It's Time to *List* the Gowanus Uplands
Brooklyn, New York

Lenny Siegel
September, 2024

The *New York Times* calls the area around the Gowanus Canal a "Toxic Corner of Brooklyn," and it notes the impressive boom in residential construction in a formerly industrial area. While the state of New York, developers, responsible parties such as National Grid, and U.S. EPA have spent a great deal of time and money investigating and addressing the contamination in both the Canal and its uplands, the current and future residents and other building occupants cannot be adequately protected until there is a comprehensive approach to the cleanup of the area.[1]

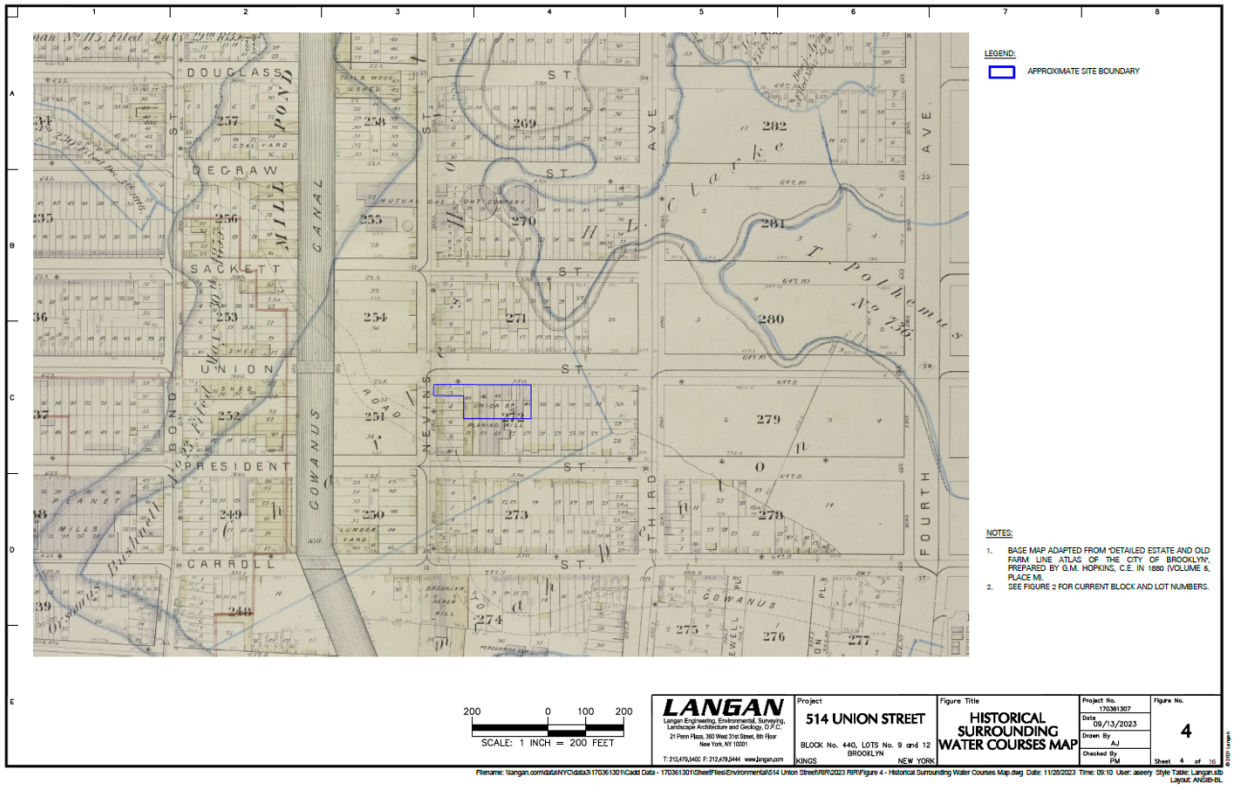
In 2009 I joined others in successfully urging the U.S. Environmental Protection Agency (EPA) to add Brooklyn's Gowanus Canal to the Superfund National Priorities List (NPL).[2] Not only was the Canal itself listed, but the listing gave EPA the authority to regulate contamination entering the canal from surrounding, low-lying wetlands. Canal cleanup is plodding, and actions to diminish sewer overflow are even slower, but there is a wider problem: As thousands of new housing units undergo construction near the Canal, underground plumes of volatile chlorinated compounds such as trichloroethylene (TCE) threaten both existing and new homes with the intrusion of toxic vapors. Many properties are subject to professionally conducted, state-overseen

[1] Winston Choi-Schagrin and Jordan Gass-Pooré, "When a Real Estate Boom Came to a Toxic Corner of Brooklyn," *New York Times,* September 5, 2024, https://www.nytimes.com/2024/09/05/nyregion/gowanus-canal-toxic-real-estate-brooklyn.html

[2] Lenny Siegel, "Listing Brooklyn's Gowanus Canal: A No-Brainer," Center for Public Environmental Oversight," http://www.cpeo.org/pubs/Gowanus.pdf

brownfields investigations leading to vapor mitigation. The area-wide "Soil Vapor Intrusion Investigation" is a step in the right direction, but it does not appear to be providing the holistic review required to protect the evolving neighborhood. Authorized by EPA's 2017 rulemaking on Subsurface Intrusion, the toxic Gowanus uplands should also be added to the NPL.[3]

Neighbors of the Canal, in organizations such as Voice of Gowanus, not only campaigned for the original listing, but they have been watchdogging government agencies' activities there ever since, participating as well in EPA's Gowanus Canal Community Advisory Group (CAG).[4] They argue that EPA's 2013 Record of Decision (ROD) for Canal cleanup already gives the Federal agency the authority to oversee uplands cleanup. On September 10 of this year, they wrote, "EPA must at long last become lead regulator for all upland sites, especially the MGP sites and nearby parcels, in accordance with ROD requirements and to protect all features of remedial actions."[5] If that can be done without going through the lengthy listing process, it could expedite heightened EPA activity.



