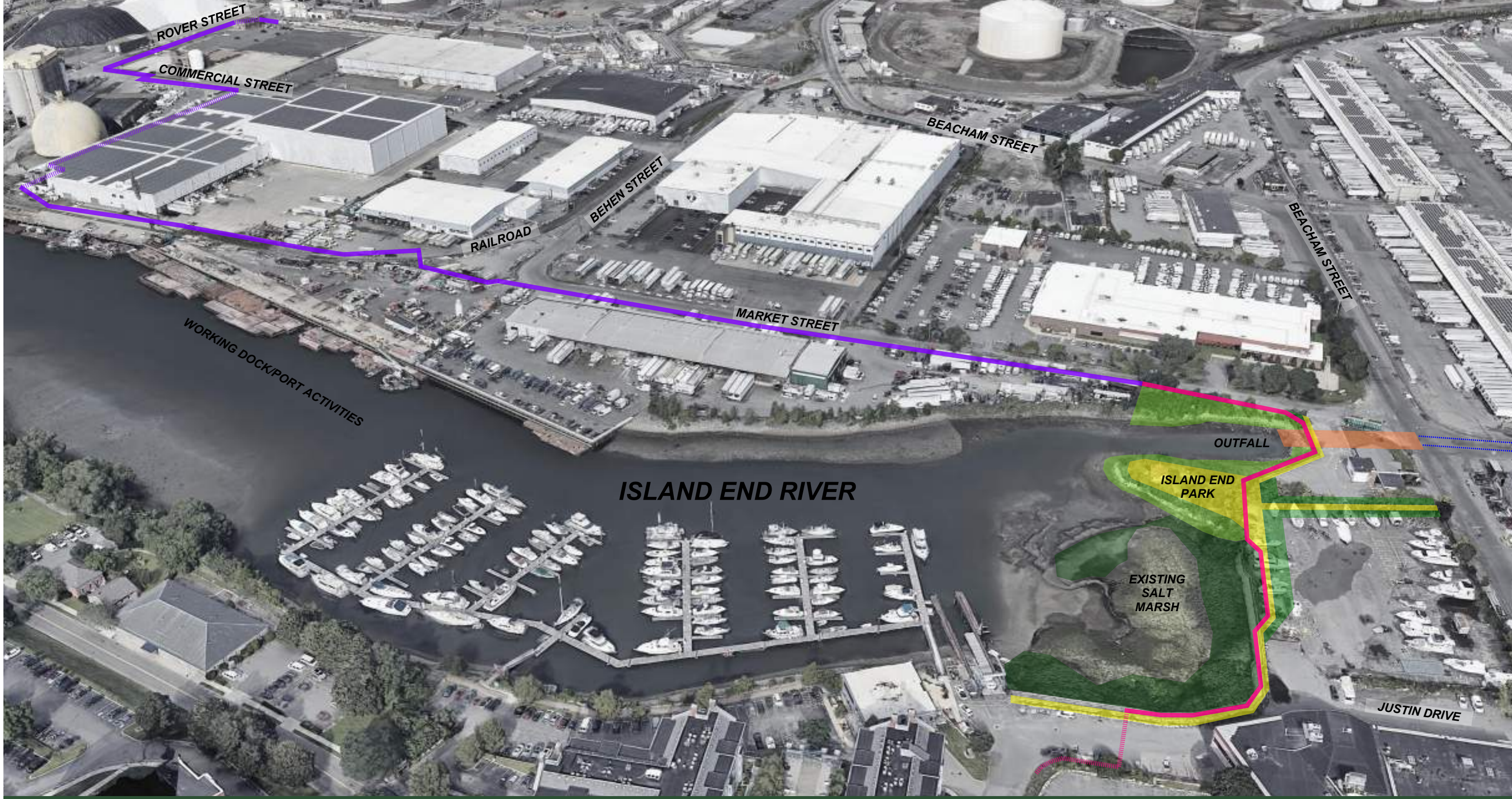

Island End River Flood Resilience Project

Chelsea/Everett, Massachusetts

Draft Environmental Impact Report (EEA #16667)

November 15, 2023

submitted to
Executive Office of Energy and Environmental Affairs

submitted by **Cities of Chelsea and Everett**

prepared by **Fort Point Associates, Inc., A Tetra Tech Company**

in association with
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TABLE OF CONTENTS

TABLE OF CONTENTS

SECRETARY'S CERTIFICATE

PROJECT NARRATIVE

TABLES

FIGURES

ATTACHMENTS

SECRETARY'S CERIFICATE

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April 14, 2023

CERTIFICATE OF THE SECRETARY OF ENERGY AND ENVIRONMENTAL AFFAIRS
ON THE
EXPANDED ENVIRONMENTAL NOTIFICATION FORM

PROJECT NAME	: Island End River Flood Resilience Project
PROJECT MUNICIPALITY	: Chelsea & Everett
PROJECT WATERSHED	: Boston Harbor
EEA NUMBER	: 16667
PROJECT PROPONENT	: City of Chelsea
DATE NOTICED IN MONITOR	: February 24, 2023

Pursuant to the Massachusetts Environmental Policy Act (MEPA; M.G.L. c. 30, ss. 61-62L) and Section 11.06 and 11.11 of the MEPA Regulations (301 CMR 11.00), I have reviewed the Expanded Environmental Notification Form (EENF) and hereby determine that this project requires the submission of an Environmental Impact Report (EIR). In accordance with Section 11.06(8) of the MEPA regulations, the Proponent requested that I allow a Single EIR to be submitted in lieu of the usual two-stage Draft and Final EIR process. I hereby deny the request to file a Single EIR. As noted below, comments submitted by Agencies urge the Proponent to continue to evaluate alternatives to avoid/minimize impacts with respect to several key project components. Comments from an abutting property owner also suggest that the Proponent has not gained full consensus on the proposed alignment of the flood barrier, thereby raising questions about the viability of the Preferred Alternative presented in the EENF. While I acknowledge the importance of this project for providing regional flood protection and improving public access and connectivity to the waterfront, a complete review of impacts should be conducted to ensure a sustainable project design that protects and enhances environmental resources. The Proponent should submit a Draft Environmental Impact Report (DEIR) in accordance with the Scope included in this Certificate.

Project Description

As described in the EENF, the project consists of the construction of a coastal storm surge barrier (flood barrier), storm surge control facility, riverfront nature-based solutions, and related amenities at the Island End River in the Cities of Chelsea and Everett to protect the surrounding area from flooding. The 1,4640 linear foot (lf) flood barrier will connect to higher grades at Justin Drive in Chelsea, traveling northwest then south along the Island End River, turning inland at #60 Commercial Street to travel north, where the barrier is proposed to tie into higher topographic grades on the northern side of the property at 156 Rover Street in Everett. The free-standing flood barrier will consist of driven sheet pile with concrete caps; the foundation will extend to a depth of approximately 45 feet below grade east of the storm surge control facility and 15 feet west of the facility (where the barrier moves upland). The footing of the barrier wall will taper from elevation (el.) 6.5 feet (ft) NAVD88 to el. 11 ft NAVD88 to maintain a top-of-wall elevation of 14-15 feet NAVD88. As proposed in the EENF, the section of the flood barrier west of the storm surge control facility will include several crossings (consisting of gates) to facilitate access between the waterfront and roadways by property owners. A majority of the gates within the flood barrier will be passive flip-up gates, floating up as flood waters rise to seal against the barrier. The active flood gates will be automated by the City of Everett Department of Public Works, with communication of gate closure upon forecasted extreme weather events.

At the northern extent of the river (near the intersection of Beacham Street and Market Street) the project includes a storm surge control facility, proposed to prevent coastal flooding from the Island End River through the existing storm drainage system that outfalls into the river at this location. The project will involve constructing a new 2,900 square foot (sf) underground surge control structure which will include a tide gate (consisting of combination flap gate valves) connecting to the existing Market Street culvert; the tide gate is proposed to close at el. 7 ft NAVD88, and would prevent water from the Island End River from flowing up through the culvert and inundating associated inland areas. As further described below, the Market Street Culvert is associated with a 500-acre catchment area that could be affected by the backflow generated when the tidal gate is closed. As described in the EENF, the backwater flow from the existing stormwater management system has caused damage to local and regional commerce and industry, as well as municipal and private utility services, community support infrastructure, and residences. The EENF states that the storm surge facility is a critical piece of the project, and will allow inland environments to continue benefitting from tidal flushing of inland waters associated with the daily tidal flows from the river while also preventing extreme coastal surge/inland flooding. The section of the existing Market Street arch culvert in this area will eventually be replaced by a box culvert as part of a separate, ongoing project. The existing Beach Street outfall will be rebuilt adjacent to the Market Street outfall, and will incorporate a flap gate valve or duckbill gate to prevent brackish flow into the existing drainage system. As stated in the EENF and further described below, the storm surge control facility was designed to facilitate the connection to a future stormwater pump station, which would provide additional capacity and the capability to drain the stormwater system (out into the Island End River) during high tidal or storm events, when needed. The stormwater pump is not proposed as a part of this project.

An 8- to 10-foot-wide, 940 lf walkway is proposed to be constructed on the landward side of the flood barrier, extending from the storm surge control facility (near Beacham Street) to Justin Drive/Commandments Way and linking the public sidewalk at Beacham Street to a waterfront pedestrian network on private property and Mary C. O'Malley State Park (owned and operated by the Massachusetts Department of Conservation and Recreation (DCR)). Near 357 Beacham Street, the walkway will ramp up to cross over the flood barrier, then descend down into the existing Island End River Park. This crossing will also provide access for municipal maintenance seaward of the flood barrier. Vegetated berms are also proposed to be constructed landward of the walkway in certain sections. As described in the EENF, the project also includes approximately 50,000 sf of nature-based solutions along the riverfront (further described below). Near the eastern terminus of the project, adjacent to the existing marsh within the Island End River, the project includes approximately 22,818 sf of wetland enhancements, consisting of plantings in sparse areas and the removal of accumulated trash and *Phragmites australis*, an invasive plant species.

Project Site

The 9.54-acre project site includes the Island End River, riverbanks, and adjacent upland commercial/industrial areas in the City of Everett to the west and City of Chelsea to the east. The surrounding area has been extensively developed and contains critical infrastructure, including the New England Produce Center, the regional FBI headquarters, Massachusetts General Hospital, the City of Chelsea's Carter Street Pump Station, Williams Middle School, and Chelsea High School. As described in the EENF, the Island End River floodplain was gradually filled for development on top of former tidal flats and marshes in the late 1800s through the mid-1900s. The site consists of filled tidelands and flowed tidelands, including private and Commonwealth tidelands. Currently, the area experiences consistent flooding during relatively minor precipitation events due to the historic filling, the extensive amount of impervious surface present, and undersized stormwater infrastructure. The area experiences significant coastal flooding during recent storm surge events and king tides. The site is located within Flood Zone AE (an area inundated during a 100-year storm), with a Base Flood Elevation (BFE) of elevation (el.) 10 ft NAVD88 as delineated on Federal Emergency Management Agency (FEMA) maps 25017C0443E (effective date June 4, 2010) and 25025C0018J (effective date March 16, 2016).

The site contains numerous coastal and wetland resource areas, much of which are highly degraded. As described in the EENF, the banks of the Island End River are eroded and are covered with pieces of brick, stone, asphalt, and dumped debris. The Mystic River, located within a half-mile of the site, is listed as an impaired waterbody due to the presence and/or concentration of various pollutants. There are nine state-listed disposal sites of varying regulated status under the Massachusetts Contingency Plan (MCP; 310 CMR 40.0000) within the project area, including the Island End River itself. Six of the sites have associated Activity and Use Limitations (AULs). There is a 6-foot deep by 75- to 100-foot-wide U.S. Army Corps of Engineers (USACE) Federal Navigation Project (FNP) located south of the site. The Everett (western) shoreline of the site is located within the Mystic River Designated Port Area (DPA). The project site does not contain *Estimated and Priority Habitat of Rare Species* as delineated by the Natural Heritage and Endangered Species Program (NHESP) in the 15th Edition of the Massachusetts Natural Heritage Atlas or an Area of Critical Environmental Concern (ACEC).

The site is located within Naval Hospital – Boston Historic District, listed in the Massachusetts Historical Commission's (MHC) Inventory of Historic and Archaeological Assets of the Commonwealth (the project is not expected to impact this resource).

The project site is located within two Environmental Justice (EJ) populations characterized by Minority and Income criteria and Minority, Income, and English Isolation criteria. There are 55 additional EJ populations within one mile of the project site, and a total of 602 EJ populations within five miles of the site. As described below, the EENF identified the "Designated Geographic Area" (DGA) for the project as 1 mile around EJ populations, included a review of potential impacts and benefits to the EJ populations within this DGA, and described public involvement efforts undertaken to date.

Environmental Impacts and Mitigation

The project will alter 1.04 acres of land and 336,510 sf (7.73 acres) of Land Subject to Coastal Storm Flowage (LSCSF), including 3,645 sf (0.08 sf) of Land Under Ocean (LUO); 11,557 sf (0.27 acres) of Coastal Beach; 967 sf of Coastal Bank; 22,812 sf (0.52 acres) of Salt Marsh; 1,609 sf (0.04 acres) of Land Containing Shellfish; 57 lf of Bank; 7,374 sf (0.17 acres) of BVW; and 22,707 sf (0.52 acres) of Riverfront Area. The project includes work in 17,487 sf (0.40 acres) within the Mystic River DPA. The project will include 1,438 cubic yards (cy) of dredging, near the proposed storm surge control facility.

Measures to avoid, minimize, and mitigate project impacts include locating the flood barrier almost entirely in upland areas, improvements to degraded salt marsh and wetlands, stabilization of coastal banks, use of erosion and sedimentation controls during project construction, revegetation of disturbed areas as needed, and the removal of 0.45 acres of impervious surface (for a total of 5.13 acres within the 9.54-acre project site/5.6 acres of upland area). As discussed below, additional alternatives to avoid/minimize project impacts should be described in the Draft EIR.

Jurisdiction and Permitting

The project is undergoing MEPA review because it requires Agency Action and exceeds ENF thresholds at 301 CMR 11.03(3)(b)(1)(a), 11.03(3)(b)(1)(c), 11.03(3)(b)(1)(d), 11.03(3)(b)(1)(f), and 11.03(3)(b)(6) based on the following: alteration of coastal bank; alteration of 1,000 or more sf of salt marsh; alteration of 5,000 or more sf of bordering vegetated wetland; alteration of one half or more acres of any other wetlands (LSCSF, LUO, Coastal Beach, Land Containing Shellfish, and Riverfront Area); and the construction, reconstruction, or Expansion of an existing solid fill structure (the storm surge control facility) of 1,000 or more sf base area, provided the structure occupies flowed tidelands or other waterways. The project is required to prepare an EIR pursuant to 301 CMR 11.06(7)(b) because it is located within a DGA (1 mile) around one or more EJ Populations. The project requires a Chapter 91 (c.91) Waterways License and Permit and 401 Water Quality Certification (WQC) from MassDEP as well as Federal Consistency Review from the Massachusetts Office of Coastal Zone Management (CZM).

The project will require an Order of Conditions from both the Chelsea Conservation Commission and the Everett Conservation Commission (or in the case of an appeal of either, a Superseding Order of Conditions from MassDEP). The project will also require utility connection permits from both municipalities.

The project requires a National Pollutant Discharge Elimination System (NPDES) Construction General Permit (CGP) and Remediation General Permit from the United States Environmental Protection Agency (EPA). The project will be required to provide Pre-Construction Notification to the USACE. The project requires review by MHC acting as the State Historic Preservation Officer (SHPO) pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended (36 CFR 800).

Because the project has received and is seeking Financial Assistance through Municipal Vulnerability Preparedness (MVP) and CZM grants, MEPA jurisdiction is broad in scope and extends to all aspects of the project that are likely, directly or indirectly, to cause Damage to the Environment as defined in MEPA regulations. Additionally, the subject matter of the c. 91 License is sufficiently broad such that jurisdiction is functionally equivalent to full scope jurisdiction.

Request for Single EIR

The MEPA regulations indicate that a Single EIR may be allowed provided I find that the EENF:

a) describes and analyzes all aspects of the project and all feasible alternatives, regardless of any jurisdictional or other limitation that may apply to the Scope;
b. provides a detailed baseline in relation to which potential environmental impacts and mitigation measures can be assessed; and,
c. demonstrates that the planning and design of the project use all feasible means to avoid potential environmental impacts.

For any Project for which an EIR is required in accordance with 301 CMR 11.06(7)(b), I must also find that the EENF:

d. describes and analyzes all aspects of the Project that may affect EJ Populations located in whole or in part within the Designated Geographic Area around the project; describes measures taken to provide meaningful opportunities for public involvement by EJ Populations prior to filing the EENF, including any changes made to the project to address concerns raised by or on behalf of EJ Populations; and provides a detailed baseline in relation to any existing unfair or inequitable Environmental Burden and related public health consequences impacting EJ Populations in accordance with 301 CMR 11.07(6)(n)(1)

Consistent with this request, the EENF was subject to an extended comment period under 301 CMR 11.05(7).

Review of the EENF

The EENF provided a description of existing and proposed conditions, preliminary project plans, details regarding historic c.91 License and Permits on site, photographs of the site, FEMA flood maps, a wetlands delineation report, projected coastal flood maps, results of a shellfish survey, sediment sampling information, and identified measures to avoid, minimize and mitigate environmental impacts. Consistent with the MEPA Interim Protocol on Climate Change Adaptation and Resiliency, the EENF contained an output report from the MA Climate Resilience Design Standards Tool prepared by the Resilient Massachusetts Action Team (RMAT) (the "MA Resilience Design Tool"),[1] together with information on climate resilience strategies to be undertaken by the project. It also included a description of measures taken to enhance public involvement by EJ populations and a baseline assessment of any existing unfair or inequitable Environmental Burden and related public health consequences impacting EJ Populations in accordance with 301 CMR 11.07(6)(n)(1).

Supplemental information was distributed by the Proponent on March 28, 2023 regarding alternatives to the tiered plantings proposed on the riverbanks. A 2-week extension of the comment period was granted at the request of the Proponent to allow for additional public review of the supplemental information. The extended comment period closed on April 7, 2023. For purposes of clarity, all supplemental materials are included in references to the "EENF" unless otherwise indicated.

Comments from Agencies identify concerns with the project's potential to impact current and future water-dependent industrial uses within the DPA, coastal resources, and inland flooding. Additional information regarding these concerns should be provided in the DEIR in accordance with the Scope below. Comments from Boston Harbor Now are supportive of the project and note the extensive outreach and coordination that has been undertaken by the Proponents, as well as the possibilities for community engagement provided by the project. As further discussed below, comments from the property owners of 155 Market Street are not supportive of the project as currently proposed, citing the short- and long-term impacts to the property.

Alternatives Analysis

The EENF provided an alternatives analysis, which evaluated a No Build Alternative for the entire project, the Preferred Alternative, and an Alternate Design Alternative for each element of the project (Resilience Provisions East and West and located east and west of the storm surge control facility, respectively). The environmental impacts associated with each alternative were summarized in a table, copied on the following page:

[1] https://resilientma.org/rmat_home/designstandards/

Item	No Build Alternative 1	Alternate Design Alternative 2				Preferred Alternative 3 - the Project
		Alternate Design– Resilience Provisions East	Alternate Design– Storm Surge Control – Flood Storage Upstream[a]	Alternate Design– Resilience Provisions West	Alternate Designs– Total	
Project Site (acres)	2.16	2.16	2	3.14	7.3	9.54
Impervious Area (acres)	4.25	1.50	0.25	2.66	4.41	5.58
Barrier Length (lf)	0	970	0	1,700	2,670	4,640
Alteration of BVW (sf)	0	0	0	0	0	1,656
Creation of BVW (sf)	0	0	0	0	0	1,641
Alteration of Salt Marsh (sf)	0	0	0	0	0	0
Creation of Salt Marsh (sf)	0	0	0	0	0	800
Wetlands Impacts (sf - temporary)	0	100,431	80,000	24,000	204,431	135,054
Wetlands Impacts (sf - permanent)	0	30,475	20,000	110,737	161,212	211,456
Dredge/Fill (cubic yards)	0	1,308	0	0	1,308	1,438

Note: [a] Impacts associated with upstream flood storage area are estimated based upon a recent H&H Study completed for City of Chelsea that indicates that more than 7 million gallons of flood storage may be needed by 2050 to prepare for significant storm events.

The No Build Alternative would leave the project site in its current condition and in turn, would not result in any new, direct impacts to environmental resources. As described in the EENF, the Cities of Chelsea and Everett have struggled to manage flooding in the Island End River floodplain. Flooding has resulted in business closures, road shutdowns, property damage, and stranded motorists. The EENF notes that, in recent years, the frequency and severity of flooding events have increased, a trend that is expected to continue in the future due to impacts associated with climate change. While much of the area currently floods during the 10- and 100-year storm events, the EENF states that in 2050 the same extent of flooding can be expected during the 1-year coastal flood event. By 2070, projected flooding depths would result in devastating impacts to regional food security (production, storage, distribution), regional transportation infrastructure, local public schools, community health and safety, and economic vitality. As the No Build Alternative would not address the existing and projected flooding issues, nor would it address the current erosion and degradation of existing wetland resources on site, it was dismissed.

The Alternate Design Alternative for Resilience Provisions East, the infrastructure east of the storm surge control facility (in Chelsea), was previously submitted as a standalone project to the MEPA Office in April 2021 (the Chelsea Island End River Flood Protection and Riverwalk project, EEA# 16363). The ENF was subsequently withdrawn from review due to concerns raised by Agencies and the MEPA Office regarding project impacts and the potential segmentation of the Chelsea component of the project in a manner that would not enable a cumulative review of impacts associated with the full extent of the flood barrier design. This alternative proposed similar infrastructure as is proposed in the Preferred Alternative, but with the walkway located on the seaward side of the flood barrier, the flood barrier located below the mean high water (MHW) line in many areas, and without any improvements to the coastal and wetland resources present on site. Due to the impacts associated with in this alternate design, and the lack of mitigation in the form of improvements to environmental resources, the former alternative for the Resilience Provisions East element of the project was dismissed and updated to include the design as presented in the Preferred Alternative.

The EENF summarizes the multiple alternatives considered for the Storm Surge Control Facility element of the project such as the creation of upstream flood storage to absorb the effects of extreme high tides and storm surge and the use of passive flow control measures, such as non-mechanical flap gates, on the Market Street culvert and the Beacham Street drainage system outfalls. The intent of these measures would be to prevent tidal ocean water from entering the Beacham Street drainage system and the Market Street stormwater culverts. While developing alternatives for Storm Surge Control, the Proponent was informed by regulatory agencies that flow through the Market Street culvert should be bi-directional, such that tidal flushing is provided to inland resources upstream. Based on this feedback, the passive flow control alternatives were dismissed, as they would prevent all flow inland from the Island End River. Alternatives that would increase upstream flood storage (such as widening the existing channel upstream) were evaluated but ultimately dismissed, as they provided limited downstream benefits and were physically or financially infeasible. With passive flow control alternatives not considered viable (due to the requirement of bi-directional flows) and upstream flood storage alternatives determined to be physically or financially infeasible, the project team pursued the active measures described in the Preferred Alternative (the proposed storm surge control facility with a tide gate).

The Alternate Design Alternative for Resilience Provisions West, the area west of the storm surge control facility (in Everett), would involve a flood wall and sheet piles with periodic gate structures, similar to the Preferred Alternative, but with a different alignment, running closer to the shoreline and extending further south towards 101 Commercial Street. As described in the EENF, this alternative would potentially provide significant cost and time saving options, but was dismissed as it would limit use of the waterfront within the Mystic River DPA and increase impacts to LUO within the Island End River.

As described in the EENF, the Preferred Alternative (described herein) provides the greatest public benefit while minimizing environmental impacts and remaining economically feasible for the Proponents. The EENF states that the project is critical to addressing the flooding in the Island End River floodplain, and will protect economic assets within the Cities, residences (including those of EJ communities), and significant local and regional infrastructure, as well as providing improvements to the degraded natural resources in the area. The EENF states that the project will not interfere with the function or purpose of the DPA; however, comments from MassDEP note concern with the project’s potential to impact current and future water-dependent industrial uses (further discussed below).

Environmental Justice

As noted above, the project site is located within two EJ populations characterized by Minority and Income criteria and Minority, Income, and English Isolation criteria. There are 55 additional EJ populations within one mile of the project site, and a total of 602 EJ populations within five miles of the site. Within one mile of the project site, the following languages are identified as those spoken by 5% or more of residents who also identify as not speaking English very well (Limited English Proficiency (LEP) individuals): Arabic, Spanish or Spanish Creole, Chinese, French Creole, and Portuguese or Portuguese Creole.

Effective January 1, 2022, all new projects in "Designated Geographic Areas" ("DGA," as defined in 301 CMR 11.02, as amended) around EJ populations are subject to new requirements imposed by Chapter 8 of the Acts of 2021: An Act Creating a Next-Generation Roadmap for Massachusetts Climate Policy (the "Climate Roadmap Act") and amended MEPA regulations at 301 CMR 11.00.[3] Two related MEPA protocols – the MEPA Public Involvement Protocol for Environmental Justice Populations (the "MEPA EJ Public Involvement Protocol") and MEPA Interim Protocol for Analysis of project Impacts on Environmental Justice Populations (the "MEPA Interim Protocol for Analysis of EJ Impacts") – are also in effect for new projects filed on or after January 1, 2022. Under the new regulations and protocols, all projects located in a DGA around one or more EJ populations must take steps to enhance public involvement opportunities for EJ populations, and must submit analysis of impacts to such EJ populations in the form of an EIR.

The EENF indicates that the DGA for the project is one mile. The Proponent provided Advance Notification under Part II of the MEPA EJ Public Involvement Protocol through the preparation of an EJ Screening Form which was translated into Portuguese, Spanish, Haitian Creole, Arabic, and Chinese and distributed to a list of community-based organizations (CBOs) and tribes/indigenous organizations (the "EJ Reference List") provided by the MEPA Office, as well as CBOs identified by the City of Everett, City of Chelsea, and GreenRoots. Hard copies of the translated EJ Screening Form were made available at Everett City Hall and Chelsea City Hall. A remote evening MEPA meeting was held to promote public involvement during the MEPA review process. Interpretation services were provided during the meeting in Spanish due to the high percentage of LEP individuals who speak these languages within the DGA, although these services were not utilized by anyone who attended the meetings. Additionally, interpretation services in Portuguese, Chinese, Arabic, and/or Haitian Creole were offered upon request, but were not requested by anyone prior to the meeting. As requested by attendees during the evening meeting, an in-person site visit was held on March 24, 2023.

As stated in the EENF, the Proponents have been conducting extensive formal and informal meetings and discussions with permitting agencies, neighboring residents and businesses, and a variety of advocacy groups since 2018. This outreach has included collaborating with GreenRoots (according to its website, a "community-based organization dedicated to improving and enhancing the urban environment and public health in Chelsea and surrounding communities") to create a Community Advisory Group (CAG), which consists of members of the community who are compensated for their participation. Numerous public community meetings, web forums, and site visits were held in conjunction with GreenRoots and the Mystic River Watershed Association (MyRWA). The Proponents have also worked with MyRWA to form a Stakeholder Working Group (SWG), which collaborated on design alternatives for the project. The Proponents have also held several community clean-ups of the Island End River since 2020 to promote awareness of the project. Comments from Boston Harbor Now highlight the extensive collaboration and community involvement that have been undertaken by the project team, and the opportunity for public involvement in the project moving forward. The Proponents will work to continue to educate the public (in their preferred language) through ongoing collaboration with local nonprofit advocacy groups about the benefits of sustainable development practices and long-term stewardship of the Island End River and nearby Mystic River. The EENF states that the Proponents are committed to further engaging the surrounding EJ Populations to seek feedback on issues of importance to the communities.

The EENF contained a baseline assessment of any existing unfair or inequitable Environmental Burden and related public health consequences impacting EJ Populations in accordance with 301 CMR 11.07(6)(n)(1) and the MEPA Interim Protocol for Analysis of EJ Impacts. According to the EENF, the data surveyed show some indication of an existing "unfair or inequitable" burden impacting the identified EJ populations. Specifically, the EENF notes that the DPH EJ Tool identifies census tracts and a municipality in which the EJ populations are located as exhibiting "vulnerable health EJ criteria"; this term is defined in the DPH EJ Tool to include any one of four environmentally related health indicators that are measured to be 110% above statewide rates based on a five-year rolling average.[2] Within the project's DGA, both the City of Everett and City of Chelsea were identified as exhibiting "vulnerable health EJ criteria" for Heart Attack rate, while the cities of Boston, Chelsea, Everett, and Somerville (all within one mile of the project site) exhibited vulnerable health EJ criteria for Childhood Asthma rates. Seven census tracts (25025160400, 25025160502, 25025160501, 25025050101, 25025050901, 25025160101, and 25017342500) exhibited vulnerable health EJ criteria for Childhood Blood Lead Prevalence rates. The EENF identified thirteen census tracts (the previous seven census tracts, as well as 25025160200, 25025160602, 25025040600, 25025040401, 25025160300, and 25025050300) that exhibited vulnerable health EJ criteria for Low Birth Weight rates. In addition, the EENF indicates that the following facilities and sources exist within the identified EJ populations within one mile of the project site, based on the mapping layers available in the DPH EJ Tool:

- Major air and waste facilities: 34
- M.G.L. c. 21E sites: 26
- "Tier II" Toxics Release Inventory Site: 15
- MassDEP sites with AULs: 84
- MassDEP groundwater discharge permits: 1
- MassDEP public water suppliers: 1
- Underground storage tanks: 20
- EPA facilities: 5
- MBTA bus and rapid transit: 76 bus stops, 3 commuter rail stops

Although not required by the MEPA Interim Protocol for Analysis of EJ Impacts, the EENF also surveyed environmental indicators tracked through the U.S. EPA's "EJ Screen," which shows the indicators measured at the following percentiles for the identified EJ

[2] See https://matracking.ehs.state.ma.us/Environmental-Data/ej-vulnerable-health/environmental-justice.html. Four vulnerable health EJ criteria are tracked in the DPH EJ Viewer.

populations as compared to the MA statewide average. The EENF indicates that the following indicators are elevated at 80th percentile or higher of statewide average within the DGA:

- Particular Matter (PM2.5): 83rd percentile
- NATA Diesel PM: 91st percentile
- 2017 NATA Air Toxics Cancer Risk (lifetime exposure): 99th percentile
- 2017 NATA Respiratory Hazard Index Ratio: 99th percentile
- Traffic Proximity and Volume Count of vehicles (average annual): 88th percentile
- Proximity to National Priorities List (Superfund) sites: 94th percentile
- Proximity to Risk Management Plan (RMP) sites: 94th percentile
- Proximity to Hazardous Waste Facilities: 93rd percentile
- Underground Storage Tanks: 82nd percentile
- Wastewater Discharge Indicator: 96th percentile

Finally, the EENF included a screening of climate risks for the project site, using the MA Resilience Design Tool, as further described below. Based on the 50-year useful life of the flood barrier and its location, the project was rated as having “High” exposure for sea level rise/storm surge, extreme precipitation (urban flooding), and extreme heat. The project also received a “Moderate” exposure rating for extreme precipitation (riverine flooding), and a “Moderate” ecosystem benefits score. As noted above, the project is proposed to address current and future flooding in the Island End River floodplain, which includes numerous EJ communities and residences. Specifically, the EENF states that the proposed flood protection measures will protect over 500 acres of densely developed urban neighborhoods in Chelsea and Everett to the projected 2070 1% (100-year) coastal storm still water elevation at minimum (further discussed below). The project will also result in a 0.45-acre net reduction in impervious surface (currently, 5.58 acres of the 5.6 acres of upland area in the project site are covered by impervious surface), and will include landscaping to reduce urban heat island effects.

As described in the EENF, the potential negative impacts to EJ populations associated with the project are limited to construction period impacts, such as dust from demolition and site excavation, and emissions from construction equipment. The EENF states that local construction regulations and best practices will be followed to minimize the potential air quality impacts in the surrounding community. As described in the EENF, the project will primarily result in benefits to surrounding EJ populations. The project will protect many critical assets from catastrophic flooding impacts, including public schools and hospitals. Environmental benefits of the project include an improved public realm, enhanced pedestrian safety conditions, ecological improvements such as improved water quality and flood protection from highly regulated industrial sites within the floodplain. The project will also provide additional community benefits including new sidewalks with shade trees, scenic overlooks, bike racks and benches, as well as 1/5-mile riverfront park to access the waterfront and expanded public open space. Use of the existing public spaces is currently limited by accessible pedestrian access points, limited visibility due to high growth of invasive species along the existing salt marsh, and lack of public education and awareness of these resource areas, all of which the project aims to address. I commend the Proponents for the extensive outreach efforts that have been undertaken to date, the involvement of the community in the design process, and the benefits to EJ communities provided by this project.

Wetlands

The Chelsea and Everett Conservation Commissions will review the project for its consistency with the Wetlands Protections Act (WPA), the Wetland Regulations (310 CMR 10.00), and associated performance standards. Potential impacts to wetlands include 336,510 sf (211,496 sf permanent / 125,014 sf temporary) of LSCSF, including 3,645 sf (2,997 sf permanent / 648 sf temporary) of LUO; 11,557 sf (4,902 sf permanent / 3,055 sf temporary) of Coastal Beach; 967 sf (759 sf permanent / 205 sf temporary) of Coastal Bank; 22,812 sf (all temporary) of Salt Marsh; 1,609 sf (1,357 sf permanent / 252 sf temporary) of Land Containing Shellfish; 57 lf (all permanent) of Bank; 7,374 sf (1,656 sf permanent / 5,718 sf temporary) of BVW; and 22,707 sf (15,481 sf permanent / 7,226 sf temporary) of Riverfront Area. The project will also involve 1,438 cy of dredging. The project will require a Section 401 Water Quality Certification for impacts to Salt Marsh and greater than 5,000 sf of impacts, including temporary impacts, to BVW. Comments from the Massachusetts Department of Marine Fisheries (DMF) state that mitigation may be required for temporary and permanent impacts to subtidal areas and tidal flats. The EENF included a discussion of the project compliance with the performance standards for coastal and wetland resources areas impacted by the project.

As noted above, the tide gate within the storm surge control facility is proposed to close at el. 7.0 ft NAVD88, the current high tide line, which would prevent water from the Island End River from flowing up through the culvert and inundating associated inland areas. As stated in the EENF, the system has been designed to maintain the existing hydrologic connection upstream/within the Market Street culvert and allow for uninterrupted tidal flows in typical conditions. The EENF included a preliminary inspection and maintenance schedule which should be expanded upon in the DEIR, as required by the Scope below. Comments from MassDEP note that, when the tide gate is closed, the resource areas adjacent to the upstream portions of the Island End River will effectively function as Bordering Land Subject to Flooding (BLSF) (as opposed to LSCSF), which is associated with different regulatory requirements (for example, such as compensatory flood storage for fill within BLSF, and different stormwater standards).

The project proposes improvements to existing vegetated wetlands along the shoreline with new native plantings, stabilizing dilapidating shoreline to prevent erosion and sedimentation, and restoring up to a half-acre of coastal beach and up to a third acre of riverfront area with other habitat enhancements. The proposed phragmites management program includes the mowing of phragmites, herbicide treatment, and debris and detritus removal. Comments from MassDEP note that this management will result in elevations of the salt marsh near and below MHW, potentially too low for salt marsh vegetation. Comments from MassDEP also note that the proposed 1,650 sf BVW replication area under and adjacent to the boardwalk may be more easily restored as Salt Marsh given the hydrology in the area. However, to accomplish this regulatorily, the Proponent would have to file for this portion of the larger project as a separate Ecological Restoration Limited Project (refer to the eligibility criteria in 310 CMR 10.24(8)).

Comments from CZM and MassDEP note that the alignment of the flood barrier has been moved landward of the high tide line along the majority of the project site length and the boardwalk moved landward of the barrier (as compared to the original alignment proposed in 2021) in response to Agency feedback, reducing impacts to fronting coastal resources areas.

However, as noted in comments from CZM and MassDEP, one section (west of the culverts) remains in close proximity to the MHW line. Currently, the access ramps to the Island End River Park (seaward of the flood barrier) are solid fill with retaining walls. Comments from MassDEP and CZM note that this design would result in wave reflection and refraction, and could be modified to reduce impacts to coastal resources (as further discussed in the Scope below).

