

NORWALK POWER ECONOMIC IMPACT ANALYSIS

CITY OF NORWALK & MANRESA ASSOCIATION

FINDINGS & RECOMMENDATIONS REPORT



Photo Credit: Geoffrey Steadman



FITZGERALD & HALLIDAY, INC.
Innovative Planning, Better Communities

12/14/18

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Introduction



Manresa Island is comprised of two parcels that occupy approximately 144 acres of Norwalk's shoreline. In 1960, a power plant was commissioned on the southern parcel by Connecticut Light & Power. The plant began operations as a coal fired plant but was converted to oil in 1972. In 1999, the property was acquired by NRG Energy. In 2012, the site was inundated with storm surge during Hurricane Sandy and was subsequently closed in 2013.

The Manresa Association was formed in 2013 as an advocacy group dedicated to ensuring that Manresa Island is environmentally safe, provides open space and conservation habitat, and contributes to the physical beauty of Norwalk and the Long Island Sound coastline. The association is comprised of over 900 households and several local neighborhoods and clubs. In 2017 the Manresa Association and the City of Norwalk partnered to conduct a study with the aims of identifying potential future uses of the property and assessing the potential economic impact of those uses. The City and Association selected Fitzgerald & Halliday Inc. and subconsultants Tighe & Bond (remediation and engineering expertise) and Ninigret Partners (economic expertise) to conduct the study.

The study team has worked closely with the project steering committee which is comprised of representatives from the City of Norwalk (Redevelopment Agency, Planning Department, Economic Development, and various Commission Members) and the Manresa Association. The City, Manresa Association, and study team have conducted outreach with NRG Energy to solicit information and receive feedback on findings. NRG has provided access to the property and representatives from NRG attended a public workshop in support of the study.

In May of 2017, Connecticut Senators Chris Murphy and Richard Blumenthal released a joint statement urging NRG to participate in the study and work towards a solution for the property that will mutually benefit all parties. This was followed by a statement released in June of 2018 by Senator Murphy, Blumenthal and Congressman Jim Himes supporting efforts to remediate, restore and revitalize Manresa Island.

This report provides an overview of environmental and ecological conditions of the property, remediation efforts to date and planned and potential remediation approaches, regional market conditions that will influence potential reuse of the property, and recommended reuses of the site based upon those conditions.

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Summary of Findings



Photo Credit: Geoffrey Steadman

Between 2012 and 2016, over two hundred coal or former-coal fired power plants have been retired; most of those are located on the east coast. Within New England alone, six power plants, including Manresa, have closed or been retired within the past several years. While there are examples of successful power plant redevelopment projects, later generation power plants such as Manresa lack structures with historic or architectural value and are likely best suited for demolition.

According to ISO New England, the New England energy grid is likely to have sufficient resources in the long term to meet reserve requirements although the development of fast-start (commonly natural gas) units would improve system performance. Massachusetts and Rhode Island have been identified as the most suitable areas for new power plant siting although the Fairfield County area has also been identified as an area of high electric demand. ISO also finds that New England has potential for expanding energy trade with neighboring regions. As such, Manresa Island's transmission lines and substation are strategic current and future assets.

The closure of power plants triggers a long process of reuse planning that involves multiple phases including decommissioning, remediation, and potential redevelopment. The average time from closure to planned completion of redevelopment is 27 years. The most common approach by operators following to closing a site is to take "no action" as there is no federal or state requirements to decommission or sell the facilities. Of the over 200 closed sites over the past several years, only 35 sites have been decommissioned. Conversions of plants to natural gas is equally common, with about 30 natural gas conversion projects underway across the country.

The Manresa site is comprised of two parcels. The southern parcel includes the power plant, substation and other supporting facilities. The northern parcel is largely constructed of fill material and coal ash. Because of this substrate, contamination and surrounding wetlands and estuary areas, this parcel is not feasible for development. The recommended remediation strategy for this parcel is to allow for a process of "natural attenuation" rather than active remediation an approach that still requires approval by the Connecticut Department of Energy and Environment.

Given the limitations of the northern parcel, the southern parcel is the focus of reuse concepts presented within this report. A majority of this parcel is within the 100-year flood zone which is a constraint to, but not prohibitive of, development. Remediation of the site could cost between \$11.8 and \$26.8 million, depending on the specific reuse of the site. Demolition of the power plant structures would likely cost between \$5.7 million and \$9.9 million.

Based on market trends and conditions, the residential market presents itself as the most likely driver of reuse of the property. This does not, however, preclude a targeted development either as a build to suit office situation or some other unique development idea brought forth by a developer. Given the associated cleanup costs, a fairly dense development model would be required to offset the land preparation costs. An open question is the potential for a high end development where density would be reduced because the price points would be higher. The viability of this approach depends in part on how much of the plant infrastructure remains, what happens with areas of contamination, and storm surge/resiliency questions. Any significant volume of residential or office development is likely to face opposition from local residents who have expressed concerns about an increase of traffic on local roads and are concerned about environmental and visual impacts of development.

While the market appears to favor residential development, there are multiple reuse options that could more effectively leverage the sites assets including the harbor and navigation channel, electric substation, and land area and solar exposure. These options include the potential for the establishment of a marina and boat storage yard, the development of a solar farm, and the on-site storage of energy.

FHI explores six unique reuse concepts in this report. These concepts were identified as feasible for further study based upon the existing conditions analysis, community and stakeholder feedback, and guidance from the project’s steering committee. These reuse concepts include:

- Conservation
- Tear-down with passive open space
- Marina
- Low density/high value housing
- Medium density housing
- High density housing
- Solar farm
- Educational Facility

There are multiple constraints to the reuse of the site for the uses listed above, with some uses such as high-density residential being subject to more constraints than uses such as a solar farm. These constraints include, but are not limited to, the following:

- Cost of remediation: The cost of remediation varies significantly upon the proposed reuse..
- Flood and coastal zone: The flood and coastal zones add complexity to permitting, engineering, and increase cost to development in addition to limited some uses.
- Site access: Site access is limited to a local residential roadway.
- Utility infrastructure: The site does not have sewer or natural gas infrastructure. These facilities are available on Longshore Avenue, one-half mile from the site.
- Electrical transmission: Three acres of the 33-acre southern parcel are occupied by Eversource’s electrical substation which will remain in place regardless of future use.
- Zoning: The existing is very restrictive and does not allow multi-family residential or commercial development.
- Fiscal impact: The existing power plant infrastructure is a significant contributor to Norwalk’s tax roles, demolition of the plant or transfer of ownership could negatively impact the revenue generated by this property.
- Community preferences: The community has been outspoken about their preference for a passive reuse their opposition against intensive uses such as high density housing.

Reuse Scenario	Visual Impact	Traffic Impact	Ecological Benefit	Allowed by Zoning	Anticipated Public Support	Property Tax Revenue Impact	Remediation Cost	POCD Supportive
Conservation	Low	Low	High	Yes	High	Negative	Low	High
Passive open space	Low	Low	High	Yes	High	Negative	Moderate	High
Marina	Moderate	Moderate	Low	No	Moderate	Neutral	Moderate	Moderate
Low Density Residential	Moderate	Low	Low	Yes	Moderate	Neutral	High	Moderate
Medium Density Residential	Moderate	Moderate	Low	Yes	Low	Positive	High	Moderate
High Density Residential	High	High	Low	No	Low	Positive	High	Low
Solar Farm	Low	Low	Moderate	Special Permit	Moderate	May be subject to Municipal Agreement	Low	Moderate
Educational Facility	Low	Moderate	Low	No	Moderate	Moderate	Moderate	Moderate

Assessment matrix of reuse options

Given these development constraints, FHI recommends the advancement of a mixed-use development concept for the site. This will allow for a diversified strategy that leverages the site's unique assets and allows for a phased development. This approach is summarized below:

Northern Parcel: Conservation

The northern parcel is best suited for conservation with limited public access.

Southern Parcel: Redevelopment for Active Uses

A number of redevelopment options are recommended for the Southern Parcel including the following:

- Marina: Includes 110 slips, a 6 acre boat storage yard, a marina facility building, a public boat launch, publicly accessible waterfront trails and public parking.
- Solar Farm: Includes a 4.9 MW solar array and a 0.5 acre battery energy storage site.
- Educational Facility: An educational institution or destination facility that leverages the coastal location and waterfront access.
- Residential Development: Moderate density residential development of up to 74 single-family homes.

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Section 1

Context and Reuse Planning

1. Context
2. Reuse Planning

1. Context

Nationwide, a significant number of fossil fuel power plants have been closed (retired) or were in the process of being retired over the past several years. Between 2012 and 2016, over two hundred coal fired plants have been retired, most of those were located on the east coast. This wave of closures is due in part to Environmental Protection Agency (EPA) provisions under the Clean Air Transport Rule for emissions of nitrous oxide and sulfur dioxide (in 2012 and 2014, respectively); a new Air Toxics Rule (in 2014); a tightened ozone standard (2014–2016); new power plant water discharge rules under the Clean Water Act (2014–2017); and a strengthening of the National Ambient Air Quality Standards for ozone and ozone precursors (2014–2017).

Within New England, the Manresa Power Plant is one of six power plants that have closed or initiated the retirement process over the past several years. Multiple other plants are at risk of closure. These power plants have been retired due to the age and condition of the structure, lack of compliance with environmental regulations and competition from more economically viable sources of generation such as natural gas or renewable sources.

Many of the plants that have been retired are in urban areas and have a high potential for redevelopment due to waterfront locations, surrounding land values, and proximity to infrastructure. A number of successful power plant redevelopment projects, such as the South Street Power Station in Providence, RI, have preserved plant structures that have significant historic and architectural value. Later generation power plants such as Manresa, lack structures with historic or architectural value and are likely best suited for demolition.

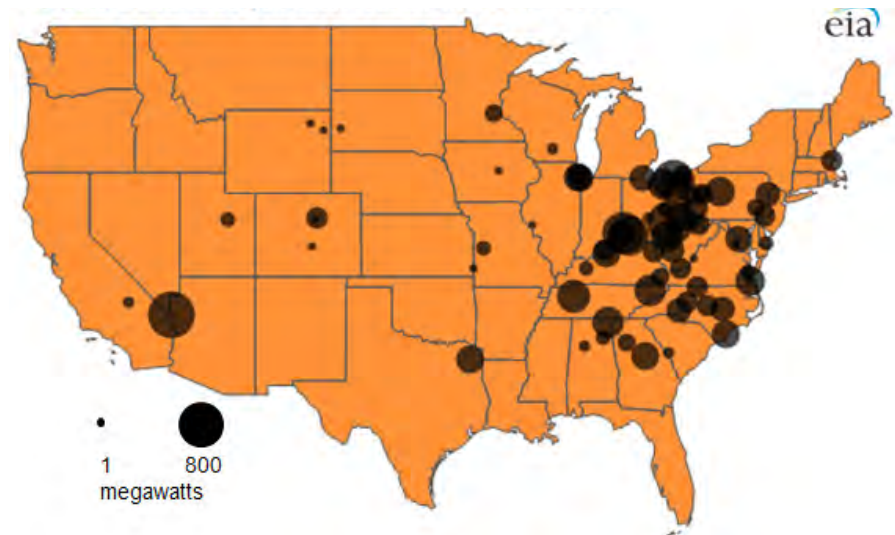
Energy Generation in New England

The future use of Manresa Island will be affected by the energy demands of the region and the viability of future energy generation at the island. The study team reviewed ISO New England’s 2015 Regional System Plan and 2030 Power System Study for information relevant to energy generation needs in the region. [ISO New England (ISO) oversees the operation of New England’s bulk electric power system and transmission lines, generated and transmitted by its member utilities.]

According to ISO, the Greater Connecticut, Southwest Connecticut, and Northeastern Massachusetts/Boston areas are likely to have sufficient resources



Closed, retiring and at-risk generation in New England

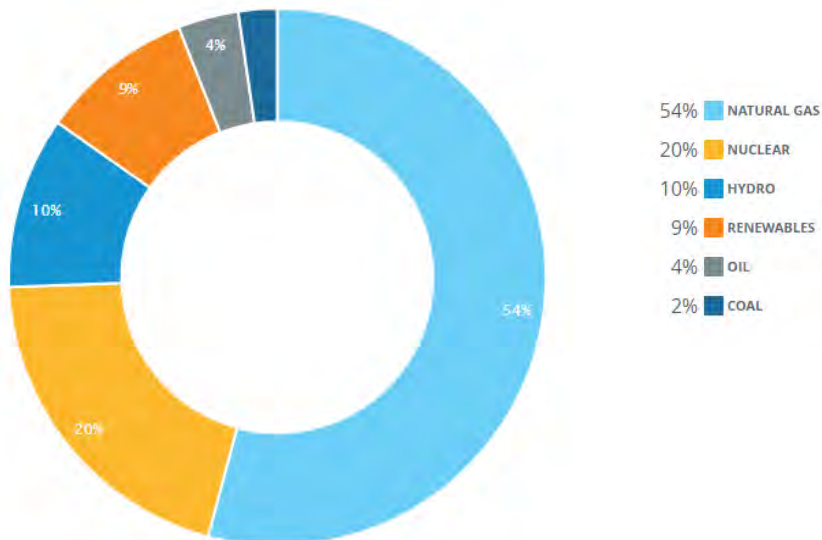


Reported Coal-fired generator retirements 2012-2016, Source: EIA

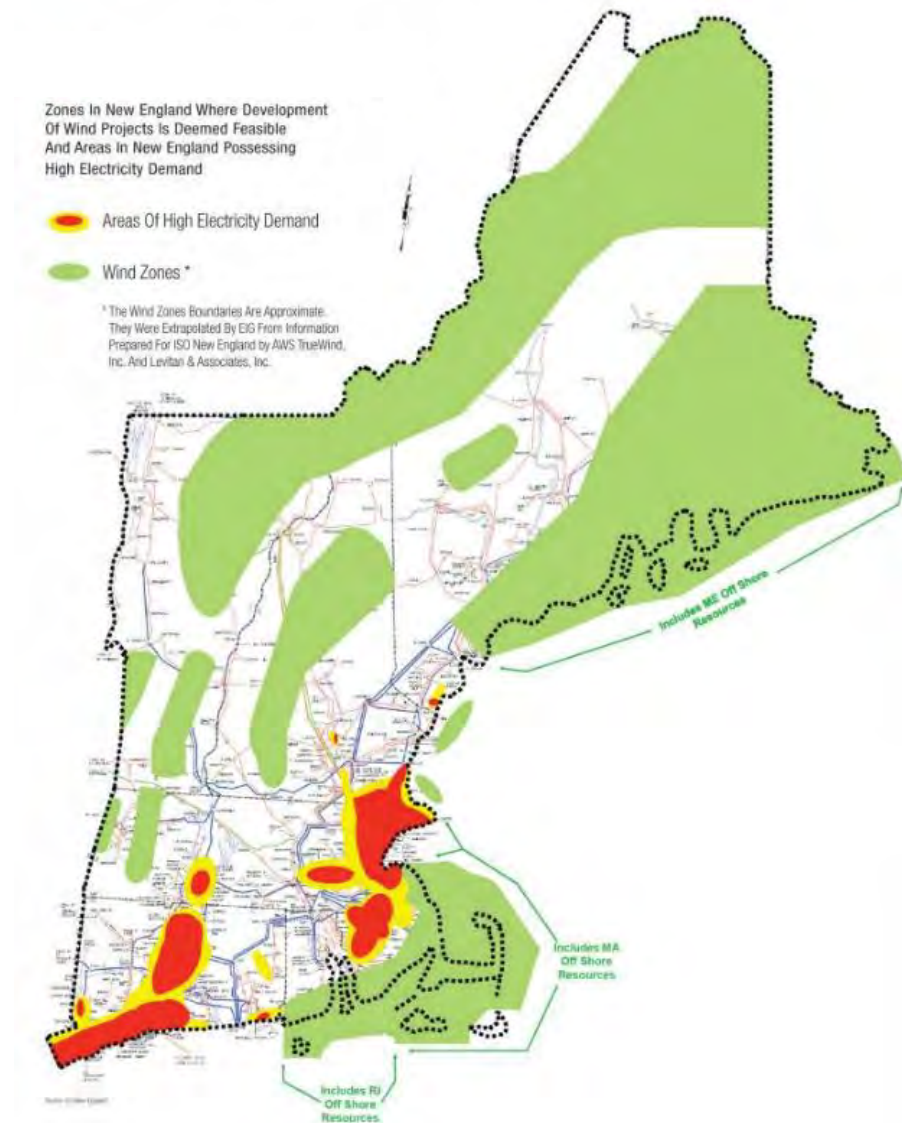
in the long term to meet their representative reserve requirements. The placement of fast-start, energy-efficient, and economical baseload resources in these areas would, however, improve system performance. These fast-start units are typically provided by natural gas units. The use of natural gas and fast-start units in the ISO's network will likely meet long-term needs for additional operating reserves.

ISO's studies suggest that the most reliable and economic place for developing new resources is the combined Eastern Massachusetts and Rhode Island areas. Fairfield County was not identified as a desirable area for new generation, although 405 megawatts of replacement capacity will be needed in Connecticut based upon planned retirements across the region and transmission constraints that limit transmission to Connecticut.

ISO's 2030 study recognized that New England has potential for expanding energy trade with neighboring regions. ISO also identified options for importing additional power through expanded transmission interconnections with New York, confirming that Manresa Island's transmission lines and substation are strategic current and future assets in the regional electricity network.



New England energy generation profile, Source: ISO New England



Areas of high electric demand and potential wind generation zones Source: ISO New England 2030 Power System Study

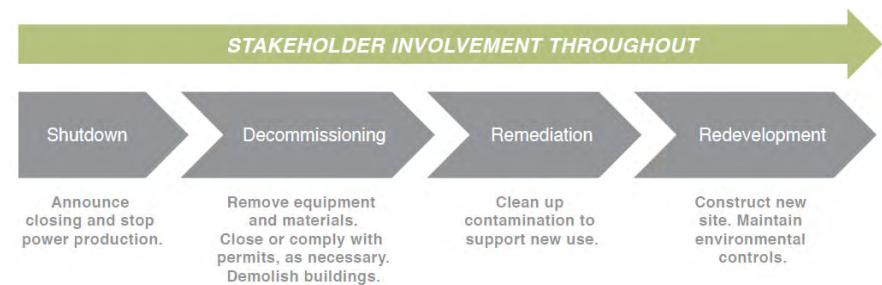
2. Reuse Planning

In response to a significant number of power plant closures and retirements, the EPA has produced guidance on coal plant decommissioning, remediation and redevelopment. While the Manresa plant was an oil-powered plant at the time of closure, it was a coal-fired plant for decades prior to its conversion to oil and therefore faces many of the decommissioning and remediation issues common to coal-fired plants.

According to EPA, after a plant closes, the site may remain dormant for several years before progressing through decommissioning, remediation and redevelopment. The multiple phases leading to a reuse of a site include:

- **Decommissioning:** The decommissioning of a fossil fuel fired power plant may overlap with remediation and redevelopment. During decommissioning, electrical generating units are shut down and all operating permits are terminated. Hazardous materials associated with both the generation process and the buildings/structures are removed. Electrical generating equipment is cleaned and may be removed for use at other locations or sold as scrap. Some demolition of buildings/structures may be performed to facilitate cleaning or equipment removal. Power plants with on-site coal ash ponds or solid waste landfills must follow federal and state permit requirements for closure of these facilities.
- **Remediation:** Remediation involves the investigation and cleanup of hazardous materials to meet federal or state requirements. It also includes defining site-specific needs for redevelopment. The property owner is responsible for ensuring that the cleanup meets all regulatory requirements and works closely with stakeholders, environmental consultants and state environmental agencies to develop and execute the remediation plan.
- **Redevelopment:** The redevelopment phase includes new construction on the site, reuse, and environmental controls to protect the use of the site from remaining contaminants.

Identifying potential reuse options early in the process can inform cleanup decisions and determine the appropriate level of work needed in each stage of the assessment, cleanup and redevelopment process.



Typical Reuse Planning Process, Source: USEPA

Typical Post Retirement Options

- **No Action:** The no action decision is taken on the majority of closed power plants nationwide. Owners are reluctant to act because of costs, risk, and the attitude that “we’re not in the real estate business.” Economic drivers are unknown until engineering and real estate studies are performed. There are no federal or state requirements to decommission or sell these facilities.
- **Owner-Controlled Decommissioning:** In some cases, owners may not be able to sell a site, and they may not want to give up a site that may be useful for new generation or transmission. In these cases, they may opt to decommission aging plants to reduce risk, monetize salvage and scrap, and prepare a site for future uses. This would reduce carrying costs for taxes and security. Of approximately 200 announced closures since 2000, about 35 sites have been decommissioned.
- **As-Is Sale for Decommissioning and Redevelopment:** Some owners opt to sell closed power plants as-is, because these sites have significant redevelopment potential. Remediation costs can be included and risks can be managed through the use of contract terms, escrows, and environmental insurance. Developers may be willing to assume the risk of decommissioning in exchange for a reduced purchase price.
- **Retrofit Conversion to Natural Gas:** Conversion from coal or oil to natural gas can be the most economical solution, there are about 30 gas conversion projects under way across the country.
- **Replacement with New Generation:** Would include modernizing and reactivating former generation.

Section 2

Site Characteristics & History

1. Location & Context
2. History of the Island
3. Landscape
4. Zoning
5. Infrastructure
6. Visual Impact

1. Location & Context

Manresa Island is located in Norwalk Harbor, on Long Island Sound, in Norwalk Connecticut. The island's location, accessible via Longshore Avenue, lies within close proximity to Cafe Pasture Beach, South Norwalk, and various marinas and residential neighborhoods. The island, currently owned by the Norwalk Power, LLC a subsidiary of NRG, is home to the Norwalk Power coal-fire power plant, which was decommissioned in June, 2013. The power plant was taken out of service following Superstorm Sandy that devastated Connecticut's shoreline in October 2012.

The site consists of two parcels; a northern parcel which is an undeveloped wooded area that provides a buffer between the Manresa power plant and residential neighborhoods and a southern parcel which is the former power plant site. This undeveloped area is not preserved as open space. Three neighborhoods lie adjacent to the Manresa peninsula on its north end; Village Creek, Harbor Shores, and Harborview. The neighborhoods are predominantly single-family homes on small lots.

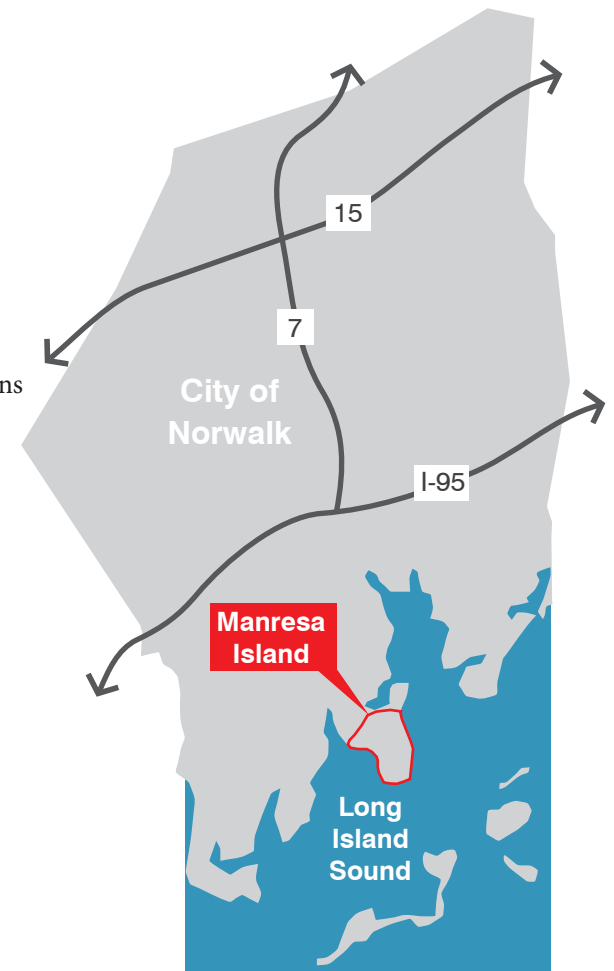
Northern parcel consists of:

- 97.0 acres
- Dense wooded forest cover
- Wetlands (freshwater and intertidal)
- Area of historic filling

Southern parcel consists of:

- 46.9 acres
- Power plant
- Oil tank farm
- Wastewater treatment plant and associated basins
- Subsurface cooling water structures
- Dock and harbor (inactive)
- Electric substation

The site falls inside the Coastal Area Management zone, which makes it subject to Coastal Area Management review and application processes.



Manresa Island Location

2. History

Manresa Island was known as Boutons Island as early as 1664 and then later as Keyser Island until World War II. In the early 1900's Father Terence Shealy opened a Jesuit retreat center on the island, known as "Mount Manresa". The name came from Manresa, a town in Spain where St. Ignatius Loyola, the founder of the Jesuits, developed a method of spiritual retreats. In 1911, Shealy moved the retreat to Staten Island, but the Manresa name remained.

In 1953, the Norwalk Zoning Commission approved Connecticut Light and Power's (CL&P) plan to develop the Manresa property into a coal-fired power plant. In 1955, the Marvin Beach Association in East Norwalk tried unsuccessfully to stop the power plant project, which came to fruition and was built in the late 1950's. CL&P commissioned the plant in 1960 and it burned coal between 1960 - 1972, when it was converted from coal to oil power.

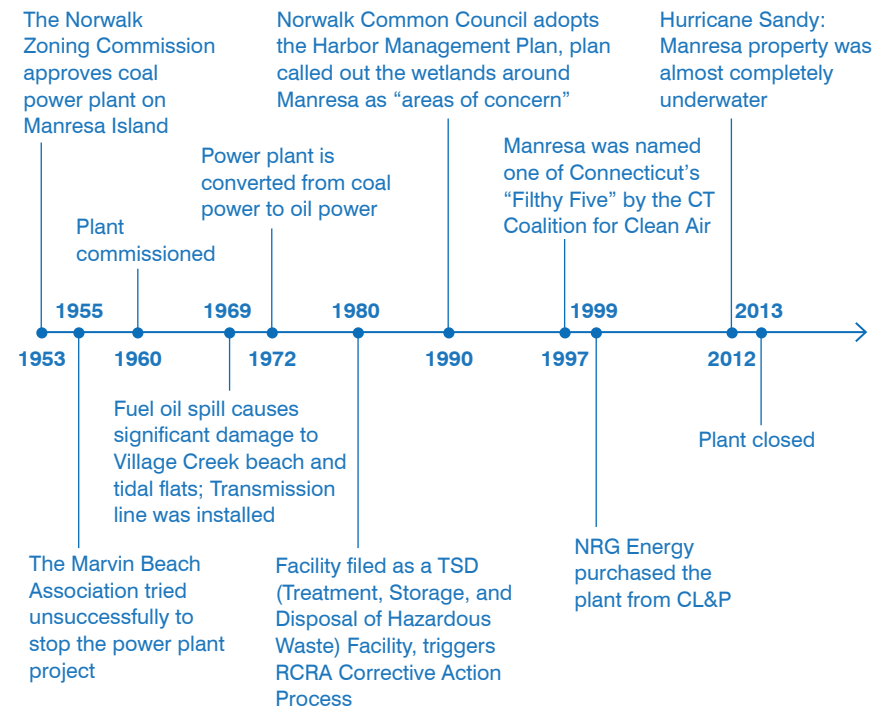
A major fuel oil spill in 1969 caused significant damage to Village Creek beach and the tidal flats between Hoyt's Island and Wilson Point. In that same year, a transmission line was installed under Long Island Sound that connected Manresa Island to Long Island. In 1980 the facility filed as a TSD (Treatment, Storage, and Disposal of Hazardous Waste) Facility in response to the 1976 Federal Resource Conservation & Recovery Act (RCRA) which governs the disposal of solid and hazardous waste. That triggered the Corrective Action Process, a requirement under RCRA that facilities investigate and clean up hazardous releases into soil, ground water, surface water and air.

In 1990 the Norwalk Common Council adopted the Harbor Management Plan. This document called out the wetlands around Manresa Island as "areas of concern". This designation required regular review of oil spill control procedures at the Norwalk Power Plant. In 1997 Manresa was named one of Connecticut's "Filthy Five" by the CT Coalition for Clean Air.

In 1999 NRG Energy purchased the plant from CL&P and operated the plant as an oil-fired power plant until 2013. In 2012 the Manresa property was almost completely underwater during Hurricane Sandy. As a result of this, the Plant was closed in June 2013.



Postcard of Manresa Institute



Timeline

Changing Landscape

Manresa Island has grown in size since the early 20th century, largely due to fill material being deposited on the site. The original fill material may have been sourced from excavation for the power plant as well as harbor dredging. CL&P was permitted to fill the area to the east of the Manresa Island Road, current wooded area, on the Northern Parcel with coal ash and sluiced water generated as a by-product of the coal-fired power plant operations. Coal storage and handling occurred on the Southern Parcel. The following aerial images display the changing landscape of Manresa Island.



1934 Aerial Photograph

Original "dry land" area



1951 Aerial Photograph

Expansion to east



1965 Aerial Photograph

Significant expansion to northeast

Harbor

Power plant

Coal storage



Expansion to north

Transmission lines to Long Island

1970 Aerial Photograph

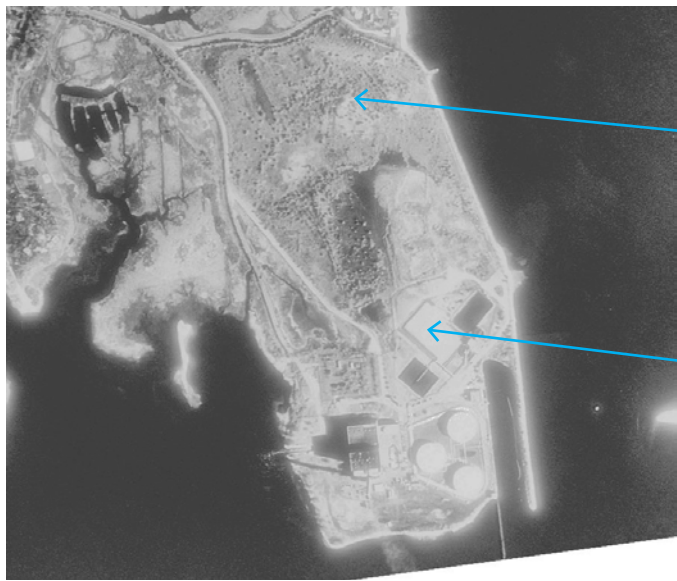


Further expansion to north

Wastewater impoundment

Fuel tanks

1985 Aerial Photograph



Emergence of tree canopy

Detention basin filled and new basin to south

1991 Aerial Photograph



Small ponds filled

Detention basins abandoned

2016 Aerial Photograph

3. Utility Infrastructure

Manresa Island is served by a robust utility infrastructure that includes sewer, municipal water, electricity, natural gas, and communications. This infrastructure has capacity to accommodate development on the island; further assessment is required to determine the amount of development that existing infrastructure could support.

Sewer

City of Norwalk sewer infrastructure is available immediately north of the site, but there is no current service to the site. Septic discharges are directed to an existing septic leach field located within the southwest corner of the site.

Additional development could require either connection to the City of Norwalk Sewer System or construction of additional on-site septic systems. If new septic system is installed, excavated soils will require proper handling and could require possible off-site disposal at an approved facility.

Water

Drinking water is supplied by the South Norwalk Electric and Power Company which has water mains along Longshore Avenue.

Electricity

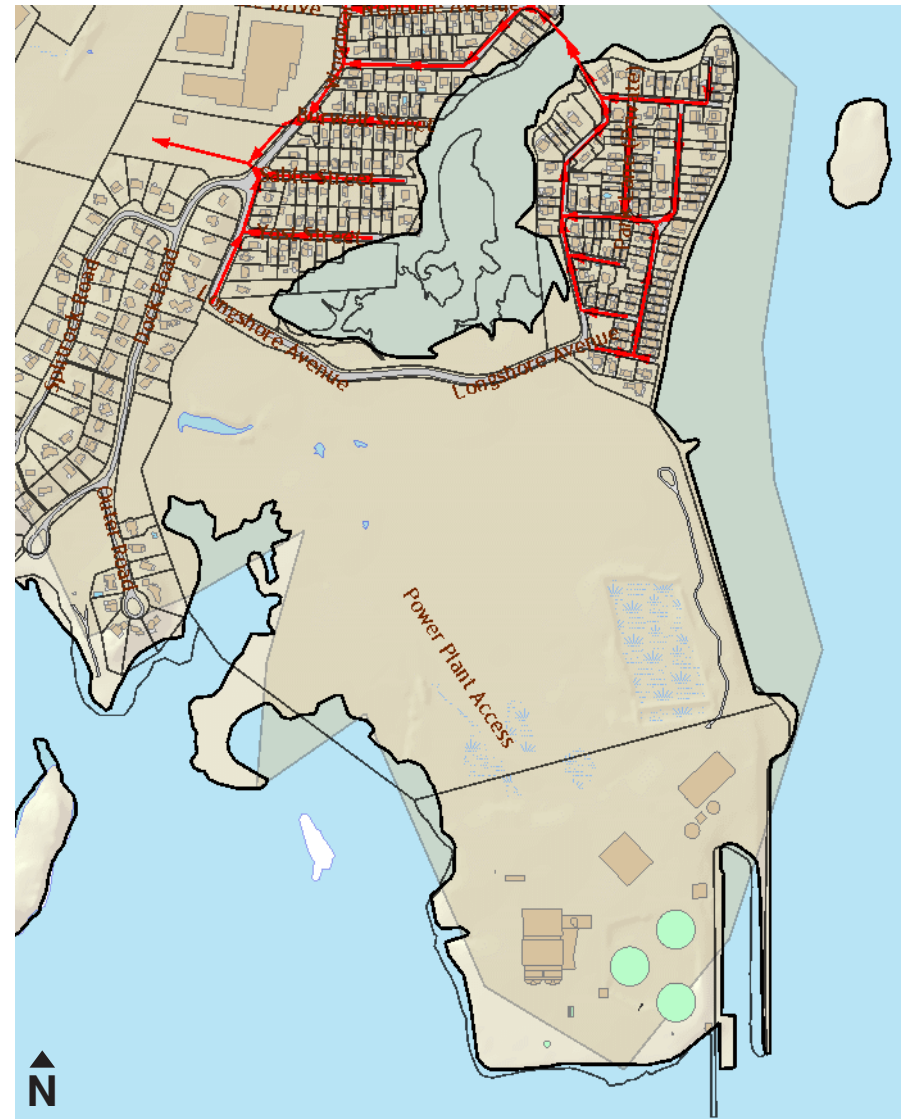
Three phase electrical service is provided by Eversource Energy. Transmission is provided to the site from Longshore Avenue.

Gas

Natural Gas service is available on Longshore Avenue and is provided by Yankee Gas. The Kinder Morgan, Inc. (Tennessee Gas Pipeline) gas transmission line is located approximately five miles north of the site.

Communications

Telephone/internet services are present on Longshore Avenue and are provided by Frontier Communications.



Sewer service limits: Sewer gravity mains shown in red above

4. Zoning

The Manresa Island power plant property is zoned as “B Residence”. The intent of this zone is for single-family dwellings and other compatible uses. Under the B Residence zoning classification, any non-residential or institutional use would require rezoning of the parcel. The former utility use was permitted as a special permit use.

Allowable uses in the B Residence zone include:

- Single-family detached dwelling units
- Parks and playgrounds
- Farms, gardens and nurseries on parcels 12,500 square feet or more

Uses allowed in this zone by special permit include:

- Public museums
- Places of worship
- Schools, public and private colleges and universities
- Public Utilities
- Halfway houses (maximum of ten persons allowed)
- Youth day camps
- Convalescent or nursing homes
- Planned residential development

Accessory uses allowed in this zone include:

- Home office
- Accessory apartments
- Lodging or rooming (up to two paying guests)
- Family day-care
- Greenhouses
- Farmers markets allowed as accessory use in public parks five or more in acres in size

Development of the power plant site with anything more intensive than single family homes would require rezoning of the site from the current B Residence zone to a commercial, mixed use, or high density residential zone.

