

VISIONING THE REUSE OF THE PHILADELPHIA ENERGY SOLUTIONS REFINERY COMPLEX

**CLEAN AIR COUNCIL
LINDY INSTITUTE FOR URBAN INNOVATION AT DREXEL UNIVERSITY**

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Foreword

Cities are a complex series of systems that evolve at a varying pace over time.

Such is the case with the Lower Schuylkill and the roughly 1,400-acre site formerly used by Philadelphia Energy Solutions for its oil refinery. The refinery started as the Atlantic Petroleum Storage Company in 1866—only seven years after oil was discovered in Titusville, PA—and grew to become the largest oil refinery on the East Coast of the United States before being shuttered by a fire and explosion in the summer of 2019.

In the intervening years, the site helped fuel the rise of Philadelphia as an industrial giant, frequently earning the moniker of “Workshop of the World” before the city’s eventual de-industrialization and decline in the 1950s and 60s. The ascent of the environmental movement in these subsequent decades—activated by the publication of Rachel Carson’s *Silent Spring* in 1962—began to make us crucially aware as a nation of the environmental and social costs of unregulated industry operating in close proximity to residential neighborhoods. Fast forward to today, where the continued work of local environmental advocates, in addition to the fire and explosion, have culminated in calls for a cleaner future use of the site that would advance environmental justice for South and Southwest Philadelphia residents living in close proximity to the former PES site.

The bankruptcy of Philadelphia Energy Solutions and the closure of its refinery has given Philadelphia residents a once-in-a-generation opportunity to rethink the future of this critically important site within the borders of the City of Philadelphia. Occupying an area larger than Center City Philadelphia and situated between the rich job hubs of Center City, University City, the Navy Yard, and the airport, the site is heavily polluted and will take significant effort, resources, and time to repurpose it for safer uses in the future.

The closing of the refinery shined a light on the persistent public health impacts of the refinery on the residents of the fence-line communities along its perimeter, as well as the significance of the loss of such a high number of highly skilled refinery jobs. Indeed, the City of Philadelphia’s Refinery Advisory Group, convened in the aftermath of the 2019 fire and explosion, made clear that future uses for the site must “put the public’s safety as a top priority” while “providing significant long-term economic benefit to Philadelphia and its residents.”

To that end, the Clean Air Council, in partnership with the Lindy Institute for Urban Innovation at Drexel University, organized a community visioning process to begin to imagine the future of the PES site. With a grant from the William Penn Foundation, the team worked with a wide number of constituents to develop initial images and diagrams of a physically connected landscape that could contribute to the social, environmental, and economic health of Philadelphia and the region.

This report details our process and our findings. It is presented as an overture to a much-needed broader and longer public conversation about the future of the site as we grapple with climate change, sea level rise, and the impact of increased storm surge in the midst of the coronavirus pandemic.

We are grateful to the William Penn Foundation for its support to the staffs of the Clean Air Council and the Lindy Institute, and to the residents, union members, public officials, advisory panel members, and design professionals who graciously gave their time and intellect to inform this work.

Yours,

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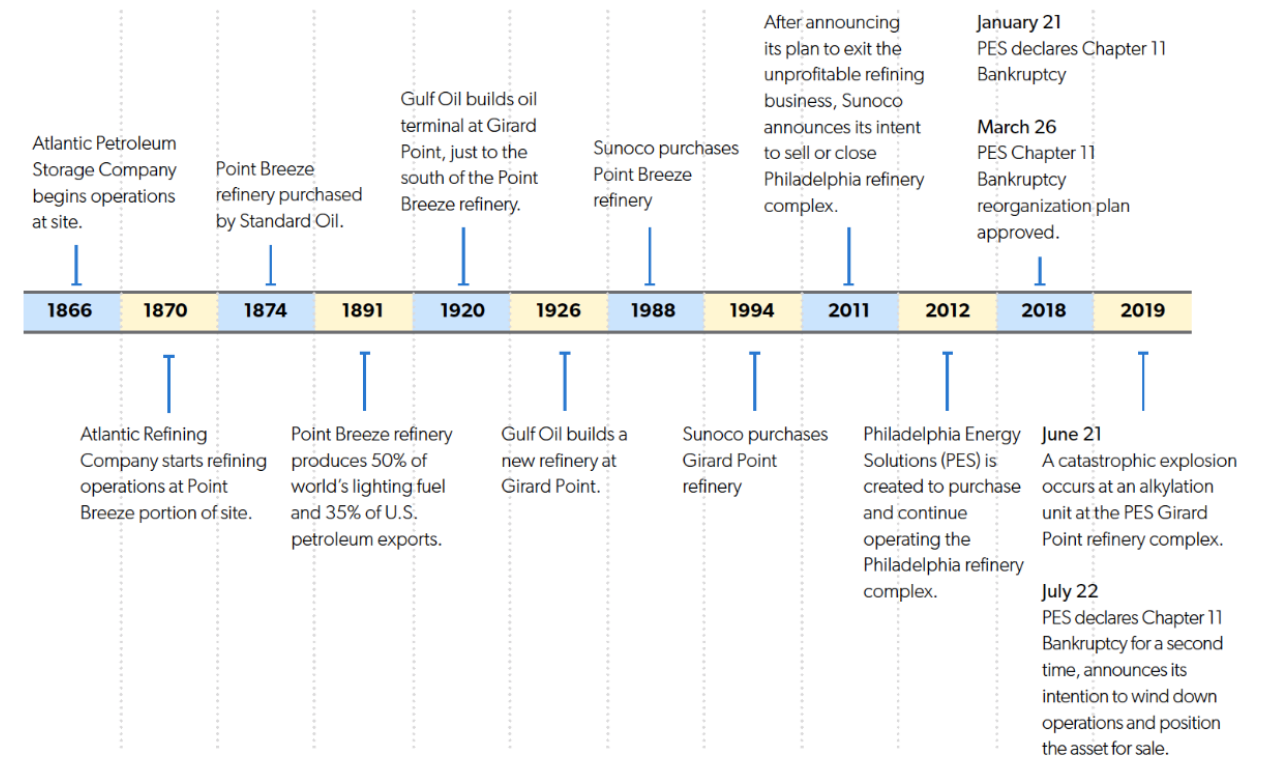


Introduction

Background

The Philadelphia Energy Solutions Refinery is sited on several parcels spanning approximately 1,400 acres on both sides of the lower Schuylkill River. Once the largest petroleum refinery complex on the East Coast, the site has undergone multiple ownership changes in its recent

history, although petroleum refining uses have existed onsite since the mid 1800s. The complex includes two separate refineries that produced a total of 335,000 barrels of crude oil per day. Operations halted following a pipe rupture and resultant explosion on June 21, 2019.



The Philadelphia Refinery: A Business History

The above timeline, from the City's Refinery Report, illustrates the past 150 years of the site's ownership by private petrochemical industries. The long history of refining creates significant hurdles to the site's reuse (Abernathy and Thiel 2019, 12).

Opposite: an aerial view of the parcels comprising the refinery site, overlaid in orange, along the lower Schuylkill River in south/southwest Philadelphia. PES's holdings encompass an area of approximately 1,300 acres, with some sources reporting up to 1,400 acres when including refining uses on adjacent parcels.

A Close Call and an Uncertain Future

Following the explosion on June 21, 2019, the city convened a working group focused on the future of the PES Refinery site. The Refinery Advisory Group, made up of representatives from several sectors including business, community, labor, academics, environment, and city government. The Group convened six public meetings to gather input from various stakeholders. The central charge for the Refinery Advisory Group was information gathering, and the group pursued several research agendas to gain a clearer understanding of the impact of the refinery's closure, environmental damages related to its operations, and the potential future uses of the site. Following this process, the group's co-chairs, Brian Abernathy (Managing Director for the City of Philadelphia) and Adam Thiel (Fire Commissioner and Director of Emergency Management), published a report entitled "A Close Call and an Uncertain Future: An assessment of the past, present, and next



steps for Philadelphia's largest refinery," summarizing the information presented to the Refinery Advisory Group. Though a majority of the report is dedicated to information sharing, the co-chairs also included some broad, initial recommendations.

The key takeaways of these recommendations are excerpted here:

Guiding values for future use of the site

Puts the public's safety as a top priority. Risks and hazards to the public should be minimized to the greatest extent possible in every aspect of how the site is used.

Has a more positive impact on public health and the environment than the status quo ever had. Air, soil, and groundwater ***pollution from the site should be minimized and remediated and operations should be more environmentally friendly than ever before.***

Provides ***significant long-term economic benefit*** to Philadelphia and its residents, including through high quality, family sustaining jobs. The site should be put to a productive use that is financially viable and creates high quality employment opportunities.

Provides direct community investment and engages meaningfully with surrounding communities. Future users should ***work collaboratively with surrounding neighborhoods to ensure that there is openness, transparency, trust, and positive impacts across the fenceline***—including through community benefits agreements or targeted job training or hiring initiatives. Future users should listen and respond to community concerns.

Provides for diverse uses/activities on the 1,300+ acre site. Regardless of how it is used in the future, the site is large enough to ***accommodate more than one use.*** The site's size should be utilized to support as many economically, socially, and environmentally positive activities as possible (Abernathy and Thiel 2019, 35).

“ In a statement, Mayor Jim Kenney said, “Though many challenges and years of work lie ahead, we are optimistic that the firm can develop this site in a way that supports the core values in the city’s recent report summarizing the work of the Refinery Advisory Group: a diverse range of uses on the site that put the public’s safety as a top priority, has a more positive impact on the environment, engages meaningfully with the surrounding communities and contributes significantly to the region’s economy.” ”

—from “New owner of PES site has no plans to continue refinery operations, city says,” January 22, 2020, WHYY

Refinery Advisory Group’s Report: challenges for site reuse, potential near-term uses, and recommendations for city/future owner of site

Despite significant challenges to the site’s reuse, including extensive soil and groundwater contamination, damage to the petrochemical processing equipment from the explosion, the increasing flood risk from sea level rise, and the fact that a large portion of the infrastructure onsite cannot be reused for industrial activities other than refining, the city outlined several potential near-term reuses for the site. These include the following:

- Continued petroleum processing by reusing the existing infrastructure
- Alternative energy, such as biofuel refining or other forms of renewable energy
- Energy-adjacent industries that use natural gas liquids in their manufacturing and operations
- Petrochemical manufacturing and recycling
- Manufacturing, warehousing, logistics, and distribution

(Abernathy and Thiel 2019, 33-34)

Additionally, the City Report identified the following next steps for the City to take to ensure that the public is better informed of public health risks, environmental remediation and monitoring, and the site’s long-term economic trajectory:

- Improve monitoring of air quality
- Increase oversight of Hydrofluoric Acid and other chemicals
- Review Hazardous Materials Response Capabilities
- Improve Environmental Impacts of the Site
- Develop clean and renewable energy
 - Enhance pollution control
 - Continue wastewater treatment activities
- Plan for climate resilience
- Incorporate landscaping, beautification, and public amenities

(Abernathy and Thiel 2019, 36-41).

“ Philly Thrive... said it wanted assurances from Hilco there would be no refining operations on the site; that Hilco would provide funding to assist the public with technical participation in clean up plans; allow active public involvement in plans for redevelopment; and establish a quota for quality, union jobs to surrounding neighborhoods. ”

—from “‘Their timeline is aggressive’: Hilco plans to clean up polluted South Philly refinery site, city says,” January 24th, 2020, Philadelphia Inquirer

The City's Power Over Reuse Process

- *The refinery site is privately owned and controlled.*
- *Zoning changes cannot prohibit a future refinery or mandate a change of use for the site—at least in the short term.*
- *The refinery's infrastructure has not been upgraded to the most state of the art technologies due to a lack of investment from recent operators.*

The PES site is privately held, which affects public control over the site's future. Private ownership and control severely limited the City of Philadelphia's ability to direct sale conditions. The City played an advising role, but could not administer actual terms of a sale. Eminent domain was a possibility but was not feasible, as it would have required a full market value reimbursement to the owner and would have saddled taxpayers with the extreme ongoing costs of site remediation (Abernathy and Thiel 2019, 12).

As of June 26, 2020, Hilco Redevelopment Partners, a subsidiary of Hilco Global—headquartered in Chicago—is the new owner of the shuttered Philadelphia Energy Solutions (PES) refinery site, which it purchased for approximately \$225 million.

Hilco does not plan to continue refining operations; instead they plan on redeveloping the site as a “state-of-the-art, light industrial park focused on warehousing and logistics.” It should be noted, however, that Hilco submitted a soil management plan and conceptual master plan for the site in June 2020. The conceptual plan showed 11-warehouses of approximately 1-million-sf each across the 1400-acre site which was elevated above flood level as an environmental remediation strategy.

While Hilco will determine the immediate next phase of use of the site, the City of Philadelphia can play a role in redefining the long-term vision for the Lower Schuylkill and the long-term use of the former PES

facility. For example, the Planning Commission could initiate a revision process for an updated version of the Lower Schuylkill River Master Plan and the Lower South District Plan, with broad public participation. These long-term plans could be used to chart the course for how redevelopment occurs at the site over the next several decades. The plans would ensure that redevelopment aligns with the City's goals and values, and they could influence regulatory or policy changes needed to advance the plans and formally plat an integrated street grid network that will determine the future shape of the site.

In the short term, any rezoning measures by the City of Philadelphia would be unlikely to prevent refining uses or mandate other land use changes. The existing use of the site as “heavy industrial” technically allows for the site to be used as a refinery even if the City changes the zoning. For example, City Council could amend the zoning map to change the Heavy Industrial District (I-3) in the area of the Lower Schuylkill River to Light Industrial District (I-1). With City Council's approval of a zoning change, the Planning Commission would review the proposed changes and deny or approve them based on a number of criteria. In this example, refining or other heavy industrial uses would be allowed to legally continue, replace, and even expand, as a “nonconformity”—a use that does not conform to the zoning of the area. Changes in ownership do not nullify this “grandfathering” of heavy industrial uses at the site, and the only process for voiding it is to prove that a use has been “abandoned” or “discontinued.” To be considered abandoned, the nonconforming use must be discontinued for over three consecutive years, and there must be evidence that the owner or operator of the parcel did not intend the same use for the entirety of that period. However, City Council has the authority to place additional restrictions on nonconformities and criteria for what constitutes an abandoned or discontinued use. Although Hilco has indicated its redevelopment plans do not include continued refining uses, it is legally entitled to continue to operate a refinery should it choose to do so (Abernathy and Thiel 2019, 30-31).

“ Mechanisms for city influence

Economic Incentives. Much of the refinery site is enrolled in Pennsylvania's Keystone Opportunity Zone (KOZ) program, which is designed to encourage business activity and investment at specific sites that are abandoned, vacant, or underutilized. Properties and businesses located within KOZs pay little to no state and local business taxes for a defined period of time. The City may submit an application to the State seeking extension of KOZ benefits subject to authorization for specific parcels by both City Council via legislation and the School District of Philadelphia Board of Education via resolution. Any extension of KOZ benefits would be conditioned upon continuance of the PILOT [payments in lieu of taxes] agreement. While the KOZ program is the most robust incentive program at the City's disposal, the City also has a range of additional discretionary economic development incentives it can use to encourage business growth and development within the City, including Tax Increment Financing (TIF) or grants and forgivable loans. These programs can be utilized to encourage business activities that align with the City's values and vision.

Infrastructure Assistance. Much of the 1,300-acre refinery site currently exists as large tracts of privately-owned land that are fenced off with relatively few

connections to the City's roadway or infrastructure network. If the future of the site is conducive to a range of activities, it is likely that parcels of the site may either require subdivision or the construction of additional infrastructure like streets, water, sewer, or river access to improve connectivity to the rest of the City. Should this situation occur, the City could leverage its infrastructure to help support the development of uses that support the City's values and vision. Should the City decline to assist with building this type of infrastructure, the onus to provide it would be on the property owner.

Targeted Assistance for Specific Initiatives. The City may also be able to exert influence to encourage certain uses on the site in a more targeted way than offering tax breaks or building roads. For example, the City has substantial purchasing power that could be leveraged to encourage the development of green energy. The City, therefore, could enter into a power purchase agreement to encourage the development of solar or wind energy on portions of the site, or agree to purchase biofuels for use in municipal vehicles. The City can also offer targeted workforce development assistance through its partner agencies like Philadelphia Works to ensure that future users of the site have access to the trained workforce they require (Abernathy and Thiel 2019, 31). ”



Opposite: The cover of the City's Refinery Report released by the Managing Director's Office and Department of Emergency Management. Above: View of the Refinery Site with Center City in the background. Photo credit: Elvert Barnes.