Much of the land surrounding the Island End River has been historically filled with a mix of debris and other urban fill, including areas of soil permeated by legacy coal tar deposits that are unsuitable planting media, including the Coastal Banks on either side of the Island End River/the storm surge control facility, which are eroding. To stabilize and provide vegetation in this area, the project currently proposes to place stone sills and concrete planters on the Coastal Bank, Coastal Beach, and in the intertidal area. The planters would be managed to accommodate sea level rise in partnership with the surrounding community. Comments from Boston Harbor Now note the benefits of “nature-based approaches” (NBAs) for a community stewardship program that would provide community members with environmental education and stewardship opportunities and empower community advocates to help implement and maintain the NBAs by contributing to planting, nest-building, and plant management. Boston Harbor Now states that this unique programmatic model fosters connections between the community and the natural environment, and would be monitored by Boston Harbor Now in the hopes that it can be replicated effectively with other resilience projects.

Comments from CZM and MassDEP note that the eroding Coastal Banks provide sediment to the Coastal Beach downgradient or downstream of them and are therefore significant to the protected interests of flooding and storm damage prevention, as is the Coastal Beach itself. Further, comments from CZM and MassDEP state that the sills and concrete planters will cause scour and erosion, adversely impacting the protected functions of the coastal resource areas, changing the form and volume of the Coastal Beach, and making stabilization of the Coastal Bank and Coastal Beach of the river more problematic. As noted above, the Proponent provided supplemental information during the EENF review period that evaluated alternatives to the tiered, concrete planters currently proposed along the riverbank. As stated in comments from MassDEP and CZM, all alternatives considered include structural toe stabilization and hard structural components on the Coastal Bank and Coastal Beach to facilitate supplemental vegetation plantings, and are not allowable under wetland regulations. Alternatives to the tired planter system should be evaluated in accordance with the Scope below. I note comments from Boston Harbor Now which state that a hybrid system of planters could introduce vegetation that would not survive the soils on site that have been degraded by urban uses, creating opportunities for community stewardship. These comments state that the important benefits provided by a community stewardship program should be maintained should the design of the concrete planters be found to be unpermittable.

Waterways

As noted above, the project site includes Filled and Flowed Tidelands (including Commonwealth Tidelands), which are subject to Chapter 91 jurisdiction pursuant to 310 CMR 9.04. Approximately four fifths of the site is within the Mystic River DPA, most of which is in Everett; the remaining one fifth outside of the DPA is predominantly within Chelsea. Comments from the MassDEP Waterways Regulation Program (MassDEP-WRP) state that the project appears to be a water-dependent use project pursuant to 310 CMR 9.12(2)(a)4, 9, 11, and 12, and 13. However, in order to be eligible for licensing within a DPA, water-dependent use projects involving installation of fill and/or structures must either be water-dependent industrial (WDI) uses, or otherwise comply with the standards at 310 CMR 9.32(2)(b). The EENF provided a discussion of the project's compliance with applicable c.91 standards, including Standards to Preserve Water-Related Public Rights at 310 CMR 9.35 and Standards to Protect Water-Dependent Uses at 310 CMR 9.36. However, comments from MassDEP-WRP state that the EENF does not include adequate documentation to show that the work subject to c.91 within the DPA complies with the categorical restrictions at 310 CMR 9.32.

The EENF states that that project will not interfere with the function or purpose of the DPA, or with public rights to waterfront and waterways access. As described above, several crossings are proposed within the flood barrier to support the functionally of WDI within the DPA. Comments from MassDEP-WRP, however, note the Waterways Regulations at 310 CMR 9.36(5)(b), which require that reasonable arrangements be made to prevent commitments of space or facilities that would significantly discourage present or future WDI activity on the project site or elsewhere in the DPA. Comments express concern that the project and in particular, unrestricted open space access) as currently proposed may not comply with this standard. Additionally, while acknowledging the value of the project and its flood protection benefits, comments from MassDEP-WRP note that the project (particularly the flood barrier) appears to impact the functionality of the DPA. I note that comments from the property owners of 155 Market Street (located within the DPA) do not support the project as currently proposed due to the short- and long-term impacts on the property, in particular, reduced waterfront access. Comments from MassDEP note that the c.91 application form will be required to be signed by all landowners within the project site, unless other evidence of legal authority to submit an application for the project site is provided.

Climate Change

Both the City of Chelsea and City of Everett are participants in the Commonwealth's Municipal Vulnerability Preparedness (MVP) program. The MVP program is a community-driven process to define natural and climate-related hazards, identify existing and future vulnerabilities and strengths of infrastructure, environmental resources, and vulnerable populations, and develop, prioritize and implement specific actions the Cities could take to reduce risk and build resilience. As noted above, the project has received funding through the MVP program. The Cities also received funding from the MVP program to conduct a planning process for climate change resiliency and implementing priority projects. The results of the initial community-driven process were presented in the "City of Chelsea Community Resilience Building - Summary of Findings" (the Chelsea Report),[3] dated May 19, 2018, and the "City of Everett Community Resilience Building - Summary of Findings" (the Everett Report),[4] dated June 2019. Both the Chelsea Report and Everett Report identify flooding associated with the Island End River as climate hazards in the respective Cities.

[3] Available here: https://www.mass.gov/doc/2017-2018-mvp-planning-grant-report-chelsea/download
[4] Available here: https://www.mass.gov/doc/everett-report/download

The EENF states that, according to the 2017 "Designing Coastal Community Infrastructure for Climate Change" report, more than 35,000 residents and 16,000 jobs will be impacted by future flooding from Island End River. Due to the geographic concentration of food sector industries, Island End River flood events can severely impact the region's food supply chain, and damage to these facilities would also have cascading impacts on food availability throughout the region. As described in the EENF, in 2050, the projected coastal flood depths will exceed 3 feet in depth in Everett and 5 feet in depth in Chelsea. By 2070, projected coastal flood depths will become catastrophic with floodwaters exceeding 5 feet in depth in Everett and reaching up to 10 feet in depth in Chelsea. The EENF included projected coastal flood maps for the Island End River and surrounding area showing the extent, probability, and 1% annual chance depth of flooding in the present, 2030, 2050, and 2070 planning horizons.

Adaptation and Resiliency

Effective October 1, 2021, all MEPA projects are required to submit an output report from the MA Resilience Design Tool to assess the climate risks of the project. As noted above, based on the 50-year useful life of the flood barrier and its location, the flood barrier was rated as "High" risk for sea level rise/storm surge, extreme precipitation (urban flooding), extreme precipitation (riverine flooding), and extreme heat. To support the MVP Action Grant Application, all assets that will be directly impacted by the project (including private commercial and industrial companies, public assets, transportation infrastructure, and natural assets) were included in the project when submitted to the MA Resilience Design Tool. All assets (other than natural resource assets, which do not receive a preliminary risk rating) were rated as "High" risk for sea level rise/storm surge, extreme precipitation (urban flooding), and extreme heat, and either High or Moderate risk for extreme precipitation (riverine flooding).

Based on the 50-year useful life and the self-assessed criticality of the flood barrier, the MA Resilience Design Tool recommends a planning horizon of 2070 and a return period associated with a 200-year (0.5% chance) storm event when designing for the sea level rise/storm surge parameter. Based on 200-year storm projections, the Tool further indicates anticipated "wave action water elevations" reaching to a maximum of 15.8 ft NAVD88 for the 2050 (intermediate) planning horizon, and 17.4 ft NAVD88 for the 2070 planning horizon. Water surface elevations (still water) are anticipated to reach a maximum of 12.7 ft NAVD88 to 14.3 ft NAVD88 over the 2050 and 2070 planning horizons, respectively, for the 200-year storm scenario. As noted above, the current FEMA BFE within the project site is el. 10 ft NAVD88. The MA Resilience Design Tool also recommends that assets within the project site design for 9.7 inches of precipitation in the 50-year (2%) return period in 2070, as well as high heat risk. The EENF states the most significant climate hazard affecting Everett and Chelsea in the project area is sea level rise and coastal storm surge. As discussed above, the Island End River floodplain experiences chronic flooding issues that are expected to worsen in the future. The EENF states the Massachusetts Coastal Flood Risk Model (MC-FRM) was utilized to assess the current and projected coastal flood risk and to evaluate the effectiveness of proposed flood protection interventions. In addition to coastal flood modeling, the Proponents evaluated the intersection of overland coastal flooding and stormwater sewer flooding in the tributary area to the Island End River (and in particular, to the Market Street culvert and the Beacham Street drainage system outfalls).

As described in the EENF, the design team reviewed the MA Resilience Design Tool outputs and compared these recommendations to existing topography and operations within the site and surrounding area. As the project spans a large area of coastline and inland spaces, more specific wave impact data along points of the flood barrier alignment were referenced from the MC-FRM to evaluate the appropriate design flood elevation (DFE). This led to a DFE barrier top elevation of el. 14 ft NAVD88, except in the section between 95 Beacham Street and Commercial Street, where the DFE is proposed to be raised to el. 15 ft NAVD88, which could be accommodated by the higher existing elevation in this area. The DFE will ramp down from el. 15 ft to el. 14 between Commercial Street and the end of the flood barrier in Everett, which will terminate inland. The elevation of the top of the flood barrier follows the DFE, varying from el. 14-15 ft NAVD88, as noted above. Overall, according to the EENF, the project will protect over 500 acres of densely developed urban neighborhoods in Chelsea and Everett to the projected 2070 1% (100-year) coastal storm still water elevation (13.6 ft NAVD88) at minimum. Comments from Agencies do not express concern with the DFE as proposed in the EENF. The project will also involve the enhancement and restoration of areas of Salt Marsh and BVW. Protection and restoration of wetlands plays an increasingly important role in promoting ecosystem resiliency and mitigating climate change impacts.

While the project will provide significant flood protection from coastal flooding/storm surge, comments from MassDEP note concern that the project (specifically, the tide gate within the storm surge control facility) could inadvertently lead to inland flooding. As described in the EENF, the Carter Street stormwater pumping station, responsible for managing storm water runoff from a 120-acre catchment area in Chelsea and Everett, is situated within the Island End River floodplain. This pumping station interconnects to the Market Street Culvert, and the culvert is connected to a catchment area over 550 acres in size in both Chelsea and Everett. Comments from MassDEP state that the catchment area could be up to 1,110 acres based on a review of the urban drainage system/topography. If the storm surge control facility is not appropriately sized for the catchment area, it could increase inland flooding during precipitation events if the tide gate is closed. As noted above, the storm surge control facility has been designed to accommodate the addition of a future stormwater pump station (which would address this issue), but it is not currently proposed as part of this project.

Greenhouse Gas (GHG) Emissions

The EENF indicates that total stationary source emissions associated with the project will not exceed 2,000 tpy; therefore, a GHG analysis is not required under the MEPA EJ protocols. Emissions will be limited to construction period impacts, which will be minimized through construction equipment requirements. The project will also construct bicycle and pedestrian facilities, encouraging the use of non-vehicular modes of transportation/avoiding transportation emissions from ongoing use of the site once constructed.

Construction Period

The EENF indicates that project construction is expected to commence in Fall 2024 (depending on available funding) and conclude in Fall 2027. As noted above, there are several MCP sites with associated AULs present within the project area. The EENF states that AUL requirements will generally be met through the development and implementation of soil (and groundwater) management and health and safety plans during construction. Additional AUL requirements for specific sites will be met on a case-by-case basis. The EENF states that the existing materials will be re-used to the greatest possible extent, subject to AUL requirements, and the remaining materials will be recycled or disposed of the remaining materials in accordance with local and state regulations.

All construction and demolition activities should be managed in accordance with applicable MassDEP's regulations regarding Air Pollution Control (310 CMR 7.01, 7.09-7.10), and Solid Waste Facilities (310 CMR 16.00 and 310 CMR 19.00, including the waste ban provision at 310 CMR 19.017). The project should include measures to reduce construction period impacts (e.g., noise, dust, odor, solid waste management) and emissions of air pollutants from equipment, including anti-idling measures in accordance with the Air Quality regulations (310 CMR 7.11). I encourage the Proponent to require that its contractors use construction equipment with engines manufactured to Tier 4 federal emission standards, or select project contractors that have installed retrofit emissions control devices or vehicles that use alternative fuels to reduce emissions of volatile organic compounds (VOCs), carbon monoxide (CO) and particulate matter (PM) from diesel-powered equipment. Off-road vehicles are required to use ultra-low sulfur diesel fuel (ULSD). If oil and/or hazardous materials are found during construction, the Proponent should notify MassDEP in accordance with the Massachusetts Contingency Plan (310 CMR 40.00). All construction activities should be undertaken in compliance with the conditions of all State and local permits.

SCOPE

<u>General</u>

The DEIR should follow Section 11.07 of the MEPA regulations for outline and content and provide the information and analyses required in this Scope. It should clearly demonstrate that the Proponent has sought to avoid, minimize and mitigate Damage to the Environment to the maximum extent practicable. I strongly recommend that the Proponents coordinate with relevant Agencies and stakeholders on the issues outlined in the Scope below prior to filing the DEIR.

<u>Project Description and Permitting</u>

The DEIR should identify any changes to the project since the filing of the EENF. It should identify and describe State, federal and local permitting and review requirements associated with the project and provide an update on the status of each of these pending actions. The DEIR should include a description and analysis of applicable statutory and regulatory standards and requirements, and a discussion of the project's consistency with those standards. It should clarify why Utility Connection permits are required from the Cities of Chelsea and Everett.

The DEIR should include detailed site plans for existing and post-development conditions at a legible scale. Plans should clearly identify buildings, interior and exterior public areas, impervious areas, transportation improvements, pedestrian and bicycle accommodations, and stormwater and utility infrastructure. The DEIR should provide detailed plans, sections, and elevations to accurately depict existing and proposed conditions, including proposed above- and below-ground structures, on- and-off-site open space, and resiliency and other mitigation measures.

The information and analyses identified in this Scope should be addressed within the main body of the DEIR and not in appendices. In general, appendices should be used only to provide raw data, such as drainage calculations, traffic counts, capacity analyses and energy modelling, that is otherwise adequately summarized with text, tables and figures within the main body of the DEIR. Information provided in appendices should be indexed with page numbers and separated by tabs, or, if provided in electronic format, include links to individual sections. Any references in the DEIR to materials provided in an appendix should include specific page numbers to facilitate review.

As noted in comments from CZM, two sets of 10-foot walkways are depicted at cross sections C and A in plan set 16 RPE-L-102 but are not described in the EENF. The DEIR should provide additional information regarding these walkways.

Environmental Justice

The DEIR should include an update on any outreach conducted since the filing of the EENF and a description of any changes made to the project (including mitigation measures) in response to this outreach. The DEIR, or a summary thereof with translations, should be distributed to the "EJ Reference List," with any updates to the list provided by the MEPA Office upon request. The Proponent is also directed to continue to provide translation services in Portuguese, Spanish, Haitian Creole, Arabic, and Chinese as part of future outreach. To the extent design changes are made in response to Agency comments, the DEIR should discuss how the project could support community stewardship efforts through NBAs as suggested in Boston Harbor Now comments.

Public Health

The DEIR should include a separate section on "Public Health," and discuss any known or reasonably foreseeable public health consequences that may result from the environmental impacts of the project. Particular focus should be given to any impacts that may materially exacerbate "vulnerable health EJ criteria," in accordance with the MEPA Interim Protocol for Analysis of EJ Impacts. In addition, other publicly available data, including through the DPH EJ Tool, should be surveyed to assess the public health conditions in the immediate vicinity of the project site, in accordance with 301 CMR 11.07(6)(g)10. Any project impacts that could materially exacerbate such conditions should be analyzed. To the extent any required Permits for the project contain performance standards intended to protect public health, the DEIR should contain specific discussion of such standards and how the project intends to meet or exceed them. The DEIR should identify public health benefits for EJ populations that would result from the project.

Wetlands

As noted above, one section of the flood barrier is in close proximity to the MHW line. Comments from CZM indicate that, based on the information provided in site plans, it appears that this area could be shifted landward so it is also located landward of the high tide line and completely out of Coastal Bank. This should be evaluated in the DEIR, as requested by CZM and MassDEP. If it is not possible to relocate the barrier landward to minimize potential impacts to coastal resources, the DEIR should provide reasoning as to why. The DEIR should also evaluate redesigning the access ramps to Island End River as pile-supported ramps and walkways, as requested by CZM and MassDEP. Alternatives to riprap seaward of the ramps (as shown on design plans) should also be evaluated, and the riprap eliminated to the extent practicable in this area. The DEIR should address the DMF's comments, including the recommendation to sequence work in tidal areas, and the potential necessity of time of year (TOY) restrictions for in-water work.

To accomplish the Salt Marsh enhancement, the EENF proposes removing debris and trash to depths of up to 12 inches. As noted in comments from CZM and MassDEP, this will result in elevations of the restored marsh near and below MHW. Situations where the resulting marsh platform will be significantly lower than existing elevations and/or lower than MHW should be avoided due to the resulting reduced resiliency of the Salt Marsh to sea level rise and risk of degradation. The proposed elevations should be refined to ensure the marsh will become reestablished and that portions of it at the lowest proposed elevations do not become mudflat. The DEIR should address these recommendations, and provide an updated monitoring plan that includes observation for these possible effects on the salt marsh restoration area. The DEIR should clarify which areas are proposed to be applied with seed mixes and which areas are proposed for direct planting. It should also specify and refine the salt-tolerant seed mixes, as requested in comments from MassDEP and CZM.

The DEIR should address MassDEP's comments on the proposed BVW replication area. Specially, the DEIR should evaluate whether Salt Marsh restoration is more appropriate in this area. If the area is proposed to be restored as Salt Marsh as opposed to BVW, the DEIR should address the need to file an Ecological Restoration Limited Project, and discuss the project's consistency with the eligibility criteria at 310 CMR 10.24(8). The DEIR should include a detailed monitoring and adaptative management plan for both the enhancement and replication areas, with a clear monitoring schedule and requirements for reporting to applicable agencies, which specifies monitoring of the restoration actions including invasive species management. The adaptive management plan should detail actions that will be taken if restoration goals are not met within the planned timeframe.

The DEIR should evaluate alternatives to the coastal bank stabilization measures currently proposed (i.e., the stills and concrete planters), focusing on stabilizing the erosion on

Coastal Banks and outfall of the Island End River, with emphasis on non-structural measures. Alternatives should include options to remove the debris on the Coastal Bank and Coastal Beach, regrading of the Coastal Bank to a gentler and stable 3:1 slope, and incorporation of more natural solutions to stabilize the regraded Coastal Bank. I refer the Proponent to comments from CZM and MassDEP for more information on alternative design considerations in this area. More details should be provided regarding the proposed stabilization around the new outfall wing walls, including information on how that stabilization will tie into the adjacent banks without exacerbating erosion, as requested by CZM and MassDEP. This information should consider including tapering the outfall protection to avoid a blunt end that is more likely to cause end scour. I note comments from Boston Harbor Now, which emphasize the importance of any design changes in this area maintaining the community stewardship program. To the extent design changes made, the DEIR should assess opportunities for community stewardship under the revised design.

The DEIR should provide additional information regarding the storm surge control facility, as requested in comments from MassDEP and CZM. Adjacent to the outfall, where dredging is proposed, sediment sampling should be conducted to determine grain size and possible contamination to inform construction protocols and disposal options. The DEIR should include details regarding the extent and type of rip rap proposed downstream, or seaward, of the headwall. A more detailed operations and maintenance (O&M) plan should be developed for the storm surge control facility (and in particular, the flood gate) and included in the DEIR. The O&M plan should identify any other criteria and the projected frequency with which the tide gate will be opened and closed, and identify who will be responsible for the long-term operations and maintenance. The DEIR should include a more comprehensive discussion and evaluation of the relationship between the storm surge control facility and the recently daylighted and expanded portion of the upstream Market Street culvert, in conjunction with an evaluation of further opportunities in the upgradient watershed to treat and detain stormwater.

As noted above, when the tide gate is closed, the resource areas adjacent to the upstream portions of the IER effectively function as BLSF. I refer the Proponent to comments from MassDEP which state that a Letter of Map Amendment should be filed with FEMA for all associated floodplain elevation amendments that will occur due to the installation of the flood wall and operation of the tidal gate, in accordance with the O&M plan to be submitted. Comments from MassDEP also note that there may have been a floodway established by FEMA in the Island End River in Everett. The Proponent must determine whether a FEMA designated floodway exists, and if so, conduct a no rise flood analysis. This information should be provided in the DEIR, as appropriate. The DEIR should also clarify the delineation of BLSF and LSCSF between Everett and Chelsea.

Waterways

The DEIR should clarify the extent of filled and flowed tidelands within the project site. The DEIR should address CZM and MassDEP-WRP's comments regarding the project's compliance with DPA standards and the potential to impact the intent of the DPA. It should address what design changes or other actions will be necessary in response to comments submitted by the property owners of 155 Market Street, and/or confirm that alignment of the flood barrier will be maintained as currently proposed. The DEIR should address project compliance with the referenced standards for all project elements subject to c.91 proposed outside and within the DPA. I refer the Proponent to MassDEP-WRP's comments for specific details and guidance regarding compliance with these standards. The DEIR should demonstrate that the flood control barrier along the DPA shoreline on the Everett side of the project does not diminish the DPA's function or take away potential future use by water-dependent industrial users. The proponent should address the following information in the EIR, as requested by CZM:

- Identify alternatives for the location of, configuration of, or type of flood barrier along the DPA shoreline which would minimize impacts to the functionality of the DPA. If no other alternatives are feasible, describe why.
- Demonstrate that the proponent has communicated with the existing water-dependent industrial users regarding the equipment they require to access the waterfront and how the proposed flood control barrier may affect ongoing DPA uses.
- Overall narrative explaining how the proposed flood control barrier does not diminish the DPA's purpose and current use.

The DEIR should evaluate opportunities to adding more gates or openings along the length of the flood barrier to increase public access and facilitate WDI uses. To the extent additional openings are deemed infeasible, the DEIR should discuss the specific reasons why and provide full explanation of how the proposed design meets c. 91 regulatory standards. The DEIR should report back on discussions with surrounding property owners. To the extent a realignment is necessary, the DEIR should provide a full assessment of impacts associated with the new design.

Public Benefits Determination

Consistent with the provisions of *An Act Relative to Licensing Requirements for Certain Tidelands* (2007 Mass. Acts ch. 168, sec.8) (the Act), now codified in M.G.L. c. 91, § 18B, I must conduct a Public Benefit Review for projects in tidelands that are required to file an EIR.

The legislation states the following regarding the PBD:

> "In making said public benefit determination, the secretary shall consider the purpose and effect of the development; the impact on abutters and the surrounding community; enhancement to the property; benefits to the public trust rights in tidelands or other associated rights, including, but not limited to, benefits provided through previously obtained municipal permits; community activities on the development site; environmental protection and preservation; public health and safety; and the general welfare; provided further, that the secretary shall also consider the differences between tidelands, landlocked tidelands and great pond lands when assessing the public benefit and shall consider the practical impact of the public benefit on the development."

The project exceeds EIR thresholds at 301 CMR 11.03. Therefore, I will issue a PBD in accordance with the regulations at 301 CMR 13.00. As a water-dependent use, the project is presumed to provide a public benefit; however, the DEIR should address the factors in 310 CMR 13.00.

Climate Change Adaptation and Resiliency

The DEIR should clarify under what conditions the stormwater pump station would be constructed, and whether this has any impact on the project flood benefits associated with the project, as described in the EENF. It should identify whether climate change impacts have been incorporated into inland flooding considerations during periods when the tide gate is closed. The EENF indicates that a stormwater modeler has been retained to generate a 2D hydrologic and hydraulic (H&H) stormwater model that used inputs from MC-FRM to evaluate the stormwater drainage network. The results of this modeling should be included in the DEIR if available. The DEIR should include stormwater design calculations and plans to confirm the storage capacity of the stormwater surge facility in order to demonstrate that a closed tide gate will not increase interior flooding. A joint probability analysis should be included assessing interior drainage of the 100-year, 24-hour storm when the tide gate is closed, as requested by MassDEP. The DEIR should discuss how this assessment would compare to storm conditions under future climate conditions, such as the 2070 50-year storm. Stormwater source reduction and treatment opportunities in the surrounding watershed to improve water quality and habitat in the Island End River and Mystic River should continue to be evaluated. The DEIR should supplement analysis of adaptation measures relative to future climate conditions, and whether the project has considered flexible adaption strategies.

Mitigation and Draft Section 61 Findings

The DEIR should include a separate chapter summarizing all proposed mitigation measures including construction-period measures. This chapter should also include a comprehensive list of all commitments made by the Proponent to avoid, minimize and mitigate the environmental and related public health impacts of the project, and should include a separate section outlining mitigation commitments relative to EJ populations. The filing should contain clear commitments to implement these mitigation measures, estimate the individual costs of each proposed measure, identify the parties responsible for implementation, and contain a schedule for implementation. The list of commitments should be provided in a tabular format organized by subject matter (traffic, water/wastewater, GHG, environmental justice, etc.) and identify the Agency Action or Permit associated with each category of impact. Draft Section 61 Findings should be separately included for each Agency Action to be taken on the project. The filing should clearly indicate which mitigation measures will be constructed or implemented based upon project phasing to ensure that adequate measures are in place to mitigate impacts associated with each development phase.

Responses to Comments

The DEIR should contain a copy of this Certificate and a copy of each comment letter received. In order to ensure that the issues raised by commenters are addressed, the DEIR should include direct responses to comments to the extent that they are within MEPA jurisdiction. This directive is not intended, and shall not be construed, to enlarge the scope of the DEIR beyond what has been expressly identified in this certificate.

Circulation

The Proponent should circulate the DEIR to each Person or Agency who previously commented on the ENF, each Agency from which the Project will seek Permits, Land Transfers or Financial Assistance, and to any other Agency or Person identified in the Scope. The Proponent may circulate copies of the DEIR to commenters other than Agencies in a digital format (e.g., CD-ROM, USB drive) or post to an online website. However, the Proponent should make available a reasonable number of hard copies to accommodate those without convenient access to a computer to be distributed upon request on a first come, first served basis. The Proponent should send a letter accompanying the digital copy or identifying the web address of the online version of the DEIR indicating that hard copies are available upon request, noting relevant comment deadlines, and appropriate addresses for submission of comments. If submitted in hard copy, the DEIR submitted to the MEPA office should include a digital copy of the complete document. A copy of the DEIR should be made available for review in the Everett and Chelsea Public Libraries.

April 14, 2023
Date

Rebecca L. Tepper

Comments received:

04/06/2023	Massachusetts Office of Coastal Zone Management (CZM)
04/06/2023	Massachusetts Division of Marine Fisheries (DMF)
04/06/2023	Massachusetts Department of Environmental Protection (MassDEP), Waterways Regulation Program (WRP)
04/07/2023	Auction Nominee Trust – property owner of 155 Market Street, Everett
04/07/2023	Boston Harbor Now
04/07/2023	Massachusetts Department of Environmental Protection (MassDEP), Northeast Regional Office (NERO)

RLT/ELV/elv

Chapter 1

PROJECT SUMMARY

CHAPTER 1: PROJECT SUMMARY

1.1 INTRODUCTION

On behalf of the Cities of Chelsea and Everett (the "Proponents"), this Draft Environmental Impact Report (DEIR) is submitted to the Executive Office of Energy and Environmental Affairs ("EEA") for the Island End River ("IER") Flood Resilience Project (the "Project"). The Proponents propose to construct an approximately 4,460 linear-foot ("lf") storm surge barrier, an approximately 3,000 square-foot ("sf") underground storm surge control facility ("SSCF"), approximately 18,000 square feet of nature-based approaches ("NbA") along the riverfront, and associated wetland and public access improvements along the IER in the Cities of Chelsea and Everett (the "Project Site") to protect over 5,000 residents. The approximately 5.2-acre Project Site is currently composed of a mix of commercial and industrial uses and supporting roadway and utility infrastructure. The existing banks of the river are highly degraded by legacy industrial uses and are comprised of hardened slope stabilization measures and littered with debris.

The Project is critical for the flood protection of the IER district and surrounding low-lying areas in Chelsea and Everett, which include the residences of under-served EJ communities, vital regional food distribution facilities, over 11,000 jobs, significant transportation (rail and roadway) infrastructure, health care facilities, a grocery store serving much of the community, and a public high school. As this district contains vital regional infrastructure facilities every effort was made to protect roadway access to seaward parcels to ensure private operator and public safety access to these facilities. These assets are all projected to be within the 100-year floodplain by 2070. This Project has selected for further review under the 2022 Federal Emergency Management Agency ("FEMA") Building Resilience Infrastructure and Communities ("BRIC") grant program to support construction funding starting in late 2025 and ending in late 2028.

Additionally, the Project will enhance natural resource areas, improve public access to the IER, and substantially improve Island End Park. Regional collaboration between the municipalities of the Mystic River watershed, nonprofit organizations, and other partners has been key to developing this flood protection initiative through extensive stakeholder input and community engagement.

This DEIR has been distributed to local, state, and federal agencies, as well as additional commenters on the February 2022 Expanded Environmental Notification Form (EENF) for the Project, in accordance with 301 CMR 11.16(3). See Attachment A, Distribution list. In accordance with 301 CMR 11.07(6)(1), the Proponents have also prepared responses to agency and public comments submitted during the EENF comment period. The responses along with copies of the comment letters are provided in Attachment B, Response to Comments.

1.2 PROJECT OVERVIEW

The Project includes the following critical flood resilience elements:

Resilience Provisions East ("RPE") – This Project element consists of a storm surge barrier along the Chelsea banks of the IER. Additionally, the Project will provide public amenities such as a resilient riverwalk, which has been designed to increase community access to the waterfront in the form of an elevated boardwalk and vegetated berm sections. The existing Island End Park is a mix of urban wild and manicured greenspace and provides the community with limited waterfront access. The park will be refreshed as part of the Project to enhance the community's enjoyment of the space and to increase the resilience of this parkland to rising tides. This element protects not only critical regional infrastructure in Chelsea but will also safeguard several residences within neighborhoods comprised of Environmental Justice ("EJ") Populations.

Storm Surge Control Facility ("SSCF") – This structure will be constructed at the outlet to the IER of the existing Market Street Culvert to prevent inland flood damage during coastal storm events. The catchment area for this outlet is approximately 420 acres within which the population has been determined to be EJ or underserved. The control gates will normally be open to allow for tidal flow into culverted and daylighted sections of the IER. Additionally, control measures will be installed on the Beacham Street drainage system to prevent backflow into the existing stormwater drainage system.

Resilience Provisions West ("RPW") – This project element consists of a storm surge barrier along the Everett banks of the IER, which is situated in the Mystic River Designated Port Area ("DPA"), in the form of vertical freestanding concrete wall and flood gates to protect working port businesses from coastal inundation. This element protects not only water-dependent industrial uses ("WDIUs"") in the DPA but other critically important infrastructure including key transportation corridors and homes for more than 5,000 residents comprised of EJ Populations.

Nature-based Approaches ("NbA") – Existing degraded riverfront slopes in portions of the Project Site will be reimagined using NbA consisting of tiered cobble beach nourishment underpinned by coir logs and with integrated coastal and upland plantings. This Project component will provide slope stabilization to prevent further erosion while also allowing for nourishment of the coastal beach along the IER waterway. This design is adaptive and will provide opportunity for intertidal vegetation to migrate landward as the sea level rises. Areas proposed for NbA treatment include the IER shoreline directly adjacent to both sides of the SSCF, as well as along the shoreline of Island End Park.

Wetlands Enhancements – The Project will improve the health of the remaining salt marsh along the Chelsea banks of the IER by removing invasive Phragmites (*Phragmites australis*), replanting with and maintaining native species, and removing significant deposits of existing trash and debris in this resource area. Additionally, it will address issues of erosion and sparse vegetation on coastal bank resource areas around the IER through robust native planting program and slope stabilization efforts.

IER Park Revitalization – The Island End River Park will be revitalized as a climate resilient space with a climate-adaptable, coastal planting palette coordinated with adjacent nature-based approaches to shoreline stabilization and resilience. The design responds to community feedback indicating a desire for a contemporary space with pathways for active recreation, like jogging and walking, as well as plenty of space to sit and take in the views of the water. The new park design elevates passive use park space above 2070 tidal cycles, eliminates the low-elevation, wood gazebo that was structurally vulnerable to storm surge and future tides, and provides new durable seating to withstand potential inundation. A planting palette that includes shade trees will help combat the local urban heat island effect.

1.3 EXISTING CONDITIONS

The IER is a tributary to the Mystic River and is tidally influenced. The IER is abutted by Everett on its western bank and Chelsea on its eastern bank. It has a Federal Navigation Channel that consists of a six-foot-deep, 2,500-foot-long channel extending from the Mystic River the Admirals Hill Marina in Chelsea. The channel is 75 feet wide at its upstream end and 100 feet wide at its downstream end. The surrounding area is heavily developed with high amounts of impervious surfaces and undersized stormwater infrastructure. The area is home to critical infrastructure including the New England Produce Center, the regional FBI headquarters, Massachusetts General Hospital's ("MGH") Chelsea HealthCare Center, the City of Chelsea's Carter Street Pump Station, Williams Middle School, and Chelsea High School. The Project Site itself contains facilities ranging in uses from industrial, such as cold storage and liquified natural gas distribution, to recreational, such as Island End Park. See Figure 1-1, Project Locus and Figure 1-2, Project Site Aerial.

Historically, the IER region has experienced consistent flooding during relatively minor precipitation events, while experiencing significant coastal flooding during recent storm surge events and king tides. This is largely because the original course of the IER and its floodplain, anchored by the Beacham Street corridor, was gradually filled for development on top of former tidal flats and marshes in the late 1800s through the mid-1900s. As such, much of the Project Site is within Chapter 91 jurisdiction. See Figure 1-3, Project Overview.

More than 400 acres in Chelsea and Everett compose the catchment area inherently vulnerable to flooding, because of the area's topography and hydrology, specifically resulting from the replacement of flood storage area with impervious surfaces and the culverted IER. The IER is culverted through the Market Street Culvert, a substantially deteriorated corrugated iron culvert constructed by Eastern Gas in approximately 1965, extending approximately 1,240 feet north to a portion that has been recently daylighted to accommodate tidal action upstream of the outfall and in response to repeated failures along that section of the culvert. Riverfront slopes are hardened using stone rip rap of varying sizes, as well as areas of other structural debris. Survey of the existing culvert outfalls identified stone rip rap conditions continuing down to the bottom of the river. Only the center of the channel at the outfalls and an approximately 10-foot radius around them is loose soil and debris material, which likely creates sedimentation and other water quality issues within IER waters today. See Figures 1-4 through 1-17 for existing conditions photographs of the Project Site.

FEMA has mapped the 100-year and 500-year coastal flooding events in their Flood Insurance Rate Maps ("FIRM"). The Project is currently located in two FEMA Flood Zones: 1) AE El. 10' NAVD88, FIRM No. 25017C0443E, dated June 4, 2010, and 2) AE El. 10' NAVD88, FIRM No. 25025C0018J, dated March 16, 2016. Though the current FIRM map panel representing this portion of Everett shows only moderate flooding, the adjacent mapping for Chelsea shows significantly larger flooding extents. This inconsistency is due to the FIRM representing Chelsea being re-mapped on March 15, 2016, as part of updates to Massachusetts Suffolk County FIRMs, as opposed to Everett's June 3, 2010, effective date for Massachusetts Middlesex County FIRMs. The Chelsea FIRM is representative of the flooding that can be expected in this area up to Elevation ("El.") 10' NAVD88 from the current 100-year flood event. FEMA's pending FIRM 25017C0443F for the City of Everett was originally released on August 13, 2021, and this preliminary map was recently redistributed to the community on June 8, 2023, but is not yet officially adopted. This preliminary map better reflects the true flood risks faced by the IER watershed in Everett and has been included in this filing. See Figure 1-18, FEMA FIRM 25025C0018J and 25017C0443E; and Figure 1-19, Pending FIRM for the City of Everett.

1.4 PROJECT DESCRIPTION

The Project includes six key elements, including the publicly accessible RPE, the efficient RPW within the Mystic River DPA, the essential SSCF protecting existing storm drainage infrastructure, stabilization of the IER riverbanks through NbA, the restoration of coastal wetland resource areas, and the revitalization of the Island End Park. The entire Project will include approximately 4,460 lf of protective storm surge barrier system, an approximately 3,000 sf underground SSCF, approximately 18,000 sf of NbA along the riverfront, approximately 22,250 sf of wetland enhancements, and approximately 9,400 sf of park improvements. Additionally, Island End Park will be substantially improved through construction of connecting walkways, multilingual interpretive signage, new benches, bike racks, and other site furnishings, native landscape plantings and trees. See Figure 1-20, Island End River Flood Resilience Project Annotated Exhibit; Figures 1-21 through 1-29, Project Renderings; and Attachment C, Project Plans.

The Project's preferred alternative, which is detailed below for each main Project Component, is the result of an extensive alternatives analysis informed by the City of Chelsea and Everett's resilience needs; discussions with regulatory agencies, area stakeholders, and community members; and the engineering constraints posed by the land uses and complex environmental conditions at the Project Site. See Chapter 1 of the EENF for the initial alternatives analysis for the Project and Chapter 2 of this DEIR for a further alternatives analysis focusing on Coastal Bank and Beach stabilization measures.