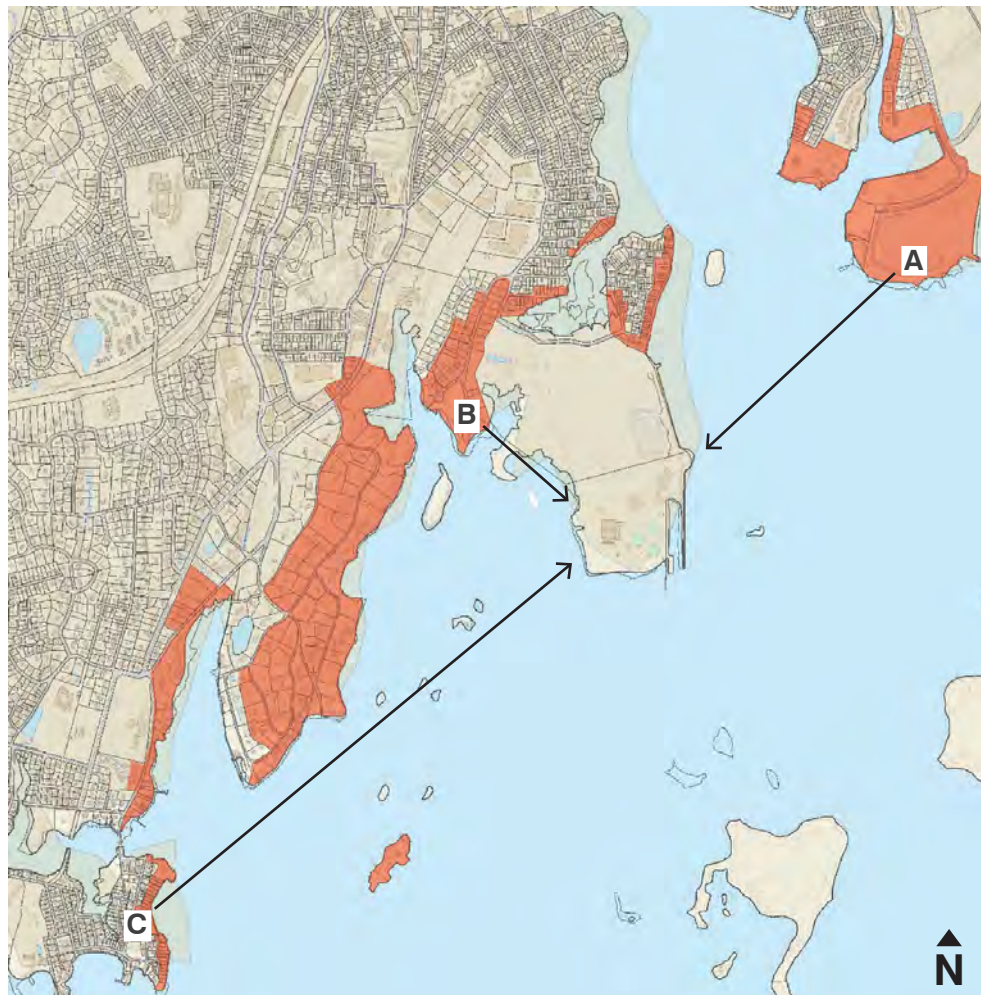
Zoning District	Size of Lot in Square Feet	Maximum Building Area
B Residence	Up to 6,250	35 %
	6,251 – 8,250	30 %
	Greater than 8,250	25%

B Residence site requirements

5. Visual Impact

The Manresa power plant building and smoke stack have a considerable visual impact on the surrounding landscape. An analysis of the area conducted by the study team revealed that there are approximately 300 properties that have a view of the power plant building and/or smokestack. Other features on the property such as the substation are far less visible.

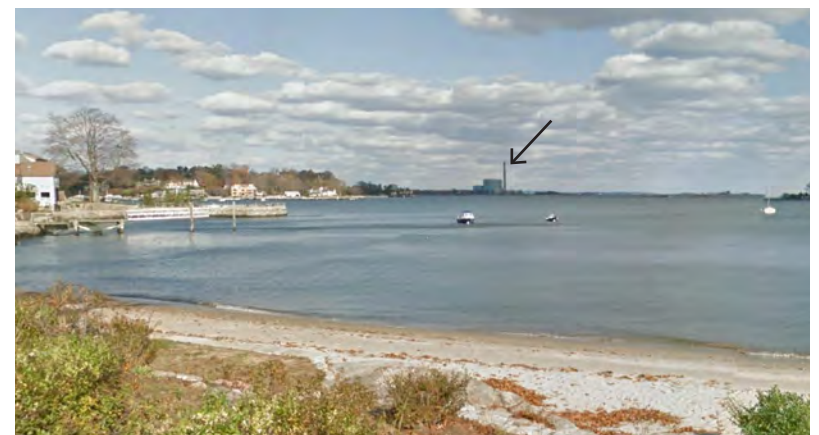
The total assessed value of these visually impacted properties is \$467.8 million and these properties generate approximately \$11.9 million in property tax revenue per year.



A. View from Calf Pasture Beach



B. View from Outer Road



C. View from Bell Island

Section 3 Remediation Analysis

1. Environmental Conditions
2. Remediation Standards
3. Site Investigation and Assessment
4. Areas of Environmental Concern (AOCs)
5. Remedial Strategy

1. Environmental Conditions

The Manresa site is comprised of two parcels (see map at right). The Northern Parcel is undeveloped with an overgrown, wooded area and contains tidal and freshwater wetlands. An access road, Manresa Island Road, is oriented north-south and connects the Northern Parcel and Southern Parcel with Longshore Avenue. The area to the west of the Power Plant Access road was subject to significant historical filling with coal ash by-product material from the coal-fired and oil-fired power plant on the Southern Parcel.

The Southern Parcel is developed with a multi-story power plant building, stack, oil tank farm, above ground oil tanks, basin and dock, wastewater treatment plant and associated basins, and subsurface cooling water structures, active substation and paved parking lot/ access roads.

The majority of the site is located within the Federal Emergency Management Agency (FEMA) 100-year flood plain with the exception of the former tank farm at the southeast corner of the site, the active electrical substation/equipment area and the area adjacent to the north-central portion of the site (as shown on flood zone map on following page).

Regulatory Framework

The site is currently enrolled in the CTDEEP's Property Transfer Program and Resource Conservation Recovery Act (RCRA) Corrective Action Program under the United States Environmental Protection Agency (USEPA) /CTDEEP. The site was previously identified as a large quantity generator of hazardous waste, as a result the site was entered into the CTDEEP's Property Transfer Program upon the sale of the property to Norwalk Power in December 1999. The CTDEEP/USEPA have been addressing investigations and remedial activities under a combined program (Property Transfer Program/RCRA Closure) since 2006.

The site was also subject to Significant Environmental Hazard notification reported to the CTDEEP on May 24, 1999. The notification was for pollution detected in groundwater that discharges to a surface water body that may pose a risk to aquatic life. CTDEEP reviewed the Significant Environmental



Site Features

Hazard information and determined that the groundwater pollution does not significantly threaten aquatic life. However, additional sediment assessment and remedial plans were completed to address sediment concentrations within the on-site wetlands as discussed below.

In 2015, USEPA finalized regulations to regulate the disposal of coal combustion residuals as solid waste under RCRA. The plant ceased operations in 2013 and does not appear to be subject to the coal combustion residuals regulations.

Hazardous building materials are not covered by the applicable soil and groundwater clean-up standard discussed below; however, they become important for disposal of demolition debris. NRG has not provided the study team with an hazardous building materials assessment of the site, nor is it clear if an assessment has been conducted.

2. Applicable Remediation Standards

The site is subject to the CTDEEP's Remediation Standard Regulations (RSRs) because the site is enrolled in the CTDEEP Property Transfer Program. The RSRs provide the framework to evaluate whether remediation, institutional controls, and/or engineered controls will be required to abate identified impacts from petroleum products, hazardous substances and/or hazardous waste. The nature and extent of impacted areas must be fully characterized and delineated prior to a final determination with respect to RSR compliance.

CTDEEP's intent in developing the RSRs was to define the following:

- Minimum remediation performance standards
- Specific numeric clean-up criteria
- A process for establishing alternative site-specific standards, if warranted

In general, RSR numeric criteria are used to remediate contaminated environmental media (i.e., soils and groundwater). RSR numeric criteria are not applicable to building materials and sediment. Brief summaries of default CTDEEP RSR soil and groundwater criteria are provided below. In addition, the RSRs provide the flexibility to apply specific exemptions and variances with CTDEEP approval, as required.

Soil Remediation Criteria

The CTDEEP soil remediation criteria integrate two risk-based goals, including: Direct Exposure Criteria and the Pollutant Mobility Criteria.

Direct Exposure Criteria were developed to protect human health from risks associated with direct exposure (ingestion) to contaminated soil.

- The Direct Exposure Criteria applies to accessible soil to a depth of 15 feet.
- The Direct Exposure Criteria for substances other than PCBs do not apply to inaccessible soil at a release area provided that, if such inaccessible soil is less than 15 feet below the ground surface, an environmental land-use restriction is in effect with respect to the subject release area to prevent access to contaminated soils. Inaccessible soil descriptions are summarized below.
- The CTDEEP has established two sets of Direct Exposure Criteria using exposure assumptions appropriate for residential land use and for industrial and certain commercial land use. The RSRs define residential activity and industrial or commercial activity as follows:
 - Residential activity – “means any activity related to a residence

or dwelling, including but not limited to a house, apartment, or condominium, or school, hospital, day care center, playground, or outdoor recreational area.”

- Industrial or commercial activity – “means any activity related to the commercial production, distribution, manufacture or sale of goods or services, or any other activity which is not a residential activity (defined above).

In general, all sites are required to be remediated to the residential criteria. If the industrial/commercial criteria are applicable and used, an Environmental Land Use Restriction is required to be placed on the property deed in accordance with the RSRs that restricts residential use of the site.

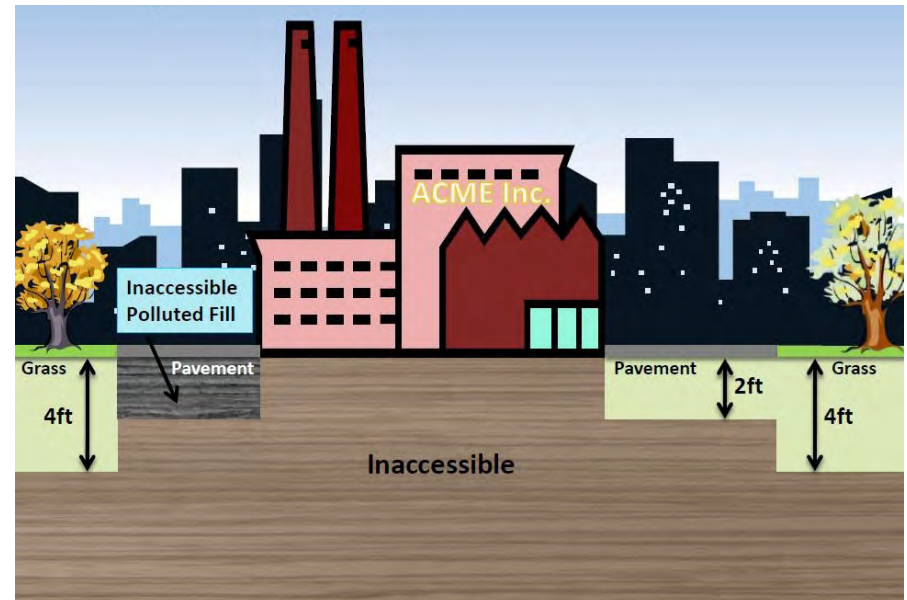
The CTDEEP RSRs provide options that will allow redevelopment of the site through limited remedial excavation of soils and placement of an Environmental Land Use Restriction on the site to prevent access to soils. The RSRs provide several options for rendering the soils exceeding the Direct Exposure Criteria inaccessible by:

- Excavating soils to a depth of 4-feet below grade within unpaved areas and then covering with clean soil
- Excavating soils to a depth of 27-inches in areas that will be paved with a minimum of 3-inches of asphalt
- Placement of soils under a building
- Placement of another permanent structure approved by the Commissioner

In addition, the RSRs provide options to request a variance for the installation of an engineering control to prevent contact with the soils. Use of an engineering control can be requested from CTDEEP if certain requirements are met. There are multiple potential options and designs for engineering controls, the applicability of which can be tailored for site-specific conditions.

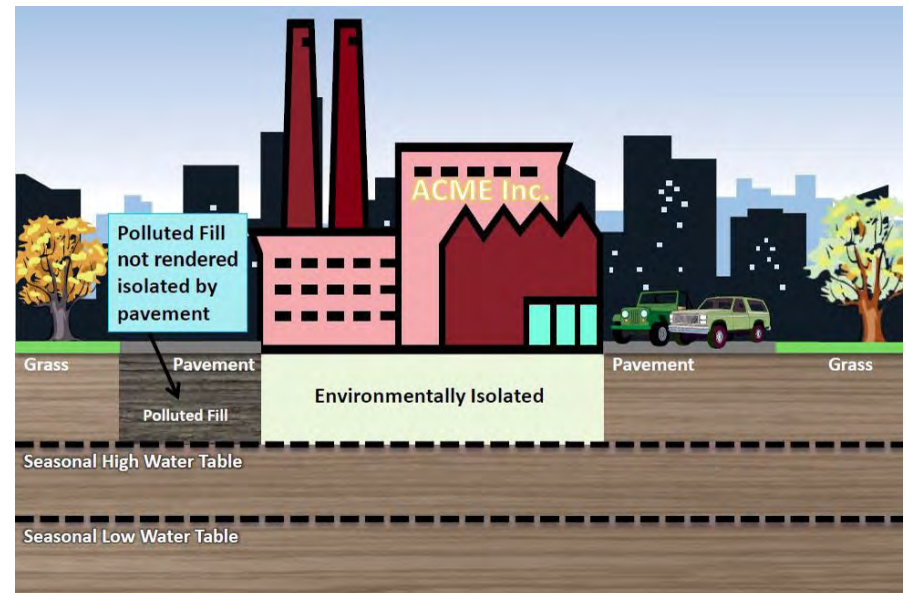
Pollutant Mobility Criteria were designed to protect groundwater quality from contaminants that migrate or leach from the soil to groundwater.

- The purpose of these criteria is to prevent any contamination to groundwater in GA classified areas, and to prevent unacceptable further degradation to groundwater in GB classified areas.
- The Pollutant Mobility Criteria generally apply to all soil in the unsaturated zone and soils to the depth of the seasonal high water table in areas with “GB” classified groundwater, which the site is located in.
- Soils that exceed the Pollutant Mobility Criteria must be remediated unless the soil are environmentally isolated.



Direct Exposure Criteria

Source: The Remediation Standard Regulations CTDEEP and EPOC



Pollutant Mobility Criteria

Source: The Remediation Standard Regulations CTDEEP and EPOC

Groundwater Remediation Criteria

The objectives of the groundwater criteria are the following:

- Protect human health
- Protect and preserve groundwater in GA areas as a natural resource
- Protect existing use of groundwater regardless of the area's groundwater classification
- Prevent degradation of surface water from discharges of contaminated groundwater

The site is classified as a GB Groundwater Area and there is no current use or contemplated future use of groundwater or surface water according to the site's Phase III Investigation Report.

Portions of the RSRs governing groundwater regulate remediation of groundwater based on each substance present in a plume and by each distinct plume of contamination. Several factors influence the remediation goal at a given site, including: background water quality, the groundwater classification, the proximity of nearby surface water, existing groundwater uses, and existing buildings and their use. When assessing general groundwater remediation requirements, all of these factors must be considered in conjunction with the numeric criteria of the RSRs.

As such, the following groundwater numeric criteria are applicable.

- **Surface Water Protection Criteria:** The Surface Water Protection Criteria applies to all groundwater, which discharges to surface water. The criteria ensure the groundwater contamination resulting from on-site sources, which exceed background, is remediated to levels that adequately protect surface water quality.
- **Groundwater Volatilization Criteria:** The Groundwater Volatilization Criteria apply to all groundwater contaminated with a volatile organic chemical within 15 feet of the ground surface or a building. According to the regulations, volatile organic chemicals shall be remediated to a concentration that is equal to or less than the applicable residential volatilization criterion for groundwater. If groundwater contaminated with a volatile organic chemical is below a building used solely for industrial or commercial activity, groundwater may be remediated such that the concentration of the substance is equal to or less than the applicable industrial/commercial Groundwater Volatilization Criteria in lieu of the residential Groundwater Volatilization Criteria, provided that an Environmental Land Use Restriction is filed preventing residential uses.

Sediment

The numeric criteria in the RSRs apply to the remediation of soil and groundwater but not directly to sediments. However, the RSRs have a provision that indicates if potential ecological risk exists then an ecological risk assessment would be required. The RSRs indicate that at any location at which polluted soil has eroded into a surface-water body, the CTDEEP may require that the impact on aquatic life be assessed and that remediation to protect or restore aquatic life and surface water quality from the effects of such polluted soils be undertaken. An Ecological Risk Assessment for the site was completed in June 2009 which identified impacts to the on-site wetlands but not the Long Island Sound. In 2014, a Remedial Action Plan for Wetland Sediment on the site was completed.

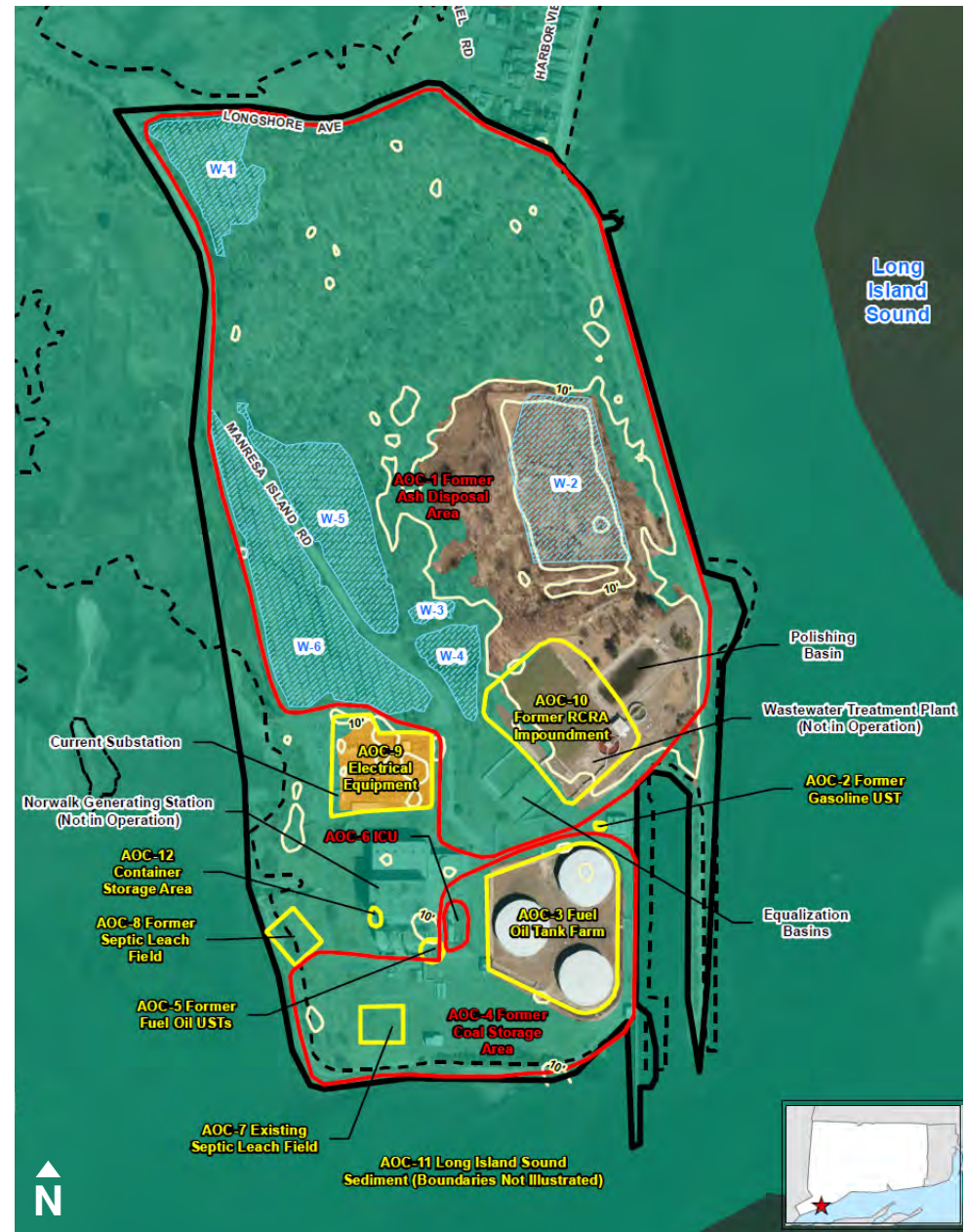
3. Site Investigations and Assessment

The site has been investigated through an iterative process of investigations to gather information regarding the nature and extent of impacts to soil and groundwater at the site. Investigations began in 1999 within a Phase I Environmental Site Assessment. The investigation phase of the project was completed with the Final Phase III Investigation Report and Completion of Investigation Transmittal Form dated September 21, 2010. Supplemental investigations of site sediments continued through 2011.

The investigation identified 12 Areas of Concern (AOCs), or locations/ areas where hazardous substances and/or hazardous substances (including petroleum) could have been used, treated, handled, disposed of or spilled and released to the environment. The map at right shows the identified AOCs at the site.

Site-wide groundwater has been impacted by the former power plant operations. The groundwater has been regularly monitored as part of CTDEEP's Property Transfer Program and as part of RCRA closure of the site. RCRA closure groundwater monitoring has been completed since 1989. A summary of groundwater data obtained from the Phase III Environmental Site Assessment are provided below.

- Metals (arsenic, beryllium, and zinc) exceeded RSR surface water protection criteria in multiple wells. Concentrations of nickel, lead and copper also exceeded RSR surface water protection criteria at individual wells. The elevated metals concentrations were detected in AOC-1 (former ash disposal area).
- Volatile organic chemicals were detected in AOC-4 (former coal storage area) at concentrations below RSR criteria.
- Extractable Total Petroleum Hydrocarbons was detected in AOC-4, AOC-6, AOC-7, and AOC-8. Concentrations of this were historically detected in AOC-4/6 and AOC-7 at concentrations that exceeded RSR additional polluting substance criteria during the 2007 groundwater sampling.
- Polycyclic aromatic hydrocarbons (PAHs) were detected at concentrations below RSR/additional polluting substance criteria.
- Polychlorinated biphenyls (PCBs) have not been detected at the site.



4. Areas of Environmental Concern (AOC's)

Areas of Concern	Chemicals of Concern	Source Material Released	Remediation Required
AOC-1: Former Ash Disposal Area	Metals, PAHs, VOCs	Coal, coal ash, oil ash, residual cleaning solvents	Yes: Metals above Residential and Ind./Com. Criteria. Potential Risk to Wetlands
AOC-2: Former Gasoline UST	Petroleum (TPH), lead	Gasoline	No: Soil indicated as compliance
AOC-3: Fuel Oil Tank Farm	Petroleum (TPH), PAHs	Petroleum oil	No: Soil indicated as compliance
AOC-4: Coal Storage Area	Metals, PAHs	Coal, coal ash	Yes: Metals above Residential and Ind./Com. Criteria
AOC-5: Former Fuel Oil USTs	Petroleum (TPH), PAHs, VOCs	Petroleum Oil	No: Soil indicated as compliance
AOC-6: Int. Comb./Blowdown UST	Petroleum (TPH), PAHs, VOCs	No. 6 petroleum oil from oil pump house	Yes: Petroleum Hydrocarbons above Residential Criteria
AOC-7 Existing Septic Leach field	No Releases of COC's noted	N/A	Not required / Not applicable
AOC-8 Former Septic Leach field	No Releases of COC's noted	N/A	Not required / Not applicable
AOC-9: Electrical Equipment	Petroleum (TPH)	Incidental spills/ leaks	No: Soil indicated as in compliance
AOC-10: Former RCRA Impoundment	No Releases of COC's noted	N/A	Not required / Not applicable
AOC-11: Long Island Sound Sediment	Petroleum (TPH), PAHs and Metals	Petroleum oil, coal, coal ash	Not required / Not applicable
AOC-12: Container Storage Area	VOCs, SVOCs/PAHs, PAHs, PCBs, Metals	N/A	Not required / Not applicable

5. Current Proposed Remedial Strategy

The following overview of the proposed remedial strategy is based upon information provided in the following documents. Many of these documents were prepared by the Licensed Environmental Professional hired by Norwalk Power, The Shaw Group (a CB&I Company).

- Phase III Investigation Final Report, prepared by Shaw, dated September 15, 2010.
- Preliminary Technical Impracticability Assessment for Groundwater, prepared by Shaw, dated November 20, 2012.
- Part 1 and Part 2 Engineering Control Submittal, prepared by Shaw, dated March 2013.
- Sediment Remedial Action Plan for Wetland Sediments, prepared by Shaw, dated October 21, 2014.
- Correspondence-NRG-Norwalk Power, Wetland Sediment Remediation Permit Approach dated June 2, 2016.

The study team has not conducted a separate third-party technical review of the site information with regard to the completeness of the site investigation or viability of the conceptual site model or proposed remedial approach.

The conceptual site model is a written and/or pictorial representation of an environmental system and the biological, physical and chemical processes that determine the transport and fate of contaminants through environmental media to environmental receptors and their most likely exposure modes.

No records of a comprehensive Remedial Action Plan or Environmental Land Use Restriction for the site were identified during the CTDEEP file review. However, the currently proposed remedial approach focuses on the use of an Engineering Control as indicated the Part 1 and Part 2 Engineering Control Submittal, natural attenuation of groundwater as indicated in the Technical Impracticability for groundwater remediation at AOC-1, and sediment remediation to mitigate ecological risk within on site wetlands in order to achieve overall compliance with remediation standard regulations. As with most complex remediation sites, the proposed remedial approach direction is not static and is subject to change based upon factors such as potential site use, sale/transfer of the property and input from the CTDEEP and USEPA. A summary of the current remedial approach based upon available reports is provided below.

Soil

Norwalk Power has proposed the implementation of an Engineering Control for AOC-1 (former ash disposal area) and AOC-4 (former coal storage area) to prevent exposure to impacted soils. These two AOC's encompass most of the site (see map on following page). The proposed Engineering Control also includes restricting the site to industrial and select commercial land uses through the establishment of an Environmental Land Use Restriction, which would preclude residential activity as defined above. The proposed Engineering Control also includes the installation of 6-inch earthen covers and 5-inch aggregate covers in the southern portion of the AOC-1 in the vicinity of the existing polishing and equalization basin and within AOC-4 (see map on page 24).

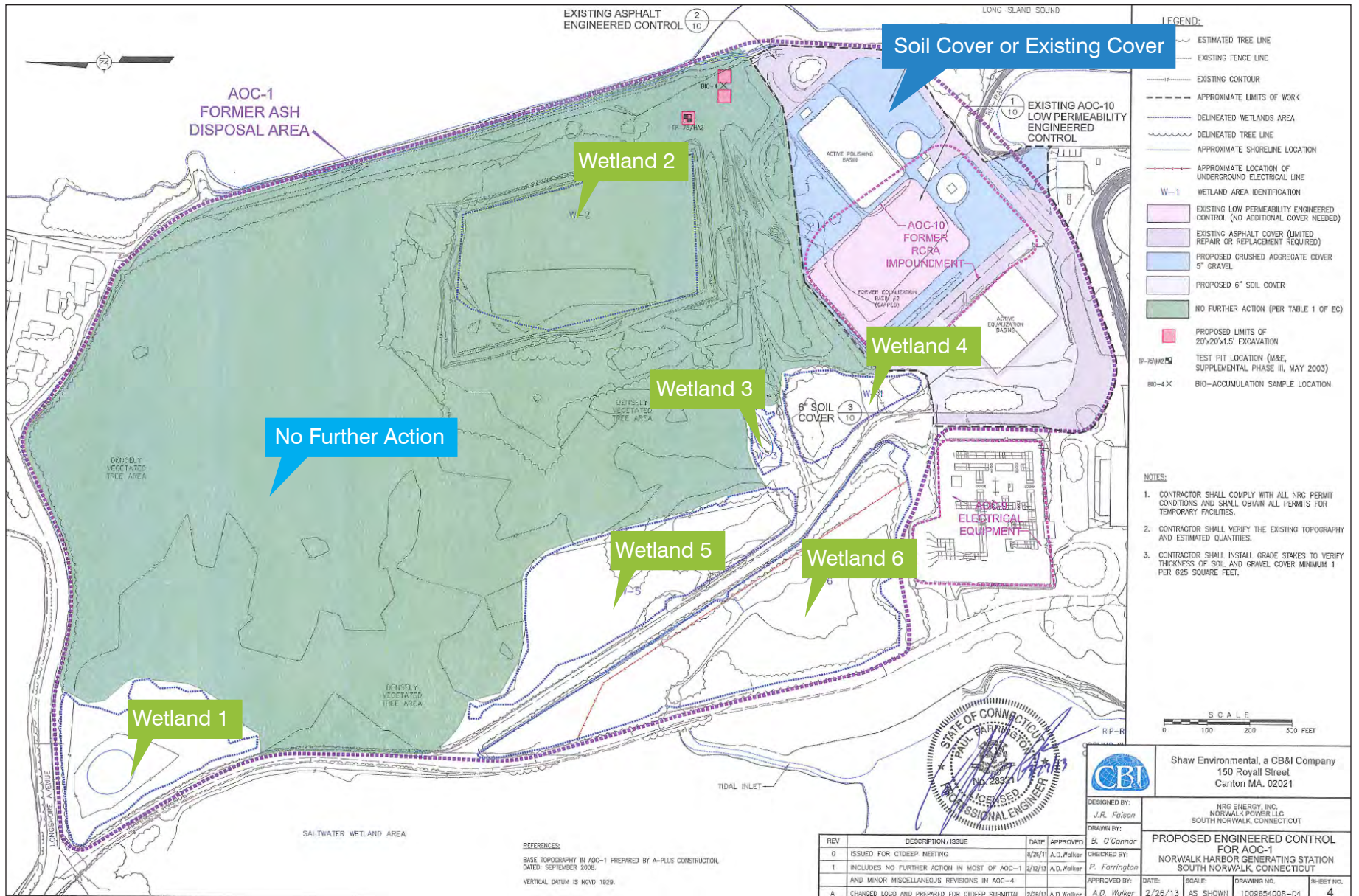
Tree clearing and remediation of the wooded area in the north and central portion of AOC-1 were not proposed in order to preserve the forest habitat. Instead, Shaw developed a site-specific direct exposure criteria for the metals arsenic and beryllium and submitted the request to CTDEEP for approval. However, it is uncertain if the proposed site-specific criteria will be approved.

The Engineering Control will require on-going inspection, maintenance, monitoring and financial assurance by Norwalk Power (NRG).

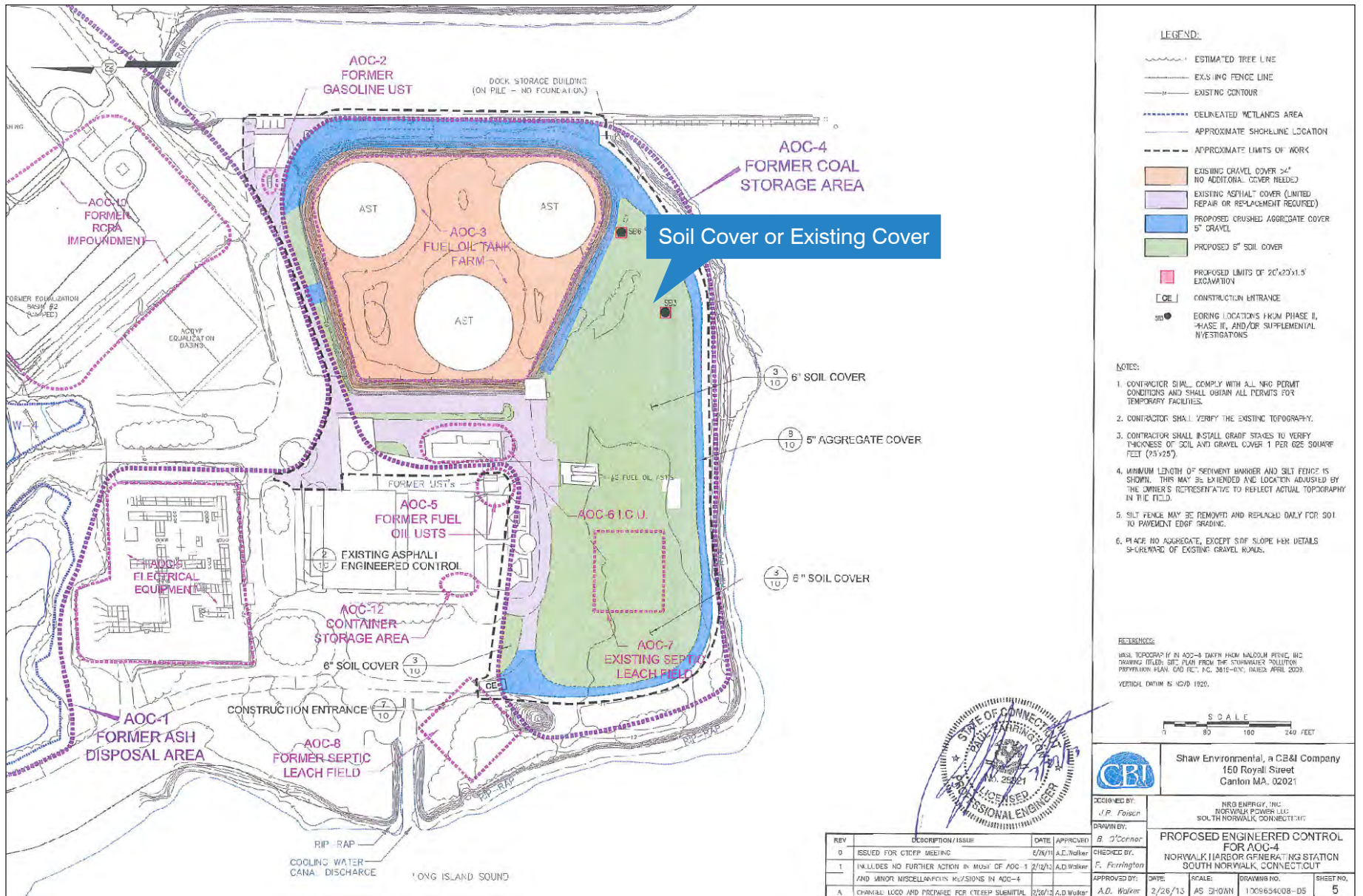
Groundwater

Norwalk Power has proposed an Environmental Land Use Restriction to address groundwater use at the site. Shaw submitted a preliminary Technical Impracticability Assessment for Groundwater to CTDEEP on November 20, 2012. This assessment was submitted as an initial step to requesting a variance from the requirement to complete groundwater remediation at AOC-1. Shaw indicated that the site should be eligible due to the extensive nature of the source and associated groundwater impacts within AOC-1. There is no significant current or future risk to human health due to the presence of metals impacted groundwater at the site. According to Shaw, the groundwater plume is stable and has a low potential for ecological risk. Shaw concluded that there are no significant risks to ecological receptors in Long Island Sound based upon surface water testing of the Long Island Sound.

The Technical Impracticability Variance requires CTDEEP review, concurrence and approval. This is currently in review with the CTDEEP.



