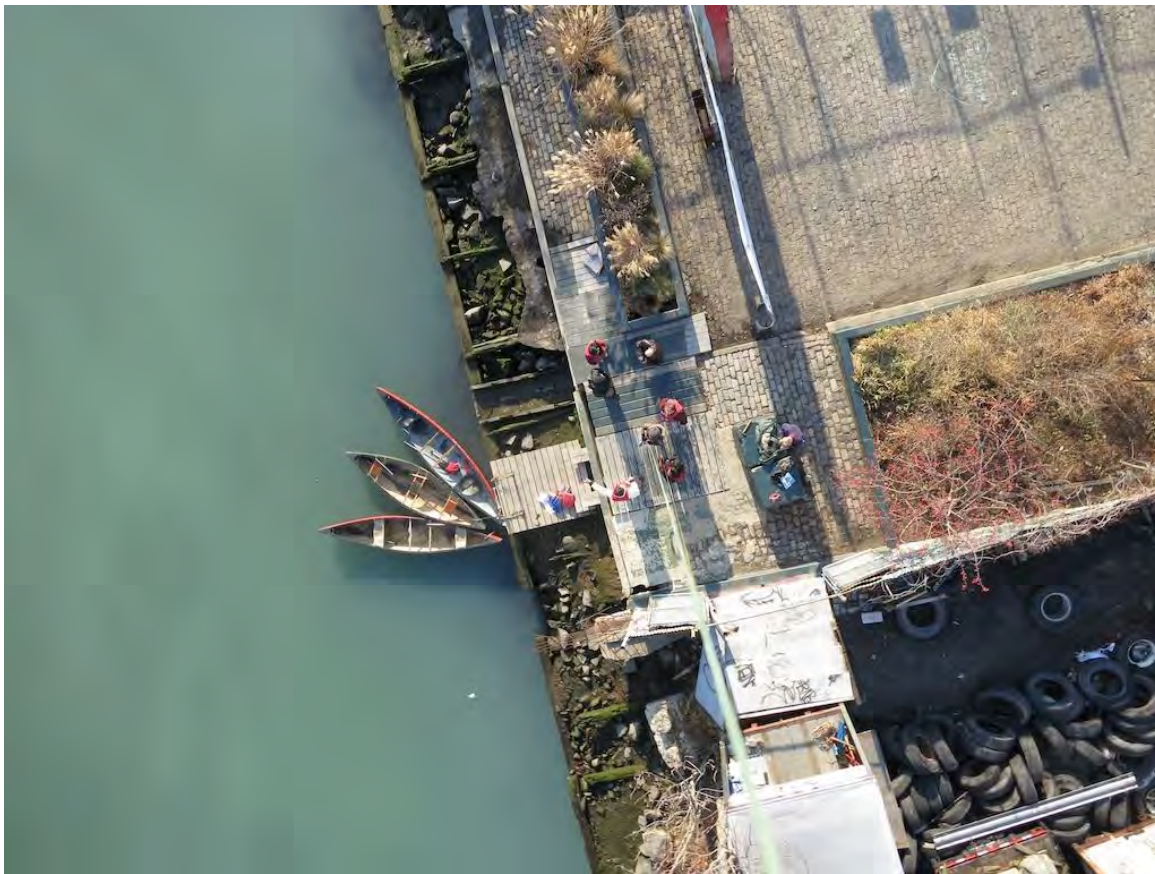
GOWANUS FISHING RECREATION OPPORTUNITIES – HEAVILY IMPACTED



*2010 / 07 / 08 - Children at Gowanus Canal Jellyfishing Expedition with captured Baby Jello
photo by Ava Chin for the New York Times*

*2009 / 03 / 17 Fishing for Atlantic silversides at Carroll Street Bridge
photo by Lisanne of Found in Brooklyn*

*2011- Smoking Gowanus Canal Fisherman with striped bass near Bond Street
photo courtesy of Christos Tsiamis, USEPA*



2012 / 12 / 15 – balloon photography of Gowanus Canal 2nd Street Gowanus Dredgers

Second End Street End Dock showing **HIGH HABITAT VALUE** soft shoreline and low tide line public water shoreline with **CONVENIENT ACCESS** that has since been lost as community assets post cleanup

COMMUNITY COMPENSATION REQUESTED:

A SWIMMABLE Gowanus with a HIGHER level of shoreline ecological visuals, fishing resources, easy water access and cultural amenities than available prior to Superfund remediation.

This includes a legal reclassification of waters of waters to **Class SC** so as to reflect actual and ongoing uses of the Gowanus Canal.

For Clean Water references:

- London - [Swimmable Waters](#)
- Paris - [Swimmable Waters](#) (for humor)
- New York - [Swim NYC](#)
- Gowanus - [Gowanus Canal Swim Team](#)

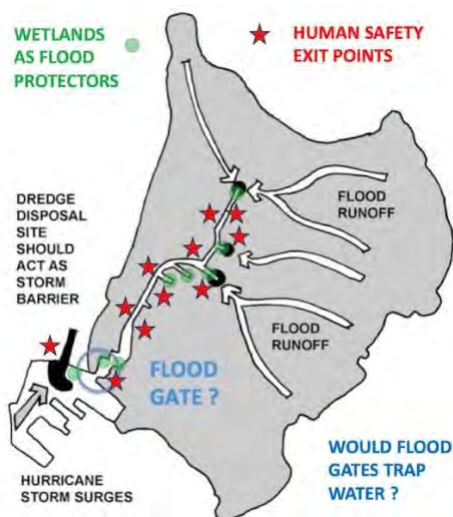
AN ACCESSIBLE WATERFRONT WHERE THE WATER CAN BE TOUCHED



2013 - Mummichog fishing – photo via Gowanus Canal Conservancy

A SAFE ACCESSIBLE WATERFRONT REFLECTING COHERENT FLOOD MANAGEMENT THINKING & SAFETY PLANNING FOR BOATERS

This sketch map explores some key sites for meeting human safety and flooding concerns



21 – WATERFRONT LEGAL REVIEW

A key barrier to habitat restoration in New York City is a **fee driven litigation system** and outdated building codes.

PLUMBING CODE REVISIONS

For example, in 2013, a warehouse building at Bond and 4th Street, directly next to the canal, added a floor to their existing structure. As a local property owner concerned about sewage overflows, they inquired with lawyers about the possibility of discharging clean rainwater from the roof directly into canal waters. Because of the blinkered New York City plumbing code and onerous State discharge permitting system they were told **it would cost them more to obtain clean water discharge permits than to connect to their existing sewer outflow.**

The owner ended up connecting the new roof drains **back into the combined sewer** and having to watch several thousand square feet of their building contribute to sewage overflows directly next to their building.

The NRDA trustees need to continue work with the [City Interagency Task Force](#) studying such non sensical legal barriers, with such **code revision funding being a valid mitigation measure.**

Here a **“Blue Zoning”** exemption would allow any waterfront property to discharge roof water directly to canal without further permitting requirements. For example, the Interagency Recommendation SW 4 - "Send Rainwater to Waterways" is an example of more rational thinking code revisions NRDA should support.

HABITAT RECONSTRUCTION PERMIT OBSTRUCTIONS

The New Jersey State Department of Environmental Protection has [blocked oyster rehabilitation projects](#) on the misguided grounds of public safety standards.

The NRDA should actively work against such **misguided regulatory thinking**, by sponsoring public interest suits and law revisions to permit filter feeder habitat reconstruction in the longer-term Clean Water Act public interest. This includes working collaboratively with the State to identify strategic compromises meet the competing needs arising from the restoration process.

ADVERSE POSSESION & EMINENT DOMAIN RESEARCH

Several of the project acreage areas need **clarification of public title.** This is an issue in particular with open water basins that were illegally filled by adjacent land owners, such as the First and 4th Street Basin. Working with the USEPA legal team, NRDA should conduct appropriate title searches on controversial properties, and where appropriate, **initiate eminent domain claims** as relevant to implementing a public interest remedy.

This is particularly relevant to the 4th Street Basin, with massive flooding now endangering commuter safety along the 4th Ave tunnel subway line. The City has set a precedent that eminent domain for sewer tanks is a reasonable mitigation measure for implementing Gowanus damage mitigation solutions. The same logic should be applied to the landfilled basins.

CONCLUSION

The Gowanus Canal is at a unique crossroads of having to meet the challenges of increased shoreline human habitation and densification, at a time of growing flooding and climate change stressors.

It is hoped that through the Damage Assessment Process we identify solutions that make our neighborhood stronger and more resilient in the face of those challenges.

The NRDA team is thanked for the tremendous effort of compiling all the public comments it received into objective strategies to help work towards that better future.

“If we surrendered to earth’s intelligence, we could rise up rooted, like trees.”

- Rainer Maria Rilke, *The Book of Hours*

TECHNICAL APPENDIX - NRDA PLAN SPECIFIC NOTES

COMMENT 1: - Pg. ES-1

“The Trustees will seek damages with the goal of restoring injured natural resources and resource services resulting from releases of oil or hazardous substances and compensating the public for interim losses (i.e., losses resulting from natural resource injuries from when the injury occurred until resources have returned to their baseline condition).”

*“This Gowanus Canal Natural Resource Damage Assessment Plan (Plan) describes the Trustees’ proposed approach to conducting the NRDA, summarizes existing data, and outlines potential analyses and studies that may be used to **evaluate contaminants and their effects on Gowanus Canal natural resources and resource services.**”*

*“To determine injury to natural resources, the Trustees will first document the pathway of contaminants from their release to natural resource exposure. The Trustees will review existing information on contaminant releases into Gowanus Canal, including **direct discharges, leaks and spills, operations from adjacent industrial facilities, and wastewater from combined sewer overflows.**”*

The NRDA Plan also needs to address **natural resources and ecological services destroyed through the Superfund remediation process** – this remediation damage is a direct extension of the original pollution damage. For example, the EPA is directly responsible for ecological damages incurred during the remediation process.



pic via Eymund Diegel / Gowanus Dredgers Canoe Club.

2023 / 07 / 15 - **Gowanus Canal Seventh St Basin Juvenile Bunker mass fish mortality event.** Thousands of these fish were killed on multiple separate occasions. These “injured natural resource” events were directly caused by the EPA Superfund team requiring the shutting off of the NYC Flushing Tunnel to reduce toxic sediment dispersal during dredging. This reasonable action however also reduced Gowanus Canal waters to a Zero ppm dissolved oxygen level when unregulated mass combined sewer overflows occurred – causing the mass fish mortality. 3 ppm of oxygen is the legally required fish survival standard, **a federal benchmark the EPA has violated** multiple times during the Superfund cleanup process.

Pg. ES-1

COMMENT 2: - Pg ES-2

*“The Trustees plan to identify **the area of habitat over which the injury has occurred in the past and is expected to occur in the future.** The damages required to compensate for ecological injuries may be determined using equivalency analyses to scale restoration projects such that **sufficient ecological benefit is provided to compensate for losses.**”*

Wastewater impact focus will require study and mitigation measures on a **watershed scale.**

COMMENT 3: - Pg ES-2

*Key that Trustees confirm these restoration projects be located **IN the Gowanus watershed, and not ecologically mitigated elsewhere in New York City.***

COMMENT 4: - Exhibit Map 1-1 “Map of the Gowanus Canal”

The map should include the landfilled First Street Basin and Fourth (also called Fifth) Street basins as these are still legally part of the Gowanus Canal and the EPA Superfund site.

It should also include the **Butler Street Storm Tunnel**, an early attempt at Gowanus stormwater management

COMMENT 5: Pg 5

“dredging approximately 300,000 cubic yards of contaminated sediment”

This dredging quantity should be discussed in the context that the Gowanus Canal is still geologically a tidal marsh in a large runoff bowl. It has a perpetual resedimentation cycle.

The Gowanus runoff tidal watershed basin will *always* resediment with similar quantities of sediment. A chronology of sediment accumulation cycles and periodic dredging table should be provided here, as it implies that whatever canal bottom habitat restoration the NRDA proposes, it will need to dredge (ie – destroyed) every 20 years or so. The NRDA needs to come up with **a clear strategy for dredge vs no dredge zones for habitat conservation.**



1953 - Gowanus Dredging via Brooklyn Chamber of Commerce Annual Report, June 1, 1952

PAGE 6 - Chronology of major Contamination / Ecosystem Alteration events

The following events should be considered for addition:

- 1636 - Jacob Van Corlaer makes first recorded purchase / expropriation of land from the Canarsie and Gowan Lenape

- 1700's onwards – 5000 year old + / 10 feet deep Lenape oyster middens / shell piles located at Carroll Street and Gowanus Creek and 37 Street and 3 Av are mined for construction materials, Systematic overfishing starts occurring.

- 1661 to 1709 – first tidal mills constructed along Gowanus Creek, with flooding of marshes

- 1661 to 1709 – Construction of hand dug Red Hook Canal from Gowanus Creek to Buttermilk channel and Gowanus Trail access canals begin altering wetlands tidal flushing patterns

- 1770 circa - Coles Mill marshes excavated for new mill pond, to be subsequently landfilled for Citizens gas works construction (Public Place

- 1775 - New York Supreme Court Rapelje vs Brower Lawsuit for the stripping off of 2 acres or a 1000 cartloads of Spartina cordgrass peat from Blauws Meadow wetland at what is now Carroll Street Bridge.