Resilience Provisions East

The goal of the RPE segment of the Project is to prevent overland storm surge flooding to the low-lying areas of the region, in coordination with the RPW segment of the Project. Additionally, this segment will provide an opportunity for the community to engage with the natural coastal resources that the IER has to offer through accessible connected waterfront pathways. The alignment of flood protection measures along the RPE portion of the Project includes a coastal free-standing flood wall, hybrid vegetated berm, and paved berm sections near Justin Drive. See Figure 1-30, Resilience Provisions East Exhibit, and Attachment C, Project Plans, Plan Sheets, RPE-C-101 and RPE-C-102.

The RPE barrier alignment is a coastal free-standing storm surge barrier with deep foundation elements connecting from higher grade at Justin Drive to the RPW storm surge barrier at the Everett/Chelsea municipal boundary to the west, through the Mystic River DPA along Market Street. Market Street is a heavily trafficked public roadway, regularly traveled by large freight vehicles that require maintaining the width of the existing public right of way for vehicle passage. From the edge of the right of way, a guard rail provides protection from the physical impact of turning freight vehicles between the barrier alignment and the edge of pavement. Barrier construction will be driven sheet pile with a form finished architectural concrete cap on each landward and waterward exposed facets. Adjacent riverfront plantings and surface treatments are described below in the Nature-based Approaches and Wetlands Enhancements section of this document.

See Table 1-1: IER Resilience Provisions East –Storm Surge Barrier Design Elements for quantities associated with this scope of work.

Table 1-1: IER Resilience Provisions East –Storm Surge Barrier Design Elements

Project Element	Quantity	Unit
Storm Surge Barrier – Free-Standing Flood Wall	190	lf
Resilient Riverwalk – Elevated Pedestrian Boardwalk	725	lf

Storm Surge Control Facility

The goal of the SSCF segment of the Project is to prevent dangerous and damaging coastal flooding from the IER via the existing storm drainage network during extreme coastal events. The structure will allow regular tidal flushing of brackish water from the IER via the Market

Street culvert to the upstream open channel, in the same way as the existing Market Street culvert system. During extreme coastal events, gates will be closed when water reaches El. 7.0 to prevent flow upstream through the storm drain infrastructure. This tidal elevation or higher has been demonstrated to cause damage to local and regional commerce and industry, as well as municipal and private utility services, community support infrastructure, and residences. The structure is needed as a critical piece of the Project to allow inland environments to continue benefitting from the daily tidal flows from the IER while also preventing extreme coastal surge from bypassing the storm surge barrier provisions and causing inland damage to critical infrastructure and the homes of EJ or underserved populations. See Figure 1-31, Storm Surge Control Facility, and Attachment C, Project Plans, Plan Sheets, SSCF-C-101 through SSCF-C-103.

The SSCF is designed to pass current and future stormwater flows and will be coordinated with long term regional stormwater capital improvements plan. The basis for SSCF hydraulic design is detailed in Chapter 7, Stormwater and Flood Resiliency. Where accessible to vehicular traffic, the structure will be designed for AASHTO HL-93 wheel load of 16 kips plus 30% impact at a minimum. In other locations the design will be suitable for anticipated maintenance operations, snow, equipment, hydrostatic loads, earth loads, and other Project elements. The SSCF will be supported on a deep pile foundation.

The SSCF will permit bi-directional flow during normal operation by use of combination flap gate valves that are normally in the 'Open' position. It will connect to the inland existing Market Street Culvert via a short culvert section and transition structure. The SSCF will connect to the IER via a short culvert section and headwall structure. In addition to the valves, the SSCF is proposed to contain an inland bar rack and rock traps on both sides of the gates to facilitate maintenance. Roll-up gates are proposed for isolation of the inland and riverside culverts. Each gate can be isolated for maintenance using stop logs. The gate actuators will be located aboveground and above the design flood elevation of El. 14 NAVD88. Providing some view shielding through plantings or other means will be investigated as part of final design. Access will be provided from the surface via hatches and maintenance holes. On the waterside of the structure, maintenance access will be required to be bolted to withstand the hydraulic head of the high water. The structure and access points inland of the gates will be located at approximately existing grade. The actuators are proposed to maintain a charge in the event of a power failure so they could still operate on a limited basis without a permanently installed generator. The footprint of the structure is approximately 41 feet wide by 70 feet long.

The SSCF is sized to accommodate peak flows from the Market Street culvert. As part of this Project, the SSCF will be connected to a 16′ by 12′ box culvert that transitions to the existing culvert. The existing Beacham Street 8′-6″ by 6′-1″ arch section culvert and local drainage will be rerouted to facilitate construction of the SSCF on the Market Street culvert. See Table 1-2: IER Storm Surge Control Facility Elements for a summary of Surge Control Structure project elements.

Table 1-2: IER Storm Surge Control Facility Elements

Project Element	Quantity	Unit
Storm Surge Control Facility Footprint	3,000	sf
Outfall Headwall	194	lf
Outfall Erosion Protection Concrete Pad	600	sf
Outfall Erosion Protection Rip Rap	2,850	sf
Combination Gate and Actuator Quantity	3	Units
Combination Gate and Actuator Cross Sectional Area	192	sf

The localized drainage system at the intersection of Beacham and Market Streets will be routed through the Beacham Street outfall. The Beacham Street outfall will be rebuilt adjacent to the Market Street Culvert outfall along with a headwall and rip rap system to stabilize this embankment and address existing erosion patterns from this tidally influenced drainage system. The Beacham Street outfall will incorporate a flap gate valve or duckbill gate to prevent brackish flow into the existing drainage system. Unlike the Market Street Culvert, the Beacham Street drainage system has no daylighted stream section that could potentially benefit from daily tidal exchange.

The proposed design also considers the possibility of connection to a future stormwater pump station that would provide additional capacity and the capability to drain the stormwater system during high tidal or storm events, when needed. Since the need for and details of this potential pump station has not been determined, no permanent facilities are included in the design. Instead, knock out panels that would facilitate a future connection have been included in the SSCF.

Resilience Provisions West

The goal of the RPW segment of the Project is to prevent overland storm surge flooding, in coordination with the RPE segment of the Project, to the low-lying areas of Chelsea and Everett, while respecting the operations of the working waterfront businesses in the Mystic River DPA. The RPW segment of the Project includes an approximately 3,470-lf Everett portion of the storm surge barrier and eight flood gates of varying types that will remain open during normal conditions to accommodate continued access to roadways and properties but can be closed during flooding events. See Figures 1-32, Resilience Provisions West Exhibit and Attachment C, Project Plans, Plan Sheets RPW-C-101 – RPW-C-107.

The proposed flood gates include a combination of active gates and passive gates, sealing against coastal flooding as flood waters rise. The active flood gates will be operated by the City of Everett Department of Public Works, which will notify and coordinate with the District's stakeholders to facilitate preparations for anticipated flood events and gate closures.

The RPW flood barrier alignment will begin at the Everett/Chelsea municipal boundary where it connects to the RPW portion of the barrier. It will run generally southwesterly along the southern shoulder of Market Street, then will exit the roadway to continue through portions of #95 Behen Street, #87 Behen Street (crossing the existing industrial rail spur (the "DPA Rail Spur") where it bisects this property), and #40-60 Commercial Street. It will then turn to continue northwesterly along the #40-60 Commercial Street property line where it will enter Commercial Street and continue southwesterly on the roadway shoulders, passing from the southern to northern shoulder in front of #101 Commercial Street. Upon reaching Rover Street it will turn northerly along the roadway's northern shoulder where the wall will terminate at the existing retaining wall at the southeast corner of the existing vacant building.

Access to each property and roadway along the RPW alignment, as well train passage along the DPA Rail Spur, will be maintained by one or more flood gates incorporated into the barrier to support continued business operations in the DPA. See Chapter 5, Mystic River Designated Port Area, for detailed analysis on this topic. Drainage improvements consisting of new drainage pipes, deep sump catch basins, and manholes will be constructed in tandem with the RPW alignment to improve drainage conditions along its extent and prevent stormwater ponding along the edge of the barrier.

The RPW storm surge barrier alignment will provide flood protection from historic and future increases in sea level rise and coastal storm surge to the critical facilities inland of the alignment. The footing of the storm surge barrier wall will taper from approximately elevation 6.5′ to elevation 10′, to mitigate the aesthetic impact of the free-standing wall and to maintain a top-of-wall elevation of 14.5′ to 15′. Barrier construction will be driven sheet pile with a form-finished architectural concrete cap on each land and waterward exposed facets. See Table 1-3: IER Resilience Provisions West – Storm Surge Barrier Design Elements for a summary of RPW project elements.

Table 1-3: IER Resilience Provisions West – Storm Surge Barrier Design Elements

Project Element	Quantity	Unit
Inland Free-Standing Concrete Storm Surge Barrier	3,469	lf
Passive Flood Gate – 1 Roadway Crossing	27	lf
Active Flood Gates – 2 Rail Crossings	76	lf
Active Flood Gates – 5 Driveway Crossings	170	lf

Nature-based Approaches

The Project's NbA will stabilize the existing degraded IER shoreline east and west of the SSCF using cobble beach nourishment, which is a method successfully employed in other coastal contexts in Massachusetts such as at Coughlin Park in Winthrop. These areas will additionally include high and low coastal beach plantings to provide greening of the IER shoreline and improve its ecological value. See Figures 1-33 Nature-based Approaches Exhibit and Attachment C, Project Plans, Plan Sheets NBA-L-101, NBA-L-102, and NBA-L-302. This proposed NbA, which replaces the tiered planter system proposed in the EENF, is the result of discussions with state agencies and an extensive alternatives analysis presented in Chapter 2.

Cobble beach nourishment includes removal of existing loose construction debris and placement of cobble over anchored coir envelopes with bands of planting soil at multiple elevations. Intertidal vegetation that will be planted within and will have opportunity to transition landward with sea level rise. Use of rounded stone limits grades to 3:1. Cobble sizes are matched to existing stone sizes and can be expected to provide similar stability and erosion control to the existing stable slopes. Use of smaller material ensures that on-foot site managers can monitor and maintain soils and vegetation with low risk of erosion following Project construction. The cobble is sized to permit some minor migration to allow for vegetation to propagate further into the banks and further stabilize the slope over time.

The intent of this Project component is to mimic a pre-erosion natural cobble shingle tidal riverbank slope populated by a diverse spectrum of plant species with varying degrees of saline environment affinity, allowing it to evolve as conditions change. This portion of the program also recognizes the need for adaptive management as the site is in an isolated urban environment and does not benefit from the natural seed and root inputs that a similarly disturbed site would receive if surrounded by natural landscapes. During the plant establishment period, conditions will be observed and adjusted, and supplemental seed and plant stock will be added. This will be followed by adaptive management program to compensate for the added pressures of life in the urban environment such as litter, invasive species, and isolation.

Wetlands Enhancements

The proposed wetlands enhancements will expand the existing Chelsea salt marsh into degraded areas devoid of vegetation, and other areas where trash and detritus have accumulated and where Phragmites and other invasive species have crowded out native salt marsh grasses, resulting in loss of salt marsh coverage. These areas will be cleared and replanted with suitable salt tolerant native wetland species using the methods detailed below. See Figure 1-34, Wetlands Enhancements Exhibit and Attachment C, Project Plans, Plan Sheets RPE-L-102-RPE-L-103.

There are two locations within the existing salt marsh along Chelsea's IER shoreline where vegetation is not present even though the substrate is suitable for vegetation. The Project proposes to restore these areas with salt tolerant plantings. It was important in this design that native species that were already growing at the Project Site be used. Salt marsh inundation levels cause distinct vegetation bands due to the sensitivity of plants to the length of inundation. Low marsh extends from mean sea level to the mean highwater mark and is dominated by smooth cordgrass (*Spartina alterniflora*). Revegetating areas will entail the placement of Spartina plugs on top of existing exposed wetland substrate (peat) above El. 2.0 NAVD88, which is over two feet above the mid-tide line (El. -0.42 NAVD88).

The Project proposes to extend wetlands enhancements into filled land above delineated extent of existing salt marsh by removing the adjacent existing wooden boardwalk, a portion of the existing hot mix asphalt pavement parking lot, and urban fill substrate to a point where native wetlands substrate is identified and then backfill with appropriate wetlands substrate soils and plant with suitable plants and seed mixtures at grade. The scope will seek to replicate approximately 2,745 sf of salt marsh to offset approximately 1,864 square feet of impacted wetlands resulting from removal of existing wooden boardwalk and construction of the Project, for an overall net increase of the resource area. The impacted existing area is of low ecological value due to accumulation of trash and detritus and presence of invasive Phragmites beneath, and inland, of the existing wood boardwalk. The Proponents are committed to maintaining the space following construction and see it as an opportunity for ecological improvements, aesthetic betterment paired to new community green space in the Project area, and that it may provide a limited space for wetlands migration with future sea level rise.

Island End Park

Island End Park is a small municipal park adjacent to IER in Chelsea which contains an existing gazebo, walking paths, and a connection to a wooden boardwalk surrounding a small pocket of existing salt marsh. Although this small park has the potential to be a significant asset to the community, it is rarely enjoyed by the public because there is no direct access from the main road (Beacham Street) and there is very little public parking available. Additionally, the views from the boardwalk are largely blocked by a stand of common reed (*Phragmites australis*) which reduces the public appeal.

The Project proposes to reconstruct the Island End River Park as a climate resilient space with a climate-adaptable, coastal planting palette coordinated with adjacent nature-based approaches to shoreline stabilization and resilience. The design responds to community feedback indicating a desire for a contemporary space with pathways for active recreation, like jogging and walking, as well as plenty of space to sit and take in the views of the water. The new park design elevates the passive use park space above 2070 tidal cycles, eliminates the low-elevation, wood gazebo that was structurally vulnerable to storm surge and future tides, and provides new durable seating to withstand potential inundation. A planting palette that includes shade trees will help combat the local urban heat island effect.

The planting palette for the Park takes its cue from the shoreline plantings to maintain a consistent native shoreline aesthetic. The plantings were selected for their ability to withstand salt spray and short-term inundation. The planting plan includes small plants densely planted along the interface between the Park and the shoreline stabilization to minimize bare ground and quickly establish cover. This will minimize erosion from rain events early in the Park's life and from storm surge events in the future. A paved path creates an accessible route through the Park, but the impervious surface is kept to a minimum to both allow stormwater to infiltrate and to maximize the square footage of vegetated cover to slow future surge events. See Figure 1-29 Project Rendering – Island End Park Improvements Viewed from the Island End River, and Attachment C, Project Plans, Plan Sheets RPE-C-102, RPE-L-101, and NBA-L-301.

1.5 PROJECT REVISIONS SINCE THE EENF FILING

In response to feedback from state agencies and other parties during the EENF public comment period, as well as continued feedback from stakeholders and the community, several Project components have been revised to reduce impacts to the environment and surrounding areas while still maintaining the Project overall goals of improving flood resilience in the IER district, enhancing public access to the waterfront, and restoring existing degraded resource areas. These Project design alterations include:

- Rerouting the previously proposed RPW storm surge barrier alignment within the Mystic River DPA from: 1) the IER shoreline to further inland areas including the Market Street shoulder and landward of the existing DPA Rail Spur, and 2) from the northeastern #101 Commercial Street property line to primarily within the Commercial Street right of way and along the southeastern #18 Rover Street property line;

- Replacing the previously proposed terraced concrete planter system with NbA consisting of cobble beach nourishment, coir logs, and coastal and upland plantings;

- Reducing the previously proposed footprint of the SSCF outlet structure, including the associated dredging and headwall; and

- Incorporating a resilient redesign of Island End Park to enhance the community's use of this parkland and to provide flood resiliency from rising tides.

- Eliminating solid fill in favor of pile supported ramps providing accessibility down to the Island End Park, which will allow passage of flow during high water events.

This revised scope of work provides a net decrease of permanent environmental impacts as compared to the scope proposed in the EENF. See Table 1-4, Summary of Project Changes since the EENF.

Table 1-4: Summary of Project Changes since the EENF

Metric	EENF	DEIR	Net Change	Notes
Project Site (acres)	9.5	5.2	-4.3	Shortened flood barrier alignment within Everett and associated reduction in extent of NbA along IER
Barrier Length (lf)	4,640	4,460	-200	Shortened flood barrier alignment within Everett
Storm Surge Control Facility (sf)	2,900	3,000	+100	Design refinements resulted in minor horizontal dimensional changes, overall reduction in vertical scale
Nature-based Approaches (sf)	50,000	18,000	-32,000	Reduction in extent of NbA along IER
Alteration of BVW (sf)	1,656	0	-1,656	Updated wetlands delineation in the area of the existing boardwalk based upon additional assessment
Creation of BVW (sf)	1,641	0	-1,641	Updated wetlands delineation in the area of the existing boardwalk based upon additional assessment
Alteration of Salt Marsh (sf)	0	1,836	+1,836	Updated wetlands delineation in the area of the existing boardwalk based upon additional assessment
Creation of Salt Marsh (sf)	800	2,745	+1,945	Updated wetlands delineation in the area of the existing boardwalk based upon additional assessment
Wetlands Impacts (sf - temporary)	135,054	107,339	-27,715	Reduction of Project Site area
Wetlands Impacts (sf - permanent)	211,456	97,428	-114,028	Reduction of Project Site area
Dredge/Fill (cubic yards)	1,438	613	-825	Elevated scour pad elevation from EL -11 NAVD88 to EL -9.5 NAVD88

1.6 PROJECT IMPLEMENTATION

The Proponents have been working to educate and inform residents, businesses, and regional entities of the increasing risk within this floodplain for nearly a decade. The community process leading up to the 2016 issuance of updated Suffolk County FIRM maps initiated significant dialogue on the expansive nature of this floodplain, which extends well inland of the Island End River and has the potential to intersect with other flood pathways from upstream segments of the Mystic River and Chelsea Creek in extreme storm events. Following the issuance of these FIRM flood maps, the City of Chelsea applied for and received a MA CZM Coastal Resilience grant award to study its vulnerability to rising sea level due to climate change and focused on IER as a priority study area. A regional partnership followed with the City of Everett to work in tandem in this vulnerable location along the Chelsea/Everett city and Middlesex/Suffolk County borders. In the following years, both cities expanded their knowledge of this critical flood vulnerability through EEA Municipal Vulnerability Preparedness ("MVP") planning projects and hazard mitigation plan updates and incorporated substantial outreach into these processes to gather feedback from the community and increase public awareness of this flood hazard. The feedback and data gathered during these processes informed the design for a storm surge barrier along the IER, and identified that project implementation would require easements on private properties.

Construction of the Project will take place within temporary and permanent easement areas that follow the Project alignment. The permanent easements and temporary work area easements will balance interests to protect and enhance the wetlands resources and resilience, while enabling private property owners to continue to operate their commercial businesses. The Proponents have circulated Intent Letters to private property owners within the Project Site as a predicate to commencing formal easement acquisition discussions and are committed to pursuing negotiated easement agreements. While negotiated easement agreements are the preferred approach, should agreements for the acquisition of the temporary and permanent easements required to construct the Project prove unsuccessful, the Proponents will undertake acquisition of such rights through the statutory procedures of M.G.L. 79 in order to facilitate this critical infrastructure project, protect human health and safety, and ensure the future economic viability of this regionally vital industrial district.

1.7 PUBLIC AND COMMUNITY BENEFITS

The Project's substantial public and community benefits include but are not limited to:

- Introduction of coastal flood resilience improvements to protect approximately 11,000 jobs, critical transportation corridors, key assets such as the MGH Chelsea HealthCare Center, Williams Middle School, Chelsea High School, Excel Academy, and a regional FBI Headquarters, and residences occupied by EJ communities within the Cities of Everett and Chelsea;

- Improvement of the IER shoreline through stabilization of eroded riverbanks with NbA that mimic natural cobble tidal riverbank slopes and plantings;
- Enhancements to the existing degraded salt marsh that will improve habitat functions and generate awareness of natural resources;
- Reduction of impervious surfaces within the Project site to increase groundwater recharge and minimize stormwater runoff;
- Investment in the existing Island End Park, including new connecting walkways, multilingual interpretive signage, new benches, bike racks, and other site furnishings, native landscape plantings and trees to enhance habitat and address urban heat island effect, and other amenities;
- Creation of community stewardship opportunities for Island End Park and proximate resource areas;
- Creation of between 670-1,000 construction jobs over the projected 36 months of construction of the Project;
- Establishment of the Community Advisory Group, composed of more than half a dozen community members, to provide input on the public benefits of the Project; and
- Formation of the Stakeholder Working Group, composed of over 20 representatives from private sector industrial businesses in Chelsea and Everett, to contribute feedback on the Project.

1.8 COMMUNITY AND AGENCY OUTREACH

Since 2016, the Proponents have tirelessly worked to gather input from community groups, business owners, and local, state, and federal agencies to inform the design of the Project. The Proponents have held numerous meetings and public engagements since the start of the Project. For a list of these events leading up to filing the EENF in February of 2023, see the EENF. Subsequent community outreach activities held between that time and the filing of this DEIR are included in Chapter 3, Environmental Justice.

In addition to continued robust community engagement, the Proponents and their representatives have held numerous meetings with local, state, and federal agencies to refine the design and be responsive to comments submitted by agencies during the EENF process. Agency outreach has included multiple individual meetings with staff from MassDEP Wetlands, MassDEP Waterways, as well as CZM. A joint meeting was held on October 17, 2023 with these agencies and others, including the U.S. Environmental Protection Agency ("EPA"), the Division of Marine Fisheries ("DMF"), the National Oceanic and Atmospheric

Administration ("NOAA"), the U.S. Army Corps of Engineers ("USACE"), and MEPA staff, to provide a project update and have a collaborative conversation on design refinements such as the revised NbA and additional DPA considerations that present overlapping agency jurisdiction considerations. Additionally, the Proponents continued to meet with their local Conservation Commissions and representatives of project funding agencies, including the EEA MVP program and the Massachusetts Emergency Management Agency ("MEMA"), to provide project updates and receive feedback to incorporate into the Project design.

1.9 MEPA HISTORY & REQUEST FOR ROLLOVER FEIR

An Environmental Notification Form ("ENF") for an earlier iteration of the Chelsea portion of the Project was submitted to EEA in April of 2021. The City of Chelsea subsequently rescinded the ENF to allow time for collaboration with the City of Everett and the development of the full regional flood resilience effort that now constitutes the Project. An EENF was filed for the full Project on February 15, 2023, and noticed in the Environmental Monitor on February 24, 2023. The Proponents requested to file a Single Environmental Impact Report ("SEIR") for the Project in the EENF. The comment period closed on April 7, 2023, and the Secretary of Energy and Environmental Affairs issued a Certificate on EENF (the "EENF Certificate") on April 14, 2023. In the EENF Certificate, the Secretary denied the request for an SEIR and required submission of a DEIR. As such, this DEIR is submitted to EEA in accordance with the EENF Certificate.

Since the issuance of the of the EENF Certificate, the Proponents have worked tirelessly to meet with federal and state agencies, stakeholders, and the community. The Proponents have continued community outreach and participation on the Project through continued Stakeholder Working Group meetings, Community Advisory Group meetings, engagement of Artists-in-Residence to support public awareness of the Project and climate education, a dedicated coUrbanize community engagement website project page, and other measures. Based upon these efforts and this filing, the Proponents are requesting that MEPA *determine that no substantive issues remain to be addressed* and rollover this draft EIR for review as a final EIR in accordance with 301 CMR 11.08(8)(b)(2).

The Proponents have collaborated directly with state and federal agencies in the identification of this highly vulnerable floodplain and in the design of structural and natural methods to incorporate flood protection and riverfront enhancements into the Project. Numerous meetings have been conducted with state and federal agencies to support consensus in approach to this project of regional importance.

Both the original EENF and this DEIR filing comply with MEPA's Rollover (or "Proposed") EIR filing guidance related to a comprehensive analysis of Project and potential impacts to the public and specifically, to environmental justice populations, as follows:

1. *Presents a complete and definitive description and analysis of the Project and its alternatives, and an assessment of its potential environmental and public health impacts and mitigation measures sufficient to allow a Participating Agency to fulfill its obligations in accordance with M.G.L.c.30. §§61 and 62K and 301 CMR 11.12(5);*

   Compliance: The EENF provided a comprehensive Alternatives Analysis of all components of the flood protection system. The DEIR expands upon this analysis by including an alternatives analysis focused specifically on Nature-based Approaches and wetland resource areas (see Chapter 2, Alternatives Analysis), which include a thoroughly documented description of anticipated resource area impacts and the Project's compliance with wetlands regulations (see Chapter 4, Tidelands and Chapter 6, Wetlands and Water Quality). All feasible measures have been taken to reduce and mitigate any adverse Project impacts.

2. *Demonstrates that the Project will not materially exacerbate an existing unfair or unequitable Environmental Burden and related public health consequences impacting an EJ population, and will not result in a disproportionate adverse effect or increased climate change impacts on an EJ population;*

   Compliance: Both the EENF and the DEIR contain an expanded analysis of environmental impacts, including on public health impacts on EJ Populations. See Chapter 3, Environmental Justice. The Project provides flood protection to more than 5,000 residents living in census blocks mapped as EJ Populations. The Project will result in considerable long-term net benefits and will significantly improve local environmental conditions. The Project will increase landscaping, reduce urban heat island effects, model best practices, and create innovative natural solutions to the risks posed by climate change and sea level rise. In addition, the Project will improve public amenities along the river with new lighting, benches, and views of the river. The Proponent has directly engaged with community organizations that serve EJ populations in Chelsea and Everett to incorporate meaningful opportunities for EJ populations to benefit from the Project and to increase the awareness of the Project Site as a regional benefit for all residents.

3. *Describes measures taken to provide meaningful opportunities for public involvement by EJ populations prior to filing the dual ENF and Proposed EIR; including any changes made to the Project to address concerns raised by or on behalf of EJ populations;*

   Compliance: As the Project is within a mile of identified EJ Populations, there has been an extensive effort to inform, engage, and empower the EJ population and provide meaningful opportunities to participate in the design of the Proposed Project. Since 2016, the Proponents have worked with community partners to identify this vulnerable flood pathway and educate the community about climate change and flood risk. In 2021, the Proponents initiated direct stakeholder groups, the Stakeholder Working Group and the Community Advisory Group, who have helped to shape this important project. The Proponent is committed to further engaging the surrounding EJ Populations to seek feedback on issues of importance to these communities. Throughout the design and permitting phase of the Project, the Proponent anticipates meeting with additional CBOs and providing notice of any public meetings, site visits, or other updates to the CBO Distribution List.

4. *Shows that comments received on the dual ENF and Proposed EIR do not raise substantial issues not previously considered by the Proponent; and*

   Compliance: The Proponent looks forward to continued discussion with MEPA and state environmental agencies, as well as the public, during the review of this filing and the comment period. Should any minor issues arise during this review, the Proponent would be happy to provide MEPA with responses to any questions and updated Proposed Section 61 Findings to be circulated as a Final EIR in accordance with MEPA guidance on Rollover (or "Proposed") EIR approval process.

5. *Shows that no substantive issues remain to be resolved.*

   Compliance: The Proponent looks forward to continued discussion with MEPA and state environmental agencies, as well as the public, through the review of the EENF and DEIR. The Proponent believes that extensive outreach to all parties in advance of this filing has allowed it to substantially address community and agency feedback and refine the Project to warrant the approval of a Rollover FEIR by the Secretary.

As the Project is on a fast-track schedule to address a critical regional flood pathway that currently endangers EJ Populations in Chelsea and Everett, a Rollover FEIR is requested to accelerate the permitting process for this important flood resilience project that will protect the community.

1.10 SUMMARY OF REQUIRED PERMITS AND APPROVALS

The following table lists the anticipated approvals for the Project.

Table 1-5, Anticipated Project Approvals

Agency	Approval
Local	
City of Everett	• Utility Connection Permits
Everett Conservation Commission	• Order of Conditions (Wetlands Protection Act)
City of Chelsea	• Utility Connection Permits
Chelsea Conservation Commission	• Order of Conditions (Wetlands Protection Act)
State	
Executive Office of Energy and Environmental Affairs	• Secretary's MEPA Certificate
Massachusetts Department of Environmental Protection	• Chapter 91 License • 401 Water Quality Certification
Office of Coastal Zone Management	• Federal Consistency Review
Federal	
U.S. Army Corps of Engineers	• Pre-Construction Notification and/or Individual Permit
Environmental Protection Agency	• NPDES Construction General Permit & Remediation General Permit
Federal Emergency Management Agency	• Conditional Letter of Map Revision (CLOMR) • Letter of Map Revision (LOMR)

1.11 PROJECT TEAM

The following table lists the members of the Project Team.

Table 1-6: Project Team List

Team Member	Contact Information
Proponents	City of Chelsea 500 Broadway Chelsea, MA 02150 Contact: Alexander Train, AICP atrain@chelseama.gov (617) 466-4192 City of Everett 484 Broadway Everett, MA 02149 Contact: Erik Swanson, P.E. erik.swanson@ci.everett.ma.us (617) 394-2251
Planning/Permitting	Fort Point Associates, A Tetra Tech Company 31 State Street, 3rd Floor Boston, MA 02109 Contact: Katie Moniz, P.E., AICP, CFM kmoniz@fpa-inc.com (617) 279-4388

Team Member	Contact Information
Engineering Design	AECOM 250 Apollo Drive Chelmsford, MA 01824 Contact: Mark Meserve, P.E. mark.meserve@aecom.com (978) 905-3146 Tetra Tech (Civil) 498 7th Avenue, 15th Floor New York, NY 10018 Contact: Jake Oldenburger, P.E., CFM, ENV SP Jake.Oldenburger@tetratech.com (646) 576-4023 Weston & Sampson 55 Walkers Brook Drive, Suite 100 Reading, MA 01867 Contact: Tim Corrigan, P.E. corrigant@wseinc.com (978) 573-4184
Land Surveying	Beals and Thomas 144 Turnpike Road Southborough, MA 01772 Contact: Mark Benson mbenson@bealsandthomas.com (508) 366-0560 x4821
Ecological Landscape Architecture	BSC Group 803 Summer Street Boston, MA 02127 Contact: Casey-Lee Bastien cbastien@bscgroup.com (617) 896-4300
Coastal & Stormwater Modeling	Woods Hole Group 107 Water House Road Bourne, MA 02532 Contact: Kirk Bosma kbosma@woodsholegroup.com (508) 495-6228

Team Member	Contact Information
Community Outreach & Regional Coordination	GreenRoots 227 Marginal Street, Suite 1 Chelsea, MA 02150 Contact: John Walkey JohnW@GreenRootsChelsea.org (617) 466-3076 Mystic River Watershed Association 20 Academy Street, Suite 306 Arlington, MA 02476-6401 Contact: Julie Wormser julie.wormser@mysticriver.org (781) 316-3438
Wetlands Science	Weston & Sampson 55 Walkers Brook Drive, Suite 100 Reading, MA 01867 Contact: Devin Herrick herrickd@wseinc.com (978) 977-0110 x2332
Environmental Remediation/Licensed Site Professional Services	Tetra Tech Marlborough Technology Park 100 Nickerson Road Marlborough, MA 01752 Contact: Bill Phelps william.phelps@tetratech.com (508) 786-2389 Weston & Sampson 55 Walkers Brook Drive, Suite 100 Reading, MA 01867 Contact: Prasanta Bhunia, L.S.P. bhuniap@wseinc.com (978) 573-4006

Team Member	Contact Information
Legal Services	Blatman, Bobrowski, Haverty & Silverstein, LLC 9 Damonmill Square, Suite 4A4 Concord, MA 01742 Contact: Jonathan Silverstein Jms@BBSHlaw.net (978) 931-2226 City of Chelsea City Solicitor 500 Broadway Chelsea, MA 02150 Contact: Cheryl Watson Fisher cfisher@chelseama.gov (617) 466-4150 City of Everett City Solicitor 484 Broadway, Room 21 Everett, MA 02149 Contact: Colleen Mejia colleen.mejia@ci.everett.ma.us (617) 394-2284 KP Law, PC 101 Arch Street, 12th Floor Boston, MA 02110 Contact: Lee Smith lsmith@k-plaw.com (617) 654-1809