Current Remedial Approach: Soils (AOC-1 Coal Ash Disposal Area), Map Source: Shaw Environmental



Current Remedial Approach: Soils (AOC-4 Former Coal Storage Area), Map Source: Shaw Environmental

Sediment

Sediments within wetlands W-3, W-4, and W-5 were determined to require remediation to mitigate ecological risk for either benthic vertebrates and vertebrate wildlife from metals in sediments. The proposed sediment remediation activities are detailed in the Remedial Action Plan for Wetland Sediment, prepared by Shaw dated October 21, 2014. Norwalk Power/Shaw is implementing the proposed sediment remediation in a two-step approach: an initial pilot test in targeted wetlands followed by a full-scale wetland remediation. The pilot test for W-4 and W-5 is projected to be completed in 2017, pending CTDEEP permit approvals. The pilot test will include the excavation of two 20 ft. by 20 ft. cells to a depth of 1 ft. One cell will be backfilled with clean fill and a second excavation cell will be backfilled with a geomembrane liner and fill. The pilot areas will be monitored for one year on a quarterly basis following completion of the excavation and backfill. The results of the pilot test will be used to determine the most effective method for mitigating risks to the wetlands. Following evaluation of the pilot test results, the full-scale wetland remediation would be completed, over a one to two-year period.

Other Potential Permitting Considerations

Depending upon the future nature of site developments, some or all of these could apply.

Floodplain

Work below the FEMA 100-year floodplain, which includes the majority of the site, will require regulatory approvals. A Flood Management Certification issued by the CTDEEP will be needed if state-funding is used for future developments at the site. CTDEEP does not allow for the increase in the intensity of the development in a flood plain unless the site is a brownfields site. In addition, future development within floodplain will require local approvals. Floodplain approvals are based on the requirements of the National Flood Insurance Program which include requirements for the types of structures which can be built in a floodplain.

Coastal Site Plan Review

Because this site is adjacent to Long Island Sound, work at the site will require a Coastal Site Plan Review by the Norwalk Planning and Zoning Commission.

Zoning Permit

Excavation, filling and grading of the site could also require a zoning permit in

accordance with City of Norwalk Article 113 Excavation and Fill Regulations. Approval of the permit is obtained from the Director or Public Works.

Coastal Wetlands

Coastal permitting with CTDEEP is required for work below the Coastal Jurisdiction Line elevation (5.4 feet in Norwalk) or adjacent wetlands. CTDEEP permits would include Tidal Wetlands Permits and Structures, Dredging and Fill Permits. This application process requires:

- Project plans for work at and near the Coastal Jurisdiction Line
- Descriptions of coastal resources
- Description of proposed work including sediment and erosion control, and water handling
- Written pre-application coordination with: CT Bureau of Aquaculture and US Army Corps of Engineering regulator division (local Harbormaster and Shellfish Commission if applicable)

Inland Wetlands

Some wetlands at the site may meet the definition of inland wetlands rather than coastal wetlands. Work within and adjacent to inland wetlands requires a permit from the local Inland Wetland board which implements the Connecticut Inland Wetlands and Watercourse Act. Local wetland commissions (i.e., Conservation Commission and Inland Wetland Agency) usually require work near wetlands (within the upland review area as defined by the municipality) also obtain permits.

Construction Stormwater General Permit

If work proposes greater than 1-acre of ground disturbance (excavation) registration may be required. If local approvals noted above include a review of erosion controls and stormwater management, then the project is exempt from filing a permit for up to 5-acres of ground disturbance. Registration under this General Permit requires the development of a Stormwater Pollution Control Plan.

US Army Corps of Engineers

Work in wetlands and waters of the US, including tidal waters, requires approvals from the US Army Corps of Engineers. Approval may be included as part of CTDEEP Coastal Permitting or may require separate submittals to the Army Corps. Work proposed in wetlands or waters of the US would need to meet the activity criteria of one of the classes of the current Connecticut General Permit; otherwise, individual permit approvals may be required.

Septic Permit

A septic system is located on the southwestern portion of the site for the treatment of on-site septic wastes. The site does not appear to be connected to the City of Norwalk sewer system based upon a sewer service area map. Additional development could require either connection to the City of Norwalk Sewer System or construction of additional on-site septic systems. A CTDEEP permit is required for septic systems with design flows greater than 5,000 gallons per day at a property. A CTDEEP permit is also required for multiple smaller septic systems with total combined daily discharges greater than 5,000 gallons at a property. Septic systems with designed daily flow rates of between 2,000 gallons to 5,000 gallons are regulated by the Connecticut Department of Health. The installation of additional septic systems or increased septic system capacities at the site will require Norwalk Health Department approval. If new septic system is installed, excavated soils will require proper handling and could require possible off-site disposal at an approved facility.

Groundwater Remediation Wastewater Directly to Surface Water

Deep excavations could encounter and generate impacted groundwater (i.e. wastewater). Depth to groundwater ranges from 6 to 15 feet below grade based upon information provided in Shaw's Phase III Investigation Report. If dewatering is necessary, contaminated groundwater generated from excavations may require off-site disposal or on-site treatment prior to discharge to surface water. Such activities will require registration under the CTDEEP General Permit for the Discharge of Groundwater Remediation Wastewater Directly to Surface Water.

Section 4

Natural Resources

1. Environmental Setting
2. Site Biodiversity
3. Opportunities for Ecological Enhancement

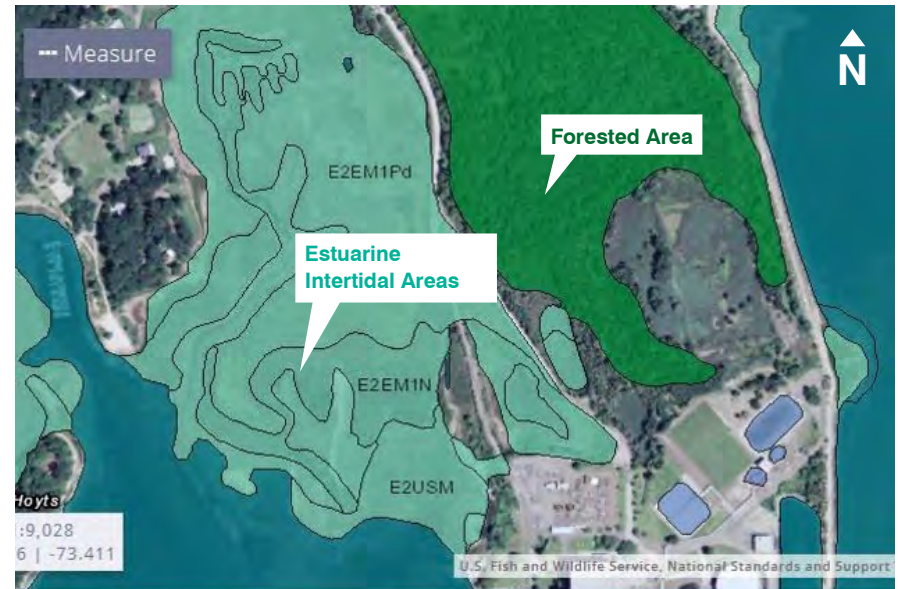
1. Environmental Setting

The Norwalk Islands and proximal mainland areas including Manresa Island and the Village Creek marshes of Norwalk have collectively been identified by the United States Fish and Wildlife Service (USFWS) in their Northeast Coastal Areas Study as a significant and unique coastal habitat (Site No. 20) (USFWS, 1991). Manresa Island lies directly across the water from the following important coastal resources:

- Hoyts Island Bird Sanctuary (Norwalk Land Trust) to the west;
- Goose, Chimon, and Sheffield Island Units of the Stewart B. McKinney National Fish and Wildlife Refuge (NFWR) to the southeast, and
- Peach Island to the northeast (McKinney NFWR).

The Village Creek salt marsh and mudflats, of which Manresa Island forms the eastern shore, was identified in the Northeast Coastal Area study as an important foraging area for shorebirds, long-legged waders, and waterfowl – all major taxa for which the aforementioned preserves were designated. Offshore waters are also used by foraging waterbirds including the state-listed Common and Least Terns. The Norwalk Islands and Village Creek Salt Marsh Complex has been identified as a Waterfowl Focus Area by the Atlantic Coast Joint Venture.

National Wetlands Inventory mapping shows that a majority of the site is mapped as containing wetland resources, including Estuarine Intertidal Emergent Regularly Flooded; Estuarine Intertidal Emergent Irregularly Flooded Ditched/diked; Estuarine Intertidal Unconsolidated Sediment; Estuarine Subtidal Unconsolidated Bottom (see map at right), and Palustrine Forested Broad Leaved Deciduous Seasonally Saturated. Wetlands would have to be delineated by qualified personnel to verify their official extent and boundaries. Assuming the National Wetlands Inventory mapping is accurate, a significant area of the site will be subject to permit issues/obstacles such as a predicted need for intricate wetland mitigation.



Manresa Island estuarine intertidal and forested areas

2. Importance of the Site to Biodiversity

The importance of Manresa Island to the area and regional ecology is centered on its biogeography. The site provides one of the few intact coastal habitat blocks in the heavily developed lower Fairfield County shoreline, and a source of freshwater for species using the Norwalk Islands and other surrounding habitats. In this regard, the Manresa Island habitat block provides a number of important functions and values to the freshwater, intertidal, and subtidal wetland and waterway resources in the area.

In addition to a number of breeding resident species of state and federal conservation concern, the site also serves as a migratory stopover habitat for birds during both northbound (“spring”) and southbound (“autumn”) migratory movements. These species include those designated by the United States Fish and Wildlife Service as “Bird Species of Conservation Concern, and species designated as Greatest Conservation Need in the State Wildlife Action Plan, which includes species listed on the Connecticut Endangered Species Act.

Nearly 200 bird species have been recorded from the Norwalk Islands and from Manresa Island collectively over the years by both CTDEEP natural resource personnel and various civic groups, which surround the site. Many of the bird

species that nest or use the Norwalk Islands as relatively safe breeding site(s) are dependent upon adjacent mainland habitats for foraging (e.g. salt marshes) or as a source of freshwater (e.g., Manresa Island Wetland Nos. 1, 4, and possible 5).

From among the nearly 200 species recorded for the Manresa Island / Norwalk Island portions of the Special Focus Area, 55 species have one or more official state or federal conservation status designations or rankings.

There is also potential for terrestrial invertebrates of conservation concern to occur on the site, however a lack of data encountered during the literature review for this taxonomic category of animals suggests that the invertebrate fauna of the area has not been well studied.

The presence of the multitude of species of Greatest Conservation Need known to occur on and around Manresa Island would not preclude redevelopment of the site into one or more productive income and tax-generating uses. It does, however, mean that the important habitat attributes required by these species should be taken into consideration as design planning for any reuse scenario commences and progresses. This includes (likely at a minimum) the preservation of the western shoreline in a natural state spared from further disturbance. This includes the preservation of its bordering vegetated coastal shrubland and woodland upland habitats as well as the freshwater and brackish water wetland resources that occur in this area. This may include some elements of the site that surpasses the baseline protections afforded by municipal, state, and federal laws and regulations enacted to protect freshwater and tidal wetland resources. However, with that said, there is a disparity in the ecological value among the wetland and upland resources across the site, and it may be feasible to impact some of those resources for the sake of a prudent reuse scenario while addressing the impact via various mitigation alternatives. Development scenarios that have potential to directly or indirectly impact critical habitats at the site should be discouraged.

Significant Habitats

The Site contains the following habitats considered unique or sensitive in Connecticut and are therefore of conservation concern:

- Salt Marsh (esp. high marsh)
- Intertidal flats
- Freshwater emergent wetlands
- Coastal shrubland
- Coastal forest



Aerial view of Manresa Island's diverse habitats

The waters of the adjacent Long Island Sound surrounding Manresa Island are designated as Essential Fish Habitat (EFH) for a number of species under jurisdiction of the New England Fisheries Management Council (NEFMC) and the Mid-Atlantic Fisheries Management Council. They are as follows:

- Atlantic Sea Herring
- Juvenile Black Sea Bass
- All life stages of Bluefish
- Juvenile and adult Little Skate
- Adult Ocean Pout
- Juvenile and adult Pollock
- All life stages of Red Hake
- Adult Scup or “Porgy”
- Striped Bass
- Summer Flounder
- All life stages of Windowpane
- All life stages of Winter Flounder
- Juvenile and adult Winter Skate.

The presence / absence status of these species can be determined by analysis of bottom depth and substrate. Their presence generally requires an Essential

Fish Habitat Assessment, the completion of which is reviewed by the National Marine Fisheries Service for concurrence prior to issuing requisite permits for activities that would result in major disturbances of bottom substrate such as dredging or various underwater construction activities.

Site provides breeding or foraging habitat for:

- CT Listed Species
- Fish species, under purview of the New England & Atlantic States Marine Fisheries Commissions (see list above)
- Other flora and fauna listed as “Greatest Conservation Need” (GCN) in the CT Wildlife Action Plan

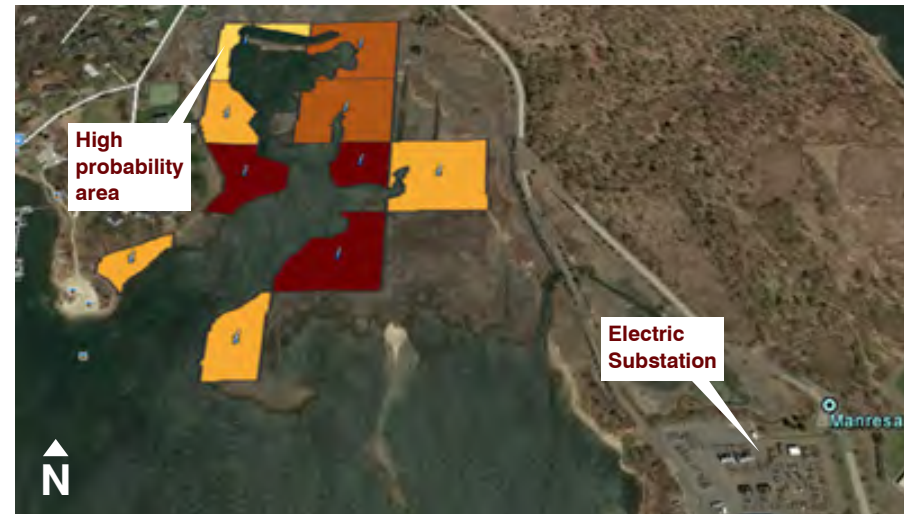
Examples of Greatest Conservation Need Species Known to Occur at the Site:

- Common Tern (SC) (Foraging)
- Least Tern (T) (Foraging)
- Bald Eagle (T) (Winter foraging)
- Peregrine Falcon (T) (Foraging)
- Great Egret (T) (Foraging)
- Snowy Egret (T) (Foraging)
- Yellow-crowned Night-heron (SC) (Breeding)
- Diamond-backed Terrapin (SC) (Breeding)

Additional rare spp. are suspected of occurring as well:

- Saltmarsh Sparrow (SC) (Breeding)
- Brown Thrasher (SC) (Breeding)
- Glossy Ibis (SC) (Breeding)
- Winter owl roosts

Habitat modeling of marshes on the west side of the point show a high predicted probability of Saltmarsh Sparrow nesting habitat (see figure below). This is due to the presence of high marsh community which is susceptible to and threatened by sea-level rise, oceanward, and from invasive *Phragmites australis* invasion from the landward side.



Predictive mapping for the presence of Saltmarsh Sparrow nests in estuarine emergent wetland resource areas of Manresa Island. Yellow indicates high probability, red indicates low probability.

3. Opportunities for Ecological Enhancements to Current Site Conditions

Redevelopment of the site may also afford the opportunity to enact ecological enhancements at the site. Examples of ecological enhancements that could be enacted at the site include the following:

- Pollution remediation
- Freshwater Wetland restoration
- Invasive species control
- Terrestrial habitat matrix improvements
- Storm resiliency improvements

There is still some uncertainty as to how remediation of contaminants of particular concern will proceed at the site. Remediation of uplands would be beneficial to the downgradient wetland receptors and the fauna that depend upon them. Further restoration of the on-site wetlands could include habitat improvements, hydrologic restorations, addition of habitat attributes, or a combination of these actions and others. Restoration of hydrologic connections may be an effective way to control the invasive Common Reed (*Phragmites australis*). A multitude of other non-native invasive plant species were noted on site, the control of which could be one measure of habitat enhancement that could benefit many of the species of conservation concern on the property.

An invasive species control plan could be an element of a larger comprehensive conservation and management plan that could be prepared for the site to address management of the sensitive habitat resources on the west side of the island (e.g., the wetland resources and their associated upland buffers). This area should be protected by a conservation easement in favor of an existing conservation entity interested in acting as ecological stewards of the site.

Opportunities for habitat improvements at the site could eventually include enhancement of the habitat matrix by incorporating native plant species of high wildlife value and the addition of other habitat attributes as a part of a Long term management plan for the site.

Any new development will need to be resilient to future changing meteorological forcing events (e.g., storms of greater frequency and intensity) predicted to occur in the northeast. Defense against storm energy should

explore natural alternatives, engineered alternatives, or a combination of both. Design standards applicable to the site may need to surpass current standards for other properties in the CT coastal zone, as the Manresa Island site is vulnerable to inundation from coastal storm surges.



Rip-rap shoreline destroyed by Superstorm Sandy: Stratford example



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Section 5

Economic Development Profile

1. Residential Housing Market
2. Population Projections
3. Employment & Industry Trends
4. Commercial Market
5. Retail Market
6. Implications for Development

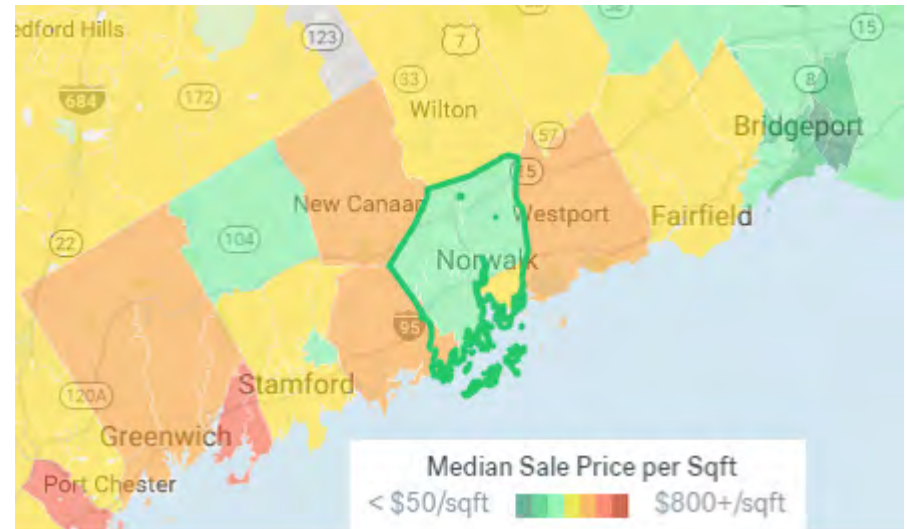
1. Residential Housing Market

Norwalk is among the most affordable communities in Fairfield County. This is based on both median sale price and median rental price per bedroom (see maps at right for a comparison of Norwalk to other towns in Fairfield County).

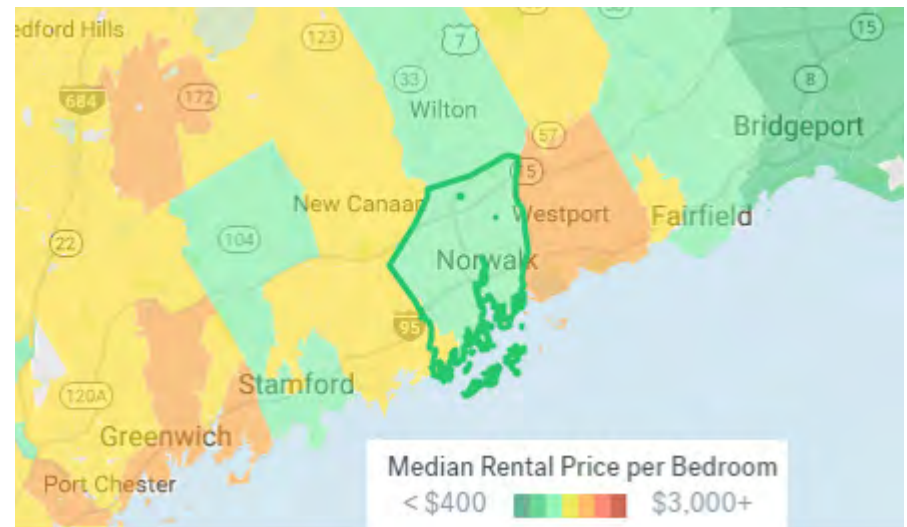
Median household income in Norwalk is approximately \$77,000. This is approximately \$7,000 below the median household income of Fairfield County. Approximately 62% of Norwalk households own their homes. This is below the 68% ownership rate of Fairfield County overall.

All real estate analyses reflect a snapshot in time and reflect what product mix is available at that time and should be viewed accordingly. Norwalk is among the most affordable communities in Fairfield County and the northeastern edge of the metro New York market. Sales prices per sq foot range from \$245 to \$257 per sq ft. By comparison Westport and New Canaan sales prices are \$403 to \$414 respectively.

On the rental side, units are available with median rental rates between \$800 to \$1,300 per bedroom with proximity to water & town center and single family residence versus multi-family being the primary drivers for more expensive units. By comparison in neighboring Westport rental units start at a median price of \$1,200 per bedroom ranging as high as \$3,100 per bedroom for single family residences.



Median Sale Price, Source: Zillow.com



Median Rental Price, Source: Zillow.com

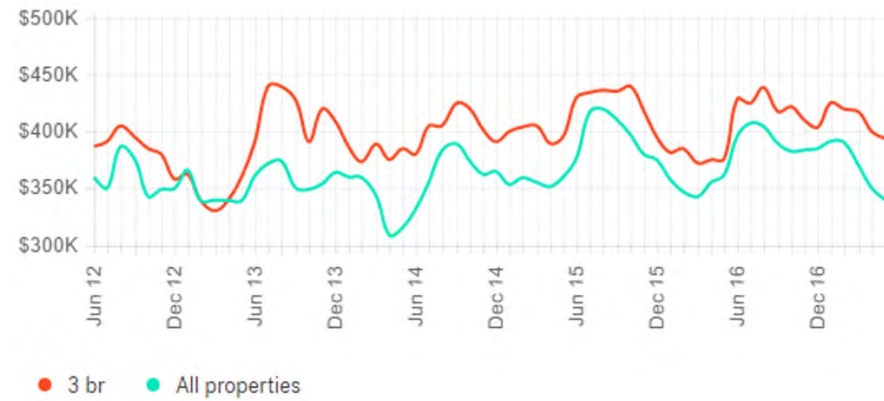
For Purchase Market

There is a substantial inventory of single family homes on the market in Norwalk.

Trends in Norwalk show a -8% year-over-year drop in the median sales price of homes. Housing prices while fluctuating, are trading within a range rather than showing a discernible trend over a 5-year period.

Median Sales Price	\$339,125
Price per SF	\$260
Houses on Market	842
Single Family	566
Condo/Townhouse	245
Other	31

Median Sales Price



Overall housing for sale market performance shows a mixed picture when examining the market by number of bedrooms. Pricing is down year over year in nearly all categories except 1 bedroom units. Prices are still above their 5-year benchmark (with the notable exception of large 4 bedroom houses).

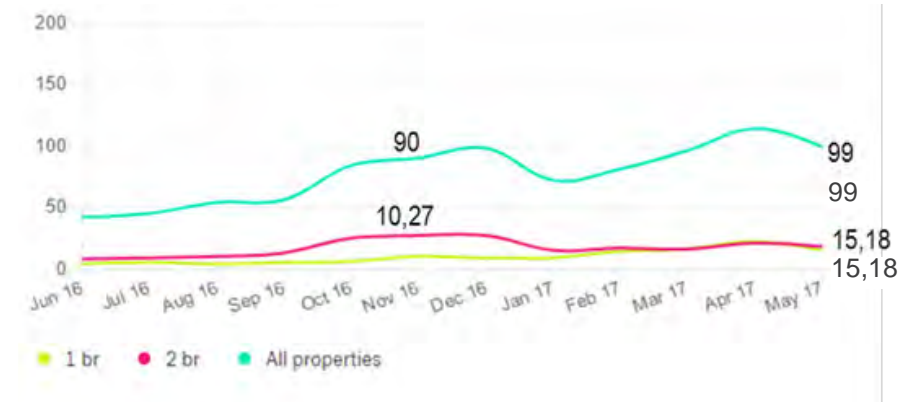
Sales Trends

No. Bedrooms	Mar 15 - Jun 14	y-o-y	3 months prior	1 year prior	5 years prior
1 Bedroom	\$211,500	+14.3%	\$204,000	\$185,000	\$204,250
2 Bedroom	\$276,750	-2.0%	\$295,000	\$282,500	\$255,000
3 Bedroom	\$414,500	-3.6%	\$408,500	\$430,000	\$385,000
4 Bedroom	\$452,500	-12.1%	\$527,500	\$515,000	\$470,000
All Properties	\$375,000	-6.7%	\$359,500	\$402,000	\$345,000

Rental Market

Rental market conditions show very little 1br/2br rental product available which is reflective in the increasing rental costs of those units. Approximately 1/3 of the rental market are 2 bedrooms or fewer. Available 1br/2br unit inventory is fairly stable.

Number of Rentals

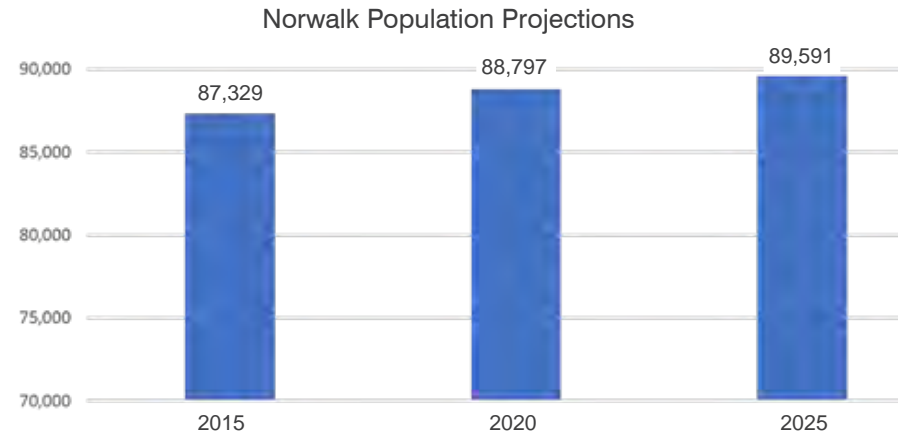


Median Rents

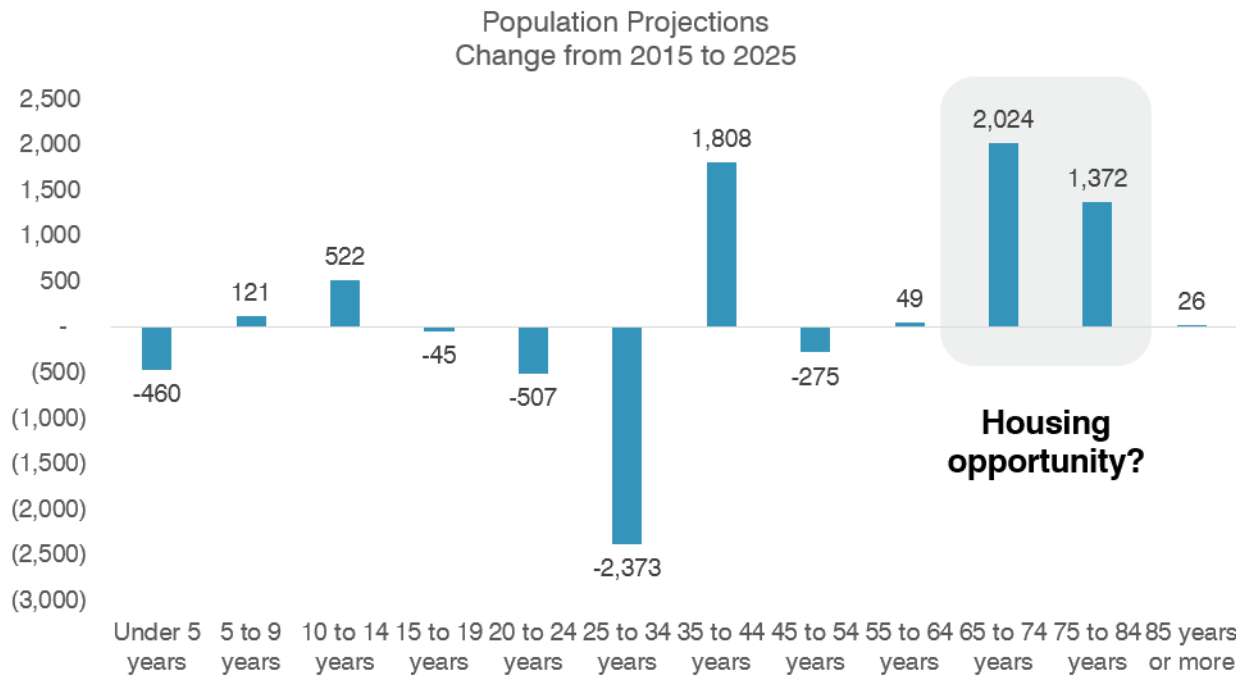


2. Population Projections

A modest 3% increase in population is projected for Norwalk. However, population change is uneven across age groups. The forecast suggests a substantial population loss in mid-twenty and early thirty age groups with a potential increase in the 35 to 44 age cohort. This offsetting population change raises important questions about the housing typology needed in Norwalk since these age groups are entering the life stage related to family formation which has substantial change for housing requirements. The other notable population change is the increase in retirees and seniors. This raises the question about the potential role of aging in place and senior housing models to support this population.



Source: UCONN population projections

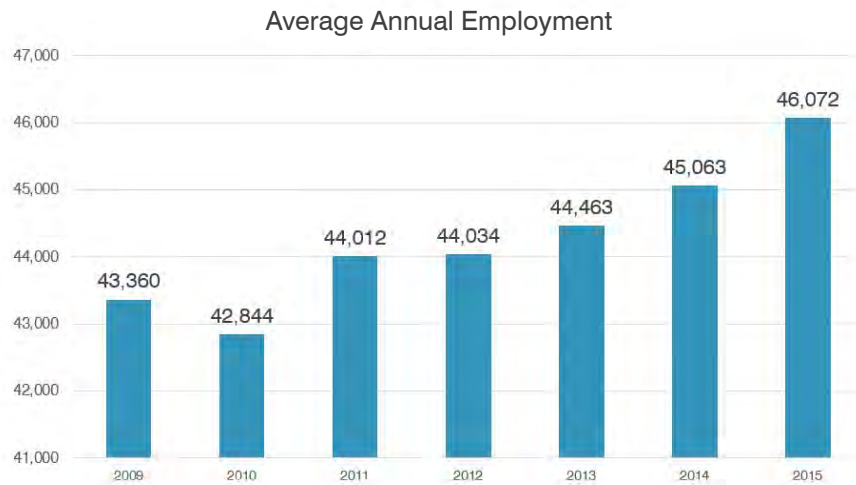


Source: Connecticut State Data Center 2015-2025 Population Projections for Connecticut at State, County, Regional Planning Organization, and Town levels – November 1, 2012 edition

3. Employment and Industry Trends

For purposes of a real estate analysis, we examined employment and industry from three perspectives. We examined employment trends, establishment trends and industry types. Employment trends give you a sense of the scale of facilities. Employment has increased by 6% since 2010 seeing a substantial increase of almost 2000 jobs since 2012. Additionally, more than 200 new firms have been formed in Norwalk coming out of the recession.

Establishment Trends



Source: NP analysis of CT LMI data

Norwalk has added 218 businesses since the end of the recession in 2009. Twenty six percent (57) of new businesses have been in Other Services which typically consist of household services such as landscaping as well as other personal services like hair salons, spas, or laundry services. Hospitality related businesses (restaurants and hotels) represent another 40 businesses.

Other service businesses typically need warehouse and storage type space if they are landscaping services or small retail storefronts if they are laundry or hair salon services. They typically cannot serve as the financial underpinning for a new development but can play a role for infill situations.

There has been some growth in office driven sectors such information, healthcare, finance and insurance and professional services but uncertainty regarding whether this trend continue. The increase in information establishments and employment may have created demand for leases (9 new leases for the companies, approximately 184,000 sf to house the employees). However, the growth in professional technical establishments created increased demand for space due to the creation of new businesses but the shrinkage in employment indicates that the spaces are likely smaller.

This interplay between establishment creation and employment levels has important implications for the commercial market.



Source: NP analysis of CT LMI data

Industry Trends

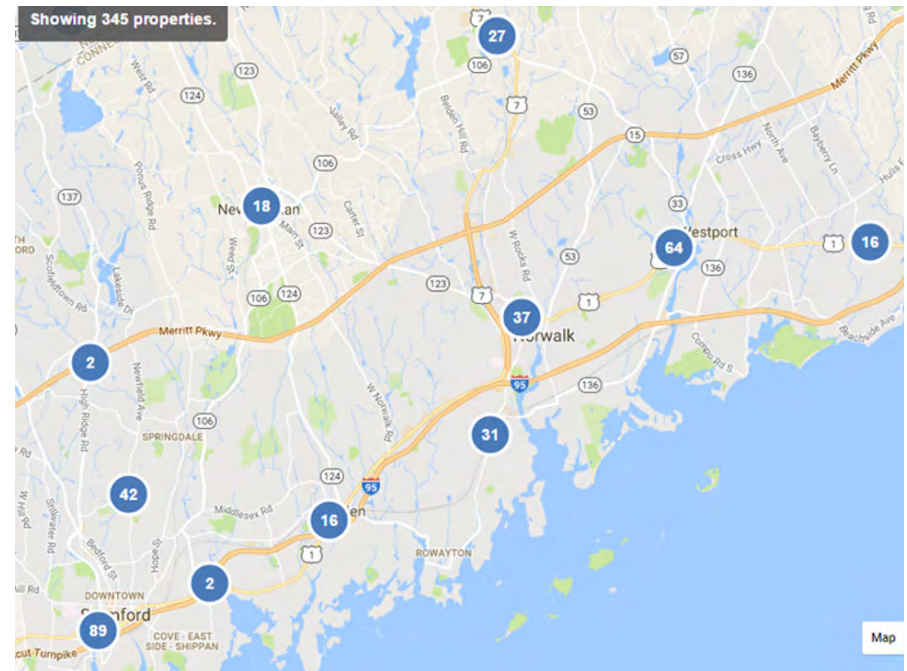
Industry	Units 2015-2009	Change in Employment 2015-2009
Total Private	218	2712
Utilities	5	92
Construction	-16	205
Manufacturing	-15	-1363
Wholesale Trade	33	87
Retail Trade	-26	395
Transportation and Warehousing	-7	1
Information	9	1227
Finance and Insurance	4	698
Real Estate and Rental and Leasing	16	74
Professional, Scientific, and Technical Services	37	-140
Management of Companies and Enterprises	4	-182
Admin Svcs & Waste Management	31	-236
Educational Services	5	-101
Health Care and Social Assistance	17	717
Arts, Entertainment, and Recreation	14	414
Accommodation and Food Services	40	566
Other Services (except Public Administration)	57	111

Source: NP analysis of CT LMI data

4. Commercial Market

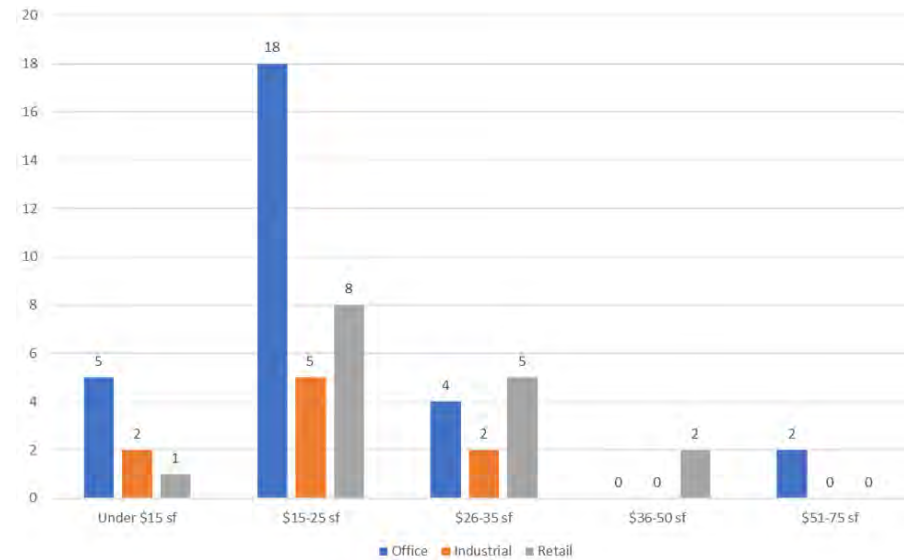
There is a substantial amount of commercial space available in the region 345 available properties are available with Norwalk representing 22% of the regional available space.