Prior to development, the Gowanus area was a swamp. It was drained a long time ago, but the water remains.

[3] U.S. EPA, "Addition of a Subsurface Intrusion Component to the Hazard Ranking System," [EPA–HQ–SFUND–2010–1086; FRL–9956– 58–OLEM], *Federal Register*, January 9, 2017, p. 2760, https://www.govinfo.gov/content/pkg/FR-2017-01-09/pdf/2016-30640.pdf.

[4] My camera malfunctioned when I last visited Gowanus in May 2024. Members of Voice of Gowanus have been kind enough to supply me with photos for this report, but I do not speak for the organization nor do they pay me for my services.

[5] Linda LaViolette and Jack Riccobono, Letter to EPA Deputy Assistant Inspector General for Audit Shelley Howes, Voice of Gowanus, September 10, 2024 p. 2

> Situated at the bottom of a topographic bowl, the Gowanus marshlands were once nourished by more than a dozen sparkling streams. Most of these rills and freshets haven't been seen for 150 years; following modern convention, engineers either buried them or corralled them into pipes as they extended the city's streets.[6]

Those former waterways, combined with basements and more than a century-and-a-half of other subsurface infrastructure, have created a labyrinth of preferential pathways for groundwater and even soil vapors (the gases found between the shallow water table and the surface). Without understanding subsurface flows, one cannot predict which buildings will be at risk of vapor intrusion in the future. Furthermore, any attempt to remove the contamination will be threatened with potential re-contamination. That is, the current strategy of installing mitigation in buildings with vapor intrusion, as well as in new buildings above or near subsurface contamination, is a proper interim response, but until contamination is measured and mapped for the entire area, that response must be regarded as temporary.

In June 2024 New York State's Department of Environmental Conservation (DEC) reported that it "is completing a broader groundwater assessment of the Gowanus Area to better understand how the implementation of the DEC remedies and the Gowanus Canal remedy are impacting the overall groundwater conditions."[7] This would be great, but it's long overdue. Such an assessment should help answer these concerns, but thus far DEC has neither explained the extent of the study or offered a completion date.

The Gowanus area suffers the confluence of four environmental disasters.

1. Contamination of Canal sediment with coal tar and other hazardous substances, primarily from the three former manufactured gas plants abutting the Canal.[8] This is what led to the Superfund listing.
2. Releases from the sewer system, which collects stormwater as well as residential and commercial wastewater, during rainstorms. This is called combined sewer overflow.
3. The presence of coal tar and other petroleum hydrocarbon releases from the three former manufactured gas plants that abut the Canal. Historically, much of this contamination has flowed into the Canal.
4. TCE, PCE, and other chlorinated volatile organic compounds in groundwater and soil gas that threaten to intrude into overlying buildings—a pathway known as vapor intrusion.

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[6] Elizabeth Royte, "The Hidden Rivers of Brooklyn," Harpers, March, 2016, https://harpers.org/archive/2016/03/the-hidden-rivers-of-brooklyn/

[7] New York State Department of Environmental Conservation, "Frequently Asked Questions (FAQs) at Community Meetings Regarding Environmental Contamination in the Gowanus Canal Area," June, 2024, p. 9 https://dec.ny.gov/sites/default/files/2024-06/gowanusareafaqs.pdf

[8] Primarily during the latter portion of the 19th Century and the early 20th Century, manufactured gas plants produced gas for lighting, cooking, heating, and industry from coal and other hydrocarbons, creating massive quantities of waste.

Cleaning the Canal

The 100-foot-wide Gowanus Canal stretches 1.8 miles from New York Harbor into the heart of Brooklyn, but unlike other Canals built in the 19th Century, it is a Canal to nowhere. Numerous industries—paper mills, tanneries and chemical plants, as well as the gas plants—operated on its shores. Over time, manufacturers and service businesses, many of which used chlorinated solvents, dotted the nearby uplands. U.S. EPA explains:

> As a result, the Gowanus Canal is one of the nation's most seriously contaminated water bodies. Canal sediment contain high levels of more than a dozen contaminants. Contaminants include including polycyclic aromatic hydrocarbons, polychlorinated biphenyls and heavy metals such as mercury, lead and copper.[9]

Despite opposition from the administration of New York City Mayor Michael Bloomberg, this contamination led EPA to place the Canal itself, but not adjacent uplands—except as they pollute the canal—on the Superfund National Priorities List in 2010. At the time I called listing a "no-brainer."

EPA's plan to clean the Canal, memorialized in its 2013 Record of Decision, relies primarily upon the removal of sediment and the capping of the exposed bottom of the Canal. Dredging will remove the soft sediment from sewer and industrial discharges in three segments, eventually shipping nearly 600,000 cubic yards of contaminated sediment off site for dewatering and, for portions with high concentrations of coal tar, thermal treatment.

