The RiverGreen Technology Site.

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List of Abbreviations:

LID – Low Impact Development

BMPs – Best Management Practices

LEED – Leader in Energy and Environmental Design

GE – General Electric

MBTA – Massachusetts Bay Transit Authority

AULs – Activity and Use Limitations

MassDEP –Massachusetts Department of Environmental Protection

EPA – Environmental Protection Agency

TSS – Total Suspended Solids

SEIR – Single Environmental Impact Report

NRDC – National Resource Defense Council

USGBC – United States Green Building Council

PV – Photovoltaic

CO2 – Carbon Dioxide

SHGC – Solar Heat Gain Coefficient

GHG – Green House Gas

GPD – Gallons Per Day

ESS – Environmental Consulting and Engineering Services

1. Introduction

i. Class Project

The goal of this project is to evaluate the plan for the construction of the RiverGreen Technology Park on the General Electric (GE) Site, located at 62 Tremont Street in Everett, Massachusetts. According to the Plan the Park will present a number of environmental, social and economical advantages to the local community and environment such as public access to the Malden River, businesses and local renewable energy. The Site is a Brownfield heavily polluted from years of heavy industry and a lack of any form of sustainable use. The concentration of soil pollutants, especially with its proximity to the already struggling river, makes the proper management of storm water vital for the improved health and continued use of the area. For this reason we will discuss the proposed management practices ESS is implementing as well as others that we feel may have been overlooked. Our additional focuses for this project will be promoting the use of renewable energy , controlling green house gas production, and ensuring genuine community development. We will propose Green roofs and Green walls as viable cost saving green technologies that will further minimize the park's ecological footprint and help fulfill the plans commitment to low-impact development and best management practices. . The socioeconomic aspects of the project will also play a large role in our assessment of the RiverGreen Technology Park as a whole. We will propose ways in which the ESS can contribute to the development of the community of Everett as well as neighboring cities.

ii. Project Overview

The RiverGreen Park located in Everett, MA is a riverfront site previously owned and operated by General Electric as an aircraft engine manufacturing facility. It is a 500,000 square foot Park that will offer research, development, light manufacturing and assembly as well as office space. Situated on the Malden River just 3 miles north of downtown Boston, this site will focus on building and operating in a sustainable

environmentally friendly way. The main purpose is to provide economic stimulus and growth to both the local community and Massachusetts as a whole, all while providing a public and environmental service. The project will also focus on incorporating on-site renewable energy generation and public access features on the Malden River. By restoring the Malden riverfront the public will gain access to riverbank paths and parklands enhancing the natural beauty of the area.

The Leadership in Energy and Environmental Design (LEED) -certification principles will lead the construction, building design, and operations. The ESS GROUP Inc, Sherin and Lodgen LLP, SMMA, Greenfield Partners LLC and Berkeley Investments lead this development project. The Environment Consulting and Engineering Services, the ESS Group, Inc., are the lead permitting and site engineers for the RiverGreen Technology Park. The ESS Group is made up of scientists, engineers, and specialists who focus on energy development, land and waterfront development, water resource management, ecology, and industrial permitting. Besides the RiverGreen Park, other projects they have worked on include the Cape Winds Renewable Energy Project and the Devens Recycling Center (ESS Group, 2011).[1] One of the main documents that sets the scope and scale of the redevelopment of the RiverGreen Technology Park with regards to the public access requirements is The Massachusetts Public Waterfront Act: Chapter 91.[2]

The Chapter 91 Waterways License outlines the special conditions and amenities that the Park must offer its users and the order in which they must be made available. Waterways license such as these help protect the public's interest in the use of private tidelands like the RiverGreen Technology Park. Chapter 91 was established in 1866 and is the Commonwealth's way to protect and promote the public use of its tidelands and other waterways. Chapter 91 regulates activities on tidelands and waterways to make sure that private uses serve a "proper public purpose". Private tidelands are considered the

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[1] ESS Group, Inc. Environment Consulting and Engineering Services – *From Concept to Reality*, (2011) ESS Group, Inc., www.essgroup.com

[2] See The Massachusetts Public Waterfront Act: Chapter 91 (accessed on May 9th, 2011) http://www.mass.gov/dep/water/resources/about01.htm

area between mean low and mean high tide and even though they may be privately owned the public has the rights to fish, fowl and navigate (MassDEP, Chapter 91).

A summary of the Chapter 91 Waterways License for the site follows:

"X Private Tidelands. …The licensee shall allow the public to use and to pass freely upon the area of the subject property lying between the high and low water marks, for the purposes of fishing, fowling, navigation, and the natural derivatives thereof" (Chapter 91 license provided by Nick Cohen)

Special conditions for the property under the Chapter 91 license:

1. Licensee shall construct and maintain:
    a. 10 foot-wide pathway, with seating, trash receptacles, bike racks and landscaping. Signage shall be provided at both ends of walkway indicating that is open to the public.
    b. An approximately 640 square foot seating/viewing area and gazebo with benches, trash receptacles. At least 7 benches
    c. At least 10 parking spaces, dedicated to users of on-site public open space facilities.
2. Open space facilities provided before issuance of certificate of occupancy for on-site buildings
3. Facilities authorized in special condition 1 shall be available to the public free of charge, between dawn and dusk.
4. The licensee shall place and maintain in good repair signage of adequate size and legibility.
5. At least one building situated on filled tidelands shall have a free public restroom open to the public during its business hours.
6. The licensee shall provide the Department a copy of each certificate of occupancy within 10 day of issuance.
7. All new structures authorized herein shall be constructed within 5 years of the date of issuance of this license. Period may be extended upon written request.
8. Any structural changes or alterations shall require prior review of the department.
9. The licensee shall ensure that passive recreational use by the general public of the facilities is fully and safely allowed on the site. Including but not limited to bike

riding, picnicking, walking, jogging, sun bathing, bird-watching, and informal athletic activities such as ball or disc tossing. (Citation for the Chapter 91)

iii. Project Goals

The RiverGreen project looked into a number of On-Site Renewable Energy Generation techniques. They considered Geo-thermal pumps and wind energy but decided on solar panels as the most cost effective, efficient means of creating clean renewable energy onsite. Photovoltaic cells – Solar panels will be set up on fifty percent of the rooftops. This will create enough energy to greatly reduce their carbon footprint and will be coupled with low-impact development – sustainable design principles and environmentally conscious development practices.

Parking will be provided along with public restrooms, an overlook, gazebo, benches, trash receptacles, and to help lower the carbon footprint access to Public Transportation will also be available. A shuttle will be provided for RiverGreen employees as well as the public to and from the MBTA Orange Line at Wellington Station. Green thinking in this project: Conservation of natural resources, improvements to air and water quality, reduction in solid waste and overall carbon footprint, contribution to overall quality of life and productivity of employees. Because of this forward thinking economic incentives are offered to any employers looking to open up business in the RiverGreen Technology Park site. Incentives include tax exemptions and grants. Public amenities and site clean up are scheduled to be concluded in the fourth quarter of 2012.

iv. Methodologies & Acknowledgement

This assessment and evaluation of the RiverGreen Technology Park site was conducted by consulting key documents such as the Mystic River Master Plan, Lower Mystic River Corridor Strategy as well as additional available sources.