New office construction typically requires rents above \$28/sf/year to break even before land acquisition costs. However, in Norwalk and nearby markets 38 properties are below \$25/sf/year. Based on the available space on the market, market pricing, as well as overall lending requirements related to commercial real estate, any new office construction will likely require an anchor tenant to be identified and preleased before financing will be finalized.



Available Commercial Properties

Rents by Property Type



5. Retail Market

A high level retail analysis shows that Norwalk is highly dependent on bringing in outside spending to support its retail capacity. Of the nine major retail categories seven categories show approximately \$354 million in sales in excess of demand that can be supported solely within Norwalk. For perspective on how much square footage that level of sales represents at \$250 per sf on average it equates to 1.4 million sf of space. Several of these categories are also subject to substantial online retail competition. Retail has increased but establishments have shrunk in Norwalk since 2009. Firms are down by 26. However, employment is up by 395 people.

New retail concepts are always coming forward and therefore, it is difficult to say there is not room for additional retail. However, at a community-wide level there is a possibility that any additional retail could cannibalize existing businesses unless it was a concept that fit an unmet market need or was a unique destination that expanded the sales potential for the area.

There appears to be additional room for food services capacity. Food services represents a range of restaurant types from sit down table service concepts to fast casual chains.

6. Implications for Development

Based on market trends and conditions the residential market is the most likely driver of reuse of this property. However, this analysis does not preclude a curated, targeted development either as a build to suit office situation or some other unique development idea brought forth by a developer. Those are difficult to forecast.

Given the associated cleanup costs, a fairly dense development model would be required to offset the land preparation costs. High density developments may be limited by site access and local infrastructure.

An open question is the potential for a high end development where density could be reduced because the price points would be higher. The viability of this approach depends in part on how much of the plant infrastructure remains, what happens with the coal ash sites, and storm surge/resiliency questions.

Estimated Retail Sales Gap



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Section 6 Community Perspective

1. Norwalk's Vision
2. Public Involvement Process
3. Review of Online Survey
4. Review of Public Workshop

1. Norwalk's Vision

The following excerpts from Norwalk's vision statement, as described in the City's 2008 Plan of Conservation and Development are guiding principles that set the tone for future development of the Manresa Island property:

"In growth lies the opportunity to fund the preservation and enhancement of both natural and man-made assets that will contribute to Norwalk's enduring quality of life."

"The harbor, streams, beaches, islands, and marshlands are fragile resources that are the foundation of the city's unique appeal."



2. Public Involvement Process

The public involvement process for the Manresa Island Reuse Study used a variety of methods to engage key stakeholders and the public. The elements of this process to date include:



Steering Committee: A steering committee was organized by the Economic Development Director that included representatives from the Planning & Zoning Department, Norwalk Redevelopment Authority, the Economic Development Department, and the Manresa Association. The steering committee was assembled to identify a strategy for exploring the reuse or redevelopment of the Manresa Island property. The steering committee has also assisted in developing and facilitating the public involvement process.

Manresa Association Meeting: The FHI team presented existing conditions findings to approximately thirty people at a Manresa Association Meeting, held at the Rowayton Community Center on February 28, 2017.

Online Survey: An online survey was composed as a means of soliciting feedback regarding how people feel about the Manresa Island property, what their preferences and concerns are, and thoughts they have about potential future uses and environmental remediation for the buildings and property. The survey, which was released prior to the public workshop, was also used as a mechanism to promote the workshop.

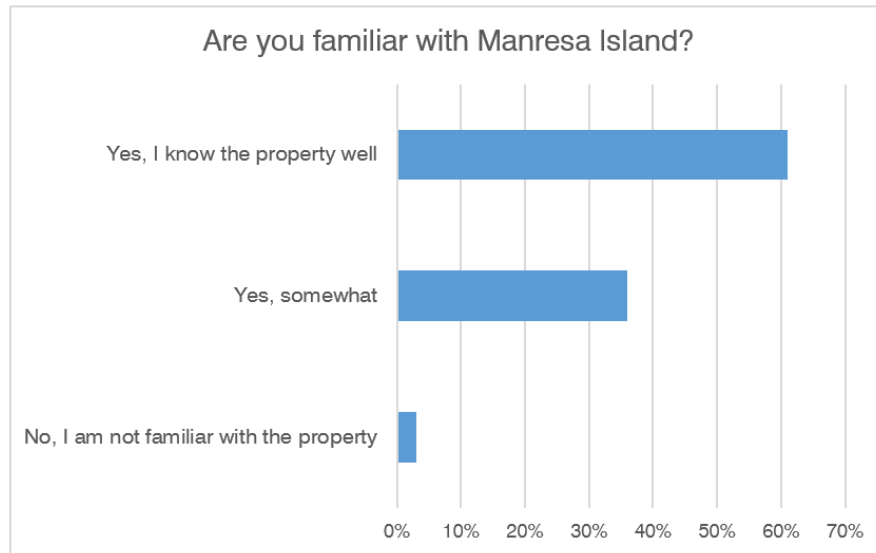
Public Workshop: A public workshop was conducted at Norwalk City Hall on 5/22/2017. Approximately sixty-five people were in attendance. The goal of the workshop was to gather input and ideas from the community regarding future uses of the Manresa Island property. The workshop included a presentation about the existing conditions of the buildings and property, as well as breakout sessions with conversations focused on different questions related to future uses of the site.

3. Online Survey Results

The online survey was conducted through May and June of 2017 and was promoted via the City’s website, social media, and in local news sources. A total of 675 responses were received. The key findings are summarized below.

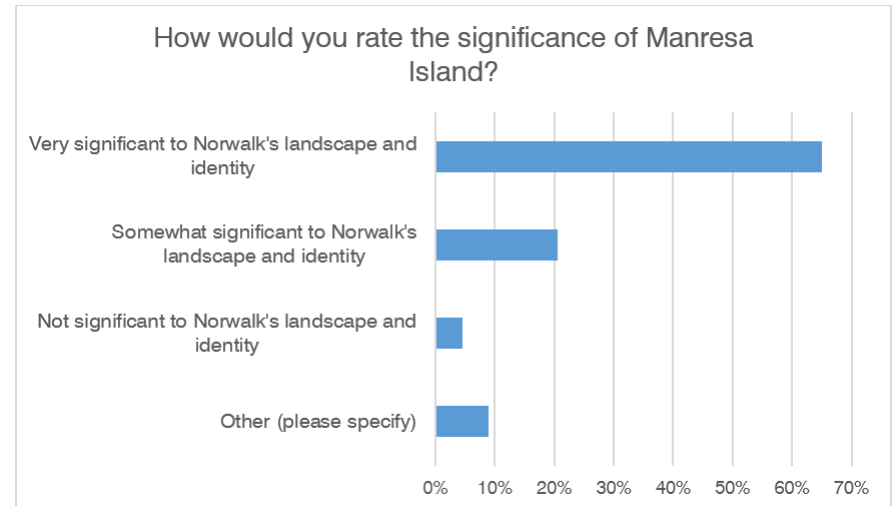
About the respondents

- 45% of respondents live within a five-minute drive of Manresa Island; 33% of survey respondents live in Norwalk, but beyond a five-minute drive from Manresa Island; 21% live outside of Norwalk
- Age of respondents was generally spread out; with 12% between the ages of 31-40; 19% between the ages of 41-50; 33% between the ages of 51-60; and 30% who were 61 and over
- When asked how familiar you are with Manresa Island, 61% of respondents said yes, I know the property well; 36% said yes, somewhat; and only 3% were not familiar with the property



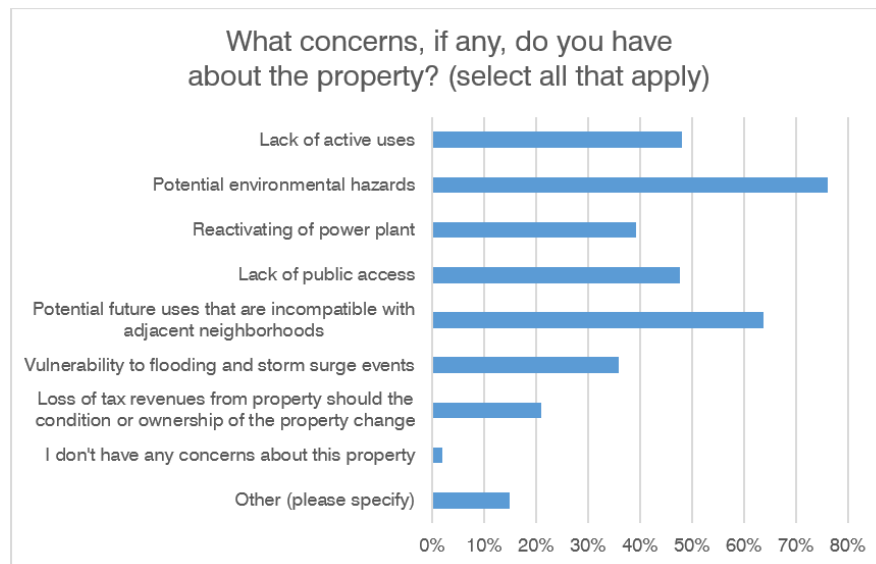
How respondents view the property

- 65% of respondents said that Manresa Island is very significant to Norwalk’s landscape and identity; 20% said it was somewhat significant; 5% said it was not significant; and 9% answered “Other”
- When asked to specify the “other” may respondents answered that the power plant and smokestack are part of the skyline and are a wayfinding point when entering Norwalk Harbor. See below for a selection of other comments:
 - *Not very significant now, but it has the potential to be very significant*
 - *It is a significant nautical landmark. Aside from that it is an eyesore*
 - *The island is significant; the power plant is not*
 - *I’m a Norwalk local and I enjoy paddle boarding and kayaking the Norwalk waters. I think it could be a beautiful place if taken care of properly and with a lot of new faces I’m Norwalk and investments in our city it might be worth giving it a makeover*
 - *Very significant to Norwalk’s landscape and a Major revenue generator*



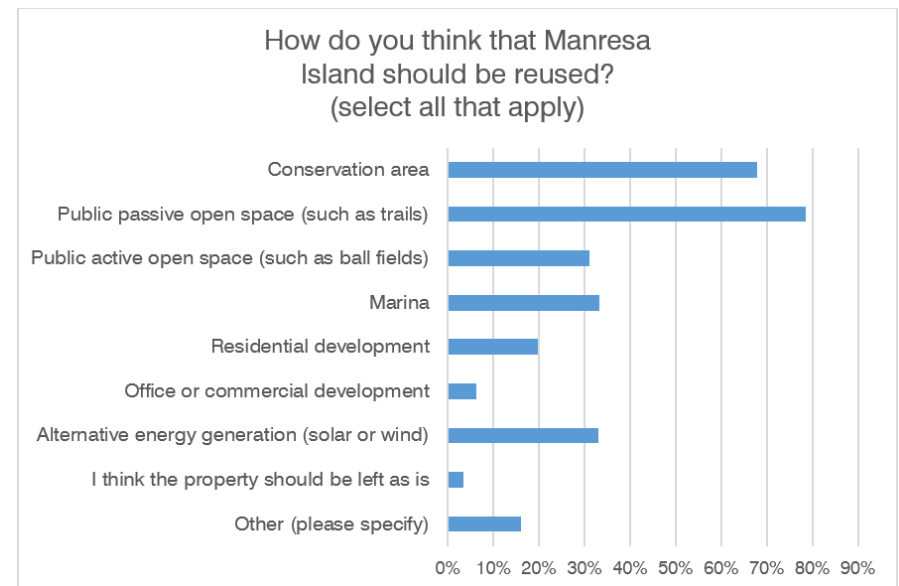
What people are concerned about regarding the property

- When asked to select all that concerns them about the property, 76% of respondents answered potential environmental hazards; 63% answered potential future uses that are incompatible with adjacent neighborhoods; 48% said lack of active uses; 47% said lack of public access; 40% said reactivation of the power plant; and 37% answered vulnerability to flooding and storm surge; 20% answered loss of tax revenues from property should the condition or ownership change. Only 2% answered that they do not have any concerns about the property
- A sampling of comments received is presented below:
 - I would mostly be concerned about not using the area to its fullest potential as it is right now. Wasted space.*
 - It should be turned into something that can be used by many in the area. Cleaning up the site will look much better as well*
 - I would not like to see the plant reactivated. Hopefully it will be demolished, the land remediated and put to a use of value to the entire area*
 - I'm concerned the power plant will be replaced with high rise condos. I'm also very much concerned a public beach will not be created on the property. Norwalk needs another public beach and does not need additional high rise condo*



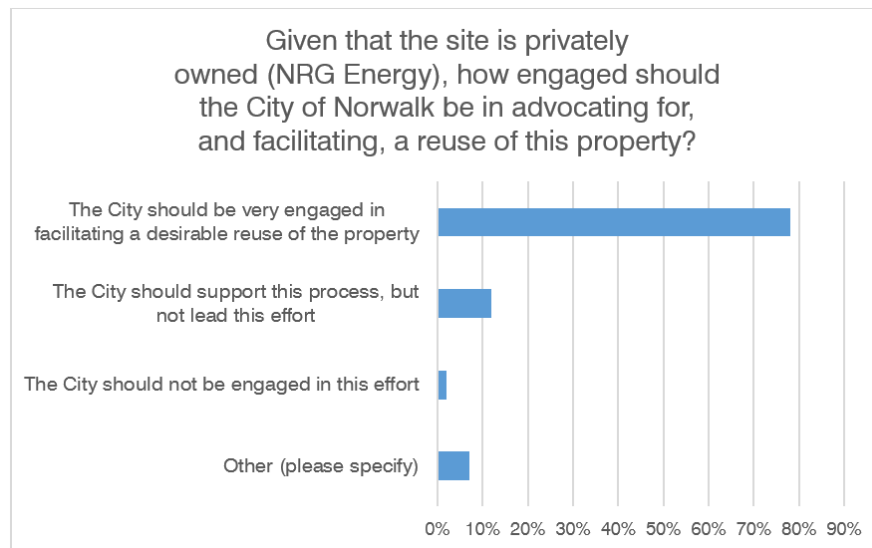
What respondents think should be done to Manresa Island

- When asked how they think Manresa Island should be reused, 79% answered as public passive open space (such as trails); 68% answered as conservation area; 33% said as a marina; and 33% answered as alternative energy generation (solar or wind). Only 3% of respondents said they think the property should be left “as is”
- A selection of additional comments received is provided below:
 - I don't know if public space is feasible due to the remediation needs costs, but if it were feasible, it would be great for an outdoor concert space similar to Westport's pavilion*
 - Maritime / Oceanographic facility*
 - Should remain as natural as possible without significant development, especially considering periodic flooding*
 - Fairfield County needs open spaces and Norwalk especially is very concentrated*
 - I think it should be a mixture of uses that ultimately is tax neutral to the City*
 - Mixed Use, many of the above items, plus some study should be conducted to review the feasibility of a possible passenger ferry system to New York City, Long Island and to Cape Cod*



How engaged should the City be in advocating for or facilitating the reuse of the property?

- When asked how engaged the City should be in advocating for or facilitating the reuse of the property 78% of respondents said that the City should be very engaged in facilitating a desirable reuse of the property, even though the site is privately owned (NRG Energy); 12% answered that the City should support this process, but not lead this effort; only 2% believe that the City should not be engaged in this effort
- A sampling of additional comments is provided below:
 - *The city should be very engaged in the process, but not as a deterrent or an obstacle. Someone needs to have a vision and this property with its prominence on the water needs to be a combination of public and private use*
 - *The City should not be letting any brownfield site sit un-remediated under a single ownership anywhere in the City*
 - *City should engage in facilitating desirable reuse of the property*
 - *The city should NOT be taking on any costs involved, but should be involved so its use is fair to the Norwalk citizens*
 - *NRG Energy should be involved with the cleanup and fund a big portion of the project. The City should monitor the progress so it does not violate any local laws*



4. Public Workshop

A public workshop for the Manresa Island Reuse Study was conducted at the Norwalk City Hall on the evening of Monday, May 22, 2017. Sixty-five people attended the workshop to provide their input and ideas regarding the future of Manresa Island. In promotion of this workshop there was an article advertisement in local news sources including the Norwalk Hour, Nancy on Norwalk and the Hamlet Hub, a link about the study and workshop was posted on the City’s website, and an online survey was launched to engage the public and inform people about the workshop.



Attendees at the Public Workshop

The workshop began with an introduction from both Charlie Taney, President of the Manresa Association and Elizabeth Stocker, the City of Norwalk’s Economic Development Director. The Manresa Association the City of Norwalk are partners, leading the study. Following the introduction, a presentation was given that included a brief overview of the study process and a history of the island and the power plant. Remediation options and related costs for the property were describe, as well as the environmental features of the site, including its essential fish habitat and bird species. The presentation included a case study example of power plant reuse completed at the Salem Harbor Power Station in Massachusetts.

A review of the online survey results was provided at the end of the presentation. Following this overview, breakout sessions were conducted. Each table of attendees was given three questions to guide discussions. These questions included:

1. What would you like to see happen with Manresa Island?
2. What do you NOT want to happen with Manresa Island?
3. What do you think is likely to happen with Manresa Island?

Participants worked together to answer each question. Following the session, a representative from each group provided an overview of the key points their group focused on.

Most participants felt that the Manresa Island Power Plant structure should be removed and that site cleanup and remediation should occur. Additionally, most believed that the building should not continue to remain “as is”. Participants were generally in favor of the site becoming a public park or open space and did not want the existing forest to be removed. Other popular ideas included the site becoming part of the Stewart B. McKinney Federal Wildlife Refuge, the island getting repurposed as a working waterfront with commercial fishing and marina uses, or a mixed-use development.



Breakout session group discussions

As a whole, participants favored, and advocated for, reuse of the site. Detailed results of the breakout sessions are provided below.

What would you like to see happen with Manresa Island?

Most people would like to see the power plant structure removed and would like site clean-up and remediation to occur. Converting the property into open space or an environmental refuge was also very favorable, as well as the creation of a mixed use working waterfront. The most popular ideas that participants identified are presented below:

- *Removal of the existing structure*
- *Significantly improve the land, remove the toxic waste where feasible*
- *It could be turned into a pier with commercial fishing, shipbuilding, and marina use, that would be an income generator for the City*
- *It should become part of the Stewart B. McKinney Federal Wildlife Refuge*
- *It should have passive recreation and open space*
- *It becomes a mixed use solar array field with green space*

What do you NOT want to happen with Manresa Island?

When workshop participants were asked what they did not want to happen to Manresa Island, all focus groups agreed that they did not want the island to remain left “as is”. High rise condominiums or other residential use was also not favorable as many groups commented that they feel Norwalk has enough condos and residential properties. The most common responses from participants are presented below:

- *Do not want the property to remain left “as is”*
- *Do not want an increase in traffic through the area*
- *Do not want high rise condominiums or a large residential development*
- *Do not want the site to become over developed*

What do you think is likely to happen with Manresa Island?

When workshop participants were asked what they believe is likely to happen with Manresa Island, all the groups initially said that they believe the property will continue to remain vacant. Despite this first reaction, some groups believe a high-end developer may bring in mixed-use or residential development to the site. The most common responses from participants are presented below:

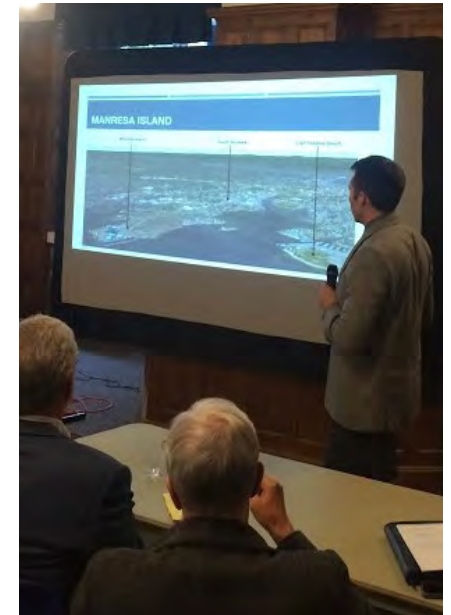
- *It will continue to sit vacant with nothing being done*
- *It is turned into a public park with beach access, a waterfront recreation area*
- *It is added to the Steward B. McKinney Wildlife Refuge*
- *It could become a Visitor's Center, water taxi, or private marina*
- *Building gets converted to some other use*
- *Site for alternative energy generation*
- *It gets developed into high end residential or commercial businesses*
- *The property is divided with mixed use proposals submitted from wealthy investors*

Presentation of Findings

A presentation of the plan's findings and recommendations was conducted on June 21st, 2018 at Norwalk City Hall. Approximately 30 people attended the presentation. A press release and flyer was distributed to promote the event and it was covered by the local press.

Those attending expressed support for the reuse concepts presented, but did have reservations regarding any uses that would generate significant volumes of traffic. Additionally, while there was support for the solar concept, there was concern that the panel array might cause adverse sunlight reflections that would be visible from water or residential areas.

FHI subsequently concluded that the elevation of the farm and the orientation of the fixed array was unlikely to produce direct solar glare that would be visible from surrounding properties or vessels that are in the surrounding waters.



Presentation of Findings

The image shows the cover of a report titled "NORWALK POWER ECONOMIC IMPACT ANALYSIS". Below the title, it says "CITY OF NORWALK" and "PRESENTATION OF FINDINGS AND RECOMMENDATIONS" with the date "6/21/18". The central part of the cover features a 3D architectural rendering of a power plant facility on an island, with a large cooling tower and various buildings. At the bottom, there are logos for the Norwalk Association, Tighe + Bond, NINIGRET PARTNERS, and FITZGERALD & HALLIDAY, INC. A small credit line reads "Photo Credit: Geoffrey Steadman".

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Section 7

Development Constraints

1. Cost of remediation
2. Flood and coastal zone
3. Site access
4. Utility infrastructure
5. Electrical transmission
6. Zoning
7. Fiscal impact
8. Community preferences
9. Plan of Conservation and Development

Development Constraints

The redevelopment of Manresa Island is challenged by a number of constraints including the following:

1. Cost of remediation
2. Flood and coastal zone
3. Site access
4. Utility infrastructure
5. Electrical transmission
6. Zoning
7. Fiscal impact
8. Community preferences

These constraints challenge the economic, physical, and political viability of redeveloping Manresa Island. The following assessment identifies the extent to which the constraints will limit the reuse options or can be overcome to allow for a desirable reuse of Manresa Island.

1. Cost of Remediation

The cost of remediation of the Manresa site will vary depending on the proposed reuse of the site. Uses such as residential development, office development and other options that allow people access and potential exposure to soils, have higher remediation requirements and costs. The actual cost of remediation could vary significantly from the following estimates as there are multiple unknown factors regarding the condition of structures, fluctuations in the reclaim value of steel and other metals on site, and the potential discover of additional contamination that is not yet known. The following estimates were developed early in the planning process to inform the reuse options. The final opinion of probable costs, based upon a more extensive analysis, is provided in Section 9 and in Appendix 2.

Demolition of buildings and structures: The potential cost of demolishing the power plant buildings and structures was initially estimated to be \$6 to \$9 million based upon preliminary findings. This includes the demolition of the power plant building, attached office building, smoke stack, fuel tank farm, wastewater treatment plant structures, and other ancillary support structures on the site.

Remediation of soils at northeast corner of site: The northeast corner of the site consists of approximately 10.5 acres and is currently occupied by the wastewater treatment facility and associated wastewater basins. This area is

located within Area of Concern (AOC) 1 which is comprised of ash fill and also includes AOC 10 which is a closed impoundment of solid waste. A full remediation of this area could cost approximately \$10.5 million and would require the removal and replacement of two to four feet of soil throughout the area.

Remediation of southern end of site: The southern end of the site includes the fuel tank farm and areas along the shore adjacent to the power plant that once served as location for outdoor coal storage. This area, known as AOC-4, is comprised of 14.5 acres and could cost approximately \$14.5 million to remediate. This area would also require the removal and replacement of two to four feet of soil. The cost excludes the removal of the fuel tanks which would be accounted for under the demolition costs.

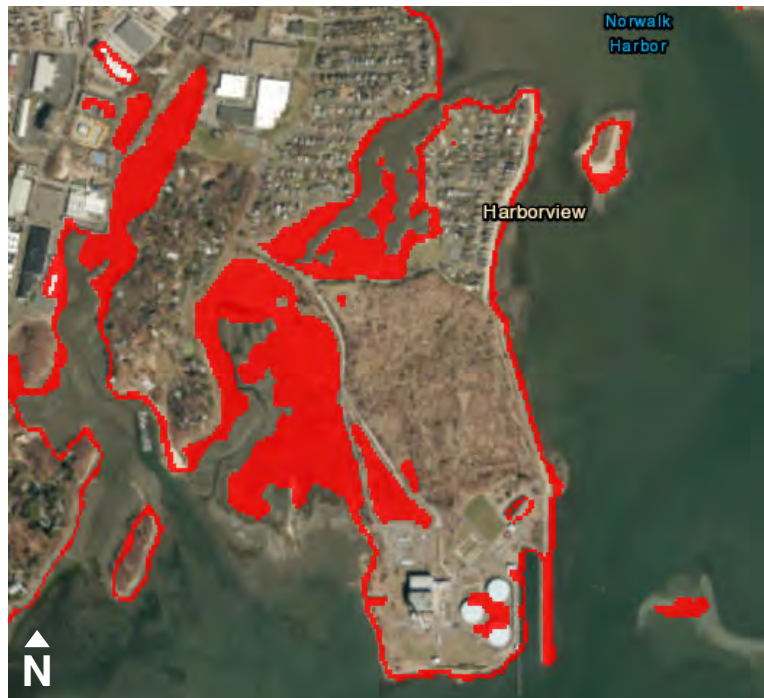
Remediation of wetlands: There are two wetlands, located primarily on the northern parcel, that are subject to remediation as per agreements with, and requirements of, the Connecticut Department of Energy and Environment. While the southern parcel is the focus of redevelopment efforts, the remediation of these wetlands will burden any future owner of the site with the clean-up cost if not conducted prior to transfer and redevelopment of the site. The cost of remediation of these wetlands is estimated to be \$1.8 million.

Total estimated cost of demolition and remediation: The total estimated cost of demolition and remediation, based upon a summation of the preceding cost estimates is likely to be in the range of \$32 to \$36 million depending upon the intended reuse. This equates to a demolition and remediation cost which ranges from **\$1 to \$1.1 million per acre**.

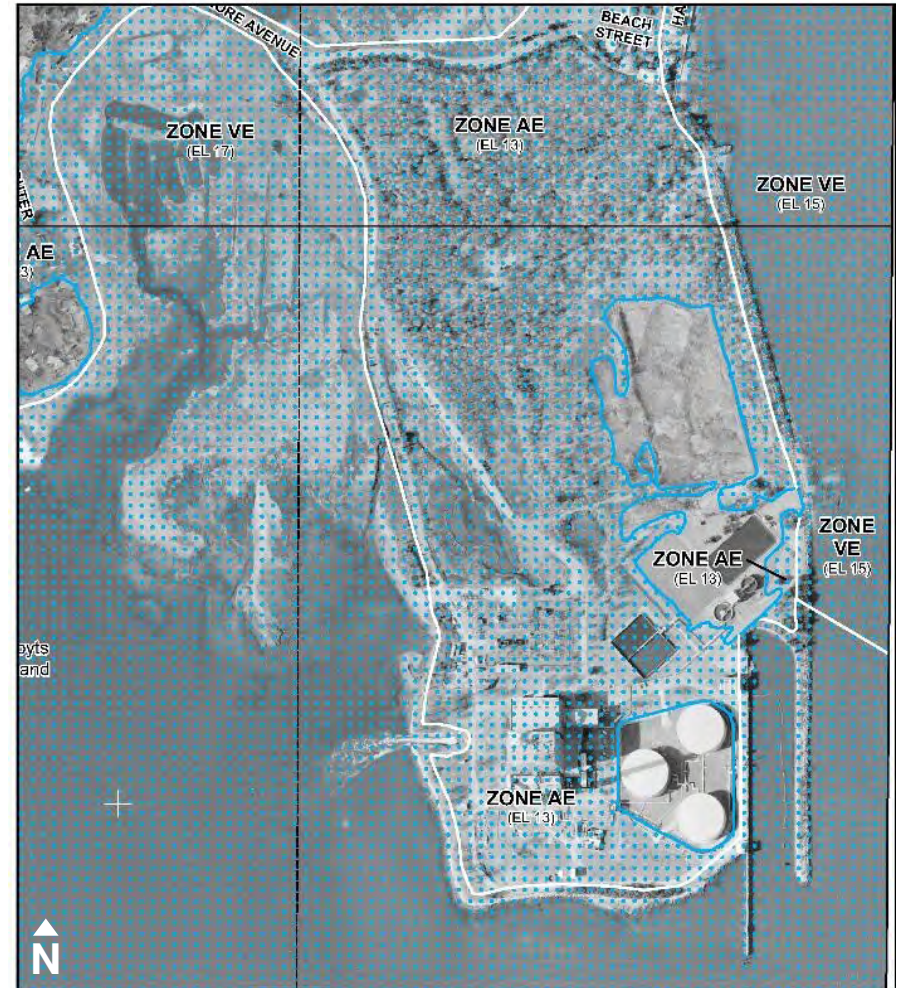
2. Flood and Coastal Zone

The Manresa site is subject to coastal zone flooding and was completely underwater in 2013 during Hurricane Sandy. Most of the site is within the Federal Emergency Management Agency (FEMA) Zone VE or AE (1% annual chance of flooding/100 year flood zone). The flood zone elevation ranges from 13 to 17 feet, but most of the southern parcel is approximately 10 feet in elevation, which is 3 feet below the flood zone elevation in that area. Commercial development on the site would need to be elevated above this flood elevation or constructed to withstand flooding. Residential development on the site would need to be elevated above the flood elevation.

The site is also within Connecticut's coastal zone, which requires a coastal site plan review of proposed site improvements by Norwalk's Zoning Commission. The coastal zone regulations are not prohibitive of development, but may require that a developer of the site take additional measures to protect and enhance the property.



Shallow Coastal Zone Flood Areas, Source: NOAA



Manresa Island Flood Zones

3. Site Access

The site is only accessible via one route, via Woodward and Longshore Avenues. These roadways are narrow local roads and are primarily residential in nature. The site is 0.75 miles from an arterial or collector roadway, 1.5 miles from rail transit, and 2.0 miles from Interstate 95. This limited access diminishes the viability of a reuse that is dependent upon on-road freight or rail access.

Woodward and Longshore Avenues have the capacity to handle additional passenger vehicle traffic, but development that would generate a significant amount of traffic could create a nuisance for local residents and is likely to face opposition from those stakeholders.



View south on Woodward Avenue approaching the Manresa site.

4. Utility Infrastructure

Sewer: The most significant utility infrastructure constraint is the lack of a sewer main extending to the southern parcel of the site. Sewer mains are, however, located approximately one-half mile north of the southern parcel. The potential cost of providing a sewer connection to the site is approximately \$1 million.

Gas: There is no natural gas service in the project area, which would prohibit the use of natural gas for heating buildings and other functions. The nearest natural gas transmission pipeline is approximately 3 miles north of the site. Access to a natural gas transmission line would be required for the development of natural gas power generation. The site's distance from the nearest transmission pipeline is prohibitive for the development of this type of facility.

Water: Drinking water is supplied by the South Norwalk Electric and Power Company which has water mains along Longshore Avenue. New water lines may need to be provided to the southern parcel for uses that exceed the capacity of the existing supply.

Electric and Communications: Three phase electrical service is provided by to the site from Longshore Avenue. Telephone/internet infrastructure is present on Longshore Avenue and is currently provided to the site.

5. Electrical Transmission

The Manresa site has a three-acre electrical substation, owned and operated by Eversource, that is critical infrastructure for the northeast power grid and is connected to Connecticut's only cross-Sound cable to Long Island.

Substations can have a negative impact on property values that range from 0.38-2.92% in loss of value according to published research¹. To mitigate this effect, the substation would need to be screened from adjacent development, particularly if residential. Exclusive roadway access to the substation site will need to be maintained on the existing roadway on the west side of the site.



Eversource's electrical substation is immediately north of the power plant and connects to underwater transmission lines that travel across the Long Island Sound to the Northport Power Station in Long Island.

6. Zoning

The current zoning (B Residence District) allows only single family residential development by right. Planned residential development and limited institutional uses such as nursing homes or educational facilities are allowed by special permit. Commercial and industrial uses are not permitted, with the exception of a utility use by special permit.

Mixed use development or commercial uses such as a marina would require modification of the existing zoning, the creation of a new zoning district or overlay zoning district, or the provision of a variance to allow for such use.

7. Fiscal Impact

The 2017 assessed value of land and structures of the southern parcel, which includes the power plant, is \$22,575,661. This is 0.189% of Norwalk's grand list. The site generates \$565,000 in property tax revenue per year (\$6.38 per capita).

A transfer of the property to a non-profit entity would result in a loss of property tax revenue that would likely require an increase in the City mill rate to replace the lost revenue. From a fiscal perspective, the City and political leaders will likely be inclined to support a use that generates tax revenue sufficient to replace any revenue lost through sale of the property or demolition of taxable structures on the site.

1. "Property Value Impacts from Transmission Lines, Subtransmission Lines, and Substations," *The Appraisal Journal*, Summer 2016.

8. Community Preferences

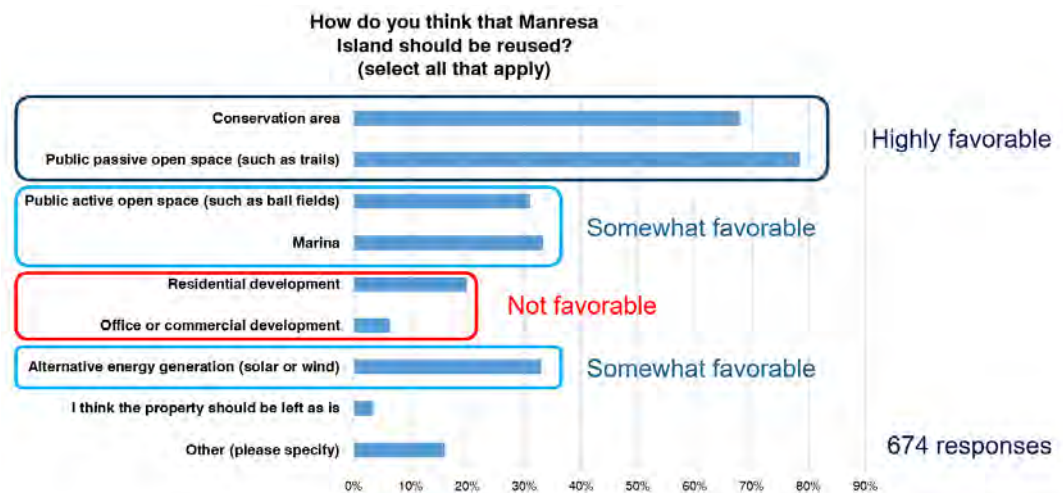
Of 674 survey respondents, comprised mostly of people living near the Manresa site, most expressed a preference for a conservation based or passive open space reuse of the site. Other uses found somewhat favorable by survey participants include active open space, a marina, or alternative energy generation. Residential and commercial or office development were not favorably regarded by respondees.