[9] U.S. EPA, "Gowanus Canal, Brooklyn, New York: Cleanup Activities," https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.cleanup&id=0206222

Following dredging of the upper portions of the Canal, cement or a similar substance will be mixed with the residual sediment to "form a five-foot solid layer that will prevent mobile liquid tar from moving upwards into the water."[10] Above that layer, cleanup crews will lay a multi-layer cap consisting of clay, activated carbon, sand, concrete mats, and more sand to prevent the upward migration of residual contamination and create a basis for aqueous habitat restoration.

National Grid, the current owner for the former manufactured gas plants, is primarily responsible for conducting and paying for the remedy, which is expect to cost hundreds of millions of dollars. Most or all of this expense will be paid by its ratepayers.

Combined Sewer Overflow

Like many other older cities, Brooklyn has a sewer system that combines wastewater and stormwater. During storm events, sewage treatment plants cannot handle the volume of water in the pipes, so the overflow from the Gowanus area has historically poured into the Canal and often backed up onto area streets. This is a type of public health threat not normally addressed by Superfund.

Beginning 1910, New York City constructed a series of "flushing tunnels" designed to cleanse the Canal by pumping New York Bay water into the Canal. Even the modern version, completed in 2014, is inadequate. So in 2013 the City agreed to construct two huge stormwater

[10] *ibid.*

retention tanks, with a combined capacity of 12 million gallons, on the banks of the Canal, to limit sewage discharges into the Canal.

Unfortunately, while raw sewage continues to overflow into the Canal during rainstorms, the work has fallen years behind schedule. In March 2024 the EPA Office of Inspector General found, "Construction of the two combined sewer overflow, or CSO, tanks for the Gowanus Canal Superfund site is approximately six-and-a-half years behind the original schedule… Multiple factors contributed to this delay:"[11] Under a new EPA order, completion is now targeted for 2028 and 2029.

Manufactured Gas Plants

Three manufactured gas plants (MGPs) operated along the Canal: the Fulton Works, Citizens Gas, and Metropolitan. As the eventual owner of these properties, National Grid is the principal responsible party, but the City now owns portions of the first two, so it is also a responsible party. The New York State Department of Environmental Conservation (DEC) is the primary regulator for the MGP cleanup, but since the placing of the Canal on the Superfund list it has coordinated its oversight closely with U.S. EPA.

Sheet-Pile Bulkhead

National Grid, with DEC and EPA oversight, has installed steel sheet pile barrier walls along the Canal to in an effort to prevent continued migration of coal tar and other contaminants into the Canal. While cleaning the Canal doesn't make sense as long as pollution is entering, neighbors are concerned that water that previously drained into the Canal is mounding behind the

[11] Office of Inspector General, U.S. EPA, "Multiple Factors Contributed to the Delay in Constructing Combined Sewer Overflow Tanks at the Gowanus Canal Superfund Site in New York City," 24-P-0029, March 21, 2024, https://www.epaoig.gov/sites/default/files/reports/2024-03/_epaoig_20240321-24-p-0029_cert.pdf

barriers, raising groundwater levels and even adding to already periodic flooding events. In their September 10, 2024 letter, they asserted that the Canal remedy is "dramatically changing the movement of groundwater in unpredictable ways."[12]

On the other hand, at the Citizens site, DEC reports, "A hydraulic relief system was installed behind the bulkhead to prevent mounding of groundwater behind the wall."[13] This is a subsurface drain system. Based upon Fall, 2023 groundwater sampling, National Grid's consultant concluded, "Post-remediation groundwater elevations and interpolated flow directions at the Site remain generally consistent with pre-remediation conditions."[14] DEC further promised in its June 2024 FAQ document, "If it is determined that a remedy or subsequent development may alter the mobility and migration of a contaminant, such as the installation of bulkhead, additional measures … are implemented to help prevent contaminant migration under the governing agreement."[15]

This document is where DEC promises a "broader groundwater assessment," but there is no public schedule for its completion. DEC's failure to conduct such an assessment before remedial construction and residential development is a fundamental weakness in DEC's Gowanus program. If the agencies had addressed the area as a whole from the start, they would have created—and made available to the public—a conceptual site model based upon available data and updated it continuously as the various site investigations generated new data. That model should have included all forms of contamination, not just the hydrocarbons associated with MGP operations. That would have made it easier to implement "additional measures" and to assigned responsibility to each of the parties—polluters, property owners, and developers—in the area.

As yet, there is no permanent cleanup plan for the Metropolitan and Fulton MGP plants, but DEC reports that 80,000 tons of "source material and contaminated soil" have been removed from the Citizens site and treated thermally off site. At least 750,000 gallons of contaminated water have been removed, and 23 wells are recovering coal tar from the subsurface. This sounds impressive, until one learns that the original 2007 plan to excavate soil to eight feet was replaced by a plan to cover the site with hardscape or two feet of clean soil.