This project was made possible with the assistance of key people such as Nick Cohen as and Anamarija Frankic. We are extremely grateful to them for making themselves available for all questions and for their guidance through out the process.

v. Finding & Recommendations

Upon assessment of the ESS Plan for the redevelopment of the GE site into the RiverGreen Technology Park, it became evident that consistent with the Chapter 91 recommendations as well as the Mystic River Master Plan, Green roofs and Green walls are key contributions that will only complement and support the low-impact development requirements. The current plan does not consider green roofs and green walls as key components of low-impact development and stormwater management.

Another finding was that the plan barely addressed community development as goal of the site's redevelopment. In the few cases where mention was made, community development was conceptualized as increased public access to the site and the creation of employment and a larger tax base for the city. We argue that in effect, this plan will fail to sponsor a community development that will target the at-risk population of Everett. We integrate considerations for community development alongside the use and implementation of green walls and green roofs as an holistic manner in which the site can become a leader in sustainable development in the community. While also addressing the crucial needs of development, stormwater management, and public access.

2. Site Assessment

The RiverGreen Technology Park is to be built on the former GE Everett site located on the banks of the Malden River. Prior to being acquired by GE in 1910 (Petho & Giacobbe; 2004) the former GE site was a 40-acre vacant Brownfield site. The U.S. STEEL CORPORATION from 1899 to 1904 and then the Steel Cutting Corporation originally owned the site until 1910. From 1910 to 1941 GE was the owner and slowly built up the site. In 1941 The Defense Plant Corporation bought the lot from GE. As preparation for construction in 1941, five feet of fill material was placed on most of the site. Between 1941 and 1948 the site changed hands a few more times, until it became under ownership of the United States Air Force from 1948 until 1984. GE remained the operating contractor the whole time and bought the property back in 1984 with an agreement to build for the Air Force for an additional five years. The main use of the site from 1941 to 1989 was the manufacturing and testing of jet engine components. Much of the waste and hazardous material during this time was stored, both above and belowground tanks, or disposed of on-site via an incinerator. After the plant shut down it

remained vacant for years until the building were demolished in 1999 after the last of the underground waste storage tanks were emptied and cleaned in 1998.

2.1. Project Site Conditions

Currently the site is considered to be on a high-yield non-potential drinking water source area and is listed by MassDEP as a disposal site. According to a Risk Characterization performed in 1998-1999, the site poses a significant risk to future residents, site workers, construction workers and children (Appendix E, p. 2). A remedial action plans prepared in 1999 included capping and prescribed Activity and Use Limitations (AULs). It essentially prohibited, amongst other things, the residential use of the site and the disturbance of soil or groundwater beneath the cap. It required also that the cap was maintained, and the installation of a vapor barrier and passive subslab venting system on all buildings unless an LSP determined that this was unnecessary in order to maintain a condition of No Significant Risk. Most of the site presented no risk for pedestrians, vendors and prospective workers, however Lot 5 poses a significant risk to human health for construction and industrial workers (ESS, 2009).

2.2. Soil Contamination

As we have mentioned before the 40-acre site in Everett is a Brownfield site, which according to the EPA are, ”real property, where the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant” (EPA, Brownfields and Land Revitalization; undated). The soil contaminants at the proposed RiverGreen Technology Park have complicated the designs for the park and will continue to make the development and construction more difficult. However, cleaning up and reinvesting in properties such as this not only takes development pressures off of undeveloped, open land, but by finally dealing with this contaminated land it both improves and protects the environment.

2.3. Community Impact

The City of Everett suffered greatly when the General Electric (GE) plant closed in 1989. GE was the largest employer in the city and provided about 1,000 jobs. The closing of the plant had a very debilitating effect on the Everett job market. As articulated by the Public Works and Economic Development Act of 1965, an area is deemed economically distressed under the actual business closure or restructuring clause[3]. It stipulates that if for areas with population up to 100,000 the actual dislocation of the jobs is 200, that area will be deemed classifiable as an economically distressed area. In the case of the closing of the GE plant, 1,000 jobs were lost for a population of 35,701 according to the Census Bureau in 1990.[4] Evidently its is highly likely that not all of those who lost their jobs were residents of Everett City, however the ratio of job loss to population firmly puts Everett city in the EDA category. Furthermore, it is safe to assume that limited public transport at the time limited commuting capacities.

Considering that lower income population directly depends on their immediate resources, the closing of the plant had a devastating impact on the local economy. Given the number of jobs that the site provided, GE was a key player in the local job market. It helped sustain the Everett's economy and well being of the local population. The closing of the plant helped accelerate the urban decline of the area. Everett's per capita income level, as well as the amount of job loss since 1990, firmly sets it in the Economically distressed area category.

The City of Everett shows significantly lower rates of per capita income and median household income when compared to the state of Massachusetts, as of 2011. The city's income per capita is respectively, $ 19, 845 for the city as opposed to $ 25, 952 for

[3]For more information See *FHWA Supplemental Guidance on the Determination of Economically Distressed Areas Under the Recovery Act* (August, 2009) http://www.fhwa.dot.gov/economicrecovery/guidancedistressed.htm.

[4] See the Fact Finder for Everett City in Massachusetts. US Census Bureau (Accessed on May 9th 2011) http://factfinder.census.gov.

the state as a whole[5]. Even more telling of the socio-economic realities of the city is the percentage of its families living in the poverty level. 9.2 percent of families live below the poverty level as opposed to 6.7 percent of families in Massachusetts. Furthermore the percentage of its low-income population (here comprised of blacks and Latinos) is also many percentage points above the state's average. Respectively, 17 percent of its population is Black or African American and Hispanic or Latino as opposed to 13.1 percent for the state as a whole. In light of this data the city of Everett is evidently primarily a low-income community with a significant minority population. Therefore it is all the more crucial that the redevelopment of the site is conducted according to the socio-economic realities of the City. The plan ought to be consistent with viable ways of operating that contribute to the sustainable development of Everett and improve the conditions of the low-income population. Before we can address this dimension of the project we will proceed to an assessment of the current plan's scale and scope. We will subsequently present the different means to improve it and ensure that it is in line with Chapter 91,the Lower Mystic River Corridor Strategies, the Mystic River Master Plan, as well as the recommendations of stakeholders.