Impacts of Refining Use and PES Closure, Site Assets

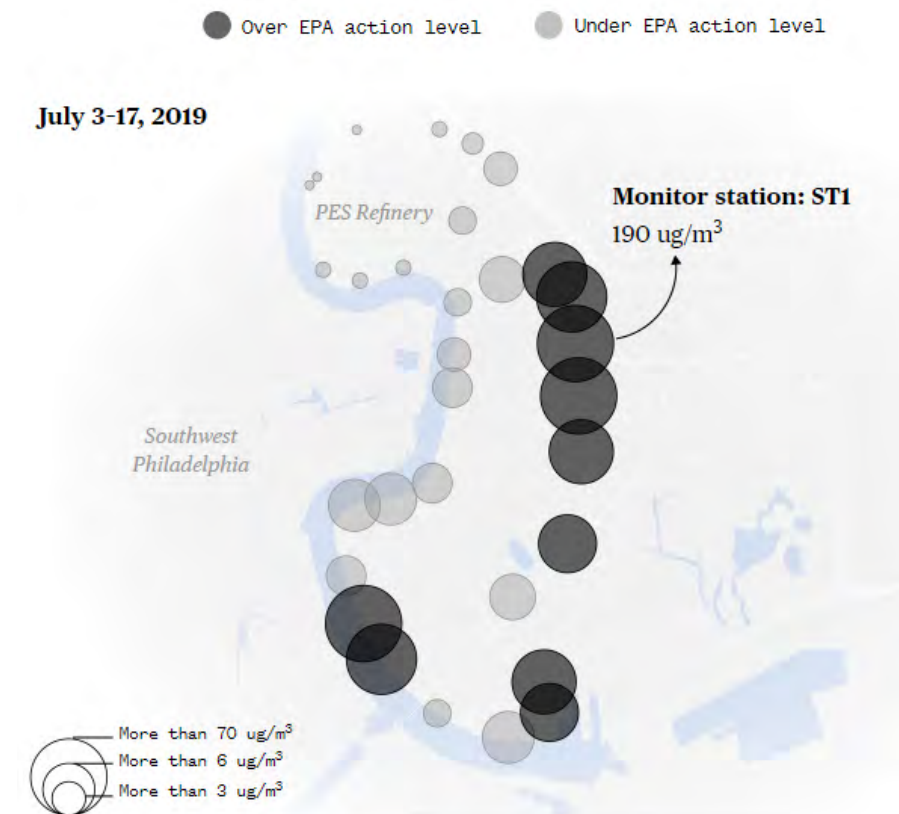
Environmental Impacts

Air Pollution

Since 2014, the site released 467,600 pounds of air toxics annually, including benzene and other carcinogens. 9% of the entire city's fine particle emissions and 20% of all Philadelphia's greenhouse gas emissions came from the refinery (Abernathy and Thiel 2019, 17).

According to the EPA and as reported by Christina Simeone, the PES refinery was the 8th largest emitter of greenhouse gases in Pennsylvania and the largest in Philadelphia, by far. As of 2014, the refinery emitted between 2.9 and 3.2 million metric tons of carbon dioxide equivalent annually (Abernathy and Thiel 2019, 21).

According to investigative reporting by NBC News, E&E News, and the Investigative Reporting Workshop, high levels of benzene, a carcinogenic compound, were recorded by air monitors at the refinery's fence line throughout 2019. As of September, the annual average was 49 ug/m³, more than five times the EPA action level of 9 ug/m³. Regulations require refineries to take corrective action if average annual benzene readings exceed 9 ug/m³. City officials were notified of the readings and received a required "corrective action plan" from PES, but the public was never informed of the potential hazard (Hiar, E&E News, Riordan Seville 2020).



Benzene Monitoring at PES

Left: Air monitors on the PES site perimeter recorded benzene levels in July as high as 190 micrograms per cubic meter (the EPA "action level" threshold is 9 ug/m³).

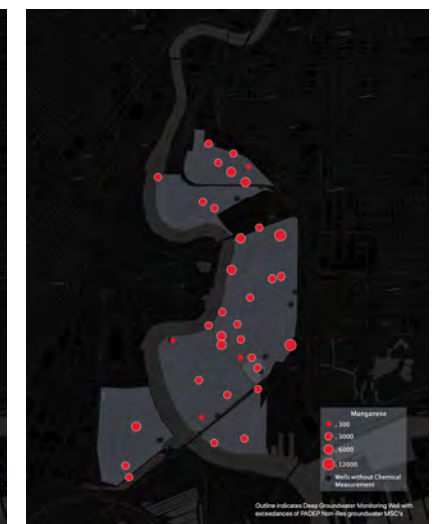
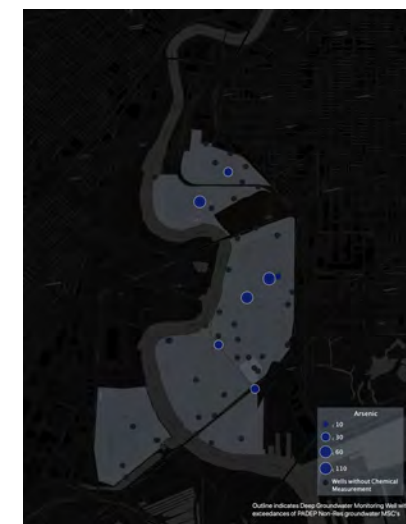
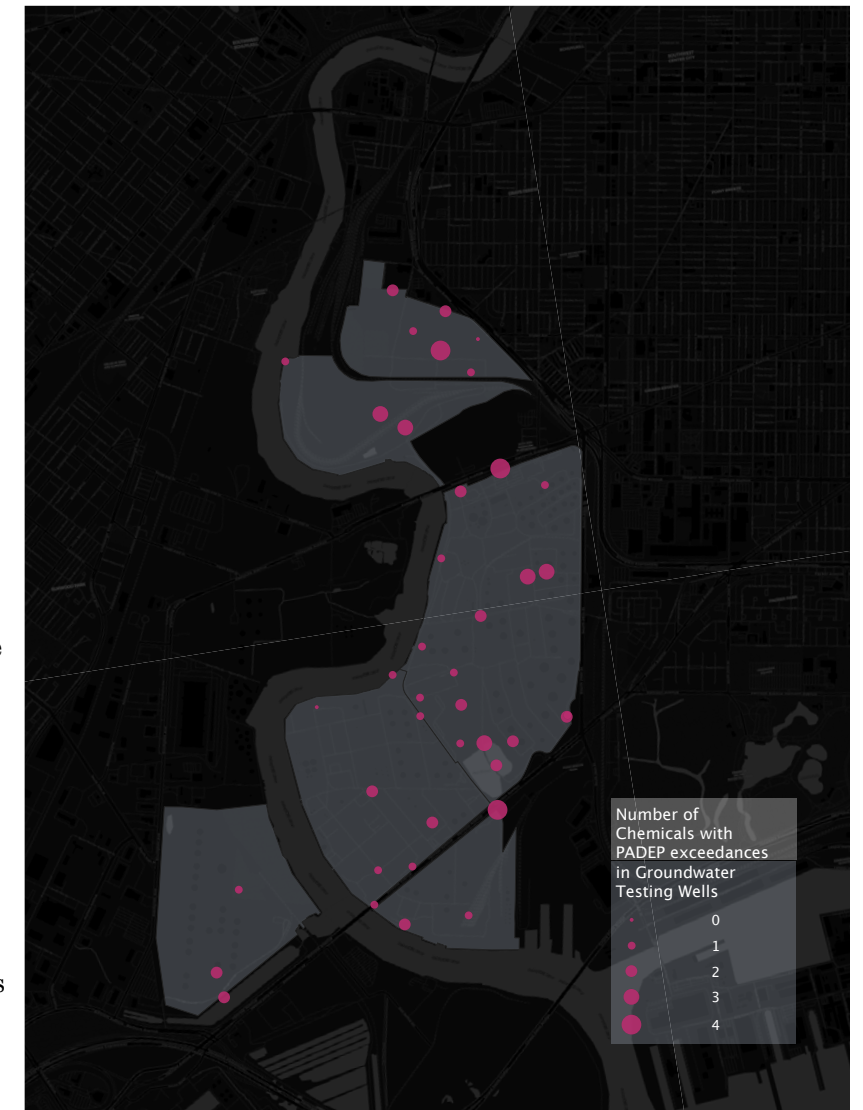
Right: EPA thresholds are 9 ug/m³ annual average; PES registered at 2019 average of 49 ug/m³. A series of high emissions put PES well over the benchmark.

Image Credit: NBC News, "Massive oil refinery leaks toxic chemical in the middle of Philadelphia." January 16, 2020.

Remediation of Soil & Groundwater Pollution

Up until its closure, the refinery was responsible for more than 5,000 pounds of water pollution annually. The site's long history of refinery operations has caused substantial environmental contamination in the soil throughout the site and the shallow and deep groundwater underlying it (Abernathy and Thiel 2019, 19). These conditions and the extent of remediation will influence the range of site activities that are viable or safe.

The diagrams to the right illustrate the degree of deep aquifer groundwater contamination from Pennsylvania's Land Recycling Program (Act 2) reports submitted to the Pennsylvania Department of Environmental Protection and the United States Environmental Protection Agency by Sunoco and Philadelphia Energy Solutions in 2013. Evergreen Resources Group LLC, an agent of Sunoco (which still retains responsibility for the pre-2012 environmental contamination)



is still in the process of performing a remedial investigation for soil and groundwater pollutants.

The Act 2 remediation process will take many years, and at the time of this report it only requires remediation of the soil and groundwater to non-residential levels. While Hilco and other potential future owners of the site would not necessarily share Sunoco's remediation obligations, the existing conditions will limit short-term development to industrial and commercial uses and may complicate the construction and engineering methods required to build new structures on the site (Abernathy and Thiel 2019, 33). It is prudent to note that there are also overlapping federal requirements and oversight from the EPA as it relates to this remediation process. Furthermore, Sunoco as the legacy polluter has not followed public involvement requirements which so far has left community members and other stakeholders with no meaningful input into the adequacy of contamination identification and proposed clean up plans.

With the contaminants of concern identified on the PES site, the next step before selecting remediation measures would be to determine the future use. Current plans call for most of the refinery site to be remediated to a site-specific non-residential standard based on the site's current and longstanding use as a heavy industrial site. Unless it is legally determined that the site is subject to a more restrictive standard, the site will likely be primarily used for industrial or commercial purposes in the future (Bhandal, et al 2019).

Social Impacts

Residents living in fenceline communities have reported negative health impacts that they believe are related to pollution from the refinery. Philly Thrive, an environmental advocacy group leading the "Right to Breathe Campaign," has long opposed the refinery's operations and has facilitated outreach to both community and city government to attempt to address the issues.

- Philly Thrive's 2017 #WeDecide Survey findings:
 - 33.9% of participants living near the refinery had asthma at some point in their life, compared to the national average of 7.7%

- 52.6% of respondents living near the refinery had one or more of the following health conditions: asthma, heart disease, cancer, or another respiratory condition.
- 82% of respondents expressed negative feelings about the PES refinery, with the top critique being that it's dangerous, a hazard, and a health concern.
- The environmental burdens of living in close proximity to the refinery are disproportionately shouldered by low-income communities of color, "many of whom did not choose to reside in close proximity to an oil refinery or have the means to relocate."
 - Of the 113, 271 people who live within 1 mile of the refinery, 60.4% are Black (a total of 77.1% are non-white) compared to the population of the city, which is 42.3% Black
 - 38.6% of households within 1 mile of the refinery earn less than \$25K/yr, compared to 31.5% of households city-wide

(Philly Thrive 2019)

Economic Impacts

Cost of Closure

It is difficult to precisely quantify the cost of the refinery's closure to the city's economy. Several estimates, including those generated for the city's Refinery Advisory Group, have been published since the refinery shuttered its doors.

Several sources estimate that 1,100 people were employed at the refinery at the time of the explosion. These employees worked "in a wide variety of occupations including but not limited to managers and corporate executives, refinery operators, rail car unloaders, tank field operators, laboratory technicians, scale operators, warehouse staff, mechanics, and skilled trades" and "earned approximately \$107,000 per year, on average." An economic analysis prepared by Econsult Solutions (commissioned by the Refinery Advisory Group) found that PES directly employed 1,950 full-time employees, paying \$237 million annually in salaries and wages. The company's expenditures totaled more than \$1 billion annually (Abernathy and Thiel 2019, 14-15).



Looking south towards the northern portion of the PES site at Passyunk Avenue and Dover Street. Photo Credit: Ryan Debold.

The city-commissioned analysis valued the PES refinery's economic impact for the city at \$2.1 billion. When including jobs indirectly supported or induced by PES operations, the job count was 6,300 full-time jobs in Philadelphia, accounting for \$600 million annually in employee compensation. Finally, the analysis estimated that "the PES refinery had a total annual tax impact to the City of Philadelphia of \$33.2 million, and a tax impact to the Commonwealth of Pennsylvania of \$30 million (while also accounting for the refinery's KOZ status)." These data were not based on actual tax data due to confidentiality issues (Abernathy and Thiel 2019, 14).

The closure of the refinery reduced refining capacity on the east coast by 28%. According to the city's report, there have been no direct fuel shortages as a result of the closure; however, the region's increasing dependence on fuel from other places (delivered by pipeline from neighboring regions) may have longer-term economic and environmental implications (Abernathy and Thiel 2019, 15).

Existing Assets

According to the Refinery Advisory Group report, the refinery site has several advantages that result from its long industrial history. As outlined in the city report,

there are four key assets: infrastructure, zoning, labor, and location.

The site currently contains extensive, specialized infrastructure for petroleum processing. While Hilco doesn't plan to continue operating a refinery, useful infrastructure investments such as a wastewater treatment plant, freight rail, and a shipping port could still be utilized in future use scenarios.

The current zoning (Heavy Industrial or I-3) allows for the site to be immediately repurposed with a variety of industrial uses without the need for zoning changes or special permissions, such as a use variance, to use the land in ways that are different from the uses allowed in a Heavy Industrial-zoned district.

The refinery's closure and other closures in the region over the past several years means there are many local workers trained for refinery, industrial operations, and other skilled trades that are unemployed, underemployed, or have left the region.

The refinery site is conveniently located in close proximity to the city's airport and seaport facilities, and is connected to shipping terminals by pipelines for transporting petroleum products. Situated near two interstate highways and equipped with rail infrastructure, the site has high freight capacity (Abernathy and Thiel 2019, 32).

Visioning Process and Framework

Background

In June of 2019, an explosion and fire at the Philadelphia Refining Solutions (PES) site along the lower Schuylkill rocked local neighborhoods and Philadelphia residents, prompting questions about what had caused the explosion, as well as calls for increased scrutiny over continuing refining operations at the site. A month later, after all refining operations had ceased, PES filed for Chapter 11 bankruptcy, leaving a lot of uncertainty about the site's future as a refinery. The City, led by Managing Director Brian Abernathy and Fire Commissioner Adam Thiel, convened a PES Refinery Advisory Group task force comprised of public and private experts and stakeholders to help understand what had happened with the explosion and fire as well as the implications for the future of the site.

In September, Clean Air Council (the Council) received a grant from the William Penn Foundation to lead a limited civic engagement process around the public comment period of Evergreen Resources regarding its

approach to remediation of the site. As part of its grant, the Council approached the Lindy Institute for Urban Innovation at Drexel University to convene a parallel civic visioning process to solicit additional public input around what values should guide future development and what citizens hoped to see for future uses.

Process

To date, the Council and the Institute have partnered to hold two advisory panel meetings and a public input session, broadly distribute a survey on the future uses of the site, and convene a group of design professionals for a two-day design workshop focused on the former-PES parcels.

The Council and the Institute held the first in-person advisory panel meeting on January 7, 2020 to kick-off the input process, present case studies on redevelopment of post-industrial land, and solicit

feedback. Forty-four advisory panel members and alternates representing a wide array of perspectives attended the meeting.

At the public input session, held at Smith Playground in South Philadelphia on January 29, 2020, the Council and the Institute facilitated a discussion with about 35 attendees on short-term and long-term concerns about the PES site. The discussion included specific site concerns such as public health and safety, environmental contamination, sea level rise inundation, and fears of gentrification and adverse neighborhood change around the uncertainty of the future development process. The attendees were then invited to comment on the information presented, give input on how to prioritize short-term policy advocacy options, and identify their greatest concerns about site remediation.

The week before the public meeting, the bankruptcy court announced that Hilco Redevelopment Partners had been selected as the winning bidder, resulting in discussion of who Hilco was and what their plans might be. The Institute prepared an initial investigation of Hilco's work on Sparrow's Point in Baltimore, a former heavy industrial site that has some similarities to the PES site. The Sparrow's Point project included stakeholder engagement and master planning as part of Hilco's process.