This was supposed to meet DEC's standards for restricted residential use, which is exactly what is planned for much of the site—under the enticing appellation of Gowanus Green.[16] But it's not clear how much more cleanup will take place:

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[12] Linda LaViolette and Jack Riccobono, Letter to EPA Deputy Assistant Inspector General for Audit Shelley Howes, Voice of Gowanus, September 10, 2024 p. 2

[13] New York State Department of Environmental Conservation, "Former Citizens Gas Works (C224012, C224012B and 224012) Brooklyn, NY, Status of Cleanup Activities," August 31, 2024, p.2, https://extapps.dec.ny.gov/data/DecDocs/C224012/Fact%20Sheet.BCP.C224012.2022-08-31.Citizens_MGP_Community_Update.pdf

[14] Michael Benoit, "Fall 2023 Post-Remediation Groundwater Monitoring Report, Former Citizens Gas Works Manufactured Gas Plant Site," Arcadis of New York, April 5, 2024, p. 4, http://www.citizensmgpsite.com/reports/4-5-2024%20Fall%202023%20Post-Remediation%20Groundwater%20Monitoring%20Report%20Former%20Citizens%20Gas%20Works%20Manufactured%20Gas%20Plant%20Site_No_Attachments.pdf

[15] NYSDEC FAQs, pp. 8, https://dec.ny.gov/sites/default/files/2024-06/gowanusareafaqs.pdf

[16] New York State Department of Environmental Conservation, "Explanation of Significant Difference, Former Citizens Manufactured Gas Plant (MGP)," August, 2020, https://extapps.dec.ny.gov/data/der/factsheet/c224012esd.pdf

> In March 2023, DEC and EPA requested that National Grid complete additional remediation work at the Former K-Citizens MGP site to address remaining contamination. National Grid declined to perform this additional work, and discussions between DEC and National Grid are ongoing. EPA and DEC continue to discuss next steps to be protective of public health and environment, including the Gowanus Canal.[17]

However, in May 2024 Voice of Gowanus sent a letter to EPA's Regional Administrator charging, "National Grid (NG), a major federal Superfund Potentially Responsible Party ("PRP"), is effectively refusing to remediate the Citizens Manufactured Gas Plant site (MGP) to Region 2 requirements that would allow site parcels to be safely reused for a school and low-income residences."[18] Residents remain hopeful that EPA will soon insist on a more thorough cleanup.

Citizens MGP Site/Public Place/Gowanus Green

Furthermore, site documents for the Citizens site largely ignore the presence of chlorinated vapor-forming chemicals in the subsurface, even though they are present at unacceptable concentrations and pose the greatest risk of vapor intrusion. The 2005 Remedial Investigation explained, "In addition to toluene, other VOCs [volatile organic compounds] were detected in soil vapor at levels exceeding the NYSDOH Upper Quartile for Outdoor Air. However, these VOCs (chlorinated solvents, chlorofluorocarbons [CFCs]) are not related to MGP operations and

[17] NYSDEC FAQs, p. 4, https://dec.ny.gov/sites/default/files/2024-06/gowanusareafaqs.pdf
[18] Linda LaViolette and Jack Riccobono, Letter to EPA Region 2 Administrator Lisa Garcia, Voice of Gowanus, May 6, 2024 p. 2

therefore are not discussed, as they do not relate to the nature and extent of MGP-related impacts at the site."[19]

But if one looks closely, there is some sampling data. Buried in the Remedial Investigation are soil vapor results for chlorinated VOCs. Trichloroethylene (TCE) was found in one sample at 15 parts per billion by volume (ppbV) (80.6 micrograms per cubic meter, or µg/m^3). That's high enough, under New York State Department of Health's [DOH] Matrix A, to require mitigation even if no contamination is found in indoor air (if there's a building, of course). The highest tetrachlorethylene (PCE) result was 1220.4 µg/m^3, which under Matrix B would require mitigation in the absence of indoor air contamination. Vinyl chloride was found at 71 ppbV (181.5 µg/m^3).[20] This is the tip of the iceberg of Gowanus-area vapor intrusion risk.

Vapor Intrusion and Groundwater

Indeed, the Gowanus area is rife with cleanup projects managed under DEC's Brownfields Program and State Superfund Program. DEC now says there are 49 sites, many of which involve more than one property or building. Many of these sites are adjacent to existing residences, while others are slated for residential redevelopment. Most of them have vapor-forming chemicals in the groundwater and soil gas. That is, they are likely vapor intrusion sites.

Aptly named, vapor intrusion describes the upward migration of volatile hazardous substances from the contaminated soil gas or groundwater that underlies buildings. That is, people in their homes and other buildings may be breathing low, but still hazardous, levels of toxic gases, especially chlorinated solvents such as TCE and PCE.[21] Since groundwater contamination moves with groundwater flow, buildings remote from source areas—properties where the contamination was released into the subsurface—are potentially subject to vapor intrusion. Exposure to these chemicals, even at very low concentrations, increases the risk of a variety of cancers, neurological diseases such as Parkinson's, and fetal heart malformations when a pregnant woman is exposed for even a short period during the first trimester of pregnancy.

If indoor air or subsurface sampling confirm the presence of unacceptable levels of these compounds, and they are shown *not* be present from household chemicals, then contractors for DEC, developers, property owners, or other responsible parties will install mitigation systems. The most common form of mitigation is a sub-slab depressurization system, which is designed to prevent vapors from rising into buildings by "vacuuming" the subsurface. This approach is based upon decades of experience protecting homes and other structures from naturally occurring radon gas intrusion.

