



Additional structural supports, cables, and other items may be required to be placed in the water. All structural supports and other items are required to be placed in the water. All structural supports and other items are required to be placed in the water.

A SITE ASSESSMENT STUDY ON POTENTIAL LAND USE OPTIONS AT THE SALEM HARBOR POWER STATION SITE

JANUARY 2012

SOURCE DIAGRAM

and areas represent the limits of the most recent hydrographic information that has been obtained for charting. Soundings have been obtained by depth and type of soundings. Soundings have been obtained by depth and type of soundings. Soundings have been obtained by depth and type of soundings.

SOURCE	DATE	COVERAGE
NCS Surveys	1960-1969	partial bottom coverage
NCS Surveys	1970-1979	partial bottom coverage
NCS Surveys	1980-1989	partial bottom coverage
NCS Surveys	1990-1999	partial bottom coverage

PREPARED FOR THE CITY OF SALEM BY:

Jacobs

343 Congress Street
Boston, Massachusetts 02210
617.242.9222

Sasaki Associates

64 Pleasant Street
Watertown, Massachusetts 02472
617.926.3300

LaCapra Associates

One Washington Mall
9th Floor
Boston, Massachusetts 02108
617.778.5515

Robert Charles Lesser Co.

7200 Wisconsin Avenue
7th Floor
Bethesda, Maryland 20814
214.644.1300

JANUARY 2012

ACKNOWLEDGEMENTS

The consultant team would like to recognize the following participants for their contributions during this study which was funded by a grant from the Massachusetts Clean Energy Center.

City of Salem

Kimberley Driscoll, Mayor

Jason Silva, Chief Administrative Aide

Lynn Duncan, Director, Department of Planning & Community Development (DPCD)

Frank Taormina, Staff Planner/Harbor Coordinator, DPCD

Kathleen Winn, Deputy Director, DPCD

Captain Bill McHugh, Harbormaster

Stakeholders

State Senator Fred Berry

State Representative John Keenan

Charles Payson, District Director for US Congressman John Tierney

Joanne McBrien, Massachusetts Department of Energy Resources

Richard Chalpin, Massachusetts Department of Environmental Protection

James Bowen, Massachusetts Clean Energy Center

Robert McCarthy, City Councilor Ward 1

Lamont Beaudette, Dominion Energy at Salem Harbor Station

Malia Griffin, Dominion Energy at Salem Harbor Station

James Smith, Dominion Energy at Salem Harbor Station

Cynthia Carr, Derby Street Neighborhood Association

Fred Atkins, Harbor Plan Implementation Committee (HPIC)

Barbara Warren, Salem Sound Coastwatch & HPIC

Patricia Gozemba, Salem Alliance for the Environment (SAFE)

Marjorie Kelly, SAFE

Jeffrey Barz-Snell, Renewable Energy Task Force & SAFE

William Luster, North Shore Alliance for Economic Development

Additionally, the consultant team would like to thank the citizens of Salem and other attendees who participated at the public meetings.

Furthermore, the consultant team would like to acknowledge the following organizations for their cooperation during this study:

Bentley Elementary School

Dominion Energy New England, Inc.

National Grid

Salem Five Bank

South Essex Sewerage District

TABLE OF CONTENTS

1 INTRODUCTION	9
2 A BRIEF HISTORY	13
3 SALEM HARBOR POWER STATION	17
4 NEW ENGLAND ELECTRIC POWER MARKET	23
5 CONSTRAINTS, AMENITIES AND ADVANTAGES	35
6 MARKET ANALYSIS	55
7 PUBLIC RECOMMENDATIONS & COMMENTS	79
8 REDEVELOPMENT	83
9 CONCLUSIONS	101



The results of the study are intended to ensure that the City of Salem will have the ability to accurately plan its finances and understand what potential economic development options exist...

1

INTRODUCTION

In 2010 the City of Salem issued a Request for Proposals (RFP) for “Consulting Services for a Site Assessment Study on Potential Land Use Options at the Salem Harbor Power Station Site”. The Study was funded by a grant from the Massachusetts Clean Energy Center. As stated in the RFP, the City’s goal was to study re-use options and the potential and timing for permanent shut down of the power station. The results of the study are intended to ensure that the City of Salem will have the ability to accurately plan its finances and understand what potential economic development options exist.

The RFP requested that the scope of the study be divided into the five distinct tasks outlined below:

- **Task 1 – Background and Definition of Current Conditions**
 - Relevant Examples of Reuse of Power Generating Sites
 - Range of Costs to Position the Site for New Development
 - Basic Project Related Data Collection
 - Existing Conditions Assessment
- **Task 2 – Evaluate Possible Necessity of Current and Future Power Plant Operations**
 - Short and Long Term Regional Power Demands
 - Investment Required for Regulatory Compliance
- **Task 3 – Alternate Uses and Approaches**
 - Identify Potential Alternative Uses
 - Options for Economic Reuse Consideration
 - Summary of Stakeholders and Key Challenges for Each Option
 - Economic Benefits of Alternative Schemes
- **Task 4 – Draft and Final Report**
 - Draft Report including Recommendations and Executive Summary
 - Review Findings with Stakeholders
 - Final Report / Presentations / Conclusions
- **Task 5 – Final Presentation and Report**
 - Up to Two Public Meetings to Present Conclusions

The consultant team selected by the City was required to have knowledge of the New England energy market, engineering and cost estimating experience relative to utility scale power generating facilities, an understanding and ability to assess the commercial real estate market in New England and planning capability to frame a vision for future development on the site.

The selected consultant team includes the following firms:

Jacobs

343 Congress Street
Boston, Massachusetts 02210
617.242.9222

Overall Project Management
Energy & Power Consultant

Sasaki Associates

64 Pleasant Street
Watertown, Massachusetts 02472
617.926.3300

Master Planning

LaCapra Associates

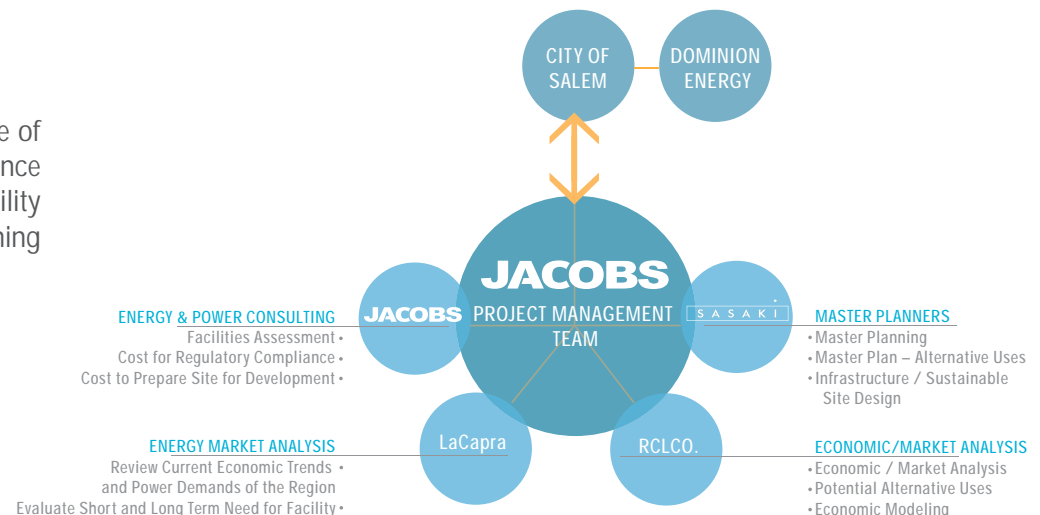
One Washington Mall
9th Floor
Boston, Massachusetts 02108
617.778.5515

New England Energy
Market Analysis

Robert Charles Lesser Co.

7200 Wisconsin Avenue
7th Floor
Bethesda, Maryland 20814
214.644.1300

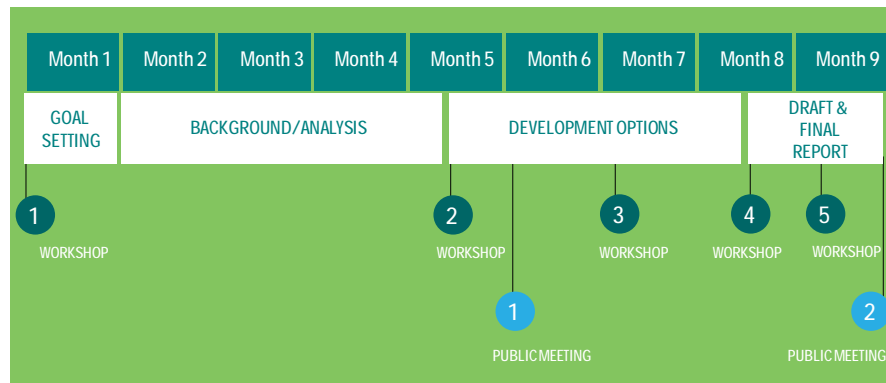
Economic / Market
Analysis



The Consultant Team suggested that the five tasks be addressed within a phased approach to the project. Distinct project phases included:

- **Goal Setting**
- **Analysis**
- **Development Options**
- **Conclusions**

Together with the City, an approach to the project was mapped and an overall schedule established.



Proposed Project Schedule

Circumstances changed in May of 2011 when Dominion announced that it would take the entire Salem Harbor Power Station out of service as of June 1, 2014.

At that point, the consultant team's focus shifted from determining the role of the Salem Harbor Power Station in the New England energy market and speculation about the time frame for the eventual decommissioning of the plant, to a focus on a new list of priorities which included:

- **Costs**
 - Clean up of the site
 - Demolition of the power station structures
- **Potential for new power generating sources**
 - Natural gas
 - Renewable energy solutions such as wind or solar / photovoltaics

■ **Regulatory constraints**

- Massachusetts General Laws Chapter 91
- Coastal Zone Management - Designated Port Area (DPA)

■ **Market conditions impacting development**

- Viable uses
- Absorption

■ **Vision**

- Reuse options
- Tax and community benefits

Over the course of the project, five workshops were held with a stakeholder group identified by the City. Two public meetings were held at the Bentley School – the first in June of 2011, the second in October. At the first meeting the consultant team described overall project background collected and preliminary site analysis. Also at that meeting, specific comments/preferences were solicited from members of the community who attended. At the second public presentation, an overall summary of conclusions was discussed. A presentation was also made to the Derby Street Neighborhood Association in June.

While this Study has been commissioned by the City of Salem, they do not own the Power Station site – which remains the property of Dominion Energy New England LLC, a subsidiary of Dominion Resources, Inc. of Richmond, Virginia. The City's goal is to understand the site and regulatory constraints that will effect redevelopment, identify land use opportunities based upon market analysis and a potential overall framework for achievable redevelopment. The City can then potentially help generate interest in the redevelopment and work at the State and local level to assist and influence – perhaps both financially and from a regulatory perspective - future redevelopment initiatives.

While this Study includes analysis of a new natural gas fired power station, renewable energy and a long list of potential commercial and industrial uses, the consultant team has no bias towards any of the potential uses outlined. The team has sought only to describe what is possible so that there can be informed participation by the community in the market's response to this key real estate parcel on Salem Harbor.

CITY OF SALEM

Part of Wards 1-2

Published by Walter L. Thompson & Publishing Co. Boston.

Scale 1 inch = 100 feet.

1. Main Street	2. Water Street
3. Railroad	4. City Hall
5. Public School	6. City Jail
7. City Hall	8. City Jail



As the quadricentennial of the founding of Salem approaches it is interesting to consider that throughout its history, this waterfront has not only contributed significantly to Salem's identity — it has had an important and varying role in serving the New England region as a whole...

2

A BRIEF HISTORY

Portions of the following section are based upon information taken from the following sources:
Salem Patch, Part 1: Before the Power Plant, Jerome Curley, May 12, 2011
Salem Patch, Part II: Salem Harbor Power Station in the Last Century, Jerome Curley, May 16, 2011
The Tide Rises, The Tide Falls - Three Centuries of Salem Waterfront, Madelyn Holmes, 1982

When Roger Conant landed with his band of settlers in Salem in 1626, they found a practically pristine environment. Then called Naumkeag, the landscape was forested with gentle rolling hills that were surrounded by the waters of the North and South Rivers and a protected harbor. The area that would eventually become the site of the Salem Harbor Power Station consisted of woods, hilly terrain, mud flats and harbor waters.

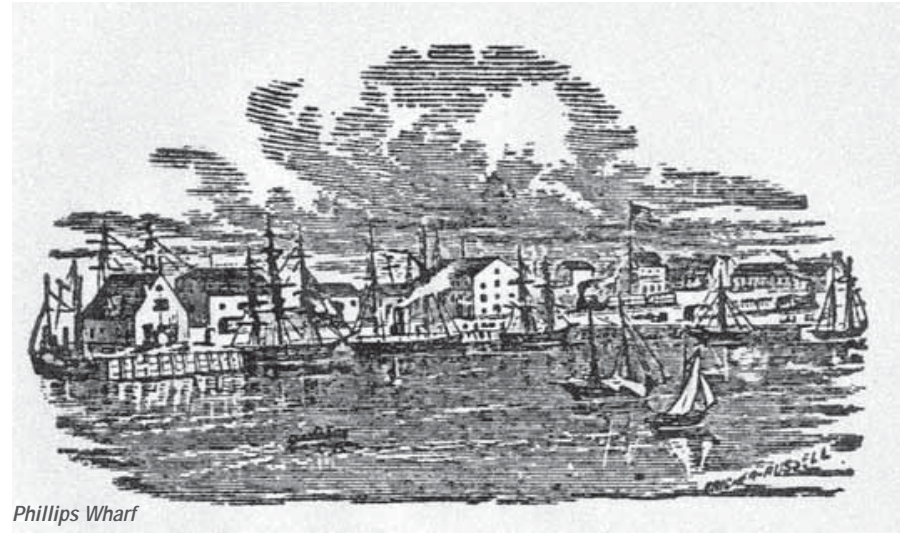
As the colonists settled along the rivers and bays of their new home, the waterfront, the sea and its bounty became a significant focus of their lives and futures. A fishing industry developed that was centered around Winter Harbor, the area between the Neck and Winter Island. As fishing grew in importance, fishermen were given much of the land along the Neck and Winter Island to use for drying and storing fish. The waterfront became the focus of much of Salem's early commerce and life.

By 1790, Salem was the sixth largest city in the country, and a world famous seaport – based particularly on its trade with China. Cod fish was exported to the West Indies and Europe. Sugar and molasses were imported from the West Indies, tea from China and pepper from Sumatra. Salem ships also visited Africa, Russia, Japan and Australia.

Ships from Salem were crisscrossing the globe opening new ports to commerce. The India trade was flourishing. As a result, the number of wharves along Salem's waterfront increased greatly as merchants expanded their businesses. The first mention of a wharf in the area of the Salem Harbor Power Station property was the India Wharf, built in 1800 for commerce and shipping with the Far East by the India Company. Throughout the 19th century however, trade from Salem was increasingly eclipsed by Boston and New York, larger cities with deep harbors and more overall economic strength. Shipping from Salem Harbor gradually declined as a result. In 1855, the last ship bringing a cargo from Batavia (now Jakarta, Indonesia) entered the port; in 1858 the last entry from Manila arrived and in May of 1870, the last shipment of goods from Zanzibar, East Africa arrived. The last shipments from Cayenne in South America's French Guiana made port in Salem in 1877. In 1878, only two vessels cleared the Salem Port in the entire year; one for the West Indies and the other for Liverpool.

As Salem's role in global trade diminished and international trade moved to Boston and New York, business leaders in the City turned towards new opportunities in New England. India Wharf, once home to thriving trade with the Far East, was bought in 1836 by Stephen Phillips, who was interested in building a railway connection between Salem Harbor and the industrial mill towns of Lawrence and Lowell. He brought the railroad to the wharf so that coal and cotton could be transported efficiently. The Salem and Lowell Railroad was created and the 24 mile railway line opened in 1850 making Salem a key link in the delivery and distribution of coal shipments to inland mill cities.

As manufacturing in New England grew, so did the coal piles along the wharves of Salem, particularly at the new Phillips Wharf, built near India Wharf. The increasing demand for coal was again confirmed in 1873, when Philadelphia Pier was built next to Phillips Wharf by the Philadelphia and Reading Coal and Iron Company. This pier extended southeasterly half way across the harbor, for nearly 2000 feet. The company started shipping coal to Salem from



Phillips Wharf

Philadelphia in 1875 and at its peak, 90 thousand tons of coal arrived annually at Philadelphia Pier. The coal trade grew unabated in New England, but bigger ports such as Boston, with equal or better access to the railroads, eventually became the center of the coal trade. These larger, better equipped ports led to the decline of Salem's prominence as a booming coal port.

In 1907, the Philadelphia and Reading Coal and Iron Company, having purchased the adjacent Phillips Wharf property previously, proposed to buy land and the mud flats at the bottom of Derby Street from the City so that they could expand their holdings. After much discussion the sale was approved – driven by hopeful individuals who believed the company would move its primary shipping operation from Boston and secure federal funding to deepen the harbor, enabling access by bigger ships and reestablishing Salem as a major coal terminal. With City approval, the land and the mud flats, were sold.

By 1916, however, the Philadelphia and Reading operation had all but shut down. The hopes and plans for a major new coal terminal never came to be. The company ignored pleas from the community to either use the property or sell it to someone who would. Philadelphia and Reading spent minimal money to maintain the stone sea wall and were adamant that the coal business was not profitable and would not be revived. The impasse became so dire that legislation was filed to take the wharf by eminent domain.

After years of disuse, the Philadelphia and Reading property, including Phillips Wharf, Philadelphia Pier, the mud flats and other land totaling nearly ten acres, were purchased by the Tenney Company, the manager of Salem Electric Light, with the intent of building a super power plant on the site. The new owners sold the equipment and buildings on the wharf to Pickering Coal Company, which moved the equipment to their property at Derby and Union Streets (currently the Pickering Wharf area). With demolition complete and the site cleared, site preparation was started for the super power plant, which was estimated to cost \$10 million. In 1924, the Middlesex, an ocean-going ship called a sand sucker, was brought in and used to vacuum sand from the harbor bottom and dump it onto the mud flats behind a granite retaining wall, expanding the site for the plant while deepening the ship channel.

The process lasted many months, filling the mud flats between Phillips Wharf and Philadelphia Pier as well as the cove near Derby Street. While filling in the flats, workers also constructed a huge coal bridge to transport coal from ships to storage areas. Rail lines in a loop from Derby Street were also added. By the time the site preparation was completed, nearly 30 acres of mud flats had been converted into waterfront land for the future power plant.

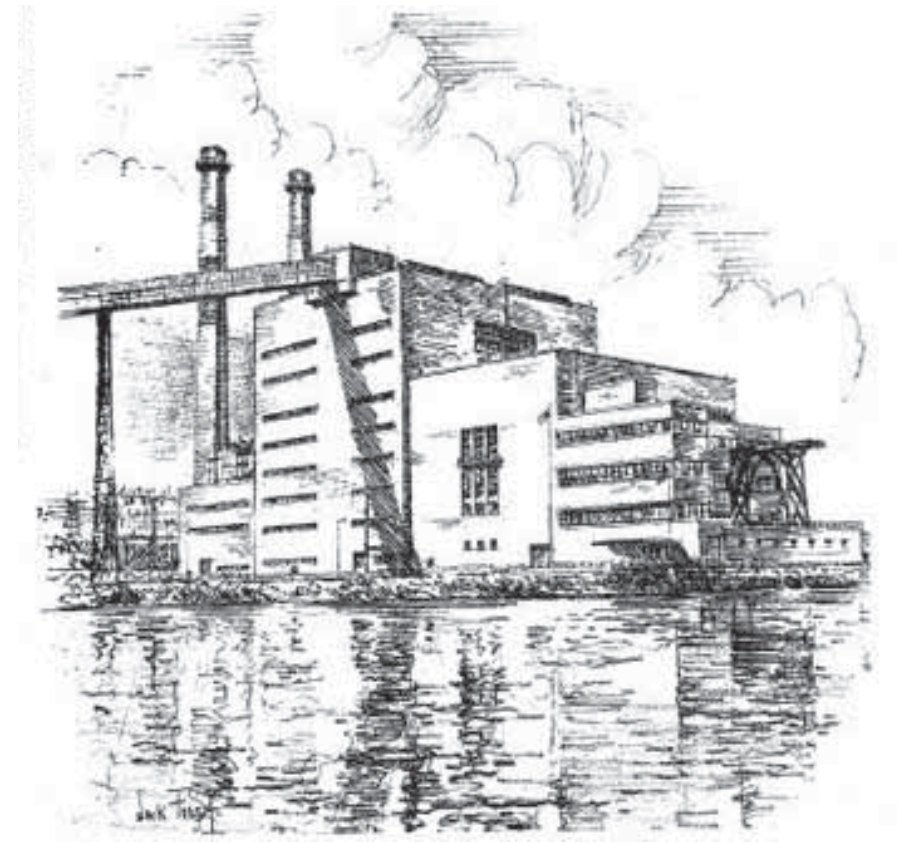
Once operational, the new facility was used as an active coal terminal for over 20 years prior to the power plant being built. Tons of both hard and soft coal were imported – some of which was shipped to other power plants in the region. Amid the Depression era, the coal business did well. Unfortunately, due to the economy, as well as World War II, actual construction of the power plant did not start until 1948. The plan was to build the power plant in units, each unit having a generating capacity of approximately 100 MW. Units would be added as the proposed distribution network – then some 60 miles of high tension wires – grew. With new piers, conveying systems and a connection to the power distribution grid, the first phase of the power plant went on line in November 1951. Its cost at the time was estimated to be \$30 million.

This brief summary is included to illustrate the relevant history of the Derby Street waterfront and the land and mud flats that became the Salem Harbor Power Station site.

Consider that for well over 200 years, this waterfront area functioned as a working and industrial port – first focused on the fishing industry, then global trade and then as a major coal terminal – prior to its use as a power station.

As the 400th anniversary of the founding of Salem approaches and new uses are contemplated on the power station site, it is interesting to consider that throughout its history, this waterfront has not only contributed significantly to Salem's identity – it has had an important and varying role in serving the New England region as a whole. Fishing, global trade, coal distribution and power generation have all historically benefited the New England region and established Salem as an important point of origin. Its inclusion on the list of key Designated Port Areas is testament to its continuing importance as one of only 11 deep water harbors recognized by the Commonwealth.

As Salem moves forward beyond its quadricentennial and into the 21st century, it would be entirely appropriate and historically consistent for the City and its residents to help identify a new use or uses for the Power Station site that maintain tradition, and contribute to both Salem and the region as a whole.



Salem Harbor Power Station



Of the coal powered units, Unit 1 produces 82 MW, Unit 2 produces 80 MW, and Unit 3 produces 150 MW. Unit 4, the oil fired generating unit, is the largest at the facility, producing 433 MW. In total, the plant generates 745 MW, enough electricity to power approximately 745,000 homes...



SALEM HARBOR POWER STATION

Salem Harbor Power Station is located on a 62 acre site along the Salem Harbor waterfront at 24 Fort Avenue. Originally built by the Tenney Corporation and operated by New England Power, the first generating unit was completed at a cost of \$30 million. Commercial operation began in 1951. Once the first unit was up and running, construction of Phase 2 commenced, adding a second generating unit that was completed in late 1952. New England Power continued to run the plant and in 1958 added a third generating unit. In 1978, the fourth and final generating unit was added.

Units 1, 2 and 3 were originally designed to produce electricity by burning coal but were converted to oil fired generating units in 1969. However, amid shortages of oil caused by the first oil crisis in the 1970s, and under pressure from the U.S. government to reduce our dependence on oil, New England Power requested and received permission to change the fuel source from oil back to coal, thus saving 180,000 barrels of oil a month. They completed the conversion of generating units to coal by 1982, resulting in today's operating configuration of three coal fired units and one (Unit 4) oil fired unit. Of the coal fired units, Unit 1 produces 82 MW, Unit 2 produces 80 MW and Unit 3 produces 150 MW. Unit 4, the oil fired generating unit, is the largest at the

facility and produces 433 MW. In total, the plant generates 745 MW, enough electricity to power approximately 745,000 homes.

In 1998, USGen a subsidiary of Pacific Gas & Electric of California (PG&E) bought the power plant from Tenney Corporation. National Energy Group (NEG) another subsidiary of PG&E assumed operation of the plant.

In 2000, a study by Harvard School of Public Health and Sullivan Environmental Consulting Group, identified a number of power plants, including Salem Harbor and one other in Massachusetts as part of the “filthy five” – power stations in the New England region that were exempt from adhering to current health limits on smokestack emissions because they began operating before the 1977 Clean Air Act took effect. The study cited significant health impacts from air and water pollution on populations living within a 30 mile radius of the plants.

In 2003, USGen filed for bankruptcy and a buyer was sought for Salem Harbor as well as additional properties in the USGen portfolio. In 2005, Dominion Resources, Inc., bought the Salem Harbor Power Station as part of a package deal that included Brayton Point, a coal fired power plant in Somerset, MA and the gas fired Manchester Street Station in Providence, RI. The total price paid by Dominion was \$656 million. Dominion Energy New England LLC, a subsidiary of the Richmond, Virginia based parent company, has operated the power station since that time.

Dominion’s ownership tenure has been difficult. Plagued by competition from newer more efficient power generators, increasing community concern and at times protest over emissions, the power station suffered additional negative press in 2007 when, sadly, an explosion at the plant killed three workers, prompting a state investigation and OSHA review of plant safety. More recently, falling energy prices and pending emissions legislation raised new questions about the viability of the 60 year old Salem Harbor facility. The plant’s future has been closely linked to federal energy regulations on ozone that are scheduled to go into effect between 2015 and 2017

In October of 2010, Dominion filed to permanently delist its four generating units, a request that was eventually approved by ISO-NE. Units 1 and 2 will shut down by the end of 2011. The two additional units and the entire station will close by June 1, 2014.

Of the decision not to “seek to negotiate an agreement that could keep the station operating,” David A. Christian, chief executive officer of Dominion said *“This was a decision we had to make given the significant costs required to keep the station in compliance with pending environmental regulations and the falling margins for coal stations selling electricity in New England...Salem Harbor employees are dedicated professionals who will continue to operate the station safely as we move toward retirement in 2014.”* The plant currently employs approximately 143 people.¹

Today, the Salem Harbor Power Station pays a total of \$4.75 million in taxes to the City of Salem - \$3 million in taxes and \$1.75 million in pilot host fees. With its current reduced operation – available typically for reliability purposes only, the number of homes in New England powered by Salem Harbor has been reduced from 745,000 to approximately 300,000.

Despite negative publicity, Mayor Kimberley L. Driscoll has said that the plant has been a good corporate citizen for the City. Recently for example, Dominion gave \$1 million to Salem’s public schools. Mayor Driscoll said the city will create an endowment fund with the \$1 million, which Dominion provided to support science, technology, engineering, and math instruction for the first through eighth grades. *“They’ve always been very generous,”* Mayor Driscoll said of Dominion, noting its past contributions to support community needs.²

In the context of much current discussion in the community about re-use of the Salem Harbor site, several parties have apparently expressed interest in the property. Mayor Driscoll said that despite challenges associated with redeveloping the site she’s hopeful it will be attractive to developers. *“They definitely have some folks kicking the tires but ... a large industrial 62-acre, highly contaminated parcel isn’t your usual transaction,”* she said. *“It has some challenges, demolition costs, existing regulations ... but it’s also a great opportunity to redevelop our waterfront.”*³



SALEM HARBOR

Newest System plant now in full operation

THE most modern steam-electric generating station in New England is now in full operation at Salem Harbor. The second of two 75,000-kilowatt turbogenerators went on the line in October.

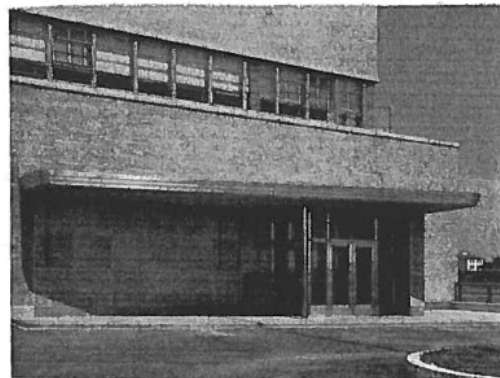
Construction of the new Salem Harbor Station of New England Power Company was begun in December, 1948. The first of the huge turbogenerators went into operation late in 1951. With the completion of the second unit, the plant has a capacity of 150,000 kilowatts and a combined annual output of over 1,000,000,000 kilowatthours. The two turbogenerators can supply the electric needs of eight cities the size of Salem.

The \$30,000,000 station is a steel frame, brick wall structure built on solid rock. Located on the shore of historic Salem Harbor, the plant is 14 stories high, 144 feet wide and 355 feet long.

The plant operates on either coal or oil and each unit uses about two-thirds of a pound of coal or an equivalent amount of oil for each kilowatthour generated. In full operation these units consume 1350 tons of coal a day or if oil is being used, 252,000 gallons per day.

The Salem Harbor Station is tied into the interconnected transmission network of New England Electric System.

