PlaNYC, Brownfields and Land Security:
Creating New Land in a Built-Out City

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Abstract

PlaNYC committed New York City to creating and operating the nation's first city-run brownfield cleanup program and the Mayor's Office of Environmental Remediation (MOER) was created to deliver it. This paper reconstructs how that commitment moved from an aspirational sustainability goal to an operating municipal system, and what its rise and decline reveal about urban environmental governance. It demonstrates that cities can competently govern complex environmental regulatory programs once reserved for state and federal agencies. Success depended on experienced technical leadership, placement of MOER in City Hall, steady political support, delegated state authority, and partnerships with environmental justice organizations, the environmental industry, and government agencies. MOER's Voluntary Cleanup Program became the second largest cleanup program in the country and would make significant strides toward urban land security by completing more than 1,100 cleanups over its first 15 years. Its many programs, including the NYC Clean Soil Bank, reduced costs and generated returns many times greater than city investment. MOER was a technocracy that used its technical experience and skills to became an honest broker for city agencies and communities with state and federal governments, filling roles never envisioned in PlaNYC. These programs advanced city goals well beyond their original brownfield mandate, including affordable housing, climate resilience, equity and circular economy. Brownfield policy lost prominence at the start of PlaNYC's second decade (2018) as mayoral support and commitment waned, and ended new program development. It also left unfinished an ambitious plan by MOER to achieve community-based remediation and correct inequities in remedial services across communities.

The chapter calls for renewed commitment to PlaNYC, a "PlaNYC 2.0," centered on community-based remediation. Recommendations include an atlas of legacy urban pollution, science-informed policy to direct government remediation toward heavily burdened neighborhoods where these services have been rare, and engagement of communities using with new tools and resources to support grass-roots environmental initiatives. Institutionalizing programs such as the Clean Soil Bank citywide could improve soil quality and reduce pollution exposures. MOER's broad functions are portable yet they have never been reproduced elsewhere. Other cities could replicate MOER's financially self-sustained environmental programming using alternate models such as public-private partnerships and distributed start-up funding. New York should also mentor other cities, sharing technology and building capacity, so smaller municipalities can achieve their land security goals.

Introduction

The Brownfield Dilemma

When PlaNYC was released in April 2007, brownfields—underutilized, polluted land—represented both an environmental burden and a major opportunity: if remediated and redeveloped, they could support housing, jobs, open space, and community revitalization. NYC could not create new land to meet the needs of a growing population, but it could make better use of thousands of acres of vacant brownfields—much of it concentrated in low-income and historically disinvested neighborhoods—whose development was held back by concerns about pollution liability and uncertainty in the cleanup process

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[1]. PlaNYC identified brownfields as a citywide sustainability challenge because they limited housing production, economic development, public health, and neighborhood vitality. The brownfield chapter in PlaNYC proposed an ambitious institutional framework to address this problem.

Before PlaNYC, brownfield cleanup in New York was primarily a state function. State cleanup programs originated in the 1980s from a Superfund-style, polluter-pays enforcement model that focused on highly polluted sites and used the threat of litigation, enforcement, and cost recovery to compel polluters to complete remediation. However, most brownfields in cities are only lightly or moderately contaminated. These sites often remained vacant because potential developers, who had not polluted the property, faced unclear cleanup standards, enforcement risks, cost overruns, and construction delays. In 1994, the state Voluntary Cleanup Program—a streamlined version of the Superfund program—emerged to reduce pollution liability and encourage redevelopment of brownfields with varying degrees of pollution [2]. Because brownfield cleanup regulation was a state function, the New York State Department of Environmental Conservation (DEC), an environmental agency centered in Albany, became the unlikely gatekeeper for redevelopment of a substantial share of land in NYC.

By the early 2000s, many potential developers were still unwilling to participate in the Voluntary Cleanup Program, in part because it was established administratively by DEC and lacked statutory authority [3]. The program completed only about 11 cleanups in the state each year from 1994 to 2007 [4]. Urban brownfield properties remained vacant or were put to low-value uses (parking lots, etc.) that did little to benefit surrounding communities. Alternatively, brownfields were cleaned up by developers without government oversight—self-directed cleanups—and without assurance that the remediated property was safe.

In 2003, NYS launched the Brownfield Cleanup Program (BCP), which finally codified brownfield cleanup and offered substantial tax credits to developers that remediated brownfield sites [5]. These tax credits resulted in an unexpectedly high state financial outlay, reportedly about $9.4 million per site [3]. DEC responded by establishing restrictive eligibility standards to reduce enrollment and lower program costs [3]. These restrictions reduced participation, and the BCP completed just 11 sites statewide each year during its first decade [4]. As with the state Superfund program two decades earlier, the focus of the BCP returned to cleaning up the most polluted sites causing the greatest harm, while many moderately polluted sites in NYC again lacked a practical path to cleanup and redevelopment.

In PlaNYC, NYC placed brownfields at the center of municipal environmental policy and sought to achieve a much broader set of public policy goals, prioritizing remediation of the most strategic development sites regardless of contamination levels. The Bloomberg administration sought greater city control over brownfield redevelopment and committed to a bold institutional solution: creation of a city-run brownfield cleanup program—the first of its kind in the nation [6] [7]—and a new mayoral office to run it. Rather than merely advocate for more state-led cleanup, the city sought a create a municipal delivery system for brownfields.

At that time, it was generally assumed that cities did not have the technical sophistication to lead complex environmental remediation programs and that only state and federal agencies could perform this function. The initiatives that emerged from PlaNYC's brownfield chapter would demonstrate that cities can assert full control over all aspects of cleanup of contaminated land. In doing so, NYC would reclaim the gatekeeping role in redeveloping polluted land and expand opportunities to revitalize communities in NYC. This chapter reconstructs the emergence and growth of PlaNYC's brownfield initiatives over the first decade after its release and documents the development of more than 30

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brownfield programs. We then trace the rapid decline in prominence of brownfields as an independent policy area and the end of brownfield program development at the start of the second decade.

I served as the founding director of the NYC's brownfield cleanup program and the mayoral brownfield office created under the plan (MOER) and served in that role for ten years. This chapter is based on PlaNYC update reports, press releases, fact sheets, briefing documents and first hand accounts from personal experiences. The origins for the brownfield chapter preceded my service in City Hall and information is drawn mainly from the email archives of Rohit Aggarwala, the director of the Mayor's Office of Long Term Planning and Sustainability (OLTPS) from 2006 to 2010, and interviews with involved mayoral staff.

Origins of PlaNYC

In the summer and fall of 2006, the Office of Long-Term Planning and Sustainability (OLTPS) first treated the establishment of brownfield policy as a topic that needed data and expert advice. Aggarwala asked staff at the Mayor's Office of Environmental Coordination (MOEC), headed by Director Robert Kulikowski, to gather data on brownfields cleaned up in the city. The earliest framework for the brownfield chapter to emerge from this exercise focused on practical improvements to the existing state BCP, the city's existing environmental review processes for suspected polluted land, and a documented inventory of contaminated land. This 'brownfield list,' initially presented as 1,700 acres, was assembled from a list of hazardous-material Environmental (E)-Designations supplied by the city Department of Environmental Protection (DEP) and a contaminated-site inventory compiled by MOEC. [1, 2, 3]

OLTPS worked closely with MOEC in late 2006 to create the first PlaNYC initiatives from this loose framework. These included cleanup of city-owned brownfields and petroleum spills, support for community brownfield planning, city-led brownfield data management, and a hazardous materials consultant on retainer to the city. Within a few months, it became clear that NYC's brownfields challenge could not be solved simply by providing incremental improvements to existing state and city programs state. [4, 5]