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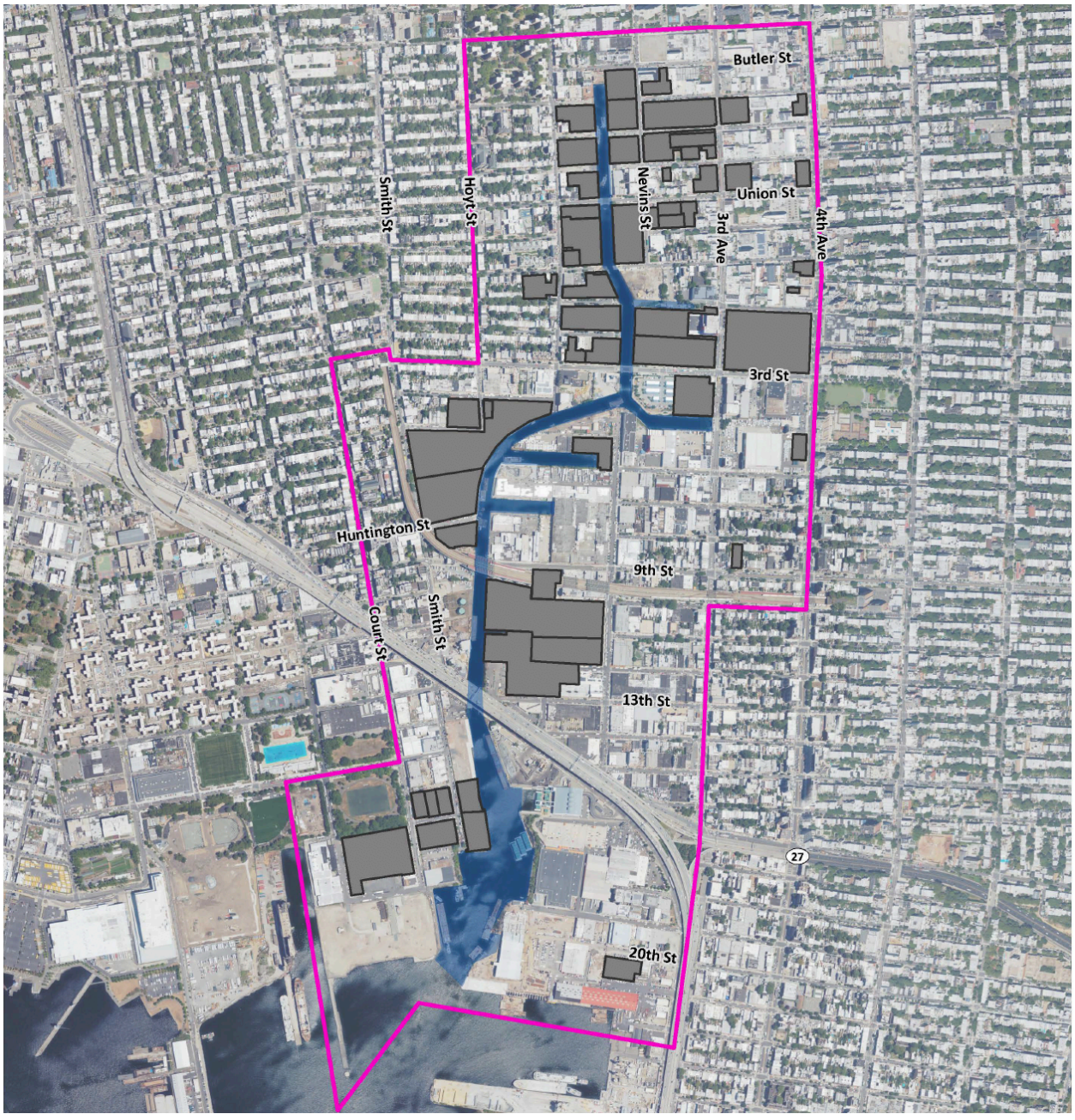
[19] David Terry, GEI Consultants, "Final Remediation Investigation Report, Carroll Gardens/Public Place," October, 2005," p. 68. https://extapps.dec.ny.gov/data/DecDocs/C224012/Report.BCP.C224012.2005-10-10.Final_RI_Report.pdf

[20] *ibid*., pp. 258-259 of PDF. DOH has two matrices to aid in vapor intrusion response decisions. Matrix A is shown below. By basing decisions whether to mitigate structures on soil gas concentrations as well as indoor air levels, the matrices are designed to provide protection should a pathway from the subsurface to the indoors open up in the future. Note that New York's screening levels for PCE are substantially less protective than California's.

[21] For detailed, but readable background on vapor intrusion, see Lenny Siegel, "A Stakeholder's Guide to Vapor Intrusion: Update," CPEO, November, 2015

I have reviewed documents for many of these projects. The investigations are professional, and for new construction, mitigation systems—designed to prevent vapors from rising into living spaces—are planned or are already installed. In fact, numerous site investigations were actually triggered by redevelopment proposals.



Area-Wide Vapor Intrusion Study Area with Remediation Sites Highlighted

However, despite its two decades of leadership addressing vapor intrusion, DEC is behind the curve in Brooklyn. Beginning 2005, DEC evaluated more than 400 pollution cases in other parts of the state, finding that dozens of them required vapor intrusion investigations. The agency quoted me in a press release: I said, “Of all the states and Environmental Protection Agency

regions, New York has the most systematic and proactive program for identifying and addressing vapor-intrusion sites."[22]

The fundamental problem is that the Gowanus vapor intrusion projects were initially conducted property by property. There was no systematic approach. In fact, I have yet to find a groundwater plume map for the area, and I have found very little information about groundwater flow. That means that it's difficult to predict which properties beyond the Brownfield and State Superfund project boundaries are at greatest risk of vapor intrusion. That includes brownstones, apartment buildings, and even a shelter for immigrants.