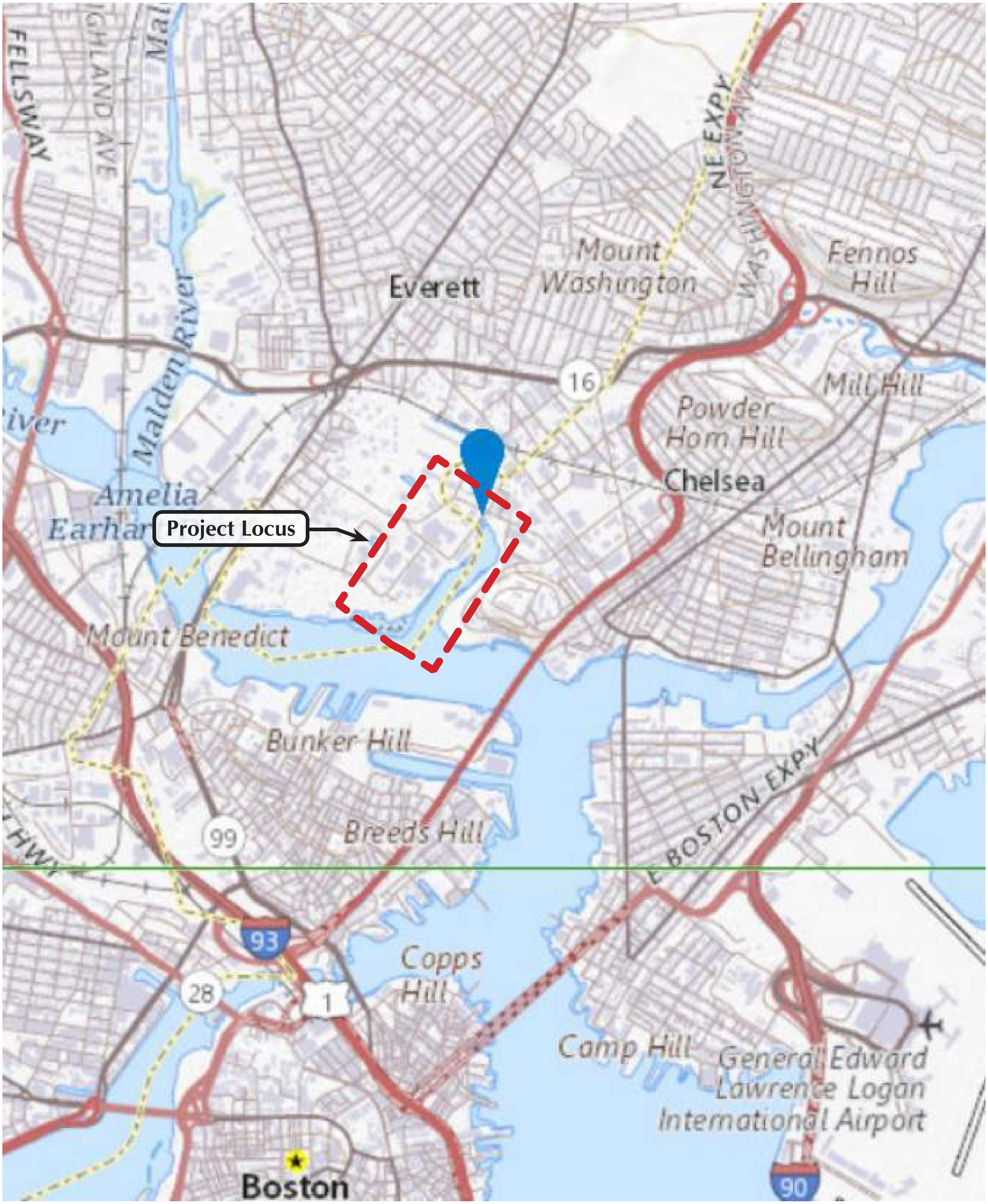


Figure 1-1
Project Locus
Source: Fort Point Associates, Inc., 2022

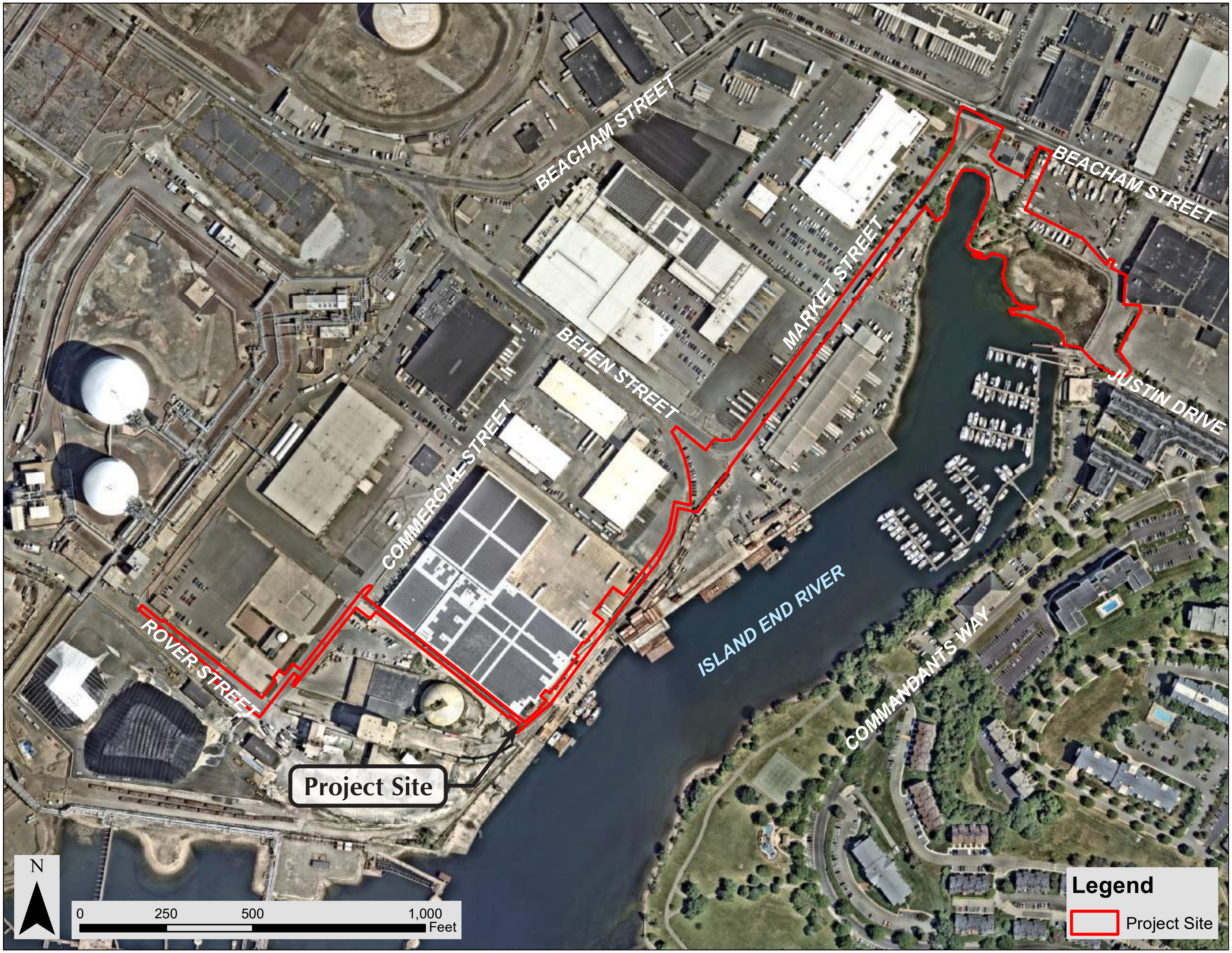


Figure 1-2
Project Site Aerial
Source: Fort Point Associates, Inc., 2023

Figure 1-3
Project Overview
Source: Fort Point Associates, Inc., 2023

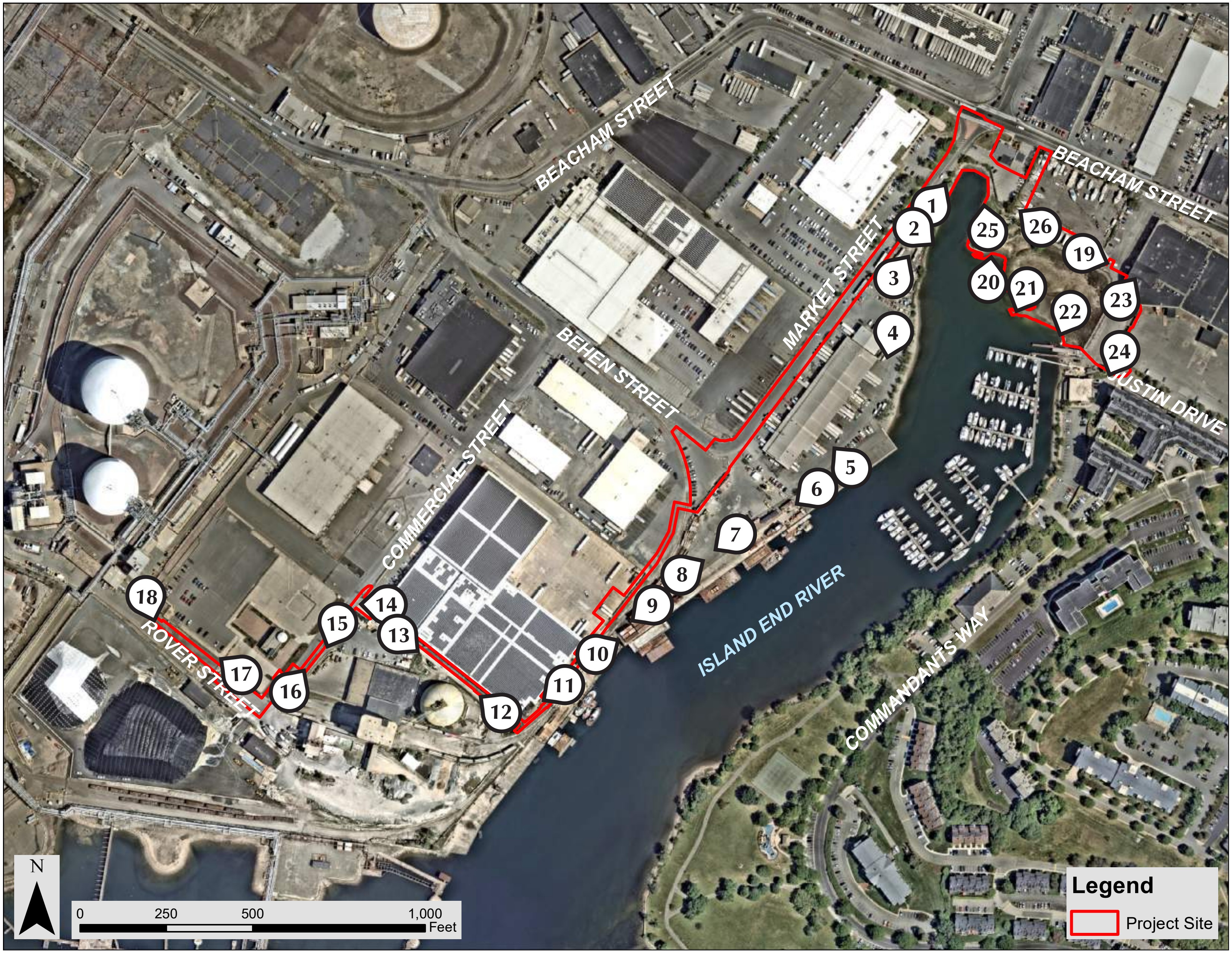
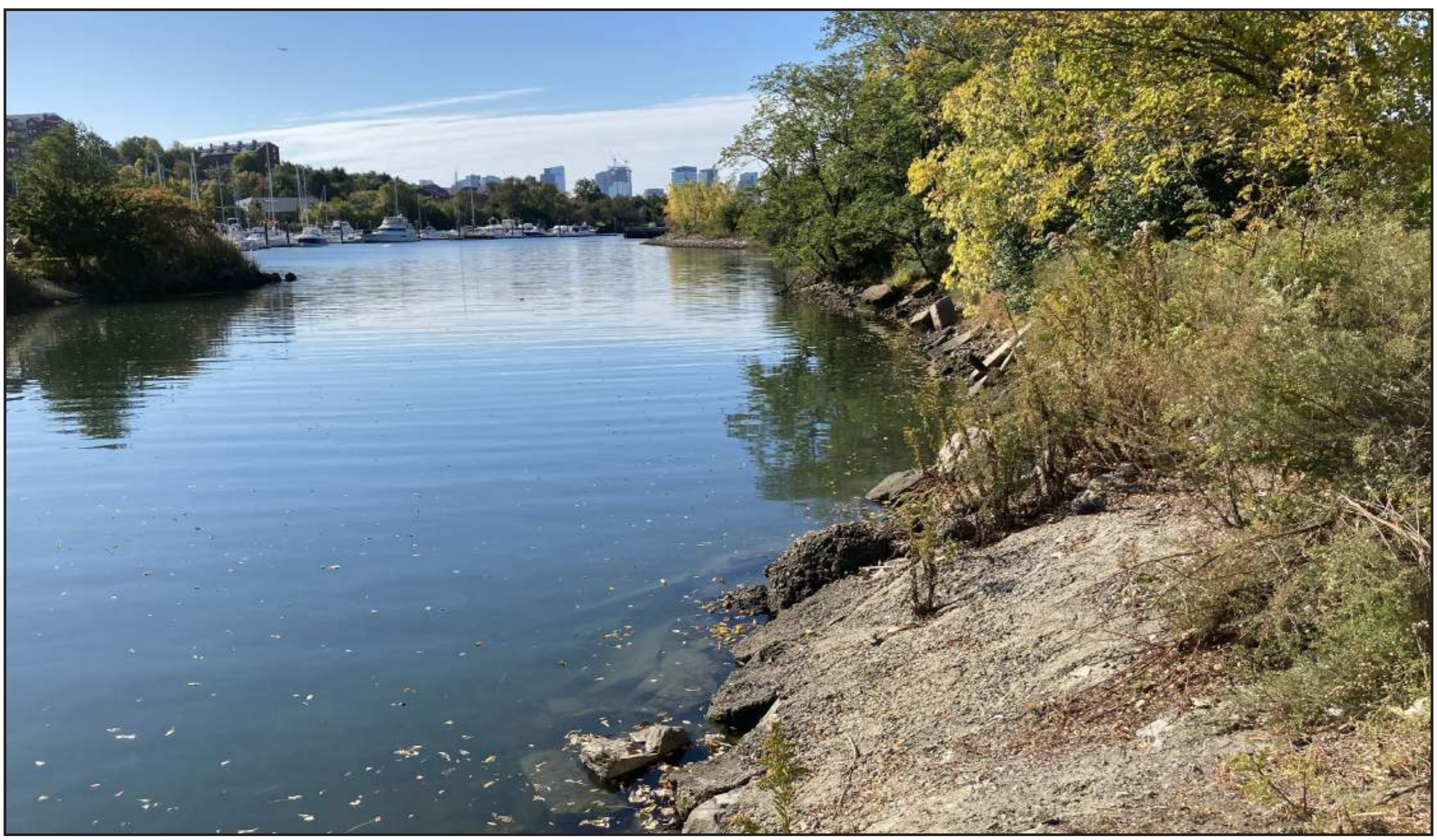


Figure 1-4
Existing Conditions Photographs Key
Source: Fort Point Associates, Inc., 2023

Photograph 1: View of the Island End River behind #359 Beacham Street property and Market Street culvert



Photograph 2: View looking up Island End River, facing south towards Mystic River

Figure 1-5
Existing Conditions Photographs
Source: Fort Point Associates, Inc., 2022

Photograph 3: View of the IER shoreline from #155 Market Street, facing north towards Chelsea/Everett border

Photograph 4: View of the Island End River facing south along #155 Market Street and shoreline

Figure 1-6
Existing Conditions Photographs
Source: Fort Point Associates, Inc., 2022

Photograph 5: View of the #155 Market Street facing west along ramp up to dock and upper parking area

Photograph 6: View of the #155 Market Street upper and lower parking areas facing south

Figure 1-7
Existing Conditions Photographs
Source: Fort Point Associates, Inc., 2022

Photograph 7: View of PW Marks and SPS New England property line facing south from SPS New England facility

Photograph 8: View of the SPS New England facility facing north along SPS New England western property line

Photograph 9: View of the SPS New England facility facing south towards the southern edge of dock

Photograph 10: View of the railroad and SPS New England facility facing north from Lineage Logistics facility

Figure 1-9
Existing Conditions Photographs
Source: Fort Point Associates, Inc., 2022

Photograph 11: View looking southwest towards the southeast corner of the Lineage Logistics building

Photograph 12: View looking west between Lineage Logistics and Quebec Ciment, towards Commercial Street

Figure 1-10
Existing Conditions Photographs
Source: Fort Point Associates, Inc., 2022

Photograph 13: View looking east towards Island End River, between Lineage Logistics and Quebec Ciment

Photograph 14: View looking southwest from Commercial Street towards Constellation Energy

Figure 1-11
Existing Conditions Photographs
Source: Fort Point Associates, Inc., 2022

Photograph 15: View looking south towards Mystic River and Rover Street, along Commercial Street

Photograph 16: View looking north from Constellation Energy towards Commercial Street

Figure 1-12
Existing Conditions Photographs
Source: Fort Point Associates, Inc., 2023

Photograph 17: View looking northwest towards Constellation Energy

Photograph 18: View looking south from Constellation Energy towards Rover Street

Figure 1-13
Existing Conditions Photographs
Source: Fort Point Associates, Inc., 2023

Photograph 19: View looking east along existing boardwalk towards Signature Breads

Photograph 20: View looking northwest towards Beacham Street from Island End Park

Figure 1-14
Existing Conditions Photographs
Source: Weston & Sampson, Inc., 2022

Photograph 21: View looking southeast towards Island End River and Admiral's Hill Marina from Island End Park

Photograph 22: View looking south towards Admiral's Hill Marina from salt marsh

Figure 1-15
Existing Conditions Photographs
Source: Weston & Sampson, Inc., 2022

Photograph 21: View looking north towards Beacham Street from Admiral's Hill Marina parking lot

Photograph 24: View looking south from Signature Bread property towards Admiral's Hill Marina

Figure 1-16
Existing Conditions Photographs
Source: Weston & Sampson, Inc., 2022

Photograph 24: View looking east towards Island End River from salt marsh

Photograph 26: View looking west towards Island End Park gazebo

Figure 1-17
Existing Conditions Photographs
Source: Weston & Sampson, Inc., 2022

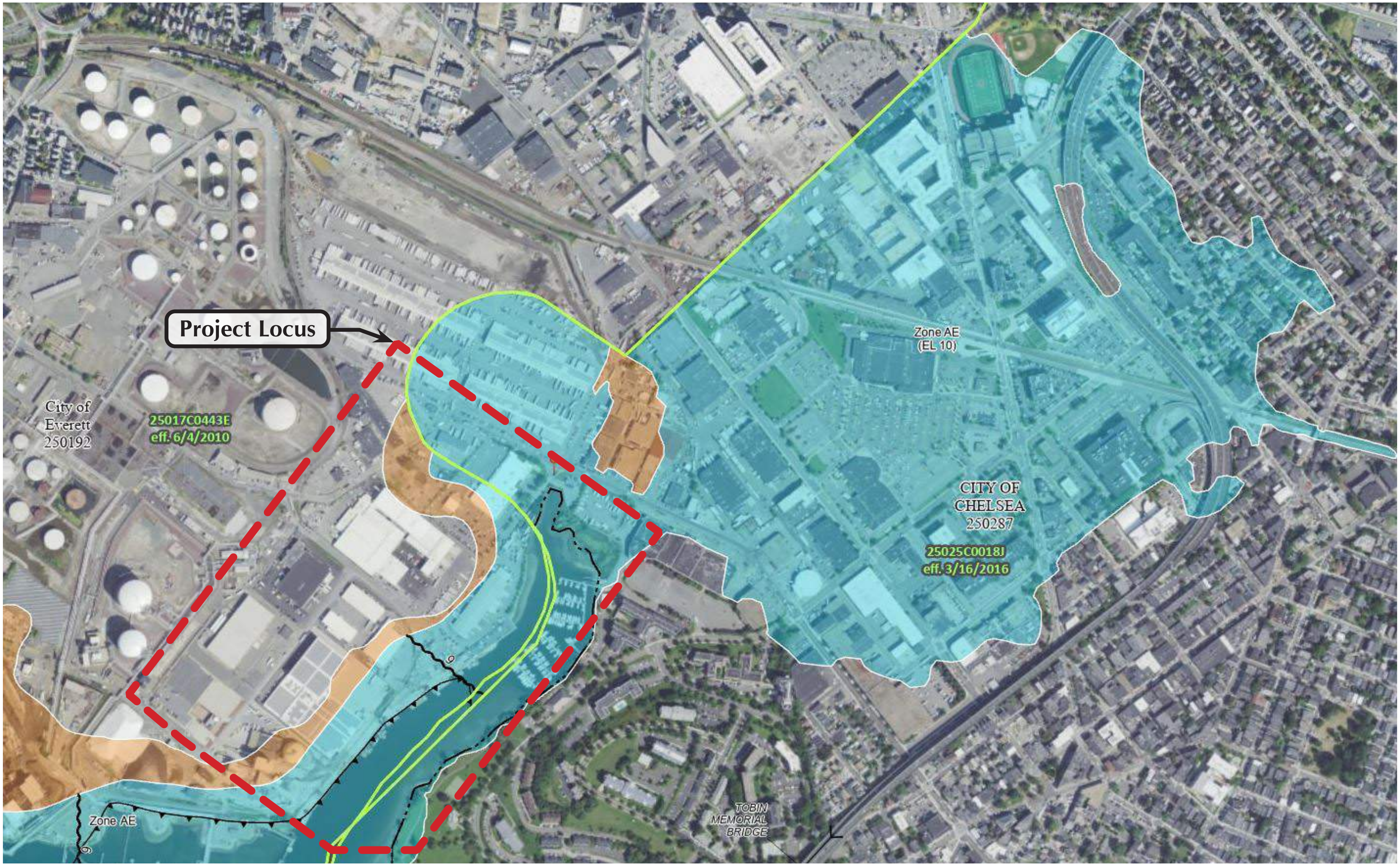


Figure 1-18
FEMA FIRM 25025C0018J and 25017C0443E
Source: FEMA, 2016 and 2010

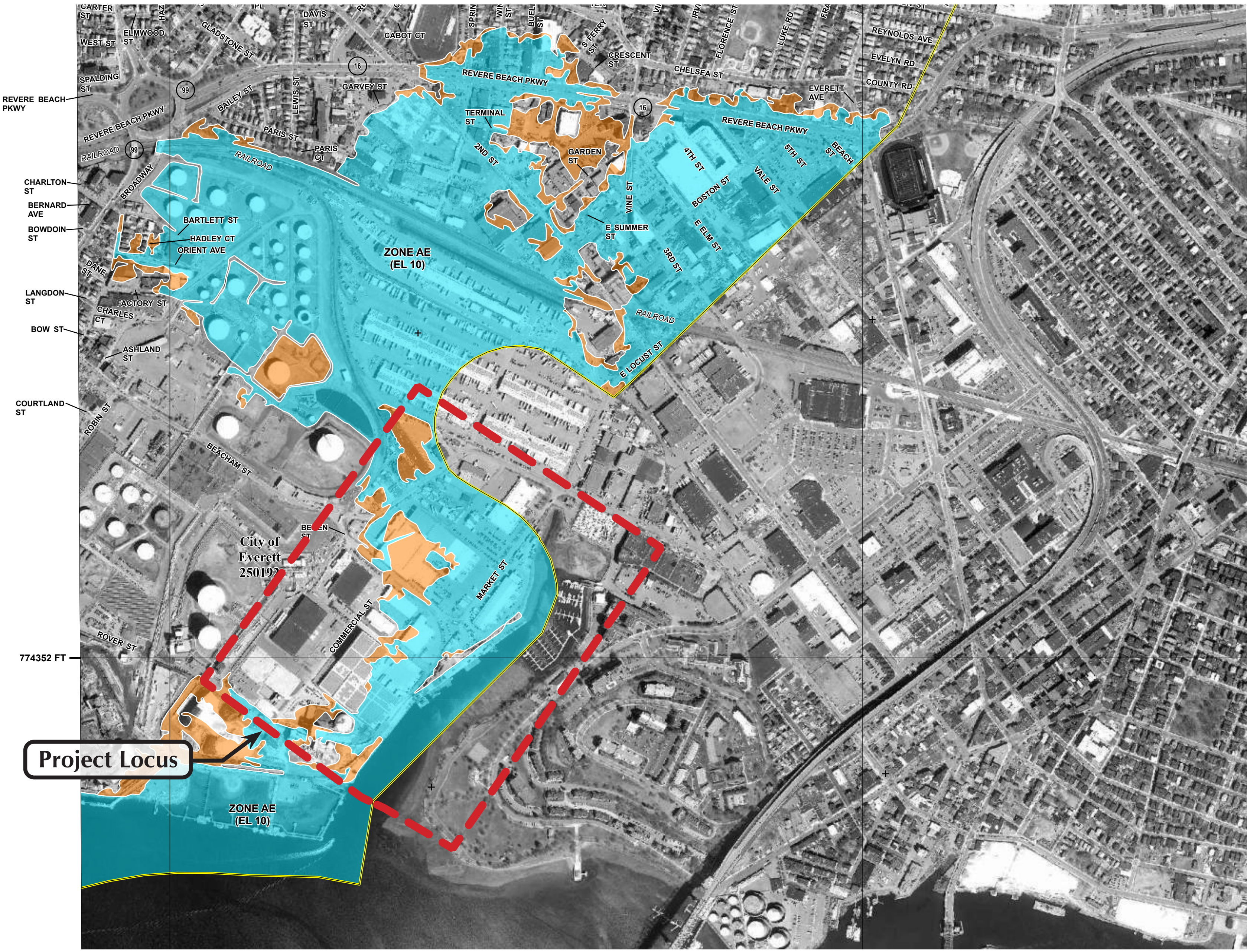


Figure 1-19
Pending FIRM for the City of Everett
Source: FEMA, 2021

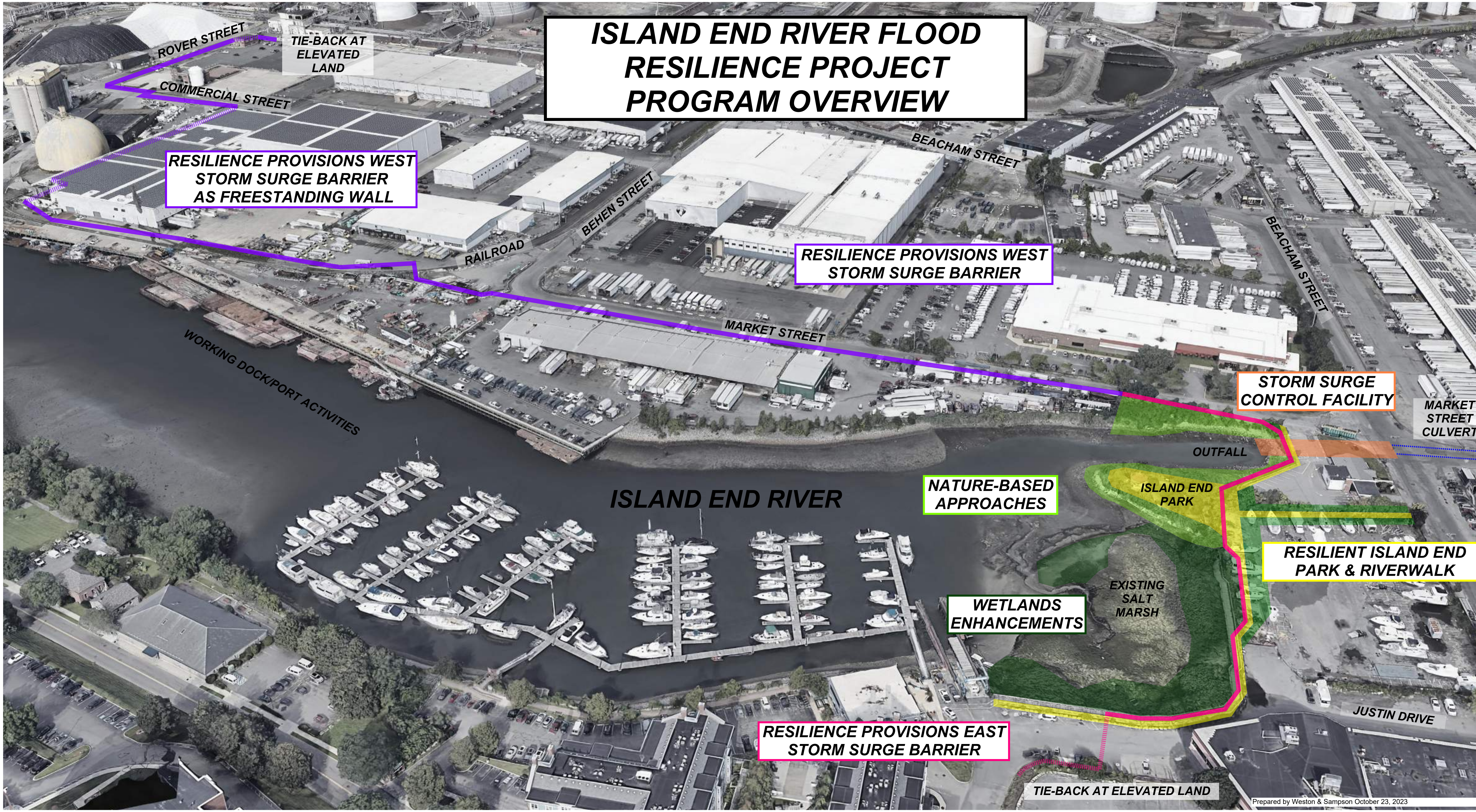


Figure 1-20
Island End River Flood Resilience Project Annotated Exhibit
Source: Weston & Sampson, Inc., 2023

Figure 1-21
Project Rendering - Chelsea Project Components Viewed from the Island End River
Source: Weston & Sampson, Inc., 2023

Figure 1-22
Project Rendering - Chelsea Project Components Viewed from the Island End River
Source: Weston & Sampson, Inc., 2023

Figure 1-23
Project Rendering - Resilience Provisions East and Wetlands Enhancements Viewed from Justin Drive
Source: Weston & Sampson, Inc., 2023

Figure 1-24
Project Rendering - Resilience Provisions East Viewed from Market Street
Source: Weston & Sampson, Inc., 2023

Figure 1-25
Project Rendering - Storm Surge Control Facility Viewed from Beacham Street
Source: Weston & Sampson, Inc., 2023

Figure 1-26
Project Rendering - Resilience Provisions West Viewed from Market Street
Source: Tetra Tech, 2023

Figure 1-27
Project Rendering - Nature-based Approaches and Resilience Provisions West Viewed from the Island End River
Source: Tetra Tech, 2023

Figure 1-28
Project Rendering - Wetlands Enhancements Viewed from the Island End River
Source: Weston & Sampson, Inc., 2023

Figure 1-29
Project Rendering - Island End Park Improvements Viewed from the Island End River
Source: Weston & Sampson, Inc., 2023

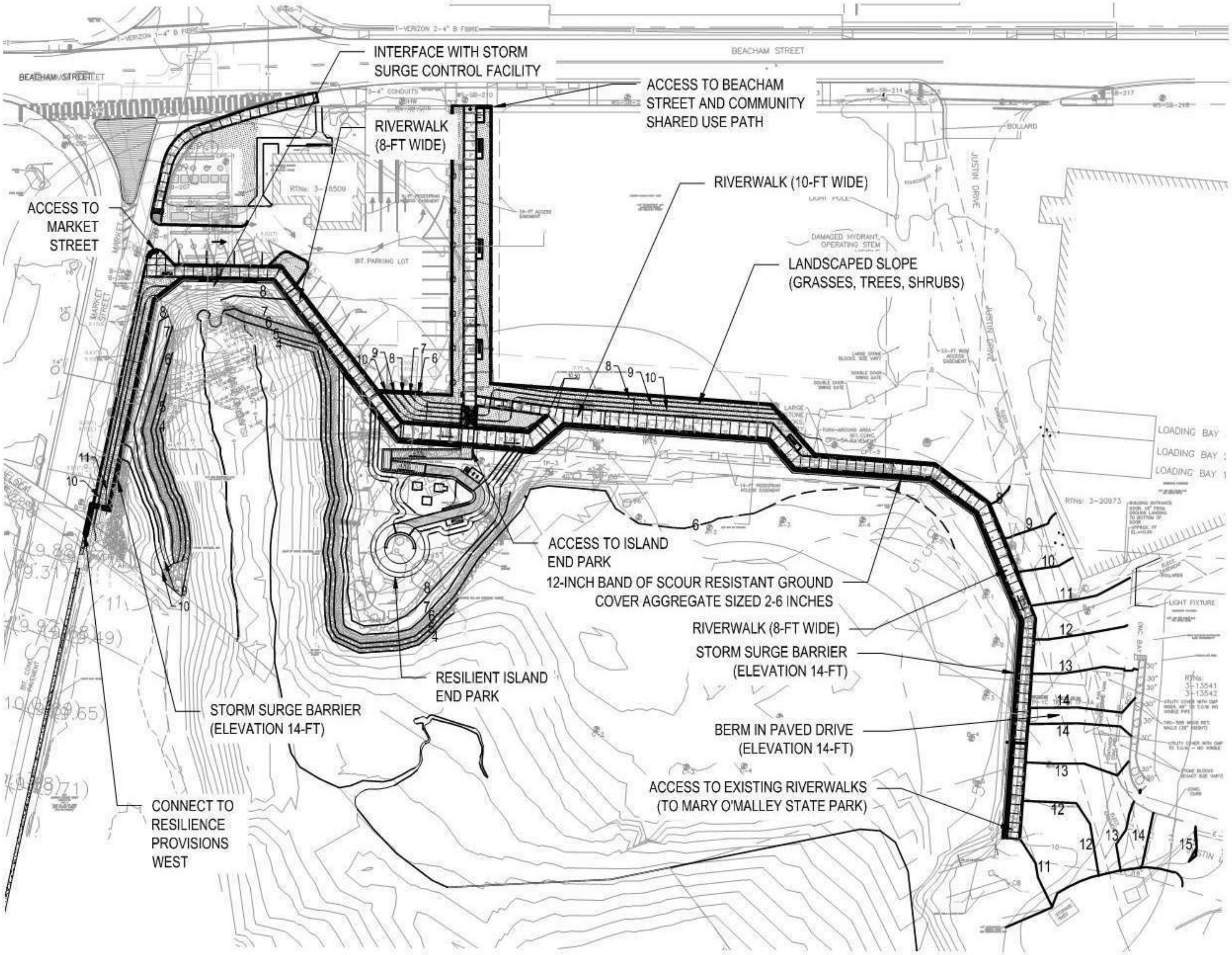


Figure 1-30
Resilience Provisions East Exhibit
Source: Weston & Sampson, Inc., 2022

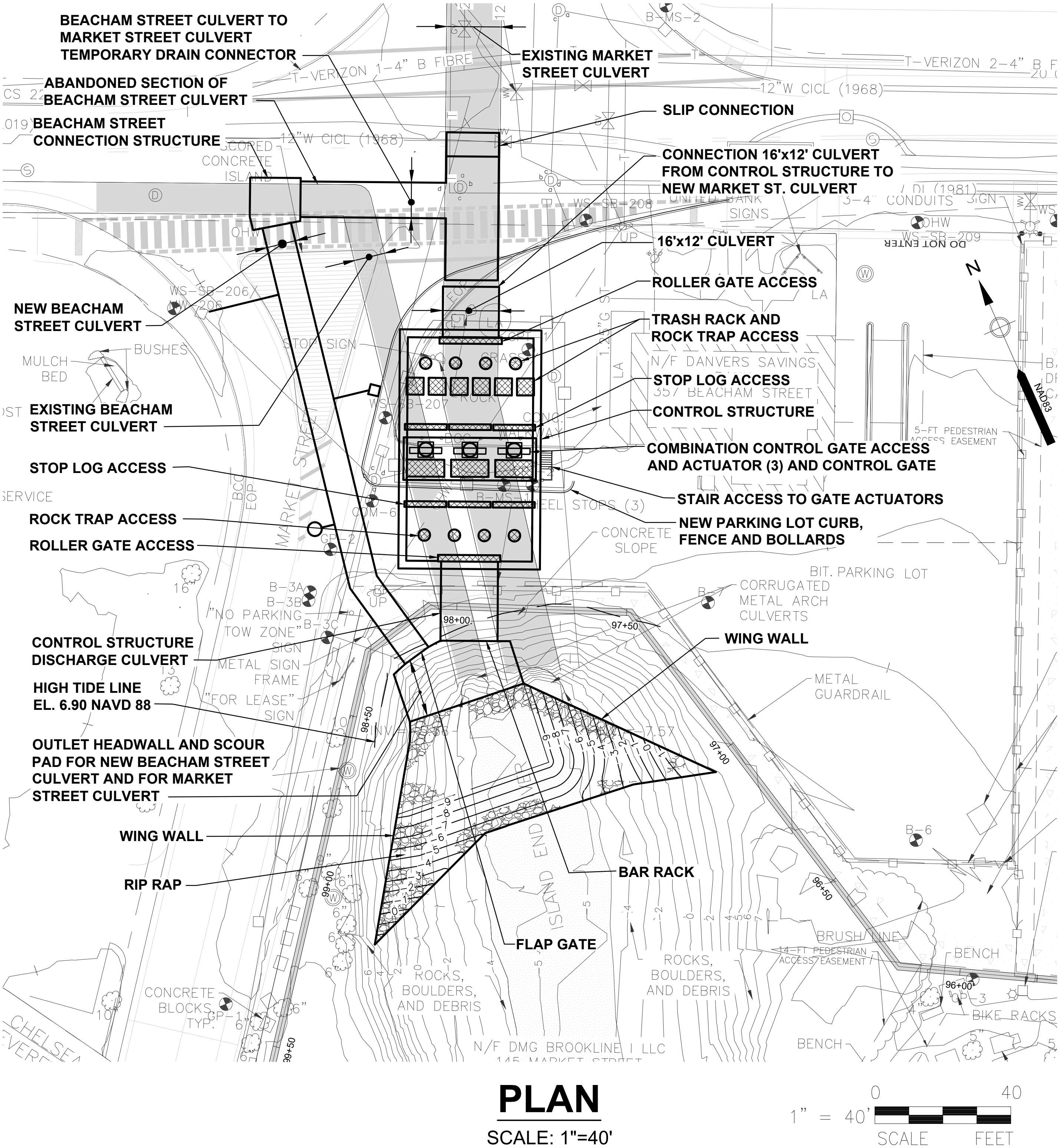


Figure 1-31
Storm Surge Control Facility Exhibit
Source: AECOM, 2023

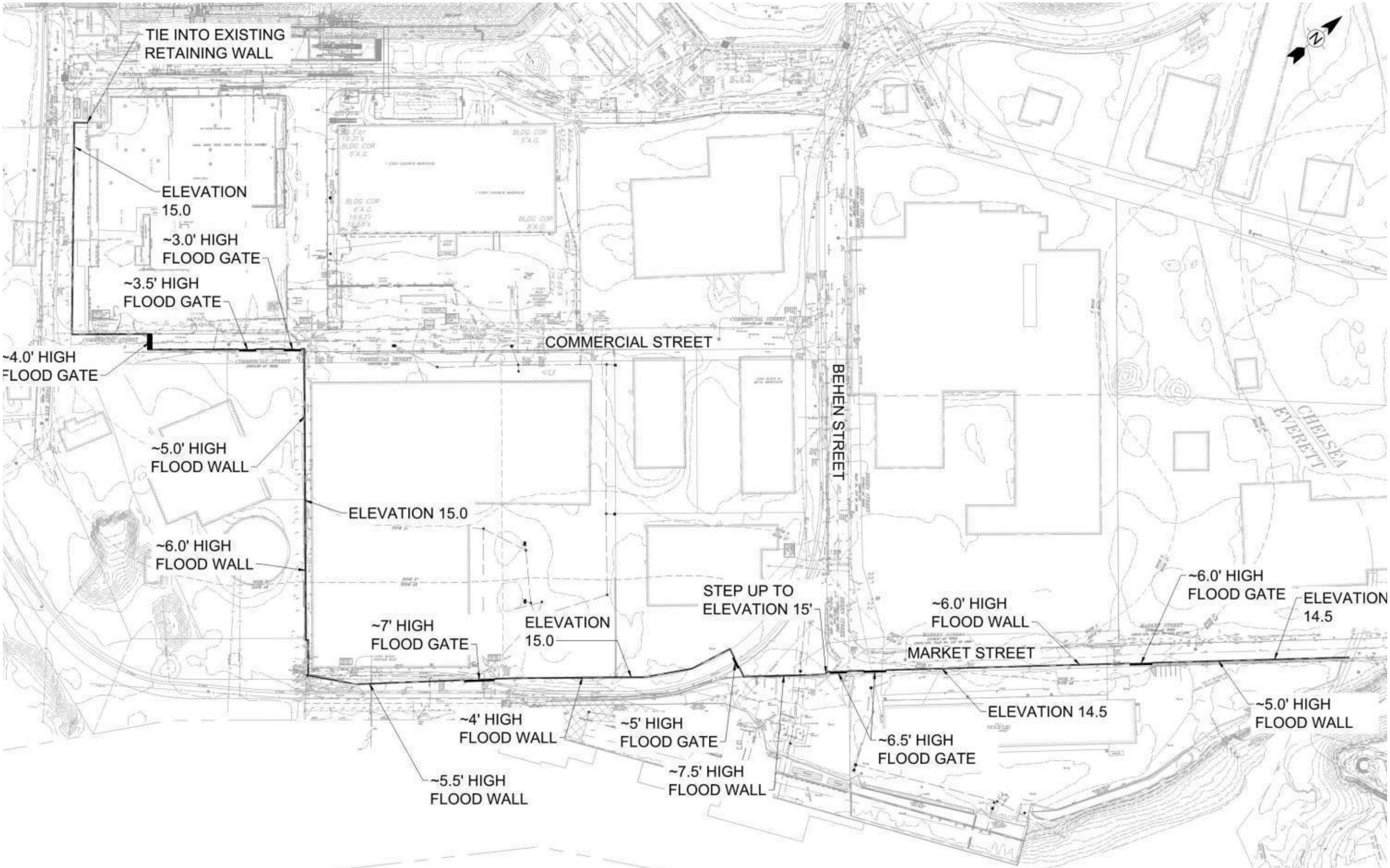


Figure 1-32
Resilience Provisions West Exhibit
Source: Fort Point Associates, Inc., 2023