The turning point came over a four-month period beginning in November 2006. Angela Sung, Deputy Chief of Staff in the Office of the Deputy Mayor for Economic Development and Rebuilding, made the decisive critique. In a late-November 2006 email, Sung explained that the city lacked both the capacity and the regulatory standing to clean the acreage implied by the brownfield list, and that it was misleading to suggest that polluted properties could simply be cleaned and turned into housing, schools, parks, or other neighborhood uses. In most cases, she reasoned, contamination was not the sole or primary barrier to redevelopment. Around the same time, Department of City Planning officials cast doubt on the methodology used by MOEC to develop the 1,700-acre brownfield figure.[6, 7, 8]

The chapter needed a significant reframing before the April PlaNYC launch. The record suggests that Aggarwala, Ariella Rosenberg, Senior Policy Advisor at OLTPS, and Deputy Mayor Daniel Doctoroff had a senior-level conversation in late January 2007, after which Sung took operational leadership of the brownfields chapter. The next day, in a pointed meeting with MOEC, she challenged the existing approach. This redirected the brownfield chapter from an MOEC program-improvement approach to a citywide development strategy that needed its own institutional home. [9, 10, 11]

During the next two months, Sung, with analytic and data support from HR&A and others, recast the chapter around a larger and more complex vision of polluted land. A key distinction was established

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between properties that were eligible for state programs and a much larger group of less contaminated brownfield properties that were affected by suspected contamination, historic fill, and city E-Designations that required cleanup and were subject to regulatory delays and other uncertainty. Clarification of the barriers identified in this work was provided by Lee Ilan, a veteran city planner at MOEC, and DCP. In a late February email, Sung proposed "seven solutions" that provided a new architecture for the chapter, including local authority to operate a city-run brownfield cleanup program to remediate properties outside the state tax-credit program, development of a historic land-use inventory, remediation insurance, remediation subsidies, and advocacy for certain state-law changes. The central innovation was the city's independent operation of a brownfield cleanup program with eligibility that would be less restrictive than the state BCP, unburdened by its tax credits, and able to give developers, lenders, insurers, and community organizations a predictable pathway for cleanup oversight when use of the state program was not feasible. [12, 13, 14]

Changes during this period also included a shift from a 1,700-acre inventory of documented brownfield contamination to 7,600 acres, with approximately 22% eligible for state programs and 78% outside them. PlaNYC would show that it was not possible to distinguish actual from potential contamination on these properties but that in either case redevelopment would be slowed. By the time PlaNYC was released in April 2007, the brownfields chapter proposed not merely to help sites through state programs, but to create city capacity to manage the broader category of contaminated or possibly contaminated land that affected development, community planning, and reuse. [15, 16]

To achieve the goals in the proposed plan, the city needed the cooperation of the DEC, especially after Governor Eliot Spitzer took office and Pete Grannis, Judith Enck, and Val Washington assumed environmental leadership roles. Sung and Aggarwala recognized that DEC might see the brownfields chapter as a city attempt to create a competing regulatory structure and that the politics of the proposal required careful handling. Doctoroff approved Sung's reordering of the chapter to lead with community planning and environmental justice concerns and praised it as "substantive, deferential to the state, good flow, tone." This redirection—substantive city authority paired with deferential presentation— likely avoided an immediate intergovernmental fight and enabled a smooth launch of MOER. [17, 18]

Once PlaNYC was released on April 22, 2007, Jeffrey Kay, Director of the Mayor's Office of Operations, became the central figure in converting the chapter's commitment into a functioning office. Kay was a powerful and well-regarded figure in City Hall and here his role was institutional: he secured the budget, navigated personnel rules, shaped testimony in legislative sessions, managed state strategy in Albany, and coordinated the staffing of MOER. [19, 20]

I was the person around whom the new office was ultimately formed. I was an RPI trained geochemist who had directed many environmental quality programs in New York City for DEC over more than two decades, had remediated hundreds of complicated pollution sites including the Fresh Kills landfill, and had served as Chief of Operations for New York State's environmental response to the World Trade disaster. In 2007, I was managing DEC's Brownfield Cleanup Program in New York City. Internal City Hall emails identified me as "the point of entry" for NYC applicants to state cleanup programs, a professional who understood urban land pollution and remediation, and who believed that "state programs are not meeting NYC's needs." At the suggestion of Trisha Zenobio, a colleague in City Hall, I first spoke with Aggarwala in February 2007.

Some in City Hall thought a high-profile developer would draw the most interest in brownfields from the real estate community. To win DEC's acceptance of the city's fledgling program, however, the Bloomberg

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administration chose a technical expert with many years of experience managing DEC's remediation programs. By February 2008, Kay had offered me the MOER directorship, I had accepted, and by April we were planning MOER's staffing. MOER was formally established by mayoral executive order, and Mayor Bloomberg introduced me as its leader at a press conference at Concrete Plant Park in the Bronx in June 2008. [21, 22, 23]

PlaNYC's brownfield chapter led to the creation of MOER, which finally allowed the city to close the gap between state remediation programs and New York City's land-use and redevelopment needs. Placing MOER in the Mayor's Office was an unusual choice. It was an operational, public-facing office responsible for cleaning up polluted properties in a dense urban setting, and given the potential for controversy, it would have been politically safer to house it in an agency such as DEP, at a greater distance from the mayor. Yet City Hall placement proved to be the single most important factor in MOER's success in achieving PlaNYC's brownfield goals.

Coming from state government, I expected layers of bureaucracy in City Hall. At my first meeting with Kay, I laid out my 100-day plan and waited for his consent. He gave me a blank stare. I was confused, and he said, "Dan, I don't know anything about brownfields. That's why we hired you." Then it hit me: there would be no bureaucracy. I had the authority and independence to build the office and its programs, just as I had heard was true of Bloomberg's City Hall. I was thrilled and more than a little intimidated. Bloomberg was term limited, and as far as I knew at the time, I had just 18 months to build and stabilize the programs before he left.

MOER occupied a prominent place within city government but had only a small budget for staff. Two employees transferred from MOEC: Ilan, a community-affairs expert who became chief of community planning and engagement, and Mark McIntyre, who became general counsel. The remaining positions were used to hire a strong team of remediation professionals. The first outside hire, and the most important technical addition, was Shaminder Chawla. He had been on my staff at DEC and was a talented project manager with extensive remediation expertise. It took some time to coax him, but he was soon hired as MOER's deputy director and my second in command. Four more talented staff were hired as assistant directors: Maurizio Bertini, an experienced noise and air-quality engineer from the NYC Department of Environmental Protection (DEP); Zach Schreiber, a DEP remediation engineer who had been trained in Europe; Cavy Chu, a professional engineer hired from the private sector; and Hannah Moore, a recent engineering graduate from Columbia University. Together they formed the founding MOER staff. Other essential staff would follow, including Michelle Sarro, who would later replace McIntyre as general counsel, and Camilo Zamora, a seasoned government financial expert.

First Steps

Our first objective was to draft the Brownfield Cleanup and Community Revitalization bill, which would give MOER the authority it needed to perform its duties. The bill was drafted with the help of Evan Hochberg and Steve Ackerman of the NYC Law Department, who would work with MOER repeatedly on new laws, operating regulations and agreements. Passing it, and building a suite of new brownfield programs, required support from a variety of outside stakeholders, including environmental justice (EJ) advocates, the New York City Council, several state agencies and the environmental industry. We conducted a broad campaign to build these relationships in the second half of 2008 and throughout 2009. None would be more influential than the city's EJ leaders, especially Eddie Bautista of the New York City Environmental Justice Alliance (NYEJA), Elisabeth Yeampierre of UPROSE, and Jodi Kass and Mathy Stanislaus of New Partners for Community Revitalization.