Thus, there is no strategy for cleaning up vapor-forming chemicals in the uplands. Furthermore, there is no practical way to allocate responsibility for the concentrations of trichloroethylene (TCE) and tetrachlorethylene (PCE) that have been found throughout the neighborhood. Finally, thus far there is no way to know how the Canal barrier walls are influencing the surface and sub-surface flow of water and the associated contamination throughout the area.

Area-Wide Sampling

To their credit in the fall of 2023, DEC, DOH, and U.S. EPA initiated a "Comprehensive Soil Vapor Intrusion Investigation" in the area. Essentially, they drew a boundary line on the map and offered to sample indoor air and/or sub-slab soil gas at buildings within a 100-block polygon around the northern half of the Gowanus Canal. That it, in addition to the Brownfields properties undergoing redevelopment and the subjects of New York State Superfund projects, DEC undertook to sample indoor air and sub-slab soil gas at homes and businesses throughout the area during the 2023-2024 heating season—the appropriate time of year for indoor air investigations.

In late August, 2024, DEC reported the results. In my view, based upon the published report, the investigation was conducted properly and professionally. However, due to DEC's privacy policy, we do not know which buildings were sampled, let alone the building-by-building results.

DEC began by mailing letters to the owners of 610 properties. The owners of 128 of the properties agreed to allow access, but due to practical difficulties only 113 were sampled. DEC's contractor, Ecology and Environment Engineering (E&E) sampled basement and first-floor air in most buildings, and it was able to collect sub-slab vapor samples in 83 buildings. Nine buildings had very shallow groundwater or standing water in their basements. In such cases, E&E collected water samples. Comparing results to its two matrices, DEC is recommending that mitigation systems be installed in 15 buildings. Those recommendations are based upon New York State Department of Health's "Soil Vapor/Indoor Air" Matrices A & B. Mitigation may be triggered by indoor air levels, sub-slab vapor concentrations, or a combination of both. I have included below the Matrix that applies to trichloroethylene (TCE) and three other chlorinated compounds.

[22] Cited in "N.Y. Initiative Uncovers Need to Mitigate Some Vapor Intrusion," *Environmental Protection*, March 16, 2009, https://eponline.com/Articles/2009/03/16/NY-Initiative-Uncovers-Need-to-Mitigate-Some-Vapor-Intrusion.aspx?admgarea=tips

Soil Vapor/Indoor Air Matrix A

May 2017

Analytes Assigned:
Trichloroethene (TCE), *cis*-1,2-Dichloroethene (*c*12-DCE), 1,1-Dichloroethene (11-DCE), Carbon Tetrachloride

	INDOOR AIR CONCENTRATION of COMPOUND (mcg/m³)		
SUB-SLAB VAPOR CONCENTRATION of COMPOUND (mcg/m³)	< 0.2	0.2 to < 1	1 and above
< 6	1. No further action	2. No Further Action	3. IDENTIFY SOURCE(S) and RESAMPLE or MITIGATE
6 to < 60	4. No further action	5. MONITOR	6. MITIGATE
60 and above	7. MITIGATE	8. MITIGATE	9. MITIGATE

While two of the 15 recommendations are based upon levels of petroleum hydrocarbons alone, most are due to the concentrations of chlorinated volatile organic compounds, particularly TCE, as shown in Table 3-1 from the report. Buildings recommended for mitigation are spread around the northern Canal area, with more on the west side. It's too soon to draw conclusions from the locations, however, because not every building was sampled. DEC expects to sample more buildings during the 2024-2025 heating season. Some might be outside the current study area.

Table 3-1 Gowanus Canal Area-wide SVI Building Mitigation Summary
2023/2024 Heating Season, Brooklyn, New York

Structure ID[1]	1,1,1-Trichloroethane (TCA)	1,1-Dichloroethene	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene (Mesitylene)	Benzene	Carbon Tetrachloride	Cis-1,2-Dichloroethylene	Cyclohexane	Ethylbenzene	m,p-Xylene	Methylene Chloride	Naphthalene	N-Heptane	N-Hexane	O-Xylene (1,2-Dimethylbenzene)	Tetrachloroethylene (PCE)	Toluene	Trichloroethylene (TCE)	Vinyl Chloride
GC005	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	ID	NFA	NFA	NFA	NFA	NFA	NFA	Mitigate	Monitor
GC006	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	Mitigate	NFA
GC008	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	Mitigate	NFA
GC016	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	Mitigate	NFA
GC024	NFA	NFA[2]	NFA	NFA	NFA	NFA[2]	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	Mitigate	NFA	Mitigate	NFA[2]
GC041	NFA	NFA	NFA	NFA	NFA	NFA	Mitigate	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	Mitigate	NFA	Mitigate	NFA
GC076	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	Mitigate	NFA
GC095	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	Mitigate	NFA
GC108	NFA	NFA	NFA	NFA	NFA	Mitigate	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	Mitigate	NFA
GC112a	NFA	NFA[2]	Mitigate	NFA	NFA	NFA[2]	NFA	NFA	Mitigate	Mitigate	NFA	NFA	NFA	NFA	Mitigate	NFA	NFA	NFA	NFA[2]
GC119	NFA	NFA	ID	ID	NFA	NFA	NFA	NFA	NFA	NFA	ID	NFA	NFA	NFA	NFA	NFA	NFA	Mitigate	NFA
GC120	NFA	NFA	Mitigate	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	Mitigate	NFA	Monitor	NFA
GC121	NFA	NFA	ID	ID	NFA	NFA	NFA	Mitigate	NFA	ID	NFA	NFA	NFA	NFA	ID	Mitigate	Monitor	ID	NFA
GC122	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	NFA	Mitigate	NFA	NFA	NFA
GC137	NFA	NFA	Monitor	NFA	Mitigate	NFA	NFA	NFA	Monitor	Mitigate	NFA	NFA	NFA	NFA	Mitigate	NFA	Mitigate	NFA	Monitor