The Lindy Institute and the Council partnered to administer a 3-question survey to gather public input about future uses of the refinery site. The groups gathered 366 responses (307 electronic survey, 59 written survey) between November 25, 2019 and January 21, 2020. The groups distributed the survey broadly through email lists. The Council also distributed the survey through outreach to registered community organizations (RCOs) and hired South Philadelphia residents to collect hardcopy responses from neighbors.

The Institute convened design professionals for a two-day design workshop, or charrette, to create visualizations of potential future uses of the former-refinery site. In preparation for the charrette, Institute staff prepared a briefing book containing background information on the site. The briefing book, which synthesized information from the City's Refinery Advisory Group's report, included land use and environmental maps, preliminary survey results, and sample cases of the reuse of toxic industrial sites. Charrette participants used this information, including public input from the surveys, to imagine several phases of redevelopment that might happen on the site over the next 50 to 100 years. At the end of the charrette, the professionals shared the designs with a subset of the advisory panel. The Institute and the Council also presented the charrette designs to the advisory panel and solicited feedback at a February 27, 2020 meeting.

Based on public input and understandings of current and future site conditions, charrette participants arrived at the following core understandings and assumptions about the PES site, which establish the basis for the guiding principles for the long-term future vision of the site:

- Toxins at the site must be remediated
- Climate change is happening and much of the site will be transformed by sea level rise in the next 50 to 100 years, according to NOAA sea level rise projections
- For the last 150 years, heavy polluting industry has had unjust impacts on the health and safety of the surrounding neighborhoods, the majority of which are comprised of people of color. Holding the public's health and safety as a top priority, especially for those that have been disproportionately impacted for so many years, future uses should not include heavy polluting industry. Resources must be identified in the short-term that can assist those whose health has been negatively impacted.



January 29th's public input session and conversation at Smith Playground in South Philadelphia.

- The location of the site situates it as a gateway to Philadelphia, and there is great potential to connect other parts of the city to and through the site
- The site should in some ways reflect the human-scale design of our city
- The energy sector is changing, and fossil fuels, particularly oil, will not continue to be cost competitive in the long run
- Philadelphia will continue to evolve, and will require a healthy mix of land uses to accommodate population growth as well as planning and proactive policies that prevent gentrification in the surrounding neighborhoods
- We cannot know for sure what the futures of transportation, work, market forces, and the environment look like, but we can design with adaptability and resilience in mind

The designs from the charrette clearly mapped a plan for reconnecting the site to the rest of the city but kept open the possibility of many types of land use that were not heavy industry. Many types of light industry, community resources and institutions, greenspaces, and infrastructure were discussed. Thus, the designs provide a framework that allows for adaptability to changes in economic and environmental conditions. Recognizing that the charrette designs are works in progress, it is important to collect additional input to continue refining future options for the Lower Schuylkill as public discourse about the site continues.

Many groups throughout the engagement sessions had different views and priorities for the future of the site: some advocated for a full site vision now; members of the labor community articulating their preference for continued refining uses; and community groups expressing frustration about a process that was too focused on the long-term future rather than responding to immediate community goals related to addressing the negative impacts of living near the refinery. Although balancing these viewpoints is at times difficult, it is equally important to address public health issues in the present while also considering what the long-term future *could be*. A long-term vision is important for ensuring that the site is redeveloped in a way that is aligned with the public's ideals.

Guiding Principles

Any vision for this site must respond both to the urgent and immediate needs of the most affected communities and address the long-term priorities of justice and equity, climate adaptation, and inclusive growth and design.

Social justice and equity:

- Recognize past harms to the community and plan with their health, safety, and economic well-being as a top priority.
- Repair the social compact between the city and the communities surrounding the site through transparency, resource allocation, and sustained communication.
- Expand mobility through and around the site

Climate adaptation:

- Prioritize remediation of toxins to prevent increased contamination with sea level rise
- Strategically adapt to sea level rise through a phasing plan

Inclusive Growth and Prosperity:

- Regenerate the surrounding neighborhoods through identifying resources to address health impacts, and advance living-wage jobs, education and job training, local hiring incentives, and inclusive economic growth and wealth-building, while designing these systems with long-term resiliency in mind around market forces and economic cycles
- Building on the above, leverage the site's centralized location and redevelopment as major employment hub to create network of economic opportunity in Lower Schuylkill and throughout region
- Redevelop the site in a way that supports a diversity of uses rather than purely industrial, with considerations of where existing residential neighborhoods can be better buffered from industry
- Establish more convenient and equitable access to the riverfront





Planning Overview

The PES site is arguably the most important piece of land in Philadelphia today in terms of opportunity. When fully developed, the site could provide valuable and equitable social, economic and environmental benefits to city residents.

The 1,400-acre PES parcel site is strategically located between the major employment centers of Center City, University City, the Navy Yard and Philadelphia International Airport.

The site is well-connected to other parts of the city by several arterial streets, in addition to Interstates 76 and 95, which offer strong connections to the region.

The site contains significant soil and groundwater contamination.

Although the cessation of refinery operations has significantly reduced the air pollution emitted from the site, serious soil and groundwater pollution still exists at the site. Before redevelopment occurs, additional investigation will be needed to assess the degree of pollution and remediation required for different uses.

The site is disconnected from the city grid, adjoining neighborhoods and infrastructure.

While nearly the entirety of the PES site is fenced off to the general public, the Schuylkill River Expressway creates an even more intimidating barrier for many adjacent neighborhoods to the east to access the riverfront to the west. The above image, taken from Google Street view at Morris Street, illustrates the common view over the Expressway and into the site from the surrounding neighborhoods. Future planning should consider how to improve connectivity between the Grays Ferry and Point Breeze neighborhoods to the Schuylkill River's east bank.

The site is located on low-lying river fill that will be at the front-line of climate change impacts.

The blue overlays on the aerial photo to the left illustrate the extent of FEMA's 100-year and 500-year flood risks, without considering future sea level rise. According to projections by the U.S. National Oceanographic and Atmospheric Administration (NOAA), portions of the refinery site are currently vulnerable to minor flooding during extreme high tides—particularly the areas near Girard Point and west of the Schuylkill River, as seen in the aqua color. In a future scenario with a higher water level due to sea level rise, increasing by just 2 feet over current levels, portions of the tank farm west of the Schuylkill River will be underwater. Increases of 3 feet over current levels are projected to submerge large portions of the Girard Point section of the refinery underwater. Flooding risks and impacts continue to increase with increases in projected sea level rise.

Future uses of the refinery site—regardless of what those uses are—must seriously plan for these scenarios when determining what types of infrastructure should be built, as well as where and how that infrastructure should be built on the site to minimize risks posed by flooding. Future developers must pay careful attention throughout the environmental remediation of the site to ensure that soil and groundwater contaminants are addressed in a way that minimizes the risks of contaminants migrating off-site in the event of more frequent and more severe flooding events (Abernathy and Thiel 2019, 40).

Connecting the Site to the City

Those who live along the fence line of the PES site have faced a foreboding barrier for generations. To truly integrate the site into the urban fabric of Philadelphia, we must breach the barrier of the Schuylkill Expressway at the northern end of the site and create urban-scaled blocks that can eventually be developed and connected to the regional transit, mobility and public trail systems.



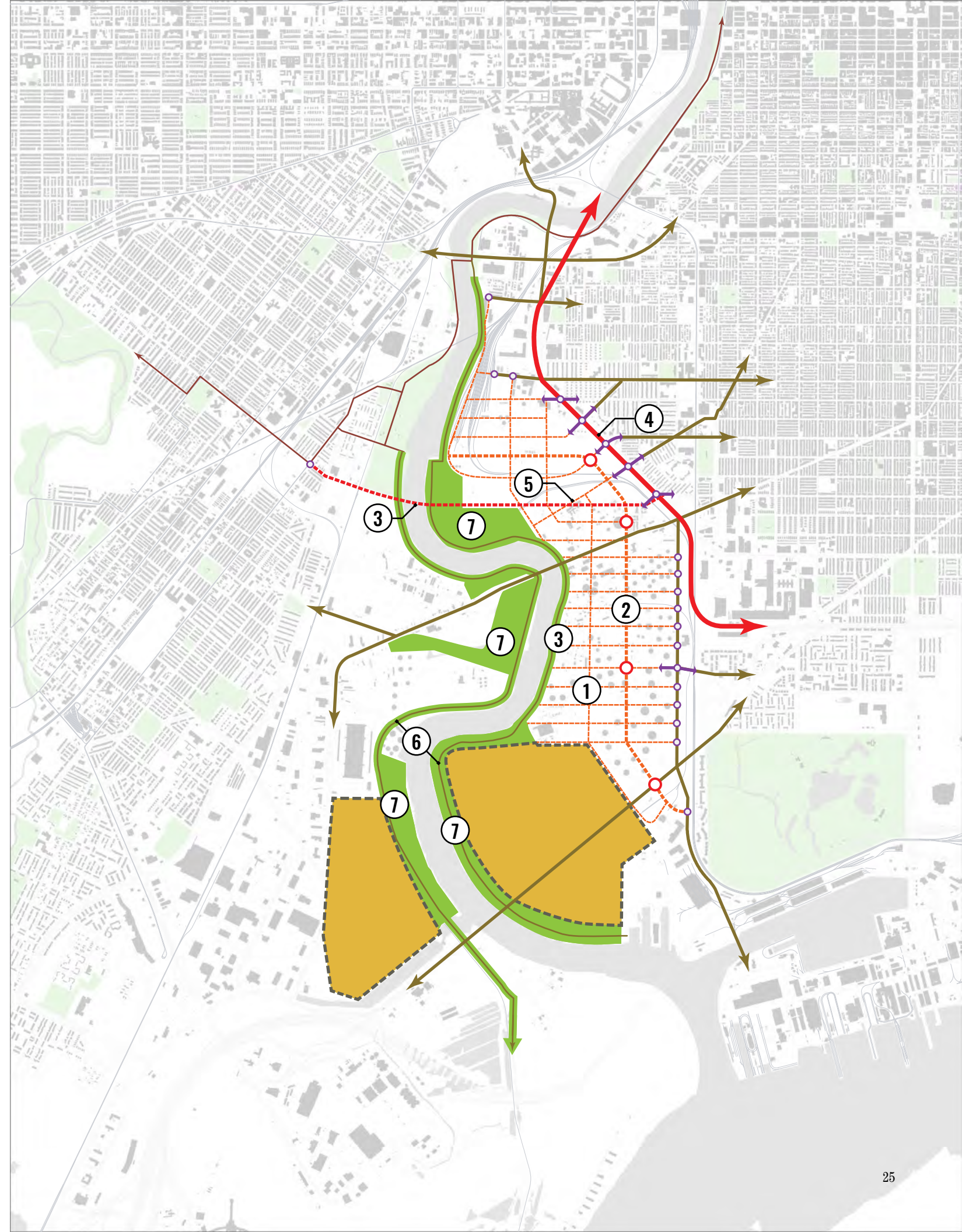
Although the public is barred from entering large portions of the site, I-76 forms a significant barrier between the site and the neighborhoods to the east. The section of interstate is at grade, which could make it easier to downgrade it to a boulevard and connect it to nearby streets. Photo Credit: Google Maps and Earth.

Create a street grid (1), central boulevard (2), and bridge (3) to the western bank of the Schuylkill River across the site to integrate the site into the surrounding city. The grid can be broken down over time to allow the site to evolve from logistics and light industrial to allow for a greater diversity of uses including residential, commercial, institutional and civic.

Boulevard the Schuylkill Expressway at Point Breeze where it is currently on-grade to eliminate this barrier to the site (4). Extend Point Breeze Avenue to the river (5).

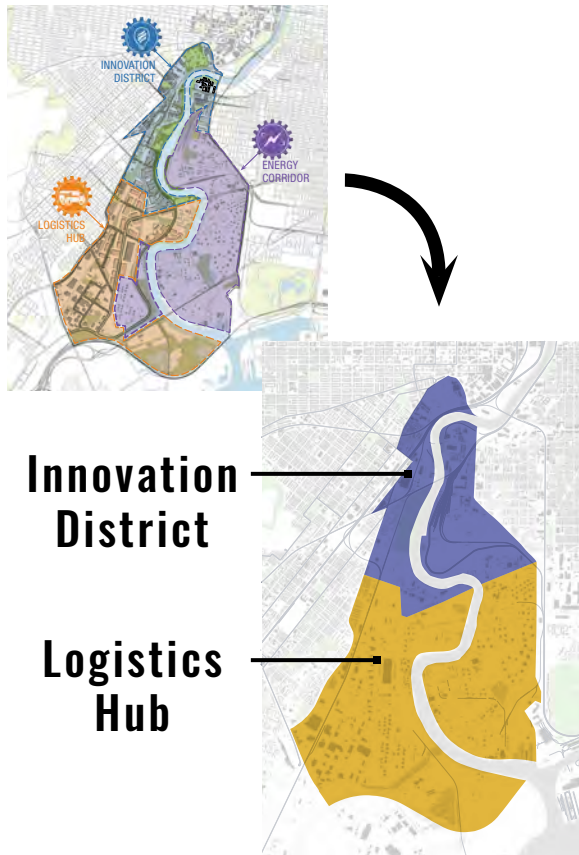
Extend the Schuylkill River Trail to the site (6) and provide new green and open spaces for the adjoining neighborhoods and the city's park system (7).

Expand public transit connectivity through new hubs of activity (for example, mixed-use centers, park space, or other employment hubs) across the site.



An Evolving Site

Out of necessity, the redevelopment of the PES site will occur slowly over time. Environmental remediation alone is a lengthy process. New uses will eventually supersede existing ones and allow us to take a sequenced and long-term approach towards the ultimate redevelopment of the site.



The evolution of the site from 150-years of petroleum refinement and storage to mixed-uses will require significant investment in environmental remediation and city infrastructure over a long period of time.

Hilco's proposal to transform the site for logistics and light industrial uses was generally viewed by the public as a positive first step in evolving and integrating the site into the surrounding city.

Hilco has a track record for transforming former heavy industrial sites similar to PES into functioning industrial complexes, usually with a focus on logistics and light manufacturing. Hilco is currently developing a similar industrial adaptive reuse project in Baltimore County, MD, at the former Sparrows Point steelworking and shipbuilding site. See page 34 for more information about the Sparrows Point Case Study.

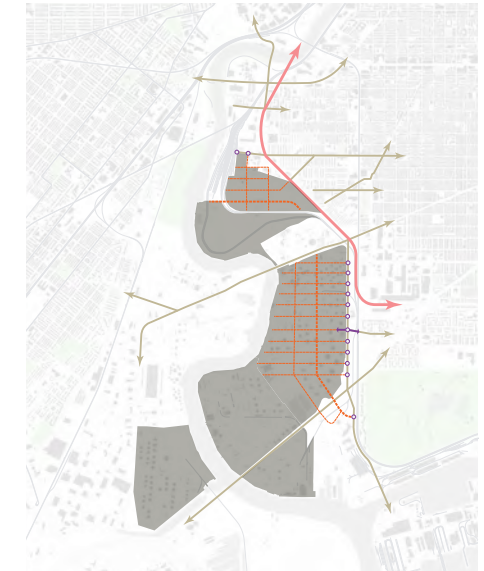
This transition to less intensive land uses complements the vision outlined in the 2013 Lower Schuylkill Master Plan, which calls for life sciences and biotech research and manufacturing uses in an "Innovation District," building on the Pennovation campus at Grays Ferry Crescent, as well as the expansion of the "Logistics Hub" in the Southwest, which has good access to Philadelphia International Airport. Hilco's strategy may align with the Master Plan's concept of expanding these two districts into the Plan's "Energy Corridor," an area occupied by the refinery.

Top: Lithograph advertisement from 1866 of the Atlantic Petroleum Storage Company along the Schuylkill River. Atlantic would later become a subsidiary of Sunoco. Bottom: Vision diagram from the Lower Schuylkill Master Plan illustrating the 3-district concept, and how the PES parcel could be absorbed into the Innovation District and Logistics Hub.