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The brownfield bill received broad support. The City Council passed it unanimously, and Mayor Bloomberg signed it into law in May 2009 [8]. The new law, Local Law 27 of 2009, amended the City Charter and the Administrative Code to make MOER a permanent part of city government. It gave MOER the authority to establish new programs, including the city-run brownfield cleanup program, and to perform a broad range of other functions [9]. MOER published its operating regulations in September 2009 and adopted them later that year [10]. Together, these steps insulated the office against policy reversals by future administrations.

The push for delegated authority

The success of the city's brownfield cleanup program, soon to be known as the Voluntary Cleanup Program (VCP), depended on developers' confidence that MOER's cleanup decisions would be final, reliable, and accepted by state regulators. Because DEC retained full legal authority over land cleanup in New York State, it could overturn or second-guess any decision the city made. MOER therefore needed a formal agreement with DEC that would recognize the VCP, delegate state authority for city cleanups, and extend state liability protection to participating projects. Securing that agreement took more than two years and would prove to be the most important and most difficult task in the development of the new office.

DEC set two prerequisites for the Memorandum of Agreement (MOA). First, MOER had to adopt the state's cleanup regulations, ensuring equivalent cleanup quality. Second, MOER had to obtain concurrence on all cleanup decisions from the New York City Department of Health and Mental Hygiene (DOHMH), replicating the state model for land cleanup. Kay played a pivotal role here by helping forge an agreement with DOHMH Commissioner Thomas Friedan, and MOER's presence in City Hall was critical to achieving it. This was the first of many inter-governmental partnerships that would anchor MOER's pursuit of PlaNYC's brownfield objectives. Many people would play important roles, including Arianna Kaplan, Ben Furnass, Annie Coloruso, Brian Mahon, Dominic Smith, Trish Zenobio and Chris Gonzales (Office of the Deputy Mayor for Operations); Aggarwala, Carter Strictland, Adam Freed, Kizzy Charles-Guzman and Dan Zarilli (OLTPS and successors), Tara Boirard, Michael Dardia (OMB), Kathryn Garcia, Angela Licata, Terrell Esteson (DEP), David Karnovsky, Howard Slatnick, Michael Marrella, Dave Dobruskin (DCP), Therese Braddick (Parks), Eric McFarlane (DDC) and Kedari Reddy (DOT).

After two years of difficult negotiation, DEC released a draft of the MOA for public comment in late spring 2010 [11]. Over the next 30 days, spurred by a vigorous City Hall advocacy campaign, environmental industry professionals, EJ organizations, and other community-based groups flooded DEC with letters of support. At the conclusion of public review, however, DEC signaled that it would postpone signing the MOA until after the 2010 gubernatorial election in deference to the incoming administration. The MOA and the launch of the VCP was now facing a likely 18-month delay and was in jeopardy.

Financing for new development is the main source of capital used to clean up polluted brownfields in NYC and other cities. Consequently, government remediation oversight and other brownfield services are heavily focused in neighborhoods where new, ground-up development is prominent and financing is available. This can create a significant disparity in the availability of environmental remediation services in disadvantaged communities that experience disinvestment and suppressed development. In parallel to the MOA, MOER was negotiating with EJ organizations to better balance access to MOER's planned remediation services.

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MOER negotiations with EJ leaders resulted in agreements on a suite of community-based programs that would become fully fledged over the next several years. These included grants for place-based community brownfield planning and brownfield redevelopment that was consistent with the community vision; a workforce development program to broaden minority employment in the environmental industry; an online community planning portal to help local organizations identify strategic brownfield sites, access data and work more efficiently with city agencies [12] [6]. These proposed programs established MOER's bona fides with Bautista, Yeampierre, Kass and Stanislaus and built strong EJ support for the new office.

The MOA was sidelined and launch of the VCP uncertain. There would likely be new leaders appointed at DEC by the next governor and there was no assurance of future support for the MOA. At this pivotal moment, I called NYEJA's executive director Eddie Bautista. We discussed the delay in the MOA and the threat this would pose to the VCP and community programs we had negotiated. I asked for his help. A few days later, with the future of the program on the line, Bautista took a road trip from Sunset Park, Brooklyn, to Albany. Later that evening he met with Dale Desnoyers, Director of the Division of Environmental Remediation at DEC. When the meeting was over, Bautista had done what the Bloomberg administration could not do: he persuaded DEC to execute the agreement. The landmark MOA was announced a month later at a press conference in the city with Mayor Bloomberg and DEC Commissioner Pete Grannis. The VCP, was launched five months later and became the first city-run brownfield cleanup program in the country [13]. U.S. Environmental Protection Agency (EPA) followed with its own letter of support for MOER and its cleanup programs [14]. The letter was signed by Stanislaus, who had been appointed by then President Obama to run the Office of Solid Waste and Emergency Response.

MOER finally had control over the fate of brownfield cleanup and redevelopment in the city. It established a suite of programs over the next two years including all of the programs that fulfilled commitments to EJ leaders. Working with Deputy Mayor Ed Skyler and his successor Steven Goldsmith, $3 million in city funding was earmarked in 2010 for grass-roots community brownfield planning grants in over 20 neighborhoods throughout the city and to launch *EPIC Community*, an online application to support community brownfield redevelopment and provide public transparency for city remediation programs. The *Community Protection Statement* and *Sustainability Plan* were introduced to MOER cleanup plans to prioritize common community concerns such as dust, odor, traffic operating hours and housekeeping, and promote community engagement, recycling of materials and reduction in greenhouse gas emissions. Other new programs included *SPEED*, an online brownfield research portal and *Green Property Certification*, a LEED-type certification for completed cleanups [13] [12]. This was a major structural change. Brownfield policy had become operational rather than aspirational: MOER could now identify brownfield sites, guide owners through cleanup, provide incentives, review remedial plans, certify completed projects, and connect redevelopment to broader planning goals.

In late 2009, seeing the need to fully engage the environmental industry, I founded the *NYC Brownfield Partnership*, an association of about 50 environmental businesses designed to provide community services and brownfield cleanup support [15]. The association was run by MOER for its first three years. We established several programs including pro bono programs for environmental consultants to provide remediation expertise to community developers dealing with land pollution and expert counseling to help community members understand the elements of a cleanup plan in their neighborhood [15]. MOER worked with the Partnership to secure placements for workforce development graduates on remediation projects (*BrownfieldWorks!)* and used city funding to support trainees with six months of worker wage subsidies.

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The need for speed

To develop any contaminated brownfield property, the first step is remediation of the pollution. Discussions with many NYC developers showed me that they would use a brownfield program if it was fast and predictable. But few believed that government could achieve this. In the words of one developer, "Working with government voluntarily on brownfield cleanup is like breaking into jail. Why would I want to do that?"

I set out to make the VCP the fastest remediation program in the country and to show that high-quality cleanup, speed, and predictability could coexist in a single program. More than 70 remediation firms were working in the city, and the quality and precision of their work was uneven. We needed all of them to deliver the highest quality products every time, and we pursued that in two ways. First, we standardized every step in the program and created precise templates for all the work plans, studies, and reports it required, which organized project flow and eliminated guesswork. Second, we launched an ambitious, industry-wide training program, *TurboTraining*, to teach NYC environmental professionals how to use the templates and navigate the VCP efficiently. We delivered meticulous instruction in grueling, day-long sessions every six months for three years, and as many as 350 environmental professionals attended.