Notes:
1. Analytical results for all analytes tested are provided in the tables in Appendix C.
2. Detection limit for this analyte is elevated related to values on the NYSDOH SVI Decision Matrix; however, structure recommended for mitgation based on other analytes.

Key:

NFA	No Further Action
ID	Identify source(s) and resample or mitigate
Monitor	Sample on a recurring basis
Mitigate	Install Soil Vapor Intrusion mitigation system

One of the problems in collecting comprehensive data is that many homes within the study area are rentals. New York has a law requiring landlords to disclose vapor intrusion findings to tenants if toxic gas concentrations exceed state guidance levels. However, the state does not have the authority to require them to grant access for sampling. Tenants in the area, like those in

Greenpoint, another Brooklyn neighborhood subject to area-wide vapor intrusion investigation, report that landlords, particularly owners of small residential properties, are reluctant to cooperate. DEC, in its August 2024 Community Update, recognized this:

> Additionally, if you are a tenant in a building in the Gowanus Canal area wide soil vapor intrusion area and would like to request sampling, contact your landlord/property owner to request that the property owner comply with the State's sampling requests. DEC and DOH will work with the owners of properties in the area and conduct additional investigations as appropriate.[23]

Even in the best of circumstances, it takes a while to arrange sampling. Furthermore, there is strong evidence supporting DEC's policy of conducting indoor air testing during the heating season. Thus, it will be a while before we know how widespread unacceptable vapor intrusion is occurring in the homes near the Gowanus Canal. Meanwhile, the agencies have publicly reported at least two buildings in the area where people were breathing TCE concentrations above state standards. Contamination at other buildings might not have been publicized due to the state's privacy policy.

Ventilation Point inside Royal Palms Shuffleboard Club

[23] New York State Department of Environmental Conservation, "Gowanus Canal Area-Wide Soil Vapor Intrusion Investigation," August, 2024, p. 1, https://extapps.dec.ny.gov/data/der/factsheet/gowanusupdate0824.pdf

Royal Palms Shuffleboard Club

The Royal Palms Shuffleboard Club is a popular community gathering spot on Union Street, roughly 400 feet from the Gowanus Canal. It's a one-story brick building that since 2013 has had an elevated wooden platform floor. In April 2021, DEC notified the Club's owners that unacceptable levels of TCE had been found in the building, due to vapor intrusion. Sampling had taken place because of a proposal to redevelop the former manufacturing site. However, most of the Club's thousands of patrons were unaware that they were breathing contaminated air until it was reported in the *Gothamist* in March of 2023.[24] Meanwhile, in September 2022 DEC-supervised crews installed a mitigation system that quickly reduced indoor air contamination:

> The SVI [soil vapor intrusion] mitigation system was designed to depressurize/mechanically ventilate the existing void space between the finished floor platform and concrete building slab with four ventilation points connected to a roof-mounted blower.

543 Union Street

This four-story former factory building sits 100 feet from the Gowanus Canal. Today it is a loft condominium building containing homes and businesses. As part of a nearby vapor investigation, in February 2023 DEC and New York State DOH sampled the basement and business units at 543 Union. It found levels high enough to trigger an immediate response: the installation of stand-alone air purifiers and a basement ventilation system. However, that proved

543 Union Street

[24] Jordan Gass-Pooré, "Toxic fumes detected at popular Brooklyn shuffleboard club for past 2 years," *Gothamist*, March 9, 2023, https://gothamist.com/news/toxic-fumes-detected-at-popular-brooklyn-shuffleboard-club-for-past-2-years

only partially successful, so the state brought in U.S. EPA's Removal Action Branch to carry out interim mitigation measures and plan for a permanent response.

> To further prevent the migration of vapors from the basement to upper levels, the basement wood-planked ceiling was cleaned and sealed with waterproofing fabric and paint. An additional self-adhering membrane, impermeable to air, moisture, vapor, and water was installed over the entire basement ceiling. Additionally, the Property Manager unclogged drainage pathways in the basement floor to facilitate better water flow and drainage. The analytical results of recent indoor air samples collected from the building indicated that the concentrations of TCE in the occupied units are well below both the DOH's and EPA's action levels and protective of public health.[25]

Redevelopment

The Gowanus uplands are experiencing an explosive, visible construction boom. Spurred by an 82-block 2021 City rezoning and state incentives, high-rise—up to 30 stories—residential buildings are rising near the Canal. In February, 2024 Governor Kathy Hochul participated in a groundbreaking, highlighting 18 new housing developments expected to provide more that 5,300 homes, including more than 1,400 affordable units.[26] That's in addition to the City's promised Gowanus Green project on city-owned lands formerly owned by Citizens Gas:

> Not on Hochul's list, the six-building development will include 950 total homes, with 475 apartments set aside for households earning up to 50 percent of the Area Median Income and the others varying for those earning up to 120 percent, as well as including some affordable co-ops.[27]

Of course, that depends upon National Grid conducting the cleanup required by DEC and EPA.