Figure 1-33
Nature-based Approaches Exhibit
Source: BSC Group, 2023

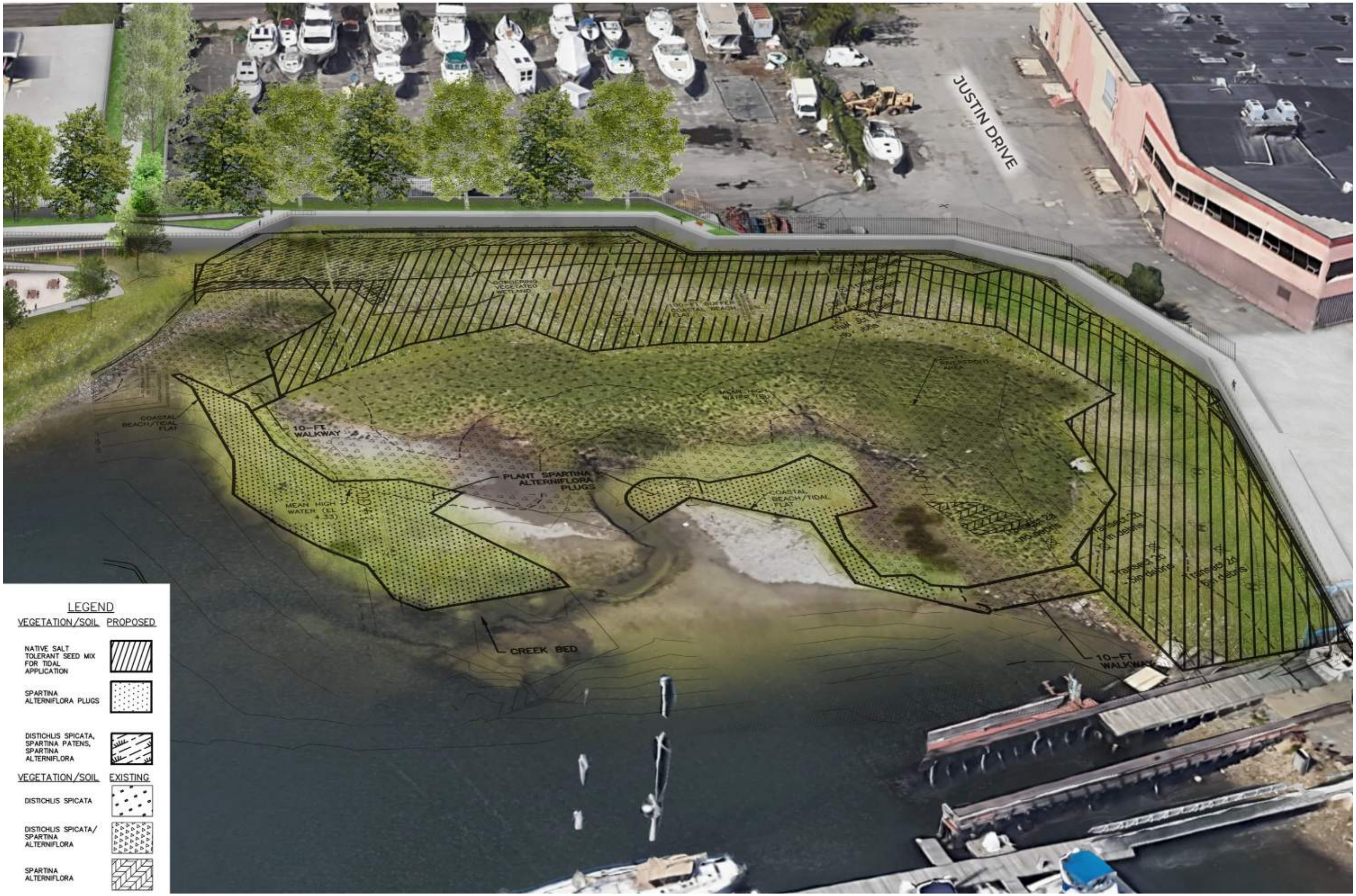


Figure 1-34
Wetlands Enhancements Exhibit
Source: Weston & Sampson, Inc., 2023

Chapter 2

ALTERNATIVES ANALYSIS

CHAPTER 2: ALTERNATIVES ANALYSIS

2.1 INTRODUCTION

The Cities of Chelsea and Everett (the "Proponents") propose to construct coastal flood resilience measures along the Island End River ("IER") in the Cities of Chelsea and Everett (the "Project Site") consisting of a storm surge barrier and flood gates, a storm surge control facility ("SSCF"), Nature-based Approaches ("NbA"), wetland enhancements, and improvements to Island End Park ("Park") and the surrounding public realm (the "Project"). The Expanded Environmental Notification Form ("EENF") provided an alternatives analysis which evaluated a No Build Alternative for the entire project, the Preferred Alternative, and an Alternate Design Alternative for each element of the Project, namely the storm surge barriers of Resilience Provisions East ("RPE") and Resilience Provisions West ("RPW"), the Storm Surge Control Facility ("SSCF") and Coastal Bank and Beach stabilization. The focus of the remainder of this alternatives analysis is in response to comments received from the Massachusetts Department of Environmental Protection ("MA DEP") and the Massachusetts Office of Coastal Zone Management ("CZM") regarding the Project's design intent for Nature-based Approaches and any potential for further refinement of the storm surge barrier alignment near the SSCF.

2.2 DESCRIPTION OF DESIGN REFINEMENTS SINCE THE EENF

2.2.1 STORM SURGE BARRIER: ALIGNMENT/LOCATION

In response to MA DEP and CZM comments, the alternatives analysis focuses on options for avoiding and minimizing impacts to coastal resources from portions of the storm surge barrier near the SSCF. While the majority of the storm surge barrier has been moved landward of MHW, Coastal Bank and the HTL, the current design represents the most feasible option since complete avoidance of coastal resource areas is not possible due to existing constraints in the highly urbanized setting.

With the exception of an approximately 155 linear foot ("lf") portion of the storm surge barrier, the remainder will be located above MHW, Coastal Bank and HTL. There are three discrete sections of the flood barrier near the SSCF that will be located within coastal resource area jurisdiction. Although every effort was made to first avoid this alteration to coastal resources, existing conditions and constraints preclude complete avoidance. These constraints include the Project proximity to Market Street, a heavily used industrial truck route, the location of the stormwater outfalls from the existing Market Street Culvert and Beacham Street Drain and the privately owned existing bank parking lot at 357 Beacham Street. These conditions represent design "pinch points" as shown in Figures 1-5 through 1-6, Existing Conditions Photographs and Photographs 1 through 3. Clockwise from west to east, three sections will be located along the Coastal Bank, but above MHW and HTL.

Segment 1: Approximately 55 lf section of storm surge barrier located adjacent to Market Street.

The Market Street right of way abuts the Project in this location. The design distance between the barrier and edge of pavement will leave approximately 7 feet. Further intrusion would reduce the paved width of Market Street, which is heavily trafficked by large vehicles, including tractor trailers and heavy equipment hauling through the industrial district. Pavement reduction in this location proximate to the intersection will reduce the required minimum safe truck turning radius required to access Beacham Street. Conversely, if the barrier were shifted toward the river and further into the Project Site, it would result in additional alterations to Coastal Bank and Beach by shifting project footprint further towards river. The proposed location will be as close to the top of the Coastal Bank as possible. The proposed location will result in the least amount of alteration to the Bank as it will occur at the top of the bank where the area transitions to a flatter slope, thereby reducing the alteration of the steeper portion of the bank.

Segments 2 and 3: Approximately 40 lf section and 60 lf section of storm surge barrier located along the edge of the existing bank parking lot.

The landward shift of the barrier in this location is not possible due to the location of the proposed SSCF and the privately owned bank parking lot at 357 Beacham Street. A landward shift would require taking portions of the existing parking spaces at the bank, which could jeopardize the bank's conformance with zoning requirements and adversely impact use of the facility by its customers.

Every effort was made to locate the storm surge barrier outside of coastal resource areas to the extent practicable; where complete avoidance was infeasible, efforts were made to minimize intrusion into the resource areas, by locating the barrier as close to the outer edge of the resource as possible to avoid fragmenting the resource area by leaving portions on both sides of the barrier.

2.2.2 STORM SURGE CONTROL FACILITY (SSCF)

The EENF summarized the multiple alternatives considered for the Storm Surge Control Facility element of the Project such as the creation of upstream flood storage to absorb the effects of extreme high tides and storm surge and the use of passive flow control measures, such as non-mechanical flap gates, on the Market Street Culvert and the Beacham Street Drain system outfalls. Measures pursued and presented as Preferred Alternative include the proposed storm surge control facility with a control gate system. No further alternatives will be vetted or presented with respect to the

SSCF as the Preferred Alternative represents the most viable option, given the site constraints.

2.2.3 COASTAL BANK, COASTAL BEACH, RIVERFRONT AREA STABILIZATION

The alternatives presented to date included a combination of nature-based and structural approaches. The alternatives presented in the EENF and Supplemental Filing included terraced slopes with concrete planters, gabions, stone toe edges, timber edges, surface plantings and imbricated stone ledges. Comments on the alternatives that included structural toe stabilization and vegetation within coastal beach and the intertidal zone indicated "such structural measures will have adverse effects on functions of Beach and Coastal Bank, other options with fewer impacts should be identified."

Based on agency comments and meetings and a field visit to a coastal resiliency project underway in Duxbury, the focus of the alternatives analysis is stabilizing the Coastal Bank and Coastal Beach with an emphasis on non-structural or NbA. The Proponents have evaluated stabilization alternatives for each discrete segment, namely RPE and RPW-adjacent shorelines, the SSCF and associated outfall headwall and wingwall areas, and Island End Park, where each location warrants a fully vetted alternatives discussion due to the variable nature of each area, existing grades, and maintenance considerations. Five key elements were noted by MA DEP and CZM as follows:

Comment: Alternatives should include options to remove the debris on the Coastal Bank and Coastal Beach.

Design Solution: At a minimum in all locations, debris and concrete will be removed from the Coastal Bank and Coastal Beach to the extent practicable without disturbing underlying coal tar deposits and other highly regulated soils.

Comment: Regrading of the Coastal Bank to a gentler and stable 3:1 slope.

Design Solution: The NbA cobble nourished beach and bank preferred alternative includes slopes that do not exceed 3:1

Comment: Incorporation of more natural solutions to stabilize the regraded Coastal Bank and non-structural toe stabilization

Design Solution: NbA were used in select areas as practicable. See Alternatives Analysis below for each option.

Comment: Tapering outfall protection to avoid blunt end that may cause end scour.

Design Solution: The end of each wingwall will be buried and rip rap scour protection will be placed, extending for a 2-foot radius around the end. See Attachment C, Project Plans, Plan Sheets SSCF-C-301.

Comment: Opportunities for community stewardship

Design Solution: The initial design included planters that could be maintained by the public. The planters were located on the majority of the Project Site, including the east and west shorelines and the Park. The planters are no longer under consideration as a stabilization solution; therefore, community stewardship was revisited in conjunction with the NbA. The most practicable location for community stewardship is the Park in terms of public access. The east and west shorelines and area behind the headwall are not conducive to public access in terms of safety along the sloped shoreline proximity to the River and retaining walls. The community stewardship component will be focused on the Park. See Chapter 3, Environmental Justice for more information on community involvement and future stewardship opportunities associated with the Project.

2.3 COMPARISON OF ALTERNATIVES

In support of the DEIR filing, four alternatives were considered, including the no-build, top dressing/surface planting, terraced rock sills and the preferred NbA. Each of the alternatives under consideration results in essentially the same alterations to coastal resources as they all include stabilization of the coastal bank and beach in their entirety. The considered alternatives are presented in Table 2-1 below and further analyzed in the sections that follow.

Table 2-1: Project Alternatives

Item	No Build	Top Dressing/Surface Treatment	Terraced Sills	Preferred Alternative
Project Site (acres)	5.2	5.2	5.2	5.2
Alteration of Salt Marsh (sf)	0	1,836	1,836	1,836
Creation of Salt Marsh (sf)	0	2,745	2,745	2,745
Temporary Wetlands Impacts (sf)	0	107,339	107,339	107,339
Permanent Wetlands Impacts (sf)	0	79,428	97,428	97,428
Dredge/Fill (cubic yards)	0	613	613	613

Note: Table 2-1 compares the quantified impacts of alternatives based on the total Project Site, extending beyond the NbA limits.

2.3.1 NO BUILD

The No Build Alternative would not address the ongoing flooding issues that plague the Project Site and the surrounding communities of Chelsea and Everett. The Proponents have consistently struggled to manage flooding in the IER floodplain. Flooding has resulted in business closures, road shutdowns, property damage, and stranded motorists. These events typically begin with seasonally high tides and heavy rainstorms and persist until tides recede. Members of the community are familiar with closures of major arterial roadways such as Vale Street, Beacham Street, and Second Street during storms and high tide events. Businesses such as New England Produce Center, one of the District's largest employers and a critical fresh food distribution center in the region, routinely experiences adverse business impacts as a result of flooding events.

In recent years, the frequency and severity of such flood events have increased, and this trend is forecast to continue. Flood risk modeling completed through the Massachusetts Coastal Flood Risk Model ("MC-FRM") indicates the current IER floodplain and surrounding area is at great risk for coastal flooding not just during current extreme flood events, but also during more regular coastal flooding events in the future due to projected climate change induced sea level rise, aided by the natural land subsidence of the region. While much of the area can be expected to flood now during the 10- and 100-year flood events, in 2050 the same flooding extent can be expected in the 1-year coastal flood. In 2070, those same areas will experience even deeper flooding during 1-year coastal floods, and 10- and 100-year flood events will penetrate further into the Cities with deep, damaging floodwaters. The MC-FRM highlighted the increasing urgency to address growing flood risk in this area with catastrophic flood depths associated with the projected 100-year flood event in 2070. The future state impacts of projected flooding would be devastating to regional food security (production, storage, distribution), regional transportation infrastructure, local public schools, community health and safety, and economic vitality.

The No Build Alternative would yield no improvement to the environmental or economic conditions of the Project Site. The shoreline would remain in its eroded condition, full of trash and other debris, and would not be stabilized by native plantings and improved natural habitat along the banks of the IER. The existing Market Street Culvert and Beacham Street Drain outfalls would remain as they currently exist today, and would continue to deteriorate, with no ability to control dangerous extreme high tides and storm surge into Chelsea and Everett communities. Although there would be no additional impacts to wetlands under this alternative, in their current state, the wetlands are degraded and provide few environmental benefits.

2.3.2 TOP DRESSING/SURFACE PLANTING TREATMENT

This option focuses on clearing both the east and west shoreline slopes of debris, and planting intertidal vegetation and upland plantings between MHW and the top of bank. There would be no importation and placement of fill material. Blankets would be used as temporary erosion prevention until the final stabilization and completion of the plant establishment period. First and foremost, the concern is the long-term stability of the top of bank in terms of continued erosion from storm surges and erosive flows from storm events. This alternative does not address the potential for continued erosion at the top of bank which poses an issue in terms of long-term effectiveness and potential for continuous maintenance and upkeep by the City. The alternative, therefore, does little to address the critical concerns the Project is designed to mitigate, and it presents significant concerns regarding long-term viability and maintenance.

2.3.3 TERRACED SILLS

This option focuses on using structures to support filling the banks to create sufficient space at appropriate elevations for inter tidal planting while encapsulating the sub soil. See Figure 2-1, Stone Terraced Sills Alternative, and Figure 2-2, Concrete Terraced Sills Alternative. The use of rock or concrete sills would be used to establish slopes below 5% where plantings are viable. Rip rap would be used to reinforce the Coastal bank and blankets used as temporary erosion prevention until final stabilization at the completion of the plant establishment period. Low marsh, high marsh and upland vegetation would be planted between the rip rap toe and the flood wall. The slope treatments would allow for plantings over the largest possible area and transitioning to fully armored slopes landward of the top of Coastal Bank to protect the base of the storm surge barrier. This fill and terraced sill option presents permanent stabilization methods that meet the structural requirements for the flood wall toe while replacing upland vegetation for intertidal vegetation.

Although a feasible option, it represents the highest construction and maintenance costs, and it was dismissed due to several factors. First and foremost, regulators expressed concerns with respect to the introduction of structural measures that do not mimic the natural appearance of the area by providing a dynamic movable material that can be transported and sorted by wave action. In addition, the option provides low habitat value or other environmental benefit.

2.3.4 PREFERRED ALTERNATIVE: NATURE-BASED APPROACHES

The existing riverbank has low ecological value and is spatially constrained by the surrounding built environment. The existing channel has not changed significantly since its construction in 1960. Soils suitable for planting are limited to the top of the embankment above Elevation 8 and are dominated by invasive species, with sparse coastal vegetation between top of bank and MHW. This is due to the limitations of the urban fill soils of the channel and low water quality.

The goal of the proposed riverbank stabilization is to replace low value urban fill and non-coastal or invasive species with higher habitat value plants, and species that are more resilient to coastal conditions. The measures will be configured in ways that allow tidal plants to migrate landward to the extent feasible. The form of the existing landscape is anthropic with steep slopes extending to the physical limit of river channel. This condition represents a high risk of future erosion and limits terrestrial species movement.

Based on comments from DEP and nature-based approaches and techniques suggested by CZM, the potential viable alternatives for long term stabilization of the Coastal Bank and Coastal Beach are as follows.

For all alternatives, existing conditions preclude options to cut or remove significant amounts of material from the Coastal Bank and Coastal Beach due to the presence of regulated soils and associated disposal costs. This leaves superficial cut/fill as the most practical viable option for grading the existing shoreline. The goal is to maintain existing grades as closely as possible to minimize the need for fill. NbA includes planted flats stabilized by coir envelopes during plant establishment, planted cobble bank above, and cobble beach nourishment below and between at slopes that do not exceed 3:1.

The NbA is to mimic a natural cobble shingle tidal riverbank slope pre-eroded to the angle of repose and populated by a diverse spectrum of species with varying degree of saline environment affinity allowing it to evolve as conditions change. Achieving this stable plant community requires temporary and permanent erosion prevention and sediment controls allowing root zones to establish. It also recognizes the need for adaptive management as the site is in an isolated urban environment and does not benefit from the natural seed and root inputs that a similarly disturbed site would receive if surrounded by natural landscapes. During the establishment period conditions will be observed and adjusted, and supplemental seed and plant stock will be added. This will be followed by an adaptive management program to compensate for the added pressures of life in the urban environment such as litter, invasive species, and isolation.

Cobble Beach and Bank Nourishment

For an urban setting such as IER, the application of cobble beach and bank nourishment has proven effective in similar urban coastal settings such as Coughlin Park in Winthrop. This portion of our site remains safe for this application due to limited kinetics/ projected kinetics. Per Woods Hole Group Technical Memorandum

6/29/22 Island End River Coastal Resiliency Improvements – Wave Processes and Forces. This option limits work to minimal grading at the eroded/undercut section along the Coastal Bank. Cobble beach and Bank nourishment includes removal of construction debris and placement of cobble over anchored coir envelopes and retaining bands of planting soil at multiple elevations allowing inter tidal vegetation to transition with the projected MHW, HTL and future sea level rise. The cobble beach and bank nourishment will be applied to the east and west shorelines and IER Park and extend from MHW, landward, to the top of the Coastal Bank. The components consist of a tiered approach at a 3:1 grade to include shelves supported by coir logs; the top layers will consist of cobbles, interspersed with native salt tolerant plantings. This option is preferred as it is the lowest risk and lowest cost alternative with some adaptation capacity for sea-level rise. The use of cobble as Beach and Bank nourishment above MHW allows for the cobbles to naturally shift during storm events while providing storm damage prevention function. The cobble beach and bank nourishment program will be applied to the east and west shorelines and Island End Park. See Figure 2-3, Preferred Alternative – NbA and Attachment C, Project Plans, Plan Sheets NBA-L-101 and NBA-L-102.

Slope Stabilization Design: (Grading, Cobble beach nourishment and planting)

The options for riverbank stabilization limits work to minimal topical grading at the erodible crest of the existing banks transitioning portions of upland to stable intertidal/ future intertidal slopes. Cobble beach nourishment includes removal of significant loose construction debris and placement of cobble over anchored coir envelopes retaining bands of planting soil at multiple elevations allowing inter tidal vegetation to transition with sea level rise. Use of rounded stone limits grades to 3:1. Stabilized soil bands which begin above MHW, cobble nourishment extends over the existing surface below MHW to meet slope constraints. Cobble sizes are matched to existing stone sizes and can be expected to provide similar stability and erosion prevention to the existing stable slopes. Use of smaller material ensures on foot site managers can monitor and maintain soils and vegetation with low risk of erosion.

Sand based planting media wrapped in coir, coir envelopes staked, and mulched with cobble will act as temporary erosion prevention to contain fines for the areas of planting while root zones establish, and the permanent soil media core limits the risk of settlement-based erosion. In addition to terraced areas, plantings will be included between coir envelopes and primary planted terraces for transitional vegetative cover.

The most significant grade changes are at the erodible crest of the slope which will be cut back and stabilized at the new 3:1 slope. Above top of bank, a mix of vegetative coastal floodplain seed and plug planting will be established. Where space allows adjacent to the flood control structure, planting will include shade trees habitat shrubs, vines, and groundcover. This is the preferred option selected from the alternatives analysis as it is the lowest risk and lowest cost alternative with some adaptation capacity for sea-level rise. This option also allows for high utility in adaptive management during the establishment period.

The typical cross section of the slope stabilization will include the following components, cobbles, coir logs, erosion control blankets and coastal plantings.

Cobbles

The top layer of the Coastal Bank will be replenished or nourished with rounded cobble ranging from 3″ to 6″ diameter corresponding to existing stable sections of the Beach. Between MHW and HTL elevations, cobble sizes will be designed to mimic average existing stone sizes and can be expected to provide similar stability and erosion prevention, while excluding smaller stones which pose the greatest potential for the cobble becoming dislodged. The smaller size cobble, 3 to 5 inch diameter, will be used on the upper tiers. For the lower tiers, closer to the toe of slope at MHW, the cobble will be closer to 6 inches in diameter to act as toe of slope protection and withstand the dynamic riverine conditions including boat wake, ice dams and potential erosive flows.

Coir Envelopes

Coir envelopes provide root zone stability below cobble mulch retaining planting soils while vegetation establishes and allows sediment to stabilize through natural hydraulic compaction. The advantage these have over coir logs is the limited organic content fill which avoids slump as the coir biodegrades. The application of coir envelopes is essential to achieving stabilization of the riparian Bank, as slopes are at the maximum angle of repose. The envelopes are set below the cobble mulch layer, to allow for root zone displacement and will not come loose at the surface or drag on new plantings.

East and West Shoreline Plantings:

For all east and west shoreline slopes, once the area has been cleared of debris coir envelopes and cobble beach nourishment will be placed as the slope is graded. Plug plantings will be installed in level terraces behind and between coir envelopes the plantings will include native deep root salt tolerant grasses and forbes. The plantings will be limited to grasses, because the introduction of the shrub layer is not practical as shrubs are not as resistant to the harsher conditions posed by the existing environment such as boat wake, ice dams, etc.

Select types of plantings were designed based on their position in the landscape and proximity to tidal influences, proposed grades, and salt tolerance. High and Low coastal Beach plantings will be introduced up to elevation 9., Above elevation 9, plantings will include coastal flood plain grasses and forbes. Finally, landward of the coastal flood plain plantings will include salt tolerant upland trees, shrubs, and vines for habitat diversity and visual buffering of the flood barrier. See Attachment C, Project Plans, Plan Sheet NBA-L-101.

The possibility of overland flows from Market Street runoff was evaluated, as it could be a contributing source to the erosion of the west bank/shoreline. Existing conditions indicated there is little to no surface runoff flows entering the site from the Market Street pavement. In any case, this will be eliminated due to the storm surge barrier effectively cutting off overland sheet flow from the street.

The impacts to resource areas associated with all alternatives will be similar where the work will be performed within the Coastal Beach and along the Coastal Bank. The addition of cobble and plantings in and of itself constitutes resource area restoration and enhancement as the current area is highly degraded, eroded and provides low value in term of habitat. No work will occur within Land Under Ocean (LUO) with the exception of dredging to accommodate the SSCF outlet.

Outfall Headwall and Transition to East/West

The tiered slopes will be graded at 3:1 to facilitate the final stabilization method, with the exception of the area between the headwall and the bank parking lot, where there is approximately 9 feet remaining for transitional grading. The slope in this location will consist of rip rap. The rip rap will be located above the landward most resource area of coastal bank.

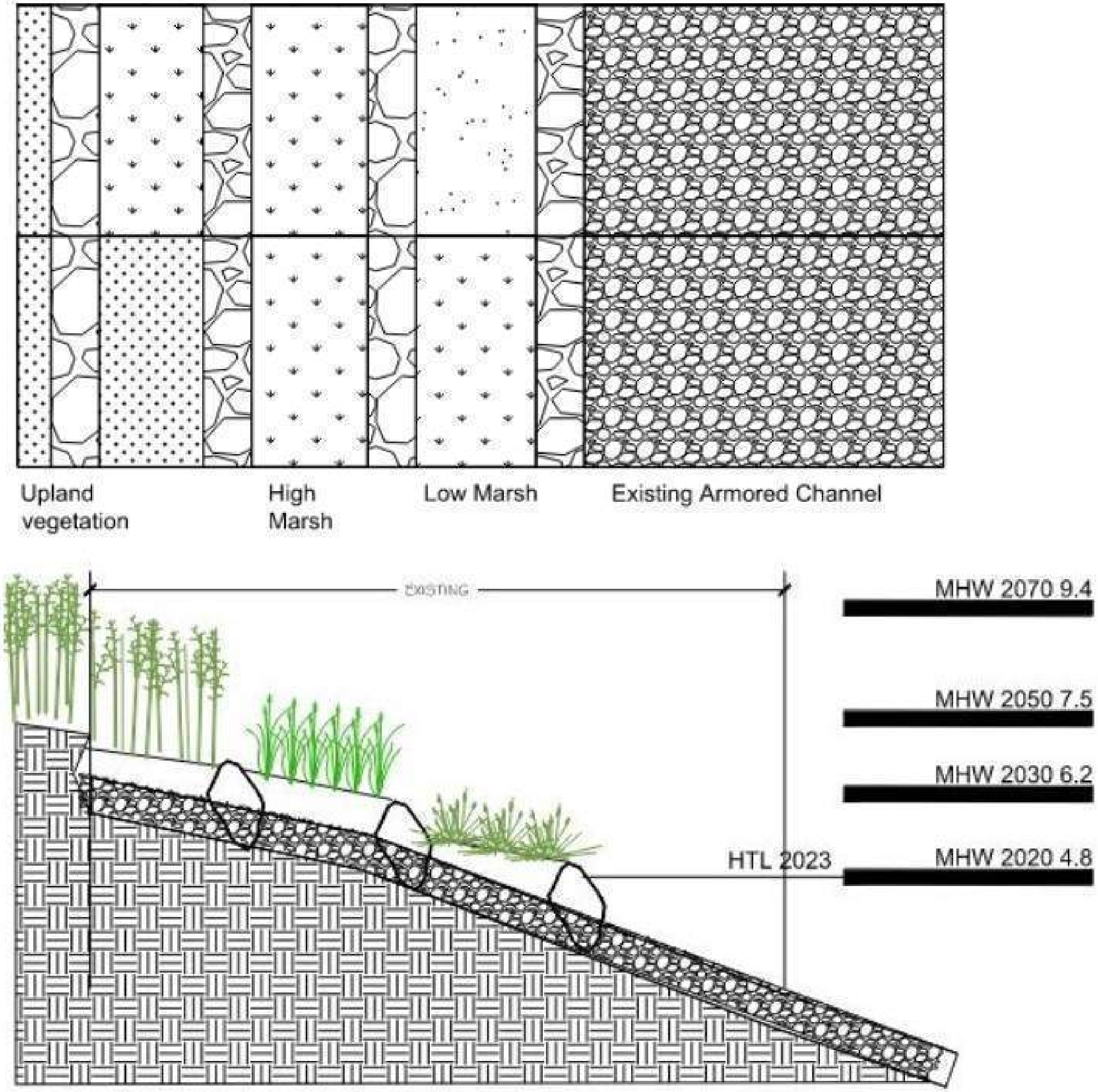
Island End Park

The existing Island End Park is a mix of urban wild and manicured greenspace and provides the community with limited waterfront access. The park will be rehabilitated as part of the Project. Like the east and west shorelines, the preferred alternative for the park includes NbA. Debris and trash will be removed and the beginning at MHW, cobble beach nourishment will be applied and interspersed with low and high beach plantings. Coir envelopes will be used to prevent erosion. The application of NbA maintains the overall form of the Park but adds storm resilience by eliminating the unstable bank condition and replacing invasive and ruderal upland plants with a gradient of higher habitat value native plantings. Upland areas will be planted with coastal salt and flood tolerant urban plantings for access and shade.

Several options for introducing hard scape structural approaches were considered; however they were dismissed for the same reasons as the east and west shoreline stabilization, based upon agency concerns. Other options explored include the relocation of features or landward shift to avoid future MHW elevation, however this was dismissed due to space constraints and the desire to provide for additional public amenities.

Community Involvement at Island End Park

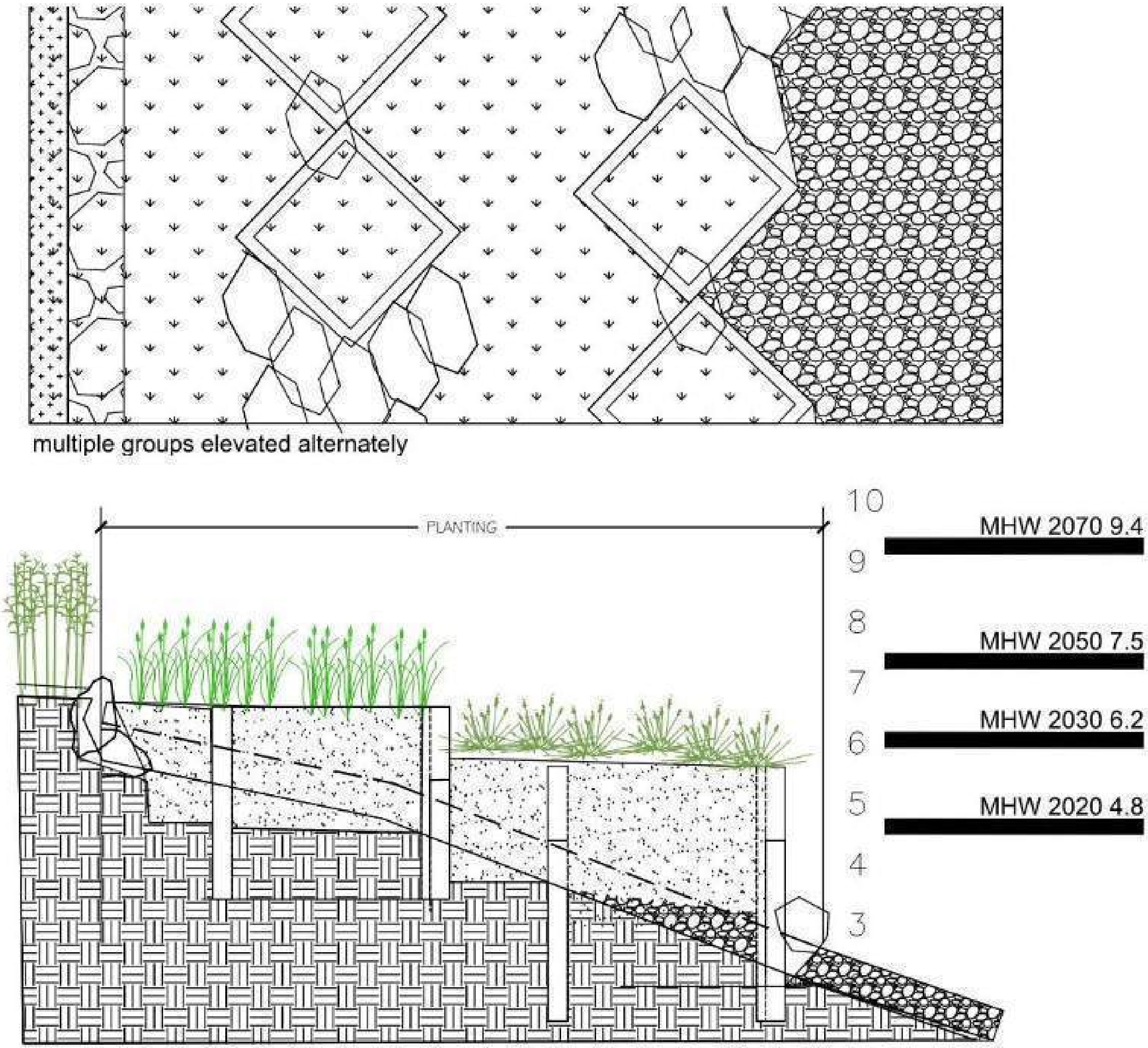
The EENF included community involvement that was focused on the maintenance of the plantings along the shorelines and park due to access limitations along east and west shorelines and because the area behind the headwall must be maintained by professional staff. In the park, educational plant establishment, monitoring, and community cleanup will still be an option for site managers. The park will also include interpretive displays showing the public the physical location of the projected MHW in the next 50 years and how this change will progressively reduce terrestrial life outside the flood barrier. The storm surge barrier wall could be used to display on a rotating basis hanging murals that interpret the history of this industrial district.



STONE SILLS WITH INTER TIDAL PLANTING OVER COASTAL BEACH 6"-18" STONE EMBEDED IN EXISTING GRAVEL BEACH FITTEDTO RETAIN SOIL. JUTE SUB LINER BACKFILLED WITH BEACH PLANTING MEDIA AND PLANTED WITH INTERTIDAL VEGETATION.

ALTERNATIVE 1: TERRACED SILS (STONE)

Figure 2-1
Stone Terraced Sills Alternative
Source: BSC Group, 2023



STACKABLE PLANTERS WITH INTER TIDAL PLANTING OVER COASTAL BEACH
PLANTERS EMBEDED IN EXISTING GRAVEL BEACH FITTEDTO RETAIN SOIL. WOOD SUB LINER BACKFILLED WITH BEACH PLANTING MEDIA AND PLANTED WITH INTERTIDAL VEGETATION.

SIMILAR TERRACING WAS EXPLORED IN STONE, GABION, AND TIMBER.