This was our central, foundation-building strategy, and it worked. The templates gave the VCP predictability, while *TurboTraining* gave it quality and reproducibility. The remediation industry quickly learned to use these tools to speed their progress through the VCP. Chawla and I reviewed every document over the first five years, and after each training session we saw a significant, industry-wide jump in document quality. Better documents cut our review and approval time by more than 90%. Almost all remediation firms welcomed the training and the faster approvals it produced. Only a few of the largest companies resisted, mainly because they believed standardizing documents harmed their brand and leveled the playing field for smaller firms. With industry as our envoys, developers began to embrace the VCP and build their business models around brownfield sites. My motto became, "Give us quality and we'll give you speed," and we delivered. These steps reduced the time it took to begin remediation and development from a year or more to as little as 40 days.

We streamlined the VCP further in several ways. We assigned a single project manager to each project, which improved accountability by creating a clear point of contact. We offered project meetings on as little as 24 hours' notice so that problems could be resolved quickly and projects kept moving. Lengthy comment letters on cleanup plans and reports had been standard government practice, but they were grossly inefficient and caused major delays. Instead, we made redline edits directly to documents, sent concise requests specifying the changes needed, and introduced riders and stipulation lists to speed the final stages of project approval.

We sought simplicity and flexibility in VCP enrollment and navigation and adopted a fully digital project-management system—revolutionary for this period—to eliminate paperwork and speed the program. We built *EPIC* (Environmental Project Information Center), an online application designed in-house to automate the VCP using digital enrollment forms, communication portals, step by step guidance, project tracking and self-activated project archives. We introduced *SPEED* [13], a GIS search engine also designed in-house to provide the community and property information needed to develop cleanup plans in any New York City neighborhood [12]. *SPEED* provides city land use information and environmental data on properties throughout the city and compiled federal, state and city government environmental

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databases, historical maps and aerial photographs of the entire city and historical land use information on more than 3,150 vacant properties.

MOER needed to be a one-stop shop for all city-government oversight related to remediation to prevent delays caused by other government agencies. We acquired several existing programs that had operated in other city agencies, including DEP's E-Designation program. These acquisitions were difficult and disruptive, but they were necessary and were made possible by the stewardship of Kay and Cas Holloway, then Chief of Staff to Deputy Mayor Ed Skyler. Holloway would later become DEP Commissioner and Deputy Mayor and would remain a strong ally for the office through the end of Bloomberg administration.

Branding the VCP

Our business model went something like this: if a developer skeptical of government involvement had a good experience on their first remediation project, it would build trust. Instead of running away, developers would seek out brownfields to unlock the financial value they possessed. One project today would lead to five more over the next several years. Repeat that process with each new developer and in time, we would see strong, geometric growth in remediation of contaminated land in NYC.

To get this started, we had to convince developers to try the VCP. We built our brand around 'government operating like a service industry' dedicated to client service and satisfaction. Meeting with hundreds of NYC developers to communicate this message would take years. Instead, we reached developers by making several hundred remediation professionals our envoys. With early control of the NYC Brownfield Partnership, we tried to build interest in brownfields by establishing an annual gala and award program and year-round educational programs. We used these events and *TurboTraining* sessions to strengthen our brand. Like earlier partnerships with EJ leaders, community-based organizations and state and federal government, our partnership with the environmental industry would become a pillar of our campaign to deliver PlaNYC's brownfield goals.

City-run brownfield cleanup takes off

When the VCP launched in early 2011, New York City's real estate market was still stalled by the 2008 recession. MOER's earliest cleanup projects were mostly affordable housing developments, which were government-funded and less affected by the recession. As the economy recovered in subsequent years, the office recorded impressive year-over-year growth in enrollment.

PlaNYC progress reports for 2013 and 2014 show MOER's brownfield programs moving rapidly from launch to scale. By 2013, the program had enrolled more than 95 remediation projects on more than 200 tax lots [13]. By 2014, the portfolio had expanded to more than 500 tax lots and included approximately 45 affordable housing projects, thousands of permanent and construction jobs, and millions of square feet of development [12]. The city was quickly turning its new brownfield apparatus into measurable land cleanup and redevelopment.

MOER had become the institutional expression of the chapter's central insight: NYC needed its own capacity to remediate contaminated land at the speed, scale, and practical specificity required by the growth strategy established in PlaNYC. Launch of the VCP and establishment of grant programs, electronic research systems, liability protections, comfort letters, community planning areas, training videos and certification mechanisms reduced friction in the brownfield redevelopment process [13] [6] [12]. This new program infrastructure enabled a shift from isolated cleanups to a programmatic,

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portfolio-based approach. The city's role expanded from regulator to market-maker and facilitator. It did not simply require better cleanup; it made cleanup easier, more predictable, less risky, and more attractive to private and nonprofit actors. That institutional platform laid the foundation for nearly every phase that followed.

The PlaNYC progress reports also show continued expansion in the tools MOER built and offered. They document continued program-building: the *NYC Clean Soil Bank* and expanded community planning grants in 2013, followed by the *Pro Bono Technical Assistance Program* for community developers and the online *Financial Assistance Search Tool (FAST)* in 2014 [13] [12].

These measures show the cleanup program evolving into a full redevelopment ecosystem. The city was addressing the practical barriers that made brownfields difficult to reuse: information gaps, financing obstacles, legal uncertainty, local distrust, limited capacity among small developers and community-based organizations, and a lack of coordination among agencies. The expansion was not only quantitative but also strategic. Brownfields were increasingly linked to city priorities with strong political and fiscal importance: affordable housing, permanent employment, small-business creation, neighborhood revitalization, and tax revenue generation. PlaNYC update reports from this period emphasize that many enrolled properties had been vacant for more than a decade. This framing positioned brownfield cleanup as an opportunity to unlock land in neighborhoods where contamination and disinvestment had suppressed development potential. Brownfields thus became more important because they were no longer treated merely as an environmental liability. They became a land supply strategy for a built-out city.

Hurricane Sandy marked a turning point in how the city characterized brownfields. Before the storm in late October, 2012, the primary concern was that contaminated vacant land impeded redevelopment and contributed to neighborhood disinvestment. After Sandy, PlaNYC update reports also framed brownfields as climate risks, particularly in flood-prone waterfront areas where storm surge could erode contaminated soils or disperse pollutants into surrounding communities. The city's 2013 resilience plan [7] and 2014 PlaNYC update report [12] introduced a suite of new brownfield resiliency initiatives to accelerate cleanup in the coastal floodplain; harden land covers and strengthen cleanup standards for industrial brownfields on the waterfront; provide climate-change resiliency audits for brownfield remediation projects; require extreme-weather contingency planning and storm-preparedness measures during cleanup; and add floodplain information to environmental data tools.

These new brownfield resiliency programs sought to keep redevelopment safe under changing climate conditions. Brownfield policy became part of the city's effort to adapt the built environment to sea-level rise, coastal flooding, and severe storms. This shift elevated brownfields within the city's adaptation agenda. Brownfields were no longer only legacy pollution sites, they were also potential pathways for climate-related contamination exposure. The city's response marked a transition from remediation as a backward-looking correction of industrial harm to a forward-looking resilience investment. This resilience framing also broadened the problems connected to brownfields and the agencies and stakeholders involved. PlaNYC updates addressed hazardous-substance storage, open industrial uses, floodplain businesses, waterfront zoning, and emergency and community resiliency planning. Brownfields became less isolated as a policy category and more relevant across policy domains and MOER's brownfield programs became part of a broader coastal environmental risk-management strategy [12] [7].