At most, if not all of these residential developments on contaminated land, DEC is only permitting "restricted residential" uses. That means that each new buildings must be under single management, exposed areas must be covered with two feet of clean soil, and no edible gardening is permitted. Not only do the high rises planned or constructed easily meet those requirements, but standard mitigation systems are more cost effective because of the low footprint to living space ratio. On the other hand, mitigation should be regarded as a temporary solution. I doubt that any of the land beneath the new buildings has adequately been cleaned up.

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[25] NYS DEC FAQs, p. 2, https://dec.ny.gov/sites/default/files/2024-06/gowanusareafaqs.pdf; See also U.S. EPA, "EPA to Mitigate Vapor Intrusion at 543 Union Street, Brooklyn, New York," December , 2023, https://response.epa.gov/sites/16144/files/543%20Union%20Street%20Community%20Update%20REMOVAL%20December%202023.pdf

[26] "Governor Hochul Advances 18 Proposals to Build More than 5,300 Units of Housing, Including Affordable Housing, in Gowanus," Office of the Governor, New York State, February 9, 2024, https://www.governor.ny.gov/news/video-audio-photos-rush-transcript-governor-hochul-advances-18-proposals-build-more-5300-units; see also Gabriele Holtermann, "Governor announces 18 Gowanus housing developments with 5,300 units at Nevins Street groundbreaking," *Brooklyn Paper*, February 9, 2024, https://www.brooklynpaper.com/governor-gowanus-housing-developments

[27] Anna Bradley-Smith, "Extensive Construction in Gowanus Forecasts a Very Different Neighborhood Ahead," *Brownstoner*, March 25, 2024, https://www.brownstoner.com/development/gowanus-rezoning-impact-new-construction-affordable-housing

Neighbors of the new buildings may have other reasons to question all the development, but the upside of all the projects is that they brought dozens of contaminated sites and vapor-forming chemical plumes to light. Of course, that doesn't guarantee that the area will be cleaned up or the public, current and future, will be protected.

The Need for Superfund Authorities

New York State's Department of Environment Conservation, in coordination with the state's Department of Health and U.S. EPA, has been conducting and overseeing environmental investigations and remediation along Brooklyn's Gowanus Canal for years. Other than EPA-led remediation of the Superfund-listed Canal itself, most of the subsurface investigation has been property by property.

The area-wide Soil Vapor Intrusion investigation is a major step in the right direction, but it's not enough. Mitigation decisions are based on current indoor air and sub-slab vapor sampling, but I have not yet seen a plan to conduct future sampling based upon the likely migration of subsurface contamination. Furthermore, the site-specific cleanup documents do not appear to consider how remediation on one property might affect the pattern of contamination on nearby properties.

In general, there is little information about the interaction of the many projects in the area. I have not found a groundwater plume map, and there is scant data about groundwater flows. The environmental response in the area would be strengthened if the vapor intrusion response in the Gowanus uplands, the historically industrial area along the Canal, were placed on the "Superfund" National Priorities List (NPL) or incorporated into the existing Canal Superfund listing.

With dozens of properties known to have experienced toxic releases, even more properties possibly impacted by vapor intrusion, and large development projects planned or underway, it's

well past time to take a holistic approach. Addressing the uplands under the Superfund program would bring additional EPA resources, as well as EPA's authorities under the Superfund law (Comprehensive Environmental Response, Compensation, and Liability Act, or CERCLA.) In general, EPA is better equipped to assign responsibility in areas with multiple historical polluters. As in Brooklyn's Greenpoint district, which is now listed on the NPL, DEC could continue its work, in cooperation with EPA.

When the Gowanus Canal, minus the uplands, was added to the NPL in 2010, it was difficult to list sites where people don't drink the water. However, in early 2017 EPA promulgated a rule adding a Subsurface Intrusion Component to the Hazard Ranking System used to score sites for listing. That's how Greenpoint—identified as the Meeker Avenue Plumes—was listed. Now the Gowanus uplands would easily qualify, particularly if the state of New York agrees.

Groups like Voices of Gowanus, Friends and Residents of Greater Gowanus, and the official Community Advisory Group have been researching, organizing, and briefing public officials for years, working for a more complete, permanent, and transparent cleanup. They feel that their concerns, like the uplands and the Canal itself, have been paved over.

Including the uplands in a Superfund response would make it easier for remedial decisions to incorporate "community acceptance," one of EPA's nine criteria for selecting remedies. It would make it possible for community members to raise uplands issues at the CAG. It might uncover additional non-redevelopment contamination sites, within the area.

Placing the Gowanus uplands on the NPL would make it possible for a non-profit organization representing the neighborhood to hire an independent technical adviser, under EPA's Technical Assistant Grant program, to help review all the uplands documents being generated by consultants for developers as well as the regulatory agencies. State and Federal cleanup programs for Brownfields and Superfund, as well as development projects subject to environmental review, general huge piles of reports and gigabytes of data. Giving the community access to its own technical expert wouldn't be enough provide balance to the environmental decision-making process, but it would be a valuable step in the right direction.

As the Gowanus area transitions from legacy manufacturing to dense residential, the state and federal governments should use every resource and regulation at their disposal to ensure that the public, current and future, is protected.