In addition to this survey, a workshop was held at the Norwalk City Hall on the evening of Monday, September 25, 2017. Over seventy-five people attended the workshop to provide feedback regarding preliminary reuse options for Manresa Island. This was provided as a follow-up to the first public workshop, which focused on existing site conditions, environmental features and concerns, and remediation strategies. Different reuse strategies were presented, including; use as a passive recreation site, marina, low density residential, medium density residential, high density residential, and a solar farm,. These options were analyzed based on their tax generation implications, public opinion, environmental benefits, and remediation costs. Following the presentation, breakout sessions were conducted.

Overall, most people were in favor of the property being converted into passive open space. Use as a solar farm or marina, or a combination of mixed uses was also favorable, but attendees were cautious about building in a flood plain. Concerns for added traffic and noise were also discussed. Most groups reported that maintaining or gaining public access in this location is critical, and would be an asset to all in the community. Concerns for the environment and natural habitat in the area were also expressed. Residential uses were least favorable and many groups believe these uses are not practical due to high remediation costs and concerns about environmental impacts.



Public workshop held in September of 2017



Summary of reuse preferences from community survey

Section 8 Reuse Options

1. Conservation
2. Tear-down with passive open space
3. Marina
4. Low density/high value housing
5. Medium density housing
6. High density housing
7. Solar farm
8. Educational Facility

Reuse Options

Based upon the first workshop, conducted in May of 2017, and at the direction of the project steering committee, FHI was directed to explore the following reuse scenarios:

1. Conservation
2. Tear-down with passive open space
3. Marina
4. Low density/high value housing
5. Medium density housing
6. High density housing
7. Solar farm/energy storage
8. Educational/destination facility

The conservation option was the only option considered for the northern parcel, which is not suitable for other forms of redevelopment. All other options were considered for the southern parcel.

Reuse options represent a “build-out” of what could fit on the site. The concepts assume remediation of the site to support the use. The concepts are physically feasible, but may not be feasible on a financial or environmental basis.

Tax revenue projections are included in the evaluation of these reuse options. The projections are based upon valuations of comparable development types in Norwalk. Actual appraised value of development and tax revenue generated by that development will likely vary and could be negatively impacted by site conditions and perceptions associated with historic use of site.

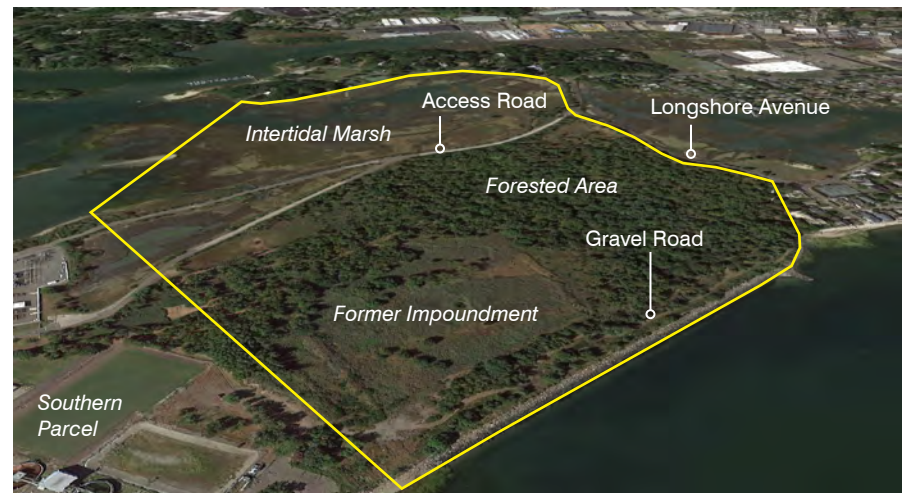
1. Conservation

Reuse Scenario	Visual Impact	Traffic Impact	Ecological Benefit	Allowed by Zoning	Anticipated Public Support	Property Tax Revenue Impact	Remediation Cost	POCD Supportive
Conservation	Low	Low	High	Yes	High	Negative	Low	High

Manresa Island’s northern parcel is comprised of 97 acres of forested land intertidal marsh and wetlands. This parcel also contains dredge sediment and coal ash fill. Most of this parcel was tidal marsh and wetlands prior to construction and operation of the power plant. The current remedial approach for this parcel is “natural attenuation” which involves allowing the forest cover to continue to encapsulate materials rather than excavate, replace, or treat soils.

Because of the historical filling of this area and the current remedial approach, this site is not suitable for redevelopment. The parcel is, however, a good candidate for conservation. Under a conservation scenario, limited public access to the site could be provided for the purposes of passive recreation such as walking and bird viewing.

The recommended redevelopment concept for this parcel is to place the site into conservation and to restrict access to contaminated areas of the site. Public access could be provided via the existing roadway from Longshore Avenue and the gravel roadway on the eastern side of the parcel. Where access is provided, soils will require remediation or encapsulation to prevent direct contact with contaminated soils.



Manresa Island: 97-acre northern parcel



2. Tear-down with Passive Open Space

Reuse Scenario	Visual Impact	Traffic Impact	Ecological Benefit	Allowed by Zoning	Anticipated Public Support	Property Tax Revenue Impact	Remediation Cost	POCD Supportive
Passive open space	Low	Low	High	Yes	High	Negative	Moderate	High

The tear-down option with passive open space envisions the removal of all structures on the site with the exception of the electrical substation. This implies remediation of the site to allow for limited site access. The site would feature parking for users and one plus miles of pathways that could provide access to the shore. Remediation of the site could allow for the growth and emergence of meadows and forests which would provide habitat for the local and migrating bird populations. The site would be used for walking, birding, running and bicycling. Characteristics of this option include:

- Low visual impact and improvement of views from surrounding properties
- Low traffic impact
- High ecological benefit
- Supported by existing zoning
- High anticipated levels of public support
- Negative property tax revenue impact: under this reuse scenario, the site would likely be held by the City of Norwalk or a non-profit organization which would be exempt from local property taxes.
- Moderate remediation cost: remediation of areas not accessible to visitors would not be required to meet the same level of remediation as areas that are accessible to visitors. Control of site access with fencing and signage.



Bluff Point State Park, Groton, CT Source: connecticutexplorer.blogspot.com

The conversion of the Manresa site to a passive open space that allows public access will likely require that the property be transferred to the City of Norwalk or a nonprofit conservation organization. Key organizations that could play a role in a property transfer and holding include:

The Trust for Public Land helps structure, negotiate, and complete land transactions that create parks, playgrounds, and protected natural areas. The Trust buys land from willing landowners and then transfers it to public agencies, land trusts, or other groups for permanent protection.

The Connecticut Audubon Society conserves Connecticut’s environment through education and advocacy focused on the state’s bird populations and habitats. The Society manages 19 wildlife sanctuaries encompassing almost 3,300 acres of open space in Connecticut. Connecticut Audubon is an independent organization, and is not affiliated with any national or governmental group.



Areas of Manresa Island would likely require the construction of boardwalks to provide access to viewing areas. The example above is the Paul F. Wildermann Boardwalk, Chatfield Hollow State Park, Killingworth, CT
Source: commons.wikimedia.org

3. Marina

Reuse Scenario	Visual Impact	Traffic Impact	Ecological Benefit	Allowed by Zoning	Anticipated Public Support	Property Tax Revenue Impact	Remediation Cost	POCD Supportive
Marina	Moderate	Moderate	Low	No	Moderate	Neutral	Moderate	Moderate

The Manresa site is capable of accommodating a marina using its harbor as a location for boat slips. Under this concept, the harbor could accommodate up to 120 forty-foot or greater slips for boats. The site could also host a 10 acre boat yard for outdoor boat storage which could be located in the area of the existing fuel tank farm and wastewater treatment facility area. This option envisions the demolition of the power plant structure to the provision of surface parking and the construction of a marina facility that would provide space for offices, storage, gathering space, and marine related retail or food sales or a restaurant and banquet function. The balance of the site could be reserved for passive or functional open space.

Characteristics of this option include:

- Moderate visual impact: supporting structures would likely be low in profile and not visually dominant, boat storage is consistent with views of the coastal landscape
- Moderate traffic impact: traffic generated by the site would be seasonal and would generate very little traffic in the off-season
- Ecological benefit: ecological benefit would be low due to the amount of land area that would be consumed by boat storage and impervious or gravel pavement associated with that use
- Existing zoning does not support a marina function
- Anticipated public support would be moderate: opposition would likely be due to traffic generation and ecological impact
- Property tax revenue impact would be neutral: a marina and boat storage is not the highest value use of the site from a property tax perspective, but is a taxable use which could replace tax revenue lost by demolition of the power plant structures
- Remediation cost would be moderate: encapsulation of soils in the boat yard area by gravel or pavement would be less intensive a remediation strategy than the removal and replacement of soils.

Dockage in the Norwalk area ranges between \$2 to \$3.50 per foot per day. Based on Dockwa (a online marina reservation platform), Norwalk area marinas are between \$1.50 to \$2.00 less than their counterparts on the eastern end of the Connecticut Shore.

Assuming a dockage rate of \$3 per foot and an average boat length of 30 feet, the 120 potential slips at Manresa would generate \$1.6 million in dockage fees over a five month season. Typical winter storage for a boat generates approximately \$2,000 per boat. Assuming storage of 500 boats, the site would generate \$1.0 million in revenue for winter storage.

Additional revenue may be generated by services typically operated at a marina including fuel sales, maintenance and repair services, and retail sales. Fuel revenues depend on usage with profit margins ranging between 12% and 21% of sales. A supporting marina facility such as clubhouse could include functions such as a restaurant and/or banquet facility which could generate additional revenue.

The market value of marina properties varies considerably. Palmer's Cove Marina in New London, CT is listed for \$1.5 million; it features a one acre site with 100 slips and, 60 boat winter storage capacity, and marine service, repair, and sales functions. The Norwalk Cove Marina is a 19.7 acre facility with multiple buildings and functions; it is appraised at \$23.2 million or \$1.2 million per acre.

Trends in the marina industry appear to favor the development of a marina at Manresa Island. A 2016 marina and boatyard trends report (see inset at right) indicates multiple positive indicators including increased profits and occupancy rates.



Norwalk Shore and Country Club and Norwalk Cove Marina: 26 acres total

Excerpt from the 2016 Marina/Boatyard Trends Annual Report

Published by: Marina Dock Age Magazine, in partnership with the Association of Marina Industries

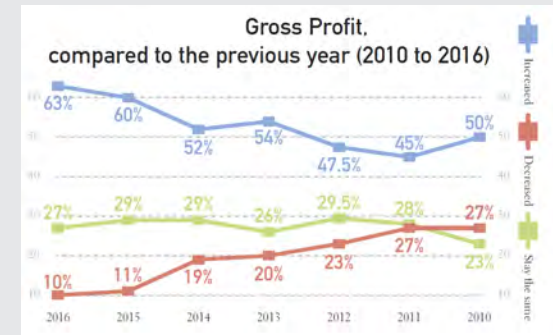
In 2016, nearly double the number of facilities reported increased profits, compared to 2009, and the number of facilities reporting decreased occupancy has been on the decline since 2010. Overall occupancy rate percentage numbers show a general decline in facilities with less than 50 percent occupancy. The majority of facilities consistently have occupancy rates at 85 percent or above.

Revenue increases and decreases vary significantly across the different product/service profit centers. Leased slip, dry storage, fuel and boat repair and maintenance revenues had the highest numbers with increased profits from year to year. The number of facilities reporting decreases in revenues was generally on decline across all the categories. Revenues for transient slips, new and used boat sales and boat club revenues were more variable throughout the years.

Rates have remained fairly steady and the majority of facilities have increased expenses since 2012. The number of facilities reporting increased gross profits has been increasing since 2012.

After 2010, the number of facilities reporting an overall profit increased from two-thirds to three-quarters. The number of facilities reporting increased gross profits has also been increasing since 2011.

Growing occupancy rates, increased or steady slip/service rates and product/service revenues, combined with increased investment has led to growth in the industry over a number of years, and that looks poised to continue for some years to come.



4. Low Density/High Value Residential

Reuse Scenario	Visual Impact	Traffic Impact	Ecological Benefit	Allowed by Zoning	Anticipated Public Support	Property Tax Revenue Impact	Remediation Cost	POCD Supportive
Low Density Residential	Moderate	Low	Low	Yes	Moderate	Neutral	High	Moderate

The Manresa site could be redeveloped for housing if a complete demolition of power plant structures and other ancillary structures was completed. Extensive remediation of the site would also be required to reduce the risk of exposure to contaminated soils and meet residential clean-up standards.

Norwalk has many high value residential properties that provide a model for this type of development. Immediately to the west is the Wilson Point neighborhood, a peninsula comprised of dozens of multi-million dollar properties with views of Manresa Island. There are multiple challenges to this type of development on Manresa Island:

- The stigma of a former industrial use and associated contamination
- The presence of an electric substation occupying a significant share of the island
- Potential for flooding and construction requirements of elevating structures above the flood elevation

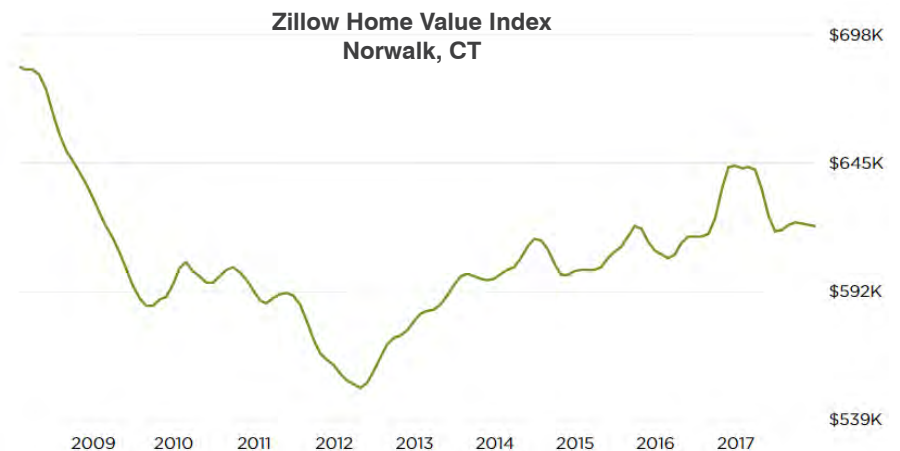


Property on Wilson Point, listed at \$4.29 million. Source: Zillow.com

Given those constraints, the site could accommodate eleven waterfront parcels, each between two and four acres. The homes would be large, high value structures (approximately \$2 million each). Under this concept, the electric substation would need to be screened from residences through the construction of a landscaped berm. A new roadway would need to be constructed into the site and could connect to the existing roadway at the boundary of the southern parcel.

Characteristics of this option include:

- Moderate visual impact: homes would likely be low in profile and not visually dominant, views of this development would be consistent with views of adjacent shoreline.
- Moderate traffic impact: traffic generated by the development would be minimal and would have the same time of day and day of week characteristics as existing residential land uses in the area
- Ecological benefit: ecological benefit would be low due to the amount of land area that would be privately owned and maintained for residential purposes.
- This development type is allowed by the existing zoning
- Anticipated public support would be moderate: the lack of public access would likely be a reason for opposition; while the public has not expressed a preference for residential development, the development would not have a significant visual or traffic impact.



Zillow home value index for top tier homes: The market has shown steady growth since 2012, with a modest decline in late 2017. Source: Zillow.com

- Property tax revenue impact would be neutral: this development type could generate approximately \$0.5 million in tax revenue per year which would replace the tax revenue currently generated by the power plant.
- Remediation cost would be high: this concept requires complete demolition of all structures and removal and replacement of all contaminated soils.

According to Zillow.com and the Institute for Luxury Home Marketing, top tier and luxury homes have been holding their value with the market having steadily increased since 2012 (see graph at left and excerpt below). The New York Metro market also continues to be strong and the market for high value properties will likely remain stable in the near term.

Excerpt from January 2018 Luxury Market Report

Published by: Institute for Luxury Home Marketing

Compared to December 2016, the median luxury home sale price has decreased by 2.1%, which may be the reason that days listed on the market have decreased to 45 days over 2016's median of 56 days...

Compared to December 2016 the single-family luxury market saw a 3.1% increase against the median sold price of \$1,425,000. The median sold price to list price ratio remained steady at approximately 97% as did the length of time a property remained on the market, about 54-58 days...

Another unexpected twist is that the number of single-family home sales actual increased by 7.9% over December 2016.



Sales and list prices of luxury homes have been steady and have exhibited modest growth over the past year.

5. Medium Density Residential

Reuse Scenario	Visual Impact	Traffic Impact	Ecological Benefit	Allowed by Zoning	Anticipated Public Support	Property Tax Revenue Impact	Remediation Cost	POCD Supportive
Medium Density Residential	Moderate	Moderate	Low	Yes	Low	Positive	High	Moderate

The Manresa site could be redeveloped into a medium density neighborhood if a complete demolition of power plant structures and other ancillary structures was completed. Extensive remediation of the site would also be required to reduce the risk of exposure to contaminated soils and meet residential clean-up standards.

A comparable development type is the Harborview neighborhood which is located immediately to the north on Manresa Island. The neighborhood is comprised of over one hundred properties that range from \$0.5 million to \$1 million in value. There are multiple challenges to this type of development on Manresa Island:

- The stigma of a former industrial use and associated contamination
- The presence of an electric substation occupying a significant share of the island
- Potential for flooding and construction requirements of elevating structures above the flood elevation

Given those constraints, the site could accommodate 33 waterfront parcels, and 35 inland parcels, each between one-quarter and one-half acre. The homes would likely have a value comparable to those in the Harborview neighborhood with the waterfront homes having the highest value. Under this concept, the electric substation would need to be screened from residences through the construction of a landscaped berm. A new roadway would need to be constructed into the site and could connect to the existing roadway at the boundary of the southern parcel.

Characteristics of this option include:

- Moderate visual impact: homes would likely be low in profile and not visually dominant, views of this development would be consistent with views of adjacent shoreline.
- Moderate traffic impact: traffic generated by the development would be noticeable to the surrounding neighborhood, but would have the same time of day and day of week characteristics as existing residential land uses in the area.

- Ecological benefit: ecological benefit would be low due to the amount of land area that would be privately owned and maintained for residential purposes.
- This development type is allowed by the existing zoning
- Anticipated public support would be low: the lack of public access to the waterfront would likely be a reason for opposition; the public would likely be opposed to the level of traffic generated by the development.
- Property tax revenue would be positive: this development type could generate over \$1.4 million in tax revenue per year which would replace the tax revenue currently generated by the power plant.
- Remediation cost would be high: this concept requires complete demolition of all structures and removal and replacement of all contaminated soils.

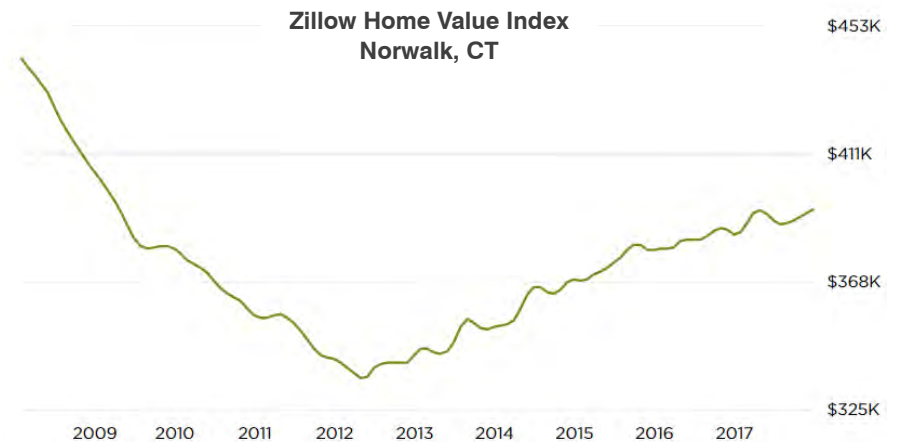
Current real estate market conditions suggest favorable conditions for residential development in Norwalk. According to data obtained from Zillow.com, median list price for single family homes as increased since 2013 and is currently \$529,000. Likewise, the Zillow home value index (the median Zillow generated property valuation for a given geographic area on a given day) for medium tier homes in Norwalk has grown steadily since 2012, improving by 16% since that time.



The Harborview neighborhood on Manresa Island, immediately north of the power plant site, is comprised of medium size single family homes on small lots that typically range in value from \$0.5 to \$1 million.



Median list price for single family homes: The market has shown continued growth since 2013 with the median list price in Norwalk currently at \$529,000. Source: Zillow.com



Zillow home value index for medium tier homes: The market has shown steady and continued growth since 2012. Source: Zillow.com

Residential Redevelopment of a Superfund Site The Midvale Slag Superfund Site, Midvale City, Utah

The 446-acre Midvale Slag site was home to lead and copper ore smelters from 1871 to 1958. These operations resulted in the contamination of soil and groundwater with heavy metals. The site was designated as a Superfund site in 1991 and was divided into two “operable units” or discrete areas of cleanup. In 1995 the Environmental Protection Agency (EPA) selected remedial measures for Operable Unit 1 (OU1) which included:

- Excavation of contaminated soils, backfilling with clean fill and revegetation of the residential area.
- Excavation of an area of contaminated soils and installation of a two-foot soil cover in the non-residential portion of OU1.
- The remedy was further modified in 2006 which brought the site’s riparian area, ground water monitoring and institutional controls in line with the recommendations for Operable Unit 2 (OU2).

EPA selected a remedy for OU2 in 2002, following extensive collaboration with stakeholders and coordination with the community to share site information and incorporate feedback into the Superfund process. Components of the remedy for OU2 included:

- Excavation and off-site disposal of a small quantity of highly contaminated smelter waste.
- Construction and maintenance of barriers over smelter waste and contaminated soils.
- Stabilization of the banks of the adjacent Jordan River.
- Ground water and surface water monitoring.
- Institutional controls limiting future excavations, requiring review of proposed changes in site land uses, restricting surface water management and irrigation practices, and requiring mitigation of organic vapors in future structures.

OU1 cleanup activities began in 1996 and OU2 cleanup activities began in 2003. The construction of the site’s remedial measures was completed in 2007, with the exception of the riparian zone portion of the remedy. The construction of the site’s riparian zone remedy began in October 2008 and was completed in 2011.

Both sites have been successfully redeveloped and are now home to over 1,000 apartment units, almost 300 townhouse units, 126 single-family homes, commercial office developments, retail centers, 38 acres of parks and trails, and a light rail station.



Aerial view of site under remediation and redevelopment (2011)



Advertisement for luxury apartments at Midvale.

6. High Density Residential

Reuse Scenario	Visual Impact	Traffic Impact	Ecological Benefit	Allowed by Zoning	Anticipated Public Support	Property Tax Revenue Impact	Remediation Cost	POCD Supportive
High Density Residential	High	High	Low	No	Low	Positive	High	Low

The Manresa site could be redeveloped into a high density residential area if a complete demolition of power plant and other ancillary structures was completed. Extensive remediation of the site would also be required to reduce the risk of exposure to contaminated soils and meet residential clean-up standards.

A comparable development type is the Maritime development in South Norwalk. The Maritime is comprised of 61 condos and 136 apartments. There are multiple challenges to this type of development on Manresa Island:

- The stigma of a former industrial use and associated contamination
- The presence of an electric substation occupying a significant share of the island
- Potential for flooding and construction requirements of elevating structures above the flood elevation

Given those constraints, the site could accommodate four 6 story buildings, each with 100 residential units for a total of 400 units. Based upon comparable values at the Maritime, the assessed value could be as high as \$500,000 per unit for a total assessed value of approximately \$200 million. This would generate up to \$5 million in tax revenue per year.

The most economically feasible construction type for the site would be five floors of Type IIIa wood-frame construction on a one-story concrete podium base. Given the flood zone exposure, the ground level would be best suited for parking. Construction costs of this type of development ranges from \$150 to \$200 per square foot. Given those costs, a full build-out of the site as presented here would cost \$600 to \$800 million for the building construction, which does not include remediation of the site, provision of utilities, roadways, surface parking, and other site improvements.

Under this concept, the electric substation would need to be screened from residences through the construction of a landscaped berm. A new roadway, driveways and surface parking would need to be constructed on the site.

Characteristics of this option include:

- Significant visual impact: Buildings, being up to six stories high, would be

visible from areas such as the Wilson Point neighborhood and Calf Pasture Beach.

- High traffic impact: traffic generated by the site would likely add over one thousand vehicle trips per day to Longshore and Woodward Avenues.
- Ecological benefit: ecological benefit would be low due to the amount of land area that would be consumed by boat storage and impervious or gravel pavement associated with that use
- Existing zoning does not support multifamily housing
- Anticipated public support would be high: opposition would likely be due to traffic generation, visual and ecological impact
- Property tax revenue impact would be positive: a full build-out as depicted could generate up to \$5 million in property tax revenue per year
- Remediation cost would be high: this concept requires complete demolition of all structures and removal and replacement of all contaminated soils.

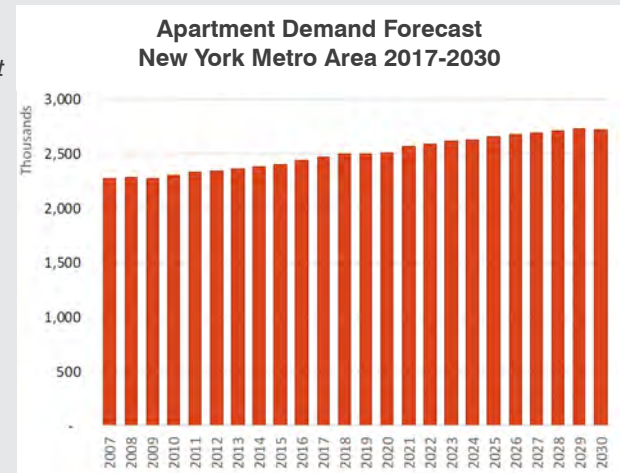
Apartment demand for the New York Metro Area is expected to be strong through 2030 with approximately 2.25 million apartment units currently supplied and over 2.78 million total units needed by 2030. See excerpt below.

Excerpts from “U.S. Apartment Demand – A Forward Look”

Prepared by: Hoyt Advisory Services, Dinn Focused Marketing, Inc. and Whitegate Real Estate Advisors, LLC

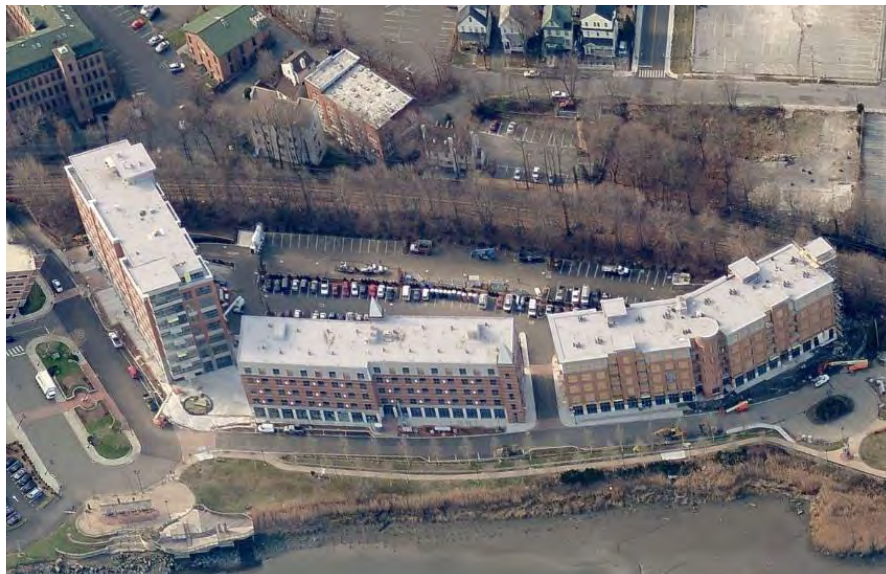
The 55+ age cohort of renters is greater than the 15-34 year-old segment in Connecticut, Maine, Massachusetts, New Jersey, New York, Pennsylvania and Rhode Island...

The New York Metro Area has the highest apartment demand of any metro area in the country. It is estimated that by 2030, at total of 278,634 additional apartment units will be needed.





Example of Type IIIa construction: Five stories of wood frame construction over a concrete podium base.



Comparable development: The Maritime in South Norwalk, 61 condominium units in the building at left and 136 apartment units in the two buildings to the right.

7. Solar Farm/Energy Storage

Reuse Scenario	Visual Impact	Traffic Impact	Ecological Benefit	Allowed by Zoning	Anticipated Public Support	Property Tax Revenue Impact	Remediation Cost	POCD Supportive
Solar Farm	Low	Low	Moderate	Special Permit	Moderate	May be subject to Municipal Agreement	Low	Moderate

If fully built out, the southern parcel of Manresa Island could accommodate a 20 acre/up to 5.0 megawatt (MW) solar field that could power approximately 600 homes. This would produce approximately 6 gigawatt hours (GWh) of electricity per year.

The build-out of a 20 acre solar farm would require demolition of all structures on the site with the exception of the electric substation which would likely serve as the connection point of the solar farm to the energy grid. Existing roadways would be re-purposed so serve the solar infrastructure. Public access to the site would be prohibited under this development option.

Characteristics of this option include:

- Low visual impact and improvement of views from surrounding properties
- Low traffic impact
- Moderate ecological benefit: the coverage of 20 acres of the site by solar arrays would reduce open space area and habitat compared to the existing use, but the lack of activity on the site while in operation may make it favorable to wildlife.
- Supported by existing zoning
- Moderate anticipated levels of public support
- The property tax revenue impact is unknown as the project may be subject to a municipal tax agreement, as tax incentives may be necessary to make the project financially viable
- Low remediation cost: because a solar farm is considered an industrial reuse with limited contact between people and contaminated soils, the clean-up standard is lower than for other uses such as residential.

Due to recently passed (February 2017) legislation regarding solar projects subject to Connecticut Siting Council (CSC) review, and pursuant to Connecticut General Statutes Section 16-50k, the project would require a Certificate of Environmental Compatibility and Public Need from the CSC. This process applies to customer-side or grid-side distributed renewable energy facilities with a capacity of 1 MW – 65 MW, assuming the project complies with specific air and water quality standards.



4.7 MW Mountain Ash Solar Farm and Battery Energy Storage, Norwich, CT

While the CSC has exclusive jurisdiction over the facilities it regulates, it must consider municipal regulations and other state laws when making declaratory rulings. In accordance with General Statutes § 16-50x(d), a municipal zoning commission and inland wetland agency may regulate and restrict the proposed location of a project.

There are several siting issues that warrant further evaluation prior to determining whether a solar installation on the site is feasible. Specifically, a wetlands delineation, biological surveys, and consultation with the CT DEEP Natural Diversity Database Program (NDDDB) would be required. NDDDB review has been a significant challenge for solar development in CT to date. It is possible that the species at the site would not be adversely impacted by a solar facility, however further consultation is required.

Solar facilities on the site could use the existing 115kV interconnection at the Norwalk electrical substation which is on site. Under current ISO New England rules, the interconnection process requires a Small Generator Interconnection Application, and a Small Generator Interconnection Agreement between the Project, Eversource and ISO New England, if the application is approved. Projects less than 5 MW require less study and review for the interconnect than projects 5 MW or more. If limited to 4.9 MW, the project, as described here, would meet the lower threshold of requirements.

The development of solar facilities at the site would follow one of the following models:

1. **Net Metering:** is available for projects up to 2 MW, if there is an on-site load to offset. Virtual net metering is available for projects up to 3MW, but only for public or agricultural entities.
2. **Virtual Net Metering:** is offered for projects up to 3 MW. This would allow the owner of the solar facility to apply net metering credits from a solar facility at the Site to “beneficial accounts” at other facilities under the same ownership. Note that virtual net metering is only available to state, municipal, or agricultural entities. If the project was privately owned, and there is no on-site load that would be offset by the project, the owner would need to find an eligible off-taker to participate in virtual net metering.
3. **Power Purchase Agreement:** a power purchase agreement would allow the solar project to sell energy directly to the grid as a small generator of renewable energy. Power purchase agreements in Connecticut are regulated by Connecticut General Statute Section 16a-3f which gives the commissioner of Energy and Environmental Protection the authority to solicit proposals from renewable energy sources and, if found to be in the interest of ratepayers, select proposals to meet up to 4 percent of state’s load distribution. The commissioner can also direct electric distribution companies to enter in to Power Purchase Agreements for energy, capacity and environmental attributes for terms less than 20 years. These agreements must be approved by the Public Utilities Regulatory Authority and costs incurred by the distribution companies can be recovered through electric rates for the distributor’s customers.

Solar Incentives: Renewable Energy Certificates

Connecticut’s Renewable Portfolio Standard (RPS) is a state policy that requires electric distribution companies and electric suppliers to get a portion of their energy from renewable sources. In 2018, companies must get 17% of their total output from Class I resources such as solar. Under current law, the Class I requirement increases each year until it reaches 20% in 2020. This policy creates a financial incentive for development of renewable energy projects by ensuring a market and steady stream of revenue for renewable generators.

Owners of electricity generation projects that qualify as renewable under one of the three classes of Connecticut’s RPS receive one renewable energy certificate (REC) for every megawatt-hour (MWh) of electricity they produce. These RECs are tradable commodities that allow the environmental attribute of the renewable energy to be bought and sold separately from the energy commodity itself.

2011 NRG Solar Proposal for Norwalk Harbor Site

In December of 2011, NRG Energy Inc. submitted a proposal to the Connecticut Department of Energy and Environment (DEEP) for the development of a solar facility at the Norwalk Harbor (Manresa) site. The proposal was submitted in response to a solicitation by DEEP for up to 30 MW of Class I (such as solar) renewable energy sources as pursuant to Section 127 of Connecticut Public Act 11-80 which was placed into effect in July of 2011. The proposal received a letter of support from then mayor Richard Moccia.

DEEP received proposals for 21 projects, including two from NRG. DEEP awarded two projects: the East Lyme Solar Park and Somers Solar Center, which cover 10MW of the 30 MW of renewable generation procurement mandated by the act.

The project was planned as a 5 MW fixed tilt, ground mounted system, utilizing silicon photo-voltaic panels and was envisioned to interconnect with and “piggyback” the existing and then operating power plant. The proposal stated that “The land comes at very low cost to the project, involving only the requirement to cover the fly ash materials with a layer of clean fill material. Deploying solar panels on the site is consistent with the existing adjacent land use of Norwalk Station, and due to the “surface-mount” nature of the ballasted foundations, is ideally suited for avoiding penetration of the ash materials.”

The solar array was planned for the wooded former fly ash disposal area on the northern parcel of the site, immediately north of the wastewater treatment area.



Proposed Solar Array Site Plan, Source: 2011 NRG Proposal to CT DEEP

NRG noted that approvals were needed from DEEP and the US Environmental Protection Agency for the Engineered Control (EC) Plan that would allow placement of clean fill over the former fly ash disposal area. NRG also noted that review and approval of the EC Plan may be required from the Army Corps of Engineers. NRG estimated that “seven months are needed to obtain the approvals, contingent on no significant negative comments being received during the public review period of the EC Plan”.