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By 2017, MOER was completing about 90 cleanups annually and had become the country's second-largest brownfield cleanup program, behind only the State of California [16]. In seven years, MOER had completed cleanups on approximately 400 projects covering 675 tax lots, removing more than 30,000 tons of hazardous waste and 300 petroleum tanks [16]. The city-run program was meeting PlaNYC's cleanup goals and making New York City's environment markedly cleaner. These remediated properties had been vacant for an average of about 10 years and the redevelopment that followed created jobs, housing, and new income- and property-tax revenue for the city and state. These cleanups enabled about $8.2 billion in new investment and generated about 27 million square feet of new building space, including thousands of affordable housing units and approximately 3,700 permanent jobs. They also produced an estimated $960 million in new long-term income and property taxes [16], or about $140 million annually. In addition to delivering high-quality remediation of polluted land, the city-run cleanup program had become an economic engine that paid for itself many times over.

Growth pains

We had overcome many obstacles to build the VCP, but success itself created new challenges. For the first few years, MOER's core technical staff easily managed the program's demands. As project enrollment grew each year, we needed more staff to maintain high performance. In the aftermath of the economic recession, the city's budget was shrinking, and hiring new staff was nearly impossible. Through out position in City Hall, MOER had direct access to the NYC Office of Management and Budget (OMB) and its directors Michael Dardia and Tara Boirard. Getting new funding from OMB for staff expansion was a difficult task. Dardia was a particularly tough gatekeeper. But we had a powerful asset: the cascade of new tax revenue we generated by revitalizing vacant land. Dardia and Boirard understood that. But we had to figure out how to successfully leverage this future revenue growth to get new staff.

To do this, we hired Camilo Zamora, a veteran city financial manager, to lead our fiscal office. Zamora's job was to model the office's return on investment. His financial modeling used the reported increases in property taxes that the Department of Tax and Finance levied for completed projects and estimates of job production based on city data. He was able to show that each cleanup and redevelopment project MOER completed produced several million dollars in new, long-term property and income tax revenue for the city. MOER's annual budget was about $4 million, funded in equal measure by state and federal grants, small program user fees, and city tax-levy funding (about $1.3 million per year). With an annual revenue generation of $140 million (and growing), our return on city investment exceeded 100:1. Our argument to OMB was simple: staffing growth was a prerequisite for revenue growth: with more staff we could complete more projects and generate more revenue. The argument and the model results convinced Dardia and Boirard, and, at a time when staffing at most city agencies was shrinking, MOER staff levels more than doubled.

Leverage of Technical Expertise

As the city's brownfield programs matured by 2013, we began to use our advanced technical expertise to achieve environmental and fiscal benefits for other city agencies, communities, and the private sector. These services extended well beyond brownfields. Drawing on relationships with former DEC colleagues, I positioned MOER as an honest broker for city agencies negotiating with the state to reduce environmental costs. In one example, we drafted a state bill with Hochberg to allow city agencies to obtain waivers of large state fees for hazardous waste generated during soil remediation on city capital construction projects. These hazardous waste fees were intended by the state legislature to promote hazardous waste recycling within the manufacturing industry and were never intended for remediation projects. Hazardous waste generation is common in remediation and state fees and assessments were

DRAFT

about $157 for a ton of highly polluted soil—an amount that would fit comfortably on a kitchen table. Our bill provided a waiver of these State fees. After some effective advocacy by City Hall, the law passed and another MOA was negotiated with DEC that allowed hazardous waste fees to be waived on city construction projects with MOER oversight. In its first year, this new program saved the Parks Department more than $1 million in state fees on park construction in the Jamaica Bay area [12].

After Superstorm Sandy, Deputy Mayor Holloway asked me to find more sustainable ways to manage enormous amounts of debris on the Brooklyn and Queens shorelines. I walked more than 20 miles of shoreline over the first several days after the storm to see the problem for myself and observed large quantities of beach sand that had washed into shoreline communities—in some cases more than four feet deep. The Army Corps of Engineers (ACOE) and the Federal Emergency Management Agency (FEMA) planned to dispose of the sand in a landfill in Trenton, New Jersey, at a cost of tens of millions of dollars. Over the next few days we worked with DEC, EPA, ACOE, and FEMA on a plan to retain and reuse the sand. Under the plan, 200,000 cubic yards of beach sand were collected separately from other debris, sifted to remove litter, and placed by the Parks Department in a one-mile-long, 12-foot-high berm under the boardwalk east of Beach Channel Drive in the Rockaways. The plan reportedly saved FEMA about $60 million in landfill disposal costs and produced a massive sand berm that provides a first line of defense against future storm surges.

The most prominent technical innovation during this period was creation of the first urban soil bank, NYC Clean Soil Bank (CSB). While providing oversight of remediation and development over the years, I had witnessed hundreds of thousands of tons of clean soil leaving the city. The soil is excavated at construction sites in the city to make room for underground development, including basements and underground parking. About 1.5 million tons of clean native soil are generated in NYC each year and about 95 percent of is transported at high cost to commercial facilities outside the city, mostly in New Jersey, Pennsylvania and eastern Long Island [17]. At the same time, many city development projects need large quantities of clean soil, which is often purchased from the same commercial vendors. City policy did not recognize loss of this valuable natural resource, and instead a commercial system that increased construction costs, truck traffic and highway congestion, fossil-fuel consumption, and greenhouse gas and other pollutant emissions had perpetuated. I built the CSB to break this cycle and promote a circular economy for clean soil resources. Launched in 2013, the CSB acts as a soil matchmaker and facilitates the transfer of soil from generating sites (donors) to recipient sites within the city [18] [13]. Excavated soil is regulated as solid waste in New York State and to operated the CSB we negotiated a third MOA with DEC to obtain delegated state authority [12].

During its first three years, the CSB exchanged almost half a million tons of clean soil and produced an estimated $16 million in savings for donors and recipients [19]. It retained clean soil resources, reduced trucking distances and associated environmental impacts by about 80 percent, and lowered soil management costs by about 85 percent [19]. The CSB supplied soil to gardens and parks; it was used to make polluted land safer; elevate flood-prone land; and build waterfront berms, tidal and freshwater wetlands and green infrastructure to improve coastal flood resilience [19]. About one-third of soil was donated to government construction projects, generating more than $3 million in savings to taxpayers. Using the CSB, MOER created *PURE Soil* in 2016 to focus the use of clean soil to improve the quality in NYC community gardens. In late 2017, *PURE Soil* would form the basis for an ambitious new plan to establish a community-based remediation program to address the geographic inequity of government remedial services.

DRAFT

The emergence of clean soil management as its own policy area is an important trend in PlaNYC. Over its first few years, it became a mature circular-economy program, retaining hundreds of thousands of tons of soil in the city, avoiding millions of truck miles and substantially reducing carbon dioxide and other air pollution emissions. It linked brownfield remediation to waste reduction and greenhouse gas reduction. This connection placed brownfield work within the city's circular-economy and climate-mitigation agenda. It also showed that brownfield cleanup could generate material benefits beyond the remediated property. Clean soil from one project could enable another project, reduce costs for affordable housing, supply community gardens, support park construction, or help raise grades in flood zones.

Building roots in communities

After the start of the de Blasio administration, MOER's policies became more explicitly focused on equity. De Blasio's OneNYC plan [6], a rebranding of Bloomberg's PlaNYC, characterized brownfields as concentrated in low-income communities and as a source of geographic and social inequality [6] [12]. This appeared to broaden MOER's agenda by presenting brownfield cleanup as an ambitious, participatory redevelopment program that could protect human health, address disproportionate exposure in low-income communities, create jobs and affordable housing, and return land to safe use. MOER had always had robust community-oriented brownfield programs and this new framing finally allowed a full embrace of that work. With several new additions, this powerful set of programs was rebranded as the *Community Land Cleanup and Revitalization Initiative*.