3. Project Assessment

3.1. Stormwater Management:

According to the ESS Group, Inc. in the Single Environmental Impact Report it estimated that the site will contain 19.6 acres of impervious area; 8.7 acres will be from the buildings themselves with the remaining 10.9 acres made up of pavement for parking lots etc. The stormwater BMPs that have been selected were done so in order to remove greater than 80 percent of TSS contained in runoff generated from impervious surfaces. This rate of removal "will be accomplished through the use of pavement sweeping, deep sump modified catch basins, grassed channels, subsurface gravel wetlands, bioretention areas, detention basins, wet basins, and underground detention chambers"(ESS, 2009). They are committed to Low Impact Development (LID). According to the EPA, (LID) is

[5] Everett Demographics (2011). (Accessed on May 9th , 2011) http://everett.massachusettssp.cit.myareaguide.com/demographics.html.

development that works with nature to manage stormwater by preserving or recreating natural landscape features and minimizing the overall amount of impervious ground cover to allow for adequate drainage of stormwater. Unfortunately due to the contamination of the project site's soils, discussed in the site history and current conditions part of our project, the Best Management Practices that will be implemented on-site will have to be lined and focused on keeping large amounts of water from reaching under the soil cap. This is necessary in order to prevent stormwater runoff from infiltrating the ground and mobilizing the contaminants and thus washing them into the Malden River. Areas not paved will most likely require an additional three feet of clean fill. The soil contaminants rule out the use of pervious pavements on the site.

As stated above, 8.7 acres of the newly added impervious area will be due to the construction of buildings and their accompanying rooftops. Their proposed way of dealing with the high volume of stormwater that the roofs will invariably collect is to capture runoff from the roof of each building, five buildings in total, using roof drains. The storm water will then be sent to underground lined detention systems for storage before being discharged into the Malden River.

The main Best Management Practices (BMPs) they will be relying on are as follows: Structural Pretreatment BMPs, which are the first BMPs in a treatment series or train. Their main focus is to remove the coarse sediments that can clog other BMPs, which make maintenance critical for pretreatment BMPs as they receive stormwater with the most suspended solids. One example of a pretreatment BMP that they plan on using is deep sump catch basins, which, according to the Massachusetts Stormwater Handbook, are underground retention systems helpful in removing about 25percent of TSS. Acts as pretreatment to runoff before it is delivered to other BMPs. This along with lined vegetated filter strips should greatly reduce the amount of TSS as well as slow runoff while preventing infiltration due to impervious liners. The vegetated filters will also act as pretreatment for the next type of BMPs, for bioretention areas.

Bioretention areas fall into the category of Filtration BMPs, which use different media to filter runoff. Generally they are areas sandy soil topped with a thick layer of mulch with dense vegetation planted over it. The bioretention areas used by the RiverGreen Park would have to be lined to prevent infiltration into the groundwater;

however they would still act as a natural filtration system. An underliner would be used to collect the water before it reached the contaminated soil and discharge it to either the Malden River or one of the detention basins that will be built on-site. Bioretention cells can also act as windbreaks, natural habitats to wildlife, reduce the urban heat island effect and improve the appearance of an urban setting. They also plan on using Gravel wetlands which when used along with sediment forebays can act as an effective filter. According to the University of New Hampshire, a gravel wetland "approximates the look and function of a natural wetland, effectively removing sediments and other pollutants commonly found in runoff, while enhancing the visual appeal of the landscape and adding buffers or greens cape to urban areas".

Stormwater treatment basins, both wet and dry will allow the park to control the quantity and quality of stormwater. They will also allow them to hold water to be released slowly in times of high flow. Having a lined detention basin also allows any other TSS to settle to the bottom before the cleaner water is slowly released from the top of the basin. Wet Basins use a permanent pool of water as their mechanism to treat stormwater in a similar way that the dry detention basin does through settling. MassDEP requires a sediment forebay as pretreatment to a wet basin. It works by having the incoming stormwater displace water already in the pool through an outlet pipe. A bottom drainpipe is also installed to allow adjustment to the detention time. As the water is retained the sediments settle. A vegetated body around the wet basin is essential for controlling erosion and removing additional sediment. The wet basin can also act as wildlife habitat and add to the aesthetic quality of the area.

The RiverGreen architectural plan is made of separate lots; each building belongs to its own lot and has its own stormwater management system tied into it. According to the ESS Group, Inc. this will allow drainage systems to be constructed along with their corresponding lot. They plan on building the Park in phases and having adequate drainage for each individual part of the build will be as important as the process of constructing the buildings themselves.

The MassDEP Stormwater Management Policy states that 80percent of TSSs must be removed. Using the BMP methods mentioned above they plan to meet that standard as well as collect and treat the stormwater that flows towards the Malden River.

Actively using street cleaning as a pretreatment BMP will greatly help reduce the TSS that move through the other BMPs in the system. Other stormwater treatment practices function whenever it rains; however street sweeping will only be effective at removing dirt and trash when streets and parking lots are actually swept. Otherwise the dirt that accumulates on roads and parking lots will run off when it rains. The average interval between precipitation events in Massachusetts is approximately 3 days. Therefore, to reach the highest effectiveness for street dirt removal would require sweeping at least once every three days (Massachusetts Stormwater Handbook, Chapter 1). This may turn out to be cost ineffective, however the fact remains that if street cleaning is to be effective it must be done on a regular basis.

3.2. Sustainable Energy & Greening

The development plan for the site is five buildings with approximately 500,000 square feet of building space. Each of the five buildings will support a photovoltaic (PV) array covering 50 percent of the roof area. The rooftop solar panels will generate on-site renewable electricity reducing the amount of electricity drawn from the city's main power grid, while simultaneously reducing the Park's carbon footprint. Based on calculations provided by ESS Group, Inc., the estimated annual PV energy production will be 2,225 MWh/yr, or 46 percent of the estimated annual energy use. The electricity generated by the PV array would offset 1,121 tons of CO2 per year, a reduction of about 41 percent from the estimated 2,721 tons of CO2 per year to 1,600 tons of CO2 per year. (SEIR).

This is an impressive feat and a fairly expensive undertaking. The initial set up for solar panels is expensive, however it is estimated that within eight years they will have paid for themselves by reducing ones need to draw from the main power grid. As impressive as the projects use of solar panels is, we feel that certain green techniques are being overlooked. Green roofing and green-walls for example would greatly help moderate building temperatures, aid in storm-water retention and management, all while adding to the aesthetics of a potentially beautiful Technology park. Instead of seriously considering this approach they have proposed using high albedo roofing materials to reduce the heat island effect and required cooling loads. They also plan to use different

types of windows to reach desired performance for heating and cooling the interior of buildings (SEIR). Green buildings would solve both of these problems.

Cities experience the heat island effect due to buildings absorbing so much of the sun's energy and retaining it. This concentration of heat can significantly raise the surrounding temperature and affect the air quality. Foreseeing this issue the developers have decided to use high albedo surfaces for the buildings. High albedo or very reflective coatings lower the absorption of solar energy, reduce surface temperatures, and decrease heat transfer into the building. However, high albedo surfaces are no help for moderating temperatures in the winter and do much less for overall air quality as they do not help filter the air or remove CO2 as a living green-roof would. Not to mention that the High-albedo roof coatings degrade significantly during the first year and more so after around the tenth year when microbial growth begins. For this reason washing or repainting is vital to its continued effectiveness (Kravitz, R).