Potential Site Phasing

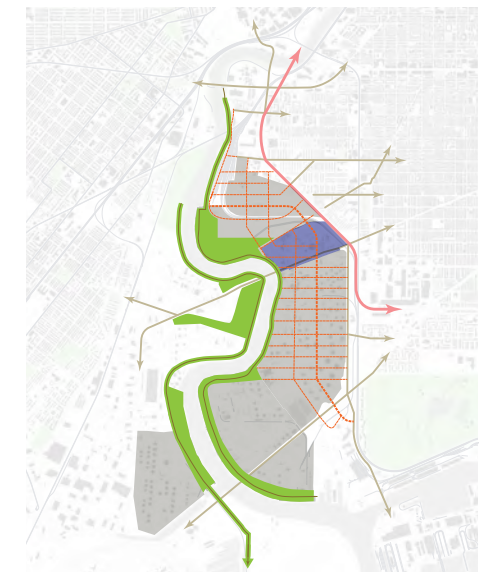
Phase I: 0—15 Years

- Clean up plans are finalized, ongoing groundwater remediation continues, and additional remediation of soil begins
- Refining operations and petroleum storage uses on PES parcels are phased out
- Street grid construction begins independently on north and south portions of site
- Construction begins on new non-polluting industrial uses in alignment with PIDC's Lower Schuylkill Master Plan: light manufacturing, warehousing and logistics, biotech research
- Construction begins on Schuylkill River Trail extensions and new park spaces



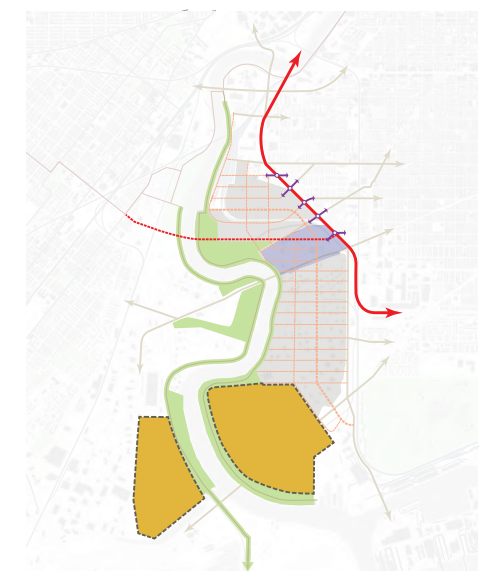
Phase II: 16—25 Years

- Ongoing site remediation and water and soil monitoring
- PGW's liquefied natural gas plant at its Passyunk site (although not part of the PES site itself) is phased out and transitioned to new, cleaner uses
- City grid extends fully across site, bridging north and south parcels
- Commercial and industrial innovation and logistics uses expand across site
- Portions of underused rail are reused, banked (where rails are taken out of service and reused as trails until the corridor is ready to be used again), or removed entirely for new development and uses



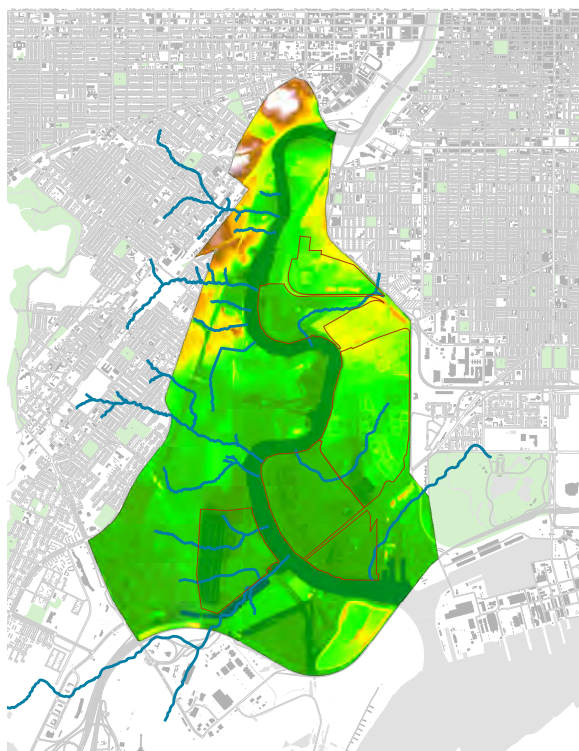
Phase III: 25+ Years

- Site remediation concludes, ongoing water and soil monitoring
- Portions of the site which meet applicable state and federal standards are considered for mixed-use residential development
- Green infrastructure (natural stormwater management interventions) or shoreline hardening (construction of traditional flood control structures) is completed in areas most vulnerable to flooding and sea level rise
- New bridges across Schuylkill to 54th Street completed; New iconic Platt Memorial Bridge
- I-76 is boulevarded, connections are created across the former expressway into adjacent neighborhoods



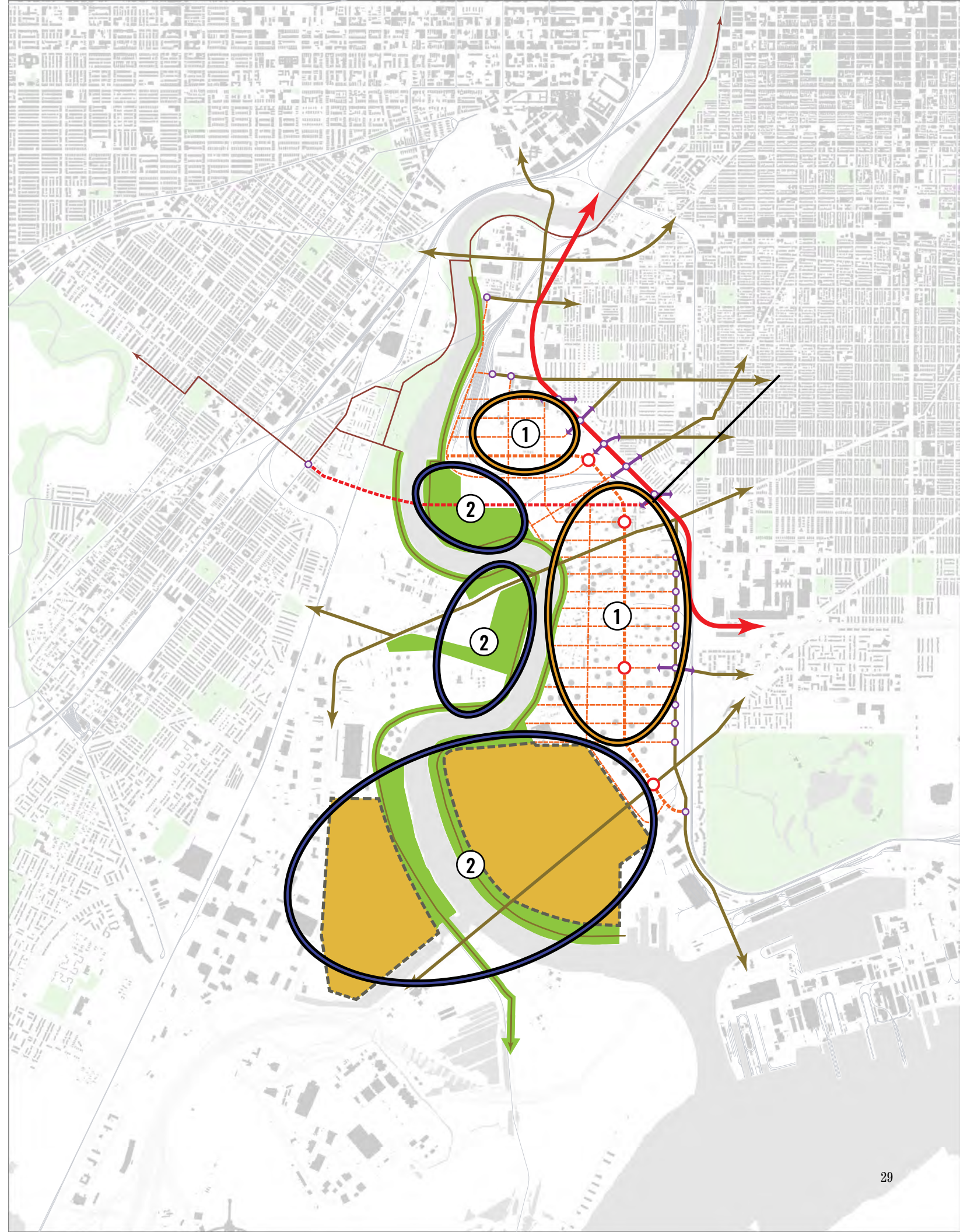
Jobs on Higher Ground and Public Access on Green Infrastructure

As the site lies within the marshy lowlands of the Schuylkill River delta, careful consideration must be given to the impact of sea level rise, climate change and surges from future super storms. The site includes higher and drier ground towards the north and the east—telling us that the best uses for the riverbanks and the mouth of the Schuylkill at Girard Point are as public green spaces.



Site elevation map illustrating areas of low (dark green) and high (brown to white) elevation, with historic streams overlaid. Many of the lower lying areas of the site prone to flooding are where some of these streams once were.

- ① The portions of the site that are currently occupied by PES industrial structures are on higher ground than some of the areas adjoining the Schuylkill River. The higher ground would be the most suitable for the implementation of a new street grid that can accommodate new development.
- ② The areas of the site that are most susceptible to the impacts of sea level rise and storm surges resulting from climate change have the potential to become part of a new green infrastructure system. This includes the Girard Point section of the site and the area where the historic Pinneyes Creek emptied into the Schuylkill above the current PGW site.



A New Gateway

The PES site has been a less than welcoming entrance to Philadelphia for a very long time. A driver coming to the city from the south must circumnavigate the site and enters the city through the back door. As a legacy of Philadelphia's great industrial age, we have the opportunity to acknowledge the site's history while transforming it into a vital and dynamic gateway to a 21st century Philadelphia.



Create a 21st century gateway to Philadelphia from the airport (1).

Opportunity for an iconic gateway landscape that reflects the history of the site and Philadelphia's sustainability goals (2).

Opportunity for iconic replacement to the Platt Bridge (3).

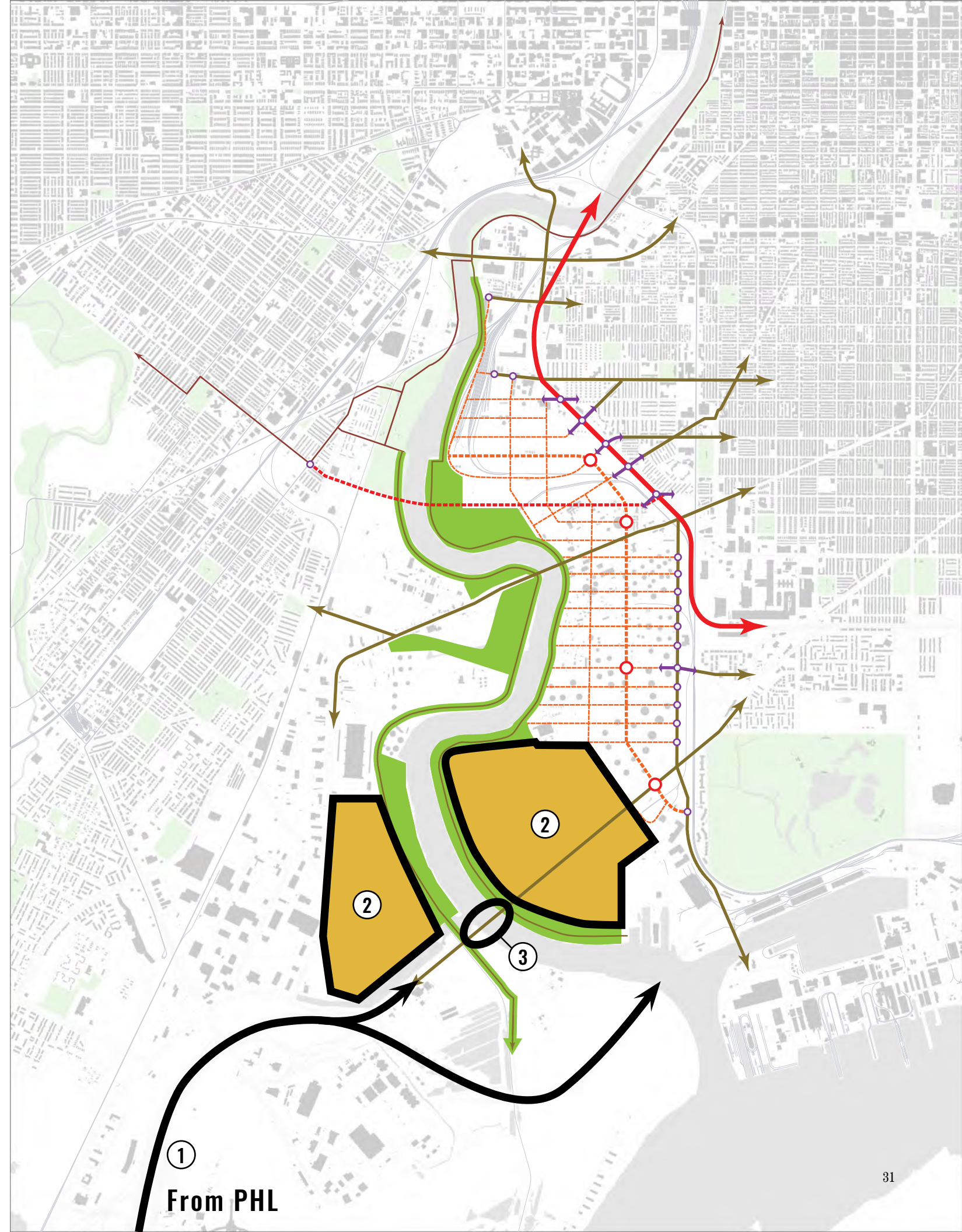


Top: the PES site is a major foreground element when traveling northeast along I-76 towards Center City, and could be envisioned as a gateway into the city from the airport to the south. Drawing Credit: Michael Miller.

Middle: Gasworks Park in Seattle, a former gasification plant turned remediated park space whose industrial remnants act as an iconic gateway traveling from downtown Seattle to its norther neighborhoods. Photo Credit: WikiPendant at Wikimedia Commons.



Bottom: The harp-style Leonard P Zakim Bunker Hill Memorial Bridge is an iconic piece of Boston's landscape connecting its downtown to Bunker Hill. Photo Credit: Tony Hisgett.



A Future Vision

While the physical aspects of the site will likely evolve over the next several decades, there are numerous relevant precedents to look to for inspiration of future possibilities. The following case studies illustrate places that have grappled with issues of environmental remediation, climate change, industrial adaptive reuse, and changing economic forces as examples of what the PES site could become.



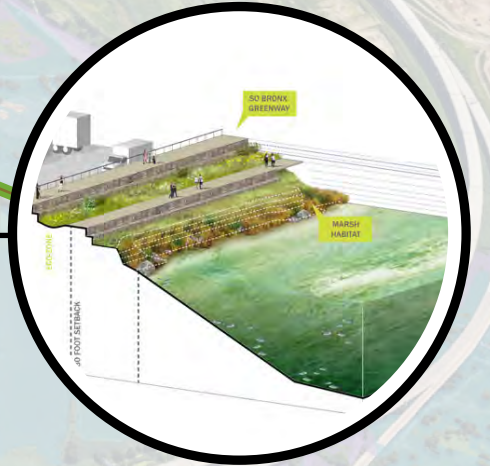
The Embarcadero
Pg. 42



Sparrows Point/Tradeport Atlantic
Pg. 30



Shanghai Houtan Park
Pg. 38



Hunts Point Lifelines
Pg. 33



Fresh Kills Park
Pg. 39



Landschaftspark
Pg. 41

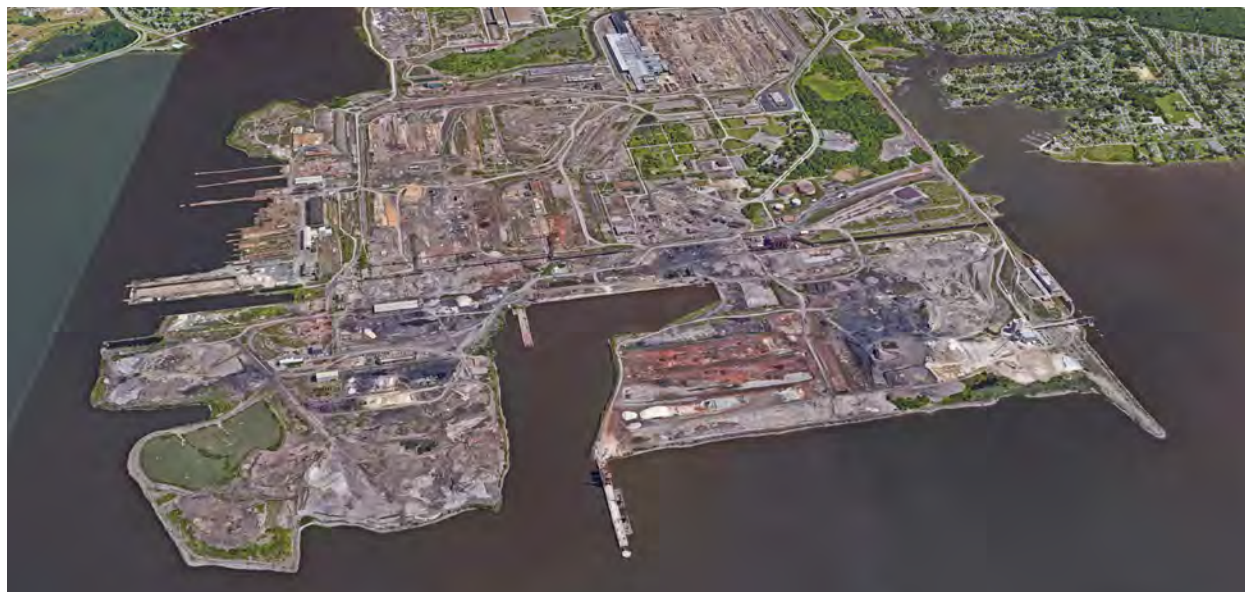


SteelStacks
Pg. 40



Rochester Inner Loop
Pg. 43





Above: Industrial reuse followed remediation at Hilco's Tradepoint Atlantic site. Photo credit: Google Earth. Right: A masterplan of the proposed infrastructure buildout of Sparrow's Point.