- 1847 to 1849 – First Plans for a canal submitted to Common Council. These plans called for a 5,400 feet long canal, 100 feet wide and 14 feet deep. Bulkheads were to be 4 feet above mean high water, with a regulated shore line height

- 1856 to 1865 – sewers and streets are laid out in the area around the canal. Additional wetlands are drained.

- 1858 – First sanitary sewers empty into the canal.

- 1865 circa – Carroll Gardens Citizens manufactured gas plant begins operation on the Coles Mill landfilled marsh site. The site is bonded by Smith Street, and Huntington Street.

- 1870 – Canal Commissioners disbanded. Canal operation and maintenance were turned over to the city.

- 1872 to 1874 – Canal is essentially complete, including five private basins under city jurisdiction and state permitting control.

- 1880 – Thirty one firms handling lumber, coal, firewood, hay, grain, oil, building materials, chemical fertilizers, dyes, and explosives are using the canal.

- 1891 to 1899 - Gowanus Canal - Butler Street Sewer and Green Ave Storm Tunnel Construction. It was hoped that this arrangement will provide sufficient fresh water to flush the canal
- 1902 - The Brooklyn Rapid Transit (BRT) Corporation opens a new power generating station along the canal. Coal delivered by water supplied 32 boilers, pulling water from the canal. The station had 2700 kw generators for both AC and DC power, with millions of gallons of [contaminated hot water](#) discharged to canal, at 90 degrees Fahrenheit in February.
- 1920 to 1930 – Between 23,000 to 25,000 vessels transit the canal each year
- 1922 – Bond Lorraine sewer line collapse at Citizens Gas Plant site, with pipe size repair downgrading increasing sewage effluent into Canal
- 1953 – Incremental filling of 1st Street Turning Basin, with demolition debris from the BRT building and e-waste from Brooklyn Navy Yard
- 1960 – The canal’s Flushing tunnel pumping system is shut down, leading to dramatic drop in dissolved oxygen levels for half a century.
- 1964 – The Gowanus Expressway is opened, with 30,000+ a day vehicles contributing to air pollution and airborne lead deposition in the canal surroundings
- 2020 - US EPA contamination control steel bulkheads installed, leading to increase of backed up groundwater basement sump pumping, increasing clean water load on the already overburdened combined sewage storm sewer overflow (CSO) system.

COMMENT 6 – pg 13

*“The geographic scope of the Assessment Area is defined as the area within which natural resources have been **directly or indirectly** affected by industrial and municipal-related oil and hazardous substances in Gowanus Canal.”*

The stated assessment area of 32 acres is not in fact valid, pursuant to (43 CFR – 11.14 c) but **357 acres as the affected natural resource wetland area.** (see acreage discussion on page 6)

A direct impact of the need for coal unloading docks for gas, oil & coal tar derivatives would mean that a minimum the geographic scope of NRDA area must at a minimum include the spatial extents of the original tidal wetlands landfilled to make the municipal related oil activities possible.

This means that at a minimum the wetlands damage compensation area is defined by Bond Street to west, 5 Ave to East, and Bergen Street to the north (see watershed map page 31 for impacted area extents)

COMMENT 7 – pg 14

Exhibit 2-1 Assessment Area

This map should be amended to include the original tidal marsh extents, available as overlay via link on page 13 of my damages assessment comments). The two Gowanus Bay landfilled basins on my Page 7 landfilling assessment (near today's Home Depot) should also be included for assessment review.

COMMENT 8 - Pg.15

*"The shoreline is composed entirely of bulkheads, riprap, and piers with **no remaining natural shoreline or wetlands**"*

Technically, The Gowanus Canal has two wetlands, a flourishing *Spartina patens* and *alterniflora* tidal wetland installed by Gowanus Canal Conservancy in 2012 at the 2nd Street Salt Lot, and a naturally occurring [Juncus gerardii](#) (Saltmarsh rush) wetland at the Carroll Street drawbridge area periodically eradicated by DOT [herbicide](#) application. *Nevertheless, she persisted.* Phragmites wetlands also naturally occur on the Citizens MGP site at Smith Street. These have all been eradicated by restoration activities. (see page 20 and 21 of my comments for other visual wetland species samples)

As a general rule, all that is required for natural Gowanus wetlands to emerge is for a certain soil grade to be reached and that the flooded sites be left undisturbed for more than 6 months.



2011 / 9 / 08 - Wetlands emerging on Public Place Site at Smith & Huntington Streets

COMMENT 9 - Pg 17

Muskrat swimming in Gowanus Canal should be credited to Adam Katzman, not NOAA

COMMENT 10 - Pg 20

3.1 Hazardous Substances

*"This Assessment will focus on injuries resulting from exposure to hazardous substances released from **past and current industrial activities**, as well as discharges from CSOs."*

The NRDA assessment should include **air pollution** PAH's and PM 2.5 contaminants (fine airborne dust) generated by ongoing high intensity traffic over the Gowanus Canal via its bridges. Though not directly generated by Gowanus land uses, ongoing industrial activities are ultimately what allow those pollutants to be generated by the human consumer cycle and traffic.

Additionally, extensive Gowanus diesel truck and heating oil operations around the Canal are major air pollutant contributors that should be included in damages assessment.

COMMENT 12 – Exhibit 3-1: Conceptual Site Model Showing Major Pathways

Model should include **airborne pollutant paths** ways both from through traffic and onsite idling. A survey of local schoolchildren asthma rates with playgrounds adjacent to the air pollution sources is a relevant data source.

COMMENT 13 - Exhibit 3-2 Former MGP Sites and CSOs at Gowanus Canal

Map should include diesel truck maintenance yards and CSOs should have estimated proportional CSO figures as shown in my comment map “1892 Greene Ave Butler Street Storm sewer” on page 52. Proportionately allocating CSO discharges to outflows prioritizes impact reduction study areas (eg RH 34 Park Slope & Butler Street Sewer Capacity, RH 35 Bond Street Bottleneck sites)

COMMENT 14 – Exhibit 3-3, pg 25: Concentration of PAHs and Other Contaminants in Gowanus Canal Surface Sediment

Nitrates, Phosphates, and emulsifiers from CSOs should be included in this chart, or a separate table, as these are the **primary variables of water oxygen levels determining fish life health** – not heavy metals



*2015 / 3 / 1 - Gowanus Milkshake foam pollution at Gowanus Canal and Sackett Street
2017 / 7 / 11 - Gowanus Milkshake Study Date - Public Lab White Water Rafting
photos by Eymund Diegel*

COMMENT 15 – Page 33 4.4 - Temporal Scope

*“If a resource is not expected to fully recover, the associated injuries will be considered **permanent**. ”*

The term “permanent damages” should not be allowed as a **legal cop out** for the State, City or Potentially Responsible Parties (PRP) to use legal loopholes to undermine LTCP and Clean Water Act restoration mandates.

LTCP = Sewer Discharge Long Term Control Plan water pollution reduction goals.

[Use Attainability Analysis](#) has been misused in the past by City lawyers attempting to block and undermine Clean Water Act and LTCP mandates. Such legal attempts should be vigorously opposed.

There is no “permanent” state in a natural ecosystem – only an objective assessment of its successional ecology restoration pathways over time, and how they can be encouraged.

The “[World Without Us](#)” by Alan Weisman is a good discussion of this non permanence of damages.

“[Huck on the Gowanus](#)” by Christina Kelly is a nice summary animation of the Gowanus Canal’s ever-changing state.



My Huynh

From: Gary Francis [REDACTED]
Sent: Friday, June 14, 2024 11:47 PM
To: dec.sm.nrd
Subject: Gowanus Canal NRD draft comments

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ATTENTION: This email came from an external source. Do not open attachments or click on links from unknown senders or unexpected emails.

Good evening,

My name is Gary Francis, I have lived in Gowanus for 14yrs & am the current Captain of the Gowanus Dredgers Canoe Club.

I've paddled the canal extensively, year round, in all weathers. It is one of the safest waterways in New York Harbor & should be a model for vibrant biodiversity as well as community engagement. Much as it was before being polluted.

The scope needs to include intertidal habitat & Ribbed Mussels. Over 350,000 have been surveyed within the Superfund area. All wild set. They can filter ten times finer than oysters, even down to enterococcus bacteria.

We desperately need to change how we live with our urban waterways, in order to change our climate future. Our community needs to understand how water level rise will affect their lives. Only by engaging them in it, will they learn how to advocate & create that change to safeguard our collective future.

Thank you, for your noble work.

Gary Francis

Sent from Gmail Mobile

My Huynh

From: jean halloran [REDACTED]
Sent: Friday, June 14, 2024 2:08 PM
To: dec.sm.nrd
Cc: [REDACTED]
Subject: Comment on Gowanus Canal Natural Resource Damage Assessment Plan 6-14-24

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Experience of Author with Gowanus Canal

My name is Jean Halloran and I have lived approximately two blocks from the Gowanus Canal, on Carroll Street between Smith and Hoyt, for twenty years, and have lived in the neighborhood since 1981. I retired several years ago from the job of Director of Food Safety Initiatives at Consumer Reports. For many of the years I have been a neighborhood resident the Canal was relatively inaccessible, although I walked over the Union Street, Carroll Street and Third and Ninth Street Bridges many times, and observed the Canal below. More recently, the opening of a pedestrian walkway between Second Street and President, as well as around Whole Foods, has allowed much more access and I have used them frequently. I have also recently joined the Gowanus Dredgers and have canoed in the Canal. I have enjoyed music made near the Canal and also from boats in the Canal over the years.

Chapter 2: Natural Resources and Resource Services

Natural Resources

The discussion of Birds in this chapter is extremely limited and inadequate. I have personally observed many species not noted in the Plan including migrating bufflehead ducks, loons, kingfishers, geese (many), mallard ducks, and on the day of the extreme air quality alert due to Canadian wildfires, a snowy egret.

In my experience, the prevalence of birds has varied with time and conditions in the Canal. For many years birds were limited (although it was hard to see them when we only could observe from bridges and the end of Bond Street). However the opening of the flushing tunnel, in my view, made a dramatic difference in the wildlife. This was when we began to see many of the birds like herons and kingfishers that feed on fish. I also saw crabs. At that time there were ample perches on debris for the birds to fish from.

The horrific fish kill, in August, 2023, which I personally observed, seemed to mark a major change, for the worse, in bird life and the fish they feed on in the Canal. Prior to the fish kill, the flushing tunnel had been shut down to allow for remediation work. A major storm led to a Combined Sewer Overflow into the Canal, and coupled with some very hot weather, dissolved oxygen disappeared. The result was a thick carpet of silvery dead fish in the Canal. It was shocking, partly because some of us did not even know that so many fish had started making the Canal their home.

Since then, as the flushing tunnel stayed closed, as barges doing remediation work have filled the Canal and steel bulkheads have gone up on the sides, both fish and birds have declined drastically. The Canal, north of Ninth Street, is currently fairly ecologically barren.

Resource Services

The contamination of the Canal clearly limited recreational use in the past since humans justifiably avoided contact with the water. They also often avoided the terrible smells coming from the water. Nevertheless canoeing was possible from the Second Street dock.

The remediation work required closing the Second Street dock for canoeing. A location was made available on 19th Street, but it is much harder to get to and canoes cannot be stored there, so this recreational use had been impaired.

Uses like boating, kayaking and fishing, walking by the water, sitting by the water, birdwatching, picnicking, wading, and perhaps may be even some day swimming, would be wonderful things that improved water quality might make possible. However locations for these activities would have to be planned for and set aside. With the present high steel bulkheads up and down the sides of the Canal, none of this recreational use will ever be possible. The bulkheads also pose a safety hazard to anyone who might fall into the Canal since they could not get out.

Chapter 3: Injury Determination Approach

The focus on PAH's is completely reasonable based on the high levels measured and the toxicity of those levels.

I would urge giving more attention to Lead however, which was also measured at very high levels in some samples (4220 ppm) and where the average level (533 ppm) is twice the SVG Class C level (220 ppm).

As a resident of the area, I had lead levels tested in my backyard before planting a vegetable garden and found that the levels were extremely high, high enough to require removal in a superfund site, and existed beyond a depth of six inches. I therefore planted all my vegetables in pots with purchased soil. My backyard is some distance from the Canal but is indicative of the widespread contamination of soil by lead in the neighborhood. This is likely to continue to wash into the Canal from sewers as long as the CSO situation exists.

To have any ecological diversity in and around the Canal it will be necessary to have some edges that are intertidal and that are not cordoned off by steel bulkheads. However lead hazards may exist if recreational or wildlife use is anticipated. Exposure could happen when children are playing for example. Remedial or mitigating measures such as removing especially contaminated dirt, adding uncontaminated fill, or insuring grass cover should be considered, to protect both humans and wildlife.

There should also be a plan for measuring actual lead levels in birds and fish in the Canal to see if they are suffering from lead poisoning.

Chapter 4: Damages Determination Approach

Ecological Services

The goal of this Superfund effort should be restoration of an ecologically diverse habitat in the Canal, to the extent possible similar to the habitat that existed over 100 years ago, but at least as diverse as existed before the Superfund project began.