Window performance is another factor taken into account when working to design an environmentally friendly building. One factor in window performance is the Solar Heat Gain Coefficient (SHGC). The SHGC is a measure of the fraction of solar energy that hits the window that is transmitted into the interior of the building. More or less solar radiation would be allowed to enter the building to get the desired heating or cooling effect. Again this is useful for helping to reduce heating and cooling costs; however green-walls would provide the required shade while protecting against winds, thus helping moderate temperatures even more (Green Roofs for Healthy Cities). The combined use of performance windows and green-walls could be an even more effective combination.

3.2.1. LEED Certification

The ESS Group, Inc. proposes that the construction of the RiverGreen Technology Park will be LEED-Certified. According to the NRDC, "LEED certification is the recognized standard for measuring building sustainability". Buildings that achieve LEED certified or higher are recognized as being green in design and construction. They aim to reduce the negative environmental impacts that buildings automatically incur as well as improving the health and well being of the people occupying them (NRDC).

LEED uses a whole-building approach to sustainability and judges buildings in a few essential areas, such as: Site selection, efficient use of water, efficient and clean energy use, sustainable use and reuse of materials, location in reference to infrastructure, transportation and open space, buildings are also awarded for innovation (U.S. Green Building Council). Building sustainably and getting LEED Certified shows the company's commitment to going green and protecting the environment. It also demonstrates their desire to become a role model for the community. We encourage these types of responsible building ideals, however as we will discuss later we feel that more can be done to improve the building design and decrease water and energy needs on-site.

3.3. Community Development

As it stands , the site plan, according to the ESS Group is conceived around community development and is consistent with the Mystic River Master Plan requirements as well as those of the Lower Mystic River Strategy [6]. According to this document, the development would position the 215 acres for industrial land into a "modern, productive, employment-generation, tax-producing, and technologically sophisticated housing and office park." (ESS, 2009: 22.) By doing so it is expected that this will provide educational opportunities, recreational space and public access to the site as well as the banks of the Malden River.

The Master Plan listed 10 objectives that the ESS reports as compatible with their redevelopment plans. In Table 3.1 titled MVDC Master Plan Objectives. (ESS, 2009: 25). Out of the 10 objectives, 8 pertain directly to the community development aspect imbedded into the redevelopment of the former GE site. The objectives of the Mystic River Master plan are briefly spelled as follows (for a complete list of the objectives see the Mystic River Master Plan):

1. Provide for development of high tech R&D and Manufacturing activities
2. Establish a regional center for high tech education

[6] ESS Group, *RiverGreen Technology Park Airforce* Road, Everett Massachusetts (December 31, 2009)

3. Create new economic activities and housing opportunities in the Tri-City area
4. Rehabilitate the Malden River
5. Provide for needed public open space and recreation
6. Link the Project area with its host communities
7. Encourage alternative transportation modes to minimize the traffic impact to the area
8. Seek, and be part of, collaborative solutions

The ESS's descriptions of the ways in which the plan is consistent with the corresponding objectives are spelled as such:

1. The Project will position the City for new regional investment in high technology through the provision of a new, multi-use center accessible to the communities of Everett, Malden and Medford, with easy access, through the use of public transportation, to the City of Boston

2. The Project, synergizing the achievements in this area developed through River's Edge Phase 1, will provide a location for private companies engaged in research and development, will incorporate renewable energy technology, and will compliment the existing partnership between Tufts University and river's Edge Phase I development.

3. The Project, synergizing the development of approximately 220 luxury, market rate and affordable housing unites by River's Edge Phase 1, will lead to creation for new jobs and expansion of the tax base within the City, primarily associated with research and development and light manufacturing. This development base will compliment the new opportunities for housing and retain expansion being implemented by River's Edge Phase1.

4. The Project will facilitate the rehabilitation of the Malden River through coordination with e USAGE recreation activities, provision of sustainable riverfront development, management of invasive species within the Scenic

Overlook area f the Malden River waterfront, management of stormwater quantity and quality discharging to the Malden River, and activation for the Malden River waterfront for public passive recreational use and enjoyment

5. Open space within the City is significantly lacking and providing greater open space opportunities is a critical planning goal for Everett. The Project will provide Rivcrwalk, a new, public multi-use trail connecting the existing City Park to the Riverfront, which will be conveyed, through the grant of a conservation Restriction, to the City, as well as the regional goal of opening up the Malden River Waterfront

6. The Project will create economic development, infrastructure, and social links within the Project within the City and the adjoining communities of Malden and Medford through provision of a shuttle bus open to the public from the Project to the Wellington MBTA Station, and the linkage of the City Park with the Malden River waterfront.

7. The Project will actively promote traffic demand management actions, including the provision of a public shuttle bus from the Project to the Wellington MBTA station, phased development of a public, multi-purpose trail, and committed support to the Bike-to-the-Sea Program.

8. The Project will continue to engage and participate in regional planning efforts to enhance the regional traffic network and will provide amenities, as described above, to encourage he use of public transportation as well as pedestrian and bicycle activities and access.

In analyzing the objectives of the Mystic River Master Plan as well as the ways in which the ESS plans to address them, it becomes evident that the RiverGreen Technology Park will provide a number of services to the community. In essence the Plan is articulated as providing a “multi-use center accessible to the communities of Everett,

Malden and Medford, with easy access to the city of Boston", a location for R&D, it will also incorporate renewable energy technology, luxury and market rate affordable housing. It will provide jobs and light-manufacturing; rehabilitation of the riverfront through management of the stormwater quantity and quality discharge as well as the activation of the waterfront for public passive recreational use; greater linkages between the park and the neighboring cities through increased public transportation, regional traffic as well as pedestrian and bicycle activities and access to the Malden River.

In a nutshell the ESS objectives in light of the Mystic River Master Plan goals summarized above, focus primarily on providing public access to the Park and the riverfront, increasing means of public transportation, utilizing renewable energy technology and the rehabilitation of the site. While these goals are compatible to the low-impact development requirement, and the goals of public access of the Mystic River Master Plan we will demonstrate later that they barely address community development and especially of the low-income population.

Other than the public access to the Park and the riverfront, there are very little proactive schemes established to help foster connectivity between the Park, the riverfront and the low-income minority population of the Tri-City area. It is also very likely that the limited number of jobs provided by the Park won't serve the low-income population because of a very possible case of mismatch between the skill-level of the labor pool and the type of jobs that the RiverGreen Technology Park will provide. Furthermore, we will also argue that the increased access of the Park to the neighboring communities and the city of Boston will only increase competition for the limited number of jobs. There is in essence no guarantee that these jobs will directly service the communities of Everett, Malden and Medford.