ALTERNATIVE 2: TERRACED SILS (CONCRETE)

Figure 2-2
Concrete Terraced Sills Alternative
Source: BSC Group, 2023

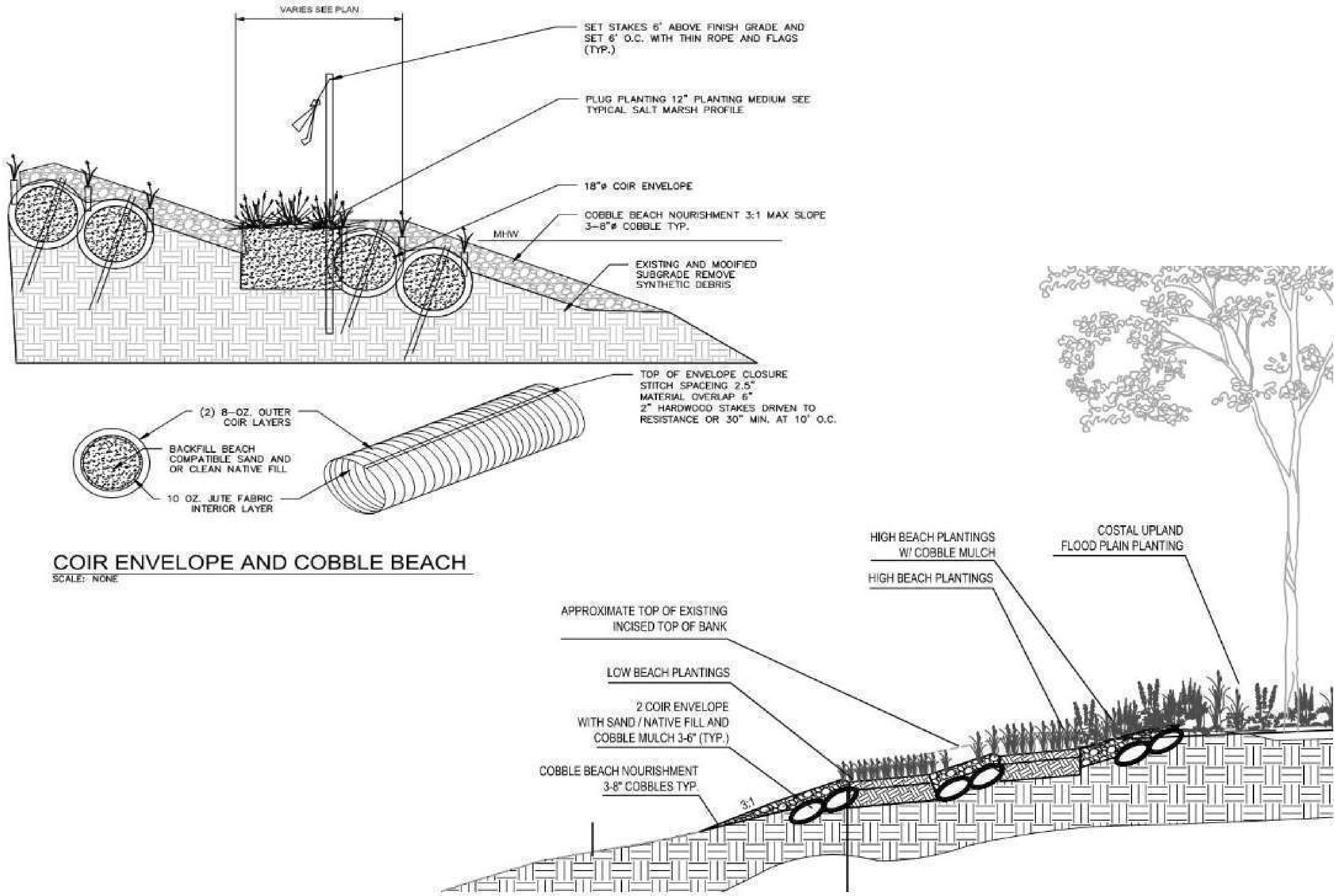


Figure 2-3
Cobble Beach Nourishment - Preferred Alternative
Source: BSC Group, 2023

Chapter 3

ENVIRONMENTAL JUSTICE

CHAPTER 3: ENVIRONMENTAL JUSTICE

3.1 INTRODUCTION

The Cities of Chelsea and Everett (the "Proponents") propose to construct coastal flood resilience measures along the Island End River ("IER") in the Cities of Chelsea and Everett (the "Project Site") consisting of a storm surge barrier and flood gates, a storm surge control facility ("SSCF"), nature-based approaches ("NbA"), wetland enhancements, and improvements to Island End Park and the surrounding public realm (the "Project"). The Project Site is located within a highly industrialized district surrounded by densely populated urban neighborhoods identified by the Massachusetts Executive Office of Energy and Environmental Affairs ("EEA") as Environmental Justice ("EJ") Populations with almost the entirety of each cities' Census Blocks meeting those criteria. See Attachment D, EJ Screening Form & Populations List for graphics showing EJ Census Blocks within the Cities of Chelsea and Everett. The Project will primarily bring net benefits to these communities by protecting over 500 acres of land in the Cities of Chelsea and Everett from current and projected future coastal flooding impacts (including the projected 1% 2070 coastal storm), while also protecting and improving safe public access to the IER waterfront and creating programs that will provide opportunities for ongoing community stewardship of Island End Park.

As outlined in the Expanded Environmental Notification Form ("EENF"), there will not be adverse impacts to EJ Populations following Project construction but several potential impacts during the construction period have been identified. This chapter provides an updated EJ analysis of the Project that focuses on the public health characteristics of EJ Populations within the Designated Geographic Area ("DGA") surrounding the Project Site, identifies how Project construction period could impact these conditions, and outlines mitigation measures the Proponents will employ to help prevent said impacts from occurring. The chapter also provides an update on the EJ outreach activities undertaken since the filing of the EENF and details the considerable net benefits that will be realized by EJ populations following completion of the Project. Note that due to Project design changes over the past eight months, the Project Site boundary, the DGA, and the EJ Populations within the DGA have all changed since the EENF filing. As such, this chapter reports updated metrics for all sections and analyses required under the Final MEPA Interim Protocol for Analysis of Project Impacts on Environmental Justice Populations.

While not a requirement of the Final MEPA Public Involvement Protocol for EJ Populations, a, the Proponents have undertaken enhanced outreach by submitting advance notice of this DEIR to community-based organizations ("CBOs") and tribes on September 27, 2023 based on the recommended list provided by the EEA EJ Director. See Attachment D, EJ Screening Form & Populations List.

3.2 EJ CHARACTERISTICS NEAR THE PROJECT SITE

The Project Site is in proximity to densely populated neighborhoods defined as EJ Populations based on the EEA Updated Massachusetts 2020 Environmental Justice Populations map viewer[1], which is derived from 2020 Census Block Groups. As defined by the state, EJ is based on the principle that all people have right to be protected from environmental hazards and live in and enjoy a clean and healthy environment. EJ is equal protection and meaningful involvement of all people with respect to development, implementation and enforcement of environmental laws, regulations, and policies and the equitable distribution of environmental benefits.

3.2.1 CHARACTERISTICS OF EJ POPULATIONS

Each of the EJ criteria were evaluated within 1-mile of the Project Site using the EEA Environmental Justice Maps Viewer.

The EJ criteria are as follows:

- *The annual median household income is not more than 65% of the statewide annual median household income,*
- *Minorities comprise 40% or more of the population,*
- *25% or more of households lack English language proficiency or,*
- *Minorities comprise 25% or more of the population and the annual median household income of the municipality in which the neighborhood is located does not exceed 150% of the statewide annual median household income.*

Within a 5-mile radius of the Project Site, there are 623 census block groups that trigger seven EJ criteria, which include: Minority; Income; English Isolation; Minority and Income; Minority and English Isolation; Income and English Isolation; and Minority, Income, and English Isolation (see Figure 3-1, Environmental Justice Populations(5-Mile Radius). Within a 1-mile radius, there are 59 census block groups that trigger four EJ criteria, which include Minority; Minority and Income; Minority and English Isolation; and Minority, Income, and English Isolation (see Figure 3-2, Environmental Justice Populations (1-Mile Radius)). Due to the revised Project Site boundary, this EJ Populations count represents an increase of two as compared to the numbers reported in the Project's EENF. Since the Project does not meet or exceed air quality review thresholds under 301 CMR 11.03(8)(a)-(b) or generate 150 or more new average daily trips of diesel vehicle traffic over a duration of one year or more,

[1] These data were obtained from https://www.mass.gov/info-details/massgis-data-2020-environmental-justice-populations

only the EJ Populations within one mile of the Project Site are included in the evaluation of potential project-related impacts.

A complete list of the EJ Characteristics of these census block groups is available in Attachment D, EJ Screening Form & Populations List.

3.2.2 LANGUAGES SPOKEN

The Proponents have and will continue to collaborate with CBOs to ensure meaningful engagement with EJ Populations throughout the region. The Cities of Chelsea and Everett prioritize multi-lingual engagement with residents in order to promote inclusivity and robust community engagement. In support of these principles, the Proponents have identified languages spoken by 5 percent or more of residents who identify as not speaking English "very well" to conduct community outreach activities. There are five languages spoken within the 1-mile radius of the Project Site, which include Arabic, Spanish or Spanish Creole, Chinese, French Creole, and Portuguese or Portuguese Creole. The Proponents are committed to continuing to conduct written and oral translation and interpretive services for the languages spoken within a 1-mile radius of the Project Site during community outreach efforts.

3.3 PUBLIC INVOLVEMENT ACTIVITIES SINCE THE FILING OF THE EXPANDED ENVIRONMENTAL NOTIFICATION FORM

In accordance with the Massachusetts Environmental Policy Act ("MEPA") Public Involvement Protocol for EJ Populations, the Proponents have been conducting extensive formal and informal community processes with permitting agencies, neighboring residents and businesses, and a variety of advocacy groups since 2018. Collaboration between the municipalities, local organizations, and community stakeholders is vital to address risks holistically. The Proponents have continued their outreach efforts since the filing of the Project's EENF in February of 2023, a summary of which is provided in Table 4-1 below.

Table 3-1: Community Outreach Efforts Since February 2023

Participant(s)	Description
Neighbors and Community Based Organization	
GreenRoots	• Hosted a Mystic River and IER Boat Tour for the CAG and Youth Eco Ambassadors to discuss community climate resilience efforts including the Project along the Everett and Chelsea waterfront (June 29, 2023) • Hosted a Mystic River and IER Boat Tour for Everett Community Growers and various community members to discuss

Participant(s)	Description
	community climate resilience efforts including the Project along the Everett and Chelsea waterfront (August 17, 2023)
Stakeholder Engagement	
Stakeholder Working Group ("SWG")	• Met in-person to attend a site walk to discuss the Project and upcoming fieldwork/permitting efforts (April 13, 2023) • Met virtually to review Project updates including field work performed and upcoming permitting efforts (October 17, 2023) • Numerous additional meetings and site walks were held with individual property owner/stakeholders to discuss the Project between February 2023 and November 2023.
City of Everett	
Department of Planning and Development	• Presented to Everett Conservation Commission for the Notice of Intent for proposed geotechnical borings within the Project Site to inform the Project design (May 25, 2023). Also, provided an overall update on the Project to Commissioners and the public.
City of Chelsea	
Department of Housing and Community Development	• Presented to Chelsea Conservation Commission for the Notice of Intent for proposed sediment sampling within the Project Site to inform the Project design (September 27, 2023). Also, provided an overall update on the Project to Commissioners and the public.

3.4 ASSESSMENT OF EXISTING UNFAIR OR INEQUITABLE ENVIRONMENTAL BURDEN HEALTH CRITERIA

The Proponents assessed existing unfair or inequitable environmental burdens and related public health consequences impacting EJ Populations proximate to the Project Site, as detailed in the following sections.

3.4.1 VULNERABLE HEALTH CRITERIA

The Proponents have utilized additional data layers through the Massachusetts Department of Public Health ("MassDPH") EJ Tool to determine other potential sources of pollution within the 1-mile radius of the Project Site. The MassDPH EJ Tool exhibits four vulnerable health criteria. The four vulnerable health criteria per municipality include Heart Attack per 10,000, Pediatric Asthma Emergency Department ("ED") Visits Rate per 10,000, Elevated Blood Lead Prevalence per 1,000, and Low Birth Weight ("LBW") per 1,000. Elevated Blood Lead Prevalence per 1,000 and LBW per 1,000 are based on 2010 census tract data. EJ Populations that exist within these vulnerable health areas could potentially bear an unfair or inequitable environmental burden and related public health consequence. The EJ criterion is met if they are equal to or greater than 110% of the state prevalence.

3.4.1.1 HEART ATTACK (MUNICIPALITY)

According to the MassDPH, heart attack hospitalization is a criterion used to identify vulnerable health EJ Populations because exposure to air pollution can increase the risk for heart attack and other forms of heart disease, and it is indicative of a serious chronic illness that can lead to disability, decreased quality of life, and premature death. People living in EJ areas with higher than average heart attack hospitalization rates may be more vulnerable to adverse environmental exposure. The Massachusetts statewide rate was 26.4 per 10,000 from 2013 – 2017. Municipalities with higher than average heart attack hospitalization rates are included in Table 4-2, Nearby Municipalities Meeting EJ Vulnerable Health Criterion for Heart Attacks, 2013 – 2017. These data have not changed as compared to the data reported in the Project's EENF.

Table 3-2: Nearby Municipalities Meeting EJ Vulnerable Health Criterion for Heart Attacks, 2013 – 2017

Municipality	Case Count	Statewide Rate Per 10,000	110% of Statewide Rate	Municipality Rate per 10,000
Chelsea	53.8	26.4	29.1	34.9
Everett	79.2	26.4	29.1	34.8

Source: MassDPH – Bureau of Environmental Health, 2023

3.4.1.2 CHILDHOOD ASTHMA (MUNICIPALITY)

According to MassDPH, childhood asthma is a criterion used to identify vulnerable health EJ Populations because people of color and low-income individuals are at greater risk for asthma exacerbations due to increased exposure to asthma triggers, and uncontrolled asthma can impact an individual's overall health and wellbeing. Asthma has been directly linked to air pollution, exposure to environmental contaminants, and poor housing conditions. The Massachusetts statewide rate was 83.1 Pediatric Asthma ED Visits per 10,000 from 2013 – 2017. Municipalities with higher than average childhood asthma rates are included in Table 4-3, Nearby Municipalities Meeting EJ Vulnerable Health Criterion for Childhood Asthma, 2013 – 2017. These data have not changed as compared to these data reported in the Project's EENF.

Table 3-3: Nearby Municipalities Meeting EJ Vulnerable Heath Criterion for Childhood Asthma, 2013 – 2017

Municipality	Case Count	Statewide Rate per 10,000	110% of Statewide Rate	Municipality Rate per 10,000
Boston	1059	83.1	91.4	172.8
Chelsea	79.2	83.1	91.4	167.7
Everett	75	83.1	91.4	131.2
Somerville	58.6	83.1	91.4	125.2

Source: Mass DPH – Bureau of Environmental Health, 2023

3.4.1.3 CHILDHOOD BLOOD LEAD EXPOSURE (CENSUS TRACT)

According to Mass DPH, childhood lead exposure is used to identify vulnerable health EJ Populations because lead exposure disproportionately impacts lower income communities and communities of color, and childhood exposure to relatively low levels can cause severe and irreversible health effects, including damage to a child's mental and physical development. Within one mile of the Project Site, nine census tracts are triggered for having Elevated Blood Lead Presence with a total of 33 cases from 2016 – 2020. Note that the updated Project Site boundary resulted in an additional two census tracts that trigger the Elevated Blood Lead Prevalence criterion being included in the DGA, as compared to the Project's EENF. Additionally, the MassDPH EJ tool has been updated to report data from 2016 – 2020, rather than data from 2015 – 2019 that was available during preparation of the EENF. No statistical data was available for an additional nine census tracts within one mile of the Project Site. The Massachusetts statewide rate was 15.0 per 1,000 for 2016 – 2020, as compared to 16.1 for 2015 – 2019. Census Tracts with higher than average elevated blood lead prevalence rates, as well as those with no statistic data available, are included in Table 4-4, Elevated Blood Lead Prevalence Per 1,000, 2016 – 2020.

Table 4-4: Elevated Blood Lead Prevalence per 1000, 2016 – 2020

2010 Census Tract	Community Case Count	Statewide Rate per 1,000	110% of Statewide Rate	Community Rate per 1,000
25025160101	5	15.0	16.5	17.0
25017342500	4	15.0	16.5	17.2
25017342101	2	15.0	16.5	17.3
25025160200	3	15.0	16.5	17.4
25025050101	3	15.0	16.5	21.8
25025160502	5	15.0	16.5	23.5

2010 Census Tract	Community Case Count	Statewide Rate per 1,000	110% of Statewide Rate	Community Rate per 1,000
25025050901	3	15.0	16.5	24.7
25025160501	5	15.0	16.5	25.8
25017351403	3	15.0	16.5	28.8
No Statistical Data				
25025040200	NS	15.0	16.5	NS
25025160300	NS	15.0	16.5	NS
25025040600	NS	15.0	16.5	NS
25017350103	NS	15.0	16.5	NS
25025040801	NS	15.0	16.5	NS
25025050300	NS	15.0	16.5	NS
25025040401	NS	15.0	16.5	NS
25025040100	NS	15.0	16.5	NS
25017339801	NS	15.0	16.5	NS
Total	33			

Source: Mass DPH – Bureau of Environmental Health, 2023

3.4.1.4 LOW BIRTH WEIGHT (CENSUS TRACT)

According to MassDPH, LBW is a criterion used to identify vulnerable health EJ Populations because exposure to environmental contaminants can increase the risk of delivering a LBW baby and LBW is a significant predictor of maternal and infant health. Women of color and women of low income have a higher risk of delivering a LBW baby. LBW can increase the risk of infant mortality and morbidity, health problems throughout childhood, developing cognitive disorders, developmental delay, and chronic diseases as an adult such as cardiovascular diseases and type 2 diabetes. Within one mile of the Project Site, 13 census tracts were triggered for being LBW vulnerable with a total of 28 cases from 2011 – 2015. Note that the updated Project Site boundary resulted in an additional two census tracts that trigger the LBW criterion being included in the DGA, as compared to the Project's EENF. No statistical data was available for an additional six census tracts within one mile of the Project Site. The Massachusetts statewide rate was 216.8 per 1,000. Census Tracts with LBW rates, as well as those with no statistic data available, are included in Table 4-5, Low Birth Weight Rate Per 1,000, 2011 – 2015.

Table 4-5: Low Birth Weight Rate Per 1,000, 2011 – 2015

2010 Census Tract	Community Case Count	Statewide Rate per 1,000	110% of Statewide Rate	Community Rate per 1,000
25017350104	2	216.8	238.5	241.2
25025040600	1	216.8	238.5	262.0
25017342400	3	216.8	238.5	268.6
25025160602	2	216.8	238.5	271.1
25025050101	2	216.8	238.5	280.1
25025160601	2	216.8	238.5	285.7
25017351403	1	216.8	238.5	285.7
25025160200	2	216.8	238.5	294.1
25025040401	1	216.8	238.5	295.4
25025160502	3	216.8	238.5	298.2
25025160400	2	216.8	238.5	315.0
25025050901	3	216.8	238.5	380.1
25025160501	4	216.8	238.5	387.9
No Statistical Data				
25025040200	NS	216.8	238.5	NS
25025160300	NS	216.8	238.5	NS
25017350103	NS	216.8	238.5	NS
25017342600	NS	216.8	238.5	NS
25025050300	NS	216.8	238.5	NS
25025040100	NS	216.8	238.5	NS
Total	28			

Source: Mass DPH – Bureau of Environmental Health, 2023

3.4.1.5 OTHER POTENTIAL SOURCES OF POLLUTION

The Proponents have also consulted the MassDPH EJ Tool to survey other potential sources of pollution within the boundaries of the EJ Populations. The following values have been updated as compared to those reported in the EENF due to the changed Project Site boundary. Within one mile of the Project Site, there are: three Air Operating Permits, four Large Quantity Toxic Users, 27 Large Quantity Generators, 36 M.G.L. c. 21E Sites, 39 Tier II Toxics Use Reporting Facilities, 110 MassDEP Sites with AULs, one MassDEP Groundwater Discharge Permit, two MassDEP Public Water Suppliers, five NPDES Points (Draft), 25 Underground Storage Tanks, and five Environmental Protection Agency ("EPA") Toxic Release Inventory Sites. The Project Site is approximately 0.1-miles away from transportation provided by the Massachusetts Bay Transportation Authority ("MBTA"). Within one mile of the Project Site, there are 167 MBTA bus stops, two Silver Line stops, two Orange Line stops, and one commuter rail stop.

3.4.2 RMAT CLIMATE RESILIENCE DESIGN STANDARDS

As part of preparation of the EENF for the Project, the Proponents consulted the Resilient MA Team ("RMAT") Climate Resilience Design Toll (the "RMAT Tool") to understand the risks associated with climate change at the Project Site. The RMAT Tool integrates best available statewide climate change projects into conceptual planning and design of projects with physical assets to help inform and guide the planning and design on infrastructure. The Project was identified as having a high risk of sea level rise/storm surge, extreme precipitation-urban flooding, and extreme heat. For more information on the RMAT Tool results, see Chapter 7, Flood Resiliency. Note that the RMAT Tool output values have not changed as compared to those reported in the EENF.

3.4.3 ENVIRONMENTAL PROTECTION AGENCY EJ SCREEN

The Proponents have also consulted the U.S. EPA's EJ Screen tool, which provides percentile ranking by census block group, compared against statewide averages for 13 environmental indicators. The Proponents used the environmental indicators to assess the potential environmental exposures that further create unfair or inequitable environmental burdens on EJ Populations. The metrics reported below reflect the updated Project Site boundary as compared to that in the EENF, as well as any data updates that may have been incorporated into the EPA EJ Screen tool since preparation of the EENF.

The EJ Screen assessed a 1-mile radius around the Project Site and reported an approximate population of 52,356. Within this radius, there are nine Hazardous Waste Treatment, Storage, and Disposal Facilities Sites; 115 Water Discharger Sites; 56 Air Pollution Sites; four Brownfield Sites; and 22 Toxic Release Inventory Sites reporting to EPA. There are no Superfund sites within the 1-mile radius.

Compared against Massachusetts statewide averages, the Project Site falls within the 77th percentile for Particulate Matter (PM2.5) at 7.14 ug/m^3, the 64th percentile for Ozone at 58.9 ppb, the 91st percentile for Diesel Particulate Matter at 0.5 ug/m^3, the 3rd percentile for Air Toxics Cancer Risk at 28 lifetime risk per million, the 49th percentile for Air Toxics Respiratory HI at 0.37, the 67th percentile for Toxic Releases to Air at 3,500, the 88th percentile for Traffic Proximity with 1,400 daily vehicles/meter, the 64th percentile for Lead Paint with 0.65 percent pre-1960 housing, the 30th percentile for Superfund Proximity with 0.075 sites/km, 89th percentile for RMP Facility Proximity with 0.94 facilities/km, the 91st percentile for Hazardous Waste Proximity with 20 facilities/km, the 81st percentile for Underground Storage Tanks with 5.9 count/km^2, and the 95th percentile for the Wastewater Discharge with 0.15 toxicity-weighted concentration/meter. This accumulation of environmental burden is unprecedented throughout the commonwealth.

3.5 ANALYSIS OF PROJECT IMPACTS TO DETERMINE DISPROPORTIONATE ADVERSE EFFECT

While the Project will primarily benefit EJ Populations (as discussed in Section 3.6), several potential construction period impacts have been identified that may exacerbate the MassDPH vulnerable health criteria discussed in Section 3.4 or will otherwise impact nearby EJ Populations. The construction period is presently anticipated to occur between Fall 2025 and Fall 2028 for an overall duration of approximately 36 months. The Proponents are committed to employing all practicable mitigation measures to protect the environment and the health of EJ and non-EJ Populations alike. All local, state, and federal regulations concerning construction will be followed, and additional measures will be employed throughout the construction period. The potential impacts and corresponding mitigation measures are analyzed below and will be further codified in the Project's forthcoming Construction Management Plan ("CMP").

3.5.1 AIR QUALITY

Air quality impacts during the construction period may include dust from demolition and site excavation. It is anticipated that upland, intertidal, and subtidal land will be disturbed during these activities, creating the potential for fugitive dust to migrate from the Project Site into surrounding EJ Populations. Emissions from construction vehicles and equipment during the construction period additionally has the potential to impact nearby EJ Populations. Both fugitive dust and vehicular emissions can be triggers of the MassDPH childhood asthma and heart attack public health EJ criteria. To mitigate air quality impacts associated with Project construction, the Proponents and their construction contractor will employ construction best practices, including but not limited to regular wetting down of work areas and washing of equipment; covering, prompt use or disposal, and proper handling of stockpiled or excavated materials; and use of diesel retrofitted construction equipment. Additionally, dust monitoring devices will be deployed at and around the Project Site during excavation to track the level of airborne dust generated during construction. If the predetermined threshold of airborne dust is exceeded, the contractor will stop construction activities immediately and deploy additional dust control interventions. Construction will not resume until airborne dust returns to safe levels in conformance with the identified thresholds. The thresholds and protocols for dust monitoring will be further outlined in the Project's forthcoming CMP.

3.5.2 SOILS

The Project Site's historical uses and filling activities have resulted in impacts to soils including the presence of coal tar and related petroleum compounds associated with former manufactured gas plant operations and supporting activities. Excavation associated with deep pile and foundation installation activities will result in the generation of surplus soils during the Project. Improper handling of these materials can cause dispersion of toxic or otherwise harmful substances in airborne dust particles, which would pose a significant public health threat to EJ and non-EJ Populations who reside or work proximate to the Project Site. Preventing public health threats associated with these contaminants is of critical importance to the Proponents. Excavation, handling, transportation, and off-site disposal of these soils, along with associated air monitoring and health and safety procedures, will be implemented under project-specific Release Abatement Measure ("RAM") Plans filed with the Massachusetts Department of Environmental Protection ("MassDEP") pursuant to MCP requirements. The Proponents will pre-characterize the soils for off-site disposal prior to the start of excavation to permit excavation and loading trucks destined for a pre-determined disposal facility. These actions will serve to minimize the need for interim storage and/or stockpiling of the materials within the Project Site.

Groundwater pumped from the excavations associated with construction will be either returned to the excavation of origin or treated on-site prior to discharge to a local surface water body. The Proponent will obtain a Dewatering and Remediation General Permit ("DRGP") from the EPA prior to the start of construction. The DGRP will specify the required treatment technologies and associated monitoring sampling activities required to maintain compliance with EPA and MassDEP requirements.

3.5.3 WATER QUALITY

Construction of the SSCF and stabilization of the banks of the IER will require dredging in intertidal and subtidal land that will disturb regulated sediments present in the river. As discussed in the previous section, improper handling of these sediments can cause migration of sediments – in the case of dredging through both airborne and waterborne pathways – posing public health threats to EJ and non-EJ Populations alike. The Proponents will comply with all applicable regulations regarding handling and disposal of these sediments in accordance with the Massachusetts Contingency Plan ("MCP") and will employ additional measures to prevent distribution of the sediments elsewhere in the IER waterway. These additional measures will include deploying turbidity curtains prior to dredging activities and compliance with Massachusetts Division of Marine Fisheries' recommended time-of-year restrictions, both of which will protect marine species and habitat within and proximate to the Project Site. The Proponents will also minimize turbidity during dredging through use of a mechanical clamshell dredge with an environmental bucket.

3.5.4 NOISE

Noise impacts associated with Project construction, which can serve as a nuisance to nearby residents including EJ populations, will result from driving of deep foundation piles and use of other construction vehicles and equipment to construct the storm surge barrier and flood gates, SSCF, and other Project components. To mitigate these impacts, the Proponents require use of construction best practices by their contractor that will be further detailed in the CMP and will include, at a minimum, use of slow-start pile driving, appropriate mufflers on all equipment, maintenance of intake and exhaust mufflers, turning off idling equipment, and replacing other specific operations with less noisy ones, as practicable. The Proponents will additionally comply with the City of Chelsea and City of Everett noise ordinances. Construction noise impacts and mitigation measures will be further identified in the Project's CMP.

3.5.5 TRAFFIC

Traffic in and around the Project Site may be exacerbated during the construction period due to temporary road closures and rerouting of general traffic, as well as transit of construction vehicles, equipment, and workers to and between Project work areas. Beyond the inconvenience of changed traffic patterns, these conditions can impact EJ Populations by causing potential increases in vehicle emissions that exacerbate the MassDPH childhood asthma and heart attack public health EJ criteria. To mitigate these impacts and the associated potential increase in emissions, the Proponents will prepare and implement a CMP that identifies routing and off-peak scheduling for trucking and deliveries, construction worker commuting options, and implementation of other transportation demand measures.

3.6 PROJECT BENEFITS TO ENVIRONMENTAL JUSTICE POPULATIONS

The Project will provide substantial net benefits to EJ populations, and EJ populations will inordinately realize these benefits due to the demographic makeup of the DGA surrounding the Project Site. The Project will help protect over 500 acres of land, including residential neighborhoods comprised of EJ Populations, employment centers, and regionally critical facilities and infrastructure including schools and hospitals, from current and projected future high tide and storm surge flooding. The Project will decrease impervious area in the final condition compared to existing Project Site conditions, and all areas will be re-graded to promote drainage to existing drainage structures or to new structures. The Project intends to install backflow preventers on the existing stormwater pipes that the barrier crosses over to prevent flood water from surcharging inland of the barrier. The increase of pervious surface and new stormwater infrastructure will reduce this impact of urban flooding around the Project Site.

The Project will create an improved public realm in and around the IER waterfront in Chelsea by reconstructing Island End Park, creating new accessways between the park and surrounding roadways and introducing new amenities including bike racks, reconstructed sidewalks, benches, and interpretive signage. Programming described in greater detail in Section 3.8 will draw residents to Island End Park and provide opportunities for the local community to assume an active role in maintaining the park following Project construction. Park enhancements will also provide EJ Populations access to shaded spaces and shelter from extreme heat through improving urban tree canopy, reducing the urban heat island effect. Construction of the Project is estimated to create approximately 670 – 1,000 construction jobs, which will create new employment opportunities for EJ populations.

3.7 CONFORMANCE WITH PUBLIC HEALTH-RELATED PERMIT PERFORMANCE STANDARDS

The Secretary's Certificate on the EENF directed the Proponents to analyze how public health-related performance standards in permits required for the Project will be met or exceeded to protect the public health of EJ Populations proximate to the Project Site. The 401 Water Quality Certification ("WQC"), Waterways, and Wetlands regulations contain such standards, and the Project's conformance with those standards is discussed below. Greater detail on compliance with these standards will be provided in subsequent permit applications.

The 401 WQC regulations at 314 CMR 9.07 include several public health-related performance standards relating to Dredging and Dredged Material Management. The Project will comply with said standards as discussed below:

- Dredging and dredged material management will be conducted consistent to the requirements of the MCP and will employ additional measures such as use of turbidity curtains to prevent distribution of sediments elsewhere in the IER waterway. 314 CMR 9.07(1)(c).

- Alternatives to dredged material disposal potentially including reuse, recycling, or contaminant destruction/detoxification will be evaluated in the Project's 401 WQC application. This evaluation will include a consideration of the relative public health impacts of the alternatives considered. 314 CMR 9.07(1)(e).

- Project dredging will be planned and conducted in conformance with the 401 WQC and the MCP requirements to provide protection to human health. 314 CMR 9.07(3).

- Any placement of dredged material at an intermediate facility, if required, will be placed in a secure manner that does not create a threat to public health and conforms with the requirements set forth under the 401 WQC and MCP programs. 314 CMR 9.07(4). No intermediate facilities will be located within the areas and buffer zones specified in 314 CMR 9.07(4)(d).

- Transportation of dredged material will conform with the requirements including the use of a Dredged Material Tracking Form, and mitigation measures including material covering and truck washing, set forth in the 401 WQC regulations at 314 CMR 9.07(5).

Additionally, in conformance with the Waterways regulations at 310 CMR 9.37(1)(b) the Project will follow the Engineering and Construction Standards and will not pose an unreasonable threat the public health if damaged or destroyed in a storm. Finally, the protection of human health has been considered in the design of Project and the alternatives considered in conformance with the General Performance Standard for Riverfront Areas under the Wetlands regulations at 310 CMR 10.58(4)(c)1.c.

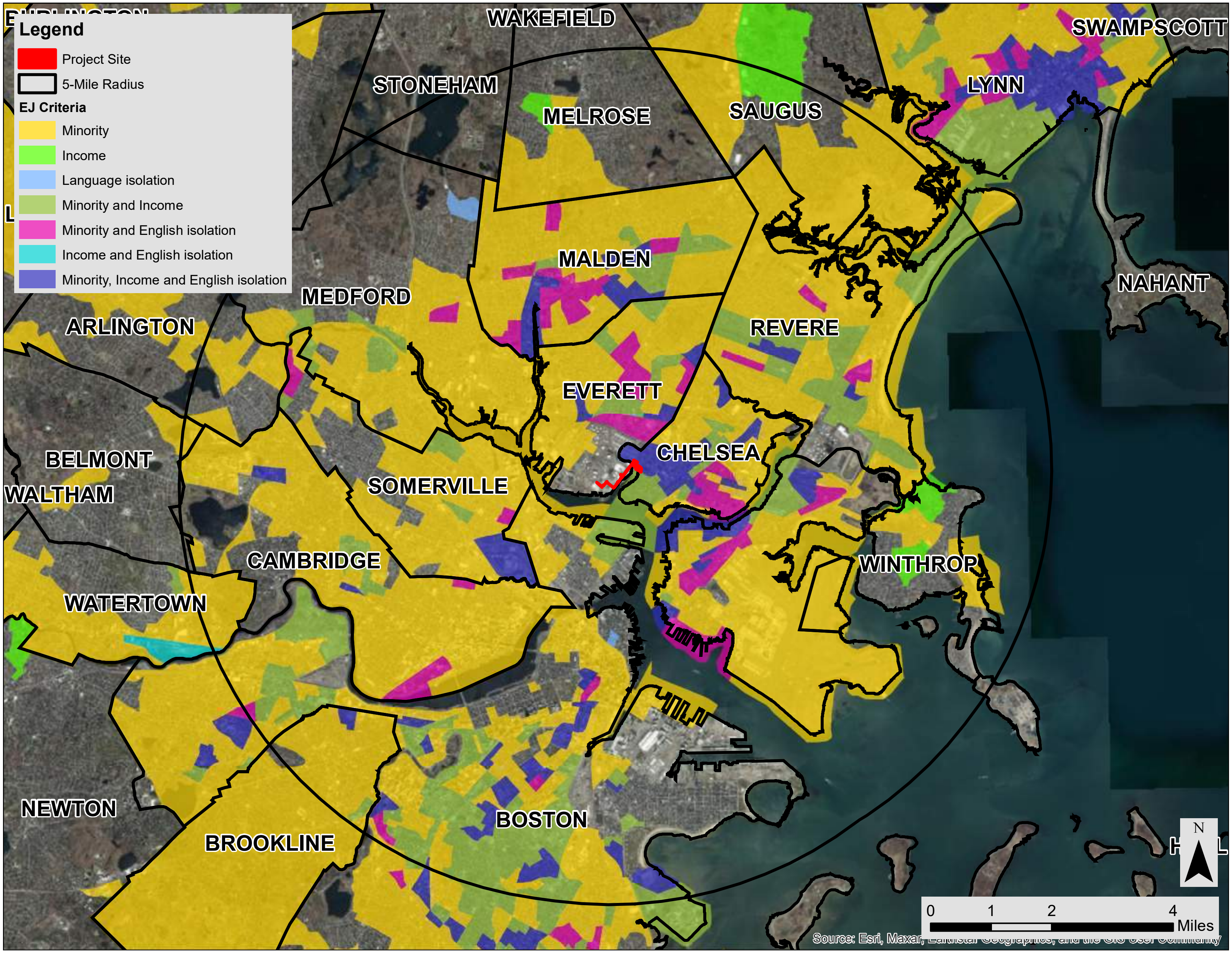
3.8 COMMUNITY STEWARDSHIP OPPORTUNITIES

The terraced concrete planter system along the banks of the IER originally proposed in the EENF included opportunities for community-led environmental stewardship including planting, nest-building, plant management, and other activities. This approached allowed local stakeholders such as MyRWA, GreenRoots, school groups, and the local populace to take a leading role in the ongoing maintenance of this part of the Project program, while also providing a mechanism for public education and development of institutional knowledge of maintaining environmental resources in what are largely highly urbanized communities with limited public open space along their waterfronts.

In response to agency feedback regarding concern over potential adverse impacts to wetland resource areas, the concrete planter systems have been removed from the Project program. However, the Proponents remain committed to facilitating involvement of local communities in ongoing stewardship of the IER and to creating additional programming opportunities to develop greater connections between residents of Chelsea and Everett to the IER waterfront. These opportunities have been repurposed to center on Island End Park, which will be substantially improved as a part of the Project and will include NbAs along its shoreline to protect it from erosion and enhance its ecological functions. Community stewardship opportunities and other public involvement activities will be overseen by the Cities and community partners following Project construction and may include the following:

- Inclusive educational signage in English and Spanish languages (with QR code for additional translation options) that incorporates information about rising sea levels due to climate change, storm surge flood risk, history of the IER and surrounding district, and other topics;
- Physical markers indicating where projected tidal and storm surge flood impacts would be experienced at/around Island End Park;
- Educational programming about ecological functions of salt marsh and community spring planting opportunities in upland areas of Island End Park;
- Community cleanup days to address trash and debris at IER and adjacent Mystic River;

- Nonprofit and community groups monitoring and maintaining coastal plantings where feasible; and
- Public art installations at Island End Park and on the storm surge barrier.