The project appears to be focussed on cleaning up the bottom of the Canal, and installing high steel bulkheads throughout its length, in order to insure good water quality. This effort will indeed improve water quality. However it will create something very sterile, resembling an aquarium that is healthy for fish but for little else, and that all people can do is look at it from afar. Without any intertidal areas, and without perches extending into the water, there will be no places for crabs or aquatic birds, much less nesting birds. There will be no ecological diversity. The Plan should insure that there are intertidal areas, nesting spots for aquatic birds, and perching spots for birds like herons.

Diverse appropriate plants should have land to grow on. They can provide homes for insects and invertebrates.

The rapid way that fish and wildlife came back to the Canal when the flushing tunnel was opened was amazing, and a testament to the power of nature to restore itself given even the most modest opportunity.

This superfund cleanup should not become a mechanism by which the environment is sterilized and nature is driven out. The most serious problem is the high steel bulkheads. There are alternatives, and the project can create more nature-friendly barriers and still protect water quality. The cleanup should not just be for the fish. The goal should be a diverse ecology.

Human Services

With wall to wall steel bulkheads, there will also be little opportunity for human recreation, other than walking around it. It will be clean water to look at, but you can't touch. Actually, even walking around is not assured, since it is not clear if walking paths are required. They should be, and included in the Plan.

There must be opportunities for human direct engagement with the canal, through boating and park like settings, that actually lead to the water's edge. Boat launches should be created.

The efforts of Gowanus Dredgers to create recreational opportunities in the Canal prior to the cleanup should not be made impossible for the future. Canoeing can thrive and continue. However the Dredgers should have their original launch location at 2nd Street returned to use. Given the popularity of their efforts, two or three additional locations should be made available for canoe and other boat launches.

The cleanup, especially after the CSO problem is addressed, should create a waterway that can be experienced, and become a place to learn about nature and enjoy the outdoors.

Otherwise what is the point? It should not just be a big clean fish tank. We should be creating a genuinely restored environment that we can all experience.

My Huynh

From: Nicole Vergalla [REDACTED]
Sent: Friday, June 14, 2024 12:23 PM
To: dec.sm.nrd
Subject: Gowanus Canal Natural Resource Damages Assessment Comments
Attachments: GreenHeron_GowanusCanal_2024.jpg; NightHeron_GowanusCanal_2021.jpg; Egret_GowanusCanal_2023.jpg

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Dear Gowanus Canal Natural Resource Damages Assessment Trustees Council,

Thank you for the opportunity to provide comments on the The Gowanus Canal Draft Assessment Plan released on March 1, 2024.

I am a resident of Gowanus and an active board member of the Gowanus Dredgers Canoe Club. Through my years of involvement with the organization I have seen how bringing the community out onto the water can change perspectives. Our canoeing activities help create environmental stewards, community activists and concerned citizens. Our visitors often return from a journey with a new-found sense of awe about the nature that exists right outside their doorways. They tell us of fish seen jumping, egrets and cormorants fishing, peregrine falcons circling.

I am concerned that the proposed NRDA plan will not fully capture the abundance of wildlife using the canal. The remediation work has caused a significant loss of habitat in the canal, and the proposed NRDA plan does not fully address this loss. The current plan is limited to assessments in the aquatic habitat, rather than recognizing the Canal's past (and potential future) as an intertidal habitat.

I urge the Trustees to expand the scope of the assessment to include the full biodiversity of the Canal and its surrounding areas. In addition, I strongly urge that the Trustees Restoration Plan creates a remedy that takes place within the impacted area - restoring the Gowanus Canal and its wetlands area.

Thank you for your time.

*Nicole Vergalla

--

Nicole Vergalla
<http://nvergalla.com/>







My Huynh

From: Peter Reich [REDACTED]
Sent: Sunday, June 2, 2024 3:23 PM
To: dec.sm.nrd
Subject: Comments on the Gowanus Canal NRDA plan, c/o Alicia Pasos

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Hello Gowanus NRDA Trustee Council,
My name is Peter Reich. I have lived on in an old industrial artist's loft building on the left bank of the Gowanus Canal with my wife Karen since 1983. We've raised 3 children here, and we all have loved the open sky and creative possibilities that our neighborhood has offered us.
Of course we've advocated for cleaning up the canal itself, but I continue to marvel at how Nature has found a way to flourish (at least temporarily, in small pockets), even in these highly polluted waters.
The photo below was taken in the Sixth Street Turning Basin a few years ago:



It gives me hope.

I've been going to monthly Community Advisory Group meetings with the EPA for years, and I know that steel bulkheads are mandatory along the main canal's edges, but it would be wonderful if the side turning basins could be restored to a natural sloped shoreline, giving Nature a better chance to refurbish what careless industrial progress has all but erased- I hope you can help make this happen.

Thanks you very much for your consideration.

Sincerely,
Peter Reich
[REDACTED]



My Huynh

From: Rita Ormsby [REDACTED]
Sent: Friday, June 14, 2024 4:49 PM
To: dec.sm.nrd
Subject: Comments on Gowanus Canal National Resource Damages Assessment Draft Plan

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Dear Trustees,

I am writing as a 32-year-resident of Park Slope and as a member for more than 10 years of the Gowanus Canal Canoe Club and in recent years a member of the Gowanus Canal Conservancy. For several years I led tours of the Gowanus Canal area for the annual Jane's Walks, sponsored by the Municipal Arts Society. I have read a lot about the history of the canal, its busy years of shipping, its decline and its pollution. Like many area residents, I am very pleased that it is being dredged through the SuperFund program.

Along with regularly canoeing the canal, in recent years I have volunteered to help with some of the club's programs to help educate children and others about the fish, birds and other animals that can be seen in and on the canal. Prior to the beginning of the dredging, one memorable moment was when young girls, residents of the nearby Gowanus Houses, were excited to see tadpoles in the water in the area where the club launches its canoes (when able to launch from 2nd St. and Bond St.) They had earlier been canoeing and had also participated in a science event organized by Gowanus Dredgers volunteers. Like those young girls, the canal is the closest body of water for me to canoe and to enjoy the excitement of regularly seeing Great Blue Herons and egrets along the shore when in a canoe. I have also seen raccoons and air bubbles of fish that I don't know the identity of. (I still have a lot to learn.)

Having reviewed the draft damages assessment plan, I believe it doesn't fully capture the great variety of wildlife using the canal. I hope more details are added to the plan. Perhaps the many community groups concerned with the conditions of the canal can be asked to share their data. I know that the Gowanus Dredgers has data, especially on mussels. Another concern of mine is the plan needs to better address the loss of habitat in the canal. Currently, it addresses only aquatic habitat. It does not consider the canal's past and future potential as an intertidal habitat. This should receive more attention in the revised report.

Thank you for the opportunity to comment on the draft plan. I realize that decisions made today will impact the canal's future use for many years. I hope the final plan will enable the canal to truly be a center for nature in Brooklyn, inhabited by a great variety of aquatic and land creatures that can be viewed by many and build a greater appreciation for the canal's diversity and greatly improved water quality.

Best,

Rita Ormsby
[REDACTED]

My Huynh

From: sandye renz [REDACTED]
Sent: Thursday, June 13, 2024 1:26 PM
To: dec.sm.nrd
Subject: Gowanus Canal Restoration Comments

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Dear Trustees,

I have lived in Gowanus, Brooklyn for almost 40 years. I am an involved community member and I raised my daughter here. My relationship to the Gowanus Canal is extensive, from being disgusted by the smell and filth, to enjoying moonrise canoeing. I have worked at the Big Reuse composting site, as well as the Gowanus Conservancy Gardens, at the Salt Lot and can not express the exemplary efforts these groups made on the shores of the canal. The extensive gardens going right to the water's edge belied the fact that these are the shores of a superfund site. It was pleasant and beautiful to see the plants flourish, as well as the extensive wildlife attracted by this surprising burst of nature.

I am happy that there is ongoing work being done to remediate the toxicity of the canal. I do not think that the scope of your assessment is broad enough. The shoreline and the air and the intertidal waterway, and whatever else is pertinent, are all to be considered and assessed as all of these areas have been affected by the years of toxic damage to the entire ecosystem and are interconnected.

One prominent example of something that needs more evaluation is the use of the domineering bulkheads. These inhibit flora and fauna as well as human access to the canal and shores. Access is an essential part of life near a waterway for all kinds of life and activities. I want all of this life and activity to thrive, whether it's a natural or planted garden, a heron standing on a rock, or a canoe launch.

The local community is quite knowledgeable about how the canal can prosper and be enjoyed. Please listen to us when you are making decisions that affect our everyday living in this neighborhood. We need some respite from the loss of air, sun, and sky we are having due to the insane endless development of our once neglected and ignored home.

Sincerely,
Sandy Renz

[REDACTED]
June 13, 2024



ArentFox Schiff LLP

233 South Wacker Drive
Suite 7100
Chicago, IL 60606



afslaw.com

Bradley S. Rochlen

Partner



June 14, 2024

VIA E-MAIL

Alicia Pasos
New York State Department of Environmental
Conservation, Natural Resource Damages Section
625 Broadway, 14th Floor
Albany, NY 12233

Re: Comments on the Draft Gowanus Canal Natural Resource Damage Assessment Plan
from National Grid

Dear Ms. Pasos:

I write to provide the attached comments on the Draft Gowanus Canal Natural Resource Damage Assessment Plan. These comments were prepared by GEI Consultants, Inc., on behalf of The Brooklyn Union Gas Company d/b/a National Grid NY ("National Grid"). If the Trustees have any questions or would like to discuss our comments, National Grid welcomes the opportunity to speak further on the Draft Assessment Plan.

National Grid appreciates your consideration of these comments.

Sincerely,

/s/ Bradley S. Rochlen

Bradley S. Rochlen

Attachment



Response to the Gowanus Canal Natural Resource Damage Assessment Plan

Gowanus Canal Superfund Site, New York, New York

Submitted to:

National Grid
175 E. Old County Road
Hicksville, NY 11801

Submitted by:

GEI Consultants, Inc. DBA GEI Consultants Engineering,
Geology, Architecture & Landscape Architecture
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June 13, 2024
Project No. 2404762



Steve E. Michalanko
Senior Ecologist

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Table of Contents

1.	Introduction	1
2.	Key Issue 1: Lack of Sufficient Detail	2
3.	Key Issue 2: Establishing Baseline	4
4.	Key Issue 3: Hazardous Substances	6
5.	Key Issue 4: Selection of Reference Areas	8
6.	Key Issue 5: Methods for Evaluating Injury and Service Loss	9
7.	Additional Specific Comments	11
7.1.	Purpose and Overview of the Assessment Plan (Section 1.1)	11
7.2.	Injury Caused by Remedial Actions (Section 3.5)	11
7.3.	Human Use Services and Human Use Quantification and Damage Determination Approach (Section 2.4.2 & Section 4.3)	11
7.4.	Ecological Injury Quantification and Damage Determination Approach (Section 4.2)	12
7.5.	Temporal Scope (Section 4.4)	12
7.6.	Quality Assurance (Appendix A)	13

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1. Introduction

GEI Consultants, Inc. d/b/a GEI Consultants Engineering, Geology, Architecture & Landscape Architecture (GEI), on behalf of The Brooklyn Union Gas Company d/b/a National Grid NY (National Grid), is pleased to provide comments on the Draft Gowanus Canal Natural Resource Damage Assessment (NRDA) Plan (the Plan) prepared by the Gowanus Canal Natural Resource Damage Assessment Trustee Council (the Trustees) dated March 1, 2024. National Grid presents the following general comments on the Plan. Specific comments on procedures, metrics, and data needs cannot be provided at this time because the Plan lacks the necessary specifics. We look forward to providing future additional comments once adequate details of the Plan have been developed and provided for public comment.

We appreciate the Trustees' adherence to the accepted NRDA process in the Plan. There are, however, concerns about the omission or inadequate presentation of several key factors which could have a significant effect on the quantification of damages to natural resources in Gowanus Canal. While it may not be uncommon for NRDA assessment plans to be kept at a high level with decision points and procedures that are open-ended and subject to modification, some key issues for properly scoping the assessment need to be fully defined prior to finalization of the Plan and further development of the NRDA process.

Establishing consistent definitions and scope early in the NRDA process is critical to 1) the assessment process; 2) the proper quantification of injuries; 3) the conversion of injuries to compensable damages; and 4) address resource losses via resource restoration and compensation. Based on our review of the Plan and its current deficiencies, we recommend the Plan be revised to include more detail on the items prescribed for the assessment plan by 43 C.F.R. Part 11. The following sections pertain to these key issues:

- Determination of baseline.
- Hazardous substances to address.
- Selection and use of reference areas in injury quantification.
- Approaches to injury quantification and conversion to natural resource service loss.

In addition to our broad comments, Section 7 of this document presents additional specific concerns that should be addressed in the updated Assessment Plan.