TESTING in the new coal laboratory at the Salem Harbor Station

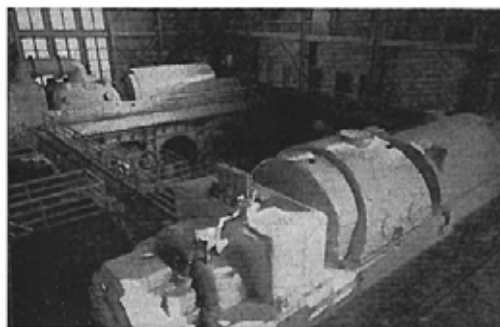


MAIN ENTRANCE to the station presents this attractive appearance

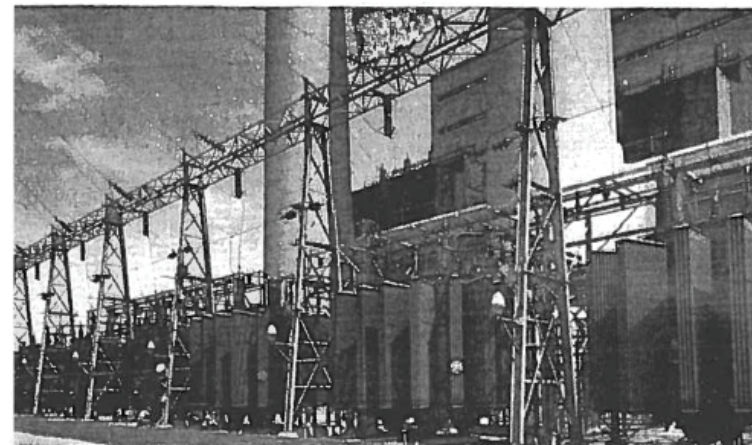
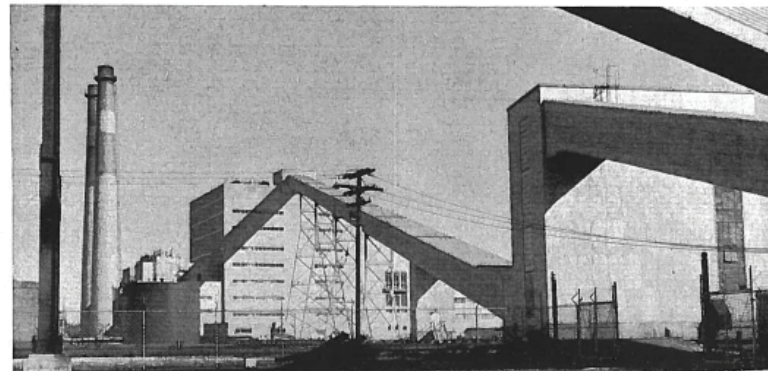


FRANK BELL, superintendent, Salem Harbor

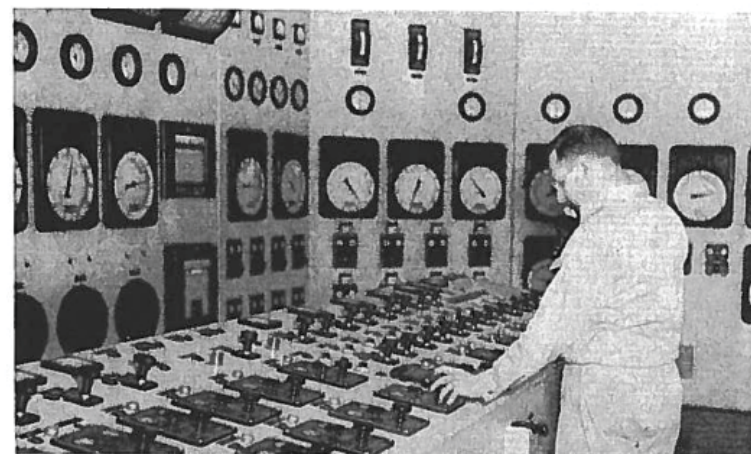
THESE TWO TURBOGENERATORS combine to produce 150,000-kw



COMPOSITION of the station from Terminal



MAIN TRANSFORMER BANK at the new Salem Harbor Station



MECHANICAL CONTROLS room contains hundreds of dials and meters as shown above





The electric power industry's model of regulated local utilities worked well for many years, however, by the late 1990s the industry began moving towards a new model...

4

NEW ENGLAND ELECTRIC POWER MARKET

OVERVIEW

*Portions of the following section are based upon information taken from the ISO-NE website as of September, 2011.

New England's electric power industry, like that of the entire nation, has changed dramatically during the past few decades. Until the 1970s, the industry was comprised of individual utilities that handled every aspect of providing electricity - generating it, transmitting it and then distributing it to homes and businesses. These utilities were essentially regulated local monopolies that, in general, operated independently of each other.

The Great Northeast Blackout of 1965 marked a turning point for the region's electric power industry. Concerned about the system's reliability, the Northeast region's utilities formed "power pools" or sharing arrangements that were set up to ensure a dependable supply of electricity. The New England Power Pool (NEPOOL), formed in 1971 by the region's private and municipal utilities, was intended to foster cooperation and coordination among utilities in the six-state New England region. During the next three decades, NEPOOL created

a regional power grid that now includes more than 300 separate generating plants and more than 8,000 miles of transmission lines—all interconnected and dedicated to ensuring that New England never again has a region-wide power failure.

The electric power industry's model of regulated local utilities worked well for many years, however, by the 1990s the industry began moving towards a new model. At that time, Congress and the Federal Energy Regulatory Commission (FERC)—which oversees the electricity industry nationally—began enabling the restructuring of the wholesale electric power market. They believed competition would improve service and minimize consumer costs while also providing needed renewal and investment in the power industry, much as it had with the transportation, telecommunications and financial service industries.

ISO-New England

*Portions of the following section are based upon information taken from the ISO-NE website as of September, 2011.

The FERC goal was to create competitive markets comprised of independent power generators, each of whom would have equal access to transmission grids. As part of that goal, states were encouraged to require individual utilities to sell their power plants to private competitive interests. Gradually, existing regulator-set rates were eliminated in favor of prices determined by competitive markets. FERC also created independent system operators, or ISOs, to oversee the market restructuring on a regional basis. These ISOs were given significant responsibility for ensuring system reliability and establishing and overseeing competitive wholesale electricity markets.

Created by FERC in 1997, ISO-New England (ISO-NE) has helped lead the nation's most advanced effort in energy market restructuring. To date, five of the six New England states have required individual utilities to sell off their power plants, and 88 percent of the region's power generation is unregulated and competitively priced. Working closely with NEPOOL, ISO-NE implemented a wholesale market structure in 1999. Today, about 400 market participants complete \$10 billion in wholesale electricity transactions annually.

As a result of ISO-NE's initiative, between 1999 and 2003 the unregulated New England electric power market experienced a 34% (approximately 10,000 MW) increase in new power generating capacity from new, primarily natural gas fired power plants, significantly improving reliability and enhancing market competition. Since 1999, generator availability has increased from 81% to 89%. Suppliers have responded to economic incentives to keep their plants running when demand is highest and have scheduled planned maintenance during off-peak periods, allowing for greater efficiency and reduction in consumer cost of electricity. Volatility in the price of natural gas and oil, which together fuel more than 60% of the region's generating units, has kept overall wholesale electricity prices high—a trend that likely will continue until the region reduces its reliance on these fuels to produce electricity. Factoring out the cost of fuel that plants use to generate electricity, whole electricity prices continue to remain stable.

Since the new power plants typically use more efficient and cleaner-burning natural gas technology, they also produce fewer pollutants. This has reduced emissions of nitrogen oxides (NO_x), sulfur dioxides (SO₂) and carbon dioxide (CO₂), which is thought to contribute to global climate change.

At the same time, system reliability has been enhanced. For instance, ISO-NE is working to eliminate artificial barriers that add to the cost of importing or exporting power from other areas, and ISO-NE is developing additional market mechanisms that promote investment of needed generating resources in the right locations.

The lights stayed on in almost all of New England during the August 2003 system failures that blacked out much of the Northeast, Midwest and Canada.

ISO-NE enhanced the energy market structure, notably in 2003, when it adopted "Standard Market Design." SMD added features such as a Day-Ahead Market, intended to protect against price volatility, and a pricing structure that is intended to accurately represent the true cost of producing and supplying power anywhere in the region.

In 2005, FERC formally designated ISO-NE as the transmission organization for the six-state region. While ISO-NE continues to fulfill its original responsibilities, it has gradually been given broader authority over the day-to-day operation of the transmission system and greater independence to manage the power grid and wholesale markets, ensuring that energy needs are met for New England's 6.5 million households and businesses. Serving the six New

England states - Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island and Vermont - it is an independent, not-for-profit corporation whose Board of Directors and 400 employees have no financial interest in or ties to any company doing business in the region's wholesale electricity marketplace.

ISO-NE has three primary responsibilities:

- **Reliability** - The ISO-NE is responsible for the minute-to-minute reliable operation of New England's bulk electric power system, providing centrally dispatched direction for the generation and flow of electricity across the region's interstate high-voltage transmission lines and thereby ensuring the constant availability of electricity for New England's residents and businesses.
- **Market Administration** - The ISO-NE is responsible for the development, oversight and fair administration of New England's wholesale electricity marketplace, through which electricity is bought, sold and traded.
- **Planning** - The ISO-NE is responsible for planning for the future through management of the comprehensive bulk electric power system and the wholesale market's planning processes that address New England's electricity needs well into the future.

To properly execute these responsibilities, the ISO-NE uses a number of wholesale markets to maintain reliability. These markets, Energy, Ancillary, and Capacity are briefly described in the sections to follow. Each market contributes to the overall cost of energy to consumers. Roughly 85% of the total wholesale market cost to consumers originates in the Energy Market, Ancillary Markets represent roughly 5%, while the Capacity Market represents approximately 10%.

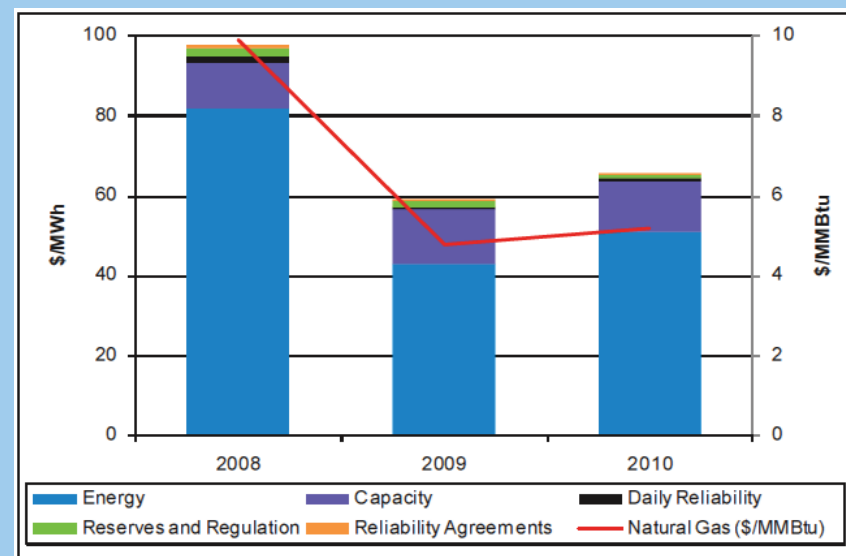
Energy Market

*Portions of the following section are based upon information taken from the ISO-NE website as of September, 2011.

A fundamental tenet of the power markets is that electricity cannot be stored, at least not cost effectively in large quantities. As a result, a real time balance must be maintained between load requirements and power generation at all times. The responsibility for maintaining this balance rests with ISO-NE.

ALL-IN WHOLESALE POWER PRICE

The figure below illustrates the average annual total wholesale electricity cost compared to natural gas prices for 2008 through 2010. This all-in wholesale cost is only a portion of the bill that consumers pay at retail. Wholesale costs do not include local charges for distributing and moving power across the grid. At the retail level, the price homes and businesses pay to their power provider includes other charges in addition to the wholesale costs. The all-in wholesale cost includes the cost of electric energy, forward reserves, regulation, capacity, daily reliability commitments, and FERC-approved Reliability Cost-of-Service Agreements (Reliability Agreements). The all-in wholesale cost of electric energy in 2008 was just below \$100/MWh. It dropped to approximately \$60/MWh in 2009 and increased to \$65.60/MWh in 2010. The graphic illustrates that the cost of energy is the largest component of wholesale power costs. Given the significant percentage of power generating facilities that use natural gas, the price of power follows the price of natural gas very closely. Another significant component of the cost of power at the wholesale level is capacity.



Source: http://www.iso-ne.com/markets/mkt_anlys_rpts/annl_mkt_rpts/2010/amr10_final_060311.pdf

The primary objective of ISO-NE is to ensure a reliable and economical supply of electricity. Supply and demand for power in real time can change for a variety of reasons. For example, power generators could be on or off line unexpectedly or consumer usage patterns could change. Real time oversight of the grid by ISO-NE must address and balance instantaneous changes in supply and demand and ensure that adequate generating resources are available to operate the system and provide power, as needed for consumers.

The Energy Market compensates power generating resources for providing energy to the electricity grid and charges entities that serve load for the energy used from the grid. Typically “entities that serve load” are thought of as utilities such as NStar, National Grid, etc., who are financially responsible for their consumers’ electricity use at the wholesale market level.

The Energy Market at the wholesale level is a commodity market where entities buy and sell power which is priced on an hourly and location basis. There are, in fact, over 900 price points for energy in New England. The Energy Market is very structured and follows a complicated set of market rules. While the details of the Energy Market are beyond the scope of this report, basic information and a brief background description are provided as context for understanding the current activity of Dominion related to the Salem Harbor Power Station.

Hourly electricity prices are determined by an equilibrium point between offers of supply (the price at which generators are willing to sell electricity) and demand bids (the price utilities are willing to pay). Generator supply offers are typically influenced by their production costs and the other operating characteristics of their power plants. For most electricity generators, the cost of fuel represents the largest variable in the overall cost to produce power, and as fuel costs change, the prices at which generators submit offers in the market change correspondingly – ultimately impacting the cost to consumers. The demand bids (the price utilities are willing to pay) for electric energy reflects the price a utility is willing to pay as well as any accompanying market related uncertainty. The market-clearing process is set on an hourly basis, at various price points or locations in the system.

Dominion places bids for Salem Harbor into the wholesale Energy Market every day, quoting a price at which it is willing to produce electricity. Their offer price is based on the plant’s operating design, cost of burning either

coal or oil, and any other costs that they deem relevant to its supply offer to generate power. Today coal and oil fired plants are not as economical to operate as newer generating units, particularly those that burn natural gas. As a result, Salem Harbor is selected infrequently by the ISO-NE to run for daily energy production purposes. Frequently, there are cheaper generating resources the ISO-NE can utilize to meet load requirements. However, the ISO-NE does select Salem Harbor to run occasionally based upon economic merit, reliability needs or constraints on the system. As a result of the infrequent power production at Salem Harbor, it is likely that revenue from the Energy Market is sufficient only to cover the cost of oil and coal and other variable costs that are incurred when the plant runs to make electricity. Given the lack of potential profit from the Energy Market, in recent years Dominion has focused on other market areas – particularly the Forward Capacity Market.

Ancillary Markets

*Portions of the following section are based upon information taken from the ISO-NE website as of September, 2011.

Ancillary Markets in New England provide services that are intended to assure reliability and support for the transmission of electricity. The Ancillary Markets are primarily comprised of Reserve and Regulation Markets. The Reserve Markets pay power generating resources that can quickly come on line in the event of an unexpected outage of another generator or transmission line failure. The Regulation Market pays power generating resources for instantaneous responses to small changes in electrical load. Both markets are set by an auction mechanism.

Forward Capacity Market

*Portions of the following section are based upon information taken from the ISO-NE website as of September, 2011.

The Forward Capacity Market (FCM) was started in 2010 by ISO-NE and replaced another market structure focused on capacity that was deemed ineffective by FERC. The prior capacity market was called the Installed Capacity Market.

The FCM is a long-term market designed to promote economic investment in power generation resources with a goal of assuring that a sufficient number of resources are available in the region to cover peak electrical load conditions. Capacity may be provided by new or existing power generation resources or through reduction in energy use as a result of consumer focused energy reduction initiatives (referred to as demand side resources). Power generation resources participating in the FCM are paid a fixed amount, established by an ISO-NE administered auction process, for the capacity potential that they make available to the grid. The FCM compensates power generation and demand side resources regardless of whether they produce energy or not.

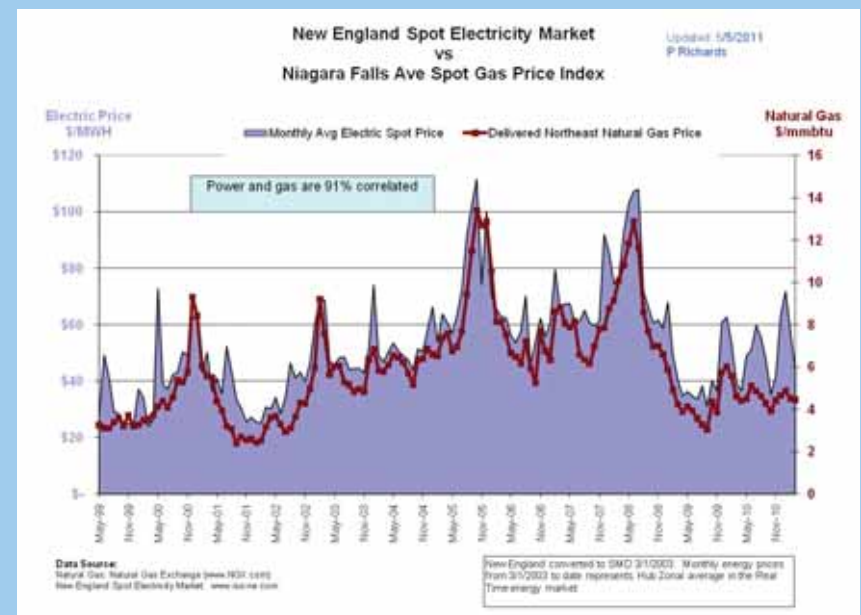
To purchase enough power generation capacity to satisfy the region's future needs and allow enough time to construct new capacity resources if needed, ISO-NE conducts auctions each year, approximately three years in advance of the time period when capacity resources must provide service or be online. Generating resources compete in the annual auction, referred to as a Forward Capacity Auction (FCA), to obtain what is called a "commitment to supply capacity," in exchange for a payment established by ISO-NE as part of the auction.

Generating resources participating in an FCA are categorized as either "new" or "existing" resources. A "new" resource is one that has not been constructed but is being planned to come on line in the near future. "Existing" resources are those that have been built and/or resources that were on line in a previous auction period. The four power generating units at the Salem Harbor Power Station are considered existing resources by ISO-NE. Only new resources are allowed to establish the market price for forward capacity in the annual FCA. Existing resources are paid the price that is ultimately set by those new resources. As a result, new and more efficient resources significantly influence the market price determined by an FCA. The auction is referred to as a descending clock auction. The process begins with a high starting price and the price is lowered in successive rounds until a floor (equilibrium) price is reached – the lowest price at which enough capacity supply is available to meet New England's electricity needs. Once the equilibrium price is determined, then all capacity resources are paid that price regardless of whether they are a new or existing generating resource. Existing resources such as Salem Harbor are considered to be "price takers" - they take whatever the cleared price is from the auction.

NATURAL GAS AND ELECTRICITY PRICES

In May 1999, the New England power markets were restructured and wholesale market competition was introduced. Since that time, the price of natural gas has been a key determinant in the price of electricity and is graphically illustrated below.

In the New England markets, the wholesale price of electricity has been highly correlated to the price of natural gas. In fact, the real time New England monthly average price for power has been 91 percent correlated to the price of natural gas since the implementation of wholesale markets began in 1999. The figure illustrates this relationship by comparing natural gas and electricity prices from 1999 through May of 2011.



An existing generating resource included in the FCM must remain in the market annually or follow a very specific process to withdraw. An existing generating resource can officially withdraw from the auction by submitting delist bids or notices of intent to leave. Delist bids are accompanied by a price - generally the price a generator proposes they be paid to not delist and remain as an available resource.

There are several types of delist bids. A brief summary of each is outlined below:

- **Dynamic Delist** – A request to leave the Forward Capacity Market for one year (and avoid a capacity supply obligation, but only for that year).
 - A request to delist is submitted during the auction.
 - Certain high bids may trigger a detailed review of the price by ISO-NE staff to assure it is just and reasonable
 - Delist requests may be subject to review by ISO-NE relative to overall reliability.
 - If a delist request is accepted, the capacity resource no longer participates in the Forward Capacity Market for that year but it can still participate in the Energy, Forward Reserves, and other markets if it so chooses.
- **Static Delist** – A request to leave the Forward Capacity Market for one year (and avoid a capacity supply obligation but only for that year).
 - A request to delist is submitted before the auction.
 - Certain high bids may trigger a detailed review of the price by ISO-NE staff to assure it is just and reasonable.
 - Delist requests are subject to review by ISO-NE relative to overall reliability.
 - If a delist request is accepted, the capacity resource no longer participates in the Forward Capacity Market for that year but it can still participate in the Energy, Forward Reserves, and other markets if it so chooses.
- **Permanent Delist** – A request to remove a generating resource from the Forward Capacity Market for a specific commitment period and all future periods.
 - Certain high bids may trigger a detailed review of the price by ISO-NE staff to assure it is just and reasonable.

- Delist requests are subject to review by ISO-NE relative to overall reliability.
- If delist request is accepted the capacity resource can still participate in the Energy, Forward Reserves, and other markets.

- **Non-Price Retirement Request** – A binding request to retire from the Forward Capacity Market at the start of a specified commitment period and for all future commitment periods
 - A request is submitted to retire regardless of market pricing.
 - ISO-NE has 90 days to review and establish whether the power generating resource is required for reliability purposes. If approved by the ISO-NE, the capacity resource's interconnection agreement is terminated. As a result, the resource cannot participate in any other ISO-NE market. In order to return to the markets, the power generating resource must go through a full new generator interconnection process, a lengthy (possibly multiple years) and complicated undertaking.
 - If a non-price retirement request is rejected for reliability reasons, the capacity resource will receive its choice of either its accepted delist bid or a Cost of Service Contract. A Cost of Service Contract is an agreement between the generating resource and ISO-NE requiring ISO-NE to pay the cost to run and operate the capacity resource, (including the fixed and variable costs while under a Cost of Service agreement). Cost of Service agreements must be filed and approved by the Federal Energy Regulatory Commission (FERC). However, even if approved, the capacity resource has the ability to refuse a Cost of Service agreement offer.

All types of delist bids submitted are binding and may not be withdrawn or modified after the submittal deadline. Except for Permanent Delist bids and a Non-Price Retirement Request, all delist bids are effective for one year, during the relevant commitment period.

All types of delist bids are subject to review relative to system reliability by ISO-NE. If a generator submits a delist bid and the generator is deemed unnecessary for reliability by ISO-NE for that period, and the market price determined by the auction is lower than the generator's delist bid price – they will likely be allowed to delist or leave the auction for the designated period. However, if ISO-NE determines there is reliability need for that power plant, the plant will be tagged as necessary for reliability. When this occurs,

compensation will be determined not by the auction process but by the ISO-NE Internal Market Monitoring group or through negotiation process for a permanent delist – starting with the (higher) bid submitted with the delist request. In the end, the negotiated price most probably will be higher than the rate established by the auction.

Salem Harbor's Participation in Forward Capacity Auctions

It would appear that Dominion has benefitted financially from the FCM's delist mechanism for several years. They have remained in the FCM for reliability purposes but have submitted delist bids as part of recent auctions. As a result they have had the opportunity to receive a higher level of compensation than the price determined by the FCA. The Conservation Law Foundation went so far as to contend that Dominion was "gaming the system" by filing to delist in the hope of being ordered to keep operating for reliability reasons and, as a result, receiving higher payments. The CLF said that the strategy could cost ratepayers in this region of the state \$30 million in "above-market costs."

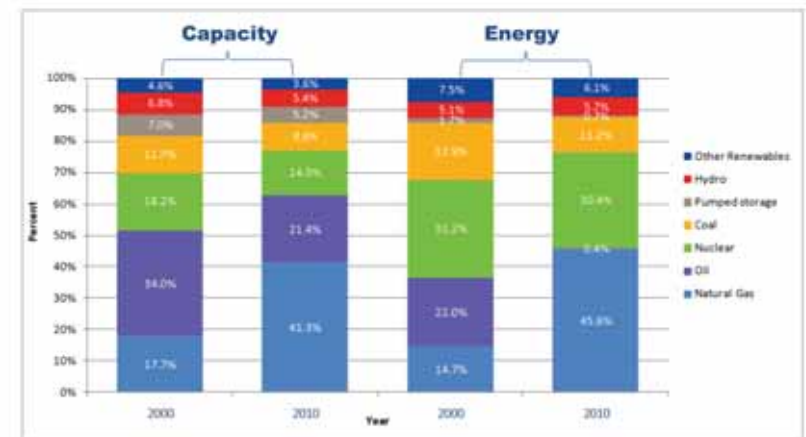
The ISO-NE requirement for availability for reliability purposes does not, however, supersede State or Federal operating controls such as emissions requirements or local permits. While the FCM had provided what appears to have been a satisfactory revenue stream for Dominion, compliance with pending emissions requirements initiated a change in strategy.

The Environmental Protection Agency's Clean Air Act requires power plants to meet environmental standards. As a result of the EPA's proposed Mercury and Air Toxics Standards, new and existing coal and oil fired power plants were asked to reduce mercury emissions as well as other acid gases and particulate matter. Power plants were given up to 4 years to comply, a requirement that was expected the cost to Dominion hundreds of millions of dollars for Salem Harbor Power Station.

2000 TO 2010 NATURAL GAS-FIRED ENERGY PRODUCTION

The relationship between gas and power prices is driven by the fact that the fleet of generation in New England has become highly dependent on gas-fired power plants to produce power. Most of the time, these plants are setting the price that all generation is paid for electricity transmitted to the grid. In fact, from 2000 to 2010 natural gas-fired energy production increased from just under 15% to almost 46%, respectively. This shift toward a natural gas emphasis and the mix of generation resources from 2000 to 2010 is displayed graphically in the figure below. In 2010, natural gas-fired generation set the wholesale price of electricity approximately 70% of the time which further emphasizes the link between natural gas and electricity prices.

2000 Vs. 2010 Capacity and Energy



Through June 2011, ISO-NE has conducted five Forward Capacity Auctions (FCA) with the most recent, FCA5, conducted in the first week of June 2011.

Salem Harbor's participation in the auctions can be described in three phases over the course of the five auctions. These three phases include:

- **Phase 1** - Full auction participation in FCA1 and FCA2
- **Phase 2** - A Static Delist strategy in FCA3 and FCA4
- **Phase 3** - A Permanent Delist/Retirement strategy for FCA5

All four of Salem Harbor's generating units were included in the Forward Capacity Market's first two auctions, FCA1 and FCA2, and Dominion will be paid for the availability of all four units at the unit price established by those auctions. As an approved participant in those auctions, all four units must be available to provide capacity to the markets for the first two commitment periods which run through May 30, 2012.

Starting with the third auction, FCA3, Dominion's participation in the process changed. Dominion sought to delist (or withdraw) all of Salem Harbor's generating units from the auction, but only for one year at a time, unless certain price levels were reached in the Forward Capacity Market. Specifically, Dominion submitted a Static Delist bid for FCA3, a mechanism that they used again as part of FCA4. In response to those delist requests, ISO-NE performed both a review of the reasonableness of the price requests included in the Dominion's bids as well as the potential impact on reliability. ISO-NE ultimately concluded that the price levels requested by Dominion in the delist bids for all four generating units were higher than allowed as part of the Forward Capacity Market rules (details of the price review process are beyond the scope of this report but there is a prescriptive process defined in the market rules that the ISO-NE must follow). They did conclude that generating Units 1 and 2 were not required for reliability and were therefore permitted to be withdrawn or not have a Capacity Market obligation for one year. The ISO-NE determined that generating Units 3 and 4 were required to remain on line for reliability purposes. The price requested for these units by Dominion as part of their delist request was reduced by ISO-NE but remained above the price established through the auction.

The latest auction, FCA5 was held June 6, 2011 and resulted in an approved market price of \$2.86 kW/month. With an aging power station that does not compete effectively in the Energy Market, no revenue growth in the Forward Capacity Market and facing a costly requirement to meet emission standards, Dominion submitted a Non-Price Retirement Request and officially notified ISO-NE of its plans to retire Units 3 and 4 as of June 1, 2014. At that point, the interconnection rights for the power station will cease. Additional revenue generation from ISO-NE markets would only be possible if Dominion applied to re-connect to the system. With FCA prices trending downward, it would appear that Dominion made a determination that while revenue from the FCM, might cover capital and operating costs, the revenue would not be adequate to address future environmental compliance obligations. A Cost of Service Agreement also would not provide adequate financial certainty. Faced with millions of dollars in costs for environmental compliance and an apparently inadequate revenue stream, Dominion opted to push for permanent retirement of all four generating units through the Non-Price Retirement Request.

As a result of not reaching agreement with the ISO-NE on a Cost of Service agreement, Dominion submitted its notice to the ISO-NE that all of the Salem Harbor generating units will be taken off line at the end of the FCA4 period on May 30, 2014.

Auction Date	Commitment Period	Capacity Supply Obligation
FCA1 June 2007	June 1, 2010 - May 31, 2011	Units 1-4 have capacity supply obligation by clearing FCA as existing generation
FCA2 June 2008	June 1, 2011 - May 31, 2012	Units 1-4 have capacity supply obligation by clearing FCA as existing generation
FCA3 June 2009	June 1, 2012 - May 31, 2013	Units 1-2 have no capacity supply obligation due to ISO-NE acceptance of delist bids Units 3-4 have capacity supply obligation due to ISO-NE rejection of delist bids for reliability reasons
FCA4 June 2010	June 1, 2013 - May 31, 2014	Units 1-2 have no capacity supply obligation due to ISO-NE acceptance of delist bids Units 3-4 have capacity supply obligation due to ISO-NE rejection of delist bids for reliability reasons
FCA5 June 2011	June 1, 2014 - May 31, 2015	Units 1-2 have no capacity supply obligation due to non-price retirement request being accepted by the ISO-NE Units 3-4 have no capacity supply obligation due to Dominion's intention to not pursue a cost-of-service agreement with the ISO-NE.

Salem Harbor Power Station's Participation in the Past Five Auctions

ISO-NE Assessment of Reliability

The Salem Harbor Power Station has contributed significantly to the reliability of the electricity grid in the New England region since it first opened in 1951 and has continued in a key role since Dominion assumed ownership in 2005. ISO-NE and the Forward Capacity Market structure have been key to maintaining Salem Harbor's necessary role in an unregulated competitive marketplace even in a context of increasing environmental regulations. All of the 745 MW capacity was available to the grid for reliability purposes as part of FCA1 and FCA2. During FCA3 (2012 – 2013) 580 MW from Salem Harbor were determined to be needed for reliability. The roughly 160 MW attributable to generating Units 1 and 2 were not required. During FCA4 (2013 – 2014) a study by ISO-NE identified a 460 MW need for reliability. The decrease from FCA3 was due to changes in load distribution for the Northeast Massachusetts (NEMA) area. In the context of Dominion's Non-Price Retirement Request as part of FCA5 (2014 – 2015) ISO-NE determined a need of 415 MW to 560 MW from Salem Harbor – or specific improvements to the grid that would eliminate the need for that reserve capacity.