Chelsea, MA
Everett, MA

Figure 3-1
Environmental Justice Populations (5-Mile Radius)
Source: Fort Point Associates, Inc., 2023; EEA, 2022

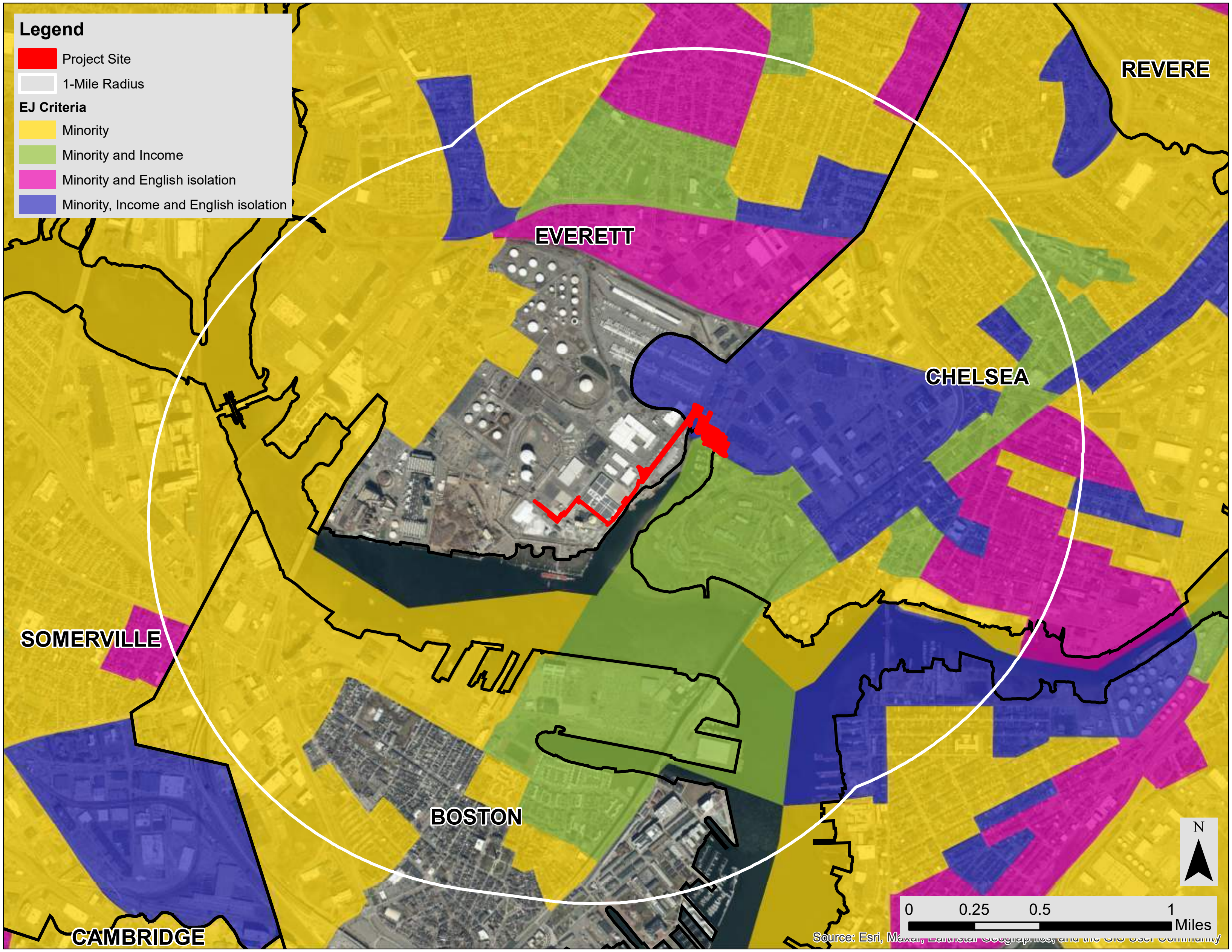


Figure 3-2
Environmental Justice Populations (1-Mile Radius)
Source: Fort Point Associates, Inc., 2023; EEA, 2022

Chapter 4

TIDELANDS

CHAPTER 4: TIDELANDS

4.1 INTRODUCTION

The Cities of Chelsea and Everett propose to construct coastal flood resilience measures along portions of the Island End River ("IER") in the Cities of Chelsea and Everett consisting of a storm surge barrier and flood gates, a storm surge control facility ("SSCF"), Nature-based Approaches ("NbA"), wetland enhancements, and improvements to Island End Park and the surrounding public realm (the "Project"). The majority of the Project is located on filled and flowed tidelands and is subject to jurisdiction of M.G.L. Chapter 91 and its implementing regulations at 310 CMR 9.00. This chapter expands upon the analysis presented in the EENF to provide updated information about Chapter 91 jurisdiction and licensing history, the Project's compliance with the Chapter 91 Regulations, and its consistency with Massachusetts Coastal Zone Management ("MCZM") policies. Chapter 5 of this DEIR addresses in greater detail the Project's interface with water-dependent industrial uses ("WDIUs") in the Mystic River Designated Port Area ("DPA"), which includes part of the Project Site.

4.2 CHAPTER 91 JURISDICTION

The Project Site consists of filled and flowed private and Commonwealth tidelands. See Figure 4-1, Chapter 91 Jurisdiction. The Chapter 91 presumptive line is based on MassGIS data and the high water mark from three historic surveys. The historic high water mark reflects the most landward high water marks of the U.S. Coast Survey, 1847 (T-233), the U.S. Coast and Geodetic Survey, 1894 (T-2190), and the Harbor and Land Commissioner's Office Survey, 1908. See Figure 4-2: Historic Chapter 91 Jurisdiction (1847); Figure 4-3: Historic Chapter 91 Jurisdiction (1894); and Figure 4-4: Historic Chapter 91 Jurisdiction (1908). The Project Site is located within the footprint of the former IER in the vicinity of Market Street and contains areas seaward of the historic low water mark as shown on the 1894 survey, and therefore meets the Massachusetts Department of Environmental Protection's ("DEP") definition of Commonwealth tidelands. Based on the National Oceanic and Atmospheric Administration's ("NOAA") Boston Harbor tide gauge (Station 8443970), present-day mean high water ("MHW") is El. 4.33 ft NAVD88 and present-day mean low water ("MLW") is El. -5.16 ft NAVD88, for a normal tidal range of approximately 9.49 ft.

4.2.1 HISTORIC LICENSES

State authorizations for fill and structures within Chapter 91 jurisdiction were researched using files provided by DEP, and the on-line websites at the Middlesex South Registry of Deeds and the Suffolk Registry of Deeds. Authorizations were found for the existing structures including pile supported piers and deck, filling, dredging, and stormwater structures in Chelsea and Everett. Authorizations for structures and fill were issued between 1897 and 2017 by the Harbor and Land Commissioner's Office, the Massachusetts Department of Public Works, the Port of Boston Authority, the Department of Environmental Quality Engineering, and DEP. See Table 4-1, Historical Authorizations within the Project Site.

Table 4-1: Historical Chapter 91 Authorizations within the Project Site

License No.	Date Issued	Authorization
2083	December 10,1897	To build bulkheads and to fill solid.
2250	January 19, 1899	To build a pile wharf and bulkhead, fill solid and dredge.
3492	July 29, 1910	To build bulkheads and supporting piles structures, to fill solid and dredge.
434	May 29, 1924	To build a bulkhead, fill solid, drive piles for a cableway, and extend a building.
1373	November 24, 1931	To build and maintain a timber wharf and walk and to drive piles for a dolphin.
1908	October 28, 1937	To fill solid.
2224	August 14, 1940	To fill solid.
2562	December 8, 1942	To build and maintain an intake well.
2790	August 14, 1945	To fill solid.
127	February 17, 1950	To extend on a pile structure a 36-inch concrete pipe drain and to construct a slag embankment to support the existing timber bulkhead.
4962	August 11, 1965	To fill solid an existing drainage ditch and to place fill, pipe drains, and structures.
1212	April 17, 1985	To construct and maintain pile-held piers, ramps, bottom-anchored floats, straddle hoist piers, steel sheet pile bulkheads, fender piles, fuel pumps, pile supported gangways, and a riprap revetment.
1527	September 29, 1986	To construct and maintain a drainage outfall and associated riprap.
2990	May 7, 1992	To maintain a timber bulkhead and construct a sheet pile bulkhead.

License No.	Date Issued	Authorization
3037	June 26, 1992	To remove tar deposits and to construct and maintain riprap.
11280	March 10, 2006	To dredge contaminated sediments as part of a Release Abatement Measure Project and to construct and maintain a confined disposal facility for the disposal of the dredged material.
12100	April 1, 2008	To maintain existing stormwater pipe and outfall; to construct and maintain new stormwater piping, manholes, outfall piping, and retaining wall; to remove, replace, and maintain concrete and bituminous concrete paving; and to replace and maintain pilings, supports, and deck.
14342	March 10, 2017	To modify existing floating dock system, install new piles, and expand existing reconfiguration zone

4.3 COMPLIANCE WITH CHAPTER 91 REGULATIONS

This section describes the Project's compliance with the following applicable standards of the Chapter 91 Regulations.

4.3.1 APPLICABLE CHAPTER 91 STANDARDS

310 CMR 9.11(3)(c)2 – Statement regarding Proper Public Purpose, Public Rights, CZM Consistency, and Conformity to Municipal Harbor Plan

Pursuant to 310 CMR 9.31(2), the Project serves a proper public purpose because it is a water-dependent use as described below. The Project is not detrimental to and does not negatively impact the rights, access, or use of the tidelands by the public – rather, the Project will expand these rights by improving public access to filled and flowed tidelands outside of the DPA at Island End Park in Chelsea. The Project Site is not within the planning area of a Municipal Harbor Plan ("MHP") and therefore, compliance with an MHP is not applicable.

310 CMR 9.12 – Determination of Water-dependency

A project is considered a water-dependent or water-dependent-industrial use if it meets the standards at 310 CMR 9.12(2). Each project component within and outside of the DPA meets these requirement as described below.

Shore Protection and Flood Control Facilities: The NbA and other shore protection structures within the Mystic River DPA, which will include cobble berms, coir logs, and plantings, are necessary to stabilize the IER shoreline along Market Street to protect the roadway from natural erosion and accretion in accordance with 310 CMR 9.12(2)(a)11. These measures and benefits will also extend to the shoreline of Island End Park, which is outside of the DPA, and comply with 310 CMR 9.12(2)(a)11. The storm surge barrier and flood gates are flood, water level, and storm surge control facilities to protect Market Street, other public and private ways, and inland DPA properties from existing and projected future flood impacts associated with sea level rise ("SLR") in accordance with 310 CMR 9.12(2)(a)12. Market Street is a critical corridor providing trucks and other vehicles with access to properties within the Mystic River DPA. The stabilization and flood protection measures will retain Market Street's capacity to provide continued access to DPA properties. Therefore, the Project is associated with the operation of the DPA and is water-dependent-industrial pursuant to 310 CMR 9.12(2)(b)7. The same shoreline stabilization and flood protection benefits will be realized by properties and infrastructure outside of DPA within the Project Site.

The SSCF is a storm surge control facility that will prevent backflow into the Market culvert and Beacham Street drain during coastal flooding events in accordance with 310 CMR 9.12(2)(a)12. In conformance with 310 CMR 9.12(2)(a)9., minor dredging associated with SSCF construction is necessary to support this water-dependent structure. Related drainage improvements including new catch basins, manholes, and drainage pipes in the catchment areas of the Market culvert and Beach Street draom will convey stormwater into the IER and are water-dependent in accordance with 310 CMR 9.12(2)(a)13.

Public Access: The enhancements to Chelsea's Island End Park and associated public realm improvements, including pedestrian facilities located at or near the water's edge, will promote use and enjoyment of the water by the public in accordance with 310 CMR 9.12(2)(a)4.

Wetlands Enhancements and Nature-based Approaches: The wetlands enhancements and NbA components of the Project will improve wildlife habitat in accordance with 310 CMR 9.12(2)(a)15.

310 CMR 9.31(2) – Proper Public Purpose

The standards at 310 CMR 9.31(2)(a) state that no license shall be issued by the Department unless the project serves a proper public purpose which provides greater benefit than detriment to the rights of the public in tidelands in accordance with the provisions of this standard. Pursuant to the standard at 310 CMR 9.31(2)(a), the Project is presumed to provide a proper public purpose if it is a water-dependent use project. Therefore, the Project meets this standard because it is a water-dependent use project.

310 CMR 9.32 – Categorical Restrictions on Fill and Structures

The Project is eligible for a license if it is restricted to fill and structures which accommodate specific uses depending on its location within and outside of a DPA. Approximately four-fifths of the Project Site is within the Mystic River DPA, most of which is in Everett, and approximately one-fifth of the Project Site is outside of the DPA, most of which is in Chelsea. As described below, the Project complies with the applicable standards of 310 CMR 9.32(1)(a) and (b) regarding the categorical restrictions of fill and structures within and outside of the Mystic River DPA.

Project Within the DPA

The Project components within the DPA qualify as WDIUs under 310 CMR 9.12(2)(b)7. because they are associated with the operation of the Mystic River DPA, as described previously. As discussed below, the Project will comply with the categorical restrictions on fill and structures for projects within DPAs. In accordance with 310 CMR 9.32(1)(b)1., fill and structures are limited to WDIUs, and all proposed fill in the DPA is necessary for stabilization of the IER shoreline and neither pile supported nor floating structures are reasonable alternatives. No new parking is proposed as part of the Project.

Project Outside the DPA

As discussed below, the Project will comply with the standards that allow fill or structures for any use on previously filled tidelands (310 CMR 9.32(1)(a)1.); and with the standards that allow fill or structures for water-dependent uses located below MHW that take reasonable measures to minimize the amount of fill by relocating the use to a position above the high water mark (310 CMR 9.32(1)(1)2.).

Shore Protection and Flood Control Facilities: The proposed storm surge barrier and flood gates will be located on previously filled tidelands and upland areas both within and outside of the DPA and complies with 310 CMR 9.32(1)(a)1. and 310 CMR 9.32(1)(b)1. Its alignment has been designed to avoid flowed tidelands while still meeting the goals to protect inland structures, uses, and infrastructure from coastal storms and flooding.

The SSCF outfall will replace the existing outfall located in filled and flowed tidelands at the northern end of the IER. This structure had several alternative designs summarized in the Project's EENF filing, some of which had a much larger structural footprint within flowed tidelands and were not chosen due to the extensive impacts to wetland resource areas. Project's preferred alternative has the least feasible impacts to resource areas and complies with the requirements to take reasonable measures to minimize the amount of fill below the high water mark pursuant to 310 CMR 9.32(1)(a)1.

Public Access: The proposed public access walkway between Island End Park and Justin Drive will replace an existing walkway on filled tidelands and will not be within flowed tidelands. Although the walkway will be pile supported, it will be located landward of the high water mark and complies with 310 CMR 9.32(1)(a)1. The access ramps connecting the walkway to Island End Park, which will also be in filled tidelands, has been redesigned since the EENF to be pile supported instead of solid fill to minimize the impacts to wetland resource areas. The proposed public access walkways between Island End Park and Market Street, which is incorporated into the landward side of the storm surge barrier, is a structure to accommodate public pedestrian access above the high water mark in accordance with 310 CMR 9.32(1)(b)8 and a structure on previously filled tidelands in accordance with 310 CMR 9.32(1)(a)1. Finally, the proposed public access walkway between Island End Park and Beacham Street is a structure on previous filled tidelands and complies with 310 CMR 9.32(1)(a)1.

Nature-based Approaches: DEP may license fill provided that reasonable measures are taken to avoid, minimize, and mitigate encroachment in a waterway. In compliance with these standards at 310 CMR 9.32(2), the Project will stabilize the IER shoreline along Market Street and Island End Park by using non-structural stabilization methods including a combination of cobble berms, coir logs, and plantings rather than the previously proposed system of planters. This design change was incorporated into the Project in response to feedback from agencies raising concern about impacts to the coastal bank and beach. Additionally, these NbA can be subsequently removed to support future conversion of properties to WDIUs, as necessary. Drainage improvements along the storm surge barrier have similarly been designed to avoid wetland resource area impacts to the maximum extent practicable.

310 CMR 9.33(1) – Environmental Protection Standards

The Project will comply with applicable environmental regulatory programs of the Commonwealth, including the Massachusetts Wetlands Protection Act ("WPA") and DEP Stormwater Standards. The Proponents will submit Notices of Intent ("NOI") to the Conservation Commissions in the Cities of Chelsea and Everett. Along with the Chapter 91 License/Permit application, the Proponents will submit a 401 Water Quality Certification application to DEP. The Proponents will file for Coastal Zone Management "(CZM") Federal Consistency Review with MCZM.

310 CMR 9.34 – Conformance with Municipal Zoning and Harbor Plans

The Project Site is located on private and Commonwealth filled and flowed tidelands and therefore the Project must conform to the standards of 310 CMR 9.34(1) regarding compliance with zoning ordinances. The Project will comply with the Chelsea and Everett zoning ordinances as applicable and will submit signed municipal planning and zoning forms DEP during the Chapter 91 licensing process.

The Project Site is not located within the Everett Central Waterfront MHP. The City of Chelsea has a MHP for Chelsea Creek, which is outside of the Project Site, and therefore the Project is not subject to the standards for compliance with an MHP.

310 CM 9.35 – Standards to Preserve Water-Related Public Rights

The Project conforms to the Standards to Preserve Water-Related Public Rights at 310 CMR 9.35. In accordance with this standard, the project must preserve any rights held by the Commonwealth in trust for the public to use tidelands along with any public rights for access that are associated with such use. In compliance with this general standard, the Project meets the applicable standards for access to waterways and tidelands set forth in 310 CMR 9.35(2) through (4).

Pursuant to 310 CMR 9.35(2), the Project does not interfere with public rights of navigation. The existing Market Street culvert and Beacham Street Drain outfalls are located on the north end of the IER along the coastal bank, which is adjacent to navigable waters. The proposed SSCF outfall will replace these structures along the coastal bank and adjacent subtidal waters and will not interfere with the public rights of navigation.

The Project will not extend beyond the length required to achieve safe berthing, generate water-borne traffic that would interfere with other existing or future water-borne traffic, adversely affect the depth or width of an existing channel, or impair in any other substantial manner the ability of the public to pass freely upon the waterways and to engage in transport or loading/unloading activities.

Pursuant to 310 CMR 9.35(3)(a), the Project does not interfere with public rights to access the site for the purposes of fishing, fowling, and navigation, and does not pose an obstacle to the public's ability to pursue such activities. Landside access to flowed tidelands at the Project Site will be available through Island End Park.

Pursuant to 310 CMR 9.35(3)(b), the Project does not interfere with public rights to walk or otherwise pass freely on Commonwealth tidelands.

In compliance with 310 CMR 9.35(5), the Project will not significantly interfere with effective public use and enjoyment of tidelands. The Project will substantially improve public access along the northern and eastern sections of the Project Site with a new pile-supported ramp, elevated boardwalk, and public access walkways to and along Island End Park and the adjacent salt marsh. These facilities will enable pedestrian access to the water's edge between the upstream end of the IER and its shoreline to the southeast in Chelsea.

The flood gates along the storm surge barrier's alignment in the DPA will enable continued access to DPA properties. The water will be accessible to DPA users 24 hours per day, 7 days per week unless there are forecasted significant coastal storm events or construction or maintenance activities that warrant its temporary closure or restricted access for safety purposes.

310 CMR 9.36 – Standards to Protect Water-Dependent Uses

The Project conforms to the Standards to Protect Water-Dependent Uses at 310 CMR 9.36. In accordance with 310 CMR 9.36, a project must preserve the availability and suitability of tidelands that are in use for water-dependent purposes, or which are reserved primarily as a location for maritime industry or other specific types of water-dependent uses. The Project meets the applicable specific provisions of these standards as described below and previously detailed in this section.

In compliance with 310 CMR 9.36(1), the Project will preserve the availability for water-dependent uses by constructing a storm surge barrier that includes several flood gate installations along the alignment that allow continuation of vehicular and railway access to WDIUs, other industrial properties, and publicly owned land. Public access will be enhanced at Island End Park with a boardwalk and ramp system and connecting walkways that together allow direct access to the water and wetland system.

In compliance with 310 CMR 9.36(2), the Project will not limit access to abutting littoral or riparian property owner's right to approach their properties. The storm surge barrier will be located landward of the IER shoreline primarily in rights-of-way ("ROWs") in the Mystic River DPA and will retain the existing level of access and maintain vehicular travel on those roadways. Where passing through private property, the barrier will be a significant distance landward of the IER shoreline except within the constrained area along #145 Market Street. The storm surge barrier alignment has been revised in several locations from that proposed in the EENF following ongoing discussions with agencies and stakeholders regarding the operational needs of WDIUs in the DPA. Landside access to properties along the storm surge barrier alignment will be provided through strategically located gated access points, and waterside access will be maintained due to the barrier's primarily inland location.

In compliance with 310 CMR 9.36(3), the Project will not significantly disrupt any water-dependent use in operation within proximate vicinity of the Project Site. Access to those sites from the water will not be impacted and landside access will be maintained except when the flood gates are required to close prior to forecasted significant coastal storm events. No new structures, except for the limited outfall headwalls and wingwalls, will be constructed within navigable waterways.

In compliance with 310 CMR 9.36(4), the Project will not displace any water-dependent uses in operation that have occurred on the site for the previous five years. Vessels will still have the same accessibility to existing wharfs and berths at the waterfront properties along the western side of the IER. Landside access to these areas will be maintained through strategically located breaks in the storm surge barrier as shown in Figure 4-1. The Proponents have engaged in ongoing outreach to stakeholders to discuss how WDIU operations can continue during construction and following completion of the Project. Landside access to water-dependent use sites may be limited during extreme coastal storm events when the flood gates are in use to protect against catastrophic damage from coastal storm surge.

In compliance with 310 CMR 9.36(5), the Project will not include fill or structures for nonwater-dependent, non-industrial uses that preempt water-dependent industrial use. As described in the previous sections, all Project components in the DPA have been designed, and in several cases reconfigured since the EENF filing, to maintain the capacity of DPA properties to support current or future WDIUs. These changes include shifting the storm surge barrier alignment inland from the IER shoreline to the Market Street ROW to maintain connectivity between the upland areas of properties along the river with their waterfronts. In conformance with 310 CMR 9.36(5)(b)1., the NbA shoreline stabilization measures proposed for a small portion of the IER shoreline within the DPA can be subsequently removed if required to support conversion of the sites it occupies to WDIUs. A more detailed analysis of the Project's interface with properties in the DPA is provided in Chapter 5, Mystic River Designated Port Area. There are no known competing parties who intend to develop tidelands at the Project Site for WDIUs in accordance with 310 CMR 9.36(5)(a).

310 CMR 9.37 – Engineering and Construction Standards

The Project will comply with the standards of 310 CMR 9.37. In compliance with 310 CMR 9.37(1), a Registered Professional Engineer will certify that fill and structures are structurally sound as designed and constructed. The Project will comply with applicable state requirements for construction in floodplains. It will not pose an unreasonable threat to navigation, public health or safety, or adjacent buildings and structures if damaged or destroyed in a storm, and will not restrict the ability to dredge any channels. In compliance with 310 CMR 9.37(3), the proposed storm surge barrier will be located landward of the existing MHW. The SSCF, which is replacing the existing Market Street culvert and Beacham Street drain outfalls, must be located below the MHW to function properly and be compatible with existing shoreline structures in terms of design, size, function, and materials.

310 CMR 9.40 – Standards for Dredging and Dredged Material

The Project will comply with the standards at 310 CMR 9.40. This section of the Chapter 91 regulations requires dredging projects to meet specific requirements for resource protection, operational requirements for dredging and dredged materials disposal, and notification of dredging and disposal activities.

Dredging activities will be timed to minimize impacts on the tidal flats and downgradient resources areas. Approximately 613 cubic yards of material will be dredged from the northern portion of the Project Site to facilitate the installation and operation of the new SSCF and its associated outfall headwall and wingwalls.

The Project will comply with specific applicable provisions of Chapter 91 regulations, 310 CMR 9.40, as follows:

- The Project will not dredge any channels or mooring basins to a mean low water depth greater than 20 feet;

- No dredging will occur during any period designated by the Division of Marine Fisheries ("DMF") for the protection of anadromous/catadromous fish runs, unless otherwise approved in writing by the DMF. Additionally, the Project will comply with DMF's Time-of-Year ("TOY") restrictions prohibiting silt producing in-water work that would impact winter flounder spawning grounds from March 15th to June 30th and or for shellfishing, which could extend to approximately September 15th. Provisions for TOY restrictions will be included in the construction plans and specifications;

- The dredge area has been designed to reasonably accommodate the navigational requirements of the Project and provide adequate water circulation; dredge footprint designed to accommodate flows from SSCF and outfalls, minimized to extent practicable while meeting the invert elevation. The dredge area will not interfere with navigation.

- The regulations require that the extent of the dredge footprint shall be a sufficient distance for the edge of the adjacent marshes to avoid slumping. The edge of the proposed dredge area is more than 250 feet from the nearest marsh, and therefore will avoid slumping;

- The dredged area will not be connected to or be any deeper than the nearby channel in the IER;

- The Applicant will notify the DEP prior to the start and completion of the dredging operation; and
- All dredged material will be pre-characterized and disposed of at a Confined Disposal Facility ("CDF") or an upland landfill in accordance with the regulations of the Massachusetts Contingency Plan. See Attachment G, Sediment Sampling Plan for additional context on the anticipated composition of dredged sediments based upon legacy industrial uses along the river.

4.4 CONSISTENCY WITH COASTAL ZONE MANAGEMENT POLICIES

The Project is consistent with MCZM Coastal Program Policies as described below.

4.4.1 WATER QUALITY

Water Quality Policy #2

Ensure the implementation of nonpoint source pollution controls to promote the attainment of water quality standards and protect designated uses and other interests.

During construction, Best Management Practices ("BMPs") will be implemented to prevent erosion and control sediment. Erosion prevention practices will include blankets and temporary seeding. Sediment control measures will include stabilized construction exits, siltation fences, and turbidity curtains, and fiber rolls.

Operation term or post construction, the Project will be designed in accordance with DEP Stormwater Standards for redevelopment projects. Immediate improvements will include a reduction in the discharge of sediment into the IER from the unstabilized shoreline side slopes. Furthermore, the Project Site, which has limited existing provisions for treatment of the stormwater runoff, will have a new stormwater drainage system that will improve the water quality of stormwater flowing to the IER.

In compliance with the DEP Stormwater Standards, there will be no new untreated stormwater point discharges associated with the Project.

4.4.2 HABITAT

Habitat Policy #1

Protect coastal, estuarine, and marine habitats—including salt marshes, shellfish beds, submerged aquatic vegetation, dunes, beaches, barrier beaches, banks, salt ponds, eelgrass beds, tidal flats, rocky shores, bays, sounds, and other ocean habitats—and coastal freshwater streams, ponds, and wetlands to preserve critical *wildlife habitat and other important functions and services including nutrient and sediment attenuation, wave and storm damage protection, and landform movement and processes.*

The Project includes provisions that will result in direct improvements to coastal habitats. The stabilization of coastal bank and beach through NbA, attenuation of storm damage, and enhancement of the salt marsh will reinforce and protect coastal habitats. During construction, BMPs will be implemented to minimize potential impacts to the resources of the IER. The existing salt marsh will be enhanced with additional plantings of salt marsh plant species, and the invasive species will be controlled to minimize their growth. The introduction of the cobble berms, coir logs, and plantings along the coastal bank and beach will provide stability and hold soils in place, reducing continuous erosion of soils into the IER. During dredging operations, turbidity curtains will be installed to minimize dispersion of suspended solids beyond the immediate work zone. TOY restrictions will be followed to protect marine fisheries.

Habitat Policy #2

Advance the restoration of degraded or former habitats in coastal and marine areas.

A portion of the Project Site in Chelsea includes a degraded salt marsh which will be enhanced with additional salt marsh plantings and removal of trash and debris and invasive phragmites. Improvements to the existing drainage system near the salt marsh will reduce fresh water intrusion to minimize future growth of phragmites and help improve the downgradient habitats and overall viability of the area. The existing coastal beach and banks of IER are degraded and eroded and will be improved through removal of trash and debris and stabilization of the coastal bank and beach with NbA consisting of cobble berms, coir logs, and plantings.

4.4.3 COASTAL HAZARDS

Coastal Hazard Policy #1

Preserve, protect, restore, and enhance the beneficial functions of storm damage prevention and flood control provided by natural coastal landforms, such as dunes, beaches, barrier beaches, coastal banks, land subject to coastal storm flow, salt marshes, and land under the ocean.

and

Coastal Hazard Policy #2

Ensure that construction in water bodies and contiguous land areas will minimize interference with water circulation and sediment transport. Flood or erosion control projects must demonstrate no significant adverse effects on the project site or adjacent or downcoast areas.

The Project has been designed to minimize interference with water circulation and sediment transport. Other than the dredging below MHW to facilitate the operation of the new SSCF outfall structure, there will be no interference with water circulation. The SSCF design and associated dredging have been minimized to the extent practicable to reduce impacts to resource areas while still achieving the Project's flood control objectives. NbA for the coastal bank and beach will include cobble berms, coir logs, and plantings to enable stabilization of the coastal banks while still retaining their ability to dissipate energy associated with storms and flooding and to perform other beneficial natural functions. Similarly, the enhancements to the salt marsh in Chelsea will improve its function as a natural buffer to coastal flooding. The purpose of the storm surge barrier is to protect the adjacent infrastructure and businesses.

Coastal Hazards Policy #3

Ensure that state and federally funded public works projects proposed for location within the coastal zone will:

- *Not exacerbate existing hazards or damage natural buffers or other natural resources.*
- *Be reasonably safe from flood and erosion-related damage.*
- *Not promote growth and development in hazard-prone or buffer areas, especially in velocity zones and Areas of Critical Environmental Concern.*
- *Not be used on Coastal Barrier Resource Units for new or substantial reconstruction of structures in a manner inconsistent with the Coastal Barrier Resource/ Improvement Acts.*

The Project is supported through local, state, and federal funding sources and will bring key protections from flood and erosion-related damage to the immediate publicly and privately owned infrastructure. Natural resources at the Project Site will be enhanced through salt marsh restoration and non-structural coastal bank stabilization that will improve their resilience to hazards associated with flooding. The Project is not located in a velocity zone, a regulatory floodway, Area of Critical Environmental Concern, or Coastal Barrier Resource Unit.

4.4.4 PUBLIC ACCESS

Public Access Policy #1

Ensure that development (both water-dependent or nonwater-dependent) of coastal sites subject to state waterways regulation will promote general public enjoyment of the water's edge, to an extent commensurate with the Commonwealth's interests in flowed and filled tidelands under the Public Trust Doctrine.

This water-dependent flood resiliency project enhances public access and use of tidelands. A new elevated boardwalk, accessible ramp system, and connecting walkways will improve access to and along Island End Park, which is located along the northern end of the IER in Chelsea. NbA, landscaping, benches, bike racks, multilingual interpretive signage, and other amenities will create a more inviting waterfront destination.

4.4.5 GROWTH MANAGEMENT

Growth Management Policy #2

Ensure that state and federally funded infrastructure projects in the coastal zone primarily serve existing developed areas, assigning highest priority to projects that meet the needs of urban and community development centers.

and

Growth Management Policy #3

Encourage the revitalization and enhancement of existing development centers in the coastal zone through technical assistance and financial support for residential, commercial, and industrial development.

The Project, which is funded through local, state, and federal funding sources, is in a critical industrial center within the coastal zone that supports regional economic activity. The Project will protect adjacent densely developed industrial and commercial sites, public institutions and other critical facilities, and residences in the environmental justice communities of Chelsea and Everett. The flood protection benefits brought to these communities following Project construction will incorporate resilience strategies to address or alleviate coastal flooding impacts associated with future SLR.

4.4.6 PORTS AND HARBORS

Ports and Harbors Policy #1

Ensure that dredging and disposal of dredged material minimize adverse effects on water quality, physical processes, marine productivity, and public health and take full advantage of opportunities for beneficial reuse.

Dredging will be conducted to support the design invert elevation for the SSCF outfall structure. Dredging operations will be conducted in accordance with local, state, and federal regulations to minimize impacts to the environmental resources as well as the public's health. BMPs will be utilized to minimize impacts to the water quality and fish and benthic habitat, including observation of the TOY restriction period. Dredging will occur from the land side using excavators to prevent impact from barges bottoming out on the substrate below and to minimize deposition of dredged material into the water. Turbidity curtains will be used to the extent practicable to limit the migration of suspended solids from the immediate work area.

Ports and Harbors Policy #3

Preserve and enhance the capacity of Designated Port Areas to accommodate water-dependent industrial uses and prevent the exclusion of such uses from tidelands and any other DPA lands over which an EEA agency exerts control by virtue of ownership or other legal authority.

As described in Section 4.3, the Project components within the DPA are associated with the operation of the DPA and therefore are water-dependent industrial in accordance with the provisions of the Waterways regulations at 310 CMR 9.12(2)(b)7. The Project will bring key resiliency benefits to properties and infrastructure in the Mystic River DPA by constructing a flood control system that will prevent damage and operational disruptions caused by coastal flooding. The storm surge barrier alignment and flood gates have been designed to accommodate the existing operational needs of WDIUs in and around the Project Site as well as those that may locate there in the future. The components will be sited landward of existing wharfs and other port infrastructure in the area and will not interfere with operations.

Ports and Harbors Policy #4

For development on tidelands and other coastal waterways, preserve and enhance the immediate waterfront for vessel-related activities that require sufficient space and suitable facilities along the water's edge for operational purposes.

There are active vessel and shoreside industrial uses along the western shoreline of the IER. The storm surge barrier will be located landward from these wharfs and piers to preserve WDIUs. Its alignment has been revised in several locations since the EENF to maintain adequate operational space for WDIUs present in this area.

Ports and Harbors Policy #5

Encourage, through technical and financial assistance, expansion of water dependent uses in Designated Port Areas and developed harbors, re-development of urban waterfronts, and expansion of physical and visual access.

The Project is supported by several federal, state, and local funding sources and technical assistance, which will protect existing and future water-dependent uses within the Mystic River DPA and the IER from flooding due to sea level rise and coastal storms.

The Project will improve pedestrian and visual access with a new public walkway, connections to several streets, NbA, and wetland enhancements. Island End Park will also be enhanced with new trees, landscaping, benches, bike racks, and multilingual interpretive signage.