NRG planned to finance the project costs from balance sheet cash reserves and assumed the following in developing the pricing of its proposal:

- Achieving eligibility of the 1603 cash grant (the 1603 cash grant program was a Federal American Recovery and Reinvestment Tax Act grant program that began accepting applications in 2009 and ended in 2012)
- Site use at no additional cost to the project as NRG owns the Norwalk Station facility and adjacent land where the panels will be installed
- Project leverages available Norwalk Harbor labor
- Property Taxes – based on assumed achievement of a Payment In Lieu of Taxes (“PILOT”) agreement with the local taxing jurisdictions
- Low insurance costs as they are priced under NRG’s umbrella insurance policy
- Optimal use of existing interconnection infrastructure
- Pricing proposal includes the cost of lining a portion of the ash landfill at the site for the portion of cost above the anticipated remediation cost
- Price fully assumes collateral costs as defined per the Power Purchase Agreement (“PPA”)
- Assumes project financing at currently low interest rates

Supporting its proposal, NRG identified the following qualifications:

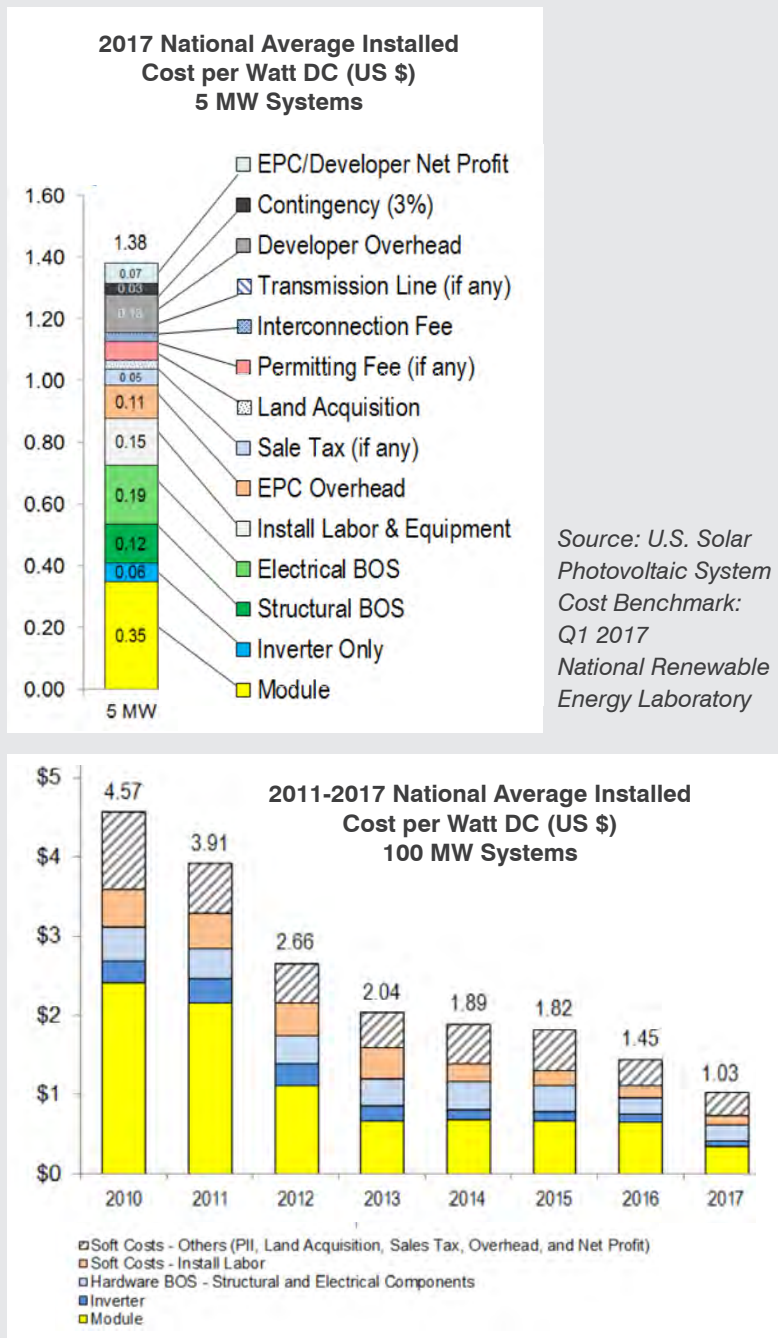
- A mission is to become the North American market leader in the technical planning, development, construction, financing and operations of multi-technology solar generation assets
- A diverse portfolio of solar projects and distributed solar products to produce clean, renewable electricity for residential and commercial customers;
- Ownership or development interests in renewable facilities with an aggregate generation capacity of close to 2,000 MW, making NRG the largest owner of solar generation in North America

Solar Development Cost: 2011 vs 2017 and 2018

In 2011, the cost of 5 MW utility scale photo-voltaic (PV) systems in Connecticut was \$5.03 per watt or \$5.03 million per MW. This includes land acquisition costs which represent \$0.05 per watt or \$50,000 per MW. Given these 2011 costs, NRG's proposed facility would have had a capital cost of approximately \$25 million and may have been lower owing to NRG's stated intent to use its own labor to assist in project development.

The solar landscaped has changed considerably since 2011, and continues to change. Installed PV system costs have decreased 74% for 5 MW utility scale systems between 2011 and 2017 owing to reduce costs of hardware and improved system efficiency. 2017 installed costs for 5 MW utility scale solar in Connecticut were \$1.32 per watt or \$1.32 million per MW. Under 2017 costs, the development of a 5 MW solar array as proposed by NRG would cost approximately \$6.35 million when adjusted to remove land costs.

Solar hardware costs are, however, subject to trade agreements. Recent federal trade policy has imposed a 30% tariff on imported solar modules. Solar modules represent approximately one-third (\$0.35 per watt) of the cost of system installation. A 30% increase of panels would bring that cost to \$0.45 per watt, increasing system installation cost by approximately 10% and would suggest that the 2018 installed cost of a 5 MW utility scale system in Connecticut would be \$1.45 per watt or \$1.45 million per MW, assuming panel physical costs remain flat instead of decreasing as they had been over the past several years. Under these 2018 conditions, the development of a 5 MW solar array as proposed by NRG would cost approximately \$7 million when adjusted to remove land costs.



Alternative Concept: Electrical Energy Storage

Electrical Energy Storage (EES) refers to the process of converting electrical energy into a stored form that can later be converted back into electrical energy when needed. Batteries are the principal devices used for EES. The first U.S. large-scale energy storage facility was the Rocky River Pumped Storage plant constructed in 1929, on the Housatonic River in Connecticut.

The impact energy storage can have on the current and future energy grid are substantial:

- *EES systems are often expressed by rated power in megawatts (MW) and energy storage capacity in megawatt-hours (MWh): the maximum charge/discharge power and the amount of energy capable of being stored, respectively.*
- *As of April 2017, the U.S. had over 24.2 GW of rated power in energy storage compared to 1,081 GW of total in service installed generation capacity.*
- *2.5% of delivered electric power in the U.S. is cycled through a storage facility. For comparison, 10% of delivered power in Europe and 15% of delivered power in Japan are cycled through energy storage facilities.*
- *Globally, 39% of operational projects and 50% of projects under construction are located in the U.S.*
- *California leads the U.S. in energy storage with 198 operational projects (4.3 GW), followed by Virginia and Texas.*
- *U.S. energy storage projects increased by 105% from 2013 to 2016.*

Several EES technologies are in research phases, but four storage technology types are considered deployed with Advanced Battery Energy Storage (ABES) being the most promising technology.

ABES stores electrical energy in the form of chemical energy, which is then converted back into electricity when needed. The U.S. has several operational battery-related energy storage projects based on lead-acid, lithium-ion, nickel-based, sodium-based, and flow batteries. These batteries account for 0.651 GW of rated power in 2017 and have efficiencies between 60-95%.

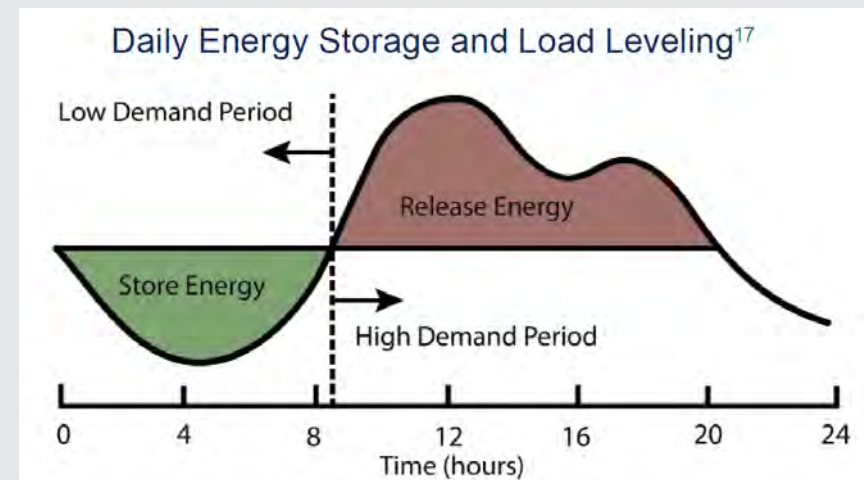
Storage technologies are becoming more efficient and economically viable. A 2010 study by the Sandia National Laboratory found that the economic value of energy storage at maximum market potential in the U.S. is \$228.4 billion over a 10 year period. Of the technologies, lithium-ion batteries are one of the fastest-growing energy storage markets due to their high energy densities, high power, near 100% efficiency, and low self-discharge.

EES has many applications, including energy arbitrage, generation capacity deferral, ancillary services, ramping, transmission and distribution capacity deferral, and end-user applications (e.g., managing energy costs, power quality and service reliability, and renewable curtailment).

EES can operate at partial output levels with fewer losses and can respond quickly to adjustments in electricity demand. Much of the current energy infrastructure is approaching—or beyond—its intended lifetime. Storing energy during low demand (off-peak periods) and using that energy during high demand (on-peak periods) saves money and prolongs the lifetime of energy infrastructure.

Many renewable energy options, such as wind and solar, have intermittent power. Energy storage systems can enable these technologies to store excess energy for times when the sun is not shining and the wind is not blowing, making them more competitive with fossil fuel-based energy sources.

The biggest drivers of the next phase of grid-scale battery deployment are likely to be state mandates, rather than markets. California, Arizona, Hawaii, Massachusetts, New Jersey, New York, and Washington are among the other states that are mandating or subsidizing electricity storage on a significant scale. Falling natural gas prices have, however, adversely affected the revenues of U.S. energy storage projects since 2009, because they must compete with gas turbines for peak shifting purposes.



Source: University of Michigan Center for Sustainable Communities
US Energy Grid Storage Fact Sheet

**Excerpt from “Hybrid Storage Market Assessment”
Joint Institute for Strategic Energy Analysis
October 2017**

“The market for battery storage is poised for rapid growth. Battery costs have declined by more than 65% in the last 7 years and are expected to decline further. An analysis conducted by HOMER Energy, a microgrid modeling software development company, on the effect of storage price on battery installation shows that once the cost of storage declines past a threshold level, the economic installation size can expand by an order of magnitude. While the threshold varies across markets, for specific applications, battery storage is now cost competitive with alternatives. Battery and system cost declines are forecasted to drive a 22-fold increase in battery storage and hybrid system capacity in the United States over the next 6 years.

While the battery storage market is expected to grow rapidly, it still faces barriers. High battery costs, regulatory uncertainty, and market structures that do not always properly remunerate energy storage or storage enabled services pose hurdles for the technology.

Battery hybrid storage can lead to synergies that increase the value of both battery and generator. Constructing a single hybrid unit instead of two separate units reduces hardware and installation costs and can increase battery charging efficiency. Battery hybrids can also provide value streams that neither component alone could provide. Pairing storage with utility-scale wind or solar can enable reduced energy curtailment and generation variability and may increase capacity payments....Finally, storage paired with distributed solar can reduce demand charges and provides resilience during outages.

The market potential for battery storage and battery hybrid storage varies by grid application and geographic location. Capacity markets provide the largest potential market application for utility-scale battery storage, while the primary applications for distributed storage are to reduce consumer demand charges and enable greater resiliency and emergency power.

Battery hybrid storage systems can be eligible for incentives for which storage alone would not be eligible. In the United States, batteries paired with renewable generation may receive up to a 30% investment tax credit and an improved depreciation schedule. Battery hybrids are also eligible for grants aimed at improving grid security and reliability. Similar incentives exist in other countries and markets.”

Energy Arbitrage

“A battery participating in energy arbitrage stores energy when prices are low and sells energy when prices are high. The possible market size for energy arbitrage is large, but revenues are not sufficient to fully support current battery costs. Energy arbitrage is best-suited as a secondary revenue stream paired with other services to increase profitability.

Energy arbitrage pairs well with value streams such as generation capacity, transmission deferral, demand charge reductions, and resilience and reliability, which only use the battery a portion of the time.

Pairing storage with variable generation can increase revenues from energy arbitrage. Periods of high production from variable generation increase line congestion and may exceed line capacity, leading to low or even negative localized prices. Pairing storage with variable generation allows the battery to charge during these periods of low prices. As the penetration of variable renewables on utility grids increase, it can be expected that this value stream will grow.”

Capacity

“While ISO-New England and PJM do not have minimum-duration requirements, they both have a “no-excuses policy,” which requires capacity resources to provide their capacity obligation for the duration of performance events or face significant financial penalties. Because performance periods in these markets have no maximum duration, storage with limited discharge duration faces considerable risk.”



13 MW Tesla solar farm paired with 13 MW/ 52 MWh battery storage facility
Kaua'i, Hawaii

8. Educational/Destination Facility

Reuse Scenario	Visual Impact	Traffic Impact	Ecological Benefit	Allowed by Zoning	Anticipated Public Support	Property Tax Revenue Impact	Remediation Cost	POCD Supportive
Educational Facility	Low	Moderate	Low	No	Moderate	Moderate	Moderate	Moderate

The property could accommodate a destination facility such as a nature center or an educational facility that leverages Manresa Island’s coastal location and landscape. A 50,000 sf or larger educational facility could be located on the site including classrooms, laboratories, offices, meeting space, and auditorium and conference facilities. The most probable building type would be a multi-story structure with ground level and surface parking. The site would allow for development of additional structures or expansion of the primary structure. Development of an educational facility would be contingent upon remediation of soils in proximity of development. Demolition of the tank farm would be required for surface parking as shown. While demolition of the power plant structure would not be required to physically accommodate an educational building, the presence of the plant would likely be a deterrent to development.

Under this scenario, the balance of the site is preserved as open space with a network of pathways accessible by the public.

Characteristics of this option include:

- Moderate visual impact: the building would be visible from surrounding properties, but could be designed and constructed to complement the landscape.
- Moderate traffic impact: traffic generated by an educational facility would be noticeable to the surrounding neighborhood, but would have similar time of day and day of week characteristics as existing residential land uses in the area.
- Ecological benefit: ecological benefit would be moderate assuming the balance of the site is preserved for open space.
- This development type is not allowed by the existing zoning
- Anticipated public support would be moderate: the public may be opposed to the level of traffic generated by the facility.
- Property tax revenue would be positive only if held by a for-profit institution. Ownership by a non-profit institution would not produce taxable revenue for the City unless subject to a payment in lieu of tax (PILOT) agreement.

- Remediation cost would be moderate: this concept requires demolition of the tank farm and remediation and/or removal and replacement of all contaminated soils in proximity of the facility.



Anne Kolb Nature Center, Hollywood, FL

Destination Facility Case Study: Anne Kolb Nature Center

The Anne Kolb nature center complex is a 1,500-acre coastal mangrove wetland that is home to a wide variety of plants and animals, including some threatened and endangered species.

The nature center features:

- An exhibit hall that features a 3,500 gallon saltwater aquarium
- A banquet hall with capacity for 160 attendees
- A 200 seat outdoor amphitheater
- A five-story observation tower
- Environmental boat tours
- 2.5 miles walking, bicycling, and observation trails

Educational Facility Case Study: Goodwin College

As one of the most quickly growing colleges in Connecticut, Goodwin College had outgrown its campus and needed to expand in order to meet student demand. The proximity of a large amount of idle land in proximity of its East Hartford campus as well as Goodwin College's commitment to environmental stewardship made the new campus's then brownfield site an ideal location for development of a new campus.

The Capitol Region Council of Governments provided funding to assess the site because, among other reasons, it is located in an area prime for redevelopment; is well served by existing infrastructure; is highly visible and accessible from major interstates; redevelopment will improve an area near minority and low-income neighborhoods; and it creates new recreational opportunities and increased public access to the Connecticut River.

Since 1926, the riverfront site was used for petroleum storage and distribution due to their location along the Connecticut River. These activities, which ceased in the 1980s, led to contamination of the soil and groundwater. The level of contamination was so substantial that petroleum seeped into the Connecticut River causing a visible layer of oily water. The MetroHartford Brownfields Assessment Program, a joint project of the Capitol Region Council of Governments and the MetroHartford Alliance provided \$121,900 from a 2004 EPA Brownfields Assessment Grant to conduct Phase I, II, and limited Phase III assessments which revealed petroleum, VOCs, lead and PAHs.

After removing the above ground petroleum storage tanks from the property in 2005, contaminated soil was removed from the property using natural bioremediation techniques. All parts of the property were cleaned up to residential standards.

The College has assembled more than 700 acres along Riverside Drive as part of its plan to create a riverfront park around its new campus. The park, accessible by Goodwin College and the general public, will include an additional 2 ½ miles of walking trails, which will connect with existing trails in the area, and several athletic fields. The park also allows public access to three deep-water docks where a research vessel will dock allowing the college to support a river ecology curriculum. Goodwin College also plans to create research opportunities by using the area's wetlands and woods for environmental research and creating a river and estuarial study center.

The new campus is a \$115 million investment that houses a total of 257,500 square feet of classrooms, dorms, a library, media center, science labs, a 700-seat auditorium, a student lounge and cafe, an early childhood learning center, and administrative space.



Goodwin College Campus Building on the Connecticut River



Goodwin College Campus Master Plan

Section 9

Remedial Strategies & Cost Estimate

1. Applicable Clean-up Standards
2. Proposed Soil Remedial Strategy
3. Opinion of Probable Cost for Demolition and Soil Remediation

1. Applicable Clean-up Standards

Because the site is enrolled in the CTDEEP Property Transfer Program, the site is subject to the CTDEEP's Remediation Standard Regulations. The Remediation Standard Regulations provide the framework to evaluate whether remediation, institutional controls, and/or engineered controls will be required to abate identified impacts from petroleum products, hazardous substances and/or hazardous waste. The nature and extent of impacted areas must be fully characterized and delineated prior to a final determination with respect to Remediation Standard Regulations compliance. CTDEEP's intent in developing the Remediation Standard Regulations was to define the following:

- Minimum remediation performance standards
- Specific numeric clean-up criteria
- A process for establishing alternative site-specific standards, if warranted

In general, Remediation Standard Regulations numeric criteria are used to remediate contaminated environmental media (i.e., soils and groundwater). Remediation Standard Regulations numeric criteria are not applicable to building materials and sediment. In addition, the Remediation Standard Regulations provide the flexibility to apply specific exemptions and variances with CTDEEP approval, as required.

2. Proposed Soil Remedial Strategy

Based upon a review of available data, the use of Engineered Controls variances are recommended for the redevelopment concepts. The Engineered Control approach is similar to the Engineered Control that NRG has proposed for AOC-4 and a portion of AOC-1; however, the proposed Engineered Control scenarios provide an increased buffer (thickness) for the proposed uses. A combination of soil excavation and an Engineered Control variance is proposed for the Residential Development and Marina Concept.

The Engineered Controls were obtained from CTDEEP's DRAFT Remediation Standard Regulations Wave 2 Conceptual Language for 22a-133k-2(f)(2) (D) dated April 5, 2016. The default thicknesses for Engineered Controls for specific-site conditions are as follows:

- Non-paved surfaces with shallow rooted vegetation, mulch or gravel:
1-foot of clean soil cover that does not exceed applicable standards and is underlain by a demarcation barrier.

- Non-paved surfaces with shrubbery: 1.5 feet (18-inches) of clean soil cover that does not exceed applicable standards and is underlain by a demarcation barrier.
- Paved surfaces: 2.5-inches of bituminous concrete or 3-inches reinforced concrete with 6-inches of suitably engineered subbase that does not exceed applicable criteria. Thicker pavement was proposed in the parking lots to accommodate use as parking lots and boat yard.
- Concrete Ballast, ground-mounted solar array: a minimum of 2-feet of clean soil that does not exceed applicable criteria underlain by a demarcation barrier.

A 6-inch layer of loam and grass seeding was added for non-paved areas as part of site restoration.

Soil excavation to a depth of 4 feet is proposed for the Residential development concept area to render impacted soils inaccessible under the Remediation Standard Regulations.

A split rail-type barrier fence and Engineered Control for non-paved area is proposed to the west of the path to Longshore Avenue to the north of the Study Area as part of the remedy to limit contact with impacted soils at AOC-1 (former ash disposal area) on the Northern Parcel. The fence requires a special design to address construction within the 100-year flood plain.

The Engineered Control process requires the submittal of an Engineered Control Application which has two parts. Part 1 of the Engineered Control Application presents the conceptual Engineered Control and supporting information. CT DEEP approval and concurrence is needed to advance to Part 2 of the Engineered Control. Part 2 of the Engineered Control application presents the detailed engineering design, implementation schedule, operation and maintenance plan, and financial assurance.

The placement of an environmental land use restriction on the deeds of the redevelopment areas will be required as part of site remediation.

3. Opinion of Probable Cost for Demolition and Soil Remediation

The opinions of probable cost for each concept are listed in the tables below. A range of scenarios are provided ranging from low-range cost scenarios to high-range cost scenarios. For the purpose of this plan, the mid-range cost scenario is used as a basis for financial pro formas and development feasibility analysis.

See the following page for a full list of assumptions and qualifications supporting these estimates.

Opinion of Probable Cost for Demolition and Soil Remediation (Low-Range Estimate)			
Concept	Demolition	Site Work & Engineered Controls	Total Cost
Marina	\$1,200,000	\$5,432,000	\$6,632,000
Education	\$4,500,000	\$11,242,000	\$15,742,000
Residential	\$4,500,000	\$15,543,000	\$20,043,000
Solar	\$4,500,000	\$6,386,000	\$10,886,000

Low-Range estimate assumes that full scrap value can be salvaged from reclaimed metals. Also assumes a 20% general conditions, incidentals, and contingency cost markup on site work and engineered controls.

Opinion of Probable Cost for Demolition and Soil Remediation (Mid-Range Estimate)			
Concept	Demolition	Site Work & Engineered Controls	Total Cost
Marina	\$1,300,000	\$5,884,000	\$7,184,000
Education	\$6,500,000	\$13,354,000	\$19,854,000
Residential	\$6,500,000	\$18,013,000	\$24,513,000
Solar	\$6,500,000	\$8,093,000	\$14,593,000

Mid-Range estimate assumes that 50% of scrap value can be salvaged from reclaimed metals. Also assumes a 30% general conditions, incidentals, and contingency cost markup on site work and engineered controls.

Opinion of Probable Cost for Demolition and Soil Remediation (High-Range Estimate)			
Concept	Demolition	Site Work & Engineered Controls	Total Cost
Marina	\$1,400,000	\$6,337,000	\$7,737,000
Education	\$8,500,000	\$15,466,000	\$23,966,000
Residential	\$8,500,000	\$20,484,000	\$28,984,000
Solar	\$8,500,000	\$9,800,000	\$18,300,000

High-Range estimate assumes that 0% of scrap value can be salvaged from reclaimed metals. Also assumes a 40% general conditions, incidentals, and contingency cost markup on site work and engineered controls.

Opinion of Probable Cost for Demolition and Soil Remediation Based Upon Mid-Range Cost Estimate	
Concept	Total Cost
Marina	\$7,184,000
Education	\$19,854,000
Residential	\$24,513,000
Solar	\$14,593,000
Marina/Education	\$27,038,000
Marina/Residential	\$31,697,000
Marina/Solar	\$21,777,000

Assumptions and Qualifiers

- *Manresa Power Plant and associated structures will require further assessment and characterization for the presence of Hazardous Building Materials (HBMs) within building materials. NRG indicated that a HBM assessment was not available for the site structures. A HBM survey was not completed as part of this scope of work.*
- *Demolition costs developed for this study were based upon a demolition contractor estimate following the review of aerial photographs and footprint of the plant structures and published literature. A cost of \$4 to \$5 million was estimated for ACM abatement estimate, contingent upon an environmental survey. An on-site inspection/ testing was not completed by the demolition contractor. The presence of HBMs could have a significant impact on the abatement and disposal costs for power plant/ associated structure debris. The cost estimate does not include additional HMB material abatement (PCBs, mercury contamination and lead paints above allow able recycling limits of 50 parts per million).*
- *The power plant demolition estimate includes the removal of concrete footings/ slabs to a depth of 3 feet below grade below structures. The extent and depth of concrete footings are unknown.*
- *It is assumed that NRG has removed petroleum from the oil tanks and distribution piping and that all hazardous wastes/ materials have been removed from the power plant and buildings.*
- *Demolition of subsurface structures (i.e., cooling water in-take/ discharge tunnel, power plant building foundations) or utilities is not included. The location and extent of these structures are currently unknown.*
- *CTDEEP has indicated that a geotechnical assessment will be needed within the footprint of the former RCRA impoundment at the proposed Marina Boat Yard area to assess soil conditions. Geotechnical investigations would also be needed in areas of the Study Area that have been historically filled. This Opinion of Probable Cost (OPC) does not include costs associated with geotechnical investigations, evaluations, or other design considerations.*
- *Coordination with CTDEEP/EPA will be required for the proposed remedial approach. Engineered controls are variances to the Remediation Standard Regulations that must be negotiated and approved by CTDEEP. Financial assurance cost for engineered controls are not included in the OPC and will be required to be established once CTDEEP provides EC approval.*
- *A cost contingency is carried in the OPC for potential limited pre-design soil investigations to assess environmental soil conditions for proposed development scenarios. Soils beneath the Manresa Power Plant and Oil Tank Farm were not previously assessed because they were environmentally isolated beneath the buildings and costs are not included in this OPC for their remediation. Only limited investigations have been completed in the western portion of AOC-4. Final remediation costs would need to be reviewed if additional impacts are identified. Disposal costs for contaminated soils are based upon non-hazardous soil conditions. Final costs to be determined based upon waste characterization sampling and acceptance at a soil disposal facility.*
- *OPC assumes use of common fill for backfilling or remedial excavations. Use of structural fill to support buildings and other site improvements is not included.*
- *Active groundwater remediation is not included in the OPC. It is assumed that alternate surface water protection criteria and technical impracticability approach will be approved by CTDEEP. Additional costs may be incurred for groundwater remediation.*
- *OPC does not include remediation outside the study area (i.e., Long Island Sound or Parcel 2) if determined to be required at a later time.*
- *Sediment remediation is not included as part of the OPC. Sediments are currently being assessed and remediated by NRG in coordination with CTDEEP and EPA. It is assumed that NRG will complete the sediment remediation and will receive CTDEEP and EPA approval.*
- *Excavations are proposed above the groundwater table; therefore, dewatering is not included as part of the OPC.*
- *CTDEEP program filing fees or legal costs are not included.*
- *Preparation of CTDEEP/ EPA Site Reports and Environmental Land Use Restriction (ELUR) for the Southern Parcel are not included.*
- *Federal, State, or Local permitting that may be required to facilitate remediation and redevelopment are not included.*
- *OPC does not include cost for replacement of monitoring well network, if needed.*
- *On-going monitoring, annual inspection, and reporting requirements associated with the engineered controls and groundwater monitoring programs are not included. The scope and costs for these items will be dependent upon the final engineering controls and CTDEEP approval.*
- *Prevailing wages (Davis-Bacon Act) were not included in the OPC costs.*
- *The site is not connected to the City of Norwalk Sewer System. Costs to connect to the City of Norwalk sewer system, if required are not included.*
- *Assumes remediation will be completed post-demolition.*
- *Site engineering investigations or evaluations for infrastructure are not included.*
- *Structural assessment and repairs of the dock and pier was not considered in the preparation of this OPC.*
- *Environmental studies and dredging assessment of the barge basin were not considered as part of this OPC.*
- *Shoreline stabilization assessment is not contemplated as part of this OPC.*
- *A final Land Survey for the Study Area is not included.*

Section 10

Recommended Redevelopment Concepts

1. Filtering the Redevelopment Concepts
2. Recommended Development Concepts
3. Marina and Waterfront Access
4. Renewable Energy Generation and Storage
5. Education/Destination Facility
6. Residential
7. Pro Forma of Development Options
8. Fiscal Impact

1. Filtering the Redevelopment Concepts

Many of the uses explored or considered were excluded from advancement as a recommended development concept. While some of these concepts may warrant additional analysis, the project steering committee, with agreement of the consultant team, has excluded multiple concepts from further consideration under this plan.

The most common limitations that informed exclusion of redevelopment concepts are as follows:

- Traffic generation
- Visual impact
- Cost of remediation
- Inadequate infrastructure
- Lack of community support
- Not supported by Plan of Conservation and Development
- Lack of local complementary services

The limitations of disqualified use concepts are summarized in the table below.



Rendering of high density housing as viewed from Outer Road: This development type would have a significant visual impact and is strongly opposed by a majority of stakeholders participating in the planning process.

Use	Primary Limitation	Secondary Limitations
Low Density Housing	Market limitations due to former use	Cost of remediation, lack of public benefit, low ecological value
High Density Housing	Traffic generation and visual impact	Not supported by POCD, lack of infrastructure, lack of community support
Hotel or Resort	Traffic generation and visual impact	Not supported by POCD, lack of infrastructure, lack of nearby complementary services
Manufacturing or Warehousing	Traffic generation, inadequate roadway infrastructure	Not supported by POCD, low ecological function, lack of community support, lack of public benefit
Retail/Services	Traffic generation and remoteness of location	Not supported by POCD, lack of infrastructure, lack of nearby complementary services, lack of community support
Office	Traffic generation	Not supported by POCD, lack of community support
Gas Turbine Peak Power Plant	Lack of proximity to gas transmission line	Energy sector shifts away from fossil fuels towards renewable energy production
Wind Farm	Insufficient wind speed and consistency	Visual impact

2. Recommended Development Concepts

Based upon the preceding analysis of potential development concepts, the project steering committee directed the project team to review the feasibility of a mixed-use development approach for the southern parcel including the following uses:

- Publicly accessible open space and waterfront paths
- Marina with outdoor boat storage and boat launch
- Education or destination facility
- Solar farm and energy storage facility
- Low to medium density residential development

These uses were selected based upon the unique attributes of the site, potential fiscal, visual, and traffic impacts, community preferences, consistency with the City's plan of conservation and development, ecological and public benefit, and potential cost of remediation.

Development is likely to occur in multiple phases and may ultimately include some, if not all of the recommended uses. A potential redevelopment framework is demonstrated in the concepts on the following pages and as described below:

Concept A: This would see the remediation and redevelopment of the wastewater treatment and RCRA impoundment areas in the northeast corner of the site. This area could accommodate a marina facility and public open space and waterfront access via a pathway.

Concept B: This concept includes a solar array facility in the area of the existing power plant and tank farm. This concept also includes an energy storage site immediately south of the electric substation.

Concept C: This concept leverages the waterfront views for an education or destination facility such as a nature center.

Concept D: This concept envisions a residential neighborhood on the southern half of the parcel.



Concept A: Marina & Waterfront Access Concept



Concept B: Renewable Energy Generation & Storage



Concept C: Education/Destination Facility



Concept D: Residential Development

3. Concept A: Marina & Waterfront Access

This concept includes the demolition, remediation and redevelopment of the former wastewater treatment plant and impoundment location. While this is envisioned as a potential stand-alone redevelopment of this area, additional development would complement this function (see Concepts C and D).

This concept includes the following features:

- A six-acre boat storage yard
- A marina facility building or buildings with offices, service bays, and potential for retail and/or food sales
- Boat docking with approximately 110 slips
- A public boat launch
- Public open space and waterfront access via a pathway network
- Surface parking supporting marina and public uses

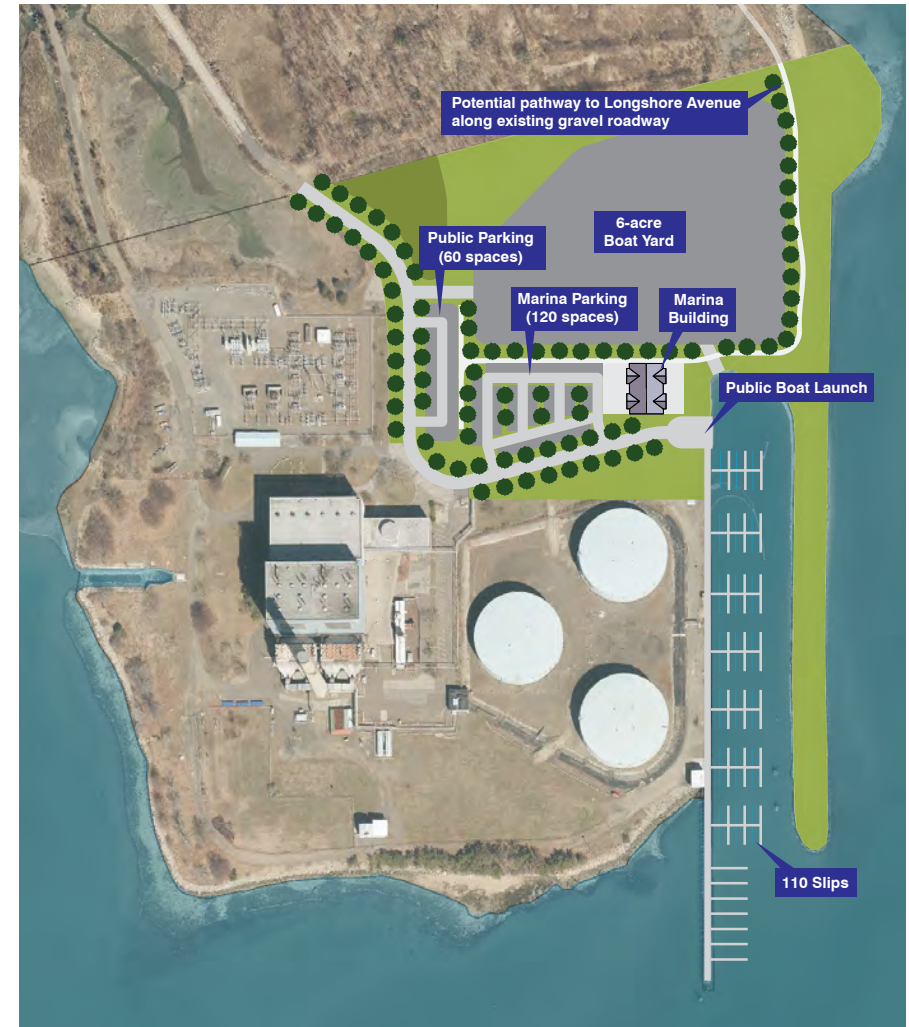
Remediation and redevelopment would be limited to the northeast corner of the site, to the north and east of the existing access roadway and parking lot. The electric substation would remain, and access would be continued via the existing access roadway on the west side of the island. The power plant structures and oil tank farm could remain.

The power plant access road would be converted to a City of Norwalk right-of-way between the harbor and Longshore Avenue. At the harbor, a public boat launch would provide access to Long Island Sound for Norwalk residents and the general public.

Estimated Marina Development Cost (2018 dollars)	
\$5,505,200	Appraised value of land (by share of parcel)
\$7,184,200	Demo and remediation cost (based upon mid-range estimate)
\$2,477,000	Development costs (sitework, utilities, structures, facilities)
\$15,166,400	Total project costs

Marina Market Value and Return on Investment (2018 dollars)	
\$6,546,000	Market value (based upon list price of comparable marinas)
\$1,690,000	Potential annual earnings (minus operating expenses)
9.0	Years to break even (based upon earnings)
5.1	Years to break even (earnings+market value)

Given the high development cost of the marina, and low market value relative to the cost of development, it is unlikely that an investor would incur the cost of property acquisition, demolition, and remediation necessary to support the development of a marina. In spite of the up-front development costs, the financial feasibility of marina operations appears favorable with the site reaching a break-even point based upon earnings at year 9 of operation. This suggests that the City of Norwalk could play an active role by acquiring the site and conducting demolition and remediation, leasing the site to an operator.