Greater Boston Study Objective

As a part of its on-going transmission planning process, and, as a result of Dominion's FCA5 Non Price Retirement request, ISO-NE undertook a reliability assessment study referred to as the Greater Boston Study. This study is a reliability needs assessment of the power grid in and around the Boston area. The goal of the study was to identify issues with meeting future load growth and load usage patterns in the greater Boston area, North Shore and Merrimack Valley areas, assuming the Salem Harbor Power Station was no longer on line.

The Study was carried out using a stakeholder working group consisting of representatives of ISO-NE, National Grid, NSTAR, Northeast Utilities, and Public Service of New Hampshire (PSNH). The main charter for the working group was to evaluate all aspects of reliability, determine alternative transmission solutions, and select the most cost effective solution.

The Study used Electrical Reliability Engineering standards and applied peak loads and various levels of power imports into the Boston area. During the first level stress testing (called N-1 contingencies), several overloads or "hot spots" were identified in the system. These theoretical overload or hot spot areas indicate the potential for system outages that would adversely impact reliability of the region should no improvements be made.

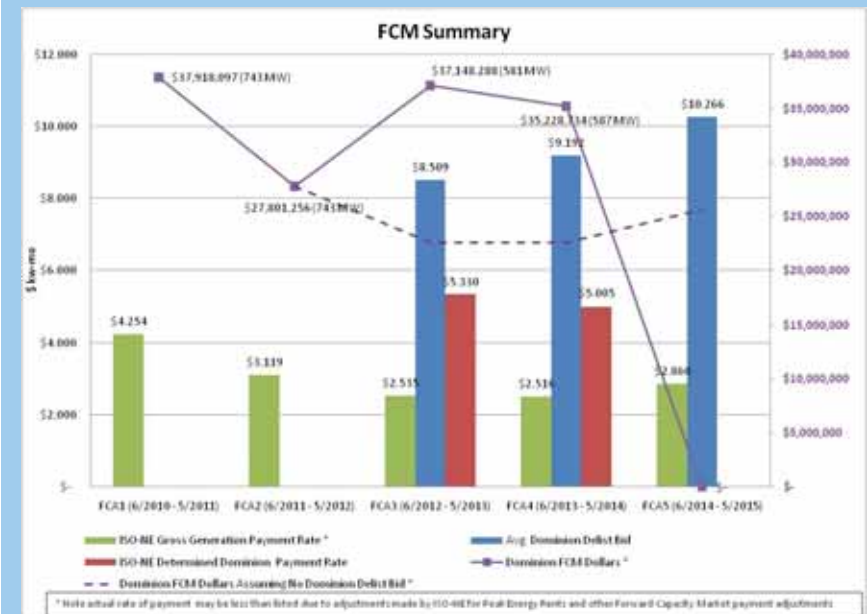
The Greater Boston study then identified a preferred transmission solution to address the hot spots. This solution includes upgrading a number of existing 115 KV lines in the North Shore area. The estimated cost is \$60 million and ISO-NE estimates that the upgrade could be done by June 2014. A complete reliability study will be finalized by the end of 2011. Subsequent to finalization of the study, Transmission Owners (TOs) must seek state and local approval to build the transmission projects. The transmission project construction would begin shortly after all applicable permits and financing are obtained.

Forward Capacity Auction Revenue

	Unit	MW Cleared	Gross Generation Payment Rate	Maximum FCM Dollars Assuming NO Delist Bids	Dominion Submitted Delist Bids	ISO-NE Determined Rate for Salem Harbor	Maximum Anticipated FCM Dollars
FCA1	1	81.988	4.254	\$ 4,185,323	\$	---	\$ 4,185,323
6/10-5/11	2	80.000	4.254	\$ 4,083,840	\$	---	\$ 4,083,840
	3	149.805	4.254	\$ 7,647,246	\$	---	\$ 7,647,246
	4	431.000	4.254	\$ 22,001,688	\$	---	\$ 22,001,688
TOTAL		742.793		\$ 37,918,097			\$ 37,918,097
FCA2	1	81.988	3.119	\$ 3,068,647	\$	---	\$ 3,068,647
6/11-5/12	2	80.000	3.119	\$ 2,994,240	\$	---	\$ 2,994,240
	3	149.805	3.119	\$ 5,606,902	\$	---	\$ 5,606,902
	4	431.000	3.119	\$ 16,131,468	\$	---	\$ 16,131,468
TOTAL		742.793		\$ 27,801,256			\$ 27,801,256
FCA3	1	---	2.535	\$ 2,494,075	\$ 9.836	---	\$ -
6/12-5/13	2	---	2.535	\$ 2,433,600	\$ 9.836	---	\$ -
	3	149.805	2.535	\$ 4,557,068	\$ 6.720	5.330	\$ 9,581,528
	4	431.000	2.535	\$ 13,111,020	\$ 7.644	5.330	\$ 27,566,760
TOTAL		742.793		\$ 22,595,763			\$ 37,148,288
FCA4	1	---	2.516	\$ 2,475,382	\$ 9.830	---	\$ -
6/13-5/14	2	---	2.516	\$ 2,415,360	\$ 9.830	---	\$ -
	3	149.805	2.516	\$ 4,522,913	\$ 9.830	5.005	\$ 8,997,288
	4	436.754	2.516	\$ 13,186,477	\$ 7.279	5.005	\$ 26,231,445
TOTAL		586.559		\$ 22,600,131			\$ 35,228,734
FCA5	1	---	2.86	\$ 2,813,828	\$ 10.266	---	\$ -
6/14-5/15	2	---	2.86	\$ 2,745,600	\$ 10.266	---	\$ -
	3	149.805	2.86	\$ 5,141,308	\$ 10.266	NA	NA
	4	436.754	2.86	\$ 14,989,397	\$ 10.266	NA	NA
TOTAL		586.559		\$ 25,690,133			

A SUMMARY OF SALEM HARBOR'S CAPACITY OBLIGATIONS AND EXPECTED REVENUES

The following chart indicates market activity related to FCA1 – FCA5, including Dominion's submitted delist bids, the ISO-NE determination related to reliability, negotiated rates for Salem Harbor (in response to delist bids) and revenue projections for Salem Harbor. After FCA1 and FCA2, ISO-NE determined that only Salem Harbor's Generating Units 3 and 4 were required for reliability purposes. Although Dominion operated Salem Harbor at lower capacity, their delist strategy for FCA3 and FCA4 significantly enhanced their expected revenues for those commitment periods. The rates determined by ISO-NE, although lower than requested by Dominion, exceeded corresponding rates established by the auction. The resulting revenue is greater than it would have been had Dominion participated conventionally in the FCA with all four generating units. Based upon the ISO-NE reliability determination, Dominion will retire Units 1 and 2 at the end of the 2011-2012 commitment period.





There are significant regulatory controls impacting future redevelopment of the Salem Harbor Power Station site. The most significant of these is the Massachusetts Office of Coastal Zone Management's Designated Port Area....

5

CONSTRAINTS, AMENITIES & ADVANTAGES

There are a wide range of issues impacting future development the Salem Harbor Power Station site. To understand the potential for redevelopment the consultant team has examined regulatory and other constraints, precedent developments, market demand, financial return on investment and impacts on the community. Amenities and advantages that could drive the ultimate direction of redevelopment on the site have also been outlined. This study focuses on realistic development scenarios, first evaluating a number of options, and then focusing further study on those that are economically viable and ultimately achievable.

While it would appear that redevelopment of this prime waterfront property might very easily focus on a mixed use development driven by residential and commercial uses, it is precisely that land use formula that will be particularly difficult to achieve. Significant land side limitations relative to traffic generation, protection of the waterfront through Massachusetts General Laws Chapter 91 and most importantly Salem Harbor's classification as a Designated Port Area, will all significantly impact the eventual redevelopment program. This section provides a brief summary of the myriad issues involved.

REGULATORY CONSTRAINTS

City of Salem Zoning Ordinance

The vast majority of the 62 acre Salem Harbor site is currently zoned Industrial (I) by the City of Salem. There is a small area (less than two acres) on the northwest corner of the site along Derby Street that is zoned for Residential Two-Family (R2). The City still owns the right-of-way for three abandoned streets (Beckett Lane, India Street and English Street). The zoning ordinance lists the following allowable uses and dimensional requirements in Industrial (I) zones:

■ Principal and Accessory Uses

- Child care facilities
- Municipal facilities
- Agriculture/horticulture
- Religious
- Educational use, nonexempt
- Arts and crafts studios and workshops
- Bank, financial agency
- Business or professional office, including medical
- Retail store, except department store
- Golf course
- Historic buildings open to the public
- Motor vehicle light service
- Museum
- Restaurant; drive-in or fast food
- Restaurant; no services of alcoholic beverages
- Sale and storage of building supplies
- Assembly or packaging
- Computer hardware development
- Food and beverage manufacturing
- Publishing and printing
- Wholesale, warehouse, or distribution facility

■ Other Dimensional Requirements

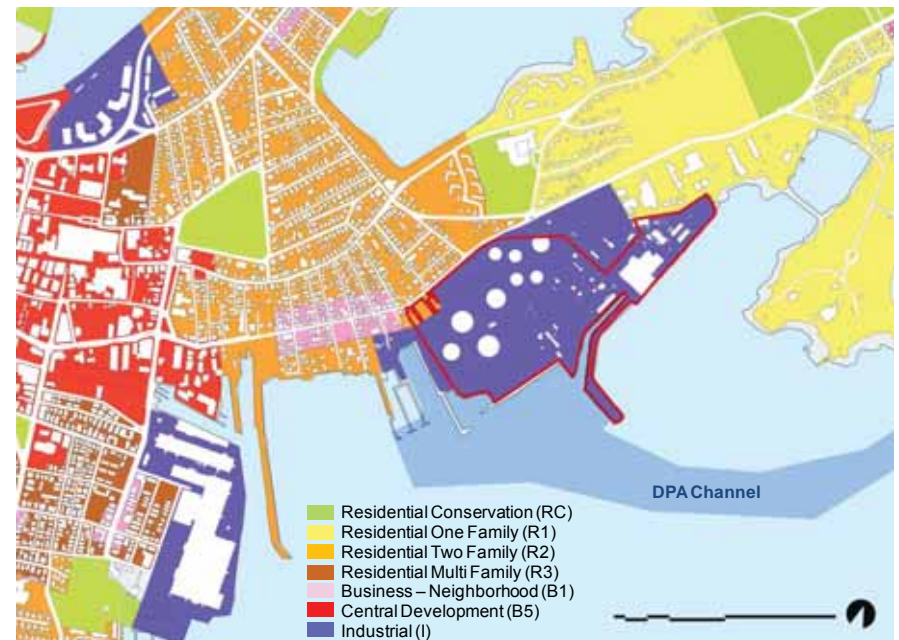
- Maximum lot coverage - 45%
- Minimum front, side and rear yard depth - 30 feet
- Maximum Building height - 45 feet (exceptions for wind facilities)

■ Uses Allowable by Special Permit (Zoning Board of Appeals)

- Institutional – Essential services
- Adult day care
- Animal clinic or hospital; kennel
- Commercial recreation, indoor
- Marina
- Motor vehicle general and body repair
- Contractor's yard; landscaping business
- Junk yard or automobile graveyard
- Light manufacturing
- Livery facility, yard, or terminal
- Manufacturing
- Mini-storage warehouse facility
- Research, laboratories, and development facilities
- Transportation terminal

■ Uses Allowable by Special Permit (Planning Board)

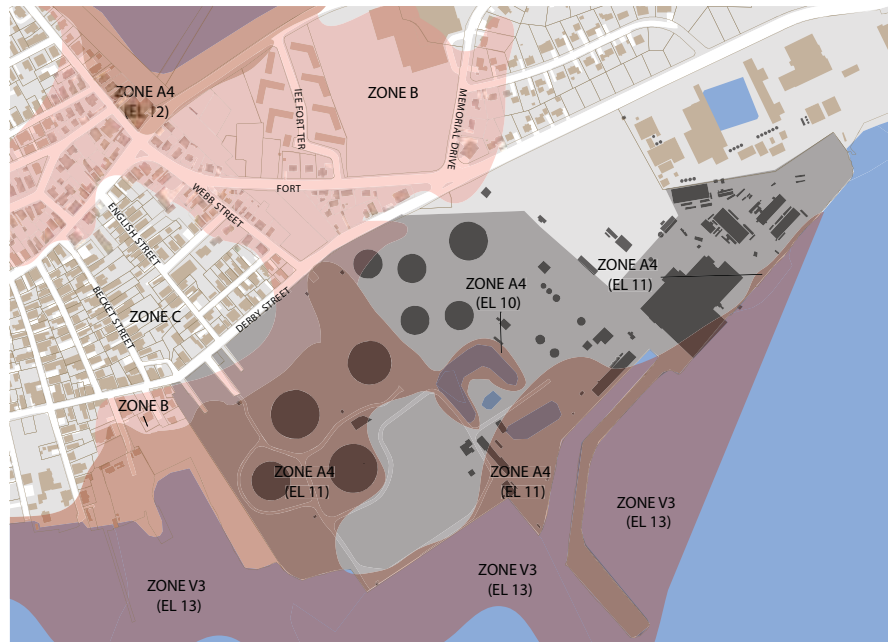
- Planned Unit Development (PUD) Residential
- Drive-through facilities (fast-food and other)
- Wind energy facility, commercial scale
- Wind energy facility, residential scale



Zoning Map

In addition to the “As of Right” uses and process, special regulations, districts, and approvals have been put in place by the City to guide other development scenarios.

- **Planned Unit Development** - Planned Unit Developments (PUDs) were developed to allow *“desirable departures from the strict provisions of specific zone classifications”* which allow multiple uses that are compatible to coexist as part of totally planned development.¹ PUD’s provide flexibility for the Department of Planning and Community Development (DPCD) and potential developers and become an important vehicle to promote development. As stated in the City of Salem Zoning Ordinance the purpose of a PUD is *“...designed to provide various types of land use which can be combined in a compatible relationship with each other as part of a totally planned development. It is the intent of the Section to ensure compliance with the master plan and good zoning practices, while allowing certain desirable departures from the strict provisions of specific zone classifications. The advantages which are intended to result from the application for planned unit development are to be ensured by the adoption of a precise development plan with a specific time limit for commencement of construction”.*²



Flood Zone Map

- **Overlay Districts** - There are three overlay districts in Salem, the Wetlands and Flood Hazard Overlay District (WFHOD), the Entrance Corridor Overlay District (ECOD), and the Conservation Overlay District (COD). The site is only partially impacted by the Flood Hazard Overlay District, as the western portion of the site has a flood hazard Zone A4 designation. Construction in this area would be by special permit as approved by the Planning Board, and the lowest floor of construction would need to be above the 100 year flood level. Only the very perimeter of the site (primarily the jetty area) is designated as Zone 3, as a high hazard area, subject to wave action. Further restrictions would apply, but the overall area involved on the site is negligible. See the Flood Zone map below.
- **Derby Street Historic District** - Although the main 62 acre parcel itself is not in the Derby Street Historic District, it is immediately adjacent. One small 1,350 square foot lot at 65 Derby Street is owned by Dominion (and contiguous to the larger 62 acre parcel), is in the Historic District, and would be subject to a Historic Commission review. See the Historic District map below.

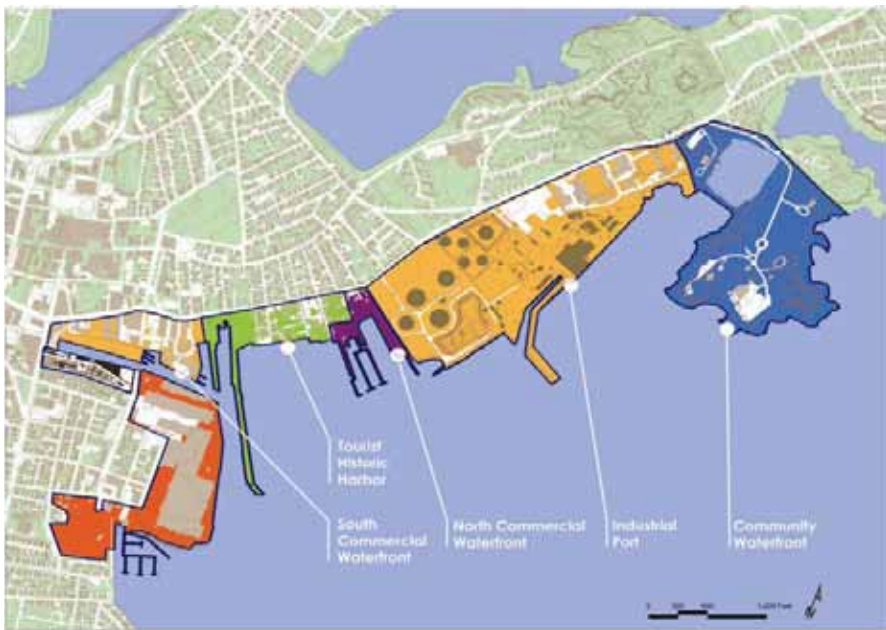


Derby Street Historic District Map

- **Site Plan Review** - Future site redevelopment will be regulated by the City of Salem Zoning Ordinance and can include "As of Right" the Principal and Accessory Uses allowed under the Industrial zone classification. Given that the potential size of the development will exceed 10,000 square feet, both "As of Right" and Planned Unit Developments will be subject to the Site Plan Review process, which will include public meeting(s) and Planning Board approval. Through this process, the City of Salem Department of Planning and Community Development, acting on behalf of its citizens, can be an active and influential entity in future development discussions.

Salem Municipal Harbor Plan

The Salem Municipal Harbor Plan was created in 2000 by the City of Salem and its planning consultant, The Cecil Group, as a planning document that creates a vision for future development in and around Salem Harbor. The Plan was updated in 2008, by Fort Point Associates, working with the City, stakeholders and community residents and with renewed approval by the Massachusetts Executive Office of Energy and Environmental Affairs (EEA).



Municipal Harbor Plan Map

The "Industrial Port" designation for the site in the Municipal Harbor Plan did not anticipate the closure of the power plant & alternative uses were not identified as part of that planning process.

Although the Harbor Plan assumes continued operation of the power station in the "Industrial Port Area", it also sets forth many valuable concepts for future development including public access along the water's edge, promotion of the maritime heritage, support for marine industrial uses (in the Industrial Port Area), and promotion of tourism, cruise ships, and the Salem Wharf district.

■ Goals of the Harbor Plan

- Re-establish the identity of Salem as an active seaport
- Maximize the economic potential of the harbor
- Promote the waterfront as a focal point for Salem's visitor economy
- Protect and enhance access to the waterfront
- Identify and preserve those aspects of Salem's waterfront experience that should be preserved and protected from change
- Protect and preserve those aspects of Salem's waterfront experience which can beneficially link the City to its maritime past
- Ensure that public investment in waterfront infrastructure will support and encourage private investment
- Protect and enhance the environmental quality of the harbor ³

The Power Station site is, in fact, significantly influenced by the Harbor Plan and its classification by Coastal Zone Management as a Designated Port Area, both of which are interrelated. When the Harbor Plan was updated in 2008, the renewal approval letter by Ian Bowles, then Secretary of Energy and Environmental Affairs (EEA), reinforced that relationship, stating the following:

"Because the Salem Harbor Plan is intended to be, in part, a master plan for the DPA, I must find that the Plan is consistent with DPA approval criteria at 301 CMR 23.05 (2)(e). Specifically, I must find that the DPA Master Plan preserves and enhances the capacity of the DPA to accommodate water-dependent industrial use, and prevents substantial exclusion of such use by any other use eligible for licensing in the DPA pursuant to 310 CMR 9.32. The master plan should also identify industrial and commercial uses allowable under local zoning that will qualify as a supporting DPA use, and identify a strategy for the ongoing promotion of water dependent industrial use.

Currently, the entire land area of the DPA is used for water-dependent industrial use, and the City continues to be steadfast in its intent to preserve and enhance this irreplaceable working waterfront. The Plan, like the 2000 version, voices a long-term commitment to maritime use at the power plant site, and to maintaining the industrial character of the entire site. In the event of any unforeseen discontinuation of the current uses, the Plan supports only projects that are entirely or predominantly maritime industrial. Accordingly,

in the vocabulary of the waterways regulations at 310 CMR 9.02, the only uses that will now be eligible for a Chapter 91 license on this site are Water-dependent Industrial Uses (with accessory use), Maritime Industrial Parks, and Temporary Uses.

*Further, the Plan limits the scope of uses that may qualify for a project as a supporting DPA use to include only boat yards, business offices (as adaptive reuse of existing buildings), general storage and warehousing, retail and service, restaurants, and off-street parking, and sets forth a strategy to assure the ongoing promotion of water dependent industrial use within the DPA, consistent with 301 CMR 23.05(2)(e)."*⁴

Note the strong emphasis on the legal obligation to promote Marine Industrial Uses within the Designated Port Area. This will be a major limitation on the types of development that could occur on the Power Station site.

More importantly, the Salem Municipal Harbor Plan renewal of 2008 includes an amplification which pertains to the Industrial Port (which includes the Dominion site) that states since " ...it is unlikely that the current uses of Dominion's Energy's Salem Station Power Plant site will be discontinued within the 10 year duration of the Plan, the City chose to include provision that would guide MassDEP licensing decisions in that event. The Plan recommends that only the following uses be eligible for licensing in the Industrial Port District: water-dependent industry, marine industrial parks, and temporary uses as defined in the Waterway Regulations". Most importantly, "any proposed new uses(s) for this site beyond energy production, marine industry, and temporary uses... will require a renewal or amendment to this Harbor Plan." ⁵

As a result the Supporting Uses which can typically account for 25% of a DPA have been excluded from Salem's Industrial Port District which includes all of the Dominion site. The Salem Wharf/North Commercial Waterfront portion of the property is not effected. (See map on previous page)

As the master plan for Salem's Designated Port Area, the Harbor Plan is the overall vehicle to seek consideration of amendments to the description of the Designated Port Area. Any revision to the Harbor Plan that includes an amended Designated Port Area would need to be approved by the Secretary of the EEA with review and guidance from the Massachusetts Office of Coastal Zone Management (CZM) and the Department of Environmental Protection (DEP), Waterways Regulation Program (WRP).

Massachusetts General Laws Chapter 91

The majority of the Salem Harbor site is subject to Massachusetts General Laws Chapter 91, The Massachusetts Public Waterfront Act, which is the Commonwealth's vehicle for protecting and promoting the public use of its tidelands and other waterways. The program was established in 1866, but it's principles date back to the 17th century, and the Colonial Ordinances which represented a belief that the air, sea, and shore belonged to the public. ⁶

As noted on the Massachusetts Department of Environmental Protection website, Chapter 91 "regulates activities on both coastal and inland waterways, including construction, dredging and filling in tidelands, great ponds and certain rivers and streams." Furthermore, through Chapter 91 the Commonwealth "seeks to preserve and protect the rights of the public, and to guarantee that private uses of tideland and waterways serve a proper public purpose. While other agencies, including the Department of Environmental Management, Massachusetts Coastal Zone Management and the Division of Fisheries and Wildlife, play a role in preserving public rights in public trust lands, the Waterways Regulation Program, the section of Mass DEP that oversees Chapter 91, is the primary division charged with implementing the public trust doctrine." ⁷



Chapter 91 Map

The Chapter 91 line identifies the historic high-tide line and limits land uses along the water's edge to those that are water-dependent.

The area subject to Chapter 91 is the land on the water side of the line of the *“historic high tide established by farthest landward tide line prior to human alteration”*.⁸ Approximately two-thirds of the Salem Harbor Power Station site is subject to Chapter 91 limitations.

Chapter 91 *serves to protect traditional maritime industries, such as fishing and shipping, from displacement by commercial or residential development*” setting the framework for future development.⁹

■ **Chapter 91 regulations specifically work to promote the following:**

- Preserve pedestrian access along the water’s edge for fishing, fowling and navigation and, in return for permission to develop non-water dependent projects on Commonwealth tidelands, provides facilities to enhance public use and enjoyment of the water.
- Seeks to protect and extend public strolling rights, as well as public navigation rights.
- Protects and promotes tidelands as a workplace for commercial fishing, shipping, passenger transportation, boat building and repair, marinas and other activities for which proximity to the water is either essential or highly advantageous.
- Protects areas of critical environmental concern, ocean sanctuaries and other ecologically sensitive areas from unnecessary encroachment by fill and structures.
- Protects the rights of waterfront property owners to approach their property from the water.
- Encourages the development of city and town harbor plans to dovetail local waterfront land use interests with the Commonwealth’s statewide concerns.
- Assures the removal and repair of unsafe or hazardous structures.¹⁰

Chapter 91 applies to flowed tidelands, filled tidelands, great ponds and non-tidal rivers and streams. The Salem Harbor Power Station site is a filled tidelands area. The regulations apply to both new and existing site activities.

■ **Regulations include the following:**

- placement of structures (including seasonal structures)
- structural alterations or demolition of structures
- change in use
- filling and dredging

Final project approval is a public process and according to the Mass DEP website can involve the following steps:

■ **Project Approval**

- Pre-Application Meeting with Waterways Regulation Program
- Environmental Notification Form (ENF) Filing with Massachusetts Environmental Protection Agency
- Chapter 91 Application Filed – preliminary review by Waterways Regulation Program
- Determining Water Dependency by Waterways Regulation Program
- Public Notice by Waterways Regulation Program
- Public Hearing
- Written Determination needs to pass these three criteria:
 - The structures or fill serves a proper public purpose
 - The purpose provides greater public benefit than detriment
 - Determination is consistent with policies of Massachusetts Coastal Zone Management
- Appeal Period – 21 days
- File Completion – applicant submits outstanding information and summary of public comments
- License Issuance and Fee Payment
- Recording of License
- Certificate of Compliance¹¹

While seeming fairly specific, there is flexibility in the Chapter 91 regulations. In exchange for public use and public access to the water’s edge, the MassDEP Waterways Regulation Program (WRP) is often willing to allow for non water-dependant use, as long as the *“non water-dependent projects... provide greater benefits than detriments to the public’s right in waterways.”*

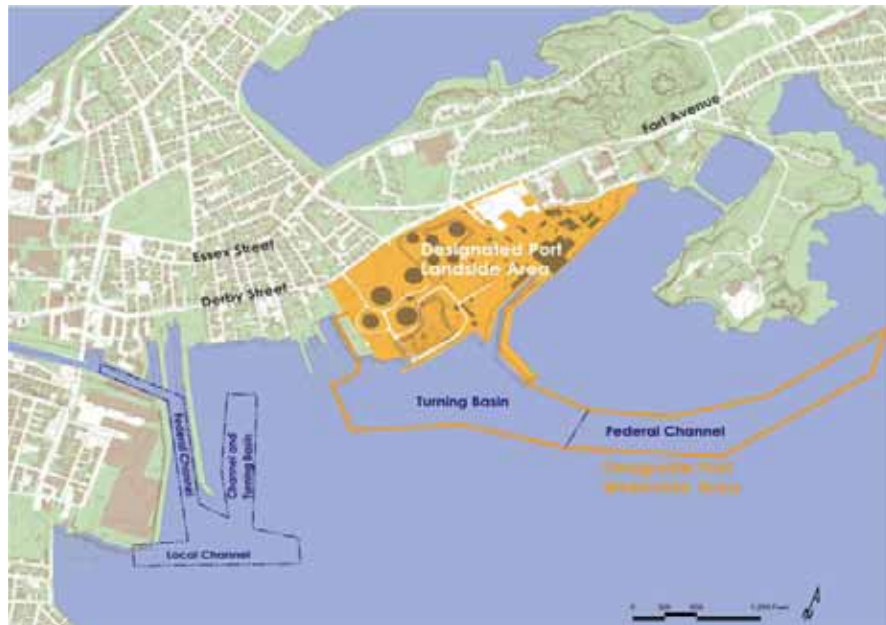
¹² Typically, a determination is made as to whether the applicant’s project is water-dependent or non water-dependent. Non water-dependant uses *“are those which may be located on waterfront property”* and may include retail and commercial outlets, hotels, offices, restaurants, gas stations and residences.¹³ The amount of public benefit that must be provided to offset the proposed non water dependent use is determined by how much of the project is located on Commonwealth tidelands (areas seaward of mean low water) versus private tidelands (areas landward of mean low water).

In summary, there is flexibility in the Chapter 91 process, and opportunities to have non-water dependent uses within the project boundaries. However, the Designated Port Area regulations do not provide as much flexibility.

Designated Port Area

In 1978, the Massachusetts Office of Coastal Zone Management (CZM) established the Designated Port Area (DPA) program which was created to *“help maintain existing port infrastructure that was built over the years at great public expense. The policy protects and promotes appropriate marine industrial development in port areas with key industrial attributes, such as deep-water channels, established rail and transportation links, and public utility services conducive to industry.”*¹⁴

In 1979, Massachusetts Department of Environmental Protection incorporated the DPA program into its Waterways Regulations to prevent *“types of development that conflict with maritime industrial use including condominiums and other residential development, hotel, and recreational boating facilities. This approach is critical – once space for water-dependent industry is lost to other development, it is virtually irretrievable. Creating new infrastructure in other areas requires dredging deep channels, altering natural shorelines with extensive fill and structures, and connecting into existing transportation and utility network. Such measures are prohibitively costly in both monetary and environmental terms.”*¹⁵



DPA Map

The Designated Port Area includes all of the land area of the Dominion site, as well as the deep water channel that connects it to Salem Harbor.