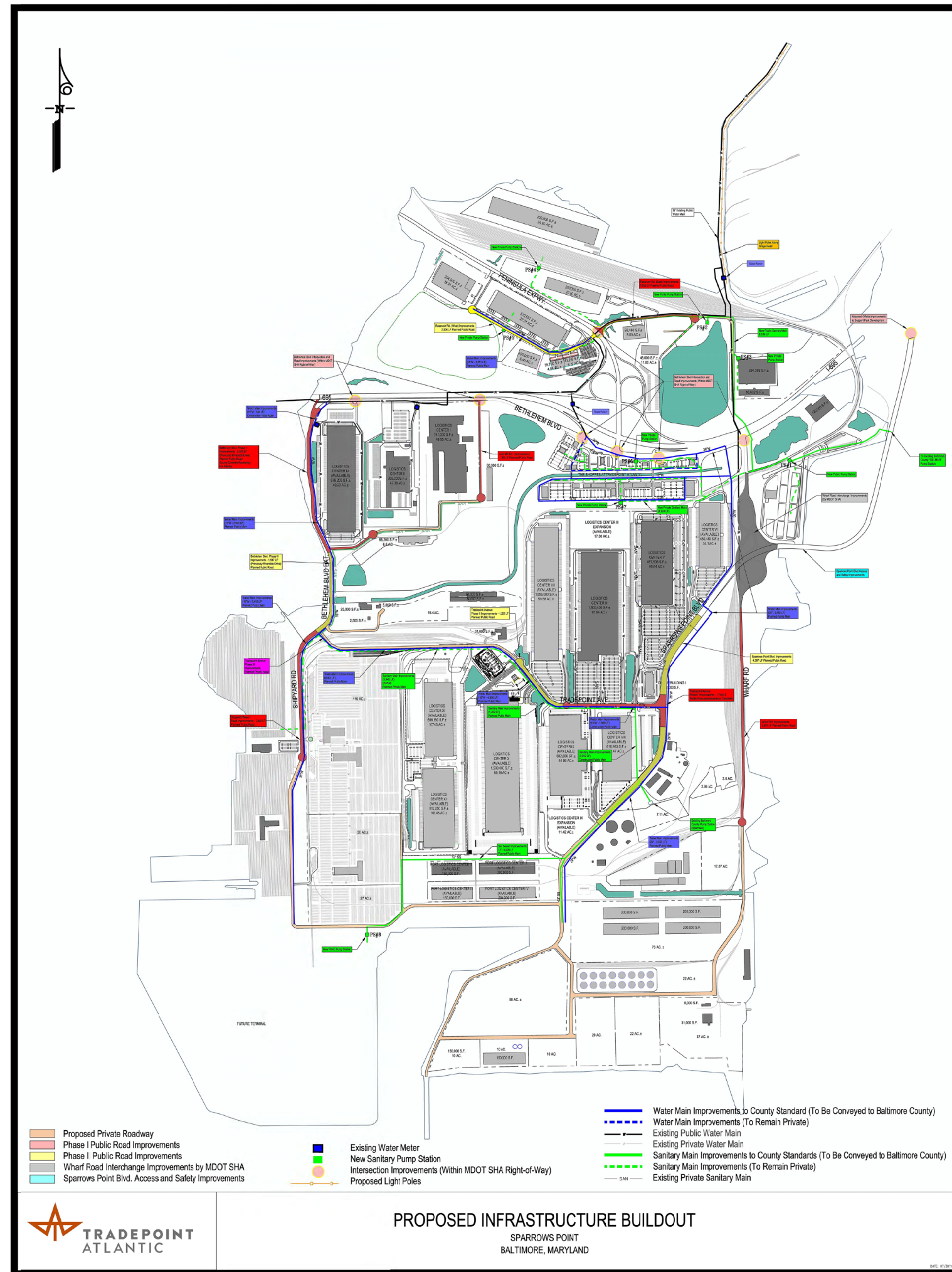
Case Study: Tradepoint Atlantic at Sparrows Point Baltimore, Maryland

Tradepoint Atlantic (TPA), a subsidiary partnership of Hilco Redevelopment Partners and Redwood Capital Investments, is the owner/operator of the Sparrows Point logistics hub in Baltimore County, MD. Sparrows Point comprises the southwestern end of the peninsula formed by the mouths of the Patapsco and Back Rivers where they enter the Chesapeake Bay. For over 125 years, Sparrows Point hosted one of the largest steel mills on the East Coast operated by Bethlehem Steel and was a major local economic driver. Shifting markets and declining production led to the facility's final shuttering in 2012.

After more than a century of active heavy industrial manufacturing, Sparrows Point required extensive remediation to address extensive contamination. Fortunately, the most serious contamination was sited on only 20% of the site, allowing development to proceed at the same time as remediation. The existing benefits to the

site far outweighed the environmental cleanup liability that Tradepoint Atlantic inherited: the 3,300-acre site is by far the largest contiguous industrial parcel in the area, allowing a wide range of repurposed uses. Additionally, an existing deep-water port and shipyard, direct connections to two Class 1 freight lines and interstate highways, and extensive on-site rail, road and utilities infrastructure all provided a number of site assets that only required upgrades and extensions as opposed to building this infrastructure on undeveloped land.

Tradepoint Atlantic is developing the site to be a powerful logistics hub that can service a wide variety of potential uses and clients. When fully developed, the site is expected to contribute an additional 1% to Maryland's total GDP. Municipal revenues after incentives and expenditures are conservatively projected to reach over \$55.7 million for the city. During the construction phase, direct and induced jobs created in Baltimore are projected to reach 8,000, generating wages of \$282 million and \$1.1 billion in new economic activity for Baltimore County. Tradepoint Atlantic is also expected to create 10,500 total permanent direct and induced jobs, generating up to \$432.8 million in income and almost \$1.3 billion in economic activity.





Focus Site: Girard Point Adaptable Development Approaches

Charrette participants focused on the future of Girard Point, the southernmost portion of the PES site on the east side of the Schuylkill River, due to hydrologic factors such as floodplain maps and sea level rise projection maps. Recognizing the vulnerability of this area, participants envisioned what future development could look like on this site, depending on the degree of flood protection implemented.

Hardened Edge

Participants posited that this scheme would retain the developable area the site currently has, although this would require bulwarking much of the shoreline around Girard Point to protect any new investment from flooding. While possible, charrette participants believed this solution would require significant infrastructural investment and do little to mitigate other stormwater concerns on the rest of the site. The top left sketch illustrates this concept, showing solar fields along this developable area with a riparian buffer/public trail access along the shore.



Full Green Stormwater Infrastructure Retreat

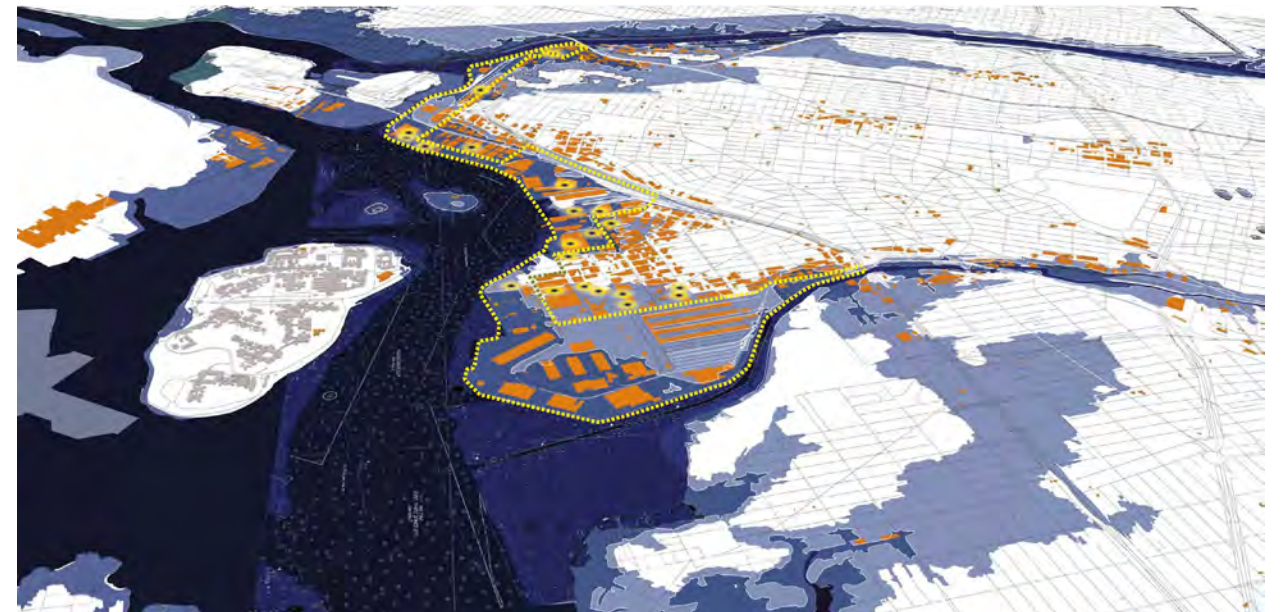
Prior to human settlement in the region, most of the confluences of large rivers around Philadelphia, and particularly along the tidal Delaware and Schuylkill, were home to large wetlands and mudflats. This scheme assumes that much of Girard Point is left to the floodplain to be reclaimed by the wetlands which once occupied the site, which could also be constructed to serve a stormwater management function during periods of lower flow. The middle sketch shows this concept, with wetland cells dotted across the site. Similarly, the bottom concept shows a network of raised islands among wetlands that are connected by pedestrian boardwalks.



Drawing Credits: Larry McEwen, José Almiñana, Cindy Sanders

Integrated Development and Wetlands

Another possible scheme is some combination of the two above approaches: Adapting the edge to protect the site against flood waters while retaining some portions of the site for new development. Several of these approaches can be seen in the Hunts Point Lifelines case study that follows.



Map of Hunts Point showing the food distribution center and flooding risk. There are several similarities to the PES site.

Case Study: Hunts Point Lifelines The Bronx, New York

Rebuild by Design was a design competition launched by President Obama's Hurricane Sandy Rebuilding Task Force and facilitated by the U.S. Department of Housing and Urban Development. Ten teams were chosen from 150 international applicants, resulting in seven funded projects out of the \$1 billion award pool.

Hunts Point Lifelines, a project focusing on addressing economic and community vulnerability to climate risks at the Hunts Point peninsula in the South Bronx, a major regional food distribution hub threatened by flooding and sea level rise, was one of the selected proposals, receiving \$20 million from the Federal Government and matched with \$25 million from the City of New York. The project team was led by PennDesign and OLIN.

The proposal envisioned four "lifelines" that aim to develop a replicable model for maritime industrial areas

seeking to adapt to the various social, economic, and environmental threats of climate change:

Flood Protection: the proposal includes "Levee Labs" which act as both flood control devices and waterfront greenways, as well as opportunities to integrate applied materials and ecology research into the intervention.

Livelihoods and Community Resilience: the project process stresses community participation in the construction and maintenance of these infrastructure interventions through jobs training for residents.

Maritime Emergency Supply Lines: building on several emerging federal programs, the proposal called for the creation of a centralized supply chain base of operations for maritime emergency food distribution during disasters that prevent the use of ground and air transportation.

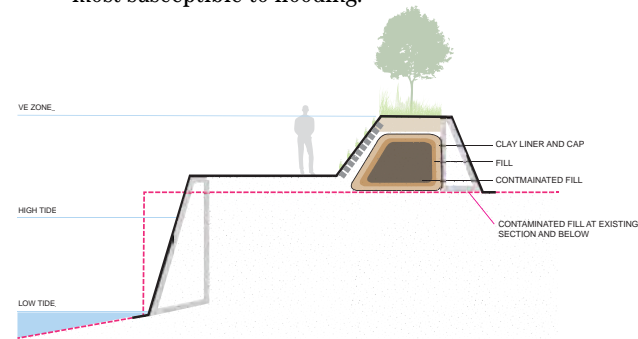
Cleanways: this element proposed connective green complete streets that bridge the waterfront spaces to the inland neighborhoods, while also proposing the creation of a tri-generation plant (a power plant

that provides electricity, heat, and cooling) that could provide low-carbon cooling and emergency backup electricity to the City's power grid during emergencies.

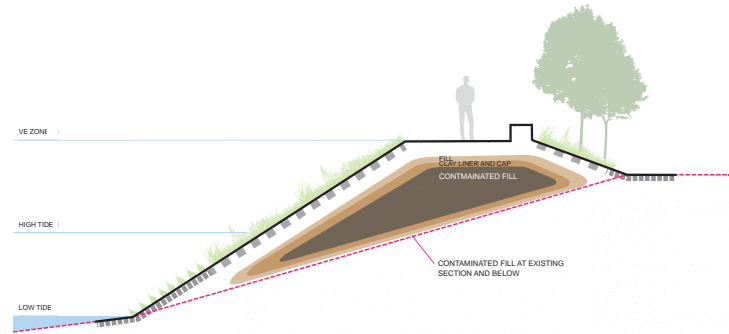
The similarities between Hunts Point and the PES site are palpable. Both are key industrial sites with a maritime presence that are threatened by sea level rise

and flooding, with a lack of waterfront access for nearby communities. Several of the elements in the Lifelines proposal could be directly applicable to the PES site, particularly as it relates to Girard Point, which is the most susceptible to flooding.

Right: section of two flood control control berms that also function as greenways. Contaminated soil is capped by a clay liner, cap, and clean soil fill.



Bottom: new access to the water is brought about through flood protection.



Opposite Top: in addition to providing flood protection and recreation opportunities, the infrastructure piece could generate jobs for construction and maintenance.

Opposite Bottom: an illustrative bird's-eye perspective of the proposed Lifelines infrastructure interventions.

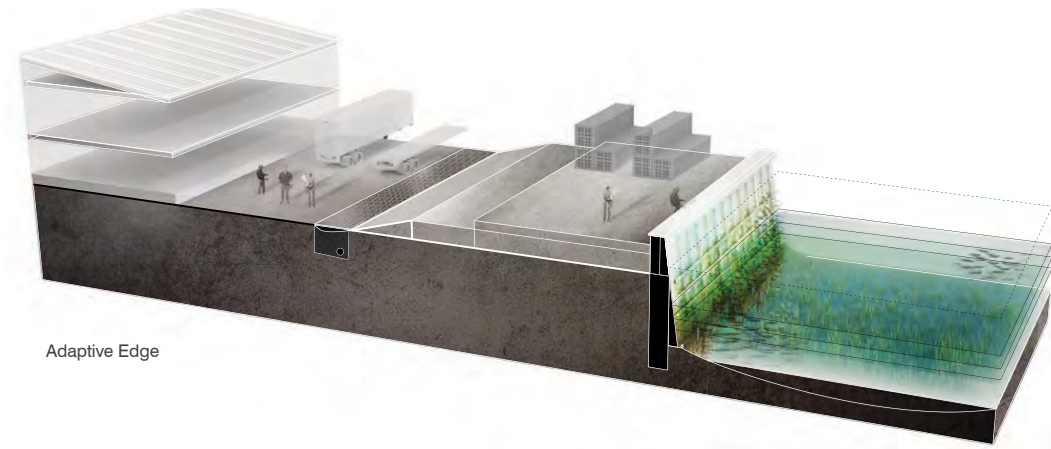
Contaminated soils can be remediated through containment strategies and used for beneficial fill



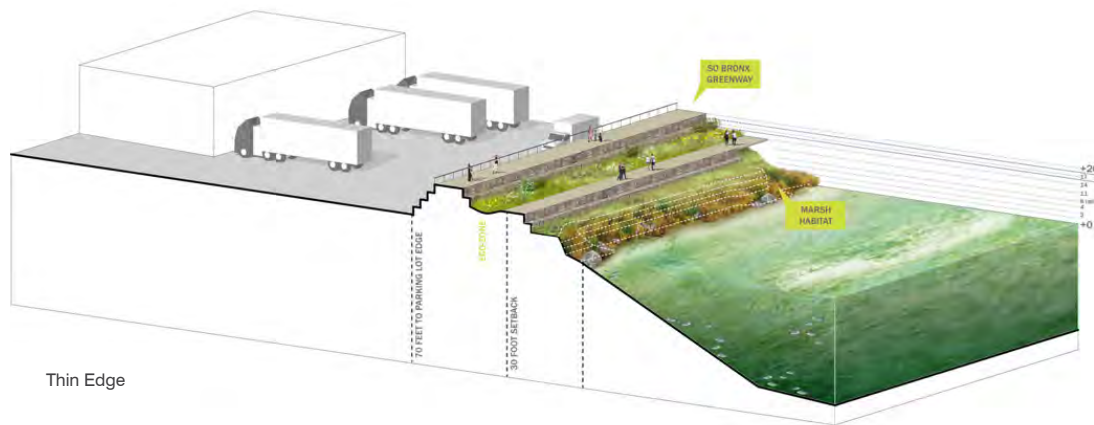
LIFELINES Livelihoods & Community Resilience

The Livelihoods chapter describes the Lifelines proposal for integrating local benefit from resilience investments and human resources into the physical design, maintenance and operations plan for flood protection and cleanways. It lays out a range of options for innovation in the design of human infrastructure.