Marina Concept



4. Concept B: Renewable Energy Generation and Storage

This concept features a 17-acre solar array and 0.5 acre energy storage facility. This concept excludes public access of the solar array area, for the purposes of minimizing remedial costs and maximizing the solar field area.

This concept includes the following features:

- A 17 acre, 4.9 MW solar array that could produce 6.5 gigawatt hours (GWh) of electricity per year, enough to power 650 homes for a year.
- A one-half acre energy storage facility comprised of lithium-ion batteries that would provide storage capacity sufficient to accommodate energy produced by the solar array. This facility would be able to provide energy to the grid during peak demand periods and would compensate for lack of production of the solar array during low generation periods.

A build-out of this concept would require the demolition of the power plant structure, fuel tank farm, and ancillary structures. Because the reuse is industrial, remediation of this area of the site would be less extensive than reuse options that would allow public access to the grounds.

Under this concept, the energy production area of the site would be owned and operated by an energy supplier such as NRG. Energy generated by the solar array or released from the storage site would be delivered to the grid via an interconnect at Eversource's electric substation.

Estimated Renewable Energy Development Cost (2018 dollars)	
\$0	Land acquisition costs (assumes that NRG operates the facility)
\$14,593,200	Demo and remediation cost (based upon mid-range estimate)
\$6,656,300	Development costs (sitework, utilities, structures, facilities)
\$21,249,500	Total project cost

Revenue Generation and Return on Investment (2018 dollars)	
\$1,388,900	Potential average annual earnings (minus operating expenses)
15.3	Years to break even (based upon earnings)
\$7,833,200	Gap between actual IRR and 10% IRR Goal

The site is generally favorable to the development of a solar farm, but demolition and clean up costs result in an insufficient (4.61%) Internal Rate of Return (IRR). Assuming a preferred IRR of 10%, there is a gap of \$7.8 million between the feasibility of development and the estimated cost of development. This gap could potentially be reduced by the negotiation of a less costly engineered control, property tax relief, the sale of Renewable Energy Certificates, and the use of energy arbitrage pricing via on-site battery storage.



Solar Concept



5. Concept C: Education/Destination Facility

This concept features an educational campus or destination facility on the southernmost area of the island. The concept also features surface parking, a naturalized area, and a publicly accessible pathway.

This concept includes the following features:

- A publicly accessible, continuous 3,000 foot long waterfront pathway
- A multi-story 50,000 SF educational building including classrooms, laboratories, offices, meeting space, and auditorium and conference facilities.
- Ground level structured parking with 50 spaces and a 200 space surface parking lot.
- A naturalized area comprised of native tall grasses or similar vegetation that would provide habitat for the local bird population.

Development of an educational facility would be contingent upon demolition of the tank farm, power plant and all associated structures as well as remediation of soils in proximity of development. Development of this concept will likely be contingent upon the redevelopment of the wastewater treatment area north of this development site. The development of a marina at that location would be supportive of the educational reuse concept.

The site can readily accommodate a facility of up to 100,000 sf in size, including the volume of parking necessary to support that development.

Estimated Educational/Destination Facility Development Cost (2018 dollars)	
\$7,517,600	Appraised value of land (by share of parcel)
\$19,854,200	Demo and remediation cost (based upon mid-range estimate)
\$14,840,000	Development costs (sitework, utilities, structures, facilities)
\$42,211,800	Total project costs

Market Value and Return on Investment (2018 dollars)	
\$22,517,600	Market value (based upon list price of Class A office)
\$1,500,000	Potential annual earnings (minus operating expenses)
28.1	Years to break even (based upon earnings)
13.1	Years to break even (earnings+market value)

This reuse concept is nuanced and does not follow typical development feasibility modeling. Institutional uses don't typically have a return on investment model that is directly correlated to the facility; such developments are often long-term investments to support a mission. For the purpose of this analysis, the proposed 50,000 sf facility and grounds have been modeled based upon comparable Class A office space. The project is likely feasible providing it is developed by an institution that is adequately positioned to absorb the cost of development.



Educational Facility Concept



6. Concept D: Residential

This concept features a neighborhood of single-family homes comparable to the Harborview neighborhood immediately north of the site.

This concept includes the following features:

- 29 waterfront lots- 7,500-30,000 sf
- 45 internal lots- 7,500 sf typical

A build-out of this concept would require demolition of all power plant structures and remediation/isolation of soils as necessary to support a residential land use. Development of the residential neighborhood is likely contingent upon the development of a marina at the former wastewater treatment facility to the north of the site. A marina in proximity of the residential development area would add significant value and marketability of residential properties would be positively influenced by the presence of a marina.

The estimated typical market value of residential properties is expected to be \$720,000 for homes on internal lots and \$1,573,000 for homes on waterfront lots. These values are based upon comparable market values for properties in Norwalk's waterfront neighborhoods. The land value has been discounted by 25% from comparable values due to land use restrictions that would be placed on the site because of subsurface heavy metal contamination that will remain on site.

Residential Development Cost (2018 dollars)	
\$7,517,600	Appraised value of land (by share of parcel)
\$24,513,300	Demo and remediation cost (based upon mid-range estimate)
\$62,987,000	Development costs (sitework, utilities, structures, facilities)
\$95,017,900	Total project costs

Market Value and Return on Investment (2018 dollars)	
\$102,133,100	Market value (based upon local real estate market)
7.5%	Profit margin
\$11,888,300	Profit gap (based on 20% profit margin)

This concept presents as the most likely to attract private investment, however profit margins (7.5%) are too low to attract investment, particularly given the risks associated due to contamination on the site. Demolition and remediation of the site would likely need to be conducted by NRG so as to reduce risk incurred by developers. Additionally, the number of units/density of development may need to be increased so as to improve the feasibility of residential development.



Residential Concept

7. Pro Forma of Development Options

The following pro forma provides an estimate of land value, demolition costs, remedial costs, infrastructure improvement costs, development costs, potential property tax impacts, potential market value and potential development revenue and profit margin. All estimates are in 2018 dollars. Market value and potential earnings estimates are based upon study of comparable development types and values in Norwalk or in comparable markets. This pro forma includes mid-range demolition and remedial cost estimates. Development cost estimates do not include potential financing costs.

This pro forma is based upon limited information regarding the level of remediation required at the site to support proposed uses. The cost of demolition and remediation is likely to vary from that identified below, which is based upon a mid-range cost estimate (see page 79 and 80). The cost and extent of infrastructure needed to support development may also differ from the pro forma and could be more favorable to development. The market value of development may also vary from the estimate below.

Pro Forma (Mid-Range Demolition and Remedial Costs)	Existing South Parcel	Parcel 3 Substation	Parcel 4 Marina	Education	Parcel 5 Residential	Solar	Right of Way
Total Land Area (acre)	46.9	7.4	15.8	21.5	21.5	21.5	2.2
Share of South Parcel	100.0%	15.8%	33.6%	45.9%	45.9%	45.9%	4.7%
Cost of Land (share of 2017 appraised land value)	\$ 16,387,280	\$ 2,587,719	\$ 5,505,221	\$ 7,517,624	\$ 7,517,624	\$ -	\$ 776,717
2017 Assessed Land Value (as share of total)	\$ 11,471,096	\$ 1,811,403	\$ 3,853,655	\$ 5,262,337	\$ 5,262,337	\$ 5,262,337	\$ 543,702
2017 Assessed Value of Improvements (as share of total)	\$ 11,104,565	\$ 1,753,524	\$ 3,730,521	\$ 5,094,191	\$ 5,094,191	\$ 5,094,191	\$ 526,329
2018 Property Tax Revenue (share of total, 25.93 mill rate)	\$ 585,387	\$ 92,439	\$ 196,658	\$ 268,545	\$ 268,545	\$ 268,545	\$ 27,746
Cost of Demolition and Remediation ¹			\$ 7,184,190	\$ 19,854,180	\$ 24,513,250	\$ 14,593,210	
Cost of Land and Remediation			\$ 12,689,411	\$ 27,371,804	\$ 32,030,874	\$ 14,593,210	
Roadway and Utilities ²			\$ 777,000	\$ 840,000	\$ 1,827,000		
Site Improvements & Landscaping ³ (excluding remediation)			\$ 200,000	\$ 500,000	\$ 3,860,000	\$ 200,000	
Construction Cost of Structures ⁴			\$ 1,500,000	\$ 13,500,000	\$ 57,300,000	\$ 6,456,300	
Total Cost of Development			\$ 15,166,411	\$ 42,211,804	\$ 95,017,874	\$ 21,249,510	
Potential 2018 Appraised Value ⁵	\$ 5,092,748	\$ 18,900,826	\$ 18,582,573	\$ 69,166,822	\$ 13,973,924		
Potential 2018 Assessed Value ⁶	\$ 3,564,927	\$ 13,230,579	\$ 13,007,801	\$ 48,416,776	\$ 9,781,747		
Potential 2018 Property Tax Revenue (25.93 mill rate)	\$ 92,439	\$ 343,069	\$ 337,292	\$ 1,255,447	\$ 253,641	\$ -	
Potential 2018 Net Property Tax Revenue Impact	\$ -	\$ 146,411	\$ 68,748	\$ 986,902	\$ (14,904)	\$ (27,746)	
Potential 2018 Market Value ⁷			\$ 6,546,040	\$ 22,517,624	\$ 102,133,099		
Net Value (Market Value-Cost of Development)			\$ (8,620,371)	\$ (19,694,180)	\$ 7,115,225		
Average Annual Earnings (Less Operating Expenses & Taxes) ⁸			\$ 1,690,000	\$ 1,500,000		\$ 1,388,888	
Internal Rate of Return at 20 years						4.61%	
IRR Gap (10% IRR-actual IRR) ⁹						\$ 7,833,210	
Total Earnings at 20 years			\$ 33,800,000	\$ 30,000,000		\$ 27,777,760	
Net Value at 20 years (Earnings-Cost of Development)			\$ 18,633,589	\$ (12,211,804)		\$ 6,528,250	
Years to Break Even (Based upon Earnings)			9.0	28.1		15.3	
Years to Break Even (Market Value+Earnings)			5.1	13.1			
Profit Margin					7.5%		
Profit Gap (20% Profit Margin-Profit Margin)					\$ 11,888,349		

Pro Forma Notes

1. See Section 9, page 80, Assumptions and Qualifiers
2. Includes reconstruction of access roadway (raising roadway grade by two feet, resurfacing, widening as needed, and stormwater infrastructure improvements as needed) and construction of new roadways. Also includes the cost of providing drinking water and wastewater infrastructure to the site.
3. Includes pedestrian infrastructure, driveways, and lawns and landscaped areas.
4. Includes all buildings, ancillary structures, and parking structures.
5. Appraised value based upon research of comparable development types and existing appraised land value. Specifically:
 - Substation: Based upon existing appraised value
 - Marina: Based upon per acre appraised value of three marinas in Norwalk.
 - Education: Based upon Class A office space comparable values in Norwalk.
 - Residential: Based upon comparable values of 11 waterfront and 11 near waterfront properties in surrounding Norwalk neighborhoods. Land value is discounted by 25% due to environmental land use restrictions that would be applied to redevelopment sites.
 - Solar: Based upon appraised value of land and construction cost of solar structures as a proxy for appraised value.
6. Assessed value = 70% of appraised value.
7. Market value based upon comparable sale listing values.
 - Marina: Based upon sales list value of four east coast marinas per slip and area of dry storage.
 - Education: Based upon sales list value of multiple Class A office spaces in Fairfield County.
 - Residential: Based upon comparable sales list value of 11 waterfront and 11 near waterfront properties in surrounding Norwalk neighborhoods. Land value is discounted by 25% due to environmental land use restrictions that would be applied to deeds.
8. Annual earnings based upon comparable values.
 - Marina: Based upon slip and dry storage rates of comparable marinas less typical overhead including property taxes..
 - Education: Based lease value of Class A office space in Norwalk.
 - Solar: Based upon value of annual energy output at \$340,000 per MW less operating expenses and property taxes.
9. IRR Gap = The gap between the projected actual Internal Rate of Return (4.61%) at 20 years and an IRR goal of 10% due to land development costs.

8. Fiscal Impact

The existing south parcel site yielded \$585,387 in property tax revenue to the City of Norwalk in 2018. The impact of development on the site will be negative or positive depending on the redevelopment option and the ownership (whether public, private or non-profit) of redevelopment sites.

Redevelopment of the site is likely to have a positive impact on properties with a view of Manresa Island, although this impact would take several years to be realized. Under a conservative scenario, the redevelopment of Manresa Island could exert a 5% positive impact on the 300 properties that have a view of the island. These properties generate \$11.9 million in property tax revenue per year; a 5% increase of this revenue would yield \$595,000 per year in additional property tax revenue, which alone would replace property tax revenue currently generated by Manresa's south parcel.

Potential property tax impacts of the development concepts are summarized in the table below. These estimates assume that the entrance road will be converted to a City of Norwalk right-of-way which would reduce tax revenue on the site by \$18,693 per year based upon the area of taxable land removed from tax rolls. This estimate also assumes that the tax revenue generated by the electric substation will remain constant.

Concept	Private Ownership Annual Fiscal Impact	City of Norwalk or Non-Profit Ownership Annual Fiscal Impact
Marina	\$ 147,343	\$ (196,773)
Education	\$ 64,219	\$ (277,751)
Residential	\$ 1,014,538	-
Solar	\$ (23,903)	-
Marina/Education	\$ 211,562	\$ (474,524)
Marina/Residential	\$ 1,161,881	\$ 817,765
Marina/Solar	\$ 123,440	\$ (220,676)

The most positive development scenario, based upon property tax revenue impact, is the combined Marina/Residential development concept under a private marina ownership model. The least favorable development scenario is the Marina/Education development concept under a City of Norwalk/Non-Profit ownership model. However, when considering the positive impact to surrounding properties, all scenarios are positive.

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Section 11 Implementation Plan

1. Parcelization Plan
2. Potential Redevelopment Sequencing

1. Recommended Parcelization

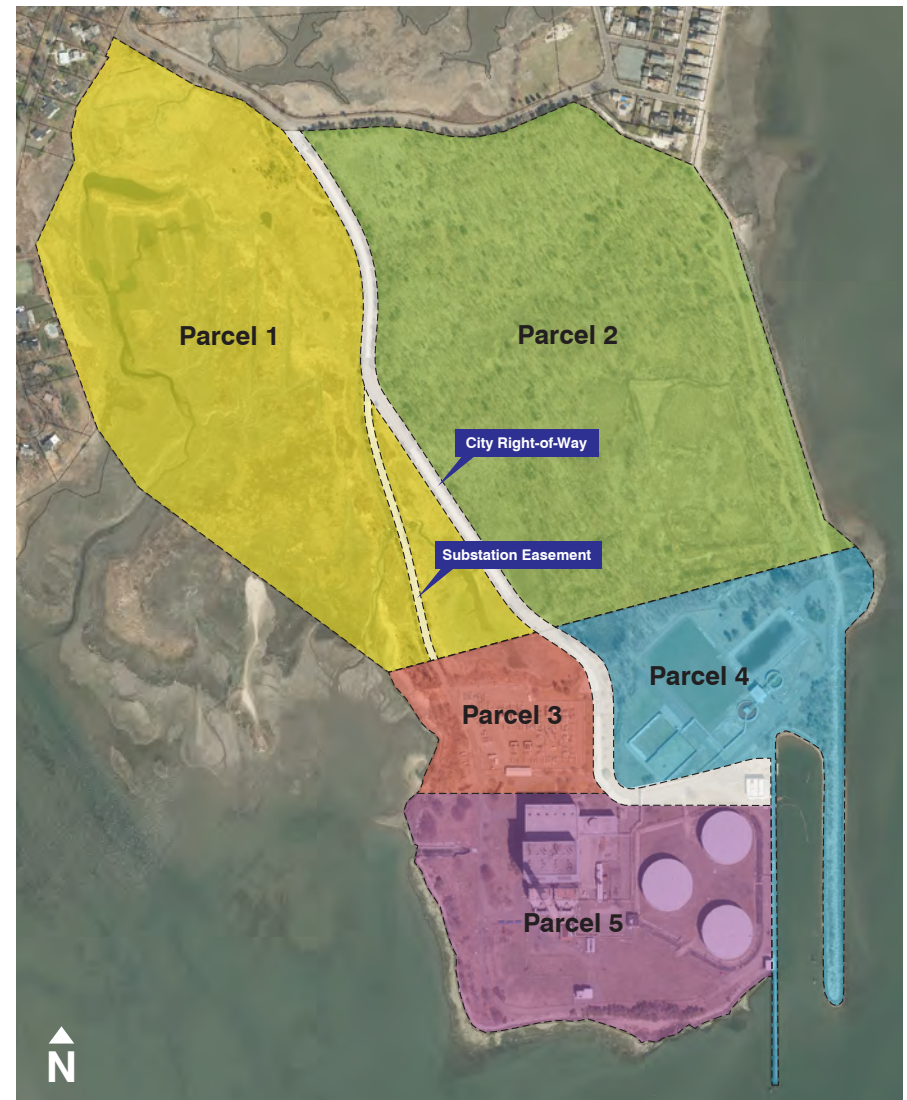
Based upon the recommended redevelopment concepts, a parcelization (subdivision) of land is recommended. A total of five parcels are recommended to replace the existing two parcels. Additionally, the creation of a City right-of-way is recommended in place of the existing access road, connecting to the harbor and providing access to a public boat launch.

Northern Parcel (parcels 1 & 2): The City of Norwalk Assessors Department identifies the northern parcel as parcel #26299 and lists the parcel at 92 acres with an appraised land value of \$5,025,500. Area calculations based upon the City’s GIS parcel data indicate that the parcel is 97 acres. This area is the basis by which the parcelization plan and values was produced.

Southern Parcel (parcels 3, 4 & 5): The City of Norwalk Assessors Department identifies the northern parcel as parcel #26297 and lists the parcel at 33 acres with an appraised land value of \$16,139,491. Area calculations based upon the City’s GIS parcel data indicate that the parcel is 26.9 acres. This area is the basis by which the parcelization plan and values was produced.

The recommended parcelization is as follows:

Parcel	Area (acres)	Estimated Appraised Land Value	Notes
1	44.5	\$2.31 million	Recommended transfer to a land conservation organization
2	50.3	\$2.61 million	Recommended transfer to a land conservation organization
3	7.4	\$2.59 million	Recommended transfer to Eversource
4	15.8	\$5.50 million	Recommended transfer to City of Norwalk
5	21.5	\$7.52 million	Ownership contingent upon reuse
ROW	4.6	\$0.90 million	Transfer to City of Norwalk



Recommended Parcelization of Site

2. Potential Redevelopment Sequencing

The following is a recommended potential sequencing of parcelization, property transfers, demolition, remediation, and site redevelopment actions necessary to support a reuse of Manresa Island. Ultimately, the property owner (NRG), will determine the course of action for a potential reuse of Manresa Island.

Step 1: NRG should complete all remedial actions of wetlands as required by the Connecticut Department of Environment and Energy (CTDEEP). The installation of engineered controls as proposed by NRG are not adequate to support reuse of the site and should not be the immediate focus of remedial activities.

Step 2: Pursue parcelization of the site. This initiative will need to be led by NRG with support from the City of Norwalk and coordination with CTDEEP. NRG should coordinate and seek approval from CTDEEP as the existing parcels are within the property transfer program, which is attached to the specific parcels and property deeds.

Step 3: Transfer Parcel 1 to the City of Norwalk or Land Trust Organization upon completion of remediation of wetlands. NRG should consider a donation of the land as it is comprised mostly of intertidal wetlands and marsh and has no development feasibility. The electric substation access would need to be preserved via an easement encompassing the existing roadway.

Step 4: Transfer Parcel 2 to the City of Norwalk or a land trust organization upon completion of remediation of wetlands and establishment of an agreement with CTDEEP regarding the natural attenuation remedial approach for the site. A sale of the property at market or appraised value (versus a donation) would likely require acquisition by a land trust organization as there is little strategic benefit to the City of Norwalk to expend funds on the acquisition of this site.

Step 5: NRG should commence demolition of the power plant structure, tank farm, and ancillary structures on Parcel 5. Demolition and installation of engineered controls should be conducted on Parcel 5 prior to the development of Parcel 4 as barge access to the harbor will be needed to support the removal of materials from, and transfer of materials to, the Island.

Step 6: NRG should coordinate with CTDEEP to identify engineered controls necessary to stabilize the site for a range of potential future uses.

Step 7: NRG should assess the viability of renewable energy production at the site versus a sale of the site as a development parcel.

Step 8: Transfer Parcel 4 to the City of Norwalk. The City should negotiate a purchase price that reflects the environmental liability of the site. As a condition of this sale, a city right-of-way should be established. The City should pursue a CTDEEP Open Space Watershed Land Acquisition grant to assist in acquisition of the site. Grants are available for up to 65% of market value, but may be limited to areas that are non-revenue generating and fully accessible to the public.

Step 9a: The City of Norwalk should develop a site master plan for a marina and public boat launch and waterfront access based upon the conceptual plan presented within this report. A site master plan will be necessary to support grant applications for remedial activities.

Step 9b: NRG should develop a solar farm and energy storage facility on Parcel 5 or sell the parcel to a residential developer or educational institution.

Step 10a: The City of Norwalk should pursue grant programs through the State of Connecticut and EPA grant fund programs so as to assist in funding of Parcel 4 remediation. These programs include:

- *Site Specific Assessment Grant: up to \$350,000*
- *Multipurpose Grant: Up to \$800,000*
- *Cleanup Grant: Up to \$500,000*

Step 10b: NRG should consider a sale of Parcel 3 to Eversource should NRG divest of Parcel 5.

Step 11a: The City of Norwalk should conduct demolition and remediation of Parcel 4 necessary to support development of a marina as specified in the site master plan. The City should consider installing all engineered controls and conducting all site work necessary to support marina operations.

Step 12a: The City of Norwalk should issue an RFP for marina operators and enter into a lease agreement with a marina operator for the site. The marina operator would be responsible for building out improvements such as docks and marina structures necessary to support marina operations.

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Appendix

1. Solar Performance and Financial Model
2. Opinion of Probable Cost Memorandum

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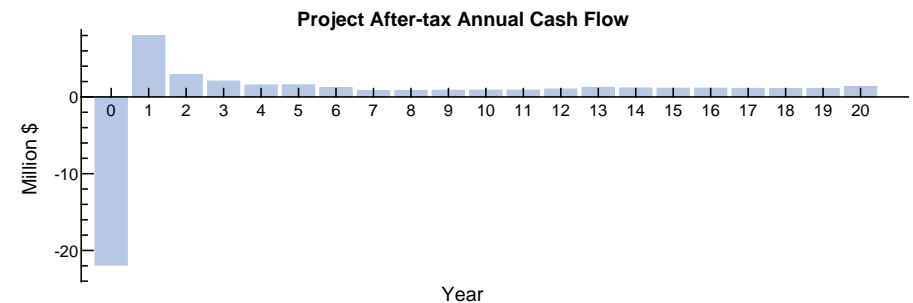
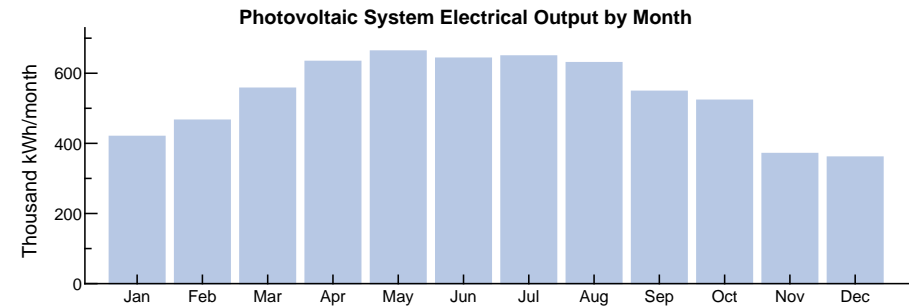
Solar Performance and Financial Model

System Advisor Model Report

Photovoltaic System 4.9 DC MW Nameplate Bridgeport, CT
 Single Owner \$4.34/W Installed Cost 41.17 N, -73.13 E GMT -5

Performance Model			Financial Model	
PV System Specifications			Project Costs	
System nameplate size	4,900 kW		Total installed cost	\$21,249,510
Module type	0		Salvage value	\$0
DC to AC ratio	1.2		Analysis Parameters	
Rated inverter size	4,083.33 kW		Project life	20 years
Inverter efficiency	96 %		Inflation rate	2%
Array type	fixed open rack		Real discount rate	5.5%
Array tilt	33 degrees		Financial Targets and Constraints	
Array azimuth	180 degrees		Solution mode	Calculate IRR
Ground coverage ratio	N/A		PPA price (bid price)	25 cents/kWh
Total system losses	14.08 %		PPA escalation rate	2 %/year
Shading	no		Tax and Insurance Rates	
Performance Adjustments			Federal income tax	35 %/year
Availability/Curtailment	none		State income tax	7.5 %/year
Degradation	0.5 %/yr		Sales tax (% of indirect cost basis)	0%
Hourly or custom losses	none		Insurance (% of installed cost)	0.5 %/year
			Property tax (% of assessed val.)	2.59 %/year
Results			Incentives	
	Solar Radiation	AC Energy	Federal ITC	30%
	(kWh/m2/day)	(kWh)	Depreciation	Depreciation allocations defined with no bonus depreciation
Jan	3.14	419,614	State PBI	0.025 \$/kWh20 yrs
Feb	3.89	465,899	Results	
Mar	4.33	557,064	Nominal LCOE	32.2 cents/kWh
Apr	5.21	633,572	PPA price (year one)	25 cents/kWh
May	5.46	663,096	Project IRR	5.6% in Year 20
Jun	5.61	642,705	Project NPV	\$-2,116,400
Jul	5.56	649,028		
Aug	5.4	629,974		
Sep	4.77	548,277		
Oct	4.25	522,743		
Nov	2.99	370,831		
Dec	2.73	360,718		
Year	4.45	6,463,526		

Photovoltaic System 4.9 DC MW Nameplate Bridgeport, CT
 Single Owner \$4.34/W Installed Cost 41.17 N, -73.13 E GMT -5



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Opinion of Probable Cost Memorandum

23-0814-003
September 19, 2018

Francisco Gomes
Fitzgerald & Halliday, Inc.
416 Asylum Street
Hartford, CT 06103

Re: **Preliminary Opinion of Probable Cost (OPC) for Soil Remediation
Norwalk Power, LLC (aka Manresa Power Plant) Property
Norwalk, CT**

Dear Mr. Gomes:

Tighe & Bond, Inc. (Tighe & Bond) has prepared this preliminary Opinion of Probable Cost (OPC) for Soil Remediation for the Southern Parcel of the Norwalk Power, LLC (Norwalk Power), former Manresa Power Plant Property located in Norwalk, Connecticut (Site). The site is located in South Norwalk on Manresa Island to the south of Longshore Avenue in South Norwalk, as shown on Figure 1. Norwalk Power, a subsidiary of NRG Energy, Inc. (NRG), is the current owner of the site and was the most recent operator of the Manresa Power Plant.

Under contract to FHI, Tighe & Bond has prepared this preliminary OPC for the Southern Parcel to assess potential soil remediation costs associated with redevelopment scenarios as part of the Economic Impact Analysis for the southern parcel of the site which is referred to as the Study Area. The Economic Study is being completed for the City of Norwalk and the Manresa Association in coordination with FHI.

The Study Area encompasses the Southern parcel of the site and is described as Map 5, Block 86, Lot 1. The Study Area includes the Norwalk Power LLC's mothballed power plant, power plant support structures, oil tank farm and active Eversource electric substation. Figure 2 is a 2016 aerial photograph that depicts the layout of the Study Area and the remainder of the site.

Based upon public outreach sessions and information developed as part of the Economic Study, FHI provided four redevelopment concepts for the site:

- Marina
- Solar Array and Marina
- Education Facility and Marina
- Residential Development and Marina

The four concepts are shown on Figure 3.

The site is currently enrolled in the Connecticut Department of Energy and Environmental Protection (CTDEEP's) Property Transfer Program and Resource Conservation Recovery Act (RCRA) Corrective Action Program under the United States Environmental Protection Agency (USEPA). NRG has completed investigations and remedial activities under a combined program (Property Transfer Program/RCRA Closure) since 2006. Remediation is required at the site to address impacts from historic power plant operations which included filling of significant portions of the site with coal ash and limited amounts of oil ash and the storage of coal at the site including the Study Area.

Background

The site consists of two parcels of land:

- Northern Parcel- 92-acre lot designated as Map 5, Block 86, Lot 2
- Southern Parcel- 46-acre lot designated as Map 5, Block 86, Lot 1 [Study Area]

The parcels are shown in Figure 2.

The Southern Parcel (Study Area) is developed with a multi-story power plant building, stack, oil tank farm, above ground oil tanks, basin and dock, wastewater treatment plant and associated basins, subsurface cooling water structures, active substation and paved parking lot/ access roads (Figure 2). The power plant is currently not in operation and was taken out of service in June 2013 following Superstorm Sandy that devastated Connecticut's shoreline in October 2012. The oil tanks are surrounded by an earthen berm. The Study Area includes grassed areas surrounding Manresa Power plant, oil tanks, access roads.

The Study Area was initially developed as the Manresa Institute, a Jesuit retreat, in the late 1800's. The Study Area and Northern Parcel were purchased by Connecticut Light and Power (CL&P) on October 2, 1952 for development as a coal-fired power plant to provide electricity to neighboring areas of Norwalk and the power grid. The plant began operation in 1960. CL&P was permitted to fill the area to the east of the Manresa Island Road, current wooded area, on the Northern Parcel with coal ash and sluiced water generated as a by-product of the coal-fired power plant operations. Coal storage and handling occurred on the Southern Parcel (Study Area). Figure 4 is a 1965 aerial photograph that depicts the site, including the coal ash filled areas on the northeastern portion of the Study Area and the entire Northern Parcel [referred to as Area of Concern (AOC)-1]. Coal storage took place within the southern portion of the Study Area. The plant was converted to an oil-fired power plant in 1972. Reportedly oil ash was also deposited within AOC-1. Norwalk Power purchased the property from CL&P on December 16, 1999 and operated the plant as an oil-fired power plant until 2013.

The Northern Parcel is undeveloped with an overgrown, wooded area and contains tidal and freshwater wetlands, designated W-1 through W-5. An access road, Manresa Island Road, is oriented north-south and connects the Northern Parcel and Southern Parcel with Longshore Avenue. The area to the west of the Power Plant Access road was subject to significant historical filling with coal ash by-product material from the coal-fired and oil-fired power plant at the Study Area.

Based upon historic power plant operations, the site, including the Study Area, were determined to be impacted by the former power plant operations and the impacts encompass the majority of the Southern Parcel (Study Area) and the area to the east of the Manresa Island Road on the Northern Parcel. The site boundary and Study Area are shown on each of the figures in this letter. NRG is completing site-wide environmental investigations and remediation to address the historic impacts associated with the former power plant operations.

Environmental Setting

The majority of the Site and the Study Area is located within the Federal Emergency Management Agency (FEMA) 100-year flood plain with the exception of the former tank

farm at the southeast corner of the Study Area, the active electrical substation/equipment area and the area adjacent to the north-central portion of the site, as shown on Figure 5.

Five wetlands were identified at the site (W-1 through W-5) as shown on Figure 5. Wetland areas, designated as W-4 and W-5, are located along the northern boundary of the Study area (Figure 5). W-5 is a tidal wetland while W-4 is classified as a freshwater wetland.

Manresa Island is surrounded to the east, west and south by Long Island Sound. Long Island Sound is classified as a SA water quality on the western and southern side of the site and SB on the eastern portion of the site near Norwalk Harbor. CTDEEP indicates that SA surface water is designated for use for marine fish, shellfish and wildlife habitat, shellfish harvesting for human consumption, recreation, industrial and other legitimate uses including navigation. SB water has similar uses as SA water with the exception that commercial shell fishing is permitted instead of shellfish harvesting for direct human consumption.

Groundwater beneath the site is classified as GB by CTDEEP. GB classification indicates that the groundwater is in a historically highly urbanized area or an area of intense industrial activity. Groundwater in a GB area has been adversely impacted by waste discharges, spills or leaks of chemicals, or land use impacts. The groundwater is not presumed suitable for direct human consumption and a public water supply is available.

The site does not appear to be connected to City of Norwalk Public sewer system based upon available sewer map information. Septic discharges are directed to an existing septic leach field located within the southwest corner of the Study Area.

Applicable Clean-up Standards

The site is subject to the CTDEEP's Remediation Standard Regulations (RSRs) because the site is enrolled in the CTDEEP Property Transfer Program. The RSRs provide the framework to evaluate whether remediation, institutional controls, and/or engineered controls will be required to abate identified impacts from petroleum products, hazardous substances and/or hazardous waste. The nature and extent of impacted areas must be fully characterized and delineated prior to a final determination with respect to RSR compliance.

CTDEEP's intent in developing the RSRs was to define the following:

- Minimum remediation performance standards
- Specific numeric clean-up criteria
- A process for establishing alternative site-specific standards, if warranted

In general, RSR numeric criteria are used to remediate contaminated environmental media (i.e., soils and groundwater). RSR numeric criteria are not applicable to building materials and sediment. Brief summaries of default CTDEEP RSR soil and groundwater criteria are provided below. In addition, the RSRs provide the flexibility to apply specific exemptions and variances with CTDEEP approval, as required.

Soil Remediation Criteria

The CTDEEP soil remediation criteria integrate two risk-based goals, including: Direct Exposure Criteria (DEC) and the Pollutant Mobility Criteria (PMC).

- Direct Exposure Criteria (DEC) were developed to protect human health from risks associated with direct exposure (ingestion) to contaminated soil.

- The DEC applies to accessible soil to a depth of 15 feet.
- The DEC for substances other than PCBs do not apply to inaccessible soil at a release area provided that, if such inaccessible soil is less than 15 feet below the ground surface, an environmental land-use restriction (ELUR) is in effect with respect to the subject release area to prevent access to contaminated soils. Inaccessible soil descriptions are summarized below.
- The CTDEEP has established two sets of DEC using exposure assumptions appropriate for residential land use (RES DEC) and for industrial and certain commercial land use (I/C DEC). The RSRs define residential activity and industrial or commercial activity as follows:
 - Residential activity – “means any activity related to a (A) residence or dwelling, including but not limited to a house, apartment, or condominium, or (B) school, hospital, day care center, playground, or outdoor recreational area.”
 - Industrial or commercial activity – “means any activity related to the commercial production, distribution, manufacture or sale of goods or services, or any other activity which is not a residential activity (defined above).”

In general, all sites are required to be remediated to the residential criteria (Res DEC). If the I/C DEC are applicable and used, an ELUR is required to be placed on the property deed in accordance with the RSRs that restricts Residential Use of the site.

The CTDEEP RSRs provide options that will allow redevelopment of the site through limited remedial excavation of soils and placement of an ELUR on the site to prevent access to soils. The RSRs provide several options for rendering the soils exceeding the DEC inaccessible by:

- Excavating soils to a depth of 4-feet below grade within unpaved areas and then covering with clean soil
- Excavating soils to a depth of 27-inches in areas that will be paved with a minimum of 3-inches of asphalt
- Placement of soils under a building
- Placement of another permanent structure approved by the Commissioner

In addition, the RSRs provide options to request a variance for the installation of an engineering control (EC) to prevent contact with the soils. Use of an EC can be requested from CTDEEP if certain requirements are met. There are multiple potential options and designs for ECs, the applicability of which can be tailored for site-specific conditions.