As stated above, in addition to the Mystic River Master Plan, the Environmental Impact Report (ESS, 2009: 26) stipulates that the RiverGreen Technology Park Plan is also consistent with three of the Lower Mystic River Corridor Strategy. The Lower Mystic River Corridor Strategy project (LMRCS) was established through the work of the Metropolitan Area Planning Council, the City of Boston through the Boston Redevelopment Authority, the cities of Chelsea, Everett, Malden, Medford and Somerville. The LMRCS brings forth six strategies that will contribute to ensure that it

realizes the full potential of the Lower mystic River. (BRA, 2009: 3; ESS, 2009: 26)

The LMRCS six strategies stipulate that all plans must: 1) Acquire, Protect, Enhance and Link Regionally Significant Open Space Parcels: 2) Enhance and Encourage Sustainable Development and Redevelopment with the Corridor, 3) Improve Access to and along the River through the Development of Water Transportation, Public Transit, Roadway Improvements and Bicycle and Development of Water Transportation, Public Transit, Roadway Improvements, and Bicycle and Pedestrian Accommodations, 4) Work with Regional Partners to Influence Policy and Ensure that Agencies and Organizations have Sufficient Resources to Effect Change on the Mystic River. (ESS, 2009: 26). Out of these six strategies, the ESS plan is said to be consistent with strategies 1, 2 and 3. The two that pertain directly to our concern around community development and also aligns with the already established objectives of the Mystic River Master Plan are strategies 2 and 3[7].

Strategy 2 titled Sustainable Development and Redevelopment states the ways in which the Project is fully consistent with its development principles. The clauses that pertain directly to the community development aspect and that are addressed in strategy 2 are:

1. Preserve and create open space and public access with an emphasis on continuous public access along the river. As described above, the Project has committed to develop the Scenic Overlook and Riverwalk, lining the waterfront to the City Park, and providing parking amenities and access to the Northern Strand Trail.

2. Provide transportation alternatives including pedestrian, bicycle, transit, water and intermodal options…. The project has committed to the creation of a new pedestrian trail, Riverwalk, has committed to providing significant financial support to Bike-to-the-Sea, and has committed to the development of a shuttle

[7] Boston Redevelopment Authority (BRA). The Lower Mystic river Corridor Strategy: Working Together to Achieve the Full Potential of the Lower Mystic. (June 2009)

bus, open to the public as well as to RiverGreen tenants in order to facilitate the use of the MBTA Orange Line by providing a free shuttle service between the project and Wellington Station[8].

Strategy 3, titled Transportation and Access, is the second identified strategy pertaining more directly to community development that the plan is identified as being consistent with. According to this strategy, as mentioned in strategy 2 , the plan takes on a 'multi-modal transportation approach' (ESS, 2009: 27) that will increase pedestrian, bicycle and shuttle access to the Wellington MBTA station (ESS, 2009: 27).

The ways in which the plan addresses the Mystic River Master Plan and the Lower Mystic River Corridor Strategies only touch on one aspect of community development. Undeniably the redevelopment of the former GE site will foster social links within the adjoining communities of Malden Medford and Everett; the new Park will generate new investments, and a larger tax base for the community. Furthermore, the focus on access and transportation is all the more key considering that those who are considered low-income depend heavily on their immediate resources and increased ease of public transportation will most definitely facilitate commuting and prove to be a great benefit to the community.

Overall the plan has many benefits however some of these benefits will also come at a cost. As an example, as briefly mentioned before, the increase in access within the neighboring cities and the City of Boston, it is likely that jobs offered may go to whomever can commute to the Park and not necessarily to members of the community. Furthermore, the types of jobs will very likely be high skilled and not match perfectly with the skill level of the low-income population. Moreover, there is little mention of community ownership and interaction other then passive recreational use. Consequently, there is a very real risk hat exist where the local communities and especially the low-income population end up experiencing very little of this growth and development. As stipulated in the ESS assessment report, they've addressed the aspect of the strategies that

[8] For a complete description of the Strategies and how the plan will address them view the Single Environmental Impact Report, ESS, 2009: p 26-27.

are compatible with private development. (ESS, 2009: 26).

It is no surprise that private developers have not historically been the best agents to foster sustainable inclusive community development. However in recent years, much of the literature around sustainable development have identified organizations and corporations as partners in fostering development. It is a holistic approach that holds the private sector accountable in the development process. Therefore, private developers or not, this is not an excuse for mediated efforts to sustain community holistic development. While we acknowledge that there is so much that can be done, due to time, permit, funding, project goals and site conditions constraints, within the current plan of the RiverGreen Technology Park we've identified ways in which the Park can become a truly key element in low-income and minority youth of the Everett and neighboring communities.

We will also acknowledge that it is very possible that part of the problem may lay with problem and project definition as well. As an example according to the SEIR "The primary goal established for River's Edge by the Mystic Valley Development Commission (MVDC) 2005 Master Plan was the conversion of 215 acres of underutilized industrial land with a significant contamination history into a modern, productive, employment–generating, tax-producing, and technologically sophisticated housing and office park". In this statement of the primary goal, the term employment could be seen as an attempt to evoque and address the role for the Park in fostering community integration and economic development, however for the reasons mentioned previously, unless such a clause is enforced and refine to ensure that it clearly and unambiguously encompasses urban revival and provides jobs for the skills of this labor force, it is vague and makes little promises. The environmental justice aspect of these projects ought to be emphasized if it is recognized that environmental and human well-being are complimentary goals rather than competing ones. They go hand and hand.

Having discussed the Site conditions as well as the plans goals, scope, scale background and limitations. We will offer a series of recommendations that will only magnify the ways in which the redevelopment of the Technology Park will contribute to comprehensive community development and ownership.

4. Findings & Recommendations

4.1. Green roofs & Green walls

While current plans are sound and are consistent with sustainable, low-impact and environmentally conscious development practices, the use of Green roofs and Green walls will only maximize their effects, contribute to further reducing the ecological footprint of the park by curbing GHG emissions and contributing to heat retention, while enhancing the aesthetic aspect of the park. The presence of Green roofs and walls can provide a potential opportunity for youth education on sustainability and green initiatives as well as community ownership. Incorporating water saving techniques, such as low flow toilets, reusing gray water and collecting rain water along with energy saving techniques such as energy efficient light bulbs and daylight/motion sensors for turning off lights will go far in improving the sustainability of the site.

A green roof refers to a vegetated rooftop. Green roofs are known to be effective best management practices (BMPs) to mitigate urbanization effects on water quality. They contribute to greater storm water retention filtration, temporal delay of runoff as well as reduction in runoff volume. Furthermore, amongst various other benefits that green roofs provide, they also provide community cost saving opportunities such as the decreased cost of meeting greenhouse gas reductions by reducing the "Urban Heat Island Effect" and the need for interior building insulation. They contribute to improvement of air quality, reduce surface temperatures and decrease heat transfers into the buildings. Storm water is one of the major sources of pollution of the Mystic river consequently Green roofs can play a key role in mitigating storm water pollution. Other green technologies such as green walls can further improve the park's commitment to pollution mitigation and best management practices. (Green Roofs).