2. Key Issue 1: Lack of Sufficient Detail

Per 43 C.F. R § 11.31(a)(2), “(t)he Assessment Plan shall be of sufficient detail to serve as a means of evaluating whether the approach used for assessing the damage is likely to be cost-effective and meets the definition of reasonable cost, as those terms are used in this part,” and “the Assessment Plan shall include the sampling locations within those geographical areas, sample and survey design, numbers and types of samples to be collected, analyses to be performed, preliminary determination of the recovery period, and other such information required to perform the selected methodologies.” The Plan as presented does not provide sufficient detail to meet this standard.

The Plan has two overarching deficiencies in its current form:

- The lack of sufficient detailed information on injury quantification and damage determination provided by the Plan.
- The lack of detail about additional studies necessary to complement existing information derived from the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Gowanus Canal Remedial Investigation and Feasibility Study investigations and reports (RI/FS) or other sources to fully identify the causes of injury and loss of service beyond the CERCLA impacts identified in the RI/FS.

The data sets collected for the RI/FS and pre-design investigation (PDI) sampling, while adequate to quantify ecological and human health risk for purposes of the RI/FS and to design and implement selected remedies, are not adequate to quantify the metrics needed to assess and appraise natural resource injury and damage. The existing data do not fully account for the origin of Gowanus Canal as an artificial water body with extensive anthropogenic alterations to Gowanus Canal and the surrounding area that need to be considered when quantifying natural resource damages.

To properly account and quantify injuries at the Canal, the following factors must be included in the analysis:

- Urban development.
- Shoreline modifications.
- Channelization.
- Long term use of the Canal as a conveyance for historic and on-going discharges via combined sewer overflows and surface runoff.

We further note that damages to natural resources must be distinguished from unacceptable risk to human health and the environment. Natural resource damage and risk are not necessarily comparable, and risk is not easily convertible to a quantifiable service loss to a natural resource. While these data are, as noted in the Plan, good indicators for potential injury to natural resources, quantifying actual injury and converting to service losses will require collection of additional data beyond what is available in the existing RI/FS and PDI data sets.

The Plan as written provides insufficient insight into the decision process that will be followed beyond generalities, especially when it comes to metrics for damage and loss assessment. National Grid fully expects to have the opportunity to provide additional detailed comments, suggestions, and concerns at each subsequent stage of the NRDA process.

3. Key Issue 2: Establishing Baseline

Baseline is defined by 43 C.F.R §11.14(e) and “means the condition or conditions that would have existed at the assessment area had the discharge of oil or release of the hazardous substance under investigation not occurred.” The NRDA process utilizes this “but for” rule to define baseline conditions to quantify injuries to natural resources and establish the scope of a compensable natural services loss. The “but for” rule is correctly stated in Section 1.3 of the Plan. The Plan goes on to further elaborate on baseline in Section 4.1:

“[B]aseline should reflect expected conditions in the Assessment Area had the release of the contaminants not occurred,”

and

“the baseline condition of natural resources reflects natural processes and changes that result from human activities that are not contaminant-related (e.g., structural alterations to Gowanus Canal).”

We agree with this interpretation; however, the Plan presents no further discussion of the nature of the baseline condition and is silent on the long- term degradation or absence of natural resources in Gowanus Canal that would exist in the absence of CERCLA hazardous substance releases. The vagueness of the Plan creates significant uncertainty regarding the establishment of appropriate baseline conditions. It is critical to the NRDA to quantify a baseline condition that considers the extensive impact to natural resource services in Gowanus Canal from discharges from the surrounding urban environment such as combined sewer overflows (CSOs) and stormwater discharges, and from discharges and releases of non-CERCLA hazardous substances. Gowanus Canal was created as a waterway in the 19th Century to support industrial use (coal yards, cement manufacturers, tanneries, paint and ink factories, machine shops, chemical plants, oil refineries, and other commercial enterprises). Its status as an entirely built environment, with no history of naturally-occurring environments since the Canal’s construction in the mid-1800s.

The use of Gowanus Creek as a receptor for discharges led to building the Flushing Tunnel to avoid intolerable conditions. The Flushing Tunnel was not maintained from the 1970s until recently, and the absence of ongoing flushing with water from Buttermilk Channel further reduced the quality of the Canal as CSO discharges and urban runoff discharges continued unabated. Not properly accounting for these influences on the baseline for Gowanus Canal would distort damage estimates and allocations associated assigned only to named CERCLA hazardous substances.

The draft NRDA further states that:

Because site-specific historical data applicable to establishing baseline have not been located for Gowanus Canal, the Trustees plan to use, in order of priority, data from reference areas/control groups (43 C.F.R § 11.72(d)) and/or relevant literature (43 C.F.R § 11.72(c)(2)).

National Grid questions whether in fact applicable data establishing pre-CERCLA conditions are truly unavailable. Studies predating 1980 relating to conditions in Gowanus Canal and surrounding areas are known to exist and need to be assessed to determine if they have the potential to demonstrate injuries to natural resources.

In fact, the Gowanus Flushing Tunnel was conceived over a century ago to help address manifest pollution problems from releases and discharges (e.g., studies associated with construction and management of the Gowanus Flushing Tunnel that focus on eutrophication and oxygen depletion). Such documentation would be useful in determining appropriate baseline conditions. An example such report is the 1911 Engineering Record (Vol. 64, No. 8) report titled *The Flushing System for the Gowanus Canal, Brooklyn*, which noted that: “...the waterway became a convenient dumping ground for large quantities of sewage, storm water and trade wastes,” and “[a]s early as 1880 plans were formulated for improving the unsanitary condition of the Gowanus Canal,” which ultimately led to the construction of the Flushing Tunnel to improve circulation and dilution of such contamination within the Canal.

Use of reference areas/control groups and “*relevant literature*” (which Trustees acknowledge “*have not been located*”) would not fully capture these other non-CERCLA related factors. Trustees must expand on how a quantifiable baseline that captures conditions in Gowanus Canal “*but for*” the release of CERCLA hazardous substances is calculated and how those damages will be accounted for in establishing the baseline.

Non-CERCLA factors include but are not limited to historic urban and industrial use, absence of fringing wetland or riparian buffers, and inflow from CSOs and other discharges. As a recipient of untreated or partially treated sewage Gowanus Canal has been subject to severe impacts due to eutrophication, oxygen depletion, and pathogens. The Long-Term Control Plan (LTCP)¹ for the CSO discharges and USEPA consent orders directing the City to install sewage retention tanks at the two largest CSO outfalls will reduce but not eliminate on-going discharges of high nutrient and oxygen demand discharges. These historic, current, and future discharges must be included in any formula for the establishment of baseline conditions.

To correctly establish baseline for the Gowanus Canal, Trustees must consider that the Canal has never properly functioned as a sustainable aquatic habitat. Gowanus Canal, as originally constructed, was incapable of maintaining a diverse aquatic habitat even in the absence of discharges due to insufficient natural water turnover without the use of the Flushing Tunnel. This is acknowledged in Section 1.2 and Exhibit 1-3 of the Plan but the implications for the “*but for*” baseline are not discussed.

Section 3 (Injury Determination Approach), and in particular Section 3.4 (Injury to Natural Resources) need to discuss how the Trustees intend to consider conditions in Gowanus Canal not associated with CERCLA hazardous substance releases. Options should also be explored on how to quantify baseline in the assessment stage or alternatively how to account for baseline effects on natural resources when calculating compensable service losses.

¹ NYCDEP. 2015. Combined Sewer Overflow Long Term Control Plan for Gowanus Canal.

4. Key Issue 3: Hazardous Substances

The Plan provides the definition for hazardous substance per 43 C.F.R. § 11.14(u) as “a hazardous substance as defined in section 101(14) of CERCLA” that can be used to determine compensable damages. This definition does not aid in establishing a comprehensive list of chemical constituents and other stressors which have significant negative impacts to Gowanus Canal. The Plan goes on to state in Section 3.1:

This assessment will focus on injuries resulting from exposure to hazardous substances released from past and current industrial activities, as well as discharges from CSOs. There are multiple hazardous substances to which natural resources have been exposed as a result of discharges or releases into Gowanus Canal. These contaminants include, but are not limited to, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), hazardous pesticides, and metals such as lead, mercury, and copper (EPA 2013). Currently, the Trustees plan to focus on total PAHs as the primary contaminant of concern (COC) for assessing ecological injury to natural resources in Gowanus Canal (as an individual contaminant and as part of the contaminant mixture found in Gowanus Canal).

A primary focus on total PAHs unacceptably restricts the scope of hazardous substances released that have the potential to result in injury to natural resources and will lead to misallocation of damages if other sources of CERCLA and non-CERCLA hazardous substances are ignored. Incorporation of other COCs is left as an option in the draft Plan and it is expected that this limitation will be revisited.

Of particular concern are the well-known effects of hydrocarbons associated with petroleum products. As has been established at the nearby Newtown Creek CERCLA site, hydrocarbons, measured as C19-C36 aliphatics, have been shown to be an important contributor to injuries to benthic biota and fish. Similar hydrocarbon mixtures are present and contribute to the common measures of injury at Gowanus Canal. The Plan mentions the possibility of considering aspects of the Oil Pollution Act (OPA) NRDA process, which specifically addresses petroleum and its byproducts. We encourage exploring this avenue to properly identify injury and allocated damages to sources. Section 3.3.1 discusses the record of historical direct oil spill discharges. We agree that it is essential to account for the residual effects from such historical discharges.

The Plan in Section 3.1 notes that “not all sewage discharges from CSOs are considered CERCLA hazardous substances.” Considering this, the Trustees must establish a baseline condition for Gowanus Canal that takes into account direct impacts from CERCLA hazardous substances in CSO discharges, as well as non-CERCLA hazardous substances. For example, ammonia and sulfides are highly toxic to aquatic biota and are an indirect effect of oxygen depletion and organic carbon accumulation due to high biochemical oxygen demand in discharges. Consideration of such non-CERCLA hazardous substances on natural resources needs to be considered when quantifying injury.

The Plan therefore should incorporate approaches to other hazardous substances to properly account for the following conditions:

- The contribution from other CERCLA hazardous substances (beyond PAHs) to contribute to natural resource injuries and services.
- The contribution from non-CERCLA hazardous substances directly resulting from discharges from CSOs to injuries and natural resource services.
- The contribution from non-CERCLA hazardous substances resulting indirectly from the biological oxygen demand generated by discharges (e.g., ammonia and sulfides). The CERCLA remedy for the Canal requires installation of CSO retention tanks to reduce but not eliminate such discharges, meaning that these non-CERCLA CSO-related releases may continue to cause injury in the future.
- The contribution from petroleum hydrocarbons to injuries and natural resource services.

It is imperative that the service loss from surrounding urban discharge contributions is fully accounted for in the baseline (if exempt as a hazardous substance) or measured as a cause of service loss (if included in hazardous substance) and allocated accordingly. The Plan must include a strategy for considering these factors.

5. Key Issue 4: Selection of Reference Areas

Throughout the Plan, the Trustees commonly reference a comparison of Gowanus Canal to unidentified “reference areas.” Footnote 13 in Section 3.4.2 states that “Reference areas are located outside of the Assessment Area and reflect environmental conditions similar to the Assessment Area but without contamination.” Section 3.4 of Plan then goes on to identify probable injury to natural resources in Gowanus Canal by referencing the Gowanus Canal BERA results defining significant effects when compared with a relatively unimpacted reference area (average of four identified reference areas). It needs to be made clear that service losses may be overestimated if defined by injuries relative to a “reference area” that is not representative of the “*but for*” baseline condition. This is especially so when considering the high degree of impact constraint to natural resources represented by non-hazardous substances, physical habitat alterations, and lack of riparian buffer or interfaces, and ongoing disturbance as discussed previously in Section 3 of this report. To properly evaluate the Plan to define and assess damages from service losses at Gowanus Canal, it is vital to understand how appropriate reference areas will be identified, evaluated, and selected for inclusion in the NRDA for Gowanus Canal.

To correctly allow allocation of natural service losses for the Site, any use of proposed reference areas should be subject to similar sources of natural resource stressors. If reference areas are used that differ in stressors relative to Site (not just the defined COCs), these differences must be quantified and included in the service loss calculations.

We suggest that when considering reference area(s) for comparison to Gowanus Canal, the Trustees should leverage the larger data sets from nearby Superfund sites such as the Newtown Creek Superfund Site. Multiple potential reference locations developed in the earlier stages of the Newtown Creek RI/FS may be very similar in nature to Gowanus Canal in terms of direct discharges to the waterways. The reference sites identified and utilized in the early stages of the Newtown Creek RI/FS included locations with habitat alterations, levels of influence from urban CSO and urban stormwater discharges. Relying on reference areas with only limited non-CERCLA impacts would be inconsistent with NRDA regulations which clearly call for a reference area that is representative of the assessment area’s “*but for*” baseline condition.

6. Key Issue 5: Methods for Evaluating Injury and Service Loss

The Plan discusses the Trustees' proposed approach for assessing injury and service loss by noting it will consider the use of existing information and, if necessary following identification of data gaps, implementation of new studies to address these data gaps.