There are presently 11 Designated Port Areas in Massachusetts including Gloucester, Beverly, Lynn, Mystic River, Chelsea Creek, East Boston, South Boston, Weymouth/Fore River, New Bedford-Fairhaven, Fall River/Mt. Hope Bay and Salem Harbor.

In Salem, virtually all of the Salem Harbor Power Station site is included within the boundary of the Designated Port Area. The waterside portion of the DPA includes the turning basin and the federal channel. As defined by 310 CMR of the Waterways Regulation, uses protected and supported by the DPA include the following:

■ Water Dependent Uses

- Marine terminals
- Commercial fishing facilities
- Marine repair and construction facilities
- Manufacturing facilities that rely primarily on bulk receipt
- Facilities accommodating the shipment of goods by water
- Industrial uses or infrastructure facilities which cannot be reasonably located at an inland site as determined by 310 CMR¹⁶

■ **Supporting Uses** - Permitted under DPA regulations, and defined as *“industrial or commercial use within a DPA that provides water-dependent industrial uses within the DPA with direct economic or operational support, to an extent that adequately compensates for the reduced amount of tidelands.....(that) will be available for water –dependent use.”*¹⁷ The following have been defined as Supporting Uses and are limited to 25% of the DPA area:

- Storefront retail and service facilities
- Shops operated by self-employed tradespersons
- Eating and drinking establishments
- Small-scale administrative offices¹⁸

■ **Accessory Uses** - Permitted under DPA regulations, and defined as *“accessory to a water dependent use upon a finding by DEP that said use is customarily associated with and necessary to accommodate a principal water dependent use.”* It must be found to be *“integral to the function of the water dependent use”* and... *“commensurate in scale”*.¹⁹

The following have been defined as Accessory Uses:

- Parking facilities
- Administrative offices
- Restaurants
- Retail facilities ²⁰

■ **Temporary Uses** - The DPA regulations defined in 310 CMR identify temporary uses as *“warehousing, trucking, parking and other industrial and transportation uses which occupy vacant space or facilities within a DPA for a maximum of ten years.”* ²¹ From a development standpoint, temporary uses are of limited value.

■ **Excluded Uses** - Defined by 310 CMR as incompatible and potentially considered to be a threat to the purpose and principle of the DPA. The following have been defined as Excluded Uses:

- Residential units
- Hotels and motels
- Recreational boating facilities
- Large sport/amusement complexes

The publication *“Designated Port Areas - A Manual for Lawyers”* prepared by the New England School of Law in 2009 summarizes the DPA designation and its limited flexibility:

“In sum, the DPA regulations protect and preserve DPAs for water-dependent industrial uses and collateral uses associated with such industrial uses. Such flexibility as can be found in the regulation does not extend to non-commercial or commercial recreational uses that would encourage members of the public to enter DPAs for purposes other than accessing a water-dependent industrial or collateral operation.” ²²

As a reminder, the current Salem Municipal Harbor Plan which runs through 2018, has an amplification which excludes Supporting Uses on the Dominion portion of the site. In order to overturn this restriction, an amendment of the Harbor Plan will be required.

DPA Precedents

It is useful to look at the other ports in the Commonwealth to understand current practices, challenges, and long term master-planning efforts as a way of understanding what may be possible in Salem.

As previously mentioned, there are 11 DPAs in the Massachusetts. Following is a description of some which seem to be most relevant to Salem.

■ **Port of Boston** - The Port of Boston is the western hemisphere's oldest continually operating seaport functioning as a busy trading area even prior to settlement by Europeans. ²³

According to The Boston Harbor Association website, Boston's working ports generate \$2.4 billion in economic benefit and provide 34,000 jobs annually. ²⁴ Four of the 11 DPAs are located (fully or partially) in the Port of Boston, including South Boston, Chelsea Creek, Mystic River and East Boston. The Massachusetts Port Authority (Massport) plays a key role in developing and managing the seaports and other transportation infrastructure. The port typically has a 40 foot deep channel which is being dredged to a depth of 48 feet at the South Boston terminal.

- **South Boston** - The South Boston DPA is an active seaport which includes the Conley Terminal, Black Falcon Cruise Terminal, Boston Fish Pier, Massport Marine Terminal, Fargo Street Terminal and the International Cargo Port.

The Conley Container Terminal handles over one million tons of containerized cargo and is a state of the art facility that has four post-Panamax container cranes and access to transportation infrastructure. ²⁴

Over 16 million tons of bulk cargo, (including petroleum, LNG, salt, cement and gypsum) is handled in South Boston at the International Cargo and Massport Marine Terminal annually. ²⁶ In addition, over 27,000 vehicles per annum are handled in South Boston as well. ²⁷

The Fish Pier was acquired by Massport in 1972 and remains a destination for seafood dealers and a major location for fish processing facilities.

The Black Falcon Cruise Terminal is the focal point of Boston's growing cruise ship industry and has more than 100 ship calls with nearly 300,000 passengers annually.²⁸ It is an active terminal with cruises to Bermuda, seasonal cruises to New England and Canada, as well as transatlantic cruises to Europe.

- Chelsea Creek - The Chelsea Creek DPA is home to the Eastern Salt Company, a major distributor of road salt. Additionally, it is the site for jet fuel storage for Logan Airport, as well as diesel fuel, gasoline, and home heating oil storage.
- Mystic River / Charlestown - The Boston Autoport is located at the former Moran Container Terminal and Mystic Pier One and handles 50,000 automobiles a year, including covered storage for high end automobiles.²⁹ Mystic River handles bulk cargo, including the storage and distribution of road salt, as well as home heating, liquefied natural gas and gasoline storage. A \$60 million wind turbine blade testing facility has recently been opened in Charlestown, the largest of its kind in the United States and funded by the Department of Energy with federal stimulus money.³⁰
- East Boston - The East Boston Port contains Pier 1 and the East Boston Shipyard, a ship building and repair facility and is home to commercial offices and other industry. The City of Boston has also been considering a proposal to construct a wind turbine manufacturing/staging location at the East Boston port.

- **Port of Gloucester** - Gloucester has a long tradition of commercial fishing, but has fallen on hard times in recent decades due to depleted fish stocks (halibut, haddock, yellowtail, flounder, ocean perch and Atlantic cod) and increased regulations.³¹ The industry has consolidated, but Gloucester remains a regional hub and leader in the fishing industry. Gloucester is a popular destination due to its fishing heritage, colonial history, and renowned art colony, Rocky Neck, and also offers whale watching excursions.

Gloucester has a large DPA area, about twice the size of Salem's DPA, which is subdivided into three areas: Harbor Cove, Industrial Port and East Gloucester. The DPA includes a 20 foot deep navigational channel and a 600 foot long dock that can accommodate vessels up to 500 feet long. In their approved 2009 Municipal Harbor Plan (MHP), Gloucester was successful in using a combination of municipal zoning and special permits to limit commercial development in some DPA areas and increase it in others. The net result was an overall decrease in commercial development and a port area characterized by the recently completed Cruiseport Marine Terminal which accommodates seasonal cruise ships from Canada. Other potential uses being considered are an aquarium, and a Harbor Innovation Center which could include a visitors center, expanded fishing port facilities, marine research and education center, historical research center, public marketplace, seafood culinary school, town landing, and harbor walk.³² Gloucester is also home to the Ocean Alliance, a non-profit whale research institute, and Neptune's Harvest, a wholesale fish and seafood company who also processes fish remains to sell as liquefied fertilizer to farmers.³³

An article from the Boston Sunday Globe, dated October 2, 2011 detailing Gloucester's current plans for their harbor is included in the following sidebar.

Gloucester's plan: to rework its working port

By Steven A. Rosenberg

GLOBE STAFF

The business of fishing is holy in Gloucester, and the heart of the industry sits at the mouth of the Atlantic in Cape Ann. Here, where nearly everyone has either lost a relative at sea or known someone who perished there, officials took steps about 25 years ago to keep Gloucester Harbor as a working port, designating the area for maritime use while excluding the construction of condos and marinas.

So over the last decade, even as the fishing industry nearly collapsed after tough regulations were implemented to rebuild stocks like cod, flounder, and haddock, the harbor has retained its gritty look. But with nearly half of the harborfront underutilized and numerous piers rotted or falling into the ocean, the city is looking not to abandon its working harbor approach, but to update it for the 21st century.

Its plan: to bring a new generation of Atlantic-oriented business into town — an ocean technology cluster, if you will — to bring in a new flow of revenue.

The city could certainly use the money, more than \$200 million of it to rebuild schools and roads and repair its water and sewer system. As things now stand, less than 1 percent of the city's tax base — around \$750,000 — comes from harborfront property tax-

es. And while federal and city officials say fishing stocks will return in a few years, Gloucester lost 21 fishing boats last year and its once-proud fleet of hundreds of vessels is now down to 75.

Hoping to stimulate interest in the empty waterfront properties, the city will hold a two-day maritime industry gathering next month. The conference will be organized by the Metropolitan Area Planning Council, and is being funded by a federal grant of \$45,000. Gloucester Mayor Carolyn Kirk said the conference goal will be to reach a consensus regarding the best types of new maritime businesses to attract to the harbor.

"We need jobs and investment on the working waterfront. That is the bottom line for the city," said Kirk, who added that diversifying the harbor's economy would be compatible with the fishing industry, which she said would always be the port's focal point. Still, she is hoping that a new "niche" maritime industry puts down roots and invests in the city. Kirk wants to usher in a burst of economic activity that would include universities, biotech companies that create drugs from ocean research, ocean scientists, aquaculture, "green" boatbuilders, and other companies that support the local fishing industry.



Jason Edwards labels a bottle of Neptune's Harvest fish-derived fertilizer.

"Reinventing Gloucester as a prestigious maritime center is much harder to do than to attract tourists and open up shops and have condos. And, in true Gloucester fashion, we're taking the hard route," she said. "The working waterfront is what resonates with the community and what makes Gloucester authentic."

Jack Wiggin, director of the Urban Harbors Institute at UMass-Boston, believes the city has to properly market its greatest natural resource, a centuries-old, natural deepwater harbor that he says is ripe for academic institutes that generate research used to spin off new businesses. He said one model for marketing the city is to list available waterfront properties, provide demographic information about the city's residents and workforce, and also detail infrastructure

support, such as tax breaks, that Gloucester could offer new businesses.

Research institutes are not new in the city. The former Bureau of National Fisheries was located in Gloucester and conducted some of the first exploratory cruises into the Atlantic from

research vessels that left the harbor. The National Oceanic and Atmospheric Administration, a scientific agency focused on the condition of the air and the oceans, has offices in the city. And colleges such as University of Massachusetts Amherst have had research facilities in the city for decades.

"The potential is phenomenal," said Molly Lutcavage, who directs UMass-Amherst's Large Pelagics Research Center. The Gloucester facility works with local fishermen to conduct research on bluefin tuna, bigeye tuna, swordfish, and leatherback sea turtles. "I think the new focus for the Gloucester waterfront cannot just be fishery science, but ocean exploration and new approaches to ocean energy."

In 2008, the whale research institute Ocean Alliance bought a cluster of old brick factory build-

ings known as the Paint Factory for \$2 million. The nonprofit, which focuses on the effect contaminants have on whales, is spending \$8 million more to renovate and outfit the site with state-of-the-art machinery.

"I think we're the first wave of ocean innovators that will be coming to the area," said Iain Kerr, Ocean Alliance's chief executive officer. "I think as we look to the future, as we look to new drugs and alternate sources of energy — whether it be wave power, wind power, or ocean currents — the ocean is an emerging new frontier."

Ann Molloy, who co-owns Neptune's Harvest, a wholesale fish and seafood firm, believes existing fishing businesses on the water need to diversify. The harbor business has been in her family for more than a century.

Until the early 1980s, just 30 percent of the fish the firm was filleting was edible, and the gurry — the head, bones and skin — was dumped at sea. That's when her family stumbled upon a way to expand their business.

Turning to UMass-Amherst researchers in the city, they established a way to grind the remains of the fish into organic liquid fertilizer. Each day, the company grinds at least five tons of fish and bottles the liquid, which is then packed in 4,500-gallon tanker trucks and shipped to farms throughout the country.

"The North Atlantic is the perfect source for nutrients, and if we had the right researchers here a number of products could be developed," said Molloy.



A planned Harbor Walk could stretch along Gloucester's waterfront as soon as next June.

- **Port of New Bedford** - New Bedford has a rich history and once was one of the most important whaling ports in the world. It is now the leading port for commercial fishing in the United States.³⁴

New Bedford also has a large DPA area, which is across the Acushnet River from the Fairhaven DPA. The New Bedford DPA includes a 28 foot deep navigational channel and a 450 foot long dock. The New Bedford DPA is also a Foreign Trade Zone which offers duty-free opportunities for importers and exporters. Dry and liquid bulk cargo is received in New Bedford with intermodal freight transfer at the Quick Start Ferry facility. The DPA has access to a good transportation infrastructure including trucking (I-95), air (New Bedford Regional Airport, a towered Class D airport), water, and rail (CSX rail service).³⁵

Maritime International offers cold storage for the perishable food industry. The Port also is home to the Sprague Energy Petroleum Terminal which offers storage for home heating, diesel, gasoline, and natural gas. D.N. Keeley & Sons Shipyard also performs boat repairs and has been steady fixture in the Fairhaven/New Bedford harbor for many years. The port also offers ferry service to Martha's Vineyard and Cuttyhunk Island, and serves as a seasonal stop for the expanding Canadian cruise ship market, bringing visitors to explore the Whaling Museum, Ocean Explorium and New Bedford's historic past.

Most recently, New Bedford has become a staging/assembly site for the wind turbines built for Cape Wind.

- **Port of Fall River / Mt. Hope Bay** - Fall River has a rich history and once was one of the most important textile milling towns in the world. Battleship Cove has the largest collection of US Navy vessels in the country and is a popular tourist destination.

Fall River also has a large DPA area, which includes a 35 foot deep navigational channel and two 500 foot long docks. According to World Port Source, Fall River is the 2nd busiest cargo port in Massachusetts, behind Boston, and its cargos, which come from South America, West Africa, Cape Verde, Europe and the Caribbean, include paper, latex, chemicals, frozen fish, coal / lignite and vehicles.³⁶ It has easy access to I-195 and an active CSX rail.

Port Comparison Summary

Port	Salem (Dominion)	Gloucester	Boston	Fore River (Ship Yard)	Fall River (Mount Hope Bay)	New Bedford
Protected Harbor	Yes	Yes	Yes	Yes	Yes	Yes
Channel Depth	32'	16-19'	40-45'	32'	40'	30'
Horizontal Clearance	280'	200'	430'	175'	400'	150'
Overhead Clearance	No vertical obstruction	No vertical obstruction	No vertical obstruction			No vertical obstruction
24 / 7	Yes	No	Yes	Yes	Yes	Yes
Exclusive Use?	Yes	No	Yes	Yes	No	Yes
Berth Length	580'	1400'	1800'	800'	620'	1600'
Upland Area	Up to 45 acres	7.8 acres	14-17 acres	111 acres	7 acres	10+ acres
Rail / Hwy Access	Rail: no Hwy: no	Rail: yes Hwy: yes	Rail: limited Hwy: yes	Rail: yes Hwy: no	Rail: yes Hwy: yes	Rail: limited Hwy: yes

Modifying DPA Requirements

In order to initiate modifications to the DPA requirements, municipalities typically work through the Municipal Harbor Plan (MHP) process. Future changes to the DPA typically will be formulated through the Salem MHP, currently approved through 2018, and must be approved by the Secretary of the Executive Office of Environmental Affairs (EEA) with review and guidance from the Massachusetts Office of Coastal Zone Management (CZM) and the Department of Environmental Protection, Waterways Regulation Program (WRP). As stated earlier in this section, the current Salem Municipal Harbor Plan has an amplification which excludes Supporting Uses on the Dominion portion of the site and will require an amendment to the Harbor Plan if other uses are contemplated.

There are current examples of modifications to DPA requirements that have been utilized by other ports. However, they are uncommon and they are extremely limited in nature, and may not be applicable to Salem. The mechanisms used for modifications, described below, have included Boundary Review, Substitution Provisions and localized trade-offs within the context of overall compliance.

- **Boundary Review** - At the written request of the municipal official, planning board or other governing body, Coastal Zone Management may undertake a Boundary Review of the DPA. Boundary reviews are further defined in 301 CMR (Code of Massachusetts Regulations), and could be used to alter the size or configuration of the DPA to allow for broader future development potential. While reconfiguration is possible, reducing the overall area of a DPA is likely to get less support from Coastal Zone Management.

A recent 2006 case, *Gypsum v. Executive Office of Environmental Affairs (EEA)*, which applied to the Mystic River DPA, is a relevant case study which challenged the designation of a portion of the DPA. *"In Gypsum, the properties in question undisputedly met the designation standards to remain in the DPA, but the (CMZ) director argues that the properties could be excluded based upon his discretion that he argues was set forth in 301 CMR."*³⁷ The Massachusetts Appeals Court found that the director has no discretion to remove a parcel from a DPA if the parcel under review keeps the designation standards."³⁸ Furthermore, *"The Court emphasized that the director's discretion*

*did not extend to the exclusion of qualifying property from a DPA: To transform the discretion...to do precisely the reverse, i.e. to exclude other includable property, entirely and forever, from the regulatory framework intended to further the fundamental goal of protection of scarce coastal zone resources, with a result that tends to minimize, not maximize, the shrinking industrialized coast and undermines, not serves, the explicit purpose of the DPA regulations."*³⁹

The case ruling does not appear to support the notion that Boundary Review is a viable method in the Court's mind to reduce a DPA area.

East Boston has also gone through a process to amend its DPA through the Boundary Review process, according to the Manual for Lawyers publication, *"The only areas removed by CZM in the East Boston Boundary Review were those portions of properties which were only partially within the DPA. Where the DPA boundary lines intersected the building located on the parcel or otherwise were not in conformance with property lines, CZM determined that the entire property should be removed from the DPA."*⁴⁰ East Boston's efforts are not relevant to Salem, whose DPA basically consists of one large parcel.

- **Localized Trade-Offs/Overall Compliance** - Marine industries anticipated by the DPA designation have not occupied available land areas as expected and many cities with DPAs have been left with economically depressed waterfronts. Stakeholders must assess the uses that are most beneficial to cities in today's economy. Some flexibility within portions of the DPA may also be possible if the overall requirements are maintained.

The City of Gloucester has gone through a process of amending their DPA and continues to pursue additional modifications. In December of 2009, the Gloucester Municipal Harbor Plan was approved by the Secretary of the EEA which initiated a change to Gloucester's DPA. The approved 2009 Gloucester Harbor Plan (and DPA Master Plan) provided *"...greater flexibility for supporting commercial uses on waterfront property so that waterfront properties have more mixed-use investment options..."*.⁴¹ The plan allowed for *"up to 50% of the ground area for commercial uses on all parcels within the DPA"* while also decreasing commercial use in specific sub-areas.⁴² The

Gloucester DPA was large enough to allow for trade-offs locally, while still achieving overall goals. As the Secretary of the EEA stated: *"A municipality may propose alternative use limitations or numerical standards that are less restrictive than the Waterways requirements as applied in individual cases, provided that the plan includes other requirements – considering the balance of effects on an area-wide basis will mitigate, compensate for, or otherwise offset adverse effects on water-related public interests."*⁴³

The Gloucester DPA is a much larger area than Salem, and unlike Salem's DPA, is comprised of numerous parcels. Trade-offs allow for some parcels and/or sub areas to have a higher percentage of Accessory Uses, as long as the aggregate area complies with the 25% Accessory Use limitation imposed by the DPA regulations. In Salem, the entire DPA is essentially recognized as one parcel. As a result, trade-offs are not viable because the 25% Accessory Use limitation only applies to aggregate developments.

- **Substitute Provisions** - The Gloucester Harbor Plan also pursued the use of "Substitute Provisions" established under 310 CMR 23.05 (2) (c). The substitute provision states that *"the regulations set forth a two-part analysis that must be applied individually to each proposed substitution in order to ensure that the intent of the Waterways requirements with respect to public rights in tidelands is preserved"*.⁴⁴ The Gloucester Harbor Plan argued that *"the configuration of the WDUZ (Water Dependent Use Zone) as directed by the Waterways standards may be less effective in providing use of the water's edge for water-dependent industrial use than another configuration allowed with flexibility to the existing standards."*⁴⁵ As a result, relief from dimensional restrictions providing public access for limited properties was granted in exchange for *"greater effectiveness in the use of the water's edge for water-dependent industrial use"*⁴⁶ Fundamentally, this represents minor adjustments for a particular situation where oddly configured parcels posed challenges probably not applicable to Salem.

- **Public Sentiment** - In 2010, the City of Gloucester expressed interest in constructing an aquarium, a use that is not permitted within the DPA. Local sentiment is summarized in an editorial in the Gloucester Times on September 7, 2010:

*"Yet the state is still insisting that property be used to service an industry that is no longer big enough to use it, and probably never will be again...The DPA designation has already been amended to allow up to half of a property to be used for 'supporting uses' of marine industrial. But according to a spokesman for the Department of Environmental Protection, an aquarium is not considered supportive of marine industrial uses...Gloucester needs economic growth. And its options in pursuing that growth should not be limited by outdated state mandates that still provide too narrow a window for the city's future."*⁴⁷

There has also been interest in modifying a portion of the Chelsea Creek DPA. The Chelsea Community Development Plan (CDP) was completed in 2004 and has focused on the need for residential and overall economic growth. The CDP stated that the status of Chelsea's waterfront needed to be changed to *"capitalize on any opportunities to advocate for changes to the current regulations to allow for 'higher and better' uses at the waterfront"*.⁴⁸ Chelsea is in the process of creating a MHP, which is intended to be a vehicle to bring about change to its DPA. As indicated in *Designated Port Areas, A Manual for Lawyers*, *"Until Chelsea is able to find a means to modify its DPA (perhaps through a MHP) the waterfront will more than likely remain as it is"*.⁴⁹

The process for amending the DPA seems difficult, but not worth dismissing. There are a few precedents. By utilizing the MHP, and seeking change through Boundary Review, the Substitute Provision, and trade-offs within the DPA itself, more flexibility may be provided for potential developments. More importantly, if DPA's in the Commonwealth of Massachusetts remain vacant or struggle, (and are supported by municipal and public sentiment against the DPA constraints), the governing authorities may ultimately be forced to ease restrictions leading to more flexibility within DPAs. This would be particularly relevant for specific DPA's like those located in Beverly and Salem, whose landside infrastructure may not be as conducive to a majority of marine industrial uses as Boston, Fall River and New Bedford.

OTHER CONSTRAINTS

Cost Of Clean Up

One of the most significant factors in determining the viability of future development on the Salem Harbor Power Station site will be the cost of clean-up, including demolition of the existing power station structures and clean-up of the 62 acre site.

The estimated range of clean-up costs determined as part of this study is preliminary and is based upon the limited information currently available. In estimating the total cost of site clean-up, the consultant team relied on the following information and criteria:

- **Salem Harbor Power Station Site Access** - The consultant team was provided access to the Salem Harbor Power Station site on August 25th, 2011 with representatives of Dominion Energy. The two-hour walk through allowed the consultant team to confirm assumptions regarding the systems and conditions within the power plant proper, as well as the surrounding power plant site. Specific measurements, quantity take-offs, photographs, and subsurface investigations or testing were prohibited.
- **Industry Experience** - The consultant team includes the Jacobs Energy & Power Group. Their experience, global expertise and familiarity with power plant construction, demolition and remediation has provided valuable insight. Jacobs also utilized an on-staff Licensed Site Professional (LSP) to better understand environmental issues and the potential complexities of site remediation. A LSP is a Hazardous Waste Site Cleanup Professional and a scientist or engineer authorized by a state to oversee the assessment and cleanup of contaminated sites.⁵⁰
- **Public Information** - With the exception of the visual observations made at the walk through, information regarding the Salem Harbor Power Station structures and site is based on publicly available information.

- **Relevant Documentation on the DEP Website** - The history of known violations and site remediation are documented on the Commonwealth of Massachusetts Department of Environmental Protection website. Dominion purchased the power station in 2005 and it is unlikely, given their due diligence at the time, that they would have assumed liability for excessive contamination as part of the transfer of ownership. Site remediation could still be a significant cost relative to redevelopment, however. According to the DEP website, there have been 16 Reportable Releases since 1987. The level of severity of these occurrences appears to be relatively minor and all were properly addressed by ownership. Records for all of the occurrences indicate a Response Action Outcome (RAO) Compliant Status, and there appear to be no outstanding issues. Additional remediation in these areas may be required depending upon the land uses included in the eventual redevelopment. During the recent walk through, Dominion indicated that in addition to reported incidents, the area of the original ash settling pond has some environmental restrictions. They have, however, assumed that varying degrees of reuse would still be allowable.

- **Other Precedents** - The U. S. is entering a new era in the development of its energy infrastructure. According to the American Clean Skies Foundation, 10 to 15 percent of the country's coal-fired power plants are likely to be retired between 2012 and 2020.

Many of these power plants, like Salem Harbor Power Station, are not architecturally significant structures, and are unlikely to be renovated for other uses. As a result, many will be demolished. At the present time, however, there are a limited number of precedents and very little relevant data is publicly available. Many plants have been decommissioned, but are yet to be demolished.

The most relevant precedents are listed below:

Source for the following Project: "Laughlin Coal-fired Power Plant Going Away" by John G. Edwards, Las Vegas Review Journal.

- Mohave Generating Station, Nevada
 - Rural desert setting
 - 1580 MW capacity
 - Demolition began in 2009
 - Estimated cost \$30 million

- Port Washington Power Plant, Wisconsin
 - Adjacent to Lake Michigan and residential area
 - 6 coal-fired units built in 1930s and 1940s
 - 341 MW capacity
 - Partially decommissioned and demolished in 2005-2006
 - Cost of \$30-35 million
- Plant Arkwright, Georgia
 - Located in a rural area
 - 14 coal-fired units built in 1940s
 - 160 MW capacity
 - Demolition and site cleanup
 - Cost of \$19 million
- Watts Bar Fossil Plant, Tennessee
 - Located in rural area
 - 4 coal fired units
 - 240 MW capacity
 - Retired 2000, partially demolished
 - Cost of \$17-25 million
- **Published Data** - Although there is relatively little public data available regarding the cost of demolishing coal fired power plants, the following published information is useful:
 - The American Clean Skies Foundation in August, 2011 in their publication *"Repurposing Legacy Power Plants"* stated that: *"Decommissioning and retirement costs ...can vary considerably from plant to plant, but may be between \$30 million and \$50 million for a plant of about 500 MW."*⁵¹
 - "The Potomac River Green" publication also prepared by the American Clean Skies Foundation in August, 2011, states that: *"Industry estimates for the cost of demolition and site remediation of coal-fired power plants like the PRGS are in the range of \$75,000 to \$100,000 per megawatt of capacity installed... Cost estimates include labor, equipment and materials expenditures to make the PRGS safe for demolition, abatement of asbestos and other site contaminants, contingency costs, credits for sale of scrap metals*

*and other recovered materials, site restoration and post-retirement monitoring of environmental quality."*⁵²

The data outlined above suggests that the total estimated demolition and site remediation cost for the Salem Harbor Power Station, (a 745 MW facility), would be in the range of \$55 to \$75 million. However, there are many other site specific variables to consider, some of which are outlined below.

- **Dismantling Versus Implosion** - The site is adjacent to a residential neighborhood, an electrical substation and a switchyard (that will remain active when the plant ceases operation), an operating regional sewage treatment plant, a historic neighborhood and Salem Harbor, all of which will have an impact on and potentially complicate the building demolition process. Given the adjacencies described, the existing buildings will likely have to be dismantled incrementally, after hazardous materials such as asbestos, lead paint, PCBs and mercury are abated and removed. Unlike power plants in more remote or rural locations, implosion is not an option here. The Salem Harbor Power Plant has already dismantled two of their existing stacks.
- **Union Labor** - Unlike many of the plants that have been demolished in southern states, or "right to work" states, Massachusetts is highly unionized and demolition of the power station structures will likely involve union labor. The cost for union labor (and wage rates generally) will be higher than other parts of the country where non-union labor could be utilized.
- **Location of Hazardous Materials Landfills** - While demolition of Salem Harbor is, at a minimum, several years away, the availability of landfills accepting hazardous materials will be an important consideration. Currently, there are two landfills relatively close to the Salem Harbor site that would likely be considered for disposal of the hazardous materials. One facility is in Chicopee, Massachusetts and the other is in Rochester, New Hampshire. The Chicopee facility is currently accepting only material generated by Hurricane Irene. It is unknown when they might resume taking waste material from facilities such as Salem Harbor. The Rochester facility is receiving industrial hazardous materials, but on a very deliberate, permitted basis and only in limited amounts. There are other hazardous waste disposal sites around the country, but the transportation costs would be prohibitive.

- **Hazardous Material Abatement** - Given that the power station was constructed in the early 1950s, the building, boilers, and turbines will likely contain significant amounts of lead paint and asbestos. Prior to any demolition, all material will need to be tested, and a comprehensive plan developed for proper removal of all hazardous materials identified. Abatement will be a time consuming process, and will represent a significant portion of the overall clean-up cost and schedule. Without actual inspection and testing, all costs associated with abatement are rough order of magnitude (ROM) estimates only.
- **Salvage Value of Materials** - Given the amount of steel, aluminum and copper in the existing structures, there is a potential to realize significant cost savings from salvage to offset a portion of the clean-up costs. The amount of salvageable materials can be estimated based upon what is known about power plants of this era and size, however, salvage value of metal is highly dependent on construction demand, and locating a buyer. Current costs have been assumed for salvage materials, but given the uncertainty of the market, costs may have changed significantly when the facility is actually demolished.
- **Varying Levels of Clean Up** - Guidelines for site cleanup allow for different levels or degrees of cleanup for different types of project development. For example, remediating the site for a residential use will require more stringent cleanup than for an industrial use. Site cleanup costs will be significantly impacted by the program and uses anticipated as part of the redevelopment.

Estimated Cost of Clean Up and Demolition

Based upon the consultant team's experience, available public information, data, and visual observations, a range of demolition and cleanup costs have been established.