Similarly to green roofs they help reduce Urban Heat Island Effect. Green walls contribute to the cooling of buildings and the surrounding areas through shading, reducing reflected heat and evapotranspiration, and help protect from the wind. They contribute to improve exterior and interior air quality, energy efficiency, building structure protection and noise reduction. Through Photosynthesis, Green walls and Green roofs improve air quality. As mentioned above, as opposed to the use of albedo coating

for temperature and heat regulation, Green roofs and walls provide the added benefits of improving overall air quality and curbing the park's carbon footprint year round. (Green Roofs for Healthy Cities;).

4.1.1. Case Study: The Solaire

The Solaire is a 27-story residential tower in New York City. It is located on the Hudson River in lower Manhattan and contains 293 residential units. This Green building, which I will discuss in depth, was awarded a LEED Gold certification as well as other green project awards. It offers convenient access to public transportation, on-demand hybrid rental cars, bicycle parking and even places to charge electric cars. Recycling its wastewater has cut the buildings water demand and its energy saving techniques, which resulted in a 35 percent decrease in demand while simultaneously using solar energy to produce 5 percent of energy needs. Almost all of the waste made to construct the building was recycled and about 60 percent of the materials used to make the building were made from recycled materials. They were able to achieve the Gold standard for LEED certification and we feel that they are an excellent example of what green buildings of the future should look like. We propose that the RiverGreen Technology Park should adopt a majority of these low impact design and sustainability principals and modify them to fit their goals.

One of the main draws is the Solaires's use of green roofs and solar panels. They planted 75 percent of their open roofs with drought tolerant, self-sustaining shrubs. They also used bamboo and other vegetations all able to grow in shallow soil depths. This along with a water retention layer reduces the amount and speed of the stormwater. They then collect the stormwater in storage tanks in there basement and use them to irrigate their landscaping and in use of their cooling tower. The Solaire uses this technique along with low-flow toilets, fixtures and an on-site blackwater treatment system that recycles 100 percent of the buildings wastewater. We do feel however that an on-site blackwater treatment plant would most likely not be cost effective for the type of development we are proposing at the RiverGreen Site. However we would especially love for the RiverGreen Park to adopt the mentality of green roofs and recycled water usage.

The Solaire and the RiverGreen Technology Park actually share a lot of the same ideas as far Energy saving ideas go. However the Solaire as a single complex solely for residential use has some high-tech energy efficient design principles that we would the RiverGreen Project to fully get behind. The Solaire building optimizes daylighting with large windows and high ceilings to reduce the need for lighting during the day. Lamps and lights dim and shut off automatically and the cooling equipment is sized appropriately for the building and as energy efficient as possible.

The RiverGreen Park is a multi-use light industry park and will not be able to emulate the Solaire project completely and we are not arguing that it should. The renewable energy plan for the RiverGreen Site as we previously mentioned contains plans for 50 percent of the rooftops to contain solar panels. This would greatly reduce the available area for plant growth; however the Solaire project is a great example of how effective they can be in tandem. The RiverGreen Site has other fail-safes set up to deal with stormwater and could use the green roofs as an added measure and example to community while still producing energy to offset their carbon footprint.

4.1.2 LEED Certification

As we mentioned before, the ESS Group, Inc. states that they will gain LEED Certification. We also discussed how their commitment to responsible building is commendable, however we feel that LEED Certified is good but LEED Silver or Gold should be the goal. LEED judges buildings on and gives points according to: Site selection, efficient use of water, efficient and clean energy use, sustainable use and reuse of materials, location in reference to infrastructure, transportation and open space, buildings are also awarded for innovation

LEED is out of 100 base points:

- Certified – 40-49
- Silver – 50-59
- Gold -60-79
- Platinum- 80+

The RiverGreen Technology Park is aiming to get the lowest LEED certification that is possible. Doing just enough will be little done is very little in comparison to the harm done to the community and the justice in seeing it corrected. When GE left the site they did the least amount of remediation they could get away with. We propose that the RiverGreen site goes above attempts to acquire a silver or gold LEED certificate.

Site Selection:

As a Brownfield the site matches well with LEED ideals of avoiding development on previously undeveloped land. The projects focus on stormwater runoff as well as steps to deal with the heat island effect are also well in line with LEED ideas about site selection (USGBC). In this aspect we feel that the RiverGreen is doing the right thing in trying to improve the highly polluted contaminated land that is the former GE site in Everett.

Efficient use of water:

However when we begin to discuss efficient uses of water we start to see that they fail to mention explicitly how they will work to reduce water consumption and if they intend to recycle water at all. They do mention that they will work with each tenant to ensure water efficient measures are taken. They aim to "use low or ultra low water-efficient plumbing fixtures and integrate other water-saving devices into the buildings" (SEIR). We are fully behind this, but more regulation for the tenants would be nice and "other water-saving" techniques is a little vague. Despite the proposed water saving techniques they state that they expect the "generation and discharge of approximately 37,500 Gallons per Day (GPD) of wastewater for discharge to the City sewer system" (SEIR).

A few of the sustainable best management practices that we feel they should incorporate are as follows: Cisterns, Water Treatment and Recycling Systems and combining roof gardens with cistern stormwater retention. These techniques are all ways to collect and reuse water and reduce the amount of water they discharge. Sophisticated water recycling systems can capture gray water collected from showers, sinks, and rainwater. Then once the water has been disinfected and filtered it can then be used for irrigation and flushing toilets. This can greatly reduce ones water consumption.

Efficient and clean energy use:

We have already discussed many of the techniques they plan on using to be efficient and clean in terms of energy use and creation (Refer to section labeled RiverGreen Technology Park Renewable Energy Plan). They have proposed a few changes from their baseline model to better follow the LEED 2009 minimum energy performance standard such as high-efficiency lighting fixtures and motion sensors to automatically turn off lights when they are not needed. They claim this could reduce their site lighting energy demand by approximately 20percent (SEIR).

Sustainable use and reuse of materials:

The EPA has made a list of materials that are available recycled, including: asphalt and concrete; shingles; gypsum wallboard; steel; wood; plastic; carpet; paint; and ceiling tiles. The ESS Group, Inc. plans to work with the Project architect to use recycled materials in the construction whenever possible. They also plan to reach out to its tenants to educate them on the benefits of recycling and even plan to "design and implement a Tenant Manual that contains guidelines to encourage and/or require future project tenants to adopt appropriate sustainable design and GHG reduction measures as part of respective lease agreements" (SEIR). We like the idea of a tenant manual and hope that it will be a requirement and not just a suggestion. Having the manual available to the public will not only is a great educational asset to the community, but it will double as an advertisement for the commitment the Park has to the park and community.