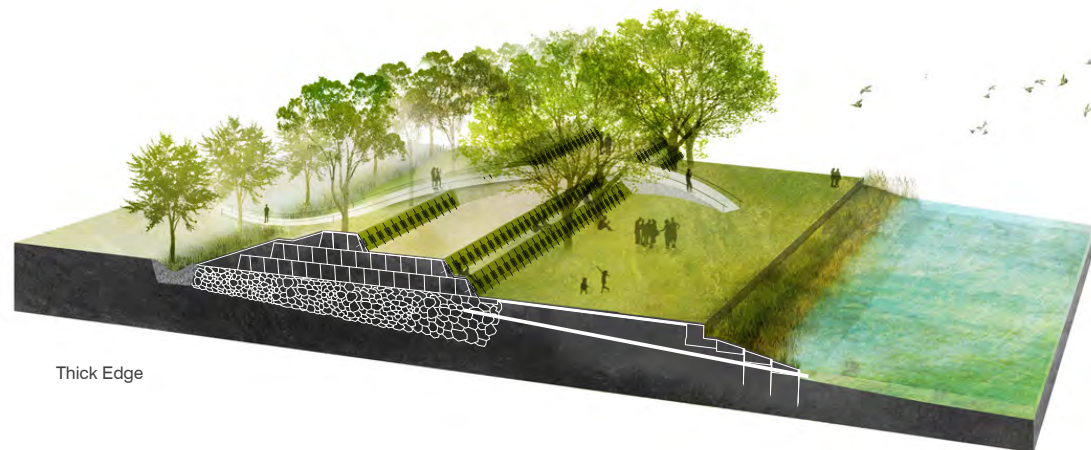




Adaptive Edge

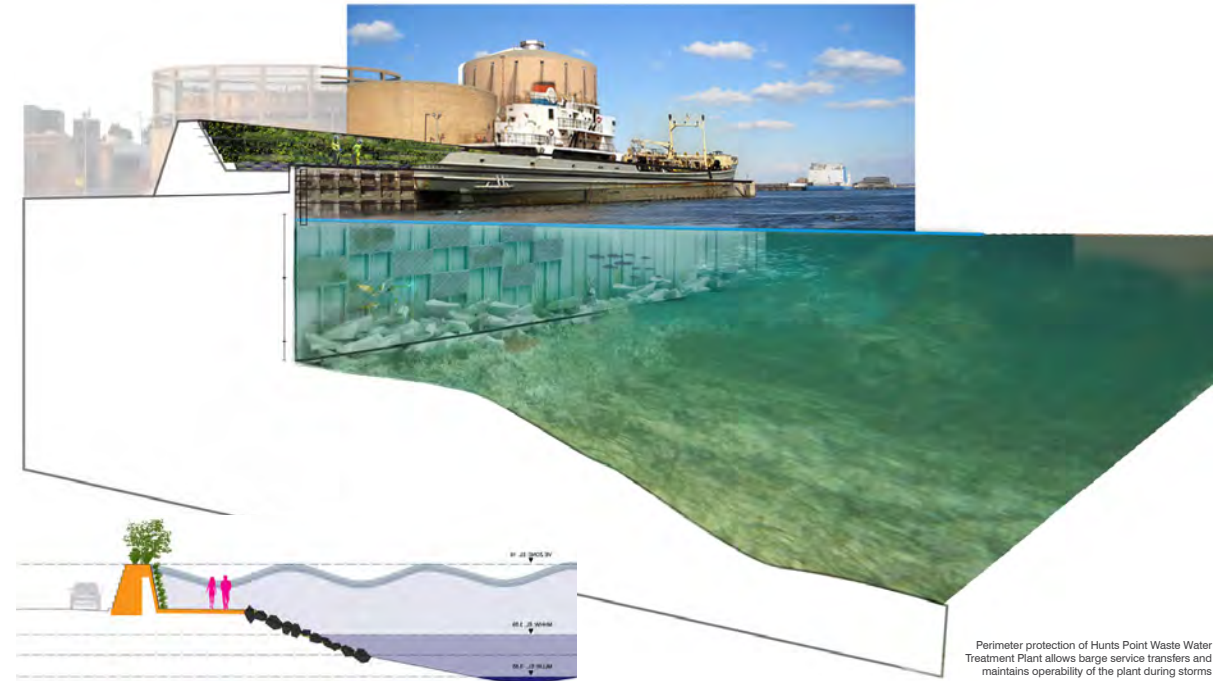


Thin Edge



Thick Edge

FLOOD PROTECTION TYPOLOGIES: Available space for ecology and public use varies



Perimeter protection of Hunts Point Waste Water Treatment Plant allows barge service transfers and maintains operability of the plant during storms



Threading the South Bronx Greenway and integrated flood protection between industry and the water's edge.

Left: Lifelines proposed three flood protection typologies for different edge conditions across the project site.

Top: Some proposed interventions took into account adjacent uses that require frequent boat access.

Bottom: The proposed South Bronx Greenway adjacent to the food distribution hub's truck yard.

Case Study: Houtan Park Shanghai, China

The 34.5 acres of land that Shanghai Houtan Park now occupies is a former brownfield, previously owned by a steel factory and shipyard that left the environment of the site severely degraded. Used as a landfill, construction and industrial debris were scattered and buried throughout the site. The Huangpu riverfront, where the park is located, was highly polluted, making it unsafe for any kind of recreation and devoid of aquatic life.

The objective of the former brownfield's design, led by landscape architecture firm Turenscape, was to create a green space for the 2010 Shanghai World Expo that demonstrated impactful green technologies. The space

went on to become a permanent public space/park and attraction, winning the American Society of Landscape Architecture Award of Excellence for General Design. The overall design of the park is inspired by the fields of Chinese agriculture—terraces reminiscent of Shanghai's agricultural heritage before industrial development—and were constructed to transition the water's edge to the road and to slow runoff to the stream in the constructed wetland.

A wetland was constructed with various plant species to treat and absorb contaminated water from the Huangpu River. Aside from purifying the water, the wetland also acts as a flood protection buffer between levees designed for flood control. The park's former concrete floodwall was replaced with large rocks, which allowed native species to grow along the riverbank and protected the shoreline from erosion.



Aerial view of Freshkills Park under construction.

Case Study: Freshkills Park Staten Island, New York

Freshkills Park will be the largest park developed in New York City since the 19th century, turning what was once the world's largest landfill into a sustainable public green space. The site spans 2,200 acres, nearly three times as large as Central Park. New York City turned the former wetland into a landfill in 1948 and by 1955, it was the world's largest. The site closed under local pressure with support from the EPA and stopped accepting trash in the beginning of 2001, but reopened to accept debris following the events of September 11. In 2001, the New York City Department of City Planning held a design competition to find a landscape architecture firm to

design the park. In 2003, Field Operations was selected and hired to produce the master plan that was released in 2006.

When renovation began in 2008, Freshkills Park was sectioned off into five different spaces—the Confluence (the link of all four parks), South Park, East Park, West Park, and North Park. Each space will have different primary areas, programming, and recreational activities. Since 2012, Schmul Park, Main Creek Wetland Restoration, Owl Hollow Fields, and the New Springville Greenway have all reached completion and are open to the public. South Park and East Park are still in design or planning stages and North Park is now in Phase 1 of construction and is expected to open in 2020. The park is expected to be completed in 2036.



Toxic industrial uses have been replaced by an interactive public showcase for wetlands and heritage agriculture.



Top and left: the Bethlehem SteelStacks hosts a FIFA World Cup viewing party near their amphitheater with the blast furnaces as a backdrop. Right: the historic structures and industrial remnants lit up during the holiday season. Photo credit: Pam Baumann and Discover Lehigh Valley, PA.

Case Study: Bethlehem SteelStacks Bethlehem, PA

Amidst financial difficulties in the mid 1990s, Bethlehem Steel closed its largest plant in 1995 after around 140 years of operation. The closing dealt a hard economic blow to its namesake town and left it with a large industrial site in need of remediation and reuse. Over the following 15 years, public and private entities collaborated on the site's redevelopment, renamed

“Bethlehem Works,” which resulted in adaptive reuse across a variety of cultural, recreational, and commercial uses. Chief among them is the Bethlehem SteelStacks, an arts and culture venue that reused portions of the plant's old blast furnaces (pictured above) as a backdrop to performances and an iconic piece of the town's industrial heritage.

Case Study: Landschaftspark Duisburg-Meiderich, Germany

Hailed as a quintessential example of industrial-to-landscape adaptive reuse, Peter Latz's Landschaftspark utilized the bones of a former Thyssen steel plant to create a series of park spaces within the industrial remnants while acknowledging the site's former industrial use. To address soil pollution, Latz used a range of remediation techniques, ranging from capping with

clean fill to phytoremediation on heavier trafficked areas to wholly closing off portions of the site that will take much longer to remediate. The park is also part of the Territorial Emscher Park, a much larger greenway and series of park spaces in the post-industrial Ruhr Region in Germany.



Large portions of the industrial remnants on the site are publically accessible via walkways and paths. Photo Credits, clockwise from top: Wikimedia Commons User Carschten; Marco Derksen; Twitter user zoetnet.



Counterclockwise from top: aerial photo of the Embarcadero today versus the freeway in the 1960s. On Sundays, the city closes the street to vehicular traffic, allowing cars and bikes to have free reign of the space. Photo Credits, counterclockwise from top: Google Earth, Todd Lappin, Ryan Debold.

Case Study: The Embarcadero San Francisco, CA

Considered one of the best examples of freeway replacement projects in the country, the Embarcadero in downtown San Francisco is a waterfront boulevard that has undergone many decades of change. Historically, the working waterfront

was an important center for inland trade and transport, fueling the growth of the city. The decline of ferry use and the movement of shipping container activities to nearby Oakland in the mid-1900s resulted in the land being used for the construction of the Embarcadero Freeway in the 1960s. Following its destruction in the Loma Prieta earthquake in 1989, the freeway was cleared and a massive redevelopment effort began. Today, the Embarcadero is a massive economic generator for the Bay Area and a quintessential public space for the City.

Case Study: Inner Loop East Project Rochester, NY

Riding the 1950s post-war boom and interstate highway construction expansion that followed, Rochester completed the construction of an inner loop freeway around its downtown in 1965, connecting portions of I-490 to the east and west. Despite being built to increase transportation and connectivity, these ring roads or beltways, a common sight in many large cities across the country, resulted in cutting off the neighborhoods adjacent to the downtowns

they encircled. Over the next several decades as de-industrialization and suburbanization hit Rochester, portions of the inner loop were used less and less, and calls for removing portions of the highway grew stronger in the early 2000s, which prompted the city to complete several design studies. With the assistance of a federal Transportation Investment Generating Economic Recovery (TIGER) grant in 2013, the city started downgrading a section of highway to an avenue and creating roughly 6 new acres of developable land adjacent to downtown Rochester. New development is now slowly filling in the long-disconnected neighborhoods near downtown as a new phase of the Inner Loop removal is in the planning stages.



Counterclockwise from top: the proposed avenue alignment following the freeway teardown, with 6 new acres of development highlighted in purple. An aerial of the teardown shortly after completion. A proposed mixed-use development along the northern end of the teardown to help stitch the downtown back to its adjacent neighborhoods. Photo Credits, counterclockwise from top: Stantec and the City of Rochester; SWBR Architects; Google Earth.



Conclusion

The transformation of the PES site along the Lower Schuylkill from a heavily polluting oil refinery into an integrated part of Philadelphia’s urban fabric will take decades and require a long-term vision that reflects the values of Philadelphia residents.

The recent announcement that a US Bankruptcy Court has approved the sale of the site to Hilco Redevelopment Partners is a positive sign. Hilco plans to remediate the site and begin to repurpose it for logistic and light industrial uses, and has a strong track record redeveloping complex post-industrial sites including Sparrows Point in Baltimore, which shares many similarities to the PES site. While the prospects of this redevelopment seem promising for aligning with what aspirations have surfaced through this visioning work, more needs to be done to ensure a broad coalition of support.

Our hope is that Hilco will continue the public engagement efforts undertaken by both the City of Philadelphia’s Refinery Advisory Group and this visioning study. The voices of members of the fence-line communities along with those of union members who worked at PES are important stakeholders—as are members of the broader Philadelphia community. Philadelphia’s strong recent track-record in civic engagement in the built environment has yielded positive planning results over the last thirteen years—from the Civic Vision for the Central Delaware which saw the creation of the Master Plan for the Central Delaware and the enactment of the Central Delaware zoning overlay to guide development, to the Philadelphia Planning Commissions’ efforts to engage communities and create plans for the 18 planning districts across the city in support of Philadelphia2035, the City’s comprehensive plan. Civic discourse is a core part of Philadelphia’s planning ethos and will be a vital component to a successful redevelopment effort.

The Lower Schuylkill holds significant promise for the social, environmental and economic health of Philadelphia. Stakeholders including Hilco, community and advocacy groups, the Planning Commission and other City departments, elected officials, regulatory agencies, and others in the public and private sector need to work together to build upon this initial visioning study to develop a long-term plan to transform a toxic landscape into an integrated, connected, and healthy part of a 21st century city. As demonstrated, Philadelphia has a proven track record for long-term visionary planning. Therefore, it is imperative that a broad, consultative public planning process must precede the redevelopment of this crucially important part of Philadelphia’s future.

References

Abernathy, Brian, and Adam Thiel. "A Close Call and an Uncertain Future: An Assessment of the Past, Present, and next Steps for Philadelphia's Largest Refinery." City of Philadelphia, November 2019. <https://docs.google.com/viewer?url=https://www.phila.gov/media/20191125145209/refineryreport-002.pdf>.

Bhandal, Harvin, Marina D'souza, Frank Lewery, Michel Mitchell, Jordan Singer, and Jefferson Ta. "REMIEDIATION OF PHILADELPHIA ENERGY SOLUTIONS REFINERY." Drexel University, December 6, 2019.

Hiar, Corbin, E&E News, and Lisa Riordan Seville. "Massive Oil Refinery Leaks Toxic Chemical in the Middle of Philadelphia." NBC News. January 16, 2020. <https://www.nbcnews.com/science/environment/massive-oil-refinery-leaks-toxic-chemical-middle-philadelphia-n1115336>.

Maykuth, Andrew. "Hilco's \$240 Million Bid for South Philly Refinery Wasn't the Highest Offer, Aggrieved Creditors Say." The Philadelphia Inquirer, January 23, 2020. <https://www.inquirer.com/business/energy/hilco-philadelphia-refinery-pes-auction-objection-winning-bid-20200123.html>.

Philly Thrive. "#WeDecide OUR ENERGY FUTURE Survey Report." Philly Thrive, November 2017. https://drive.google.com/file/d/11_KIhuPdTUNmbnsTrWQMuxGk_VMIi4vJ/view.