In 43 C.F.R § 11.14(v) "*injury*" is defined as "*a measurable adverse change, either long- or short-term, in the chemical or physical quality or the viability of a natural resource.*" And in 43 C.F.R § 11.14(nn) "*services*" are defined as "*the physical and biological functions performed by the resource including the human uses of those functions. These services are the result of the physical, chemical, or biological quality of the resource.*" An "*injury*" (e.g., an increased mortality in key species due to exposure to COCs in sediment) is by itself not a service. The "*service*" is the value (in terms of function or perceived use value) provided by the sediment "*but for*" the hazardous substance in terms of food source (direct and indirect), shelter, reproduction substrate, flood control, cycling of nutrients, etc. The service "*loss*" must be quantified as the amount of those services lost due to the release – generally expressed in units such as DSAY ("*discounted service acre years*") as proposed in the Plan. Conversion from "*% mortality*" in a sediment toxicity test relative to a reference location to a DSAY is not obvious.

An analogous situation can be observed in Exhibit 3.6 where Hazard Quotients (HQs) from the BERA are discussed as evidence of likely injury to ecological receptors. An HQ is intended to evaluate if there is unacceptable ecological risk present. HQs are a ratio of risk threshold compared to exposure concentrations. An HQ is not a scalar quantity and is not a calculable metric for quantifying injury. Based on this, it is not evident how an HQ exceedance from the BERA could be interpreted as a quantified injury to a natural resource. More detail on how existing information will be utilized is required before providing further comment.

The general approach proposed in the Plan is acceptable for evaluating data pertaining to potential injury. Section 4.2 of the Plan states that "*existing data, in combination with the potential analyses and studies described in Chapter 5, would generate data appropriate for quantifying losses for each resource and endpoint over time*" and "*to determine damages required to compensate for ecological injuries ... Trustees intend to use appropriate equivalency analyses ... to scale restoration projects.*" And, in the introduction to Section 3, the Trustees state they will "*consider the relationship between injury and restoration to ensure that the metrics used to assess each type of natural resources are comparable.*" These are general statements with no details as to how the critical conversion of a natural resource injury to a corresponding service loss is to be performed. The Plan needs to clearly state how the Trustees will apply habitat equivalency analysis or other approaches to deriving service losses from the injury estimates. Measured injury is not equivalent to a resource loss, i.e., a reduction in a natural resource function or service relative to the baseline.

Additional detail on how existing information – much of which consists of data that was not collected or was intended to be used to calculate natural resource injuries – will be used to quantify resource injury service loss is necessary to evaluate the Plan.

Overall, we find the Plan to be too vague on many of these critical issues regarding assessment of injury and determination of service losses to properly evaluate. The Plan should be revised to clearly define the procedures for quantification in service loss as this is essential to the NRDA and needs to be developed to allow proper feedback from the public.

7. Additional Specific Comments

In addition to the broad comments set forth above, GEI has the following specific comments on the draft Plan.

7.1. Purpose and Overview of the Assessment Plan (Section 1.1)

In Section 1.1, the Trustees state that the Plan will “*ensure efforts are conducted in a systematic manner and at a reasonable cost as required by CERCLA*” and cite the definition of ‘reasonable cost’ in 43 C.F.R § 11.14(ee). We agree with the application of this definition, but we emphasize that this should not be in lieu of or in disregard for effective and accurate determination of services losses for Gowanus Canal. All avenues necessary to ensure accurate quantification of injury, conversion to service loss to natural resources, and estimation of damages at Gowanus Canal, but for the impact of Site COCs must be utilized. This requires proper accounting for baseline conditions, and a robust way to evaluate loss in terms of natural resource service loss.

7.2. Injury Caused by Remedial Actions (Section 3.5)

The Trustees state that “*Remedial actions often do not fully return natural resources and/or lost services to baseline conditions*” and remedial actions under the CERCLA process “*may also result in unavoidable, additional injury that is compensable under the CERCLA NRDA regulations (43 C.F.R § 11.15[a][1]).*” Compensable injuries due to the ongoing and planned remedial activities need to fully consider not only any compensable injury caused by ongoing and planned remedial action, but also consider the improvement in the aquatic and shoreline habitat resulting from remedial action. Such credits may include creation of local wetland habitat or benthic substrates where none existed before and similar actions that may result in a net positive effect on natural resource services.

7.3. Human Use Services and Human Use Quantification and Damage Determination Approach (Section 2.4.2 & Section 4.3)

Section 2.4.2 lists recreational and non-recreational community activities and connections, and further states that “*Gowanus Canal serves as a local recreational resource and can support a variety of recreational activities such as fishing, crabbing, boating, canoeing, kayaking, swimming, and scuba diving.*” Gowanus Canal “*is also an essential part of the culture of local neighborhoods*” with benefits and values to community enjoyment. The Plan concludes “*because of [the Canal’s] past and current contaminated state, community enjoyment of and connections to Gowanus Canal may have been diminished and in some cases eliminated altogether.*” This discussion is a tendentious approach because it highlights uses that have never been present or have been present only for a limited group (e.g., the Gowanus Dredgers diving group) and were conducted under adverse and risky environmental conditions prior to the implementation of the CERCLA remedy. The prior state of the 150 years of environmental contamination led to extremely limited conditions conducive to community enjoyment for the entire history of the Canal. These factors must be fully acknowledged when defining the potential scope of human use losses.

Section 4.3 indicates that Trustees anticipate estimating lost recreational services from fishing and crabbing based on benefit transfer analysis of these activities, and that there may be other recreational losses or reduced or diminished community connections to consider. The underlying assumption is that there have been compensable losses relative to some prior condition when these activities and connections were present. Given the documented history of Gowanus Canal, Trustees should consider that there were extremely limited conditions present within the relevant temporal period for NRDA compensation.

The Trustees also should consider that the ongoing remedial activities will likely result in a significant net improvement in human use services by the creation of aquatic habitat conditions that previously did not exist, improved overall water quality, and safe access and use the Canal for recreational activities. These effects might be considered as examples of early restoration resulting from ongoing efforts. The refurbished Flushing Tunnel will likely also result in ongoing improvement of conditions in Gowanus Canal increasing potential human enjoyment, and the future development of Gowanus Canal in a rapidly changing part of the City.

7.4. Ecological Injury Quantification and Damage Determination Approach (Section 4.2)

This section (p. 31) notes that *“the Trustees will ensure that there is no double-counting of losses in the quantification process (43 C.F.R § 11.83[c][20]).”* The NRDA Plan should include measures or guidelines that will be utilized to prevent *“double counting”* of services losses. We note for example that Section 3.4.1, Subsections *“Benthic Macroinvertebrates”* and *“Fish”* that fish consumption advisories are noted as lines of evidence of injury to these resources. However, fish consumption advisories are also noted in Section 4.3 as a cause of injury to human use of these resources. This is an evident risk that consumption advisory evaluations could be double counted as an injury to the fish resource and an injury to human use of the fish resource.

7.5. Temporal Scope (Section 4.4)

The Plan establishes that *“the Trustees would quantify injury after the enactment of CERCLA.”* Per NRDA regulations, a resource loss is only compensable from the enactment of CERCLA (December 1980) forward. But the very next sentence states: *“Where injuries are not distinguishable, injury would be quantified for all years that injury occurred in the past and is expected to occur in the future.”* This is not consistent with NRDA regulations.

We note that while a release occurring prior to 1980 may be compensable, only the natural resource injuries and their service loss manifesting since 1980 should be components of the service loss equation. The statements of the Trustees regarding the temporal scope of the Plan are contradictory and need to be qualified so it is clear and established that only injuries manifesting since 1980 can be quantified. A method to distinguish pre-1980 injuries (non-compensable) from post-1980 injuries (potentially compensable) must be detailed in the Plan.

7.6. Quality Assurance (Appendix A)

The Quality Assurance appendix presents very general guidelines related to project management, data generation and acquisition, assessment and oversight, data validation and usability and reporting and documentation and defers the methods for ensuring quality assurance and quality control to individual task QAPPs. 43 C.F.R §11.31(c)(2) specifies that “[a] *Quality Assurance Plan that satisfies the requirements listed in the NCP and applicable EPA guidance for quality control and quality assurance plans*” should be included with the Assessment Plan. The current version does not meet this standard. The Plan should clearly state that appropriate opportunity for comment will be granted to all interested parties following issuance of quality assurance plans consistent with NCP and EPA guidelines for any future studies.



June 14, 2024

Via E-Mail to nrd@dec.ny.gov

NYS Department of Environmental Conservation
Natural Resource Damages Section
c/o Alicia Pasos
625 Broadway, 14th Floor
Albany, NY 12233

**RE: Comments on the Gowanus Canal Draft
Natural Resource Damage Assessment Plan**

Dear Gowanus Canal Natural Resource Damages Assessment Trustees Council:

Riverkeeper, Inc., respectfully submits the following comments on the draft Natural Resource Damage Assessment (NRDA) Plan for the Gowanus Canal Superfund Site. Riverkeeper thanks the Trustees for providing an extended 60-day public comment period on the draft NRDA Plan. In addition to Riverkeeper's comments raised herein, Riverkeeper strongly supports the comments and requests made by the Gowanus Canal Community Advisory Group (CAG), the Gowanus Dredgers Canoe Club, the Gowanus Canal Conservancy and the community input gathered by our partners.

Riverkeeper is a member-supported watchdog organization dedicated to protecting and restoring the Hudson River from source to sea and safeguarding drinking water supplies through advocacy rooted in community partnerships, science and law. For more than 50 years, Riverkeeper has defended the Hudson River Estuary, its fisheries, and the entire Hudson River ecosystem. Riverkeeper has established itself as a leading pollution enforcer, exemplified by its citizen suits against oil companies, cement manufacturers and other polluters.

Riverkeeper has been active on the Gowanus Canal since 2006 and has been a vocal advocate for a thorough Superfund cleanup for the Gowanus Canal since the U.S. Environmental Protection Agency (EPA) announced that it was considering the canal for the federal Superfund program in April 2009. Riverkeeper has also been an active member of the Gowanus Canal CAG since its creation in April 2011. Riverkeeper strongly supports efforts to reclaim the canal for public use and believes that future redevelopment of the area requires a full and comprehensive remediation of the canal and a thorough natural resource damage assessment.

The natural resources on the Gowanus Canal, including birds, fish, and aquatic plants, provide invaluable benefits to both humans and the environment. These natural resources have been grievously injured by industrial activities along the canal over the last several hundred years. Through the NRDA, the Trustees—on behalf of the public—can ensure adequate damages are awarded to fund restoration within this waterway that will benefit the environment and community for generations to come. To achieve this goal, Riverkeeper urges the Trustees to adopt a comprehensive NRDA Plan for Gowanus Canal and calls upon the Trustees to expand the scope of injuries and damages considered in the Plan, correctly identify the designated use of the canal for primary contact, and utilize public engagement opportunities and community knowledge to inform the NRDA Plan to ensure meaningful restoration in the canal and the adjacent community.

We thank the Trustees for their commitment to engaging the CAG throughout the extensive NRDA process and for the careful work that the damage assessment requires.

Expand the Scope of the NRDA Plan

a. *Assessment Area:*

The proposed geographic scope of the Assessment Area is inadequate and fails to properly define the area within which natural resources have been directly or indirectly affected by industrial and municipal-related oil and hazardous substances in the Gowanus Canal. The proposed Assessment Area currently only includes the aquatic habitat within the Gowanus Canal, however, natural resources adjacent to the canal, including the intertidal zone, marsh areas, shoreline areas and CSO tank site areas, have been directly affected by industrial and municipal-related oil and hazardous substances and EPA's remediation efforts.

Even if constrained by bulkheads and other development, Riverkeeper believes the intertidal zone must be included in the NRDA Plan for Gowanus Canal because it represents critical habitat that has been severely impacted by decades of contamination and remediation efforts. The majority of the intertidal habitat in the canal once thrived on the decaying bulkheads and soft shorelines that previously lined the canal. Cleanup activities, including dredging, capping and the installation of new steel bulkheads are destroying these habitat areas.

It is important to note that the Assessment Area proposed in the NRDA Plan for the Newtown Creek Superfund site does include the intertidal zone.¹ The Trustees anticipate quantifying ecological service losses to representative resources for intertidal and subtidal aquatic habitats in Newtown Creek. The Trustees must do the same for Gowanus Canal. Intertidal habitats were historically documented in the canal and have been both directly and indirectly affected by oil and hazardous substances and the remediation of this Superfund Site.

The intertidal zone, wetland areas and marshes provide critical habitats that are highly productive ecosystems that support a broad diversity of species. Wetlands and hyporheic zones² interactively communicate and facilitate slow movement of water and establish rich ecosystems. Marshes and wetland areas filter nutrients and attenuate terrestrial runoff. Salt marshes and wetland areas also perform a critical role in supporting aquatic food webs and are immensely important through the exportation of carbon and nutrients that provide the foundations of interdependent ecosystem linkages

¹ Newtown Creek Natural Resource Damage Assessment Trustee Council, Newtown Creek Natural Resource Damage Assessment Plan 17 (2024), https://www.fws.gov/sites/default/files/documents/draft_newtowncreek_assessment-plan_03.01.2024.pdf.