Transportation and open space:

As laid out earlier in the Chapter 91 Waterways license a significant amount of open space is required to be set aside and maintained for public use. On exciting thing about the proposed site is that The RiverGreen Technology Park has committed to providing Bike-to-the-Sea $10,000 in order to help them get more federal funding. Bike-to-the-Sea is a non-profit organization that has been working for years to get a connected bike trail from Everett to Lynn. Once completed, the trail could be connected through River walk to waterfront access at the RiverGreen Technology Park. Existing bicycle and pedestrian trails in the Project area are largely disconnected. The interconnection of major bicycle and trail networks is also a part of the Lower Mystic River Corridor Strategy (SEIR).). Bike parking will also be available on the site. These alternative methods of transportation will help reduce the traffic and reliance on automobiles for

both employees and visitors of the Park.

4.2. Community & Youth Development Program

4.2.1. Environmental Awareness & Ownership Youth Program

"Redevelopment is also sustainable development …redevelopment is first and foremost about building better communities… A successful and sustainable redevelopment project must incorporate attributes that go beyond materials, technologies and water and energy conservation measures, it must foster a true sense of community." (Henegar, 2008). In her article Lilian Henegar touches on key aspects of community development that are imbedded assumptions in Brownfield site development efforts. As an environmentally distressed area, Everett is in dire need of community-oriented development. Furthermore, redevelopment ought to sponsor connectivity.(Henegar, 2008) It is not sufficient to use low-impact development principles in the redevelopment of the site. Community vitality must fit within the goals of the project. In addition to this aspect of community development, the literature also supports pedagogical benefits to youth environmental education as a key aspect of sustainable environmental awareness and engagement.

Therefore, we will bring forth an Environmental Awareness & Ownership Youth Program as a viable means to help foster community ownership, environmental awareness and increase connectivity between the Park and the local community. As argued before, green walls and especially green roofs have a key role to play in sustainability, stormwater runoff and community development. Low-income and minority youth living in urban environment have very limited access to nature (Green & Castleberry, undated). Therefore initiatives such as Green roofs provide much needed opportunities for youth interaction with nature and will effectively help provide incentives for positive attitude towards the environment. Many in the field of environmental education have supported the notion that not only increased interaction between youth and nature has a positive impact on their behaviors, it is all the more crucial for minority and urban youth to have such interaction with their immediate environment (Tidball & Krasny, 2010; Green & Castleberry, undated).

According to Tidball & Krasny (2010), Frank et al. provides "pedagogical support for environmental education in cities, claiming that programs in which youth are taken outside their urban surroundings may communicate that cities are unnatural, are separated from the otherwise integrated functioning of the planet, and offer nothing to tech or learn about" (Tidball & Krasny, 2010: 2). In light of this relationship between youth ownership of their communities and being subjected to environmental education within their community, the RiverGreen Technology Park provides a unique opportunity for youth of the community to engage with nature within their own communities. A key component of community sustainability is inherently community ownership. Local residents entertain direct and continuous relationship with their environment, they are thus the best equipped to ensure its sustainability and frankly they have the most as stake.

The term "civic ecology" coined at the Cornell University supports such views (as cite in Tidball & Krasny 2010; Tidball & Krasny 2007; Krasny & Tidball 2009). It considers 'urban areas' as 'linked social-ecological systems' and they present the youth with unique opportunities to experience community engagement, small-scale land use management, and even more importantly it highlights for them the ways in which they can impact their environment and protect it. The underlying principle of civic ecology is one that views human as 'nested within' their environments and can effectively able to 'take action' to 'improve' their communities and local ecosystems. (Tidball & Krasny, 2010: 5).

In an experiment conducted by Larson et al, undated, on *The Impact of a Summer Education Program on The Environmental Attitudes and Awareness of Minority Children*, it was shown that white children were more aware of the environment than were African American or Hispanic children. (Larson et al., undated: 4) Similarly 'environmental content knowledge' was 'higher for white children than African American or Hispanic Children" (Larson et al., undated: 4). Moreover, while their results showed that environmental education had a positive impact on environmental attitudes for all children regardless of race, when controlled for age the results where event more statistically significant for older children. However interestingly, African American children displayed higher levels of eco-awareness than they did before. After the

exposure the difference between white children score on content knowledge became less pronounced (Larson et al., undated: 5).

Overall their results showed that eco-affinity tends to decrease for children beyond the age of 10. The researchers believed this to be due to decreased emphasis on outdoor science and contact with nature. Furthermore, given the significantly lower score of Hispanic and African-American children on wildlife knowledge and attitude, "reduced access to safe, nature-based activities and limited opportunities for positive outdoor experience may constrain the development of eco-awareness in minority children from low socio-economic status families (as cited in Larson ., undated: 6; Bullard, 2006).

While the authors concede that more research is needed to confirm their result and assessment methods, as well as to investigate the long-term impacts of environmental education for children of all backgrounds, the research showed that across the board children awareness and behaviors towards nature improved with the exposure through the summer program. It is very possible that if such results are consistent, such programs can strengthen youth environmental awareness, community ownership. These are the two foundations for incentives to preserve ecosystems and the environment.

In light of this evidence, the proposal for an environmental awareness & ownership youth program is sound and suitable for the local community of Everett as well as surrounding cities. There are a number of elementary schools in the vicinity of the Park. Two of such schools, are in the Everett public school systems: the Madeline English School and Albert N. Palin School[9]. Youth in these schools especially the elementary children would greatly benefit from either an after-school or summer program where youth would be introduced to gardening on the green roofs of the five buildings of the RiverGreen Technology Parks. Considering the limited ways in which the private developers has engaged in a comprehensive sponsorship of local community development such a proposal has the added benefit of placing the Park at the heart of sustainable development efforts within the local community while remaining with in possible scope and scale of operations. It is all the more crucial that the ESS plans of

[9] For more information about the Everett Public School system see their website; http://www.everett.k12.ma.us/

redevelopment of the GE site facilitate the interaction between the local residents and the park , it helps develop ownership of the site. (Mystic River Master Plan, 2009: 155)

In addition to the cost-effectiveness dimension of it, the implied principles, goals, and scope of such a program would align perfectly with the Mystic River Master Plan Objectives as well as those of the Lower Mystic River Corridor Strategy of development, community engagement, public access, natural scenic aesthetics, outreach to the community, recreation area and increase awareness about environmental and ecosystem protections and rehabilitation. Such efforts are continuously being considered by the Environmental Protection Agency (EPA) in Massachusetts, the Brownfields sustainability pilot projects such as the Jackson Square Development Project that the EPA is evaluating by providing assistance to Urban Edge, a nonprofit a non-profit community development corporation, for green roof options for the Jackson Square redevelopment project in Roxbury, Massachusetts.[10]

5. Project Limitations,

As we've mentioned briefly, some of the shortcomings of the project's plan identified above are not entirely due to vision. Constraints such as funding, permits, accessibility, time-constraints, and problem-definition are but a few that shapes the scope and scale of projects in general. In the specific case of this Park the fact that it isn't suitable for residential living is a plausible reason why the focus isn't so much on residents and their connectivity and ownership of the Park as an integral part of the community, but on the private sector development aspect of it. There are not mutually exclusive or necessarily competing but these goals don't necessarily align either.