Brownfields gained new significance in public policy early in this period because their redevelopment raised questions about who benefits from urban growth and whether historically burdened communities share in the city's environmental and economic improvements. MOER had considerable success in advancing city-supported affordable housing projects, which were commonly located on brownfield properties in disadvantaged neighborhoods. Shepherding these projects had been a cornerstone of MOER's brownfield programming since its inception. In the Bronx, for instance, 56% of the first 48 completed remediation projects were for affordable housing supported by HPD [12]. Under OneNYC, we sought to accelerate this and included a significant expansion of brownfield incentives for affordable housing. MOER funded part of this expansion by aggressively pursuing state and federal grants and earmarking the funds to support remediation for affordable housing [6]. These efforts would continue to pay dividends. By 2024, after almost 15 years of operation, MOER remediation projects had enabled more than 12,000 new affordable housing units and 2.9 million square feet of community space [20].

At the same time, city documents reveal tension within the de Blasio equity agenda. Because brownfield cleanup relies heavily on private development and its capital, most remediation occurred where developers were prepared to build and the real estate market largely shaped program outputs. Remediation was primarily occurring in high end and trendy neighborhoods. Seeking better balance, MOER again responded with targeted incentives for affordable housing, community facilities, parks, and community-supported projects to align private redevelopment with new public equity goals through incentives, technical assistance, community planning, and formal oversight.

Although brownfields received much attention early in the de Blasio administration, their prominence waned precipitously in 2018, at the start of the administration's second term. After more than a decade as a marquee environmental policy issue, brownfield policies and initiatives were no longer independently reported beginning with the 2019 PlaNYC update. Brownfields became merely a facet of other policy initiatives, including affordable housing production, parks, green infrastructure and resilience planning. Brownfields were no longer associated with aspirational policy objectives and new

DRAFT

programs and initiatives. Instead, they were expressed through a handful of operational outputs—lots cleaned, acres returned to developable use, affordable housing units supported, community planning grants awarded, soil recycled, and truck miles avoided.

The diminished prominence of brownfields coincided with a series of events in late 2017 and 2018 that book-ended the departure of First Deputy Mayor Anthony Shorris. Shorris had been a champion of MOER during de Blasio's first term. In the last months of Shorris' service, I had finalized an aggressive agenda for community-based remediation, a novel approach intended to finally provide equity in the remedial services the city provided. At the center of this agenda was a significant expansion of the *PURE Soil* program to finally address legacy pollution in many NYC neighborhoods that were not receiving remedial services in city and state brownfield cleanup programs. This equity agenda received strong support from Shorris but after his departure, mayoral support disappeared. This was a precipitous reversal and convincing evidence that the energy and focus PlaNYC had placed on brownfields had come to an end. I resigned in mid-2018 after more than a decade in City Hall.

Paradoxically, the community-based remediation agenda would finally have provided the equity in remedial services that was envisioned in OneNYC. With respect to brownfields, however, the de Blasio administration lacked focus and commitment to its own ideals. Community-based remediation is the most significant remaining challenge in remediation of legacy terrestrial pollution in NYC. It would have required an effort equal in scale to the attainment of the original goals in PlaNYC. The first decade of PlaNYC had showed that audacious goals like these were achievable.

Ironically, as MOER's brownfield policies disappear as a reporting category, the city remediation program continued to be praised for the cumulative scale of its achievements. After a short period under McIntyre, MOER's cleanup programs would be directed by Shaminder Chawla, who became MOER's director in 2021 and has served as a technical anchor for MOER for almost 15 years. Chawla, and his experienced leadership team, including Bertini, Schreiber, Ilan, Sarro and Zamora have been responsible for the continued execution and long-term stability of MOER's complex remedial programs.

Over the last two decades, the city's brownfield efforts expanded in practical reach and cumulative impact. In the first decade, there was a period of rapid expansion where brownfields were at the frontier of environmental policy. PlaNYC had inspired expansion of brownfield programs through invention, program creation and a steady proliferation of brownfield initiatives and community planning tools. This included focused brownfield resilience initiatives in the post-Sandy period and equity initiatives under OneNYC. The second decade was characterized by continued implementation of existing programs but termination of new program building and diminution of brownfields as an independent area of public policy. Brownfield remediation had become a facet of the city's routine and hidden machinery for producing safe development and managing urban land. The question remains whether the city's sustainability plans give enough attention to the strategic potential of what has become an increasingly routine program and whether they will ever address the inequitable distribution of government remediation services within NYC communities.

Discussion

PlaNYC made the bold commitment to design, build, and operate the first city-run brownfield cleanup program in U.S. history. The success of the VCP and other MOER programs in the years that followed demonstrates that cities can competently govern even the most complex environmental regulatory programs—programs formerly managed only by state and federal governments. MOER's history also

DRAFT

suggests the powerful role municipal governments can play in other highly technical areas of environmental stewardship. MOER's record of program development offers a glimpse of what the next generation of the environmental movement could look like in the U.S.: cities taking a leading role in environmental governance and using delegated state and federal authorities, together with support from community and industry partners, to build programs, resources, and services tailored to their urban communities. In retrospect, perhaps the most important lesson of PlaNYC's brownfield chapter lies not in the specific goals achieved, but in the role that PlaNYC's broad, holistic approach can play in our cities' future.

Municipal governance of brownfield remediation makes sense on several levels. Cities, not states, control land-use planning, zoning, building permits, and most other land-use functions. Cities also have deep relationships with communities and the organizations that represent them. Each city—and each community within it—is unique. It is unreasonable to expect centralized state agencies to recognize and address all of their diverse needs. PlaNYC opened the door to a new model for municipal governance of brownfields, allowing the city to assert its role as the gatekeeper for managing cleanup and redevelopment of polluted urban land. It also enabled a host of other environmental programs designed to address the distinct needs of New York City communities.

The importance of brownfields changed significantly in the first decade after PlaNYC's release. In 2007, brownfields were reported to constrain growth and pose environmental and health concerns. The city initially emphasized removing barriers to the redevelopment of polluted land. In MOER's early years, these straightforward policy goals were institutionalized and transformed into an operating system managed by a growing team of technical professionals. MOER gradually built a program architecture that included the cleanup program, incentive grants, liability protections, online data portals, community planning designations, green property certification, workforce development, and soil-exchange mechanisms.

By the end of the Bloomberg administration in 2013, MOER had established a unique, nationally recognized municipal cleanup model and had accomplished most of the original goals established in the PlaNYC brownfield chapter (Table 1). During this period, although remediating land remained central, MOER's brownfield programs shifted from an early emphasis on risk management toward value creation and integration with other land-use priorities, including support for affordable housing, job creation, and community engagement in shaping land reuse. The programs placed new emphasis on the communities that benefited from redevelopment, land safety in relation to climate risk, and the beneficial reuse of clean soils. After Superstorm Sandy, city reports reframed some brownfields as contaminated waterfront and floodplain sites, and new programming addressed their risks through floodplain cleanup grants, stronger waterfront cleanup standards, climate-resiliency surveys, storm-preparedness planning, and the reuse of clean soil for grade raising and shoreline protection.

With the launch and expansion of the Clean Soil Bank, MOER's brownfield programs increasingly focused on the circular economy. Reports from this period show that brownfield cleanup can reduce waste, conserve natural resources, reduce truck mileage, avoid greenhouse-gas and air-pollutant emissions, lower construction costs, and support public projects beyond the cleanup site. At the start of the de Blasio administration, brownfields became closely tied to equity, as reports associated them with disproportionate exposure in low-income neighborhoods, environmental injustice, and opportunities to create affordable housing and jobs.