This estimate assumes demolition of all existing on site structures and site clean-up, enabling redevelopment of the site. Given the disposition of uses and structures on the site, demolition and site cleanup, subsequent development could occur in phases – potentially a more realistic scenario given economic and market related constraints.

- **Estimated Site Cleanup Costs** - Given the public information available on the Massachusetts DEP web-site, and the fact that remediation costs will be directly dependent upon the anticipated re-use, a reasonable assumption of costs could range from \$5 million to \$20 million.

Specific areas for remediation will include:

- The original ash settling area where there is currently a monitoring system in place. Depending on the nature of future uses, a range of remediation measures could be required including soil excavation and pumping/purifying ground water. It is also possible that very little beyond current monitoring would be required.
- The ash settling area now in use could be remediated in a similar manner.
- The area under the coal pile and the storm water collection area around the coal pile could also be remediated in a similar manner.
- The area around tanks that have been used for oil storage will have to be monitored and, if found contaminated, remediated.

In all cases extensive exploration testing and monitoring will be required to establish existing levels of contamination. Known as a Phase 1 Environmental Study, the levels of contamination would be cross checked against anticipated future uses as part of establishing a final plan and budget for site cleanup.

- **Estimated Demolition Costs** - Based upon experience with similar facilities, our site observations, and our knowledge of the existing market, a reasonable estimated range for building demolition and hazardous material abatement is \$80 million to \$85 million. The range includes demolition of the oil tanks, buildings and equipment. Should the plant be closed for more than one year, Dominion will be obligated at their own expense to demolish the four large fuel oil tanks on the western portion of the site, two of which are presently active, and two of which are presently empty and abandoned. The estimated range of cost also includes \$10 million for hazardous materials abatement, based on our knowledge of the facility, its age, and information gathered from other owners who are in the process of demolishing power plants. The overall schedule for the hazardous materials abatement is somewhat indeterminate, because of scarcity of licensed hazardous waste landfills in the area and the rate at which those facilities can receive the materials. The time required could be as much as a few years. The schedule for demolition of existing buildings after abatement will likely be in the range of one year.

A Phase 1 Environmental Study would need to be done in order to provide an estimate with a higher level of certainty.

- **Salvage Value** - A few years ago, before the economic downturn, salvage values were very high for steel and other metals, sometimes over \$1,000 per ton, however, values are much lower today. Recently, the salvage values seem to have stabilized, and for an ongoing power plant demolition project in Florida, salvage values are around \$400 per ton. The Salem Harbor plant has some 20,000 tons of structural steel and a similar amount of piping, boiler drums and waterwall tubes, equipment such as turbines and generators, pulverizers and burners, ductwork and precipitators. There is also a large amount of copper in the facility in the form of electrical cable, the generator rotors and stators. The tubes in the feedwater heaters and turbine condensers most likely contain some form of copper compounds, such as copper nickel, making them relatively valuable as well. Based roughly on the current market, the salvage value of material could provide a credit in the range of \$20 to \$25 million.

- **Range of Estimated Total Cost for Demolition and Site Clean Up**
Combining the cost of site clean-up with the cost of the building demolition and hazardous materials abatement, we believe that a reasonable overall cost range would be \$85 to \$105 million. When a credit of \$20 million to \$25 million for salvage value is applied the final cost could be in the range of \$60 to \$85 million, consistent with the American Clean Skies estimate of \$75,000 to \$100,000 per megawatt of capacity. Costs are summarized below:

	Lower Range	Higher Range
Site Remediation	\$5 Million	\$20 Million
Abatement	\$10 Million	\$10 Million
Demolition	\$70 Million	\$75 Million
Salvage Value Credit	(\$25 Million)	(\$20 Million)
Total Cost For Demolition And Remediation	\$60 Million	\$85 Million

Regional Access Limitations

Salem is located 15 miles from downtown Boston, and has a population of approximately 42,000. According to the 2010 U.S. Census, the Greater Boston metropolitan statistical area is home to nearly 4.6 million people making it the 10th largest Metropolitan Statistical Area in the country.

Salem, can be accessed by seasonal ferry (48 minutes), MBTA Newburyport/Rockport commuter rail (35 minutes; one mile from station) and by automobile via Route 1A or 93 & 95/128. Air travel would typically utilize Boston's Logan Airport (15 miles to the south) or the Manchester Boston Regional Airport (50 miles to the northwest).

Despite the many options for access to Salem, the primary vehicular access via Route 1A from Boston, is circuitous, congested and time consuming. The commute from Boston to Salem, although only 18 miles, can often approach an hour. Alternatively, the access via Route 93 to 95/128 and Exit 25 through Peabody to Route 114 is about 25 miles and can be difficult as well. Despite its proximity to Boston, Salem can be difficult to access for both commercial vehicles and individuals.

Local Landside Access / Traffic Issues

Local access to the site is also challenging, either via historic Derby Street (one-way eastbound) or Webb Street to Fort Avenue. Both Derby Street, Webb Street, and the residential neighborhood to the north are better suited for light residential traffic as opposed to frequent commercial or industrial truck traffic. Although the access and capacity of Fort Avenue is reasonable, there are choke points further from the site where intersections are already at or beyond traffic capacity. It is these intersections that will ultimately impact traffic generating uses on the power plant site in the future. The DPA mandated industrial development typically generates truck traffic, a significant challenge considering the residential and historic character of the adjacent neighborhoods.

While, there is a shortage of parking in the immediate area, especially along Derby Street to the west, the site is large enough to incorporate the necessary capacity. The power plant site is ideally suited for arrival and departure by water, as well as providing access and services for marina development.

Substation Easement

The 62 acre Salem Harbor Power Station parcel has a 10 acre easement for the National Grid substation and its overhead power lines on the northeast portion of the site. National Grid has indicated that they have no intention of removing this substation as it is a valuable location. The location of the substation easement is adjacent to the Sewage Treatment plant, away from the water and located on the more industrial eastern portion of the site, and should not be a significant impediment to future development. Should the site be used in the future for power generation, the location of the substation is a significant asset.

Adjacency to SESD and Future Expansion

Future development of the site will also be impacted by the immediate adjacency of the South Essex Sewerage District (SESD) to the east of the site. Created by state legislation, SESD is a wastewater treatment plant functioning as a regional quasi-municipal agency. SESD is responsible for a six city area which includes the communities of Danvers, Peabody, Marblehead, Salem and Beverly.

Currently, SESD is believed to be near its liquid capacity (although this can fluctuate on an annual basis), and to a lesser degree with regards to its capacity to process additional organic solid matter. Although SESD has not publicly indicated a desire for expansion (either for increased capacity, tertiary treatment or cogeneration), from a master planning standpoint, it may be prudent to allow for some future expansion. SESD would need an act of the state legislature to serve a larger area, and could acquire additional property at fair market value by eminent domain if necessary.

The current Salem Harbor Power Station is not a significant provider of wastewater. When the power station ceases to operate in 2014, the impact of future development on the overall capacity SESD will need to be studied.

AMENITIES AND ADVANTAGES

In addition to the numerous constraints impacting redevelopment of the Salem Harbor Power Station site, one must also consider the many amenities and advantages the site offers.

- **Historic Context** - The Salem Harbor site, is adjacent to the Salem historic district. Salem's colonial and seaport heritage, will continue to appeal to both tourists and historians. Salem enjoys many visitors during the summer and fall, and new development could benefit from this established visitor traffic.
- **Federal Navigational Channel, Turning Basin and Port** - The DPA was created to help protect and maintain existing port infrastructure, built over time at great public expense. The Salem Harbor site has an active dock that is accessed by the federal channel and turning basin. The access channel is 32 feet deep, (only Boston and Fall River having deeper channels in the Massachusetts area) and can accommodate most commercial ships without additional dredging. The site can accommodate ships of 800' in length and has a dock length of approximately 580 feet.
- **Substation** - For any potential developments considering power generation, the location of the existing substation is a significant advantage.
- **Access to Natural Gas Network** - The site is also located within two miles of the existing natural gas network. Should a power generator wish to develop a natural gas power plant, extending the existing natural gas network to the site can be reasonably accommodated in a development proforma.

There is a 30 inch diameter natural gas pipeline, the "HubLine" completed in 2004, which extends from the Fore River plant in Weymouth 29 miles through the Massachusetts Bay and Salem Sound into Beverly. Also, the Northeast Gateway Deepwater Port has a 16 mile Lateral Pipeline that ties into the existing HubLine and is owned by Algonquin Natural Gas. There is also a 30 inch diameter Maritimes & Northeast pipeline opened to the New England market in 2000 that extends from Nova Scotia south to Massachusetts where it also connects with the Algonquin

Gas Transmission near Beverly at the Beverly/Salem Interconnect. The Maritimes Pipeline also ties into the North American pipeline grid in nearby Dracut MA at the Dracut Interconnect with Tennessee Gas.

The potential to extend the gas pipeline to the site is very feasible; with a cost estimated to be approximately \$1 million.

- **Infrastructure for Power Generation** - The site, which has functioned as a power station for nearly sixty years has inherent amenities, based on its current use. As noted above the combination of access to natural gas and an electrical grid distribution network, coupled with access to water and shipping, make this site very suitable for power generation.

Already zoned and operating as a power station, the potential to utilize new technologies and existing infrastructure make this site potentially appealing to those interested in generating energy. Additionally, the low traffic volumes associated with energy production (with the exception of biomass) make this a viable alternative.



This section is focused on a more detailed market analysis, the goal of which is to generate an achievable land use program...

6

MARKET ANALYSIS

UNDERSTANDING SCALE

When looking at a map of the Salem Harbor Power Station site, it is easy to imagine a variety of potential reuse scenarios that take advantage of its tremendous waterside access. However, as the number of constraints outlined in this report indicate, realizing the full potential of the site will require consideration of a creative, phased approach. Aside from the physical and regulatory constraints, market demand for different land uses must also be considered a factor in creating a viable redevelopment scenario. With this in mind, understanding the scale of the site and its potential development capacity is important to paint an accurate picture of a potential redevelopment timeline.



Comparing the site with the two Salem neighborhoods

- **Comparable Neighborhoods** - The consultant team identified two areas within the adjacent urban fabric of the City of Salem that are similar in size to the Salem Harbor Power Station site: 1) the downtown or Central Business District (CBD), and 2) the historic Derby Street neighborhood. Assuming both the existing substation and power line easements remain as part of the long-term future of the site, the effective “usable” area for redevelopment is reduced from 62 to 53 acres. By comparison, both the Central Business District and the Derby Street neighborhood are nearly identical in size (52 acres).



Site developed as a new mixed-use “downtown” would require 54 years for the market to absorb

- **Comparable Development Density** - Using GIS data from the City of Salem, the consultant team was able to determine that there is approximately 1.9 million square feet of mixed-use commercial development within the Central Business District. Given the potential costs of site cleanup, one could argue that a similar level of development density might be required on the power station site to generate enough revenue to overcome these costs. Aside from the physical hurdles in the way of achieving this, current market conditions indicate that it would take between 50 and 60 years for the market to absorb a new mixed-use center on the Power Station site. Further, development of this type could put the vitality of the existing CBD at risk by pulling economic activity away from the downtown.



A new neighborhood the size of Derby Street neighborhood would take 34 years for the market to absorb

- **Comparable Residential Density** - Similarly, the consultant team looked at the Derby Street neighborhood to illustrate market conditions for future residential development along the waterfront. Using GIS data from the City, there are about 900 homes within the Derby Street neighborhood. If this residential fabric were to extend over time to the northeast to include the Power Station site, it would take between 30 and 40 years for market demand to justify this many additional homes. This assumes no other new homes are added to this market, so the actual timeline for such a scenario is likely much longer.

The point of this exercise is to introduce the market challenges related to redevelopment of the site—there is no obvious “higher and better use” for the land given the combination of physical and market constraints, and any redevelopment scenarios will likely take decades to implement. Despite this reality, all hope is not lost: the consultant team has outlined a variety of viable land uses and a flexible framework within which redevelopment can occur over time.

The balance of this section is focused on a more detailed market analysis, the goal of which was to generate an achievable land use program, used by the consultant team to generate the land use options presented in [Section 7: Development](#). The detailed market analysis includes examination of precedents for various redevelopment scenarios related to former power station sites, an examination of the viability of a broad range of commercial, institutional and industrial uses; an examination of marine industrial uses; an examination of the potential for alternative / renewable energy uses on the site, and finally; a detailed proforma analysis focused on the viability of building a new natural gas fired power generating unit on a portion of the site.

REDEVELOPMENT OF POWER STATION SITES

Because the redevelopment of an aging power plant on a large scale is particularly challenging, we have looked at a number of project precedents to determine what could be learned from previous redevelopment efforts in other parts of the country. While the consultant team was able to identify a variety of small power plants that have been repurposed, and in a few instances demolished for redevelopment, the team did not locate any examples of large scale plants (500 megawatts or more) that have been demolished and replaced with large scale mixed-use development.

Precedents

The following precedents are select examples of redevelopment projects that the consultant team determined to be the most analogous to Salem. Projects include existing power plants to be replaced by new more efficient generating facilities and power plant sites redeveloped for other purposes. Tracking these initial projects as they near completion will be an important indicator of a broader future trend, as according to the American Clean Skies Foundation, “*industry analysts predict that environmental and economic factors will lead to the retirement of dozens of aging coal-fired power plants in the coming decade.*”



Existing Port Everglades Power Plant with existing cruise port.

- **Port Everglades Power Plant, Hollywood (near Fort Lauderdale), Florida** - The Port Everglades is a four unit 1,200 megawatt natural gas and fuel oil power plant constructed between 1960 and 1965. Florida Power & Light (FPL) intends to demolish the existing plant in 2013 and replace it with a \$1 billion (including demolition) 1,277 megawatt combined cycle natural gas energy center slated for opening in 2016. ¹

The power plant site is adjacent to Port Everglades, one of the busiest cruise ship ports in the world, and sits less than half a mile away from Terminals 18 and 19, and Berths 18-22. ²

The power plant and its adjacency to a passenger cruise terminal is a useful precedent to be considered relative to Salem Harbor's future development.



Existing Riviera Beach Power Plant with adjacent residential neighborhood.

- **Riviera Beach Power Plant, Riviera Beach (near Palm Beach), Florida** - The Riviera Beach Power Plant is a natural gas and oil fired power plant constructed in the 1960's. Florida Power & Light demolished the plant in June of 2011 and intends to replace it with a \$1.3 billion 1,250 megawatt combined cycle natural gas energy center slated for opening in 2014. ³

The power plant site is adjacent to the Port of Palm Beach, and is immediately adjacent to residential neighborhoods to the south and west - a useful precedent to be considered relative to Salem Harbor's future development.



Proposed Cape Canaveral Power Plant

- **Cape Canaveral Power Plant, near Titusville, Florida** - The Cape Canaveral Power Plant is a natural gas and oil fired power plant constructed in the 1960's on a 42 acre site. Florida Power & Light demolished the plant in August of 2011 and intends to replace it with a \$1 billion 1,250 megawatt combined cycle natural gas energy center slated for opening in 2013.^{4,5}

The power plant site is near a residential neighborhood located to the northwest, less than a mile away. As with the Riviera Beach project, the adjacency of a residential neighborhood to the power plant provides a useful precedent that supports the potential for building a natural gas power generating facility at the Salem Harbor site.



Source: Potomac River Green - American Clean Skies Foundation

- **The Potomac River Generating Station (PRGS), Alexandria, Virginia**

A 482 MW coal-fired power plant constructed on the Alexandria waterfront in 1949. The plant is still operating, but decommissioning appears imminent. The current operator has indicated that it will not make the necessary upgrades to comply with recent EPA environmental regulations, and regional energy officials have determined that the plant is no longer required to ensure energy 'reliability' for the area. The redevelopment plan was completed in August 2011 by the American Clean Skies Foundation and assumes a 10-year schedule. With an estimated cost of \$450 million, the mixed use plan includes:

- 204,100 square feet of retail, restaurants, and office
- 467 multi-family and 96 townhouse units, 125-room boutique hotel
- A working Energy Museum, demonstrating energy technologies
- Enhanced access to water taxis and mass transit
- Recreation and open space
- Required \$450 million project funding from developer funding, municipal bonds, tax credits/other public funds
- The current operator paid \$2.48 million in taxes in 2010



Source: Seaholm Power Plant - Renovation & Change of Use

- **The Seaholm Power Plant, Austin, Texas** - A 100 MW gas/oil power plant on the edge of downtown Austin, which operated between 1950 and 1989. The main building is an architecturally significant Art Deco structure consisting of 110,000 square feet of usable floor area. In 1996 the City of Austin decided to preserve the facility for a major public use. Details include the following:

- The 8-acre site will include: 160 hotel rooms; 80 for-sale condominiums; 275,000 square feet of rental residential; 62,000 square feet of office space; 136,000 square foot public event space; and 3-acres of open space.
- The site took nine years to remediate at a cost of \$13 million.
- The redevelopment is expected to create more than 200 jobs and produce \$2 million a year in tax revenue.

The City began redevelopment efforts in 1996, and 15 years later none of the planned buildings have reached completion. By the time the Seaholm master plan was complete and the development partners were identified, the real estate market hit a downturn which has delayed construction.



Aerial View of the Bartow Power Plant

- **The Bartow Power Plant, St. Petersburg, Florida** - Progress Energy's Bartow Power Plant was rededicated in 2009 (the plant was originally opened in 1958), following the successful completion of a two-year, \$800 million investment that changed the 50-year-old facility's primary fuel source from oil to more efficient, cleaner burning natural gas. The conversion of the plant included the following features:

- The plant's generating capacity has been more than doubled, adding 800 megawatts (1,200 megawatts total generation)
- Emissions have been reduced by more than 80 percent — including a 98 percent reduction of sulfur dioxide emissions
- Reduced dependence on foreign oil and improved fuel security
- Increased electricity reliability due to transmission upgrades related to plant improvements
- The redesigned power plant takes up substantially less land than the original fuel-oil plant, opening major portions of the property to the possibility of redevelopment in the future
- Low profile gas turbine units lend themselves to 'screening' by architectural features

ALTERNATIVE LAND USES

In order to describe the market opportunity for a variety of land uses including retail, office, hotel and residential, it is necessary to look at the subject site in its overall market context and evaluate its unique strengths and challenges based upon various characteristics pertaining to its location and physical attributes. Gaining a comprehensive understanding of the market dynamics in the area provides for a more informed analysis of likely future market demand and provides the basis for the creation of a successful land use and development plan.

Market Driven Land Uses

The following section provides a summary of the strengths and challenges of each of the candidate land uses and an evaluation of the potential opportunity to incorporate those individual land uses into the master plan. This analysis was performed at a 'high level' and a more intensive analysis should be performed as a preferred master plan emerges from the planning process.

- **Parks / Open Spaces / Recreation** - Parks, open spaces, and recreation are logical uses for providing public access to, and enjoyment of, the waterfront. Moreover, these uses help to support other commercial activity by attracting additional visitors to the site. A waterfront park that provides a view to the harbor and allows for passive enjoyment of the waterfront would likely be heavily utilized by Salem residents and tourists and would upgrade significantly the visual quality of this portion of the waterfront. Additionally, parks, open space and recreational uses could allow for an extension of the harbor walk through the subject site connecting to Winter Island. Such a connection would allow for active enjoyment of the waterfront and further enhance the waterfront district.
- **Strengths:**
 - Strong market support – parks, open spaces and trails are some of the most utilized and fervently supported land uses in any community
 - No zoning changes – a limited amount of open space is allowable by right under the DPA regulations

- **Challenges:**
 - Tax Revenue Generation – Parks, open spaced and trails do not generate tax revenue and are some of the most costly land uses to maintain

Several industrial waterfronts have been able to transform their appearance by developing parks and open space that simultaneously acknowledge and celebrate their industrial origins. Examples include Gantry State Park in Queens, New York and the Charleston Maritime Center Park in Charleston, South Carolina, both of which are illustrated in [Section 8 - Redevelopment](#). The parks in these examples are small but have had significant influence on the public perception of the waterfront district and have brought more pedestrian activity to the area. It is not difficult to imagine how Salem could 'reclaim' its waterfront for public use in a similar manner, increasing both visitation and support for abutting land uses.

- **Public Buildings** - One possible use for the subject site would be the inclusion of a public building that could act as a 'civic anchor' for the redevelopment and help to animate the area and support other commercial uses by attracting additional visitors to the site. There are numerous examples across the country of public buildings such as libraries, city halls, and event centers, used as anchors for large scale redevelopment projects. While it is unlikely (based on feedback through this study) that the City would relocate any of its major administrative functions or existing libraries to the subject site, it is possible that the redevelopment could include an event space operated by the City.
- **Strengths:**
 - Strong Market Support – Public uses generally receive strong support from the general public provided they fill a perceived need in the community
 - No Zoning Changes – An event center use could be considered a 'supporting use' under DPA and should be allowable by right
- **Challenges:**
 - Tax Revenue Generation – Public uses would not generate tax revenue but would likely generate user revenues to offset the cost of operation

An event space at the redeveloped Blaney Street Wharf could work very well and would provide a flexible public space for a variety of city related as well as private events. The event space would help to draw more attention and activity to the redesigned waterfront, which will be critical for the success of the redevelopment, especially in the early phases. Much like the maritime center that was the anchor for the redevelopment at the Charleston, South Carolina waterfront, Salem's event center could share a building with other uses (retail, office, etc) and could make a bold architectural statement that would draw attention to the redevelopment site and the Blaney Street Wharf district.

- **For Sale Residential** - During the last market cycle, the City of Salem has experienced limited construction of new for sale housing product due to land constraints and the maturity of development in the area. Salem is a residential market and is characterized by tight regulatory controls and a lack of greenfield development sites. Under these conditions it is difficult to assemble large land parcels which are suited for residential development. Most of the redevelopment activity consists of small infill projects. The maturity of the market is reflected in the small quantity of annual building permits, totaling only fifty during peak years. The Salem market consists of a variety of single, two and three family unit typologies but does not offer a significant amount of for sale units in multifamily developments larger than five units. The average for sale home price in Salem is \$270,000.

- **Strengths:**
 - Tax Revenue Generation – Owner occupied residential uses pay a lower tax rate than commercial users, but would still generate positive tax revenues that exceed other land uses such as open space or institutional
- **Challenges:**
 - Clean up Costs – Residential uses require a very high level of site clean up and therefore would increase the overall cost of site preparation
 - Zoning Changes – Residential uses are not permitted under DPA. The DPA regulations would need to be amended in order to allow residential uses

Based on demographics and slow growth of the Salem market, the demand for residential product at the subject site is likely to be moderate. If the DPA is amended it is likely that the site could support a small offering of cluster style single family homes based on the pent up demand for new residential product within the local market. Demand is likely to be driven primarily by empty nesters and pre-retirees seeking housing that will allow them to move down from large single family homes in the immediate area and to age in place. An additional market audience is likely to consist of young professionals but the ability to attract this market segment will be highly dependent on the format and the price point of the product offered.

- **For Rent Residential** - Overall the apartment market has been strengthening across Metro Boston and the nation. This asset class has been the beneficiary of several macro trends including a flight from home ownership (due to foreclosure or fear of dropping prices), a generational wave of Echo Boomers moving into their prime renting years and a lack of new supply as credit markets tightened during the recession and made it very difficult to finance new apartment development.

The apartment market in Salem is fairly robust with renter households roughly equal in number to owner households. Though the majority of rental units are located in structures with fewer than five units, there are several examples of large apartment communities in the area, with the most prominent being the Jefferson at Salem Station, consisting of 266 units ranging from \$1,500 to \$2,100 per month. Like for sale residential, tight restrictions and lack of developable land has limited the supply of new apartment communities. Because of this, the existing high quality communities are performing strongly and the market is exhibiting evidence of pent up demand for newly constructed product.

- **Strengths:**
 - Strong Market Support – The multifamily rental sector is strengthening across the Boston region and the Salem market is under supplied with quality product
 - Tax Revenue Generation – Apartment communities are taxed at a lower rate than commercial users, but would still generate positive tax revenues that exceed other land uses such as open space or institutional

- Challenges:
 - Clean up Costs – Residential uses require a high level of site clean up that would increase the overall cost of site preparation
 - Zoning Changes – Residential uses are not permitted under DPA. The DPA regulations would need to be amended in order to allow multifamily residential uses
 - Limited Infrastructure – The distance of the subject site from Route 128 and low capacity road networks surrounding the subject site make the power plant site less than ideal for large scale multifamily development

Demand for apartment product in Salem should be robust over the next five to ten years. The subject site is not ideal for multifamily development due to its distance from Route 128 and infrastructure limitations, but apartment uses would likely perform well at the site due to market fundamentals and the lack of high quality rental product in the market.

- **Hotel** - The City of Salem hosts between 700,000 and 1 million tourist visits annually. The tourist draw to the City, based on its rich history and picturesque setting, is the main driver of the downtown hotel market. The hotel product in the area consists mainly of small inns and bed and breakfast operations but lacks a substantial offering of large, branded properties. A typical example of a hotel operator in Salem is the Hawthorne Hotel which is a historic property offering 93 rooms at rates between \$115 - \$315 per night and caters primarily to tourists. The best example of a waterfront hotel is the Salem Waterfront Hotel, which has 86 guest rooms at Pickering Wharf and offers marina services to visitors arriving by boat. Most of the inns in the Salem market can be considered limited service. Some have restaurants on the ground floor but the market currently lacks a resort style hotel which would offer a wider range of amenities including business services, meeting space, and services for relaxation/wellness including a spa component.

- Strengths:
 - Strong Market Support – The hotel market in Salem is likely to support additional hotel product especially considering the new demand that would be created if the Blaney Street cruise terminal becomes a reality

- Tax Revenue Generation – Hotel properties are taxed at the same rate as commercial uses and also pay an additional local rooms excise tax. They generate very high tax revenue
- Job Creation – New Hotel operators would bring jobs to the waterfront, further supporting other commercial users in the area

- Challenges:
 - Zoning Changes – Hotel uses are not permitted under DPA. The DPA regulations would need to be amended in order to allow this use
 - Limited Infrastructure – Hotel uses typically generate a high rate of vehicle trips which would further tax an already strained road network. This impact could be limited or reduced by a reliance on waterborne visitation and public transit links to downtown areas to reduce automobile use

A hotel is a natural fit for a waterfront district and would offer an appropriate complement to the planned cruise terminal at Blaney Street. Hotel uses would also help to create an eighteen hour environment which would improve the vibrancy and the perception of safety at the waterfront. A hotel use could blend with a variety of other uses at the site enhancing viability from a developer's perspective; however, DPA regulations would need to be amended.

- **Office** - The City of Salem consists of a variety of low and mid rise professional office buildings and owner occupied single tenant structures. The offices housed within these buildings are primarily service oriented businesses that cater to the needs of the local population base. Some of the predominant tenant types are medical and dental offices, small professional services and law offices, and various civic and nonprofit enterprises. The office structures tend to be buildings of older vintage, many of which lack amenities and layouts required by Class A tenants. Demographic data (from Esri) indicates that there are a total of 34,527 employees and 1,901 businesses in the city of Salem, including retail operations.

- Strengths:
 - Tax Revenue Generation – Commercial uses pay a higher tax rate than residential uses, generating a very high tax rates per square foot

- Job Creation – New office tenants would bring jobs to the waterfront area, further supporting the retail uses in this area
- Cleanup Costs – Commercial uses do not require the same level of site cleanup as residential uses and therefore could reduce the overall cost of site preparation
- No Zoning Changes – Commercial uses are considered a supporting use under DPA and a limited quantity of office would be allowable by right
- Challenges:
 - Limited Market Support – The Salem office market consists primarily of small service oriented businesses. Because the market lacks strong population growth, much of the demand is based on turnover of existing users looking for better space
 - Limited Infrastructure – The distance of the subject site from Route 128 and low capacity road networks surrounding the subject site make the power plant site less attractive to traditional office users

Given the market and location characteristics of the subject site, most demand will likely emanate from the local serving office market. Modest household growth and turnover of existing tenants will likely drive the demand in this segment. Tenants fitting into this category will likely be smaller space users with the majority requiring less than 2,000 square feet. The development of a new cruise ship terminal at Blaney Street should create incremental demand for office space and will make the subject site a more attractive location for office users that value an active waterfront setting.

- **Retail / Restaurant** - Retail in the City of Salem is comprised of a variety of neighborhood and regional serving shops arrayed primarily in a downtown style format. In total, Salem has approximately 350 retail establishments occupying over 800,000 square feet of ground floor space. The retail market has four major market audiences including tourists, residents living within the local retail trade area, downtown workers, and Salem State students. The majority of retail is clustered around Essex Street and Pickering Wharf. Salem offers a wide variety of restaurants and gift/souvenir shops that cater to the large tourist market. The majority of downtown retailers inhabit small inline spaces, as the larger format and mall retailers are typically located closer to Route 128 or in the North Shore Mall.

- Strengths:
 - Tax Revenue Generation – Commercial uses pay a higher tax rate than residential uses generating a very high tax rate per square foot
 - Job Creation – New retail tenants would bring jobs to the waterfront area, further supporting other uses in this area
 - Cleanup Costs – Commercial uses do not require the same level of site cleanup as residential uses and therefore could reduce the overall cost of site preparation
 - No Zoning Changes – Commercial uses are considered a ‘supporting use’ under DPA and a limited quantity of retail and/or restaurant space would be allowable by right
- Challenges:
 - Limited Market Support – The Salem retail market consists primarily of small service oriented businesses. Because the market lacks strong population growth, much of the demand is based on turnover of existing users looking for better space
 - Limited Infrastructure – The low capacity road networks surrounding the subject site create challenges for retail uses
 - Competition with Existing Retail Uses – New retail uses will have to be differentiated from current downtown retail tenants in order to avoid siphoning off traffic from existing retailers

Support for retail will emanate from the same four market audiences (households, tourists, workers, and students) that currently support downtown retailers. While it is unlikely that the subject site will support a large influx of new retail based on the lack of growth in these market audiences, and the lack of infrastructure to support it, it is likely that the Blaney Street cruiseship and ferry terminal will create incremental new demand. As such, it makes sense to include a limited quantity of restaurant, and other tourism based shops to capture this new incremental demand and to create additional vibrancy along the waterfront area.