Appendix A: Survey Questions and Results

Survey Response Summary

Total complete responses: 367
(307 online, 59 written)

Survey dates: 11/25/19 - 2/17/2020

Most common Zip Codes:

19145 (56), 19146 (44), 19147 (26), 19103 (26),
19104 (22), 19143 (21), 19119 (20)

Total responses from Zip Codes along Lower Schuylkill (19143, 19145, 19146):

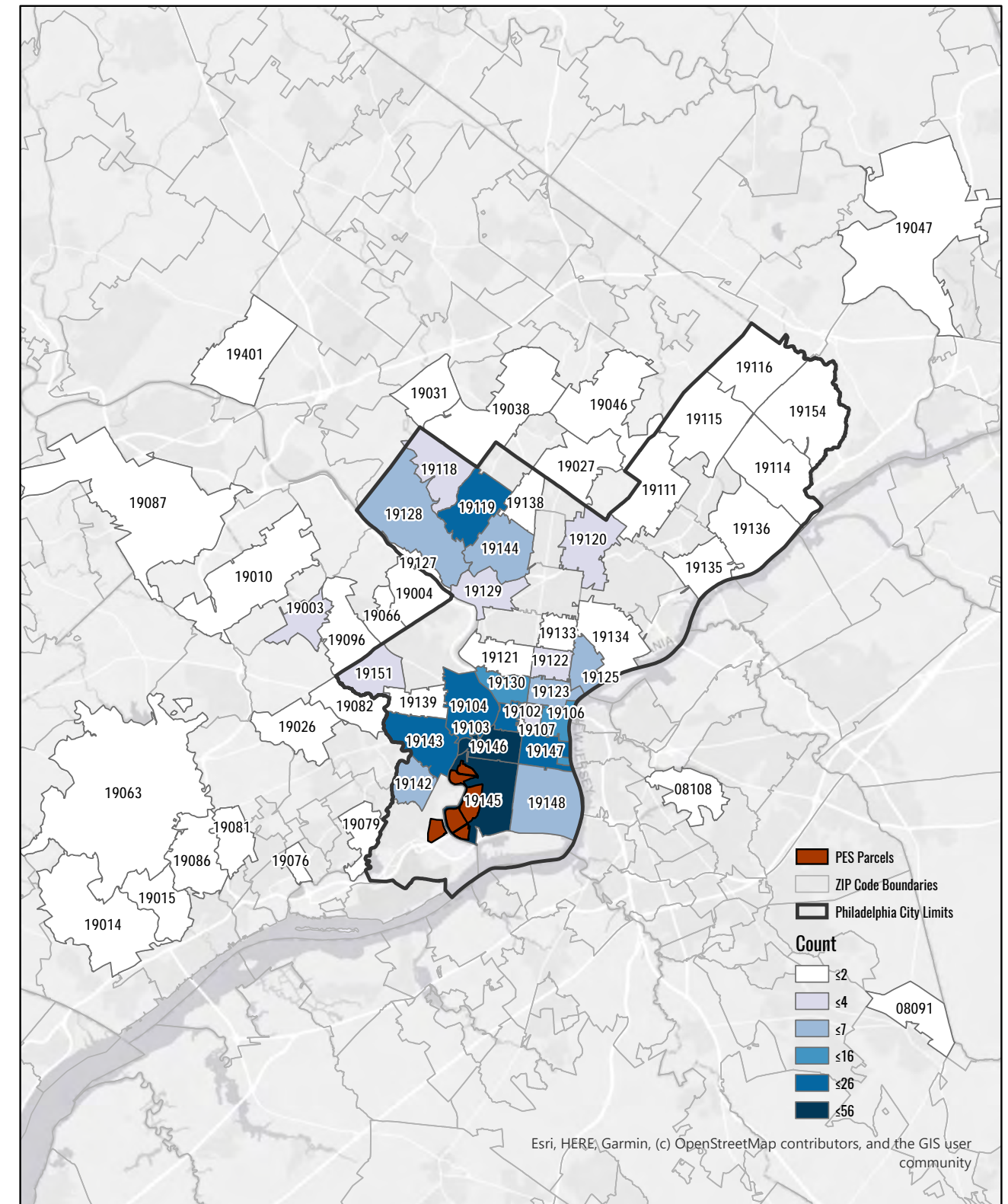
121 (33% of all respondents)

Survey Questions:

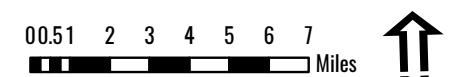
Q1-What are the most important aspects of your ideal neighborhood?

Q2-Imagine it's 50 years from now. In the best case scenario, how has the Philadelphia Energy Solutions (PES) refinery site changed?

Q3-Given your answers to the above questions, how would you like to see the 1,300 acres of PES refinery land used in the future? (You can include multiple types of uses).



COMMUNITY SURVEY RESPONDENTS BY ZIPCODE



Q1-What are the most important aspects of your ideal neighborhood?

Overall, the responses were very consistent, with nearly all mentioning one or more of the following themes. Specifically, 7 themes were shared by at least 1 in 5 of survey responses (respondents could articulate more than one theme in their response):

- 47% mentioned access to green space or trees
- 38% mentioned walkability or bikability
- 27% mentioned public health (air quality, water quality, etc)
- 27% mentioned public safety
- 24% mentioned a diverse commercial corridor
- 22% mentioned transit access
- 20% mentioned connection with neighbors

Other Common themes:

- Jobs - green, fair wage
- Public amenities - libraries, rec centers, good public schools
- Cultural and socioeconomic diversity
- Food access
- Aesthetics - good design, art
- Affordable housing
- Green energy/energy efficient/climate neutral
- Cleanliness

Points of contention:

- Many desired a reduction in vehicular traffic/dependence on cars, while some identified street parking as a priority.
- Several people mentioned urban density, while a couple specifically desired single-family homes.

Representative Quotes:

“A neighborhood that prioritizes people. Walkable, bikeable, and transit friendly. Mixed uses of residential and retail commingled.”

“A great public school; a good public park; racial and economic diversity; food markets; tree-lined streets; people out on the streets day and night.”

“My ideal neighborhood will be habitable 25, 50, 100, 200 years from today. I won’t get sick from living there, and, in fact, living there may increase my life span because it is a peaceful, enriching place. [It] has a deep sense of its own history; it is demographically representative of the city-at-large; it is a multicultural space that prioritizes, elevates and serves the formerly-incarcerated, immigrants, people of color, people of all genders; it is safe (this is the kind of safety that comes from a shared community responsibility as opposed to a fear of authority or an economic or a cultural homogeneity); it is easy access to public resources (transportation, green spaces, education and cultural centers, libraries, health care, rehabilitation); there are employment opportunities that do not require expensive or exclusive trainings or certifications as barriers-to-access.”

Outliers:

“Irrelevant question. The area is not a “neighborhood” in any meaningful sense. It is an industrial wasteland.”

“At this time, having a source that we are confident is giving us correct information about our air quality. We have been getting mixed or no messages since the explosion on 6/21. Philadelphia not having the 3rd highest cancer rate in the country.”

Q2-Imagine it’s 50 years from now. In the best case scenario, how has the Philadelphia Energy Solutions (PES) refinery site changed?

Again, responses were largely consistent, with green energy, transit connectivity, environmental remediation, and greenspace/river access being among the most popular elements of respondents’ predictions. Many felt that, realistically, the site will be underwater in 50 years due to climate change.

Common themes:

- Environmental remediation
- Green/clean energy & jobs
- River access
- Transit-connected (particularly to regional rail lines)
- Park and/or recreation space
- Balance of development and greenspace
- Wetlands/forestlands
- Not polluting
- Connected to surrounding communities
- Research campus (biotech, environmental science, life sciences)
- Supporting existing residents
- Underwater/ flooding
- Sustainable/green development

Representative Quotes:

“The varied wetland, moist upland environments have been restored; dedicated open space for passive and active recreation; renewable power with biomass harvesting and soil carbon sequestration occurs; soft rather than hard flood protection due to rising sea levels is the basis for all land use plans; mix of commercial educational and residential uses outside the predicted flood levels. Land surface and atmospheric temperature neutrality. A health monitoring and treatment fund is set up to compensate and care for victims of land and air pollution in the area that have occurred in the past 100 (taking into account the 50 years back from today) years.”

“I would love to see this transformed into a large park or recreation facility. As many residents in South Philly will tell you, we certainly do not have enough green space. I would love to have a waterfront trail go all the way up the Schuylkill so we can have a healthy way to connect to different parts of the city.”

“The site is remediated and is repurposed. The current purpose of the site, oil refinery, is both harmful to the nearby communities and the environment. If the industrial aspect of the site is to remain, then a renewable energy facility would be great. A mixture of parks and a renewable energy facility. Providing the nearby communities with some green parks and areas is important.

It is important for the PES site to be repurposed into something more sustainable and friendly to its nearby communities and environments. Successful repurposing and transition will become a great precedent for other refineries and fossil fuel industries throughout the world.”

Q3-Given your answers to the above questions, how would you like to see the 1,300 acres of PES refinery land used in the future? (You can include multiple types of uses).

61% of respondents (count=223) envisioned multiple uses for the site (as opposed to single-use). Of the types of use listed, nearly all fell into 11 categories: park or greenspace, residential, retail/commercial, renewable energy manufacturing, renewable energy generation (solar and/or wind), industrial, wetlands and/or forestlands, river access, education/research, transit, and cultural facilities.

Representative Quotes:

“The PES site is an incredible opportunity for Philadelphia to transition away from a single monolithic oil corporation to a diverse ecosystem of industrial companies which can be far better economically for the city and better environmentally for the surrounding neighborhoods. Due to the fact that much of the river edge south of Pattison Ave will most likely be underwater by the end of the century, environmental remediation efforts should be focused on this area in order to allow for it to transition to a more natural environment which will help protect the rest of the site. As this is going on, the northern sections of the site should be reintegrated into the urban street grid, with some care taken to allow for the occasional large industrial site. The main focus of this should be to open up the land uses to a variety of uses which could support multiple industrial uses and allow access to the river. Creating connections through I76 and 26th St will be difficult though.”

“I would hope growth would be incremental so that we aren’t left with a giant overplanned dead zone. Large plots should be separated from other use.”

Other quotes:

“I don’t think I know enough about the potential possibilities of the site (is it safe for residential redevelopment?) to comment deeply. As long as the immediate health and wealth of the existing communities are taken into account and integrated into a plan that makes sense for them, that would be ideal. Focus on

generating and enforcing local wealth and the power of existing communities. Keep people in their homes but elevate their quality of life with this development.”

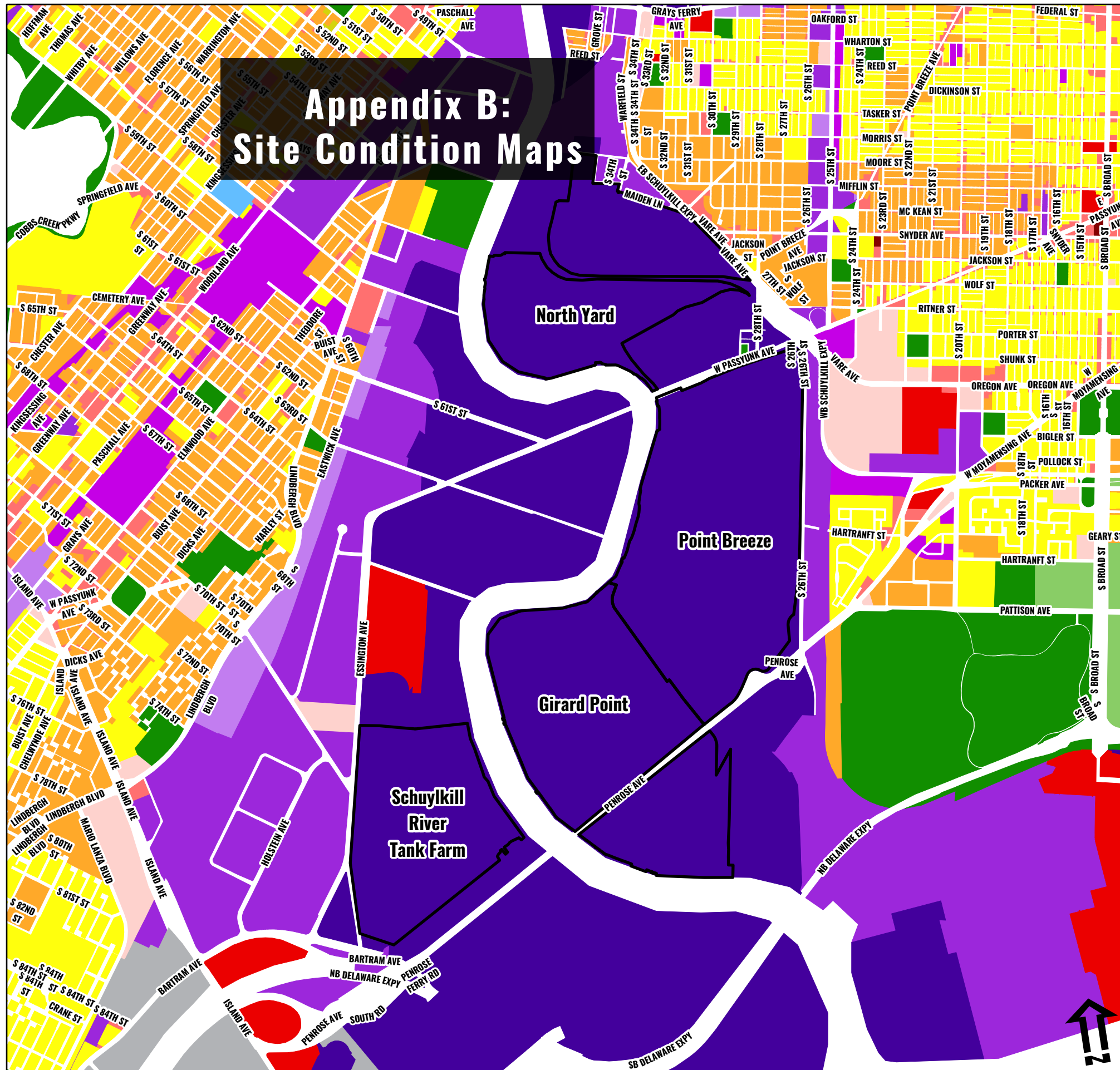
“The fence-line community must be centered and have first say as to how this is developed. That has to include being given the resources to bring in the best (non partisan) advisors who can expand their range of options. The process must allow the community to educate itself to what is possible and desirable for them and have the power to implement its vision. It is not acceptable that they just be fed a ‘choice’ between a few predetermined options offered to them from “above” and driven by politics as usual.”

“Get PES to remediate the site and return it to representatives of the Lenape people.”

“Either the site needs to be cleaned of all toxic material or the PES executives who made the explosion possible should be forced to live there (not their children—they didn’t choose their parents). Using it for generating renewable energy while removing toxic material would be ideal, and once it is safe to live on, rent-controlled housing should be built. I think you should specifically be asking people who have been living near the site for 10 or more years what they want. I’ve lived in Philly for over ten years, but not near around there. Note that I have not had a chance to read the briefing book yet. Doing so will certainly cause me to refine my thoughts, but my responses at this point are uninfluenced by other ideas.”