DRAFT

Throughout the period from 2007 to 2018, brownfields were recognized as a foundational issue in the city's long-term sustainability agenda. Brownfield programs broadened in function and became more closely integrated with other urban policy issues. MOER sought to build programs that formed a multipurpose platform for urban regeneration, and these goals were largely achieved during its first decade. This period shows that a mature urban brownfield program does more than clean-up sites: it can help the city shape where and how redevelopment occurs, who benefits from land reuse, how communities are protected from exposure, and how redevelopment can adapt to climate change.

In 2018, brownfields abruptly ceased to be a platform policy issue and development of new programs ended. The political commitment that drove brownfield policy innovation under PlaNYC for more than a decade had dissolved. Brownfields were no longer a public policy priority and existing programming became subsumed within other policy initiatives, including affordable housing, parks, capital construction, workforce development, community planning, and resilience planning. Important new policy objectives intended to fill remaining gaps in the equity of government remedial services were dismissed and remain unfulfilled.

Even as brownfields disappear as an independent policy domain, MOER's brownfield cleanup program is lauded for the cumulative scale of its achievements. These achievements were a direct function of PlaNYC and were enabled by infrastructure created mainly during the Bloomberg years. Despite the loss in prominence, brownfields will remain important because they lie at the intersection of many of the city's most difficult problems: land scarcity, housing affordability, environmental inequality, legacy pollution, climate vulnerability and neighborhood revitalization.

At the launch of PlaNYC, the Bloomberg administration made the formative decision to employ experienced technical leadership at MOER, remove bureaucratic obstacles and provide unwavering political support for its development of new brownfield policies. These decisions were probably more responsible than any other in enabling MOER to reach the full potential of PlaNYC by the end of Bloomberg's third term. The technocracy that MOER established reshaped the nascent brownfield framework in PlaNYC and enabled MOER to play many disparate environmental roles not anticipated in the original Plan. In this way, PlaNYC was imperfect, but perfectly suited to achieve the brownfield objectives it had established.

Most notable among the roles that MOER played that were not envisioned in PlaNYC was filling a formerly unrecognized void between city and state/federal government and its service as an environmental ombudsman and honest broker to serve communities and mayoral agencies. MOER repeatedly worked with state and federal government on their behalf, crafting MOA's to solve long-standing environmental problems and acquiring grants to seize opportunities. The many programs that emerged, such as the NYC Clean Soil Bank, lowered city costs, generated new revenue, and improved community safety, urban resilience, and environmental quality.

Every city should have access to the environmental functions that MOER provided in New York City. These functions are reproducible and scalable to meet distinct needs in other cities. Although more than a decade has passed since MOER established this new municipal brownfield model, no other city has replicated these programs. The likely explanation is that New York City had resources to fund start-up and operating costs that other cities lacked. However, findings reported here suggest that brownfield programs in other cities could generate financial returns many times greater than their costs. Thus, while costs may be the central impediment to development of municipal brownfield programs, they could provide financial returns that are many multiples of their ongoing investment.

DRAFT

This is a solvable paradox. There are many other ways that cities can reproduce the robust, technocracy-driven environmental functionality established in NYC. Notably, municipal governments could form public-private partnerships with environmental professionals to build comparable technical capacity. New brownfield programs could be designed to generate revenue and cost savings to fund a broader environmental agenda. Start-up costs could be covered using phased-growth models that distribute early costs among federal, state, and municipal funding sources. State and federal leadership could greatly facilitate this work and support self-sustained
program design by engaging in a collaborative partnership with cities to guide the formative stages of municipal program development and by delegating all required government authorities.

Unfinished business: Community-Based Remediation

Over the last 35 years, states have built brownfield cleanup programs staffed by experienced professionals to deliver high-quality cleanup of polluted urban land. These services focus primarily on properties undergoing well-funded, moderate- to large-scale redevelopment. However, legacy pollution in cities is widespread, and remediation services are needed everywhere, including places that don't have redevelopment opportunities like residential backyards, community gardens, and open spaces. This leaves a substantial inequity in access to government pollution remediation services that must be addressed. An aggressive program to achieve this was proposed by MOER at the beginning of the second decade of PlaNYC, but mayoral leadership had moved on from the guiding principles of PlaNYC and this work has remained unfinished.

To achieve holistic and equitable pollution protection, NYC and other cities need programs to manage pollution wherever it exists—in every community. This requires a new model for brownfield remediation and environmental governance that prioritizes and funds community-based remediation according to pollution-exposure risk, regardless of development plans or access to financing.

This is a significant challenge on the scale of those already addressed under PlaNYC, and that plan provides a model to address it. MOER's early collaborations with NYC's EJ organizations, the environmental industry, and state and federal governments were essential to achieving PlaNYC's brownfield goals. The EJ community helped secure the delegated authority agreement with DEC, shepherded City Council passage of the NYC Brownfield Cleanup and Community Revitalization bill and helped MOER design community brownfield programs. The environmental industry participated in training that improved work-product quality and expedited VCP navigation, and it promoted the program's value to landowners and developers. State and federal agencies publicly supported MOER's programs, provided critical liability protection, and made room at the table for the fledgling office. These collaborations must be renewed to achieve community-based remediation.

Recent interest in affordable housing, which is commonly built on brownfields, has focused public attention on the speed and efficiency of government environmental quality review. The cause for these delays are often identified as laws and regulations that must be reformed and insufficient government staffing to perform the work. Findings reported here show that operational and administrative reforms play a much more important role in accelerating government environmental review. State government would do well to learn from the service industry model established by MOER under Bloomberg and the reforms that were implemented to speed brownfield cleanup processes. These administrative and operational reforms are under executive agency control and can be implemented in days and weeks, rather than the months or years needed to change regulations, acquire funding and grow staff.

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Implementing these reforms requires informed leadership and a dynamic partnership between government, the environmental industry, and environmental advocates.

Conclusions

PlaNYC was an aspirational plan that sought to make New York City the most sustainable city in the world. By the end of the Bloomberg administration, most of PlaNYC's original brownfield goals were achieved. Going forward, the central question is not whether New York City should continue brownfield cleanup—city reports show that the program has become indispensable. The question is: How can New York City regain momentum and achieve remaining brownfield objectives—like community-based remediation—that remain incomplete? This would require a renewed commitment to the approach in PlaNYC and the unwavering political support that it enjoyed.

What should 'PlaNYC 2.0' look like? For brownfields, it should finally affirm the city's support for remediation of polluted land in all communities. It should include new initiatives that demonstrate a commitment to community-based remediation in four key areas: (1) research to develop an atlas of legacy urban pollution, identify hidden pollution threats, and provide a foundation for community-based remediation programming to improve environmental quality for all city residents; (2) public policy that translates scientific research into design of the next generation of urban environmental stewardship. Policy should seek to improve environmental quality and manage sources of chronic pollution exposure in all communities by finding practical solutions now and as our climate changes in the future; (3) new remediation programs to repair the effects of legacy pollution in all urban communities with an emphasis on eliminating sources of pollution exposure to sensitive populations, such as children, and in areas with disproportionate pollution burdens; and (4) a commitment to community engagement including development of tools and resources to support grassroots community implementation of remedial programming and assembly of coalitions of community-based organizations, residents, environmental scientists and professionals, local, state, and federal government agencies to support and implement this work.

Next-generation community-based remediation programs should provide communities with the resources they need to address pollution at the grassroots level and empower community-based organizations to provide local remedial services. By fully institutionalizing programs like the NYC Clean Soil Bank in all parts of the city, PlaNYC 2.0 could promote the retention and reuse of the large network of clean, low-cost, locally available secondary natural resources—such as clean soil and rock, concrete, brick, native dredge materials and compost—to systematically improve the chemical quality of the urban landscape, the abundance and diversity of coastal habitats and the resilience of our waterfronts to the impacts of climate change. Community-oriented programs should make better use of vacant city-owned land and equipment and focus the power of city government and its substantial economy of scale to make communities cleaner and safer. Examples include broad access to government remedial contracts and other resources for community use.