² The hyporheic zone refers to the area is defined hydrologically as "a subsurface flowpath along which water recently from the stream will mix with subsurface water to soon return to the stream." See Harvey, J. W., and K. E. Bencala, *The Effect of Streambed Topography on Surface-Subsurface Water Exchange in Mountain Catchments*, *Water Resour. Res.* 29(1), 89–98 (1993).

for a wide variety of organisms. These habitat areas have been destroyed by decades of contamination and Superfund remediation work.

The Assessment Area must also include the CSO tank site areas. These areas were procured and are being redeveloped for CSO tank installation pursuant to the Record of Decision adopted by EPA for the Gowanus Canal Superfund site³, and as such are directly impacted by the Superfund remediation.

The proposed NRDA Plan limits the Assessment Area to only the aquatic habitat within the canal. However, additional adjacent habitat areas have been impacted by contaminants and will again be disrupted by the remedy that will require the replacement of bulkheads and riprap in some areas. Restoring habitats, groundwater drainage and community access throughout and following the remedy will be crucial to reestablish functional ecosystems and clean waters, fully usable by local communities. For these reasons, the Assessment Area should be expanded to include the intertidal zone, marsh areas, shoreline areas, and CSO tank site areas located adjacent to the canal.

b. Natural Resources:

The Trustees must quantify injuries to groundwater and air as part of their NRDA Plan. The Trustees acknowledge in the draft Plan that groundwater and air have been exposed to canal-related contaminants, therefore Riverkeeper strongly believes that the Trustees must quantify these distinct injuries to these resources. It is inadequate to state that the Trustees reserve the right to quantify injuries to these resources at a future time.

Groundwater has been severely impacted by direct discharges from current and historical industrial activities. The Gowanus Canal Remedial Investigation Report states that “[a]ll classes of constituents (VOCs, SVOCs, pesticides, and metals) except PCBs were detected in samples from both the shallow and intermediate groundwater throughout the length of the canal. Chemical concentrations in groundwater were relatively higher in wells where NAPL saturation was observed in the soil borings.”⁴ As a result, groundwater resources in the area have been rendered unusable for any purpose.

In addition, volatile organic compounds (VOCs) and polycyclic aromatic hydrocarbons (PAHs) were found in air samples along the canal.⁵ Recreational users,

³ U.S. EPA, Record of Decision Gowanus Canal Superfund Site (Sept. 2013), <https://semspub.epa.gov/work/02/692106.pdf>

⁴ HDR, *Gowanus Canal Remedial Investigation Report*, Vol 1. p. 4-33, (Jan. 2011), <https://gowanussuperfund.com/wp-content/uploads/2021/09/Gowanus-Canal-Remedial-Investigation-Report-V-1-DRAFT.pdf>.

⁵ *Id.*, at 4-31

anglers, residents, and nearby industrial workers may all become exposed to hazardous chemicals through contact with contaminated air. Recreational users may come into contact with dangerous contaminants through contact with surface water and sediment but also through ambient air (volatile and particulate emissions from the surface water and sediment) at canal level while boating, fishing, and crabbing in the canal.⁶ Residents and industrial workers may inhale ambient air (associated with volatile and particulate emissions from the canal) at street level.⁷ As residential development expands along the canal, additional residents may be exposed to contaminated air both outside and inside their homes. Exposure to air may result in carcinogenic risks above EPA's acceptable risk levels. These risks, and the noxious odors emanating from the VOCs and PAHs, have impeded or impacted recreational and aesthetic uses of the canal for centuries.

For these reasons, the Trustees must quantify the distinct injuries to groundwater and air during the initial assessment given the significance of the impacts.

c. Contaminants of Concern:

By the late 1870s, sewers entering the canal carried a combination of household waste, industrial effluent from the manufactured gas plants and other industries, and stormwater runoff. These discharges, which contained hazardous substances such as PAHs (a semi-volatile organic compound [SVOC]), polychlorinated biphenyls (PCBs), pesticides, metals and VOCs, caused the canal to become one of New York's most polluted waterways. The draft NRDA Plan states that the Assessment will focus on injuries resulting from exposure to hazardous substances released from past and current industrial activities, as well as discharges from CSOs. The Plan acknowledges that there are multiple hazardous substances to which natural resources have been exposed as a result of discharges or releases into the canal, including but not limited to, PAHs, PCBs, hazardous pesticides and a variety of metals. However, the Trustees only plan to focus on total PAHs as the primary contaminant of concern (COC) for assessing ecological injury to natural resources in the Gowanus Canal.

EPA's Record of Decision (the ROD) for the Gowanus Canal Superfund site identifies the contaminants of concern in Appendix II, Tables 3, 4 and 6. Such contaminants include BTEX, PAHs, PCBs, barium, cadmium, copper, lead, mercury, nickel, and silver.⁸ The ROD established remediation goals for these contaminants to restore and protect sediment, the benthic community and the ecological community.⁹

⁶ *Id.* at 5-3

⁷ *Id.* at 5-3

⁸ U.S. EPA, Record of Decision Gowanus Canal Superfund Site (Sept. 2013), Appendix II, Tables 3, 4 and 6. <https://semspub.epa.gov/work/02/692108.pdf>.

⁹ *Id.* at tables 13-15.

The ROD also clearly states that “[w]hile the soft sediments are comprised of mineral grains, naturally-occurring organic material and sewage [...] these sediments are heavily contaminated with PAHs, PCBs, metals and VOCs.”¹⁰

In addition, EPA’s webpage for the Gowanus Canal identifies the following contaminants as COCs:¹¹

- Benzo(b)fluoranthene
- Benzo(k)fluoranthene
- Benzo[a]anthracene
- Benzo[a]pyrene
- Copper
- Dibenzo(a,h) anthracene
- Indeno(1,2,3-cd) pyrene
- Lead
- Polychlorinated biphenyls (PCBs)
- Polycyclic aromatic hydrocarbons (PAHs)

These COCs likely have caused additional and compounding impacts besides those caused by PAHs alone. For these reasons, the scope of the draft NRDA Plan must be expanded to include PCBs, pesticides, metals and VOCs. These chemicals are pervasive and persistent in the aquatic environment of Gowanus Canal and must be part of the Trustees’ Assessment.

d. Injury Caused by Remedial Actions:

The Trustees must identify and quantify the extent to which remediation affects natural resources by assessing both physical injuries and injuries resulting from residual contamination throughout the documented or expected timeframe of recovery. EPA’s remedial actions in the Gowanus Canal have involved extensive sediment removal and capping. Since 2020, the EPA has removed contaminated soft sediment from the bottom of the Gowanus Canal and capped the native sediment below. The soft sediment layer removed is, on average, 10 feet thick along the bottom of the canal. Dredging has had a heavy impact on all pre-existing life (shellfish, algae, soil bacteria) and wiped out the majority, if not all, of it. NRDA-related restoration efforts must include work to restore the bottom of the canal bed.

To support the dredging, steel bulkheads were constructed to stabilize the land. This process has removed essentially all of the intertidal habitat in the canal, which was thriving on the decaying bulkheads and soft shorelines. The new bulkhead line also

¹⁰ *Id.* at, 15, FN 16. <https://semspub.epa.gov/work/02/692106.pdf>.

¹¹ U.S. EPA, Gowanus Canal, Brooklyn, NY Contaminant List, <https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.contams&id=0206222>.

encroaches into the channel, reducing aquatic habitat by approximately an acre. Such injury is compensable and must be thoroughly evaluated by the Trustees.

In addition, the steel bulkheads are sealed to prevent remaining land contamination from entering the canal. These bulkheads interfere with and diminish upland groundwater drainage to the low drainage point in the canal. Development and remediation using steel bulkheads have led to the covering and blocking of underground streams and groundwater mounding, exacerbating inland flooding and causing buildings to sink. The new steel bulkheads create impediments to natural succession ecologies due to the lack of a more porous substrate for filtration and biodiversity. Additionally, the new bulkheads significantly reduce access and egress from the water, raising heights and removing former community access points at 2nd Ave, 11th St., and a ladder at Douglass/Degraw.

Overall, Superfund remediation efforts have resulted in extensive physical injuries to the canal and the natural resources that depend on it. The Trustees must be sure to carefully examine the impacts dredging and bulkhead construction has had on habitat loss.

e. Baseline:

The Trustees should provide additional information as to how baseline conditions and services will be determined or provide a specific baseline year. Natural resources have been exposed to and injured by contaminants since the late 1800s and are likely to continue to be injured. The Trustees currently advise that they “plan to use, in order of priority, data from reference areas/control groups and/or use relevant literature.” This statement is overly vague. Riverkeeper requests additional information and clarification as to how the baseline will be established. Please clarify and articulate the reference areas/control groups that will be reviewed and the literature that will be referenced and relied upon.

f. Ecological Injury Quantification:

For this NRDA the Trustees anticipate quantifying ecological service losses to representative resources for aquatic habitat. The Trustees state that these resources may include benthic invertebrates, fish and birds. The Trustees must quantify the ecological service losses to these resources and must also expand the scope of ecological injury quantification to also include mammals. We want to ensure that all species present in Gowanus Canal are properly evaluated as part of the NRDA process. To achieve this goal, the Trustees should review the Biological Survey Report prepared

by the Gowanus Canal Conservancy in 2021 to ensure injuries to biological resources are appropriately and sufficiently evaluated.¹²

Healthy ecosystems are composed of an extensive assemblage of organisms, all interacting with themselves and their abiotic environment. Such dynamic interactions and trophic relationships have been destroyed by years of contamination. The Trustees must consider such impacts when quantifying ecological service losses.

Direct impacts include all physical and environmental alterations to the usable habitat for each species. Potential impacts to Essential Fish Habitat (EFH) for managed species associated with sediment contamination would directly impact demersal fish species, including winter flounder, windowpane flounder, summer flounder and red hake as listed by NOAA.¹³ Potential indirect impacts for EFH would be related to bottom habitat disturbance and the potential loss of forage organisms. Trophic transfer of contaminants would initiate a bottom-up continuum that begins with oligochaetes that reside in the sediments and extends upwards into the food-chain. Filter feeding invertebrates species, crustaceans, and copepods form the foundation of the food-chain and provide a vector for contaminants to be trophically transferred into higher levels of the ecosystem. Antagonistic consequences associated with PAHs contamination of the sediments would mobilize these toxins in higher doses while moving up the food-chain. Risks to wildlife from consuming contaminated prey items during foraging causes trophic linkages to biomagnify and bioaccumulate the toxin by an order of 10 for each linkage up the food chain. Hence, higher order piscivorous predators would be greatly exposed to contaminants that would affect their individual health, population health, and even genetic health, which would alter evolutionary trajectories.

PAH exposure has been linked to a wide range of biological dysfunctions in fish, including neoplasia, reduced reproductive success and other types of endocrine disruption, immunotoxicity, post-larval growth, somatic condition, and transgenerational impacts. In addition, recent findings show that embryonic development of fish is severely affected by even extremely low concentrations of PAH exposure.¹⁴ The fact that very low levels of hydrocarbons in sediments, water, or forage fish may produce

¹² Gowanus Canal Conservancy, Biological Survey Report (Apr. 2021), <https://gowanuscanalconservancy.org/wp-content/uploads/2020/04/2021-Gowanus-Ecosystems-Report-Draft-210611-optimized.pdf>.

¹³ Essential Fish Habitat Mapper, New England/Mid-Atlantic Region, https://www.habitat.noaa.gov/apps/efhmapper/?page=page_3.

¹⁴ Tracy K. Collier, et al., *Effects on Fish of Polycyclic Aromatic Hydrocarbons (PAHS) and Naphthenic Acid Exposures*, *Organic Chemical Toxicology of Fishes*, 33:195-255 (2014); Jerry F. Payne, et al., *What is a Safe Level of Polycyclic Aromatic Hydrocarbons for Fish: Subchronic Toxicity Study on Winter Flounder (Pseudopleuronectes americanus)*, *Can. J. Fish Aq. Sci.* 45:1983-1993 (1988).

biological responses in fish species attests to the importance of developing criteria for assessing the toxicological significance of sublethal effects.¹⁵

Research shows that CSOs have been shown to impact the community structure and diversity of benthic communities.¹⁶ Pollution from outfalls can hinder larval dispersal and thus gene flow by creating localized environments that are toxic or deadly to larvae and may cause local directional selection for certain genotypes.¹⁷ While no studies appear to have examined adaptation of organisms living near CSOs, these sources of contamination are likely to alter ecosystems to a limited number of organisms that are capable of tolerating a wide range of chemical stressors. Changes in the adaptive properties of fish, as well as their physiology, digestive systems, developmental stages, reproductive systems, and sensitive organ functioning has contributed to population declines of fish fauna in aquatic environments contaminated with heavy metals, petro-hydrocarbons and other pollutants introduced through anthropogenic factors of influence.¹⁸ The Trustees should consider studies that examine the impacts of such adaptations.

Research has shown that species such as mummichogs and tomcods show resistance to some of the most toxic substances known to humans. Their high reproductive rate combined with fast generational times contributes to their seemingly effective adaptive response. However, point mutations that facilitate these seemingly beneficial responses to toxic exposure tend to knock out functional genes. In essence, there is a genetic cost to an organism that can survive in a toxic environment. Before any organism develops a genetic resistance to a contaminant, we can assume that an unquantifiable number would have experienced directly injurious effects or transferred harmful mutagenic effects to their offspring before an adaptive response becomes stabilized in a population.