Appendix B: Site Condition Maps

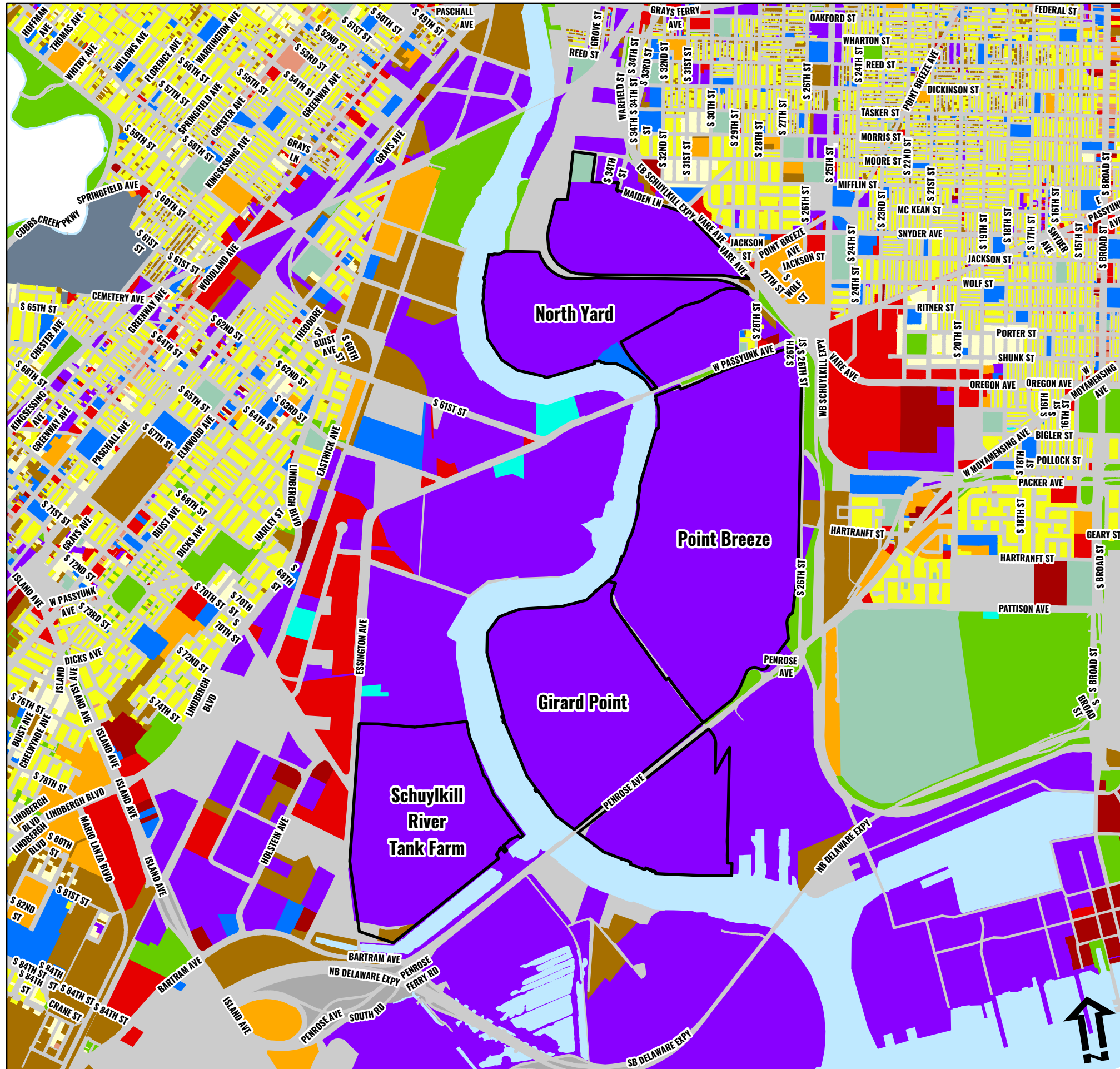


EXISTING ZONING

- PES Parcels
- Zoning Base Districts
- CA-1, Auto-Oriented Commercial-1
- CA-2, Auto-Oriented Commercial-2
- CMX-1, Neighborhood Commercial Mixed-Use-1
- CMX-2, Neighborhood Commercial Mixed-Use-2
- CMX-2.5, Neighborhood Commercial Mixed-Use-2.5
- CMX-3, Community Commercial Mixed-Use
- CMX-4, Center City Commercial Mixed-Use
- CMX-5, Center City Core Commercial Mixed-Use
- I-1, Light Industrial
- I-2, Medium Industrial
- I-3, Heavy Industrial
- I-P, Port Industrial
- ICMX, Industrial Commercial Mixed-Use
- IRMX, Industrial Residential Mixed-Use
- RM-1, Residential Multi-Family-1
- RM-2, Residential Multi-Family-2
- RM-3, Residential Multi-Family-3
- RM-4, Residential Multi-Family-4
- RMX-1, Residential Mixed-Use-1
- RMX-2, Residential Mixed-Use-2
- RMX-3, Residential (Center City) Mixed-Use-3
- RSA-1, Residential Single-Family Attached-1
- RSA-2, Residential Single-Family Attached-2
- RSA-3, Residential Single-Family Attached-3
- RSA-4, Residential Single-Family Attached-4
- RSA-5, Residential Single-Family Attached-5
- RTA-1, Residential Two-Family Attached-1
- RSD-1, Residential Single-Family Detached-1
- RSD-2, Residential Single-Family Detached-2
- RSD-3, Residential Single-Family Detached-3
- SP-AIR, Airport (Special Purpose)
- SP-ENT, SP-ENT, Entertainment (Special Purpose)
- SP-INS, Institutional (Special Purpose)
- SP-PO-A, Active Parks and Open Space (Special Purpose)
- SP-PO-P, Passive Parks and Open Space (Special Purpose)
- SP-STA, Sports Stadium (Special Purpose)

Data Source: Philadelphia Department of Planning and Development





EXISTING LAND USE

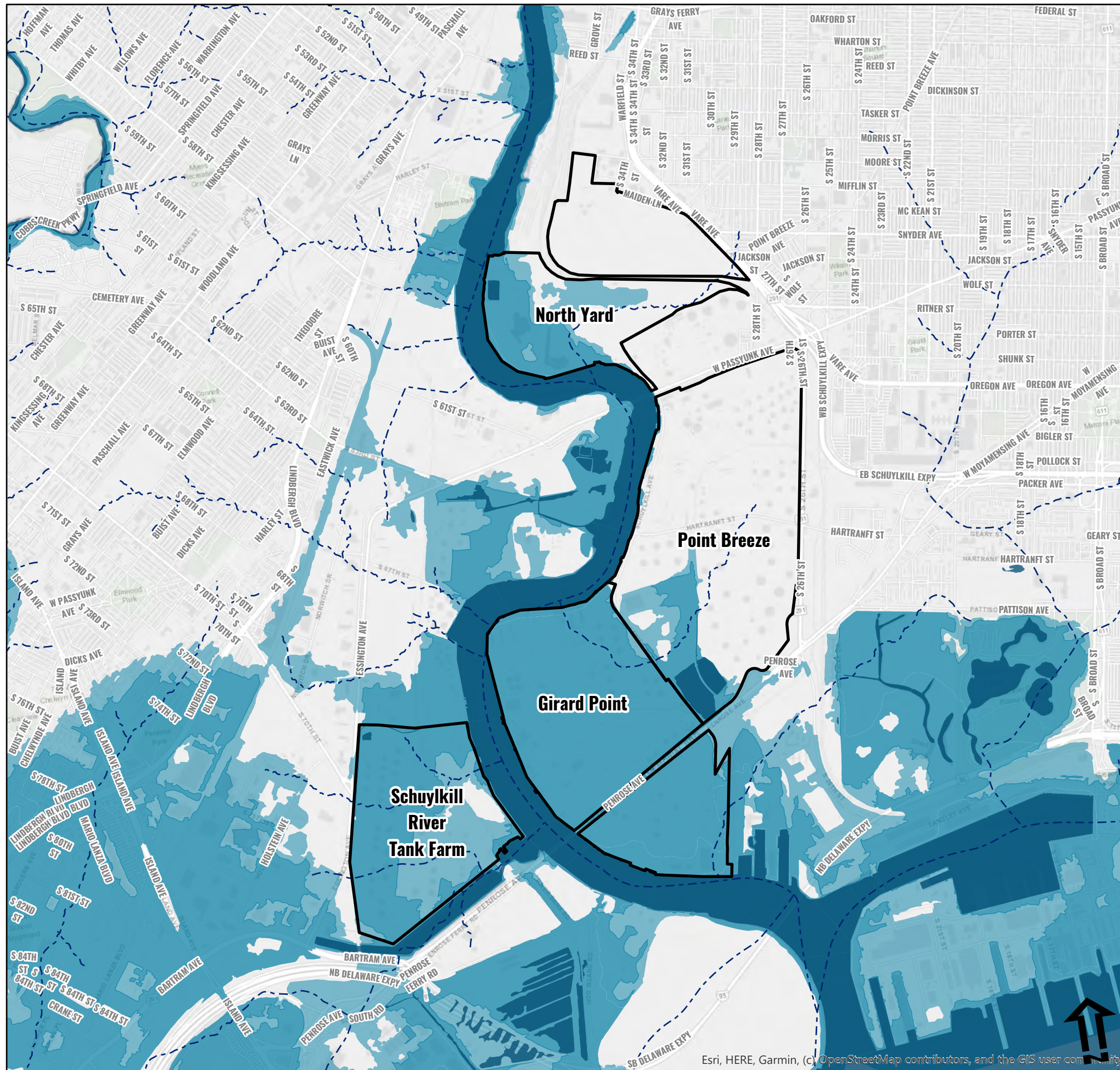
□ PES_Parcel

Land Use






- Residential Low
- Residential Medium
- Residential High
- Commercial Consumer
- Commercial Business/Professional
- Commercial Mixed Residential
- Industrial
- Civic/Institutional
- Transportation
- Culture/Amusement
- Active Recreation
- Park/Open Space
- Cemetery
- Water
- Vacant
- Other/Unknown
- Other

Data Source: Philadelphia Department of Planning and Development





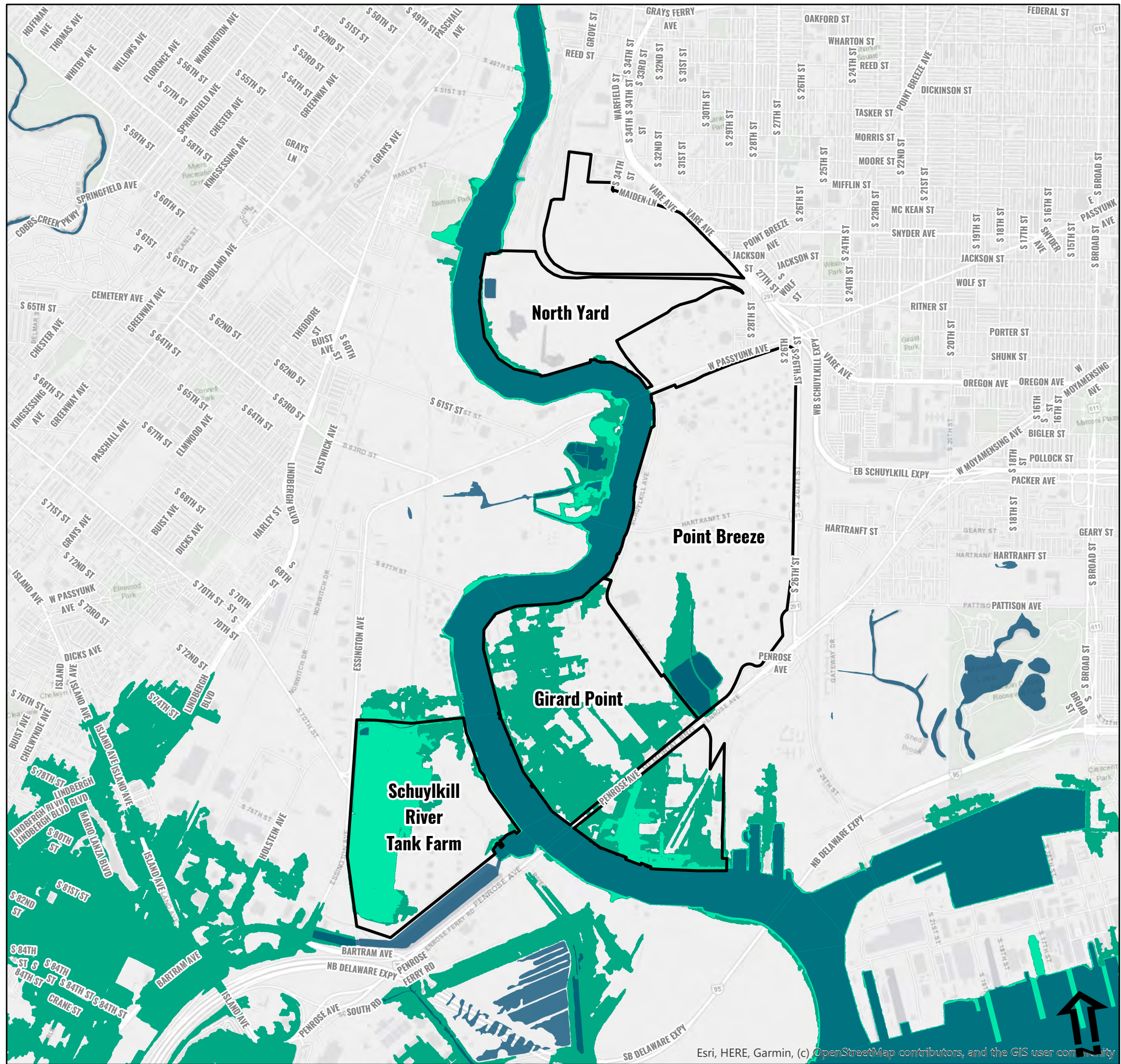
HYDROLOGY: FEMA FLOOD MAPPING

-  PES Parcels
 -  Hydrologic Features
 -  Historic Streams
- FEMA Flood Plains
-  100 Yr Flood Plain
 -  500 Yr Flood Plain





Data Source: Federal Emergency Management Agency



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



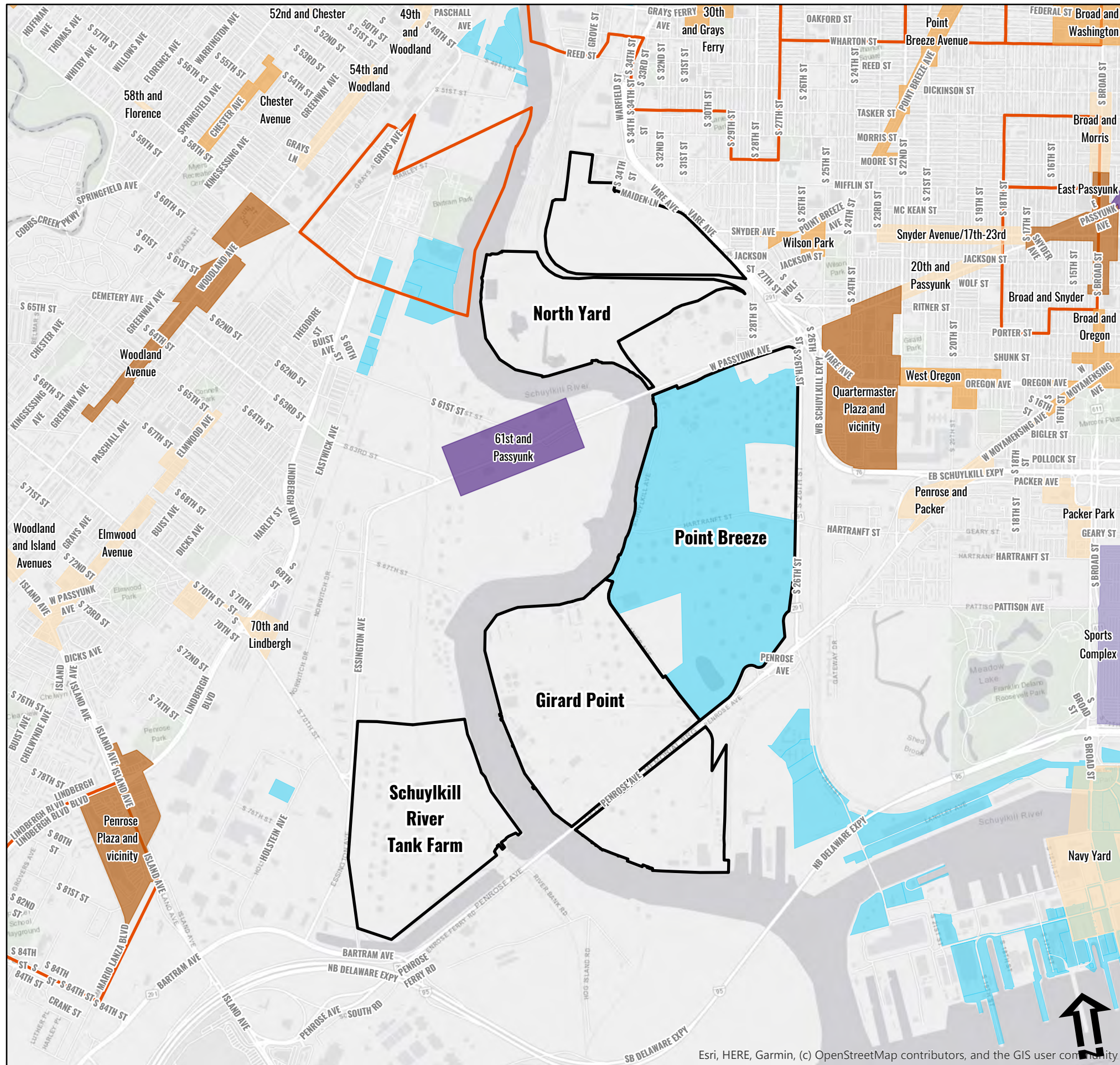
HYDROLOGY: PROJECTED SEA LEVEL RISE

-  PES Parcels
-  Hydrologic Features
- Sea Level Rise
 -  Yr 2050 2 ft (approximate estimate)
 -  Yr 2100 4 ft (approximate estimate)

Data Source: National Oceanic and Atmospheric Administration



Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community



ECONOMIC DEVELOPMENT: FEATURES AND INCENTIVES

- PES Parcels
- Keystone Opportunity Zone Parcels
- Federal Opportunity Zones
- Commercial Corridors**
- Neighborhood Subcenter
- Neighborhood Center
- Community Center
- Regional Center
- Super-regional Center
- Specialty Center
- Undefined

Data Source: Philadelphia Department of Planning and Development



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APPENDIX C: GROUNDWATER POLLUTION MAPS