How can the lessons learned in New York City be translated to benefit other cities? PlaNYC was a pioneering plan that provided leadership to cities worldwide. A renewed commitment under PlaNYC 2.0 should seek to foster improved global progress in urban environmental governance, to mentor other cities, share technology, build capacity, and develop new public-private partnership models for smaller cities with fewer resources to achieve their land security goals.

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Make existing brownfield programs faster and more efficient	
Initiatives	**Programs**
1. Adopt on-site testing to streamline the cleanup process	**TurboTraining (2011)** Industry-wide techncial training program designed to guide onsite testing and improve plan and report quality to streamline the cleanup process in the NYC VCP
	Streamlining Site Cleanup in NYC (2013) Report published in colaboration with US EPA
2. Create remediation guidelines for NYC cleanups	**Title 43 RCNY Chapter 14, Subchapter 1 (2009)** Rules adopted by MOER to govern remediation and operations in the NYC VCP
	Climate Change Resilience Audit Program (2013) City-funded audits of brownfield development plans and blueprints to provide expert advice on means to establish more sustainable cleanup and resilient development on brownfield sites.
3. Establish a City office to promote brownfield planning and redevelopment	**Mayor's Office of Environmental Remediation (2008)** New office established and its founding director Daniel Walsh appointed by Mayor Bloomberg to oversee establishment of brownfield programs under PlaNYC
	NYC Brownfield Cleanup and Community Revitalization Act (2009) Authorizing legislation to establish MOER and operate the NYC VCP and other brownfield brograms established under PlaNYC
Expand enrollment into streamlined programs	
Initiatives	**Programs**
4. Expand participation in the current State Browfield Cleanup Program (BCP)	**NYC Affordable Housing Jumpstart Program (2015)** Program to promote enrollment city- or state-supported affordable and supportive housing projects in the State BCP to enable access to millions in state cleanup grants, lowering cost of affordable housing projects. Provides city financing for environmental investigation and cleanup up to $250,000
5. Create a city program to oversee all cleanups	**NYC Voluntary Cleanup Program (2010)** Launched the nation's first city-run brownfield cleanup program. Established a landmark agreement with New York State to operate the program and acquire State liability protection for parties cleaning up brownfields under the program.
	EPIC: Environmental Project Information Center (2015) Online public environmental communication portal to speed navigation tjhropugh the VCP. Includes online applications, document archive and repository, cleanup project tracking database, information sharing portal and other resources
6. Provide incentives to lower costs of remediation	**Affordable Housing Revolving Cleanup Loan & Grant Program (2015)** Established municipal low interest loans and grants to fund cleanup of affordable housing using $2.8 M in grants awarded by US EPA.
	BIG: NYC Brownfield Incentive Grants (2010) Established nation's first municipal grant program for environmental cleanup in NYC prioritizing projects in EJ and low-income communities. Over $9 million in grants delivered in first five years
	Hazardous Waste Disposal Tax and Fee Waiver program (2015) Amended NY State law to waive state fees and taxes for hazardous waste generation during cleanup in NYC under OER stewardship. This program lowers cleanup costs for all projects including non-profit development, affordable and supportive housing projects and city agencies
	NYC Clean Soil Bank (2013) Established world's first urban soil bank to enable retention and reuse of clean NYC soil in NYC. Bank shortens soil transport, lowers truck fuel usage and emissions, improves air quality and lowers GHG emissions. Soil used to improve soil quality in community gardens and other open spaces, cover polluted land to lower soil pollutant exposure, build wetlands and other greeen infrastructure and raise floodprone land. Almost 500,000 tons of soil exchanged in first three years.Received the State DEC Environmental Excellence Award
	FAST: Financial Assistance Search Tool (2014) Online search tool to help find grants and other financial assistance for environmental investigation and cleanup in NYC
	Environmental Industry Pro Bono Technical Assistance Program (2014) Pro bono technical assistance to community-based developers for land investigation and cleanup performed by environmental consulting firms
	NYC Concrete & Asphalt Millings Banks (2015) Established cost-free banks to obtain recycled concrete and asphalt millings for new construction to promote retention and local reuse. Program lowers construction costs, shortens transport, lowers truck emissions, improves air quality and lowers GHG emissions
Encourage greater community involvement in brownfiled redevelopment	
Initiatives	**Programs**
7. Encourage the State to release community based development grants	**Brownfield Opportunity Area (BOA) Supplemental Grants and Regional Economic Development Council Cleanup Grants (2013)** Established municipal grants for community brownfield planning to supplement and expand existing State funding under the BOA program. Used $500,000 award by the NYS Regional Economic Development Council to support affordable and supportive housing in low-income communities
8. Provide incentives to participate in Brownfield Opportunity Area (BOA) planning	**Place-Based Community Brownfield Planning Grants (2010)** Established planning grants for non-profits and community organiations including BOA grant recipients to develop community plans for reuse of vacant brownfields. Additional assistance in securing city, state and federal grants and advancing community plans with mayoral agencies. Over 30 communities participated in the program.
9. Launch outreach effort to educate communities about brownfield redevelopment	**New York City Brownfield Partnership (2008)** Established 75-member association of environmental industry and community-based organizations dedicated to community service including Pro Bono Environmental Assistance Program.
	NYC Green Property Certification Program (2011) Established a land quality and safety certification program to formalize NYC recognition that remediated brownfields are the 'safest places in NYC to live and work'. Markets land cleanup as an important sustainability goal, similar to LEED does for building sustainability
	"Cleaning Up New York City" Community Education Video Series (2012) Produced a 4-video series dedicated to public education for community protection and community engagement, environmental investigation and environmental cleanup. Funded by a grant from the Rockefeller Brothers Fund
	Peer Technical Assistance for Non-Profits (2015) Free technical assistance to faith-based and community-based developers for land investigation and cleanup performed by high-capacity non-profits under contract with MOER
	Environmental Industry Pro Bono Technical Assistance Program (2014) Pro bono technical assistance to faith- and community-based developers for land investigation and cleanup performed by participating environmental consulting firms
	Big Apple Brownfield Awards (2009) Established annual award program to showcase the best examples of brownfield cleanup in NYC. Highlights include the best environmental cleanup programs for affordable housing and community-based development
	BrownfieldWorks! (2010) Established a subsidized green job training and mentorship program in the environmental remediation industry. Workforce development funded by ARRA grants.
	Environmental Remediation College Scholarships and Internships (2009) Scholarship program and internships that leverage the environmental industry in NYC to fund need-based scholarships for college students in NYC seeking environmental degrees. Scholarships established by MOER and administered by NYC Brownfield Partnership
Identify remaining sites for cleanups	
Initiatives	**Programs**
10. Create a database of historic uses across NYC to identify potential brownfields	**SPEED: Searchable Property Environmental Electronic Database (2010)** Established GIS-based, online government environmental data search engine to speed and simplify the cleanup process and promote government transparency for environmental data.
11. Limit liability of property owners who seek to redevelop brownfields	**Liability Limitation Agreement with NYS DEC (2010)** Landmark agreement with State DEC to provide liability protection to all parties that complete brownfield cleanup in the NYC VCP. Letter from USEPA acknowledging MOER and its operation of the VCP

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Table 1. Eleven initiatives established in the Brownfield chapter of PlaNYC (left) and selected programs established by MOER over the first seven years to achieve these initiatives (right).

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