- **Education and Research** - Another potentially appropriate use for the subject site would be the inclusion of an educational or research facility that could bring visitors to the site while simultaneously fulfilling its operational mission. There are a variety of examples of nonprofit innovation and education centers serving as catalysts for large scale redevelopment. While it is unclear at this time what the precise function of such an anchor use would be, it has been suggested during this study that partnerships with major universities such as Salem State University should be explored further, especially in the area of marine research. Other recommendations include a clean energy demonstration and research facility.

- **Strengths:**
 - Strong Market Support – Generally institutional users receive reasonably strong support from the public provided their mission is perceived as important to the community
 - No Zoning Changes – It appears that an institutional use, especially one that focuses on marine and industrial activities, would be allowable by right
- **Challenges:**
 - Tax Revenue Generation – Institutional users typically do not generate a significant amount of tax revenue but some larger institutions do participate in PILOT (payment in lieu of taxes) programs that can be independently negotiated

The inclusion of an institutional use should be explored in greater depth. While it is difficult to pinpoint the exact type of user, given the wide variety of options, it is assumed that such a use would drive activity and interest in the redevelopment, much like a civic anchor would. The advantage of an institutional anchor over a civic use is that it is more likely to fund its own construction and to potentially contribute to the tax base in the form of a PILOT program.

Marine Industrial Uses

The Power Station site is subject to DPA regulations, which promote, protect, and mandate Marine Industrial Uses. Marine Industrial Uses are defined as, and limited to marine terminals, commercial fishing facilities, marine repair and construction facilities, manufacturing facilities that rely primarily on bulk receipts, facilities accommodating the shipment of goods by water, and industrial uses or infrastructure facilities which cannot be located at an inland site.

Unlike the more traditional land uses previously mentioned, it is more difficult to evaluate the marine industrial market due to a lack of available data. However, based on the current state of many of the DPA's in the Commonwealth, one could assume that market demand may be lacking. The 1978 DPA designation was intended to save these port areas from more appealing and potentially profitable development, but in many cases, allowable uses have not materialized.



Typical Marine Industrial Waterfront

In general, although the Marine Industrial designation encompasses a variety of uses, the strengths and challenges relative to the Salem Harbor site are indicated below:

■ Overall Designation

- Strengths:
 - No Regulatory Changes: Marine Industrial Uses are consistent with DPA designation; no changes required
 - Port/Waterside Infrastructure – the combination of water, port infrastructure and an existing substation make this an appealing choice for a power generating use, considered a Marine Industrial Use as it uses water for cooling
 - Adjacency: Compatible with the adjacent industrial SESD property to the east
 - Clean-Up Costs: Costs for site clean-up would be minimized
- Challenges:
 - Limited Market Support - The 11 DPA's in the Commonwealth are competing for a limited pool of potential uses. Many of those markets have been hit hard (i.e. the fishing industry) over the last few decades
 - Limited Landside Infrastructure – The limited landside infrastructure would negatively impact the majority of uses, with the exceptions of power generation and cruise ships
 - Adjacency: Certain uses can be incompatible with the adjacent residential neighborhood to the north

Tax generation and job creation are dependent on specific uses, some of which are examined in more detail below.

- **Cargo and Shipping** - Ports for cargo and shipping are very active in the northeast. As the United States continues to import large amounts of goods, the need for container and bulk storage will continue to be strong, despite the sluggish economy. Leading items include automobiles, various types of fuel and gasoline, road salt, food and perishables.

Presently, Boston, New Bedford, and Quonset Point in Rhode Island are the regional leaders in bulk and containerized cargo. Successful

ports must have an ample turning basin and channel depth, sufficient dock length, multiple berths, a foreign trade zone designation, and access to landside infrastructure (rail and highway system).

The American's Marine Highway (AMH) program has increased reliance on short sea shipping. The AMH is a program promoted by the Department of Transportation to shift a portion of the nation's cargo and passenger traffic from roadways to waterways, particularly in areas with traffic congestion. Due to the road congestion, companies are looking to ship freight along coastlines and through waterways to move cargo onto barges and smaller vessels to get them closer to their destination.

Despite meeting much of the necessary port criterion, Salem does not have convenient access to either a rail or the interstate highway system, and would require travel through the adjacent residential area. Also at less than sixty acres, Salem would not appear to have the necessary footprint in order to be a major cargo port. As a result, Salem does not appear to be a good candidate for cargo and shipping. However, it should be mentioned that the Salem Harbor site, up until the mid 90's, was active as a port for home heating oil, operated by Northeast Petroleum.

- **Commercial Fishing** - Commercial fishing as an industry has been hit hard by both depleted fish stock from years of overfishing and by government regulations. Nonetheless, fishing is still a major industry in Massachusetts, including fish processing, cold storage and wholesale distribution.

Gloucester, New Bedford, and the Fish Pier in Boston are the major regional commercial fishing hubs.

Commercial fishing, while consistent with Salem's maritime heritage and a viable marine industrial use, would be challenging at any significant commercial scale. As with cargo and shipping uses, land side traffic generation from a commercial fishing use would need to be studied, given the potential to overburden adjacent streets. The overall mix of potential uses on the Salem Harbor site must also be considered. A commercial fishing operation, for example, might not be a compatible neighbor with a first class cruise ship terminal.

- **Ship Building and Repair** - Shipbuilding in the northeast has also fallen upon hard times. While Weymouth Fore River has closed, several companies still exist in the numerous DPA's, including East Boston Shipyard in East Boston, D.N.Keeley & Sons Shipyard in Fairhaven and on a smaller scale in Salem.

Shipbuilding in Salem would be better suited for smaller vessels and could be part of an overall development solution.

- **Manufacturing and Assembly** - Manufacturing is another potential alternative land use at the site. In accordance with DPA, if the manufacturing utilizes shipping and/or supports the marine industry, it would be considered an allowable use.

The manufacturing base in New England has been on the decline, as jobs and factories have moved regionally south and then overseas. Coupled with the poor economy, this does not appear to be a strong market segment.

The idea of value added manufacturing, where parts come in by sea, are assembled or upgraded, and then shipped out would be well suited to this site. This would avoid the landside access issues that exist. However, given the cost of labor and heavy unionization, Massachusetts is not a likely candidate for value added manufacturing.

Manufacturing associated with alternative energy is a market that is growing. China has entered this market, and is fast becoming a major manufacturer of green energy components. However, a number of communities are exploring the possibility of wind turbine manufacturing and/or assembly. Given the projected expansion of wind power along the east coast, and the availability of federal funds to support such endeavors, this appears to be a strong market.

Charlestown has already built a \$60 million wind turbine blade testing facility, the largest in the nation. In terms of the offshore wind industry, New Bedford will soon gain a competitive advantage. New Bedford has been chosen for the staging area for the Cape Wind turbines, and will construct the New Bedford Marine Commerce Terminal, which will serve as both a staging area and marine cargo facility. The \$35 million facility will be financed with a combination of state, federal,

and municipal resources as well as project revenues. In neighboring Rhode Island, Deepwater Wind, is poised to utilize Quonset Point for the staging area for a new wind farm off the coast of Rhode Island.

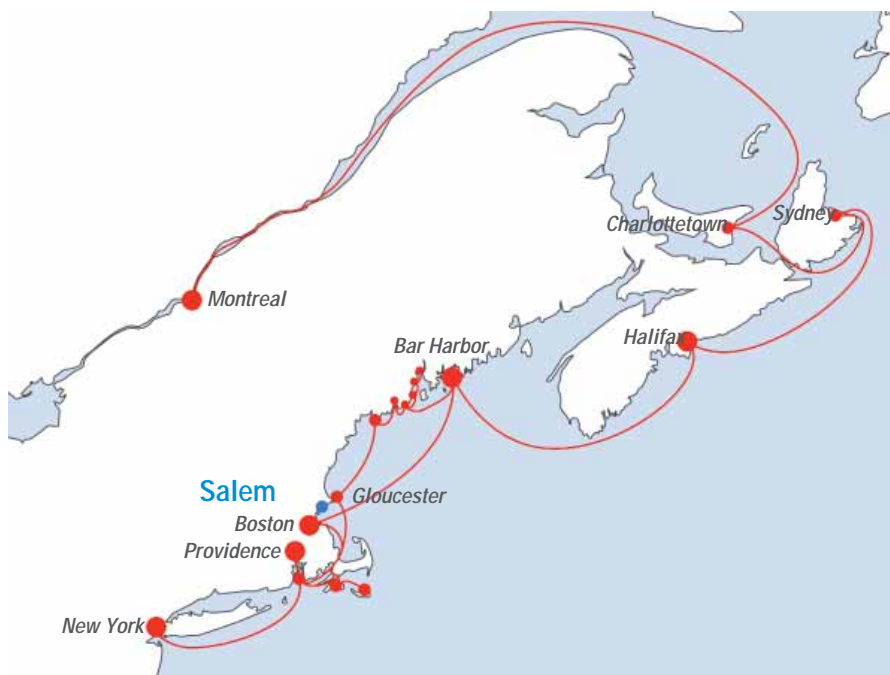
- **Cruise Ships** - In 2005, the City of Salem initiated a lease (for \$1/year) of the Blaney Street property from Dominion to build a temporary pier and parking lot so that it could initiate round trip ferry service from Salem to Boston as of 2006. The success of the ferry spurred interest in expanding service to include the cruise ship industry. In 2008, a Rhode Island based cruise line brought several 180 foot ships to Salem Harbor as part of a five night New England cruise that included stops in historic ports between Rhode Island and Portland, Maine. Passengers have returned in subsequent years on similar cruises and, utilizing the existing trolley service, visited different downtown destinations, and spending along the way.

Salem can be an integral part of this growing niche market in the cruise industry. Work is underway on expanding the Blaney Street docks to accommodate larger vessels in the future, and the potential exists to expand on this concept utilizing additional land for parking and supporting retail/commercial activity after the Salem Harbor site is closed. In 2010, the City purchased the Blaney Street property, which is approximately 2 acres in size, from Dominion for \$1.7 million using a Massachusetts Seaport Advisory grant. We recommend that the City consider working with Dominion to expand the site in the future, utilizing a portion of the Power Station property.

The viability of an expanded cruise port is further supported by the recent "Salem Economic Impact Analysis" published by Salem State University's Center for Economic Development and Sustainability in November 2008. The report indicated that cruise tourism has expanded at an annual rate of over 7% since 1990, with port of call passenger visits more than doubling in a four year period in Boston. As the report states, "Salem is well positioned to capitalize on the future growth of this market segment." The current Blaney Street Wharf expansion, combined with a larger adjacent terminal on the Dominion property, would help to solidify Salem's share of the expanding cruise ship tourism market.

While some members of the community have expressed concern over potential noise and traffic that could accompany an expanded cruise ship operation in Salem Harbor, there are several positive factors that should also be considered:

- There is strong interest in promoting Salem as a cruise ship destination from the City as well as cruise ship operators
- The scale of ships is much smaller than those that would come to larger ports (such as Black Falcon Pier in Boston), typically carrying between 100-200 passengers
- For passengers aboard these smaller ships, the focus is on “authentic experiences” which Salem certainly offers.
- Walkability and shuttle service to downtown would not generate any additional traffic, thereby taking advantage of waterside access without impacting landside resources.
- A typical passenger is expected to spend roughly \$135 a day, which would equate to an average of \$20,000 spent in Salem businesses for each day a ship is docked there.



The above map shows the itineraries of existing cruise lines operating along the coast of the northeastern US and Canada. The expansion of Blaney Wharf and supporting facilities would make Salem a more viable destination along these routes.

ENERGY FOCUSED REDEVELOPMENT

Renewable Energy Potential

Significant interest in using the Salem Harbor site for alternative energy sources has been expressed at the workshops and public meetings by stakeholders, the general public and advocacy groups. Following is a summary of the potential alternative energy types mentioned and the viability of each for this particular site. For a frame of reference, it should be noted that the current capacity for energy generation of Dominion's four units is 745 MW.

- **On-Site Wind** - Wind power has become a recognized alternative to fossil fuels. It is renewable, clean, and produces no greenhouse gas emissions. Individual wind turbines harness the wind's energy and connect to the electric power transmission network. The wind turbines are large and concerns have been raised in more populated areas about noise and shadow effects; and generally about effects on bird migration patterns.

Regarding the Salem Harbor site, the adjacency to the existing electrical substation and transmission system is ideal. A wind analysis would need to be done and assuming wind conditions are suitable, multiple wind turbines could be placed on the site. Given the size and configuration of the available area, and the size of a typical 2 MW turbine (200-400 height; 300 foot spacing), only about five turbines could be sited. With five turbines, a total of 10 MW could be generated, less than 2% of the existing energy generating capacity at the site today.

Given the initial costs of the land, and the low generating capacity, on-site wind generation does not appear feasible to achieve significant volumes of power generation. Furthermore, wind energy is not a water-dependent use, and would not qualify as a compliant use under existing DPA regulations.



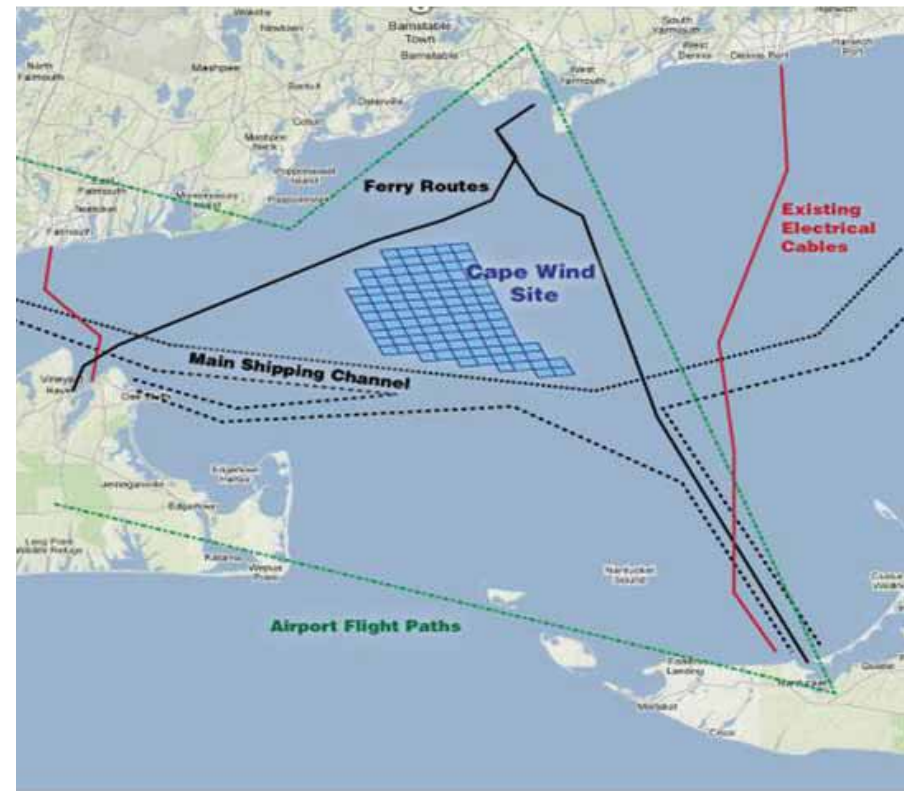
On-Site Wind



Each circle on the diagram indicates the potential location of a 2MW wind turbine and required spacing. Given these spatial requirements, only five towers could be accommodated, generating a total of 10MW.

- **Off Shore Wind** - Relative to a landside transmission station for an offshore wind farm, (like Yarmouth is to the Cape Wind project) certainly the electrical substation at the Salem Harbor site is an ideal connecting point. Studies have indicated that there is a more suitable wind speed profile offshore as well. Only a small right-of-way would be needed for underground transmission and connection to the electrical substation. As a result, nearly the entire site would still be available for development, as the off shore wind farm is not linked to land surface area. While an offshore wind farm could be part of a future redevelopment plan, it does not address strategy for developing the site. In other words, with virtually any future development scenario, the connection to an off shore wind farm could still occur.

The economics of off shore wind farms are still unproven. The Cape Wind project has not yet been able to sell all of its power. National Grid has agreed to buy half of the power that Cape Wind will generate the first year at 19 cents per kilowatt, then increasing annually after. ⁶ This purchase price will result in a ratepayer increase of approximately \$1.50 per residential customer. ⁷ As of this date, NStar has still declined to buy power, but circumstances may change, as they seek approval of a merger with Northeast Utilities. It is believed that NStar has been able to purchase land based wind power at rates cheaper than the Cape Wind rate.



Cape Wind Site - Nantucket Sound



Off Shore Wind



Landside Requirement For Off Shore Wind

- **Solar** - Solar energy is also a viable renewable energy alternative, using photovoltaics and concentrated solar power, to generate electricity. However, if the entire 53 acres of available land (the site less the electrical substation and transmission easement) were to be developed as a photovoltaic field, the energy generation would only be about 11 MW, less than 2% of the current Salem Harbor generating capacity.

A photovoltaic field is not economically viable on a site of this size, in this geographical location. Furthermore, solar energy is not a water-dependent use, and would not qualify as a compliant use under existing DPA regulations. Solar power and photovoltaics could be incorporated at a smaller scale as part of future development on the site, however.



Development Site - 53 Acres



Photovoltaic Field

- **Biomass** - Biomass is derived from biological material from living or recently living organisms. There are a variety of methods of biomass conversion, but it is primarily generated from wood, waste, landfill gases and alcohol fuels. The two primary sources of biomass are wood (pulp by-products) and municipal solid waste.

To produce significant energy, large quantities of wood or other biomass would need to be trucked or shipped to the site. The trucking option would not be compatible with the character of the residential neighborhood, and would raise concern regarding increased traffic (especially industrial) on the local streets. Given this constraint, biomass fuel would need to be transported by ship. Most biomass fuel sources, however, are inland, and getting it to an adequate shipping point would most likely be cost prohibitive. Studies have indicated that for biomass to be economically feasible, the plant needs to be relatively near the fuel source, usually within a 100 miles.

With SESD immediately adjacent, the idea of using methane gas produced by the treatment process is logical; however, the amount of energy that could be harvested and created from the SESD plant would probably be in the range of 2 MW, less than 1% of the current Salem Harbor generating capacity. In the future, methane could be a fuel source to help power SESD or portions of the future development, but it has no viability in the quantities referenced to be used for regional power generation.

- **Other Alternative Energies** - Both tidal power (conversion of the embodied energy of tidal action into electricity) and wave power (the transfer of embodied energy of ocean surface waves into electricity) are in development. At the current time they generate relatively small amounts of energy and are generally located offshore.

Geothermal energy, is thermal energy derived from the heat of the Earth's core. Recent advances in technology are creating more widespread use.

The newer technologies for power generation consist of binary cycle units, which take large quantities of hot water from deep wells, typically, 5,000 to 10,000 foot deep wells with water flows upward of 5,000 gpm. Water is passed through heat exchangers where the heat vaporizes a secondary fluid. However, even if the entire site were used, a small amount of energy would be produced, likely 3-5 MW.

NATURAL GAS

Natural gas is commonly used for replacement of coal and oil as fuel. The increased supply of natural gas in the last ten years has reduced the cost of energy generation and established a cleaner and more economical alternative to coal. As natural gas production has expanded, however, environmentalists have expressed concern over the "fracking" methods used to obtain natural gas, and the potential environmental impact on the water supply.

The amount of space needed for a natural gas-fired combined cycle facility would be roughly 15 acres, which would leave nearly forty acres for other development. The facility could be located adjacent to the substation, leaving the more desirable western portion of the site for other development. The amount of energy produced would be comparable to the existing facility, and much more than wind, solar, and biomass. The existing infrastructure is in place and a natural gas pipeline is less than two miles away and could be extended to the site for approximately one million dollars. A natural gas combined cycle facility, would utilize water for cooling, and would be allowable relative to the DPA regulations.

The consultant team summarizes the financial viability of both a natural gas-fired combined cycle and a "peaker" natural gas-fired combustion turbine facility in more detail in the following section.

Economic Viability of Natural Gas Power Generation

Following, is a preliminary analysis of the economic viability of two natural gas fired power generation options for Salem Harbor Power Station. The analysis includes an exploration of the cost of building a new baseload power plant fueled by natural gas (Combined Cycle Natural Gas Plant) and alternatively, a peaking power plant also fueled by natural gas (Conventional Combustion Turbine Peaker). Baseload plants typically run continuously throughout the year except in the case of scheduled repairs, maintenance, or unplanned outages. A peaking power plant runs very infrequently, such as when there is a spike in demand or when power prices are extremely high. The analysis was performed assuming traditional financing of a new power plant project and is based upon the existing structure and rules within New England's power markets. In many of the scenarios that were analyzed, the economics do not appear to justify the development of a new power plant at the site. However, these results should not be assumed to rule out construction of a new power

plant at the site in the future. The environment for new development could change if financial incentives or grants were to be offered by the Commonwealth or other entities facilitating a reduced or non-traditional financing structure. New market rules within the ISO-NE could also be implemented in the future that would provide added incentive to construct new power generating plants.

Market Price Assumptions

In both the baseload power plant and the peaking power plant scenarios, Energy, Capacity and Ancillary Market revenues were modeled. In each of the scenarios a base case, high case and low case was assumed for all revenue sources and expenses. Hence, 27 combinations of revenue and expenses for each power plant configuration were modeled. Energy Market prices began at \$50/MWH and were adjusted for sensitivity testing using a Northeast Market model to project energy revenues over a 20 year future period assuming base, high and low market conditions. Capacity Market prices were also forecast over the same time frame assuming base, high and low price conditions. Ancillary Market products such as reserves were also projected using a base, high and low case. All prices are expressed in current (2010) dollars.

Baseload Power Plant (Combined Cycle Natural Gas)

The existing site can accommodate a maximum 745 MW natural gas fueled plant configuration (existing power station capacity) with minimal costs required to upgrade the existing substation and transmission lines that serve the existing power plant. However, since combined cycle natural gas plants are typically built in 400 MW units, a single unit has been assumed (400 MW) so as not to exceed the current plant size. For modeling purposes, two ownership structures were assumed. A merchant ownership structure in which a plant is built to provide energy wholesale to the spot market and a Municipal Utility development structure in which a municipal electricity utility or consortium of municipal utilities builds a power plant to serve their customer's needs.

Municipal electric utilities and businesses are special purpose entities that provide electricity to residents of the district. They usually are set up through government agencies, hold votes by residents of the district and are not-for-profit. Examples of a few Massachusetts towns that provide municipal electric service include Danvers, Boylston, Braintree, and Hull. There are currently 40 municipal electric utilities in the state of Massachusetts today.

NGCC Cost Data Assumptions

The table below summarizes the cost and data sources used to model the cost of building a new 400 MW combined cycle natural gas power station. We also assumed clean up costs ranged from zero to \$75 million as part of the analysis. The cost to bring natural gas to the site was estimated to cost \$1 million. The power plant costs data was obtained from publicly available sources through the United States Energy Information Agency and are summarized below.

Cost / Configuration	Advanced NGCC	Note
MA Overnight Costs S/kW (S2010)	\$1,396	1
MW	400	1
Single Unit Overnight Dollars	\$558,400,000	1
Heat Rate (btu/kWh)	6,430	1
Fixed O&M (S2010 S/kW)	\$14.62	1
Variable O&M (S2010 \$/MWH)	\$3.11	1
Site Decommissioning and Clean Up	\$0 to \$75,000,000	2
Gas Pipeline	\$1,000,000	3
Number of Units	1	
Total MW	400	
Grand Total: Total Overnight Dollars	\$559M - \$634M	

Note 1 EIA AEO 2011 Update Power Plant Cost Assumptions, November 2010

Note 2 From Jacobs Engineering Larry Dalton

Note 3 From Jacobs Engineering in consultation with Gas supplier

- **Merchant Development** - In the merchant case, the consultant team assumed 80% debt and a 20% equity position, 6% financing and a debt term of 15 years. With these financing parameters and assuming a zero value for demolition and site clean up (which is the most favorable economic case) 27 combinations of base, high, and low market revenue and expense scenarios were run. 15 of the best case scenarios have been included on the accompanying table. In the base case for revenues and expenses, the payback was almost 19 years with a positive Net Present Value and Internal Rate of Return near 7%. The numbers indicate that under a merchant development scenario the economics would be challenging to justify building a 400 MW combined cycle natural gas plant at the site. Adding significant clean up costs to the analysis makes this scenario even more challenging.

There are however, some scenarios that are more positive for a merchant ownership structure. In cases with high energy revenues and base to low natural gas prices (see lines 2 through 7), financial outcomes appear to be more favorable relative to building a power plant. This is, however, a low probability scenario over a long term planning period as the price of energy and natural gas are highly correlated. As the price of natural gas increases, energy prices typically follow the same pattern and trends. Therefore, it is highly unlikely that over the long term the New England markets would experience high energy prices while natural gas prices are low.

Some modeling combinations had results that may be considered by some power plant developers as favorable outcomes with a payback close to 10 years an Internal Rate of Return in the range of 15% to 16%. While these results may be positive, these cases have lower probability of occurring over a 20 year future period.

In lines 10 through 15, a cluster of base to low case assumptions are included which are more indicative of the expected future value of revenues and expense. The results in these cases do not appear to be desirable from a developer's standpoint. All the other combinations of revenue and expenses shown, yielded longer paybacks and lower internal rates of return.

NGCC Merchant Owner, No Clean-up Costs

NGCC, Merchant Owner, Discount Rate = 7.58% Site Cleanup Cost = \$0						
Row #	Energy	FCM	Natural Gas	IPR Projected ROE	NPV (2010 \$M)	Payback Years
1	Base	Base	Base	6.91%	\$98.27	18.76
2	High	High	Low	24.14%	\$457.43	4.87
3	High	Base	Low	23.72%	\$445.98	4.90
4	High	Low	Low	23.06%	\$428.17	4.93
5	High	High	Base	20.84%	\$387.27	5.69
6	High	Base	Base	20.39%	\$375.82	5.79
7	High	Low	Base	19.68%	\$358.01	5.96
8	High	High	High	16.10%	\$292.06	8.65
9	High	Base	High	15.60%	\$280.61	9.22
10	High	Low	High	14.83%	\$262.80	10.28
11	Base	High	Low	10.89%	\$179.88	15.74
12	Base	Base	Low	10.34%	\$168.43	16.11
13	Base	Low	Low	9.49%	\$150.62	16.73
14	Base	High	Base	7.47%	\$109.72	18.20
15	Base	Base	Base	6.04%	\$80.46	19.74

The merchant development ownership structure was also modeled using a cleanup and demolition cost of approximately \$75 million. This is the high median of the estimated cost range for demolition and site remediation based on visual observations, limited public information and experience with similar facilities. The added expenses of clean up and demolition make it increasingly difficult to justify the economics to build a 400 MW combined cycle natural gas plant.

The analysis was performed assuming traditional or full financing of the project and assumed existing market rules within New England's power markets. In many of the scenarios that were analyzed, the economics did not appear to justify the development of a new power plant. Construction of a new power plant at the site in the future could be possible if financial incentives or grants could be offered by the Commonwealth or other entities to facilitate a reduced or nontraditional financing structure. New market rules within the ISO-NE could also be implemented in the future that provide added incentives to construct new power generation plants.

NGCC Merchant Owner, \$75M Clean Up Costs

NGCC, Merchant Owner, Discount Rate = 7.58% Site Cleanup Cost = \$75M						
Row #	Energy	FCM	Natural Gas	IPR Projected ROE	NPV (2010 \$M)	Payback Years
1	Base	Base	Base	4.94%	\$62.95	20.11
2	High	High	Low	19.70%	\$422.11	6.43
3	High	Base	Low	19.30%	\$410.65	6.61
4	High	Low	Low	18.68%	\$392.85	6.93
5	High	High	Base	16.85%	\$351.95	8.08
6	High	Base	Base	16.43%	\$340.50	8.45
7	High	Low	Base	15.77%	\$322.69	9.16
8	High	High	High	12.83%	\$256.74	13.03
9	High	Base	High	12.39%	\$245.28	13.95
10	High	Low	High	11.70%	\$227.47	15.14
11	Base	High	Low	8.31%	\$144.56	17.34
12	Base	Base	Low	7.84%	\$133.10	17.74
13	Base	Low	Low	7.10%	\$115.30	18.43
14	Base	High	Base	5.42%	\$74.40	20.03
15	Base	Low	Base	4.19%	\$45.14	20.25

- **Municipal Utility Development** - In the municipal ownership structure, a 100% debt position was assumed along with a lower financing rate than the merchant structure due to a municipal entity's ability to fund the project using low cost financing mechanisms. The debt term was also adjusted to 30 years given that municipal entities tend to extend debt positions longer than merchant developers. Using these financing parameters and assuming a zero value for demolition and site clean up costs, expense scenarios were run for 27 combinations of base, high, and low market revenue.

In the base case for revenues and expenses with no demolition and site clean up costs, the payback was approximately 7 years with a positive Net Present Value and Internal Rate of Return near 14%. These results seem to indicate that the economics could support development of a 400 MW combined cycle natural gas plant at the site, assuming no demolition or site clean up costs.

Some of the 27 municipal ownership market runs that assume no demolition or site clean up costs did indicate financial feasibility.

In cases with high energy revenues and low natural gas prices the modeling yields reasonably favorable financial outcomes. However, these cases are low probability events over a long term planning period as the price of energy and natural gas are highly correlated. As the price of natural gas increases energy prices tend to follow. It is highly unlikely that over the long term the New England markets would experience high energy prices while natural gas prices are low.

Lines 8 through 10 represent combinations and results that may be considered by some power plant developers as favorable outcomes. In these cases, the payback is closer to 4 years.