In summary, the Trustees must quantify ecological service losses to capture the ability of aquatic species to function and provide services. The contamination in the Gowanus Canal has severely impacted fish reproduction and population levels. Populations of managed species that would normally utilize this canal system would have been deterred or physically harmed by the quantity or toxicity of the contaminants. There have been immense ecological and environmental ramifications from decades of

¹⁵ Jerry F. Payne, et al., *What is a Safe Level of Polycyclic Aromatic Hydrocarbons for Fish: Subchronic Toxicity Study on Winter Flounder (Pseudopleuronectes americanus)*, Can. J. Fish Aqu. Sci. 45:1983-1993 (1988).

¹⁶ SE Alter, et al., *Evolutionary Responses of Marine Organisms to Urbanized Seascapes*, Evol App 14:210-232 (2001).

¹⁷ *Id.*

¹⁸ Valery Vorobyov, et al., *Anthropogenic Factors of Diseases and Death of Atlantic Salmon (Salmo Salar L.)*, Fisheries 2023(3):14-24 (2023).

contamination to aquatic species and the current scope of the draft assessment for injury must be expanded and more clearly defined.

g. Injury Assessment Studies:

The Trustees must amend the Plan to provide more details on the potential injury assessments. While Riverkeeper recognizes that the scope of this Plan does not, and should not, preclude additional or alternative studies from being undertaken during the assessment, the draft NRDA Plan should provide a greater level of scientific detail necessary for the public to prepare meaningful technical comments on the studies being proposed. The information provided in Exhibit 5-1: Potential Assessment Studies & Analyses does not reach the level of specificity called for in the Department of Interior regulations at 43 C.F.R. Section 11.31. The table in Exhibit 5-1 fails to identify and describe the sampling locations, the number of samples to be collected, the sampling procedures and the analysis to be performed. Such additional information is needed to adequately inform the public of the studies the Trustees will or may undertake.

The suite of migratory fishes that potentially utilized the canal are now shadows of their former populations. Some have been extirpated and most are barely present. Most methods of research would tend to underestimate the biotic potential of the former ecosystems and attendant degradation of the various resources. The NRDA Plan must include additional details on the injury assessment studies to ensure damages are not underestimated.

In addition, the NRDA Plan must perform studies to evaluate impacts to the air and groundwater from the release of hazardous materials. Additional site-specific data through means such as field sampling or laboratory tests are required to properly quantify and assess injuries and damages to these resources.

h. Future Contamination:

Some COC inputs to the canal will continue, despite the important improvements to the local combined and separate sewer systems and stormwater practices implemented to minimize direct runoff from commercial and industrial sites. Not only will the continued presence of contaminants harm wildlife, but it will also harm the reputation of the canal and impact human recreation. These future ecological and ecosystem services harms should be quantified in the NRDA process.

Correctly Identify the Designated Use of Gowanus Canal

The draft Plan states that “upstream of Hamilton Avenue Bridge, NYSDEC designated Gowanus Canal Class SD, that is, appropriate for fishing (NYSDEC 2022). Downstream of Hamilton Avenue Bridge, Gowanus Canal is designated Class I, meaning appropriate for secondary contact recreation (e.g., canoeing and kayaking) and fishing as well as suitable for fish propagation and survival (NYCDEP 2015).” Although the majority of Gowanus Canal is designated as a Class SD waterbody, the NYSDEC has determined that the Gowanus Canal does not support the designated use of fishing and the Canal has been on the Clean Water Act Section 303(d) list of impaired waterbodies since 1998. This status should be reflected in the draft Plan.

The draft Plan must also be corrected to acknowledge that the entirety of the Canal is designated for primary contact recreation. As explained by EPA Region 2 Clean Water Division Director Javier Laureano, New York State Department of Environmental Conservation promulgated, and EPA approved, the recreational use in 2015 and 2016, respectively:

On February 24, 2016, the U.S. Environmental Protection Agency (EPA) received the New York State Department of Environmental Conservation (NYSDEC) revisions to New York State's water quality standards (NYSWQS). These revised water quality standards (WQS), adopted by the NYSDEC on November 4, 2015, amended the designated uses of Class I and Class SD saline surface waters [including Gowanus Canal] to include a designated use of primary contact recreation (6 NYCRR §§ 701.13 and 701.14). Additionally, these revised WQS amended the water quality criteria for Class I and Class SD saline surface waters (6 NYCRR Part 703). In a letter dated May 9, 2016, the EPA approved, pursuant to Section 303(c) of the Clean Water Act (CWA), 33 U.S.C. §1313(c), the revised designated uses of Class I and Class SD saline surface waters at 6 NYCRR Part 701.¹⁹

For the purposes of federal law, and for actions taken pursuant to the Clean Water Act and Comprehensive Environmental Response, Compensation, and Liability Act, the Trustees must incorporate the designated use of primary contact.

¹⁹ Letter from Javier Laureano, Director of Clean Water Division at EPA, to Mark Klotz, N.Y. DEC (Mar. 7, 2018) (citation omitted).

Utilize Public Engagement Opportunities and Community Knowledge to Ensure Meaningful Restoration

There is considerable community knowledge of existing shorelines and community use of the Gowanus Canal. The Gowanus Canal Conservancy has published detailed reports and plans outlining remediation efforts and pilot studies that could lay the groundwork for future restoration efforts.²⁰ These plans detail local knowledge of intertidal habitat, species usage within the waterways, and community use. In 2019, the Gowanus Canal Conservancy prepared the Gowanus Lowlands Master Plan to create a community-based vision of parks and public spaces centered on the Gowanus Canal.²¹ The Gowanus Lowlands can provide the community with accessible green space, cultural resources, and recreational amenities while serving multiple functions through increased flood resilience, mitigation of the impacts of the urban heat island effect, creation of habitat, stormwater management, and reduction in pressure on the sewer system. The Gowanus Canal Conservancy developed the Gowanus Lowlands Master Plan to ensure the community has a key role in shaping a watershed that is accessible, active, and clean for all. At the heart of the Gowanus Lowlands vision is a clean and thriving waterway of aquatic habitat, community activity, and bustling industry. It is imperative that every effort is made to locate restoration projects within the canal. Restoration projects in and on the banks of the canal can improve stormwater management, provide habitat, and provide much needed public access. These projects will directly benefit the communities that have lived for years adjacent to persistent contamination. The Trustees must secure funding for such projects.

In addition, the Trustees should review the recommendations of the Gowanus Improvement District Formation Steering Committee.²² This committee represents a comprehensive array of stakeholders and leadership from the Gowanus neighborhood. The committee is working to establish a Business Improvement District in Gowanus that would specifically focus on advocacy for and management and programming of the public realm in Gowanus. The Trustees should engage with the Gowanus Improvement District to implement projects and organize land use and restoration projects.

²⁰ Gowanus Canal Conservancy, Gowanus Ecosystems Biological Survey Report (Apr. 2021), <https://gowanuscanalconservancy.org/wp-content/uploads/2020/04/2021-Gowanus-Ecosystems-Report-Draft-210611-optimized.pdf>; Gowanus Canal Conservancy, Gowanus Lowlands Master Plan (Dec. 2019), https://gowanuscanalconservancy.org/wp-content/uploads/2017/11/191219_Draft-Gowanus-Lowlands-Master-Plan.pdf.

²¹ Gowanus Canal Conservancy, Gowanus Lowlands Master Plan (Dec. 2019), https://gowanuscanalconservancy.org/wp-content/uploads/2017/11/191219_Draft-Gowanus-Lowlands-Master-Plan.pdf.

²² Gowanus Improvement District Formation Effort, <https://gowanusimprovementdistrict.org/>.

The Trustees must also consider pilot restoration projects along the waterways using existing community knowledge and priorities to do so. The neighborhoods surrounding the Gowanus Canal are being extensively redeveloped, providing opportunities for stormwater maintenance, habitat restoration, and community amenities. The Trustees must ensure restoration opportunities that become available during new development are not missed and must not let the dynamic and active nature of the canal impede robust restoration opportunities in and around the Gowanus Canal.

To that end, the Trustees should specifically consider the following restoration efforts and pilot studies:

- Develop a restoration approach that considers upland areas beyond the canal itself and considers the broader Gowanus ecosystem, such as a watershed-wide restoration scope or MOSS (Metropolitan Open Space System) to reconnect species via greenways to the Gowanus Canal;
- Provide shore-side surface rainwater filtrations such as the engineered sponge-park to collect water so less untreated water is released into the canal after rain;
- Provide additional native plantings along the canal, including grass, reeds and trees (in addition to other plants), to increase green space that absorbs rain, reduces heat islands created from buildings/concrete/asphalt, and improves aesthetic enjoyment;
- Expand existing projects focused on building habitat. For example, the Gowanus Dredgers Canoe Club and the Gowanus Canal Conservancy have created a program to research, create and monitor constructed habitats to encourage mussel growth along the bulkheads of the canal.²³ Programs like this should be expanded;
- Repair and enlarge sewer systems to mitigate the effects of groundwater mounding and restricted drainage;
- Restore wetland areas in the Gowanus turning basins;
- Dredge out and build access into bulkheads and install habitat (e.g. install tabs);
- Improve long-term monitoring schemes and establish clear objectives.

Restoration of waterways can be conceived as healing ecosystems that can no longer perform essential ecological and fluvial functions such as mitigating excessive

²³ Mighty Mussels, <https://gowanusdredgers.org/mighty-mussels/>.

levels of nutrients and sediments and supporting aquatic life and wildlife. Clean water protects public health, supports fishing, swimming, boating, and other recreational uses, and provides critical wildlife habitat. Healthy waterways are community focal points and provide societal benefit through the enhancement of property values, as recreational hubs, and improved human psyche.

Conclusion

Over the past 150 years, chemical pollution and sewage dumping severely affected the ecosystem of Gowanus Canal. Gowanus Canal is now a toxic shadow of the profusion of life that once existed. Ecological risks to wildlife received from long-term exposure to contaminated waters and substrates in the Gowanus Canal have resulted in severe biological and ecological ramifications. As one of the most polluted waterways in the country, the canal is burdened by toxic contamination and organic pollution, and, in turn, the wildlife that could be expected is severely limited. The canal also remains generally unsafe and unwelcoming for human recreation, severely limiting its role as an asset to the City's residents and visitors. Humans have suffered extensively from the loss of cultural, economic, or recreational activities, degraded and polluted habitat, and negative health consequences from consuming contaminated organisms or breathing in noxious air and harmful airborne particulates. The NRDA plan must provide a thorough assessment of damages to help restore this valuable resource.

Respectfully submitted,

Drew Gamils

Drew Gamils, Esq.
Staff Attorney
Riverkeeper, Inc.



My Huynh

From: [REDACTED]
Sent: Wednesday, May 29, 2024 4:21 PM
To: dec.sm.nrd
Subject: Restore the Newtown Creek

Follow Up Flag: Follow up
Flag Status: Flagged

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May 29, 2024

Alicia Pasos, NYS DEC, Natural Resource Damages Section
625 Broadway, 14th Floor
Albany, NY 12233

Dear: Pasos, NYS DEC, Natural Resource Damages Section,

I am one of a growing number of New Yorkers who regularly paddle up the Newtown Creek. It is a remarkable and vital natural feature; an important and thriving (given the circumstances) estuary ecology and an historic and increasingly visible urban waterway. I write to express my support for comprehensive Natural Resource Damages Assessment (NRDA) Plans for Newtown Creek and, for that matter, the Gowanus Canal, and to urge the natural resource Trustees to expand the scope of natural resource injuries and damages considered in the NRDA Plans, increase public engagement, and ensure meaningful restoration in these waterways and communities.

I know firsthand, from my canoe expeditions up the creek and canal that the natural resources on these waterways, including the birds, fishes, and aquatic plants, provide invaluable benefits to both humans and the environment. These natural resources have been grievously injured by industrial activities on both waterways over the last several hundred years. Through the NRDA, the Trustees--on behalf of the public--can ensure adequate damages are awarded to fund restoration within these waterways that will benefit the environment and community for generations to come.

However, there is a danger that the draft NRDA Plans could prematurely narrow the scope of the assessments and omit timely community assessment and monitoring that could inform assessed shoreline types and community use. To ensure meaningful restoration within Gowanus Canal and Newtown Creek, the draft NRDA Plans must be revised to address the following concerns:

1. Expand the scope of the NRDA Plans to:

- Address known contamination from other types of contaminants such as volatile organic compounds (VOCs), polychlorinated biphenyls (PCBs), hazardous pesticides, and metals such as lead, mercury, and copper. The draft NRDA Plan for Gowanus Canal only considers polycyclic aromatic hydrocarbons (PAHs) as the primary contaminant of concern for assessing ecological injury to natural resources in Gowanus Canal.

There are multiple hazardous substances to which natural resources have been exposed as a result of discharges or releases into Gowanus Canal, which can have a compounding effect on aquatic organisms. These other contaminants must also be considered primary contaminants of concern in the NRDA.