- Pollutant Mobility Criteria (PMC) were designed to protect groundwater quality from contaminants that migrate or leach from the soil to groundwater.
 - The purpose of these criteria is to prevent any contamination to groundwater in GA classified areas, and to prevent unacceptable further degradation to groundwater in GB classified areas.

- o The PMC generally apply to all soil in the unsaturated zone and soils to the depth of the seasonal high-water table in areas with "GB" classified groundwater, which the site is located in.
- o Soils that exceed the PMC must be remediated unless the soils are environmentally isolated.

Groundwater Remediation Criteria

The objectives of the groundwater criteria are the following:

- Protect human health
- Protect and preserve groundwater in GA areas as a natural resource
- Protect existing use of groundwater regardless of the area's groundwater classification
- Prevent degradation of surface water from discharges of contaminated groundwater

The site is classified as a GB Groundwater Area and there is no current use or contemplated future use of groundwater or surface water according to the Phase III Investigation Report prepared by Shaw.

Portions of the RSRs governing groundwater regulate remediation of groundwater based on each substance present in a plume and by each distinct plume of contamination. Several factors influence the remediation goal at a given site, including: background water quality, the groundwater classification, the proximity of nearby surface water, existing groundwater uses, and existing buildings and their use. When assessing general groundwater remediation requirements, all of these factors must be considered in conjunction with the numeric criteria of the RSRs.

As such, the following groundwater numeric criteria are applicable.

- Surface Water Protection Criteria (SWPC): The SWPC applies to all groundwater, which discharges to surface water. The SWPC ensure the groundwater contamination resulting from on-site sources, which exceed background, is remediated to levels that adequately protect surface water quality.
- Groundwater Volatilization Criteria (GWVC): The GWVC apply to all groundwater contaminated with a VOC within 15 feet of the ground surface or a building. According to the regulations, VOCs shall be remediated to a concentration that is equal to or less than the applicable residential volatilization criterion for groundwater. If groundwater contaminated with a VOC is below a building used solely for industrial or commercial activity, groundwater may be remediated such that the concentration of the substance is equal to or less than the applicable industrial/commercial (I/C) GWVC in lieu of the residential (RES) GWVC, provided that an ELUR is filed preventing residential uses.

Sediment

The numeric criteria in the RSRs apply to the remediation of soil and groundwater but not directly to sediments. However, the RSRs have a provision for sediments. If potential ecological risk exists are anticipated then an ecological risk assessment would be required. The RSRs indicate that at any location at which polluted soil has eroded into a surface-water body, the CTDEEP may require that the impact on aquatic life be assessed and that remediation to protect or restore aquatic life and surface water quality from the effects of such polluted soils be undertaken. Shaw completed an Ecological Risk Assessment for the

site dated June 2009 which identified impacts to the on-site wetlands but not Long Island Sound. In 2014, Shaw prepared a Remedial Action Plan for Wetland Sediment for the site.

Investigation Status and Summary of Impacts

Tighe & Bond conducted a review of files at the CTDEEP public records file room and contacted the CTDEEP and USEPA case manager to gain an understanding of site status.

The site has been investigated through an iterative process of investigations to gather information regarding the nature and extent of impacts to soil and groundwater at the site. Investigations commenced in 1999 within a Phase I Environmental Site Assessment (ESA). The investigation phase of the project was completed with the Final Phase III Investigation Report and Completion of Investigation Transmittal Form dated September 21, 2010. Supplemental investigations of site sediments continued through 2011.

The investigation identified 12 AOCs, or locations/areas where hazardous substances and/or hazardous substances (including petroleum) could have been used, treated, handled, disposed of or spilled and released to the environment. Figure 3 shows the identified AOCs at the site. The table below provides a summary of the AOCs, the associated source material and COCs, whether a release was identified in soils, and if remediation is required based upon current site use. The information provided below was compiled from Shaw's Final Phase III Investigation Report which was provided to CTDEEP and USEPA.

Areas of Concern Summary Norwalk Power, LLC Manresa Power Plant Norwalk, CT				
AOC	Chemicals of Concern (COCs) In Soils	Release Identified	Source Material Released	Remediation Required
AOC-1: Former Ash Disposal Area	Metals, polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs), ETPH	Yes	Coal, Coal Ash, Oil Ash, residual cleaning solvents	Soils: Metals above Res DEC and I/C DEC. Vanadium was detected above the PMC. Wetlands: Potential Ecological Risk to Wetlands from metals.
AOC-2: Former Gasoline UST	Petroleum (TPH), lead, Aromatic VOCs (AVOCs).	Yes	Gasoline	Soil indicated as in compliance
AOC-3: Fuel Oil Tank Farm	Petroleum (TPH), Polycyclic Aromatic Hydrocarbons (PAHs)	Yes	Petroleum/Oil	Soil indicated as in compliance

Areas of Concern Summary Norwalk Power, LLC Manresa Power Plant Norwalk, CT				
AOC-4: Former Coal Storage Area	Metals, PAHs	Yes	Coal, Coal Ash	Soils: Metals above the Res DEC and I/C DEC. PAHs were detected above the PMC.
AOC-5: Former Fuel Oil USTs	Petroleum (TPH), PAHs, AVOCs	Yes	Petroleum/Oil	Soil indicated as in compliance
AOC-6: Internal Combustion / Blowdown UST	Petroleum (TPH), PAHs, AVOCs	Yes	No. 6 petroleum oil from the oil pump house	Soils: Petroleum Hydrocarbons detected above Res DEC
AOC-7 Existing Septic Leach field	No Releases of COCs noted	No	Not Applicable	Not required/ Not applicable
AOC-8 Former Septic Leach field	No Releases of COCs noted	No	Not Applicable	Not required/ Not applicable
AOC-9: Electrical Equipment	Petroleum (TPH), PCB	Yes	Incidental spills/ equipment leaks	Soil indicated as in compliance
AOC-10: Former RCRA Impoundment	No Releases of COCs noted	No	Not Applicable	Not required/ Not applicable
AOC-11: Long Island Sound Sediment	Petroleum (TPH), PAHs and Metals	Yes	Petroleum oil, coal, coal ash	Not required/ Not applicable
AOC-12: Container Storage Area	VOCs, SVOCs/ PAHs, PCBs, Metals	No	Not Applicable	Not required/ Not applicable
Note: 1. Bold indicates RSR soil exceedance 2. Tighe & Bond has not completed a third-party LEP review to confirm the nature and extent of the delineation nor completed an evaluation of the conceptual site model developed by Shaw.				

Groundwater

Site-wide groundwater has been impacted by the former power plant operations. The groundwater has been regularly monitored as part of the PTP and as part of RCRA closure of the site. RCRA closure groundwater monitoring has been completed since 1989. A summary of groundwater data obtained from the Phase III ESA are provided below.

- Metals (arsenic, beryllium, and zinc) exceeded RSR SWPC in multiple wells. Concentrations of nickel, lead and copper also exceeded RSR SWPC at individual wells. The elevated metals concentrations were detected in AOC-1 Former Ash Disposal Area.
- VOCs were detected in AOC-4 Former Coal Storage Area at concentrations below RSR criteria.
- ETPH was detected in AOC-4 Former Coal Storage Area, AOC-6 Internal Combustion/Blowdown UST, AOC-7 Existing Septic Leach Field and AOC-8 Former Septic Leach Field. Concentrations of ETPH were historically detected in AOC-4/6 and AOC-7 at concentrations that exceeded RSR additional polluting substance (APS) criteria during the 2007 groundwater sampling. ETPH exceeded the RSR APS criteria for concentrations observed in AOC-7 during the 2008 sampling as indicated in the Phase III.
- PAHs were detected but at concentrations below RSR criteria/ APS criteria.
- PCBs have not been detected at the site during previous sampling events.

Current Proposed Remedial Strategy

Tighe & Bond is providing this summary of the proposed remedial strategy at the site based upon file information available at the CTDEEP public file room during our visit on March 16, 2017 and correspondence with the CTDEEP and USEPA project managers. The CTDEEP delegated oversight of the investigation and remediation site to an LEP. Norwalk Power selected Shaw for LEP services which have included investigation, remediation and remedial planning for the site. Shaw has completed the investigation of the site and has submitted the completion of investigation to CTDEEP on behalf of Norwalk Power. Tighe & Bond primarily relied on information provided in the following documents:

- *Phase III Investigation Final Report*, prepared by Shaw, dated September 15, 2010.
- *Preliminary Technical Impracticability Assessment for Groundwater*, prepared by Shaw, dated November 20, 2012.
- *Part 1 and Part 2 Engineering Control Submittal*, prepared by Shaw, dated March 2013.
- *Sediment Remedial Action Plan for Wetland Sediments*, prepared by Shaw, dated October 21, 2014.
- Correspondence-NRG-Norwalk Power, Wetland Sediment Remediation Permit Approach dated June 2, 2016.

Tighe & Bond has not conducted a separate third-party technical review of the site information with regard to the completeness of the site investigation or viability of the conceptual site model (CSM) or proposed remedial approach. No records of a comprehensive Remedial Action Plan (RAP) or ELUR for the site were identified during the CTDEEP file review. However, the currently proposed remedial approach focuses on the use

of an EC as indicated the Part 1 and Part 2 Engineering Control Submittal, natural attenuation of groundwater as indicated in the Technical Impracticability for groundwater remediation at AOC-1, and sediment remediation to mitigate ecological risk within on-site wetlands in order to achieve overall compliance with RSRs. As with most complex remediation sites, the proposed remedial approach is not static and is subject to change based upon factors such as potential site use, sale/transfer of the property and input from the CTDEEP and USEPA.

A summary of the NRG's apparent current remedial approach based upon available reports is provided below.

Soil

Norwalk Power has proposed the implementation of an Engineering Control for AOC-1 Former Ash Disposal Area and AOC-4 Former Coal Storage Area to prevent exposure to impacted soils. These two AOCs encompass most of the site and the Study Area (Figure 3). The proposed EC also includes restricting the site to I/C DEC use through the establishment of an ELUR, which would preclude residential activity as defined above. The proposed EC also includes the installation of 6-inch earthen covers and 5-inch aggregate covers in the southern portion of the AOC-1 in the vicinity of the existing polishing and equalization basin and within AOC-4 as shown in the Figures appended to this document.

Tree clearing and remediation of the wooded area in the north and central portion of AOC-1 were not proposed in order to preserve the forest habitat. Instead, Shaw developed a site-specific I/C DEC for the metals arsenic and beryllium and submitted the request to CTDEEP for approval. However, it is uncertain if the proposed site-specific criteria will be approved.

The EC will require on-going inspection, maintenance, monitoring and financial assurance by NRG.

Groundwater

Norwalk Power has proposed an ELUR to address groundwater use at the site. Shaw submitted a preliminary TI Assessment for Groundwater to CTDEEP on November 20, 2012. The TI assessment was submitted as an initial step to requesting a variance from the requirement to complete groundwater remediation at AOC-1. Shaw indicated that the site should be eligible due to the extensive nature of the source and associated groundwater impacts within AOC-1. There is no significant current or future risk to human health due to the presence of metals impacted groundwater at the site. According to Shaw, the groundwater plume is stable and has a low potential for ecological risk. Shaw concluded that there are no significant risks to ecological receptors in Long Island Sound based upon surface water testing of the Long Island Sound. The TI Variance requires CTDEEP review, concurrence and approval.

In addition, Shaw submitted an alternative surface water protection criteria (SWPC) request for arsenic, beryllium, copper, lead, nickel, zinc, phenanthrene, ETPH and vanadium to CTDEEP in April 2008.

The TI and alternative SWPC request are currently in review with the CTDEEP. It is uncertain if the variance requests will be approved by CTDEEP.

Sediment

Sediments within wetlands W-3, W-4, and W-5 were determined to require remediation to mitigate ecological risk for either benthic vertebrates and vertebrate wildlife from metals in sediments. The proposed sediment remediation activities are detailed in the *Remedial Action*

Plan for Wetland Sediment, prepared by Shaw dated October 21, 2014. Norwalk Power/Shaw is implementing the proposed sediment remediation in a two-step approach: an initial pilot test in targeted wetlands followed by a full-scale wetland remediation. The pilot test for W-4 and W-5 was targeted to be completed in 2018, pending CTDEEP permit approvals. The pilot test will include the excavation of two 20 ft. by 20 ft. cells to a depth of 1 ft. One cell will be backfilled with clean fill and a second excavation cell will be backfilled with a geomembrane liner and fill. The pilot areas will be monitored for one year on a quarterly basis following completion of the excavation and backfill. The results of the pilot test will be used to determine the most effective method for mitigating risks to the wetlands. Following evaluation of the pilot test results, the full-scale wetland remediation would be completed, over a one to two-year period.

Redevelopment Concepts

FHI has developed four concepts for the study area based upon information developed as part of this study. A summary of the four development concepts are provided in the table below.

Concept	Summary
Marina	<ul style="list-style-type: none"> • 6-acre Paved Boat Yard • Marina Building • 120-space Paved Marina Parking Lot • 50-space Public Parking Lot • Public Boat Launch • 110-slip Marina • Gravel Path/Fencing to Longshore Avenue along the Eastern Shore of AOC-1 • Removal of existing wastewater treatment plant structures including polishing basins and equalization basins
Solar Array and Marina	<ul style="list-style-type: none"> • 12-Acre Solar Array • 1-Acre Energy Storage • Gravel Pathway surrounding the Solar Array • Marina Concept Components (listed above) • Removal of Manresa Power Plant Structures and Fuel Oil Tank farm
Education and Marina	<ul style="list-style-type: none"> • 50,000 to 100,000-s.f. Educational Facility • 300-space Parking Lot • Naturalized Area with a fence • Gravel Pathway surrounding the Naturalized Area • Removal of Manresa Power Plant Structures and Fuel Oil Tank Farm • Marina Concept Components (listed above)
Residential Development and Marina	<ul style="list-style-type: none"> • 30-Waterfront Residential Lots • 46-Internal Residential Lots • Street • Removal of Manresa Power Plant Structures and Fuel Oil Tank farm • Marina Concept Components (listed above)

Proposed Soil Remedial Strategy

Based upon a review of available data, Tighe & Bond recommends the use of EC variances for the Marina, Solar and Marina and Education, Solar and Marina concepts is proposed. The EC approach is similar to the EC that NRG has proposed for AOC-4 and a portion of AOC-1; however, the proposed EC scenarios provide an increased buffer (thickness) for the proposed uses. A combination of soil excavation and an EC variance is proposed for the Residential Development and Marina Concept.

The ECs were obtained from CTDEEP's DRAFT RSR Wave 2 Conceptual Language for 22a-133k-2(f)(2)(D) dated April 5, 2016. The default thicknesses for the ECs for specific-site conditions are as follows:

- Non-paved surfaces with shallow rooted vegetation, mulch or gravel: 1-foot of clean soil cover that does not exceed applicable standards and is underlain by a demarcation barrier.
- Non-paved surfaces with shrubbery: 1.5 feet (18-inches) of clean soil cover that does not exceed applicable standards and is underlain by a demarcation barrier.
- Paved surfaces: 2.5-inches of bituminous concrete or 3-inches reinforced concrete with 6-inches of suitably engineered subbase that does not exceed applicable criteria. Thicker pavement was proposed in the parking lots to accommodate use as parking lots and boat yard.
- Concrete Ballast, ground-mounted solar array: a minimum of 2-feet of clean soil that does not exceed applicable criteria underlain by a demarcation barrier.

A 6-inch layer of loam and grass seeding was added for non-paved areas as part of site restoration.

Soil excavation to a depth of 4 feet is proposed for the Residential development concept area to render impacted soils inaccessible under the RSRs.

A split rail-type barrier fence and EC for non-paved area is proposed to the west of the path to Longshore Avenue to the north of the Study Area as part of the remedy to limit contact with impacted soils at AOC-1 on the Northern Parcel. The fence requires a special design to address construction within the 100-year flood plain.

The EC process requires the submittal of an Engineered Control Application which has two parts. Part 1 of the EC Application presents the conceptual EC and supporting information. CT DEEP approval and concurrence is needed to advance to Part 2 of the EC. Part 2 of the EC application presents the detailed engineering design, implementation schedule, operation and maintenance plan, and financial assurance.

The placement of an ELUR on the deeds of the Study Area/ Southern Parcel will be required as part of site remediation.

Preliminary OPCs for Soil Remediation for Redevelopment Concepts

The preliminary OPCs for Soil Remediation for the four redevelopment scenarios are provided below. The OPCs were developed for areas where the proposed concepts overlap with the footprint of the AOCs identified during the Phase III ESA. Unit costs for the OPC were obtained from material cost ranges provided in the *Connecticut Department of Transportation 2017 Cost Estimating Guidelines*. Opinions of Cost provided have an anticipated accuracy range of +30% to -15% and include a 25% contingency factor.

Preliminary OPCs for Soil Remediation for Redevelopment Concepts

Marina Concept: \$ 7,860,000

Solar and Marina Concept: \$25,460,000

Education and Marina Concept: \$25,420,000

Residential and Marina Concept: \$36,140,000

OPC Assumptions and Qualifiers

- Manresa Power Plant and associated structures will require further assessment and characterization for the presence of HBMs within building materials. NRG indicated that a HBM assessment was not available for the site structures. A HBM survey was not completed as part of this scope of work.
- Demolition costs developed for this study were based upon a demolition contractor estimate following the review of aerial photographs and footprint of the plant structures and published literature. A cost of \$4 to \$5 million was estimated for ACM abatement estimate, contingent upon an environmental survey. An on-site inspection/ testing was not completed by the demolition contractor. The presence of HBMs could have a significant impact on the abatement and disposal costs for power plant/ associated structure debris. The cost estimate does not include additional HMB material abatement (PCBs, mercury contamination and lead paints above allowable recycling limits of 50 parts per million).
- The power plant demolition estimate includes the removal of concrete footings/ slabs to a depth of 3 feet below grade below structures. The extent and depth of concrete footings are unknown.
- It is assumed that NRG has removed petroleum from the oil tanks and distribution piping and that all hazardous wastes/ materials have been removed from the power plant and buildings.
- Demolition of subsurface structures (i.e., cooling water in-take/ discharge tunnel, power plant building foundations) or utilities is not included. The location and extent of these structures are currently unknown.
- CTDEEP has indicated that a geotechnical assessment will be needed within the footprint of the former RCRA impoundment at the proposed Marina Boat Yard area to assess soil conditions. Geotechnical investigations would also be needed in areas of the Study Area that have been historically filled. This OPC does not include costs associated with geotechnical investigations, evaluations, or other design considerations.
- Coordination with CTDEEP/EPA will be required for the proposed remedial approach. EC are variances to the RSRs that must be negotiated and approved by CTDEEP. Financial assurance cost for ECs are not included in the OPC and will be required to be established once CTDEEP provides EC approval.
- A cost contingency is carried in the OPC for potential limited pre-design soil investigations to assess environmental soil conditions for proposed development scenarios. Soils beneath the Manresa Power Plant and Oil Tank Farm were not previously assessed because they were environmentally isolated beneath the buildings and costs are not included in this OPC for their remediation. Only limited investigations have been completed in the western portion of AOC-4. Final remediation costs would need to be reviewed if additional impacts are identified.


- Disposal costs for contaminated soils are based upon non-hazardous soil conditions. Final costs to be determined based upon waste characterization sampling and acceptance at a soil disposal facility.
- OPC assumes use of common fill for backfilling or remedial excavations. Use of structural fill to support buildings and other site improvements is not included.
- Active groundwater remediation is not included in the OPC. It is assumed that alternate surface water protection criteria and technical impracticability approach will be approved by CTDEEP. Additional costs may be incurred for groundwater remediation.
- OPC does not include remediation outside the study area (i.e., Long Island Sound or Parcel 2) if determined to be required at a later time.
- Sediment remediation is not included as part of the OPC. Sediments are currently being assessed and remediated by NRG in coordination with CTDEEP and EPA. It is assumed that NRG will complete the sediment remediation and will receive CTDEEP and EPA approval.
- Excavations are proposed above the groundwater table; therefore, dewatering is not included as part of the OPC.
- CTDEEP program filing fees or legal costs are not included.
- Preparation of CTDEEP/ EPA Site Reports and ELUR for the Southern Parcel are not included.
- Federal, State, or Local permitting that may be required to facilitate remediation and redevelopment are not included.
- OPC does not include cost for replacement of monitoring well network, if needed.
- On-going monitoring, annual inspection, and reporting requirements associated with the ECs and groundwater monitoring programs are not included. The scope and costs for these items will be dependent upon the final EC and CTDEEP approval.
- Prevailing wages (Davis-Bacon Act) were not included in the OPC costs.
- The site is not connected to the City of Norwalk Sewer System. Costs to connect to the City of Norwalk sewer system, if required are not included.
- Assumes remediation will be completed post-demolition.
- Site engineering investigations or evaluations for infrastructure are not included.
- Structural assessment and repairs of the dock and pier was not considered in the preparation of this OPC.
- Environmental studies and dredging assessment of the barge basin were not considered as part of this OPC.
- Shoreline stabilization assessment is not contemplated as part of this OPC.
- A final Land Survey for the Study Area is not included.

This is Preliminary Opinion of probable Construction Cost. Tighe & Bond has no control over the cost or availability of labor, equipment or materials, or over market conditions or the Contractor's method of pricing, and that the estimates of probable construction costs are made on the basis of the Tighe & Bond's professional judgment and experience. Tighe & Bond makes no guarantee nor warranty, expressed or implied, that the bids or the negotiated cost of the Work will not vary from this estimate of the Preliminary Probable Construction Cost.

If you have any questions or comments, please contact me at (860)-852-5214 or via e-mail at lewilley@tighebond.com.

Sincere regards,

TIGHE & BOND, INC.



Lynn E. Willey, P.G., LEP
Senior Environmental Scientist



Dana C. Huff
Vice President

Enclosures:

- Figures
- Tighe & Bond Preliminary Opinion of Probable Costs for Soil Remediation
- Power Plant Demolition and Fence Estimate Back-up Information



Project Name: **Preliminary Opinion of Probable Cost (OPC) for Soil Remediation**
 Project Number: **N0814003**
 Project Location: **Southern Parcel -Map 5, Block 86, Lot 1**
 Description: **Marina Concept**
 Prepared By: **LEW** Date: **June 14, 2018**

Item No.	Item	Quantity	Unit	Price	Amount
1	Wastewater Plant Demolition	1	LS	\$1,000,000	\$1,000,000
2	Remove and Dispose of Damaged Bit. Conc. Pavement	5,000	SY	\$8	\$39,999
3	Clearing and Grubbing	1	LS	\$12,000	\$12,000
4	Formation of Subgrade	37,430	SY	\$3	\$112,290
5	Sedimentation and Erosion Control (Inc. Tracking Pad)	1	LS	\$15,000	\$15,000
6	Engineered Control Unpaved				\$1,412,822
6a	Demarcation Layer	37,500	SY	\$2	\$75,000
6b	Puncture Resistant Geotextile	37,500	SY	\$4	\$150,000
6c	Silt fence	4,765	LF	\$8	\$38,120
6d	Turf establishment	37,500	SY	\$3	\$112,500
6e	EC soils	12,500	CY	\$65	\$812,478
6f	Loam	18,727	SY	\$12	\$224,724
7	6' Flood Zone Fence- Northern Coastal Path	1,600	LF	\$52	\$83,200
8	Engineered Control Paved				\$2,884,243
8a	Bituminous Concrete (4.0 inch)	10,489	Ton	\$200	\$2,097,728
8b	Processed Aggregate Base (6-inches)	7,600	Ton	\$55	\$418,025
8c	Processed Aggregate Base (6-inches)-Impoundment	5,745	Ton	\$55	\$315,989
9	Asphalt Curb	3,500	LF	\$15	\$52,500
10	Environmental Investigation				\$50,000
	Subtotal Construction Costs				\$5,609,554
	General Conditions			15%	\$841,433
	Incidentals and Contingency			25%	\$1,402,388
	TOTAL CONSTRUCTION COSTS				\$7,853,376
				EST.	\$7,860,000

Refer to OPC Assumptions and Qualifiers provided in Preliminary Opinion of Probable Cost (OPC) for Soil Remediation dated 9-19-2018

SY-square yard

LF- Linear feet

LS- Lump sum (Estimated)

CY -Cubic Yard



Consulting Engineers
Environmental Specialists

Project Name: **Manressa Remedial Cost Assessment**
 Project Number: **N0814**
 Project Location: **Longshore Avenue**
 Description: **Opinion of Probable Environmental Remediation Soil Costs-Solar and Marina Concept**
 Prepared By: **LEW** Date: **June 14, 2018**

Item No.	Item	Quantity	Unit	Price	Amount
1	Power Plant Demolition	1	LS	\$9,000,000	\$9,000,000
2	Remove and Dispose of Damaged Bit. Conc. Pavement	5,000	SY	\$8	\$39,999
3	Clearing and Grubbing	1	LS	\$12,000	\$12,000
4	Formation of Subgrade	99,500	SY	\$3	\$298,501
5	Sedimentation and Erosion Control (Inc. Tracking Pad)	1	LS	\$15,000	\$15,000
6	Engineered Control Unpaved				\$4,037,851
6a	Demarcation Layer	110,135	SY	\$2	\$220,270
6b	Puncture Resistant Geotextile	110,135	SY	\$4	\$440,540
6c	Silt fence	12,000	LF	\$8	\$96,000
6d	Turf establishment	99,453	SY	\$3	\$298,360
6e	EC soils	36,711	CY	\$65	\$2,386,237
6f	Loam	49,704	SY	\$12	\$596,444
7	6'Flood Zone Fence- Northern Coastal Path	1,600	LS	\$52	\$83,200
8	Engineered Control Paved				\$2,902,243
8a	Bituminous Concrete (4.0 inch)	10,489	Ton	\$200	\$2,097,728
8b	Processed Aggregate Base (6-inches)	7,600	Ton	\$55	\$418,025
8c	Processed Aggregate Base (6-inches)-Impoundment	5,745	Ton	\$55	\$315,989
9	Asphalt Curb	4,700	LF	\$15	\$70,500
10	Excavation and off-site disposal (Non-Hazardous)	500	Ton	\$85	\$42,500
11	Backfill Tank Farm	25,000	Ton	\$65	\$1,625,000
12	Environmental Investigation				\$125,000
	Subtotal Construction Costs				\$18,181,293
	General Conditions			15%	\$2,727,194
	Incidentals and Contingency			25%	\$4,545,323
	TOTAL CONSTRUCTION COSTS				\$25,453,811
				SAY	\$25,460,000

Refer to OPC Assumptions and Qualifiers provided in Preliminary Opinion of Probable Cost (OPC) for Soil Remediation dated 9-19-2018

SY-square yard

LF- Linear feet

LS- Lump sum

CY -Cubic Yard



Project Name: **Preliminary Opinion of Probable Cost (OPC) for Soil Remediation**
 Project Number: **N0814003**
 Project Location: **Southern Parcel -Map 5, Block 86, Lot 1**
 Description: **Education Facility, Natural Area and Marina Concept**
 Prepared By: **LEW** Date: **June 14, 2018**

Item No.	Item	Quantity	Unit	Price	Amount
1	Power Plant Demolition	1	LS	\$9,000,000	\$9,000,000
2	Remove and Dispose of Damaged Bit. Conc. Pavement	5,000	SY	\$8	\$39,999
3	Clearing and Grubbing	1	LS	\$12,000	\$12,000
4	Formation of Subgrade	99,500	SY	\$3	\$298,501
5	Sedimentation and Erosion Control (Inc. Tracking Pad)	1	LS	\$15,000	\$15,000
6	Engineered Control Unpaved				\$3,436,028
6a	Demarcation Layer	103,067	SY	\$2	\$206,135
6b	Puncture Resistant Geotextile	103,067	SY	\$4	\$412,269
6c	Silt fence	12,000	LF	\$8	\$96,000
6d	Turf establishment	54,311	SY	\$3	\$162,932
6e	EC soils	34,355	CY	\$65	\$2,233,104
6f	Loam	27,132	SY	\$12	\$325,588
7	6' Flood Zone Fence- Northern Coastal Path and Wetland Area	3,950	LF	\$52	\$205,400
8	Engineered Control Paved				\$3,350,901
8a	Bituminous Concrete (4.0 inch)	12,359	Ton	\$200	\$2,471,836
8b	Processed Aggregate Base (6-inches)	8,956	Ton	\$55	\$492,576
8c	Processed Aggregate Base (6-inches)-Impoundment	5,745	Ton	\$55	\$315,989
9	Asphalt Curb	4,700	LF	\$15	\$70,500
10	Excavation and off-site disposal (Non-Hazardous)	500	Ton	\$85	\$42,500
11	Backfill Tank Farm	25,000	Ton	\$65	\$1,625,000
12	Environmental Investigation				\$125,000
	Subtotal Construction Costs				\$18,150,329
	General Conditions			15%	\$2,722,549
	Incidentals and Contingency			25%	\$4,537,582
	TOTAL CONSTRUCTION COSTS				\$25,410,460
				EST.	\$25,420,000

Refer to OPC Assumptions and Qualifiers provided in Preliminary Opinion of Probable Cost (OPC) for Soil Remediation dated 9-19-2018

- SY-square yard
- LF- Linear feet
- LS- Lump sum
- CY -Cubic Yard



Project Name: **Preliminary Opinion of Probable Cost (OPC) for Soil Remediation**
 Project Number: **N0814003**
 Project Location: **Southern Parcel -Map 5, Block 86, Lot 1**
 Description: **Residential and-Marina Concept**
 Prepared By: **LEW** Date: **June 14, 2018**

Item No.	Item	Quantity	Unit	Price	Amount
1	Wastewater Plant Demolition	1	LS	\$9,000,000	\$9,000,000
2	Remove and Dispose of Damaged Bit. Conc. Pavement	5,000	SY	\$8	\$39,999
3	Clearing and Grubbing	1	LS	\$12,000	\$12,000
4	Formation of Subgrade	37,430	SY	\$3	\$112,290
5	Sedimentation and Erosion Control (Inc. Tracking Pad)	1	LS	\$15,000	\$15,000
6	Engineered Control Unpaved				\$1,412,822
6a	Demarcation Layer	37,500	SY	\$2	\$75,000
6b	Puncture Resistant Geotextile	37,500	SY	\$4	\$150,000
6c	Silt fence	4,765	LF	\$8	\$38,120
6d	Turf establishment	37,500	SY	\$3	\$112,500
6e	EC soils	12,500	CY	\$65	\$812,478
6f	Loam	18,727	SY	\$12	\$224,724
7	6' Flood Zone Fence- Northern Coastal Path	1,600	LF	\$52	\$83,200
8	Engineered Control Paved				\$2,884,243
8a	Bituminous Concrete (4.0 inch)	10,489	Ton	\$200	\$2,097,728
8b	Processed Aggregate Base (6-inches)	7,600	Ton	\$55	\$418,025
8c	Processed Aggregate Base (6-inches)-Empoundment	5,745	Ton	\$55	\$315,989
9	Asphalt Curb	3,500	LF	\$15	\$52,500
10	Residential Development Soil Remediation (4 ft.)				\$12,052,500
10a	Excavation and disposal of non-hazardous soils	121,000	Ton	\$85	\$10,285,000
10b	Clean Backfill	20,200	CY	\$65	\$1,313,000
10c	Loam	30,300	SY	\$12	\$363,600
10d	Turf establishment	30,300	SY	\$3	\$90,900
11	Environmental Investigation				\$200,000
	Subtotal Construction Costs				\$25,812,054
	General Conditions			15%	\$3,871,808
	Incidentals and Contingency			25%	\$6,453,013
	TOTAL CONSTRUCTION COSTS				\$36,136,875
				SAY	\$36,140,000

Refer to OPC Assumptions and Qualifiers provided in Preliminary Opinion of Probable Cost (OPC) for Soil Remediation dated 9-19-2018

SY-square yard
 LF- Linear feet
 LS- Lump sum (Estimated)
 CY -Cubic Yard



2754 Aqueduct Road
Schenectady, NY 12309
(518)-374-3366 Fax (518)-372-1116

www.jacksondemolition.com

May 7th, 2018

Tighe & Bond
213 Court Street, Ste. 1100
Middletown, CT
06457

Attn: Lynn E. Willey
Senior Environmental Scientist

Subject: Norwalk Power Station, Manresa Island

Good Afternoon Lynn,

Jackson Demolition Service, Inc. (JDS) is pleased to provide the following budgetary analysis and general pricing recommendations for the current Norwalk Power Station redevelopment project study.

JDS is a privately held Corporation headquartered in Schenectady, New York. JDS has been in continuous operation and owned by the same family for more than six decades. Originally founded and operated by the Jackson family in 1949, JDS was incorporated in the State of New York on June 29, 1978, and has grown from a small and local operation, to a nationally renowned demolition company, specializing in decontamination, decommissioning, demolition, dismantling and recycling of materials in the commercial manufacturing, mining, chemical, petrochemical, pulp/paper, power-generation, steel, food/beverage, and auto industries.

JDS has consistently, safely and efficiently performed vast scopes of work within a variety of settings; to include fully operational industrial processing plants, brownfields & superfunds encompassing hundreds of acres, as well as multi-story commercial and residential structures in downtown, metropolitan areas – all for an assortment of Fortune Five Hundred companies.

JDS has a repeat client list and prides itself on customer satisfaction and owner involvement. Our corporate clients demand premier services such as environmental controls, safety, cost efficiency, scope evaluation, and timeliness all paired with a broad array of services. JDS provides economical bid responses and overall solutions superior to our competitors, to benefit our clients. With hands-on executive leadership and involvement from start to finish of every major project, from our President "Sandy" Jackson, Executive Vice President Mark Hodgkins, and Vice President of Industrial Services "Bill" Rose, our projects are driven to success.

Safety is the central consideration in all JDS operations, and protecting the health and safety of all our employees and sub-contractors' employees is our primary concern. Our safety record reflects our diligence. Our industry leading safety record, along with our ability to provide maximum asset recovery value and premium dismantlement services to our clients has set us apart from our competition.



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Budgetary Analysis, Norwalk Power Station

The following projections and analysis for the Demolition, Asbestos Removal, and Asset Recovery of the Norwalk Power Station is based on information previously provided by Tighe & Bond, satellite imagery from Google Earth, and JDS Project Experience.

COSTS & ALLOWANCES:

1. Demo Cost of between	\$3MM to \$3.5MM
2. ACM Allowance	<u>\$4MM to \$5MM</u>
TOTALS	\$8MM

Notes:

1. ACM Allowance is based on previous and similar sized projects.
2. ACM Costs could be more accurately determined if there has been an Environmental Survey Previously Performed.
3. Demo Cost is based on a mixture of "Conventional and Explosive" Demolition methods.

POTENTIAL SCRAP CREDITS

1. 18K to 20K tons of ferrous @ \$ 1.75	\$3,250,000
2. 600K lbs. of Copper @ \$0.80	\$480,000
3. 400K lbs. of other non-ferrous @ \$0.40	\$160,000
4. Misc. Sales of Equipment	<u>\$50,000</u>
TOTAL CREDIT	\$ 3,940,000

Total for Demo and Abatement Budget is \$ 4MM to \$5MM (Depending on the interior build out that will increase the amount of Hard and Soft debris that will need to be hauled off)

Budget Pricing does not include:

1. Site Work (Backfill, Sod or Seed).
2. Concrete Removal below 3'
3. Design/New Engineering of SWPPP
4. Any additional environmental work such as PCB, Mercury contamination or Lead Paints in excess of the allowable recyclable amounts (50ppm).
5. Any closures around cooling water inlet sources.

Lynn, in addition to the budgetary information, I have also included our JDS company brochure, with project highlights and key personnel resumes. I am confident this information will provide a comprehensive overview of the type of work we undertake, our approach, history, and reputation.

Please feel free to contact myself, or Bill Rose at (832) 302-8377 or brose@jacksondemolition.com with any questions or need for additional information.

We look forward to your feedback, and continued discussion.

Thank you,
Jason Rebok

Jackson Demolition Service, Inc
Business Development
Office (410) 546-2502
Cell (410) 603-7101
jrebok@jacksondemolition.com