NGCC, Municipal Owner, No Clean-up Costs

NGCC, Municipal Owner, Discount Rate = 5.00% Site Cleanup Cost = \$0						
Row #	Energy	FCM	Natural Gas	IPR Projected ROE	NPV (2010 \$M)	Payback Years
1	Base	Base	Base	14.23%	\$293.03	6.73
2	High	High	Low	35.10%	\$935.63	3.31
3	High	Base	Low	34.74%	\$915.46	3.31
4	High	Low	Low	34.19%	\$883.70	3.31
5	High	High	Base	31.48%	\$806.01	3.60
6	High	Base	Base	31.07%	\$785.83	3.60
7	High	Low	Base	30.46%	\$754.07	3.60
8	High	High	High	25.99%	\$645.20	4.18
9	High	Base	High	25.51%	\$625.02	4.19
10	High	Low	High	24.75%	\$593.26	4.19
11	Base	High	Low	20.01%	\$442.83	5.01
12	Base	Base	Low	19.36%	\$422.65	5.07
13	Base	Low	Low	18.31%	\$390.90	5.15
14	Base	High	Base	15.06%	\$313.20	6.39
15	Base	Low	Base	12.88%	\$261.27	7.42
16	Low	High	Low	6.80%	\$143.55	14.08
17	Base	High	High	7.10%	\$152.39	17.24

When site clean up costs of approximately \$75 million are included in the analysis, the base case resulted in a longer payback period of roughly 10 years. The Net Present Value calculations were positive and the Internal Rate of Return was approximately 11%, leading to a conclusion that the municipal financing structure could potentially

be economically viable. However, the economic feasibility diminishes should demolition and clean-up costs exceed the estimated amounts.

The analysis was performed assuming traditional or full financing of the project and assumed existing market rules within New England's power markets. In many of the scenarios that were analyzed, the economics did not appear to justify the development of a new power plant. Construction of a new power plant at the site in the future could be positive if financial incentives or grants could be offered by the Commonwealth or other entities to facilitate a reduced or nontraditional financing structure. New market rules within the ISO-NE could also be implemented in the future that provide added incentives to generation plants.

NGCC, Municipal Owner, \$75M Clean up Cost

NGCC, Municipal Owner, Discount Rate = 5.00% Site Cleanup Cost = \$75M						
Row #	Energy	FCM	Natural Gas	IPR Projected ROE	NPV (2010 \$M)	Payback Years
1	Base	Base	Base	10.64%	\$256.04	10.29
2	High	High	Low	29.98%	\$898.65	3.79
3	High	Base	Low	29.62%	\$878.48	3.79
4	High	Low	Low	29.06%	\$846.72	3.79
5	High	High	Base	26.72%	\$749.02	4.14
6	High	Base	Base	26.31%	\$748.85	4.14
7	High	Low	Base	25.68%	\$717.09	4.15
8	High	High	High	21.76%	\$608.21	4.92
9	High	Base	High	21.28%	\$588.04	4.95
10	High	Low	High	20.52%	\$556.28	4.98
11	Base	High	Low	16.03%	\$405.85	6.57
12	Base	Base	Low	15.39%	\$385.67	6.85
13	Base	Low	Low	14.35%	\$353.91	7.37
14	Base	High	Base	11.42%	\$276.22	9.36
15	Base	Low	Base	9.35%	\$224.29	12.39
16	Base	High	High	4.51%	\$115.41	30.26
17	Low	High	Low	4.05%	\$106.56	30.39
18	Base	Base	High	3.63	\$95.24	30.40
19	Low	Base	Low	3.10	\$86.39	30.53
20	Base	Low	High	2.25	\$63.48	30.63
21	Low	Low	Low	1.60	\$54.63	30.76

Conventional Combustion Turbine Peaker

Construction of a peaking power plant, also referred to as a conventional combustion turbine peaker, was also considered. A peaking unit runs very infrequently, such as when power prices are extremely high or when required for reliability purposes. Typically peaking facilities run for a small fraction of the year while baseloaded power plants run more continuously.

The existing site can accommodate a maximum 745 MW natural gas fueled plant (the existing power station capacity) with minimal costs required to upgrade the existing substation and transmission lines that serve the current facility. Given typical peaking power plant configurations, a new facility with a generating capacity of 510 MW was assumed.

Peaker Cost Data Assumptions

The table below summarizes the cost and data sources used to model the cost of building a new 510 MW combustion turbine peaker power station. Assumed clean up costs ranged from zero to \$75 million as part of the analysis. The cost to bring natural gas to the site was estimated to be \$1 million. The power plant costs data was obtained from publicly available sources through the United States Energy Information Agency and are summarized below.

Cost / Configuration	Advanced NGCC	Note
MA Overnight Costs S/kW (S2010)	\$1,341	1
MW	85	1
Single Unit Overnight Dollars	\$113,985,000	1
Heat Rate (btu/kWh)	10,850	1
Fixed O&M (2010 S/kW)	\$6.98	1
Variable O&M (2010 \$/MWH)	\$14.70	1
Site Decommissioning and Clean Up	\$0 to \$75,000,000	2
Gas Pipeline	\$1,000,000	3
Number of Units	6	
Total MW	510	
Grand Total Total Overnight Dollars	\$685M - \$759M	

Note 1 EIA AEO 2011 Update Power Plant Cost Assumptions, November 2010

Note 2 From Jacobs Engineering Larry Dalton

Note 3 From Jacobs Engineering in consultation with Gas supplier

- **Merchant and Municipal Ownership Development** - For modeling purposes, two ownership structures have been assumed. A merchant ownership structure in which a plant is built to provide energy and market products in the wholesale markets and a municipal utility development structure in which a municipal electricity utility or consortium of municipal utilities builds a power plant to serve their consumer's needs.

The merchant case, assumed 80% debt and a 20% equity position and also assumed 6% financing and a debt term of 15 years. The municipal case assumes a 100% debt position, a lower financing rate than the merchant case, 5%, due to the municipal entities' ability to fund the project using low cost financing mechanisms. The debt term was also adjusted to 30 years given municipal tendency to extend debt positions longer than a merchant developer would.

Neither the merchant nor municipal ownership model, proved feasible in any of the 27 combinations analyzed even without consideration of demolition and site cleanup costs or the cost of constructing a new gas pipeline from the site to existing pipelines in Salem Sound.

A peaking facility generally runs infrequently, and therefore revenues from the Energy Market are normally low to negligible. The bulk of revenues for a peaking facility generally come from the Forward Capacity and Ancillary Markets. The primary reason the peaking facility proved infeasible in both the merchant and municipal ownership structures is the low revenue stream from the Capacity Market. As long as the projections of capacity revenues remain relatively low, it does not appear that building a new peaking facility at the site makes economic sense.

The analysis assumes traditional or full financing of the project and existing market rules within New England's power markets. As pointed out above, in many of the scenarios that were analyzed, the economics do not appear to justify the development of a new peaking power plant. Construction of a new power plant at the site in the future might be feasible if financial incentives or grants could be offered by the Commonwealth or other entities to facilitate a reduced or nontraditional financing structure. New market rules within the ISO-NE could be implemented in the future that provide added incentives to power generation plants.

SUMMARY

As a site for energy generation, the Salem Harbor site has the electric and waterside infrastructure in place. It would appear that to continue as a power generating location, the only viable alternative energy source would be natural gas. While a "peaker" facility would not be viable, as it would not run frequently enough to generate sufficient revenue, a natural gas-fired combined cycle facility, under the right circumstances, could be a viable alternative. Under the right financing circumstances, a combined cycle facility could produce enough revenue to overcome the initial cost of demolition and site remediation, the cost of construction and the operating costs. Viability would be highly dependent on the future market price for energy generation, and the cost of natural gas.



Feedback from the community has been very beneficial, providing insight for the consultant team, the City and potentially for future developers...

7

PUBLIC RECOMMENDATIONS & COMMENTS

PUBLIC COMMENTS

During the course of this study, three public presentations were made. An initial presentation was made to the Historic Derby Street Neighborhood Association on June 13, 2011. Two additional presentations were given to the general public, one at the midpoint of the study on June 30, 2011, and one at the conclusion of the study on October 4, 2011. The intent of each presentation was to inform the public of the study progress and to solicit their opinions and vision for redevelopment of the site. The sessions were well attended and the two public presentations were also broadcast on local access cable television.

At the conclusion of all of the public presentations, public comment and questions were solicited. At the public meeting on June 30th, the consultant team distributed a brief questionnaire intended to gauge the community's point of view regarding future development. Following is a summary of the results of the questionnaire, as well as a summary of general comments made during that presentation. Note, attendees represented Salem, Marblehead, and other organizations and special interest groups.

Question No. 1 – June 30, 2011

Rank each item in order of priority with #1 representing the highest priority.

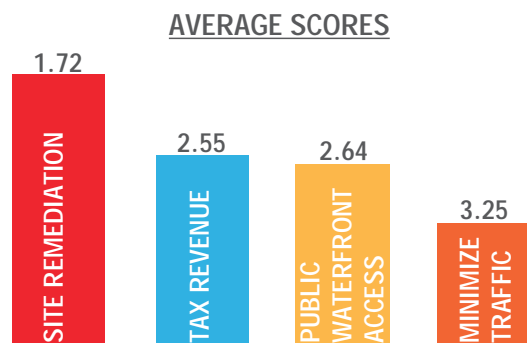
“What are your priorities for redevelopment of the Salem Harbor Power Station site?”

- Generating significant tax revenue to the city
- Clearing the site and remediating any soil contamination.
- Minimizing impacts from traffic or noise on the nearby residential neighborhoods.
- Providing waterfront access for the public.
- Other

There were more than 60 responses to Question No. 1. As the graphic indicates, the results of the responses were as follows:

- **High Priority**
 - Clearing the site and remediating any soil contamination. (Average Score 1.72)
- **Medium Priority**
 - Generating significant tax revenue to the city (Average Score 2.55)
 - Providing waterfront access for the public (Average Score 2.64).
- **Low Priority**
 - Minimizing impacts from traffic or noise on the nearby residential neighborhoods. (Average Score 3.25)

COMMUNITY RESPONSE TO QUESTION #1



Question No. 2 – June 30, 2011

Rank each item in order of priority with #1 representing the highest priority.

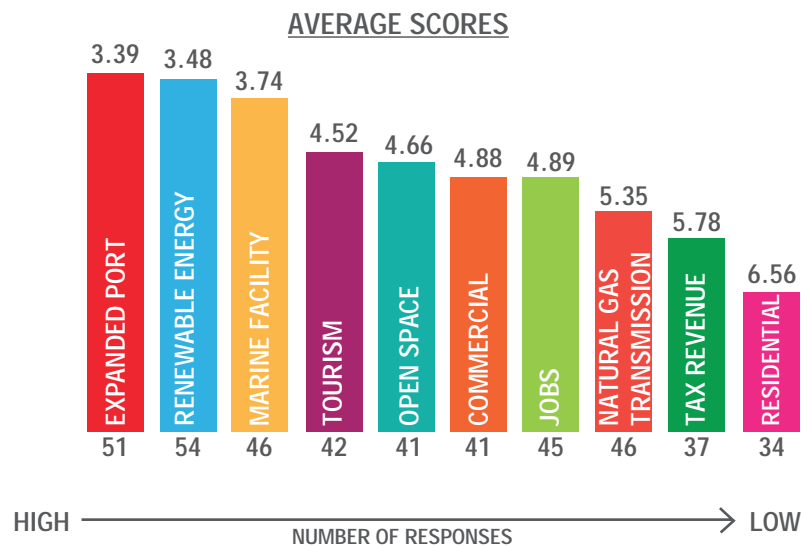
“What use would you like to see?”

- Highest market value
- Tourism related activity
- Natural gas power generation facility
- Renewable energy related
- An expanded port
- Marine facility
- An activity that will generate many jobs
- Residential
- Commercial
- Open space
- Other

There were also more than 60 responses to the question, As the graphic indicates the results of the responses were as follows:

- **High Priority**
 - An expanded port (Average Score 3.39)
 - Renewable energy related (Average Score 3.48)
 - Marine Facility (Average Score 3.74)
- **Medium Priority**
 - Tourism related activity (Average Score 4.52)
 - Open space (Average Score 4.66)
 - Commercial (Average Score 4.88)
 - An activity that will generate many jobs (Average Score 4.89)
- **Low Priority**
 - Natural gas power generation facility (Average Score 5.35)
 - Highest market value (Average Score 5.78)
 - Residential (Average Score 6.56)

COMMUNITY RESPONSE TO QUESTION #2



QUALITATIVE COMMENTS

At the question and answer sessions following the public meetings, there were a wide range of comments and concerns. The following points were made consistently at the various meetings:

- Dominion should be obligated to clean-up the site
- Fear that Dominion would close the plant and leave the buildings standing
- Concern about private ownership of the land and the ability of the City and community to impact the development
- Interest in cultivating Salem's port and marine history
- Interest in tourism and the cruise ship industry
- Interest in alternative energy/off shore wind
- Mixed opinions about natural gas power plant
- A need to be both visionary and realistic

The feedback from the community has been very beneficial, providing insight for the consultant team, the City and potentially for future developers.



Given the complexities of site clean up, access, ownership, and market conditions, a logical phased approach to redevelopment is required...

8

REDEVELOPMENT

POTENTIAL SITE USES

In 2008, The Brattle Group authored a study which examined the potential economic impacts of redeveloping the Salem Harbor Power Station site. This study primarily examined the potential revenue generated by alternate uses without estimating costs of acquisition or site cleanup. This study was also done at a point in time when it was unclear what Dominion's intentions were for maintaining the site for the purpose of generating power.

As we now know, Dominion will cease operation of the power plant and its supporting facilities in 2014. Based on further evaluation of potential cleanup costs of the site and, more significantly, for demolishing the main power plant building, it is now understood that these costs are major impediments to any redevelopment scenario. While The Brattle Group study optimistically reported that a mixed use development scenario on the Dominion property could yield \$5.6 million in taxes and revenues for the City within five years, the proposed uses upon which this was based are not allowed under current regulations. Specifically, the Massachusetts Public Waterfront Act (Chapter

91) and the Coastal Zone Management Designated Port Area (DPA), do not allow the single family homes, an apartment complex, large hotel, and retail/ office space that The Brattle Group report based its findings upon. In addition to failing to acknowledge the regulatory constraints that govern use of the property, factors such as market demand/saturation and inadequate landside infrastructure were not considered. Also, other issues such as the cost of demolition and the development's cost impact on City services, although generally acknowledged, do not appear to be factored into The Brattle Group's cost model. As a result, the proposed uses, timeline and revenue generation suggested were impractical and unrealistic.

The City of Salem and the group of assembled stakeholders have asked that any future redevelopment of the Dominion site be consistent with both Chapter 91 and the DPA regulations. Additionally, members of the community were polled at the first public meeting in June 2011 and they indicated a clear preference for expanded port operations, renewable energy facilities, marine industrial uses, and tourism based activity. Given this direction, the consultant team considered the following potential land uses for all redevelopment scenarios going forward:

- **Marine Industrial**
 - Cruise ships / terminal facilities
 - Manufacturing (perhaps "green" technologies or renewable energy)
 - Ship building / maintenance / dry storage
 - Commercial fishing (processing, frozen storage)
- **Alternative Energy**
 - Demonstration-scale wind or solar power generation
 - Natural gas power generation
 - Cogeneration / methane capture associated with an SESD expansion
- **Higher Education / Research**
 - Marine-dependent research facilities (similar to Cat Cove in Salem or, at a larger scale, Wood's Hole in Buzzard's Bay, MA)
- **Commercial / Recreational Marina**
 - Supporting Office / Retail Facilities (up to 25% of the total development program is allowed under DPA regulations)

DEVELOPMENT GOALS

To guide the creation of different development scenarios, the consultant team established the following planning principles:

- **Comply with the regulatory environment** - There are a multitude of reasons why compliance with current regulations is important to the successful redevelopment of the Power Station site. First, maintaining public access to the waterfront is a high priority for the City and is the primary goal of Chapter 91. Second, significant public investment has been made over time to maintain and improve deep water access to the site. Deep water ports are precious public amenities and uses that can take advantage of the site's waterside access should therefore be prioritized, which is consistent with DPA regulations. Finally, without owning the site the City of Salem has very little leverage over what kinds of future redevelopment may eventually occur here. However, the City is in the position to assist potential developers to seek relief from current regulations if the proposed development options are of mutual benefit to the City. Therefore, the City should not seek to alter current regulations in advance of any viable development options and thereby forfeit the only real leverage it has to influence development absent using public funds to acquire, remediate, and improve the site itself.
- **Replace as much tax revenue as possible** - There have been many discussions about the pending loss of \$4.75 million of tax revenue generated by the power station today. Dominion is the single largest taxpayer in the City of Salem, paying five times more than the City's next largest taxpayer. However, Dominion paid \$8.7 million in taxes to the City in 2001, so this is not the first time the City will see a decrease in payment. In addition, the State Legislature adopted legislation in July, 2011 to assist the City of Salem and protect it from losing any of the \$4.75 million in tax revenue that Dominion pays before 2016, and there have been proposals to extend this agreement to 2021.

Part of the challenge with the tax revenue agreements with Dominion is that they are negotiated rates based on the amount of power generated on site. The only other viable, single land use that could generate as much tax revenue on the site is a natural gas power

generation facility. If the mandate were to recover all of the \$4.75 million in annual tax revenue as quickly as possible, a natural gas facility would be the clear winner in terms of future land use options for the site. However, given the lack of consensus in the community about having natural gas facilities on the site, letting tax revenue alone drive future land use decisions does not seem wise.

With this in mind, redevelopment of the Power Station site should have a goal of replacing as much tax revenue as possible, within the context of promoting public access to a more active waterfront.

- **Provide public waterfront access** - There have been a number of improvements to Salem's waterfront over the years, including the creation of the Harborwalk. The opportunity exists to significantly expand the existing Harborwalk, and provide better pedestrian access to and along the Blaney Street pier. By providing more public open space along the waterfront, it will become a more attractive destination for both residents and visitors, which is critical to support future retail and commercial development. Improved pedestrian, bicycle and transit access are also critical to limiting additional vehicular traffic to the area as redevelopment occurs.



With constrained access to the site from the existing road network, uses that take advantage of sea-based inflows and outflows of goods & people are preferred.

- **Propose uses for which there is market demand** - Any redevelopment scenario must be viable from a market perspective. Initially, development options will be subjected to existing market conditions. If implemented strategically, however, certain types of development can act as catalysts for future development on the site. A goal for the successful redevelopment of the Salem Harbor Power Plant site, then, is to create a nucleus of activity that builds on the existing activities along Salem's waterfront rather than disperse uses across the site. Once a certain amount of development "momentum" is initiated, the site can more fully transform from a former power station site into something new.



The designated port area limits land uses on the site to those that are water-dependent & take advantage of the site's deep water access.



The site is envisioned to include a variety of uses to create a vibrant waterfront.

- **Provide a mix of uses** - Provide uses that contribute to a healthy marine industrial economy without straining land based infrastructure. The goal for this site is to create an array of different uses that complement one another to create a greater whole. One way to do this is to promote a certain character, or “brand,” of development that will attract a vibrant mix of uses that can coexist here in a way that cannot occur elsewhere. For example, this site could become part of the network of Massachusetts Clean Energy Incubators, which is overseen by the Massachusetts Clean Energy Center (MassCEC). As noted on MassCEC’s website (www.masscec.com), business incubators “have the potential to create jobs, revitalize neighborhoods, commercialize new technologies, and strengthen local and national economies.”

Under this model, one could imagine a scenario similar to that which has recently played out in Charlestown, MA, with the opening of the nation’s first large-scale wind blade testing facility. The large blades, up to 90 meters in length, are difficult to transport via road, and will be primarily delivered to the site in Charlestown via water for testing. This type of use is ideal for Salem Harbor, where waterside access is straightforward in many ways but landside access is problematic. A similar facility in Salem could include incubator space for designing wind energy components, light industrial space for developing and testing materials, and large scale manufacturing facilities for constructing the components, with all materials coming to and leaving the site by water.



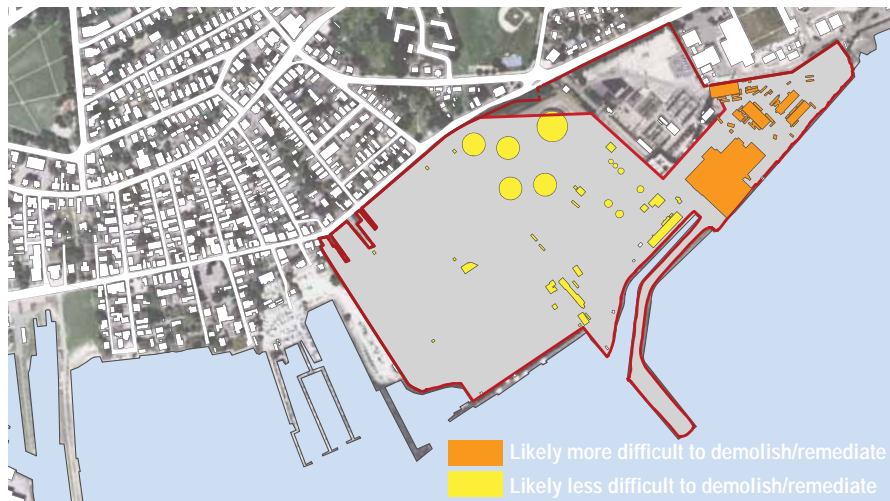
Dominion will be required to remove four large oil tanks within one year of closing in 2014.

- **Streamline phasing and implementation** - Given the complexities of site cleanup, access, ownership, and market conditions, a logical, phased approach to redevelopment of the Salem Harbor Power Station is required. Fortunately, there are a few factors that play favorably into a phased development approach for the site. Although the timeline for most of the site cleanup and remediation required to support future development is uncertain, Dominion will be required to remove the four large tanks on the southwestern portion of the site within one year of the plant’s closing. This provides a near-term opportunity for the City to consider acquiring additional lands adjacent to the existing Blaney Street pier, which would provide space for additional parking and support facilities for the ferry service and growing cruiseship industry. This project could be the “catalyst” upon which future phases of development are built, moving northeast towards portions of the site which are more challenged in terms of both access and site cleanup costs.

PROPOSED DEVELOPMENT SCENARIO

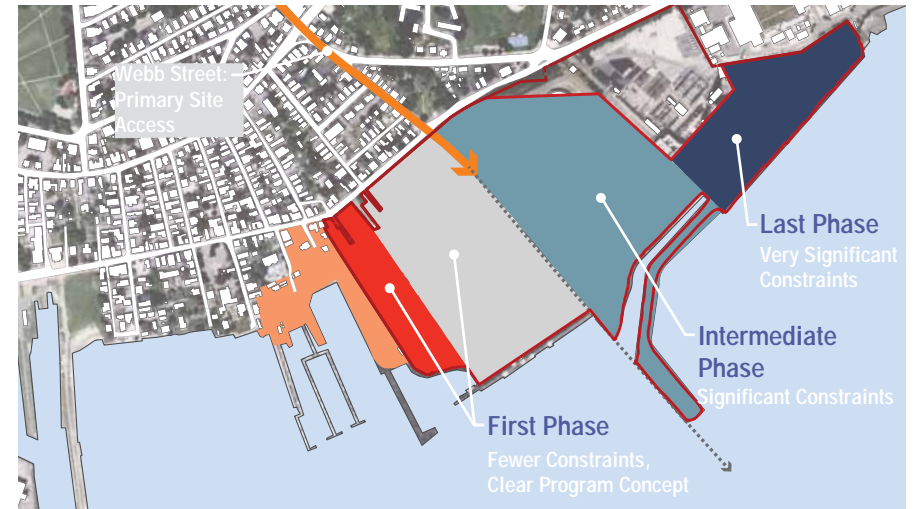
Taking into consideration the variety of opportunities and constraints presented by the Salem Harbor Power Station site, the proposed development scenario provides a flexible framework for future development. This flexibility provides the City with the tools it needs to have productive discussions about how, when and where future development should occur on the site. The proposed plan also reflects the goals established by the City and its stakeholders, as well as input from the broader community gathered during public meetings.

- **Site Organization and Phasing** - The proposed redevelopment is organized into three basic phases, based upon the level of constraints and potential development program. The initial phase of development is adjacent to the existing Blaney Street Wharf, where there are the fewest constraints and the development program is the most straightforward. In this location, it is envisioned that a terminal building, supporting retail/commercial uses, and additional parking could all be implemented in the near-term to support a growing cruise ship industry in Salem.

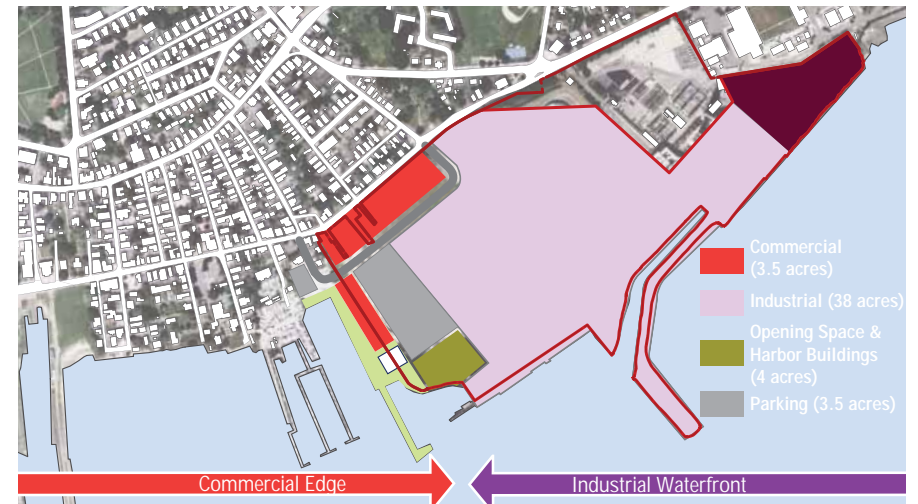


This diagram illustrates the location of additional structures on the site that would be costly to remove—the orange buildings represent the old power plant, which may cost as much as \$50M to remove.

Webb Street represents an important boundary between the second and third phases of development: there will be fewer constraints west of this line when the tanks are removed by Dominion, but the oil tanks east of this line will be costlier to remove and may prevent near-term redevelopment. The final phase of development includes the area surrounding the main power plant building, which represents the most significant cleanup cost on this site



The proposed phasing strategy moves generally from west to east, taking advantage of existing activity at Blaney Wharf and lower site remediation cost.



The proposed land use for the site concentrates commercial development to the west to provide critical mass and to establish an “anchor” for public activity along the water’s edge.



Public Realm

The driving force behind the development plan for Salem Harbor Power Station is a series of improvements to the public realm, supported by development, which can be phased over time to improve access to and use of the waterfront. The proposed plan creates a series of different “events” along the waterfront, each with its own character and use that will provide a true waterfront destination for the City of Salem. The events include:

- The Blaney Street Promenade
- The Waterfront Lawn
- The Industrial Edge
- The Jetty Park
- Vehicular and Bicycle Circulation

- **The Blaney Street Promenade** - The first step in the process of creating a vibrant waterfront is the extension of the existing Harbor Walk to better engage the ferry service and, in the future, to connect to an extended pier that could also accommodate small cruise ships. Today, pedestrian access to Blaney Wharf is compromised due to the need for surface parking in this location. Going forward, it is proposed that the Blaney Wharf extend eastward, so that surface parking can be relocated onto what is currently Dominion property. Once the large tanks are removed, surface parking may be implemented in this location with little or no site remediation requirements. With parking relocated, the waterfront adjacent to the pier can become more pedestrian oriented, and eventually made more functional with the addition of a new terminal building and supporting retail/commercial use.

The vision for this space in the future is to create a strong anchor for the existing Harbor Walk that connects all of Salem’s waterfront destinations. Event space, restaurants, and community uses would attract both residents and visitors to the site, which could become a signature civic space for the city and the region.



The Blaney Street Promenade



View of Blaney Wharf today.



View of Blaney Wharf after the site is redeveloped.

- **The Waterfront Lawn** - As people move out along the edge of the water to an extended Blaney Street pier, a new active open space is proposed at the intersection between the industrial activity to the east and the commercial waterfront to the west. Views back to the City of Salem are also captured at this location – a place where private industrial activity has occurred for decades is transformed into a public park.

This space could be used for large outdoor gatherings such as concerts or festivals, or on a more daily basis, as a place for people to exercise or for children to play. The new park would be a destination in and of itself, further enhancing the vitality of Salem's new waterfront. Similar models exist in cities throughout the US, though one excellent example is the Charleston Waterfront Park in Charleston, SC. Built on the site of the city's old port, the park transformed the character of the waterfront and continues to have tremendous influence on development in the City. In 1980, the site was overgrown and full of old pilings and gravel parking lots. The new park was completed in 1990, and is now a significant landmark for Charleston and a great success story for Mayor Joe Riley. While the development did not happen overnight, it is clear that this project was transformative and worth the investment – the same could be true in Salem ten years from now.



The Waterfront Lawn



Examples of other waterfront parks that could serve as models for Salem: (1) and (2) Gantry State Park, Queens, NY; (3) Charleston Maritime Center



Different types of small scale wind turbines could be used on the site to demonstrate the City's interest in renewable energy and a reflection of the site use for energy production.

- **The Industrial Edge** - The proposed plan does not attempt to ignore or hide the site's industrial past. Rather, this important part of its historic and future use is integrated within the overall open space strategy for the site. The character of the industrial edge is meant to be just that – industrial. Whereas the landscape treatment of the Blaney Street Promenade and Waterfront Park require higher quality materials, the key features of the Industrial Edge are identifying a pedestrian zone and creating enhanced wayfinding and signage to connect people to various destinations. There is also an opportunity within this zone to provide interpretive signage that describes the history of the site, and also of various locations in Salem visible from this waterfront vista.



The Industrial Edge



Commercial Waterfront Boston, MA

- **The Jetty Park** - Few people in the general public have had access to the existing jetty that has been utilized by the power plant for the past 60 years. In fact, this manmade landform is an integral part of the site's history, and is clearly visible on historic maps of Salem Harbor. At one point in time, rail extended through the site and out onto the jetty. Going forward, it is proposed that the Harbor Walk extend all the way out to and along the Jetty, creating a loop system for joggers and bicyclists. Limited improvements are proposed beyond the creation of a new path system and an extension of the interpretive signage and wayfinding system introduced along the Industrial Edge.