- Assessing impacts to the intertidal habitat in Gowanus Canal. The NRDA plan appears to consider impacts solely to the aquatic environment. Even if constrained by bulkheads and other development, the intertidal habitat must be included in the NRDA Plan for Gowanus Canal because it represents critical habitat and has been severely impacted by decades of contamination.

- Avoid the use of bioindicators. Bioindicators are living organisms that represent a single tool to assess environmental health.

Their use does not fully capture the accumulated impacts and ecosystem changes that have occurred over the course of nearly 200 years and cannot fully evaluate species richness, biodiversity, biotic potential, species long extirpated from an ecosystem, or alternative stable states that effectively limit keystone species. The use of bioindicators provides a narrow lens of limited scope that cannot accurately assess species absence, especially those that vary seasonally. Consequently, with such limited capacity using bioindicators, more conventional methods need to be utilized to determine environmental damages.

2. Utilize public engagement opportunities and community knowledge to inform the NRDA Plan:

- Consider pilot restoration projects along the waterways using existing community knowledge and priorities to do so. The neighborhoods surrounding both waterways are being extensively redeveloped, providing opportunities for stormwater maintenance, habitat restoration, and community amenities. The Trustees must ensure restoration opportunities that become available during new development are not missed.

- Incorporate community knowledge and prior work into the NRDA where appropriate. There is considerable community knowledge of existing shorelines and community use of the Gowanus Canal and Newtown Creek. Newtown Creek Alliance, Gowanus Canal Conservancy, Riverkeeper, and others have published detailed vision plans for restoration, and some of those plans could be implemented prior to remediation, or pilot studies beginning now could lay the groundwork for future restoration efforts. These plans detail local knowledge of intertidal habitat, species usage within the waterways, and community use.

Newtown Creek and the Gowanus Canal are iconic New York City waterways and have withstood generations of industrial, commercial, and residential development and contamination. The NRDA Plans for each waterway provide a unique opportunity to ensure that damages to these famously polluted areas are properly assessed and used to restore the environment and improve the surrounding communities. I urge the Trustees to work closely with relevant agencies and stakeholders, including the Environmental Protection Agency, the City of New York, and the local community to ensure the NRDA Plans will provide the maximum restoration benefit within each waterway in a timely fashion.

I appreciate your attention to this important matter.

Thank you,

[Redacted] pson
[Redacted]

My Huynh

From: [REDACTED]
Sent: Thursday, May 30, 2024 10:24 PM
To: dec.sm.nrd
Subject: Utilize Ongoing Community Dialogue to Ensure a thorough assessment of natural resource injuries and damages to Newtown Creek ...

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May 30, 2024

Alicia Pasos, NYS DEC, Natural Resource Damages Section
625 Broadway, 14th Floor
Albany, NY 12233

Dear: Pasos, NYS DEC, Natural Resource Damages Section,

To the NYSDEC and associated parties:

As a member of the Brooklyn community who intends to continue to build my life, businesses, and family in the vicinity of Newtown Creek, I am writing to urge the Trustees and relevant administrative bodies to support and expand the Natural Resource Damages Assessment (NRDA) by continuing to engage the local community and utilize the wealth of knowledge and research of community members and organizations such as Riverkeeper and the Newtown Creek Alliance. While the scope of projects and concerns of the NYSDEC, EPA, NOAA, and other responsible organizations is understandably broad and multi-faceted, local community groups have a much more specific and invested understanding of the impact of the Newtown Creek and Gowanus Canal Superfund projects, as well as a wealth of highly educated and experienced minds who have and continue to commit their efforts to research and community involvement in these important issues. It is my hope as an engaged New York City resident, that the voices of these communities and organizations continue to be heard, supported, amplified, and answered as the planning and implementation of these projects take place.

As a maritime professional, environmental advocate, and cultural innovator, it is my hope to see the NYC waterfronts transcend generations of neglect, and begin a new chapter as a vibrant and engaging asset to New York City's residents, visitors, and wildlife.

New York City is often referred to as the greatest city in the world, but its level of pollution and failure to provide healthy ecosystems for humans and wildlife alike, is a harsh disconnect from that ideal.

It is high time that we follow the lead of many greener international cities, and prioritize the true evolution of the environmental and cultural health of our 520 miles of coastline and associated waterways.

My personal vision includes greener bulkheads and coastlines to support biodiversity, increased accessibility for recreation and boating, and support for waterfront projects aboard permanently-moored vessels. Permanently-moored vessel venues and attractions are a huge opportunity for the re-developing of the waterfront. In this moment, there are numerous historic vessels, including multiple decommissioned Staten Island ferries, that while no longer viable as voyaging, passenger-carrying vessels, can still provide valuable space for entertainment, education, and

environmental studies. I see a huge opportunity in utilizing these vessels as adaptable, floating environments, since they provide direct access to the waterways, while also maintaining the ability to relocate as needed as coastlines continue to adapt and change over the coming years. At present, many of these potentially powerful vessel restoration projects are being hindered by complicated jurisdictional parameters, and the lack of precedent for their legal and commercially viable use. It is my hope that with the support of the City and the organizations associated with the leadership of the Superfund cleanup projects, that we can explore new possibilities for the success of these important and timely projects.

Thank you for your time and attention to this pressing matter. The future of our City starts now, and it is up to all of us to make it cleaner and brighter for the next generations.

Sincerely,
Lindsay Cooper
Brooklyn, NY

Thank you,

A large black rectangular redaction box covering the signature area.

My Huynh

From: Voice of Gowanus [REDACTED]
Sent: Tuesday, May 28, 2024 12:23 PM
To: dec.sm.nrd
Cc: [REDACTED] Susannah Pasquantonio; Talia Hoch; Shahana Hanif; Mia Perez; Daniel Goldman; [REDACTED] Marcela Mitaynes; Michael Lynch; Erin Sager Vaughn; Steve Barton; Tim Ryder; Patrick Donovan; Nydia Velazquez; [REDACTED] Kirsten Gillibrand; Gil Ruiz; Kathleen Hochul; Hakeem Jeffries; Zoe Oreck; Sean W. O'Donnell; Lucy Lang; [REDACTED] Suzanne Novak; Michael Dulong; [REDACTED]; Lincoln Restler; Lincoln Restler
Subject: Public comment on NOAA Draft Assessment Plan for Gowanus Canal, NY
Attachments: Voice Of Gowanus comment-draft Assessment Plan for Gowanus Canal NY.pdf
Follow Up Flag: Follow up
Flag Status: Flagged

You don't often get email from [REDACTED]. [Learn why this is important](#)

ATTENTION: This email came from an external source. Do not open attachments or click on links from unknown senders or unexpected emails.

To the trustees, find our comment below -also attached as a PDF

Voice of Gowanus, the only grassroots community coalition in Gowanus advocating for a full and comprehensive environmental clean-up of our neighborhood, would like to underscore to the Trustees that the creation of this Trust confirms that the Potentially Responsible Parties have done irreparable harm to this area and its natural wildlife. The water quality in Gowanus will never be the same nor will the estuaries or land that surrounds it. And with that acknowledgement, the Trustees cannot ignore the risks to human health in this profoundly damaged environment.

Although this Trust will be used in an attempt to rebuild the aquatic ecosystem, Voice of Gowanus asserts that we must also factor humans into the equation and acknowledge that there will be thousands of people moving on top of profoundly toxic land. How can we even attempt to put a dollar amount on the projected impacts to the environment, wildlife, and the human health of thousands of future residents in Gowanus, many of whom will be living on contaminated former industrial sites, when we simply do not know the effects of leaving so much toxic contamination in our soil and water, and allowing that contamination to spread under the homes, schools, senior housing, and businesses of our community as climate change increases the flooding, rainfall, and sea levels in our area?

What we do know is science. The toxins in the soil will continue to off-gas and try to escape. They will continue to pollute the water and will become trapped inside our buildings. And thanks to science, we know the harmful effects that exposure to these toxins have on humans and wildlife.

The responsibility for human health and comprehensive local remediation of Gowanus land, air, and soil falls directly on the PRPs who polluted our local and global environments, and on the New York State, New York City, and United States governments, which are not doing enough to enforce the legally mandated restoration of Gowanus. The failure sadly falls on our publicly elected officials, in particular Governor Kathy Hochul, who has allowed real estate developers to build on deeply contaminated land without enforcing the laws that require a full remediation of the uplands and the surrounding deeply damaged ecosystem.

In Gowanus, the State and City of New York and the U.S. federal government will continue to expose future generations of humans and wildlife to serious health risks that are compounded by the flood risks and rising water tables caused by climate change. Going forward with this assessment at this point in time will fail to capture and address the harm that has been done to our community.

Sincerely yours,
Voice Of Gowanus



www.VoiceofGowanus.org

NYS Department Of Environmental Conservation Natural Resources Damages Section
c/o Alicia Pasos
625 Broadway, 14th Floor
Albany, NY

May 23, 2024

To the Trustees,

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Sincerely yours,
Voice Of Gowanus

Cc:
The Honorable Chuck Schumer
The Honorable Jo Anne Simon
The Honorable Kirsten Gillibrand
The Honorable Nydia Velázquez
The Honorable Kathy Hochul
The Honorable Daniel Goldman
The Honorable Shahana Hanif
The Honorable Jabari Brisport
The Honorable Hakeem Jeffries
The Honorable Marcela Mitaynes



The Trustees also received comments from 349 individuals, sharing the following common remarks:

I write to express my support for comprehensive Natural Resource Damages Assessment (NRDA) Plans for Newtown Creek and the Gowanus Canal, and to urge the natural resource Trustees to expand the scope of natural resource injuries and damages considered in the NRDA Plans, increase public engagement, and ensure meaningful restoration in these waterways and communities.

The natural resources on Newtown Creek and the Gowanus Canal, including the birds, fishes, and aquatic plants, provide invaluable benefits to both humans and the environment. These natural resources have been grievously injured by industrial activities on both waterways over the last several hundred years. Through the NRDA, the Trustees--on behalf of the public--can ensure adequate damages are awarded to fund restoration within these waterways that will benefit the environment and community for generations to come.

However, there is a danger that the draft NRDA Plans could prematurely narrow the scope of the assessments and omit timely community assessment and monitoring that could inform assessed shoreline types and community use. To ensure meaningful restoration within Gowanus Canal and Newtown Creek, the draft NRDA Plans must be revised to address the following concerns:

1. Expand the scope of the NRDA Plans to:

- Address known contamination from other types of contaminants such as volatile organic compounds (VOCs), polychlorinated biphenyls (PCBs), hazardous pesticides, and metals such as lead, mercury, and copper. The draft NRDA Plan for Gowanus Canal only considers polycyclic aromatic hydrocarbons (PAHs) as the primary contaminant of concern for assessing ecological injury to natural resources in Gowanus Canal.

There are multiple hazardous substances to which natural resources have been exposed as a result of discharges or releases into Gowanus Canal, which can have a compounding effect on aquatic organisms. These other contaminants must also be considered primary contaminants of concern in the NRDA.

- Assessing impacts to the intertidal habitat in Gowanus Canal. The NRDA plan appears to consider impacts solely to the aquatic environment. Even if constrained by bulkheads and other development, the intertidal habitat must be included in the NRDA Plan for Gowanus Canal because it represents critical habitat and has been severely impacted by decades of contamination.

- Avoid the use of bioindicators. Bioindicators are living organisms that represent a single tool to assess environmental health.

Their use does not fully capture the accumulated impacts and ecosystem changes that have occurred over the course of nearly 200 years and cannot fully evaluate species richness, biodiversity, biotic potential, species long extirpated from an ecosystem, or alternative stable states that effectively limit keystone species. The use of bioindicators provides a narrow lens of limited scope that cannot accurately assess species absence,

especially those that vary seasonally. Consequently, with such limited capacity using bioindicators, more conventional methods need to be utilized to determine environmental damages.

2. Utilize public engagement opportunities and community knowledge to inform the NRDA Plan:

- Consider pilot restoration projects along the waterways using existing community knowledge and priorities to do so. The neighborhoods surrounding both waterways are being extensively redeveloped, providing opportunities for stormwater maintenance, habitat restoration, and community amenities. The Trustees must ensure restoration opportunities that become available during new development are not missed.

- Incorporate community knowledge and prior work into the NRDA where appropriate. There is considerable community knowledge of existing shorelines and community use of the Gowanus Canal and Newtown Creek. Newtown Creek Alliance, Gowanus Canal Conservancy, Riverkeeper, and others have published detailed vision plans for restoration, and some of those plans could be implemented prior to remediation, or pilot studies beginning now could lay the groundwork for future restoration efforts. These plans detail local knowledge of intertidal habitat, species usage within the waterways, and community use.

Newtown Creek and the Gowanus Canal are iconic New York City waterways and have withstood generations of industrial, commercial, and residential development and contamination. The NRDA Plans for each waterway provide a unique opportunity to ensure that damages to these famously polluted areas are properly assessed and used to restore the environment and improve the surrounding communities. I urge the Trustees to work closely with relevant agencies and stakeholders, including the Environmental Protection Agency, the City of New York, and the local community to ensure the NRDA Plans will provide the maximum restoration benefit within each waterway in a timely fashion.

I appreciate your attention to this important matter.

Thank you,