Our own assessment limitation in terms of the project assessment has also been time. Also, this project is an already established project. Therefore, it severely and realistically limits the type, scope and breath of recommendations that can be made in order to enhance its role as a community development opportunity for the Tri-City area. We have

[10] See the full Jackson Square technical assistance report at: http://www.epa.gov/brownfields/sustain_plts/factsheets/roxbury.pdf

also found that in terms of waterfront rehabilitation and sediment remediation are areas that the ESS plan barely focuses on. Ensuring that this dimension of the redevelopment is addressed and consistent with Chapter 91 requirements is also crucial as the project unfolds itself. We also acknowledge that the use of green walls and green roofs may increase the cost of the project, however they are a well worth investment as have proved the many initiatives nationally that take advantage of such green technology and even possibly locally, the Jackson Square Redevelopment Project in Roxbury Massachusetts, that we referenced above. There are also technicalities that ought to be addressed in terms of security and funding for the environmental awareness & ownership youth program, however considering the benefits of such programs and the way sin which they are becoming popular it is not unrealistic to envisage it as a possibility and pursue this avenue as a means to further community development, environmental engagement and guaranteeing access and integration of the Park within the community. [11]

6. Conclusion

The plan of the RiverGreen Technology Park will undeniably have a positive impact on the community. As a Brownfield the site represent a significant health hazard in the Everett and neighboring communities. Its redevelopment has a unique opportunity to revitalize the community and curtail somewhat its urban decline. We've also proposed green roofs, green walls, as well as an environmental awareness & ownership youth program as key means to address key considerations for the site, such as low-impact development, stormwater management and runoff, the preservation of energy and the reduction of its footprint in carbon dioxide, the aesthetics, its public access requirements, community and youth integration and development; and all in a cost-effective holistic and sustainable way.

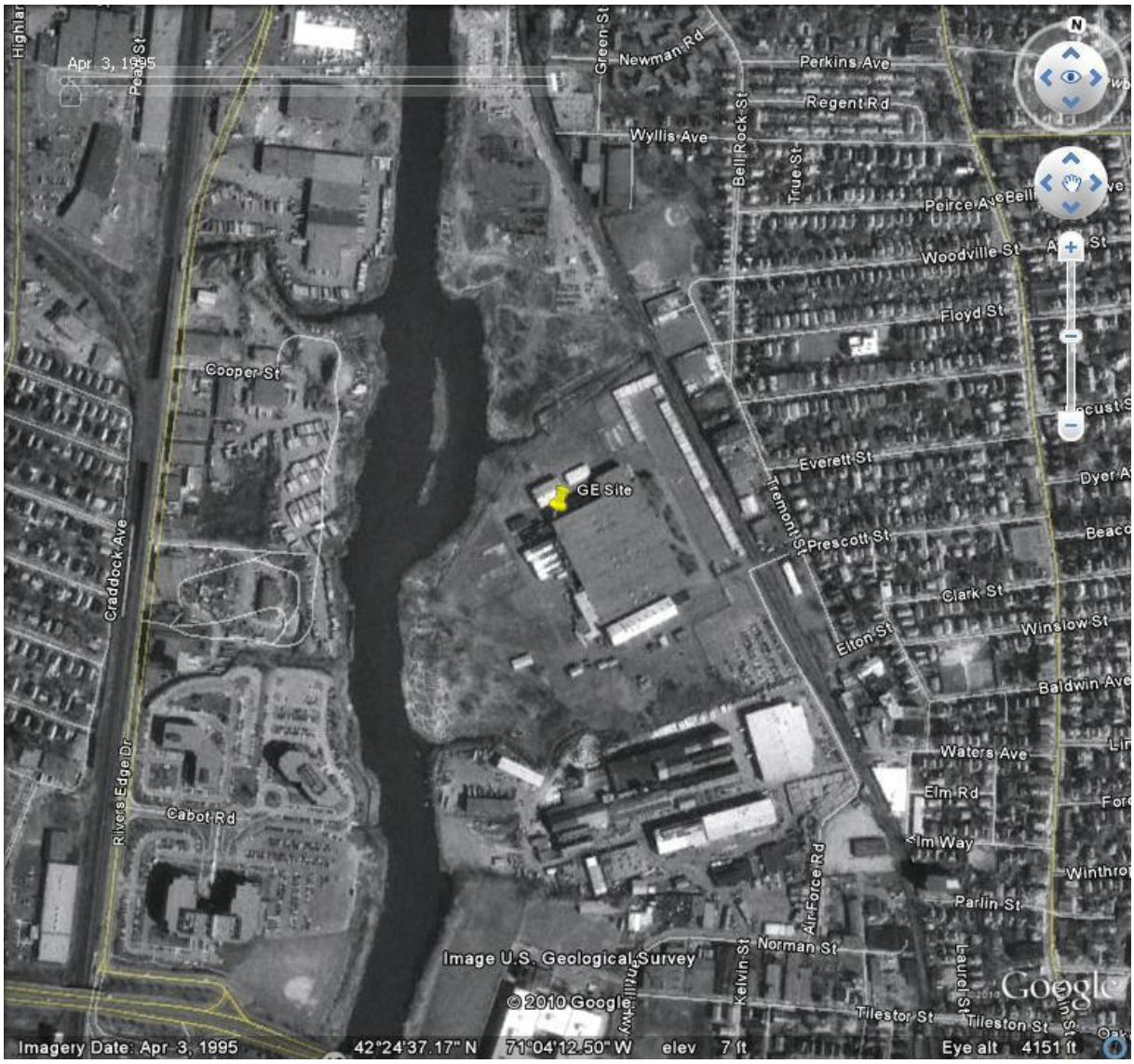
[11] For further information about resources and literature around gardening with children and youth, see Vander et al., *Printed Resources For Gardening With Children And Youth*. (June, 2009) Landscapes for Learning, Clemson University, Clemson, SC.

Over the short-term, green roofs can efficiently curtail stormwater runoff and effectively help address pollution. Some studies have shown that green roofs can attain an annual 50 percent reduction in roof runoff. They are key technologies in urban areas with limited space. They continue to provide numerous benefits over the long-term. As mentioned, the park can serve as site where the local middle schools can run youth environmental awareness programs. This will provide the added benefit of simultaneously creating public access, serving as a recreational area, and the cost-benefit of these schools maintaining the green roofs.

Over the long-term the literature supports the idea that long-term community involvement develops ownership. Community ownership is a one of the key requirements to community engagement, sustainability practices and development in general. Green roofs and Green Walls will present youth of the community with a unique opportunity to learn and experience about green infrastructure. The Park can also help create awareness especially about environmental pollution and its direct impact on their well being. Moreover, studies have shown that leisure activities in green settings such as gardens and parks are an excellent way at helping people cope with stress and in meeting other non-stress-related needs. This would be a great contribution to the Everett community. The Park has a unique opportunity to demonstrate in practice how community sustainable development practices can further local development, protect the environment, and beautify a low-income community.

Appendix A. The RiverGreen Technology Park Site

Appendix B. Former GE Site



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