The Jetty Park



Gantry State Park, Queens, NY



Liberty State Park, NJ

- **Vehicular and Bicycle Circulation** - The entrance to the Blaney Street Wharf is currently located at the intersection of Derby Street and Becket Street. This entrance, and some of the existing parking that exists there, are maintained in the proposed development plan. Parking that currently exists closer to the water, however, will be relocated to an expanded parking area to the east. The new parking will support expanded ferry and cruise ship activity, as well as supporting retail and commerce.

Webb Street will serve as the primary entrance to the industrial portion of the site. The existing entrance to the Dominion plant will be maintained for access to the substation. These entry points establish a loose grid of development parcels that can accommodate a variety of uses. The larger parcels in the industrial zone could be subdivided if necessary. The parcels to the west are smaller and more typical of an urban grid, supporting smaller buildings within a walkable environment.

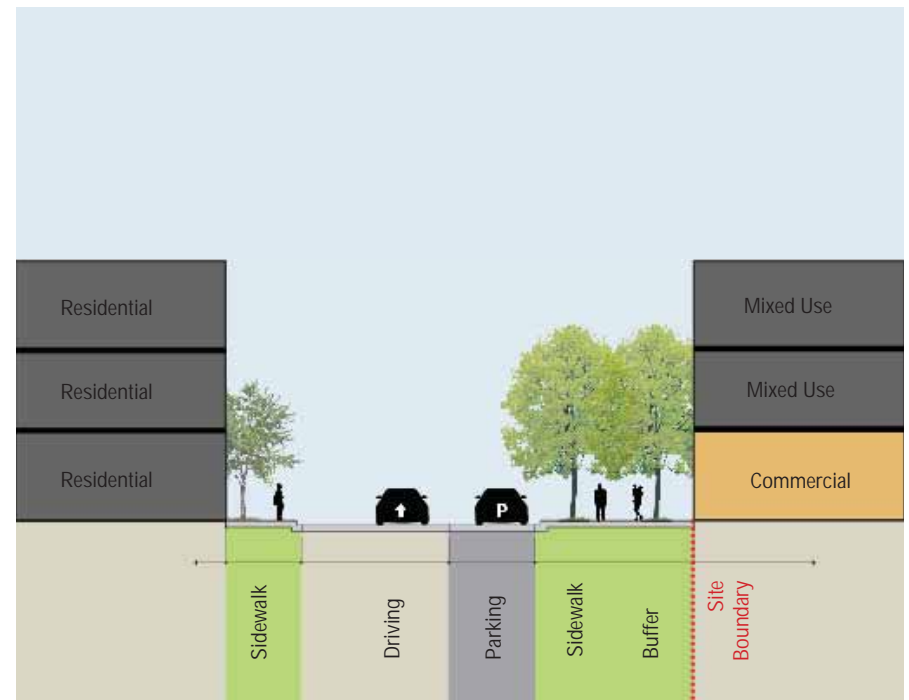
Derby Street was also considered in the planning process, particularly in terms of how the character of this street can be strengthened along the edge of the Dominion property. Closer to downtown, Derby Street has an intimate quality that inherently slows vehicular traffic. The closeness of buildings to the street edge reflects a more historic condition where streets did not occupy as much space as they do today. Many buildings have ground floor retail uses with residential use above them, suggesting a more complete community where people who live in the neighborhood can walk, rather than drive, to a store or to visit neighbors.

The proposed plan will extend the historic fabric of Derby Street further to the east, while maintaining the “green buffer” that exists there today. Future development along Derby Street will consist of two and three story buildings sited closely together with active ground floor uses.

Finally, bicycle access will be encouraged as an alternative means of access to the site. All future development should provide safe bicycle parking and signage identifying where bike traffic should go. Enhanced trolley service and free parking in other locations (such as existing downtown garages) could reduce vehicle trips to the site and further incent alternative means of transportation.



Proposed street network



Section at Site

DEVELOPMENT PROGRAM

The proposed plan currently provides approximately 500,000 gross square feet (gsf) of development. An additional 100,000 gsf could be accommodated where potential sites for a natural gas power generation facility and an expansion of the Southern Essex Sewerage District facilities have been identified. Additionally, if residential (which is not permitted under current regulations) becomes a viable use in the future, a portion of the space currently dedicated to office or R&D space could be reallocated to provide up to 120 units of multifamily housing (apartments or condominiums). The development program represented by the plan is broken down by land use in the following table.

Land Use & Area

● Retail:	90,000 SF
● Office	25,000 SF
● Terminal Building	25,000 SF
● R&D/Incubator Space	120,000 SF
● Light Industrial	90,000 SF
● Manufacturing	150,000 SF
TOTAL	500,000 SF



The Proposed Master Plan Diagram



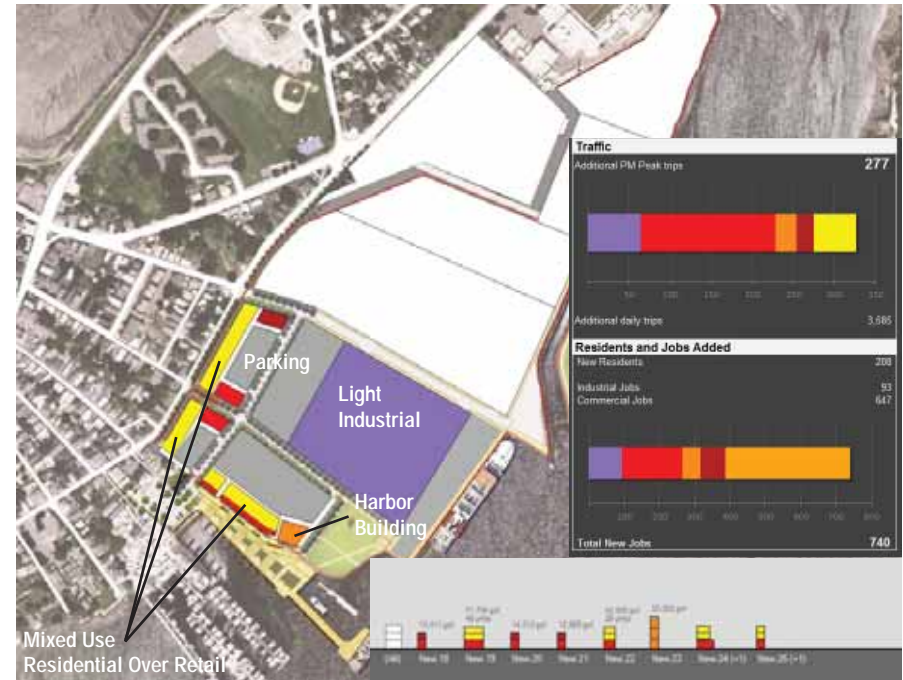
COMMUNITY IMPACTS

A key aspect to the implementation of any development plan is a comprehensive understanding of the potential impacts different types of development have on its host community. For this site, the most important consideration is how much tax revenue different land use scenarios will generate and how much traffic will be added to an already overstrained roadway network in Salem. We can create a snapshot of this for what we think the redevelopment of the Salem Harbor Power Station will look like at full build-out. Realizing that the redevelopment process will likely occur over several decades, a more iterative approach is required.

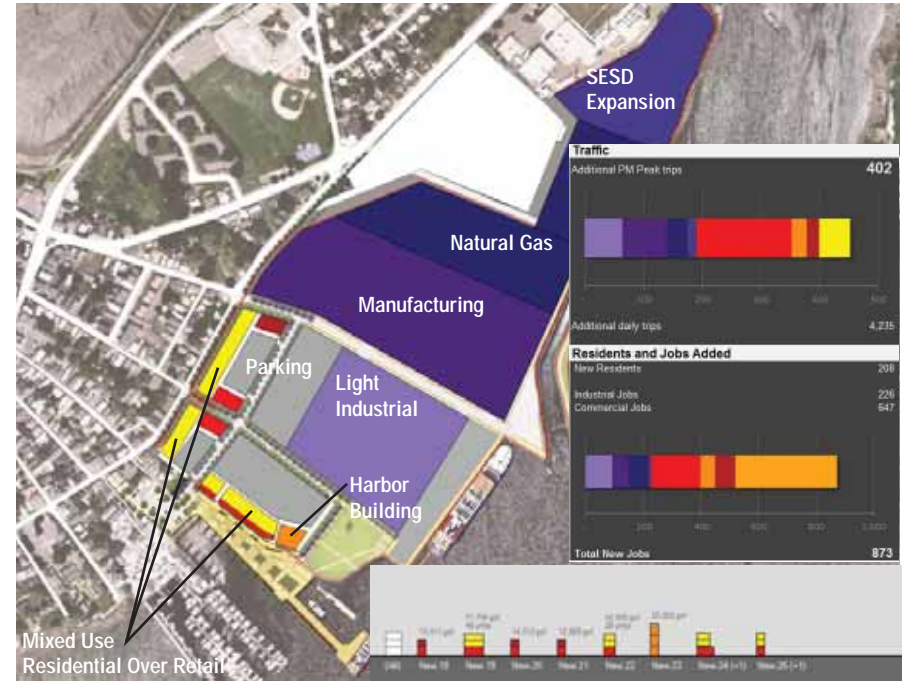
To this end, Sasaki has created propriety software application called SmartPlan™ to measure the impacts of design decisions in real time. SmartPlan™ is a computer application designed to bridge the gap between design and the practicalities of planning, including financing, regulatory constraints, environmental solutions, sustainability metrics and other implications of different development scenarios. The power of SmartPlan™ lies in its ability to provide information on the impact of design decisions in real time.

For this project, the consultant team has created a SmartPlan™ model that ties these metrics to the proposed plan. As some of the complex issues of site ownership, remediation, and development interest become more definitive, the intent is to be able to update the proposed development plan so that key factors can be determined in the City's decision making process. For example, if someone buys the site from Dominion and creates a modified or new development plan, it can be quickly modeled to assist the City in understanding the potential impacts.

The Smart Plan model will illustrate the potential tax revenue generation of particular types and mixes of development, as well as the associated cost burden to the City of Salem.



SmartPlan Model - Potential Partial Site Development



SmartPlan Model - Potential Full Site Development

- **Tax Generation** - Although Dominion's tax contribution has declined, in fiscal year 2010 taxes totaled approximately \$4.75 million, making the power station the largest contributor of tax revenue in the City of Salem. The \$4.75 million includes a negotiated usage fee of \$1.75 million, and property taxes of \$3 million which included \$800,000 attributable to the land.

When the plant ceases to operate in 2014, tax revenue contributions will be dramatically less. Dominion will still be obligated to pay property taxes, but the usage fees will cease or drastically diminish. The extension of the Regional Green Gas Initiative legislation through 2016 will help the City temporarily fill the revenue gap.

The overall additional tax burden on Salem residents and property owners would appear to approach \$4 million. Given the varying commercial and residential tax rates, along with the complexities of various other factors, it is difficult to calculate the additional tax burden on a per property basis. It should be noted, that the absence of the power plant could increase values of adjacent residential properties, which in turn, would provide a limited amount of offsetting property tax revenue.

The ability of the new development to generate significant tax revenue will be an important issue for the City of Salem. In an ideal scenario, the future development would generate the same or additional tax revenues. However, this is not to say that there aren't other considerations. Different types of developments can provide other non-tangible benefits (parks and open space, improved air quality, etc.), as well as other financial benefits to the city (jobs, tourism, sales tax revenue).

Different types of development can also bring increased cost which will need to be considered. Increased traffic, infrastructure, government services and public education costs can also offset the tax revenue generated.

RESPONSIBILITY AND FUNDING

Challenges

One of the most important factors for future development will be overcoming the cost of clean up, which would include both demolition of the existing structures and the clean up of the 62 acre site. The cost for site clean up is estimated to be in the range of \$5-20 million, while building demolition is estimated to be in the range of \$80-\$85. Including a credit for the salvage value of materials of \$20-25 million (based on today's market prices), the building demolition cost would be reduced to a net \$55-\$60 million. The total cost of the site clean up and demolition would likely be in the range of \$60 – \$80 million.

- **The following parameters will likely effect development:**

- Dominion or the potential buyer is legally obligated to clean-up the site.
- Dominion could choose to postpone potential clean-up costs after they close the plant in 2014, by leaving the plant dormant.
- The majority of the projected costs are for building demolition, not site clean-up.
- To avoid the potentially significant building demolition costs, a developer could leave the existing building intact, and develop the western portion of the site.
- Should the owner of the property be unable to clean-up the site and demolish the structures, government funding could become available.
- Dominion earned \$2.8 billion in net earnings in 2010 and potentially has the financial resources for remediation and demolition.¹
- Funding sources for brownfield and Superfund sites are typically for site clean-up costs, rather than building demolition.
- The City or potential developers may have to seek specific project funding initiated through the Commonwealth or the Federal Government.

Responsibility

In order for partial or full redevelopment to begin, either by the current property owner, Dominion (Dominion Resources, Inc.), or a new buyer, the cost of clean-up would need to be addressed. Depending on the extent and type of development, the cost of clean-up and demolition would vary.

- **Responsibility for Clean Up** - Under the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), a potentially responsible party (PRP) for contamination of sites is one of the following:

- the current owner
- owner or operator at the time of contamination
- person who arranged for the disposal
- transporter who selected site for disposal ²

According to prevailing opinion, the United States Court system has interpreted (CERCLA) to mean that “a buyer, lessor, or lender may be held responsible for remediation of hazardous substance residues, even if a prior owner caused the contamination; performance of a Phase I Environmental Site Assessment, according to the court’s reasoning, creates a safe harbor, known as the ‘Innocents Landowner Defense’ for such a new purchaser or his lenders.” ³

A Phase I Environmental Site Assessment (ESA) is a report identifying potential existing environmental contamination of a property, including both the land and any built structures. An environmental consultant will perform the investigation and prepare the report. A Phase I ESA is often required by a purchaser’s lender when a property is suspected of being contaminated. It should be distinguished from a Phase II ESA, when the actual testing of the soil, groundwater and building materials occurs.

Dominion is currently responsible for clean-up of the site. However, presently, there are no recorded environmental violations at the site that are required to be addressed. If the Salem Harbor site becomes dormant but is still owned by Dominion, more extensive clean up would not be required. Dominion, as the property owner, also has the legal right, after they cease operation in 2014, to leave the site

dormant, as long as it does not pose an immediate danger and there are no known outstanding environmental violations. They could simply choose to continue paying property taxes and avoid the cost of site clean-up and building demolition indefinitely.

Dominion, (Dominion Resources, Inc.) is a Fortune 500 company with \$2.8 billion of net income in fiscal year 2010. ⁴ Revenues for 2010 were listed at \$15.2 billion, with total assets listed at \$42.8 billion. ⁵ They certainly have the resources for remediation and demolition, but must consider the burden of this cost on shareholders. Dominion must also consider the public relations impact of a very visible shuttered plant and the significant negative publicity it would generate.

- **Demolition Prior to Sale** - Dominion could also choose to sell or transfer the property to a new owner. According to the City of Salem’s Assessor’s Online Property Data, the property was purchased by Dominion from USGEN New England Inc., for \$46.44 million on January 3, 2005. If a new owner were to purchase the site, they would likely request a Phase I Environmental Site Assessment, and pending the outcome, potentially a Phase II and Phase III Environmental Assessment. The transaction would involve a complex negotiation between Dominion, the buyer and the buyer’s lender that would focus on the results of the Environmental Assessments, the cost of clean up and its impact on the value of the land – all based upon the intended future use of the site. Industrial and power generating uses potentially require the lowest level of clean up and residential requires the highest level of clean up.

- **Partial Demolition and Development** - Given the fact the potential cost of demolition and site remediation (estimated at \$60-\$85 million) exceeds the market value of the remediated and cleared land, it is also unlikely that a new owner would take the land at no cost. This would likely only occur if the new owner intended to utilize a portion of the land (western portion), and avoid the demolition cost by leaving the majority of the remaining power plant structures in place. It should be noted however, as mentioned previously, a new natural gas power plant would only, require 10-15 acres of land. Locating such a plant to the west of the substation, would potentially avoid the need to demolish the existing plant, and concurrently allow for other development to occur on the western 30 acres of the site. However,

it is unlikely that a new owner would willingly expose themselves to the pressures of a community and City that wants to see the buildings demolished.

- **Funding** - Brownfield sites are a “relatively low-risk site” defined under CERCLA as “real property, the expansion, redevelopment or reuse of which may be complicated by the presence of a hazardous substance, pollutant, or contaminant”.⁶ There is funding available through the EPA’s Brownfield Initiative or through the State program. In Massachusetts, funding of up to \$2 million is available for “Priority Projects”, and loans and grants of \$1 million or less are available through the EPA.⁷ These numbers are a small amount compared to the anticipated cost for demolition of the project.
- **Superfund Site Funding** - This site is not a Superfund site, but the law created under the CERCLA in 1980 grants federal authority for the clean-up of “releases or threatened releases of hazardous substances that may endanger public health or the environment”.⁸ The Environmental Protection Agency (EPA) potentially would identify the responsible party for the contamination of the site and act to prompt the responsible parties to clean up the sites. In cases where responsible parties cannot be determined, when the responsible parties no longer exist or are financially unable to undertake the clean-up, the EPA has the authority to clean-up the site itself utilizing the special trust fund.”⁹ Historically, about 70% of Superfund cleanup activities have been paid for by the responsible parties.”¹⁰
- **Federal and State Funding** - The recently extended RGGI legislation will help to bridge the (lost tax) revenue gap between 2014 (when the plant closes) and 2016. Should Dominion choose not to demolish the plant in a timely fashion, the City of Salem may ultimately need to pursue additional funding from the state and federal government to help stimulate redevelopment. Even if the plant is demolished by Dominion, additional state and federal funds may be required to stimulate development that is consistent with the developmental constraints levied by the DPA designation. The City of New Bedford has successfully taken this route in securing \$35 million of municipal and state funding to construct the new 20 acre New Bedford Marine Commerce Terminal in their DPA. The terminal will act as a staging area for the Cape Wind project and position New Bedford at the forefront of the offshore renewable industry.



Charleston Maritime Center



9

CONCLUSIONS

Over the course of this study the consultant team met with the City's stakeholder group five times and with the broader community at two public meetings and one neighborhood meeting. The input received at those meetings from a broad cross section of the community has provided a wealth of information and a sense of the pulse of the community relative to the existing power station and a vision for eventual redevelopment of the site.

A few key conclusions have emerged from those discussions and should form the foundation for the next steps initiated by the City in the coming months. Those conclusions outlined below.

COST OF CLEANUP AND DEMOLITION / PUBLIC FUNDING

As part of this report, a preliminary cost estimate was developed for both site clean up and demolition of the existing power station structures. The estimate is based upon public records, a brief walk through of the facility and past experience of the consultant team with design, construction and modifications to utility scale power generating facilities. The overall range of costs presented - \$60 Million to \$85 Million - is also consistent with rule of thumb numbers developed by the American Clean Skies Foundation.

Site preparation costs of this magnitude will seriously burden any proforma for redevelopment – no matter what the planned use is. While it is technically the responsibility of Dominion to clean up the site, they are not obligated to do so if use of the site does not change. Dominion could also pass along the responsibility for cleanup to a new owner as part of a transfer of ownership. While not out of the question, it is unlikely in either case that an owner would be able to fund clean up of the site independently. As a result, future redevelopment will need to be considered on a phased basis and /or financial assistance must be provided from the state or federal level to reduce or alleviate this significant burden on redevelopment. Broader public participation in the financing solution would logically follow the broader benefit to the region that the power station has provided for 60 years.

DESIGNATED PORT AREA

The Massachusetts Office of Coastal Zone Management has identified Salem Harbor as one of 11 Designated Port Areas in the Commonwealth. Emphasizing the limited amount of deep water access – the Designated Ports are protected as an irreplaceable resource. While it is hard to disagree with the fundamental need to preserve deep water ports for marine related use, one must also consider whether there are sufficient allowable uses to generate viable economic activity in all of the ports identified. One must also consider that Salem Harbor does not have the landside access to highway and rail transportation that other ports such as Fall River and New Bedford have which support significant port operations.

Perhaps the small scale and physical limitations of ports such as Salem and Beverly will drive some reconsideration, at the state level, of development

proposals that combine appropriately scaled port related functions with other uses that are currently disallowed.

LANDSIDE INFRASTRUCTURE

Redevelopment of the power station site will be influenced by the existing limitations of land side infrastructure. While the utility infrastructure currently in place to serve the power station may be adequate to serve new development, traffic generation will be a significant concern. The network of streets immediately adjacent to the power station site are characterized by the Derby Street Historic District. While perhaps minimally adequate relative to capacity, the streets typically are narrow and one way. Other major intersections in Salem through which traffic to and from the site will pass, are currently beyond capacity and will create choke points should measurable increases in traffic volume occur. The eventual density of development on the site will, in part, be determined by analysis of the resulting vehicle trip generation.

MARKET ANALYSIS

The current residential and commercial real estate market in New England generally, and Salem in particular, is characterized by absorption rates that do not suggest that a substantial single phase development is feasible.

A phased development, focused on an initial use, such as the Charleston, SC waterfront, would support the Blaney Street Wharf ferry and cruise ship activity and would create an appropriately scaled catalyst that would anchor the east end of Derby Street and act as a complement to the downtown commercial district. Future development could occur on the balance of the site as determined by the market, generally.

NATURAL GAS

As this study is concluding we are aware that there may be dialogue between Dominion and parties who may be interested in developing a gas fired power generating facility on the Salem Harbor property. The advantages the site offers – proximity to the existing substation and the offshore natural gas network – are significant. The City should also consider that the footprint required for a

gas fired facility of similar generating capacity to the current power station is approximately 15 acres – leaving a significant portion of the site, particularly the Blaney Street Wharf area - available for other development. Specific questions have been raised regarding separation of gas fired facilities from other uses. Other than dimensional requirements expressed in the building code relative to industrial uses, we are not aware of regulations requiring separation of a gas fired power generating facility from other uses that may be contemplated, or the existing residential neighborhood.

Given Dominion's delisting of the existing facility and its decommissioning as of June 2014, owners / operators of a new gas fired power generating facility will face a lengthy approvals process with ISO-NE prior to construction and actual energy production.

RENEWABLE ENERGY

While there is much community sentiment in favor of developing a green energy solution on the site, it does not appear to be a formula that will provide a regional benefit. Since neither wind or solar / photovoltaics will generate more than 10 – 15 MW utilizing the entire site area, neither appear to be economically viable relative to regional scale power generation. However, both have potential to provide a portion of the on-site power required by new development.

Studies have indicated that the wind profiles off shore are sufficient to justify development of an off shore facility at a scale similar to the Cape Wind project. Given Cape Wind's current struggles to find a market for its capacity, it may take a few years for the market to mature sufficiently that a new off shore project can be justified economically. The landside footprint for off shore wind would be minimal – requiring only a connection to the existing substation – that could easily be accommodated at some future date. The balance of the site would remain available for significant additional development.

In any case, renewable energy at a demonstration or site specific scale should be part of any future development proposal.

CITY REVIEW

One of the City's fundamental goals relative to this study has been to "have the ability to accurately plan its finances and understand what potential economic development options exist". Since the City does not own the Salem Harbor Power Station site, in order to influence development direction, all available means must be utilized along with support from the current owner. Community involvement, securing public funding sources for site clean up and demolition, review of development proposals relative to the City's Zoning Ordinance, Municipal Harbor Plan, Chapter 91 and Designated Port Area regulations, all offer the City a basis for involvement in the review and approvals process and leverage over what will ultimately be constructed on the site.

FOOTNOTES

SECTION 3

1. Marblehead Patch May 11, 2011
2. Boston.com January 2, 2011
3. Boston.com October 3, 2011

SECTION 5

1. City of Salem Zoning Ordinance, September 12, 2009, p. 47
2. Id.
3. Fort Point Associates, Inc., "Salem Harbor Plan" January, 2008, pp. 23-28
4. Bowles, Ian, "Decision on the City of Salem's Request for Approval of the Salem Municipal Harbor Plan Renewal Pursuant to 301 CMR 23.00" June 24, 2008 p. 13.
5. Bowles, Ian, "Decision on the City of Salem's Request for Approval of the Salem Municipal Harbor Plan Renewal Pursuant to 301 CMR 23.00" June 24, 2008 p.12
6. Massachusetts Department of Environmental Protection, "Chapter 91, The Massachusetts Public Waterfront Act" available September, 2011 at http://www.mass.gov/dep/water/resources/about_01.htm
7. Id.
8. Fort Point Associates, Inc., "Salem Harbor Plan", January, 2008, p. 100.
9. Massachusetts Department of Environmental Protection, "Chapter 91, The Massachusetts Public Waterfront Act" available September, 2011 at http://www.mass.gov/dep/water/resources/about_01.htm
10. Id.
11. Id.
12. Id.
13. Id.
14. Coastal Zone Management, Anne Donovan, "Designated Port Areas: Flexible Protection for a Finite Resource" available September, 2011 at <http://www.mass.gov/czm/coastlines/2003/c27.htm>
15. Id.
16. New England School of Law, "Designated Port Areas A Manual for Lawyers", 2009, p. 11.
17. Id. p. 11
18. Id., pp. 11-12.
19. Id., p. 12
20. Id.

21. Id. p. 11
22. Id.
23. World Port Source, "Port of Boston" available September, 2011 at http://www.worldportsource.com/ports/USA_MA_Port_of_Boston_88.php
24. Boston Harbor Association, "Boston Harbor's Working Port" available September, 2011 at http://www.tbha.org./programs_workingport.htm
25. World Port Source, "Port of Boston" available September, 2011 at http://www.worldportsource.com/ports/USA_MA_Port_of_Boston_88.php
26. Boston Harbor Association, "Boston Harbor's Working Port" available September, 2011 at http://www.tbha.org./programs_workingport.htm
27. Id.
28. Id.
29. World Port Source, "Port of Boston" available September, 2011 at http://www.worldportsource.com/ports/USA_MA_Port_of_Boston_88.php
30. Aaron Orlowski, The Boston Globe, "Largest wind turbine testing facility nears opening in Charlestown", February 7, 2011
31. World Port Source, "Gloucester Harbor" available September, 2011 at http://www.worldportsource.com/ports/USA_MA_Gloucester_harbor_1800.php
32. Norris & Norris Associates, "Gloucester Harbor Innovation Center: Concept Proposal for the I4C2 Site", undated (after December, 2010).
33. Steven Rosenberg, The Boston Globe, "Reworking the port", October 2, 2011
34. World Port Source, "Port of New Bedford" available September, 2011 at http://www.worldportsource.com/ports/USA_MA_Port_of_New_Bedford_1806.php
35. Id.
36. World Port Source, "Port of Fall River", available September, 2011 at http://www.worldportsource.com/ports/USA_MA_Port_of_Fall_River_1514.php
37. New England School of Law, "Designated Port Areas A Manual for Lawyers", 2009, p. 15.
38. Id.
39. Id.
40. Id., p. 35
41. Bowles, Ian, "Decision on the City of Gloucester's Request for Approval of the Gloucester Municipal Harbor Plan Renewal and Designated Port Area Master Plan Pursuant to 301 CMR 23.00" December 11, 2009, p. 4.
42. Id., p. 18
43. Id., p. 11
44. Id., p. 10

45. Id., p. 12
46. Id.,
47. GloucesterTimes.com "Editorial: City, lawmakers must press for more I-4, C-2 flexibility" September 7, 2010 available at <http://www.gloucesterimes.com/opinion/x1208496694/Editorial-City-lawmakers>
48. New England School of Law, "Designated Port Areas A Manual for Lawyers", 2009, p. 30
49. Id.
50. Licensed Site Professional Association, "What is a LSP", available October, 2011 at <http://www.lspa.org/mc/page.do?sitePagelId-90930>
51. American Clean Skies Foundation, "Repurposing Legacy Power Plants – Lessons for the Future", August 2011, p. 27.
52. American Clean Skies Foundation, "Potomac River Green" A Concept for Redeveloping the Potomac River Generating Station Site in Alexandria, Virginia" August, 2011, p. 59.

SECTION 6

1. Salisbury, Susan, The Palm Beach Post, "FPL to replace Hollywood power plant" July 18, 2011 available December, 2011 at <http://www.palmbeachpost.com/money/fpl-to-replace-hollywood-power-plant-1621481.html>
2. <http://www.porteverglades.net>
3. <http://www.smartbrief.com/news/asce/storyDetails.jsp?issueid+3D72274A-F2AE-46CO-8..>
4. Salisbury, Susan, The Palm Beach Post, "FPL to replace Hollywood power plant" July 18, 2011 available December, 2011 at <http://www.palmbeachpost.com/money/fpl-to-replace-hollywood-power-plant-1621481.html>
5. http://www.fpl.com/environment/plant/cape_canaveral.shtml
6. Patrick Cassidy, Cape Cod Times "NStar feel the heat", September 30, 2011 at <http://www.capecodonline.com/apps/pbcs.dll/article?AID=/20110930/NEWS/109300319>.
7. Id.

SECTION 8

1. Bloomberg Businessweek, "Financial Statement for Dominion Resources Inc/VA (D)" available at <http://investing.businessweek.com/businessweek/research/stocks/financials/financials.asp>
2. Wikipedia, "Superfund" available September, 2011 at <http://en.wikipedia.org/wiki/Superfund>

3. Wikipedia, "Phase I Environmental Site Assessment" available September, 2011 at http://en.wikipedia.org/wiki/Phase_I_Environmental_Site_Assessment
4. Bloomberg Businessweek, "Financial Statement for Dominion Resources Inc/VA (D)" available at <http://investing.businessweek.com/businessweek/research/stocks/financials/financials.asp>
5. Id.
6. Occupational Safety & Health Administration, "Brownfields Health & Safety For Sites Evaluated & Remediated under Federal Brownfields Initiative for State Voluntary Clean-up Programs" available September, 2011 at http://www.osha.gov/SLTC/brownfields/brnfld_qna.html
7. Massachusetts Department of Environmental Protection, "Site Assessment and Cleanup Funding" available September 2011 at <http://www.mass.gov/dep/cleanup/bffund.htm>
8. Wikipedia, "Superfund" available September, 2011 at <http://en.wikipedia.org/wiki/Superfund>
9. Id.
10. Id.