Figure 4-1
Chapter 91 Jurisdiction Map
Source: Fort Point Associates, Inc., 2023; CZM, 2021 and 2011

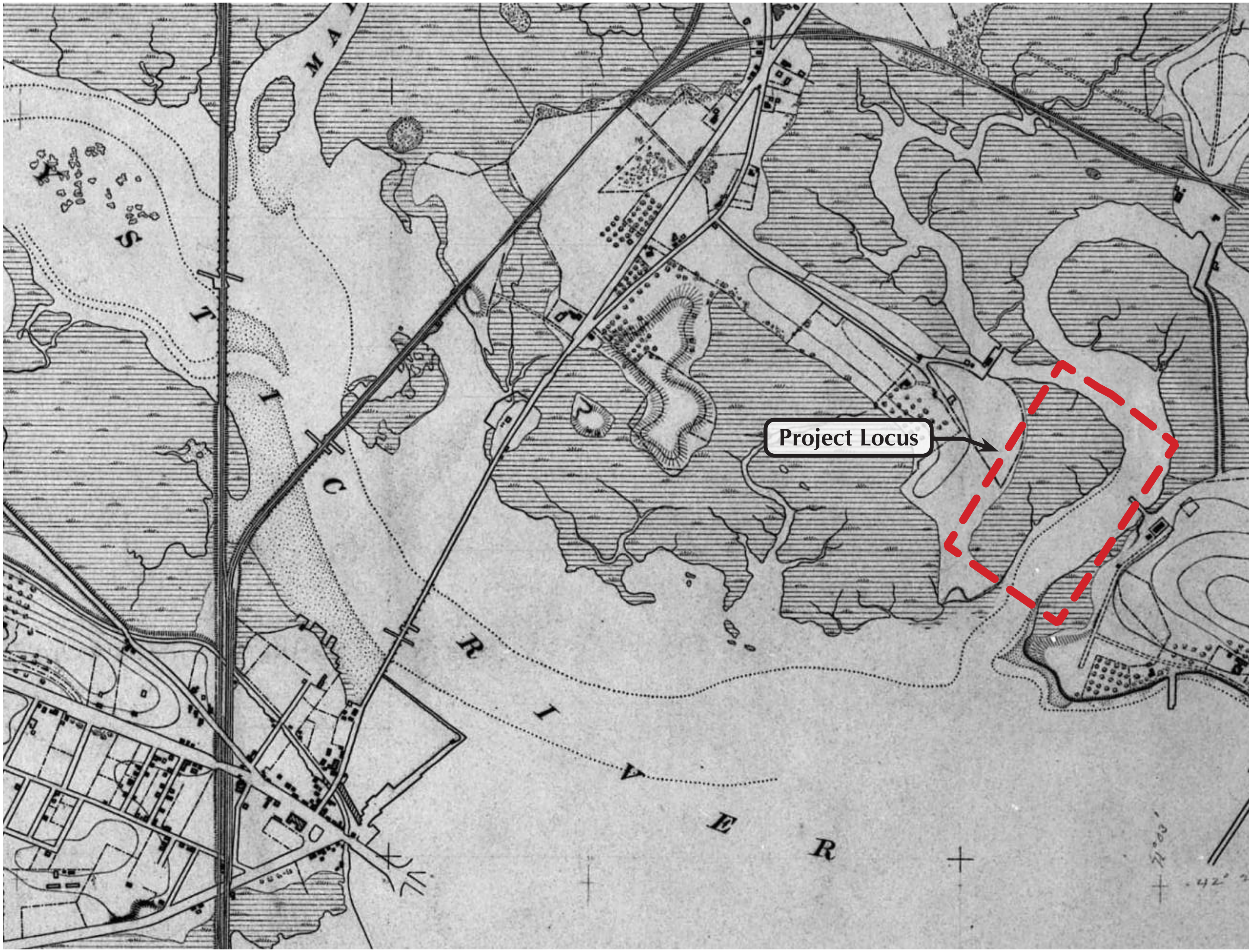


Figure 4-2
Historic Chapter 91 Jurisdiction (1847)
Source: U.S. Coast Survey, 1847

Chelsea, MA
Everett, MA

Figure 4-3
Historic Chapter 91 Jurisdiction (1894)
Source: U.S. Coast and Geodetic Survey, 1894

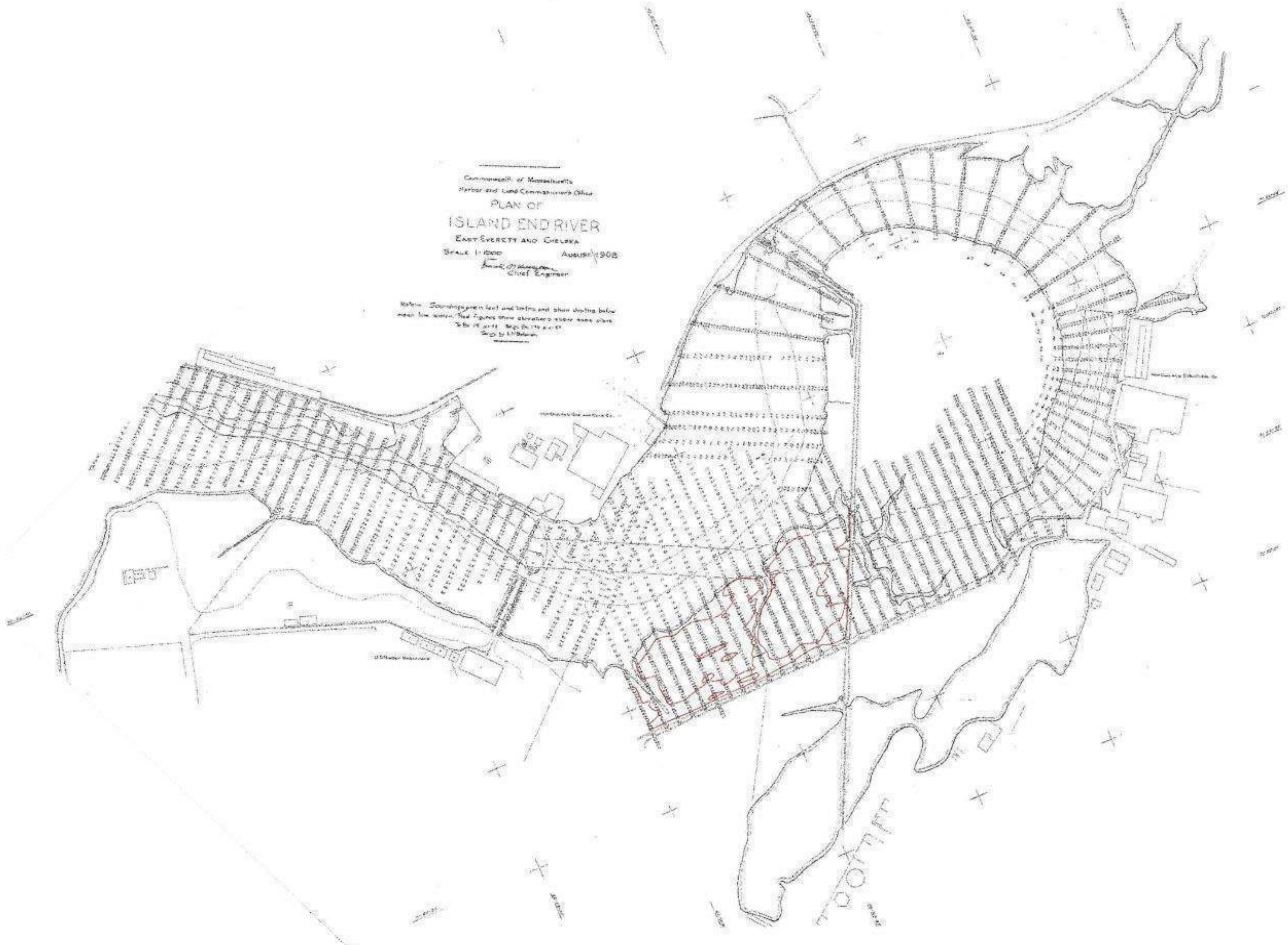


Figure 4-4
Historic Chapter 91 Jurisdiction (1908)
Source: U.S. Coast Survey, 1908

Chapter 5

MYSTIC RIVER DESIGNATED PORT AREA

CHAPTER 5: MYSTIC RIVER DESIGNATED PORT AREA

5.1 INTRODUCTION

The Cities of Chelsea and Everett propose to construct and implement coastal flood resilience structures and measures along the Island End River ("IER") in the Cities of Chelsea and Everett (the "Project Site"). They consist of a storm surge barrier and flood gates, a storm surge control facility ("SSCF"), shoreline Nature-based Approaches ("NbA"), wetland enhancements, and improvements to Island End Park and the surrounding public realm (the "Project"). Several key Project components including the proposed storm surge barrier and flood gates in Everett will be located within filled tidelands in the Mystic River Designated Port Area ("DPA") and are subject to the DPA program requirements codified in the Waterways Regulations at 310 CMR 9.00. Project components at #145 Market Street in Chelsea will also be located on filled and flowed tidelands in the DPA.

Chapter 4 of this DEIR addresses the Project's general conformance with the Waterways Regulations as well as its consistency with the Coastal Zone Management Program polices. In response to feedback from state agencies during the Expanded Environmental Notification Form ("EENF") review process, this chapter expands upon the analysis presented in Chapter 4 to focus on the Project's interface with water-dependent industrial uses ("WDIUs") and other properties and infrastructure in the Mystic River DPA. As this district contains vital regional infrastructure facilities, every effort was made to protect roadway access to seaward parcels to ensure private operator and public safety access to these facilities. The following sections demonstrate that the Project will avoid significant interference with existing WDIUs and will not preclude future WDIUs while still achieving its flood resilience, public access, and natural resource enhancement goals.

5.2 DESIGNATED PORT AREA SUMMARY

The DPA program was instituted in 1978 with the intent of protecting and promoting WDIUs. WDIUs include uses specified in 310 CMR 9.12(2)(b) that rely on direct water access or proximity to a navigable waterway, or require withdrawal and/or discharge of large volumes of cooling water, for operation. There are 10 DPAs in the Commonwealth, which all share the common characteristics of having navigable waterways, well-developed port infrastructure such as wharfs and piers, backland area of a size, configuration, and land use typology to support WDIUs, and access to intermodal transportation systems and utility services.

DPAs are so designated by the Massachusetts Office of Coastal Zone Management ("MCZM") and their boundaries are codified at 301 CMR 25.00. In coordination with MCZM, the Massachusetts Department of Environmental Protection Waterways Regulation Program ("DEP Waterways") administers regulation of tidelands within DPAs through the Waterways regulations at 310 CMR 9.00.

Approximately four-fifths of the Project Site is located within the Mystic River DPA, which encompasses waterfront areas in the Cities of Everett, Chelsea, and Boston. Within and adjacent to the Project Site, properties along Market Street, Behen Street, Commercial Street, and Rover Street in Everett and Chelsea all fall within the Mystic River DPA. See Figure 5-1, Project Alignment in the Mystic River Designated Port Area. Tidelands proximate to the proposed storm surge barrier alignment within the Mystic River DPA have a variety water-dependent uses. These include but are not limited to marine liquified natural gas ("LNG") terminals and marine construction vessel berthing and equipment storage. Tidelands proximate to the barrier alignment are also under a variety of nonwater-dependent uses, including but not limited to cold storage and food distribution facilities and suppliers of cement and other construction material. Several parcels within the DPA are presently vacant.

5.2.1 NAVIGATION AND DREDGING IN THE DESIGNATED PORT AREA

Based on the National Oceanic and Atmospheric Administration's (NOAA) Boston Harbor tide gauge (Station 8443970), present-day mean high water ("MHW") is El. 4.33 feet ("ft") NAVD88 and present-day mean low water ("MLW") is El. -5.16 ft NAVD88. The normal tidal range is approximately 9.49 ft. WDIUs along the IER in the DPA are supported by a federal navigation channel overseen by the United States Army Corps of Engineers ("USACE"). The IER navigation channel connects to the Mystic River federal navigation channel located approximately half a mile downstream from the Project Site. The IER channel was last dredged in 2008. It has an authorized depth of -6 ft mean lower low water ("MLLW") and an authorized width of 90 ft from the Mystic River to approximately the mid portion of the river, and then a width of 100 ft to the downriver edge of the Admiral's Hill Marina east of the Project Site in Chelsea. At this point it narrows to an authorized width of 75 ft before ending approximately at the upriver edge of the marina. See Figure 5-2, Federal Navigation Channel.

West of the federal navigation channel along the DPA shoreline, the IER's depth ranges from -21.9 ft MLLW near the 40-60 Commercial Street to 0.4 ft MLLW near the 147 Market Street. Upriver from the northern limit of the navigation channel, the depth of the IER ranges from -3.5 ft MLLW to 0.1 ft MLLW and the width narrows significantly to approximately 5.6 ft at MLLW before entering the Beacham and Market Street culverts. The constrained nature of the IER upriver from the federal navigation channel prevents travel of typical commercial vessels through this area.

See Chapter 6, Wetlands and Water Quality for a description of the recent history of dredging in the IER.

5.3 PROJECT DESIGN IN THE DESIGNATED PORT AREA

The Project has been carefully designed to preserve existing WDIUs and not preclude the conversion of sites to such uses in the future. Several components of the Project have been revised based on continued discussions with landowners since the Project's EENF was filed in February of 2023. The purpose of these revisions was to locate the storm surge barrier to meet the Project's flood protection goals and maintain continued WDIU operations. For a summary of stakeholder coordination efforts over this period, see Attachment E, DPA Site Plans & Stakeholder Communication Table.

Most notably, the storm surge barrier's alignment was removed from its originally proposed location directly along or nearby the Island End River's shoreline at #147 Market Street, #155 Market Street, #95 Behen Street, and #40-60 Commercial Street. The updated alignment travels along the Market Street right-of-way ("ROW"), the landward property line of #95 Behen Street, and the landward side of the industrial rail spur (the "DPA Rail Spur") running through #87 Behen Street and #40-60 Commercial Street. See Figure 5-3, Comparison of Storm Surge Barrier Alignments in the Designated Port Area. Along with this updated alignment are revised strategic locations for eight flood gates of varying types that have been incorporated into the Project to allow for continued truck and equipment access to WDIU properties in the DPA. The flood gates will be open under normal conditions and will only be closed during forecasted significant coastal storm events.

The Project will additionally provide critical resilience benefits to properties within the DPA by introducing protections to current and future high tide and storm surge flooding, which is predicted to increase in frequency and severity in upcoming years due to the impacts of sea level rise ("SLR"). These protections will preserve the value of inland properties within the DPA and improve the resilience of transportation and utility infrastructure vital to their functioning, thereby maintaining the suitability of the DPA to support WDIUs into the future.

The storm surge barrier wraps around the northern end of the IER at #145 Market Street in Chelsea from Island End Park to the property's frontage along Market Street. Along this extent the barrier is located between MHW and the parcel's property line and is landward of the SSCF outlet structure. The storm surge barrier continues southwesterly for approximately 170 lf, then jogs to enter Market Street and travel southwesterly along the seaward side of the Market Street ROW. As the barrier passes #147 Market Street it crosses the city line into Everett. It continues past #155 Market Street for approximately 900 lf, and includes two 40-ft-wide active flood gates to provide continued access to the nonwater-dependent food distribution facility at that property.

The storm surge barrier continues straight passing across the #95 Behen Street driveway. A 30-ft-wide active flood gate is provided in this location for continued access to the water-dependent marine construction facility at 95 Behen Street. The storm surge barrier turns to travel southwesterly into #87 Behen Street, then turns again to travel westerly towards the DPA Rail Spur. Where it crosses the DPA Rail Spur a 20-ft-wide active flood gate is incorporated to enable continued rail service to the properties south and west of this location. Once landward of the DPA Rail Spur, the storm surge barrier resumes and reenters #87 Behen Street, turning to head southwesterly through this property and through #40-60 Commercial Street for approximately 460 feet. A 56-ft-wide active flood gate is provided in this section approximately at the location of the existing #40-60 Commercial Street driveway across the DPA Rail Spur to provide continued access to the #40-60 Commercial Street wharf along the IER. This wharf area is leased by a marine construction company for vessel berthing and equipment storage.

The storm surge barrier then turns approximately 90 degrees to head northwesterly along #40-60 Commercial Street's southern property line until entering the Commercial Street ROW. Once in the ROW, it turns southwesterly along the seaward side of the roadway. Two 30-ft-wide active flood gates are incorporated in this segment to provide access to #80 Commercial Street, which falls outside of Chapter 91 Jurisdiction. After traveling along this alignment, the storm surge barrier turns approximately 90 degrees, where a 27-ft-wide passive flood gate across Commercial Street is provided. The storm surge barrier turns approximately 90 degrees to continue southwesterly along the landward side of the Commercial Street ROW for approximately 145 lf. Finally, the storm surge barrier turns approximately 90 degrees to travel northwesterly along the southern edge of the #18 Rover Street parcel. The barrier terminates at the existing retaining wall at the southeast corner of the existing vacant building at #18 Rover Street.

See Figure 1-32, Resilience Provisions West Exhibit, for the height of the storm surge barrier in these locations.

5.4 SITE-LEVEL REVIEW OF PROPERTIES IN THE DESIGNATED PORT AREA

Comment letters submitted in response to the EENF filing for the Project by MassDEP Waterways on April 5, 2023 and MCZM on April 7, 2023 requested that the Proponents conduct a site-level review of each property within the DPA that fall within or adjacent to the proposed storm surge barrier alignment. The EENF comment letters are available in Attachment B, Response to Comments.

Out of the seven properties located within the Project's alignment on tidelands in the DPA, three meet the definition of a WDIU and the remaining four parcels are vacant or under varying general industrial uses. The analysis of each site is provided in this section to outline how the Project will not undermine current WDIUs nor preclude future conversion of properties to WDIUs that would otherwise be viable under a no-build condition. General information about each property is provided in Table 5-1 below and further details are available in the site-specific subsections that follow. The updated Project alignment and components proposed in this DEIR are compared to those proposed in the EENF, where applicable. Property plans showing site layouts, the proposed storm surge barrier alignment and flood gate locations, and the truck turning movement all demonstrate that current and future operations at these properties will not be significantly impacted by the Project (see Attachment E, DPA Site Plans and Stakeholder Communication Table). Note that several additional properties in the DPA are adjacent to the Project alignment but fall outside of filled or flowed tidelands and are not discussed in this section.

Table 5-1: Designated Port Area Properties within the Project Site

Address	Owner	Business Entity	Area (ac)	Current Use	Water Access
#145 Market Street, Chelsea	DMG Brookline I LLC	N/A	0.77	Vacant, no active uses	Yes
#147 Market Street, Chelsea	Commonwealth of Massachusetts	N/A	0.06	Vacant, no active uses	Yes
#95 Behen Street, Everett	MRT Wharf LLC	SPS New England	1.87	Marine construction and vessel berthing	Yes
#87 Behen Street, Everett	PW Marks LLC	PW Marks	2.32	Dairy distribution	No
#40-60 Commercial Street, Everett	Every Bear Investments LLC	Lineage Logistics; Smith Marine (tenant)	8.20	Cold storage and distribution; marine construction and vessel berthing	Yes
#18 Rover Street, Everett	Distrigas of Massachusetts LLC	Distrigas/ Constellation	43.82	Liquified Natural gas terminal	Yes

5.4.1 #145 MARKET STREET

#145 Market Street is a vacant marine parcel at the northern end of the IER in Chelsea that primarily consists of the IER and the intertidal land along either side of the river. A portion of this property along Market Street is mapped within the DPA. The existing outlet of the Beacham and Market Street culverts is located at the northern end of the property. Project components on this property within the DPA will include the storm surge barrier proximate to the parcel’s northern property line, landward of MHW. Additionally, the site’s shoreline will be stabilized and enhanced with NbA including cobble berms, coir logs, and plantings. The existing

Beacham and Market Street culverts' outlet structures at the site will be replaced with the SSCF's outlet structure and associated outfall headwall and wingwalls. The SSCF outlet structure will be sited outside of the mapped DPA boundary. See Table 5-2 below for a description of #145 Market Street and the Project components at the site, and Sheet DPA-1 of Attachment E.

Table 5-2: Summary of Project Components at #145 Market Street

Category	Value
Property Information	
Property Area	0.77 ac
Property Area above MHW	12,298 sf (0.28 ac)
Primary Property Use	Vacant
Additional Property Uses	Market Culvert and Beacham Street Drain outlets
Chapter 91 License No.	4962 – in part for fill and construction of Market Street Culvert and Beacham Street Drain outlets
IER Depth at Property	-0.1 ft MLLW
IER Width at Property	5.6 lf at MLLW
Project Information	
Storm Surge Barrier Length	374 lf
Storm Surge Barrier Location	Landward of MHW along northern property line
SSCF Outlet Location	Northern end of parcel (upriver end of IER)
NbA Location	Landward of MHW along coastal bank

Introduction of the proposed storm surge barrier above MHW and NbA at #145 Market Street will allow shoreline stabilization and enhance the ecological functions of the resource areas present within, providing major improvements over existing conditions. The new SSCF outlet structure will replace the existing outlets of the Market Culvert and Beacham Street Drain to prevent backflow into area drainage systems during coastal flooding events. Protection brought to the Market Street ROW from impacts caused by flooding and further erosion at #145 Market Street is especially critical to maintaining access to properties within the Mystic River DPA.

Due to the location of #145 Market Street within the IER and its limited area above MHW, it is vacant and has no marine infrastructure under existing conditions. The location of the Market Street ROW, which is a key corridor for accessing other properties within the DPA, precludes opportunity for further expansion of the site inland from its western property line to increase the area to support a future WDIU. The key Project goal of protecting this roadway from coastal flooding similarly precluded any alternative siting options to the storm surge barrier alignment at #145

Market Street. The presence of the Market Culvert and Beacham Street Drain also limits the potential for marine use of this property. Despite these constraints, the majority of the site's area above MHW on the western side of the IER will be maintained following Project construction and will be available to support a WDIU in the future. The shoreline NbA at #145 Market Street can be subsequently removed as necessary to support a future conversion of the site to a WDIU.

5.4.2 MARKET STREET

Market Street is a public way connecting Second Street in Chelsea in the north to Behen Street in Everett in the south. The two-lane, two-way undivided roadway varies in width. The proposed storm surge barrier will be located within the Market Street ROW from #145 Market Street, north of the vacant #147 Market Street parcel. It will continue southwesterly along the seaward shoulder of the ROW adjacent to #147 Market Street in Chelsea and #155 Market Street in Everett. Two 40-lf active flood gates are incorporated into the barrier as it passes #155 Market Street to accommodate continued truck access to the nonwater-dependent food distribution facility at the site. Refer to Table 5-3 below and Sheet DPA-1 of Attachment E for a summary of the barrier along this extent. Ensuring the integrity of this roadway to other critical infrastructure facilities in the event of flooding is paramount in the design and placement of the storm surge barrier.

Table 5-3: Summary of Project Components within Market Street

Category	Value
Storm Surge Barrier Location	Seaward side of Market Street ROW
Barrier Length	972 lf
Flood Gates Count	Two 40'-wide Active Gates
Flood Gates Location Description	Access Points to 155 Market Street

The storm surge barrier alignment within Market Street leaves the existing #155 Market Street bulkhead along the IER and other portions of its IER shoreline unobstructed to accommodate future WDIUs.

5.4.3 #95 BEHEN STREET

#95 Behen Street is the furthest upriver property along the IER in the Mystic River DPA that is under an active a WDIU. The roughly triangular parcel is occupied by a marine construction company and includes a wharf used for berthing barges and other industrial vessels, and transfer of construction equipment between ship and shore. The remainder of the site is used for equipment laydown and parking. The Project will construct the storm surge barrier along #95 Behen Street's northern property line and includes a 30-lf active flood gate where it crosses the site's driveway. See Table 5-4 below for a description of #95 Behen Street and the Project components at the site, and Sheet DPA-2 of Attachment E.

Table 5-4: Summary of Project Components at #95 Behen Street

Category	Value
Property Information	
Property Area	1.87 ac
Primary Property Use	Marine construction and vessel berthing (WDIU)
Chapter 91 License No.	11280 – in part for construction and maintenance of confined disposal facility now used as wharf by marine construction company
Project Information	
Storm Surge Barrier Length	147 lf
Storm Surge Barrier Location	Northern property line
Flood Gate Count	1
Flood Gate Location	Across driveway near northern property line

The updated storm surge barrier alignment proposed in this DEIR has been moved to site's landward property line as compared to the EENF alignment, and includes a flood gate across the existing driveway. See Figure 5-3. This alignment and flood gate location will maintain the site's existing usable area and access to Behen Street with a configuration nearly identical to existing conditions. The wharf will be unobstructed by the Project and will continue to be suitable for berthing of commercial vessels and transfer of equipment between ship and shore. Connectivity between the wharf and backland laydown areas on the site will be maintained and equipment associated with the WDIU operating at the property, including semi-trucks, will have continued access to the site from Behen Street.

5.4.4 #87 BEHEN STREET

#87 Behen Street is a landlocked parcel under nonwater-dependent use as a diary distribution facility. The parcel is bisected by the DPA Rail Spur which services properties to the south and west. The small portion of the site east of the DPA Rail Spur is used for parking and equipment storage. Access to the site is primarily through adjacent #8 Commercial Street and #26 Commercial Street, both of which are under the same ownership as #87 Behen Street. There is additional access from Behen Street to the portion of the site east of the DPA Rail Spur and across a rail crossing into the main portion of the parcel.

The proposed storm surge barrier alignment will be located along the southeastern property line of #87 Behen Street, representing a continuation of the barrier from the adjacent #95 Behen Street property. A 20-lf active flood gate will be provided across the DPA Rail Spur, then the barrier will continue along #87 Behen Street's southeastern property line directly landward of the DPA Rail Spur before entering #40-60 Commercial Street. See Table 5-5 below and Sheet DPA-3 of Attachment E for a summary of #87 Behen Street and the Project components on the site.

Table 5-5: Summary of Project Components at #87 Behen Street

Category	Value
Property Information	
Property Area	2.32 ac
Primary Property Use	Dairy distribution
Chapter 91 License No.	N/A; no known licenses for current use
Project Information	
Storm Surge Barrier Length	175 lf
Storm Surge Barrier Location	Southeastern property line
Flood Gate Count	1
Flood Gate Location	Across property line at the DPA Rail Spur

The storm surge barrier alignment proposed in the Project's EENF did not pass through #87 Behen Street and instead was located closer to the IER shoreline at #95 Behen Street and #40-60 Commercial Street, seaward of the DPA Rail Spur. The alignment proposed in this DEIR has moved the barrier towards #95 Behen Street's northern property line, and into #87 Behen Street landward of the DPA Rail Spur. This updated alignment poses a minimal reduction of the usable space at #87 Behen Street and does not impact the site's existing access points from surrounding roadways. Semi-truck access to existing loading docks along the seaward side of the #87 Behen Street building will be maintained. The property's owners have operated its family-owned business at the site for more than 50 years. Because of the landlocked status of the parcel and segmentation by the DPA Rail Spur, it is largely unsuitable for conversion to a WDIU in the event of a change in use.

5.4.5 #40-60 COMMERCIAL STREET

#40-60 Commercial Street is a parcel with direct frontage along the IER that includes an 8.20-acre ("ac") wharf separated from the remainder of the property by the DPA Rail Spur. The primary use at #40-60 Commercial Street is a nonwater-dependent, state-of-the-art cold storage and distribution facility. The site's wharf is leased to a marine construction company that berths vessels and stores construction equipment. The property has its own rail spur landward of the DPA Rail Spur for shipping and receiving cold-stored goods via freight rail. Access to the wharf is from Commercial Street through the driveway and truck loading bay area along the site's northeastern property line. There are two rail crossings (one across the property's rail spur and the other across the DPA Rail Spur) for vehicles and equipment to pass between the two portions of the site. The Project will construct the storm surge barrier landward of the DPA Rail Spur, and a 56-lf active flood gate is incorporated at the existing rail crossing point near the #95 Behen Street property line. Table 5-6 below and Sheets DPA-4 and DPA-5 of Attachment E present summary information about the parcel and the Project components on the site.

Table 5-6: Summary Project Components at #40-60 Commercial Street

Category	Value
Property Information	
Property Area	9.10 ac
Primary Property Use	Cold storage and distribution facility
Additional Property Uses	Marine construction and vessel berthing (WDIU)
Chapter 91 License No.	12100 – in part to improve wharf now leased to marine construction company
Project Information	
Storm Surge Barrier Length	742 lf
Storm Surge Barrier Location	Landward of DPA Rail Spur and seaward of the property's rail spur; along southwestern property line to Commercial Street
Flood Gate Count	1
Flood Gate Location	Existing rail spur crossing

The Project design proposed in the EENF included the storm surge barrier alignment on the seaward side of the DPA Rail Spur. As shown in Figure 5-3, the revised alignment proposed in this DEIR instead has the storm surge barrier sited landward of the DPA Rail Spur to maintain the existing configuration and usable space of the wharf for existing and future WDIUs. A 56-lf active flood gate is incorporated where barrier crosses the site's rail spur to allow for continued access by 40' long box trucks and equipment to the wharf from Commercial Street (as shown in Attachment E), as well as continued access to the site by freight trains. The storm surge barrier will continue along this alignment until reaching the southern corner of the cold storage facility, then will follow the site's southwestern property line until entering Commercial Street.

Both the property owner and marine contractor tenant of #40-60 Commercial Street have been active participants in stakeholder engagement efforts for the Project. Current and past owners of #40-60 Commercial Street have made continued investments in the cold storage facility over recent years. The marine contractor tenant intends to continue leasing the wharf following Project construction to maintain the existing WDIU at the site.

#40-60 Commercial Street cold storage facility is critical to the regional cold chain and overall food security. The Project will benefit the site by protecting this key asset from coastal flooding impacts. The wharf at the site is under a WDIU by the marine contractor tenant and is an important contributor to the marine industrial economic activity in the Mystic River DPA. This use will be maintained following Project construction and will not be adversely impacted by the Project. The DPA Rail Spur separates the wharf from the remainder of the site. It is controlled by another party and must remain unobstructed, precluding opportunity for expanding the marine contractor's lease area further inland.

5.4.6 #18 ROVER STREET

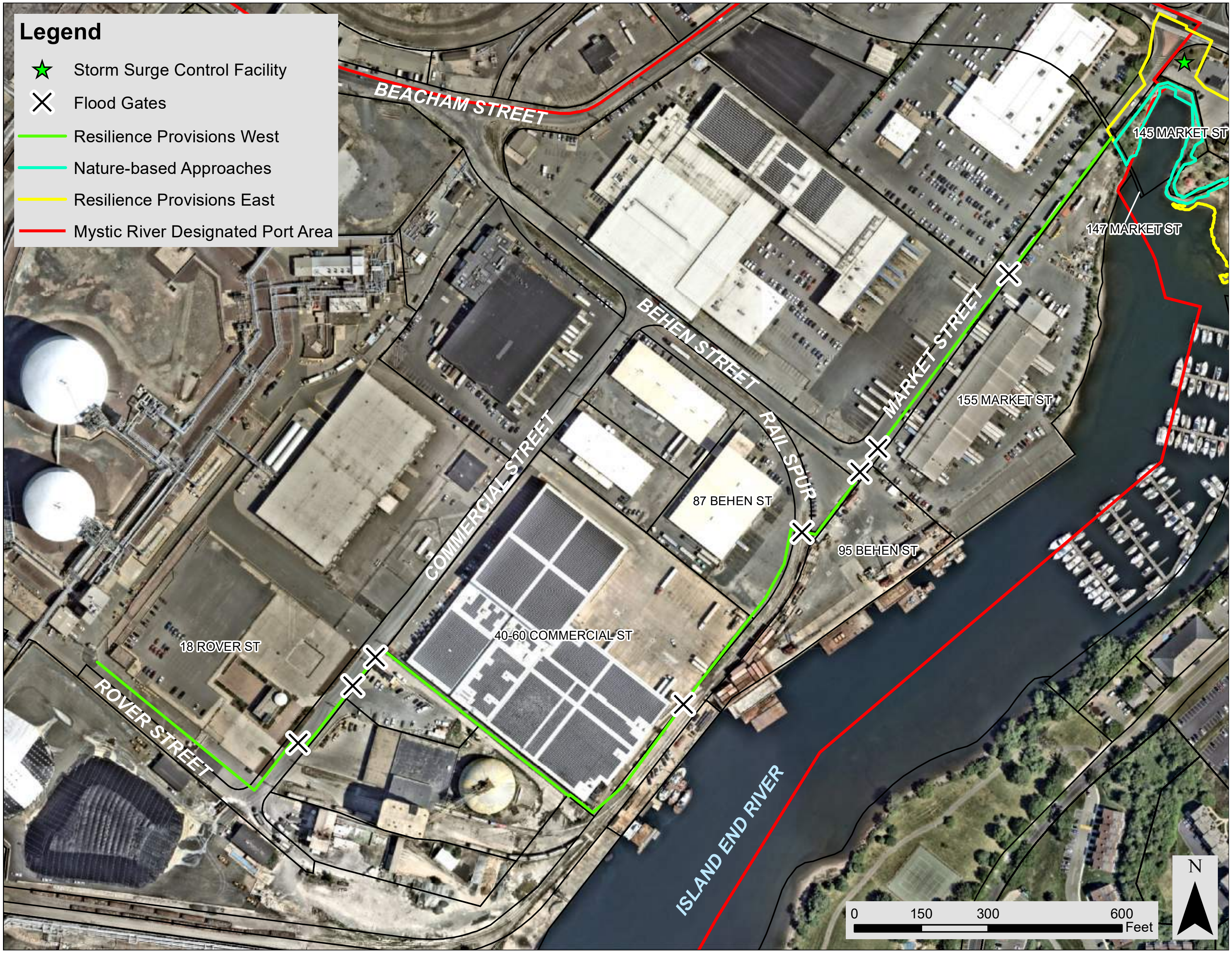
#18 Rover Street is the site of a LNG terminal with storage tanks, above ground and subsurface pipelines, and associated infrastructure and support buildings. This site is designated by the United States Coast Guard as a Maritime Security ("MARSEC") Level 2 facility and as such is subject to federal requirements for security features and protocols. The main portion of the property is on the northerly or landward side of Rover Street. An additional portion of the property extends southerly to the Mystic River and includes dolphins for receiving tanker shipments of LNG. The Project will construct the storm surge barrier within Commercial Street and along the southeastern #18 Rover Street property line. See Table 5-7 below and Sheet DPA-6 of Attachment E for a summary of #18 Rover Street and the Project components adjacent to the site.

Table 5-7: Summary of Project Components at #18 Rover Street

Category	Value
Property Information	
Property Area	43.82 ac
Primary Property Use	LNG terminal (WDIU)
Chapter 91 License No.	N/A; no known current licenses for portions of property proximate to Project Site (not jurisdictional)
Project Information	
Storm Surge Barrier Length	448 lf
Storm Surge Barrier Location	Interior of property adjacent to Rover Street, >500 ft from Mystic River shoreline and entirely outside of Chapter 91 jurisdiction.
Flood Gate Count	0
Flood Gate Location	Commercial Street ROW along

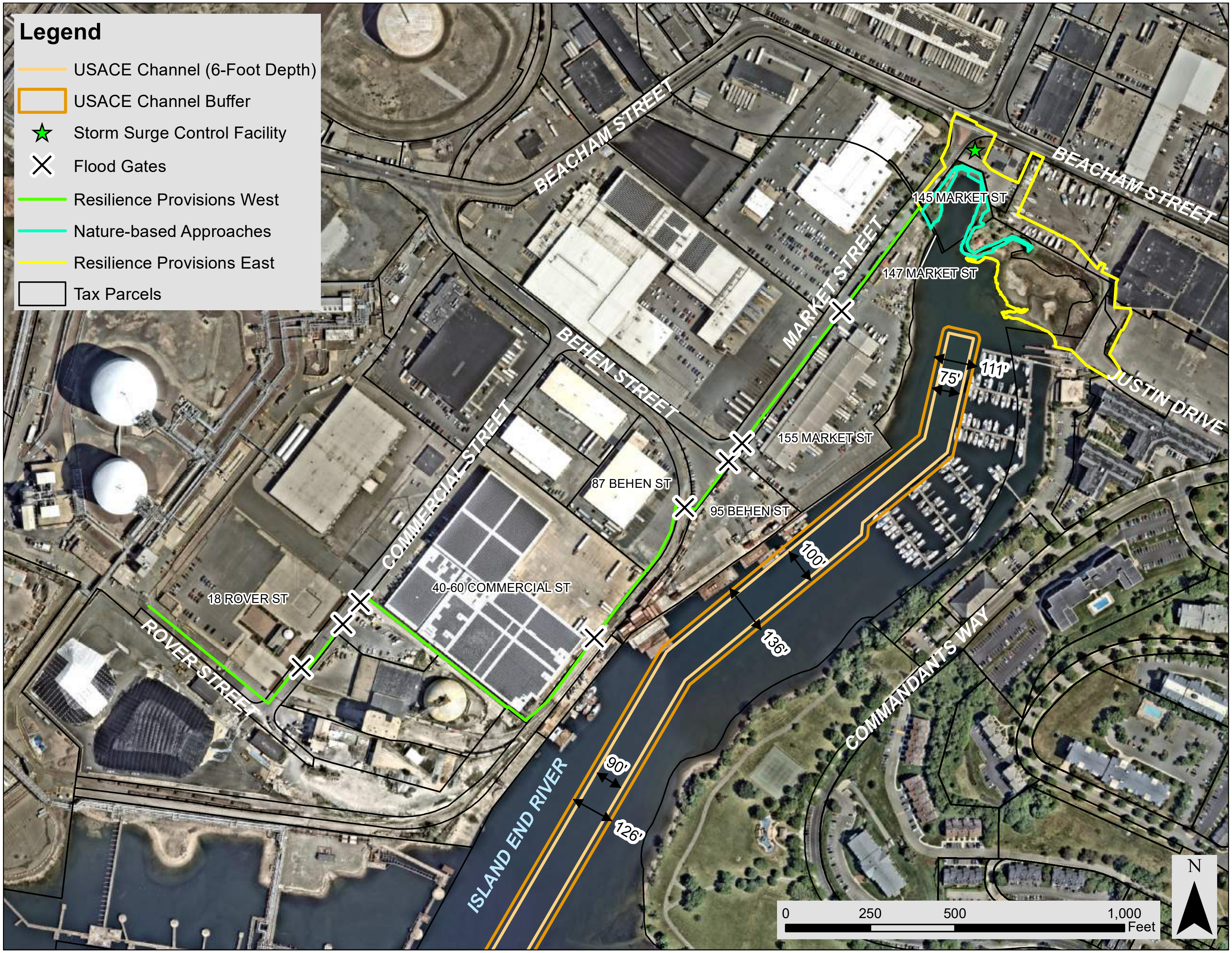
Category	Value
	southern property line

While #18 Rover Street is under an active WDIU and is partially located both filled and flowed tidelands, the Project components adjacent to the property will not be located within Chapter 91 Jurisdiction. Additionally, the main portion of the property is landward of a public way (Rover Street), and any filled tidelands are considered landlocked tidelands and are not subject to Chapter 91 jurisdiction. However, the Project will maintain unrestricted access between the main portion of #18 Rover Street and its jurisdictional frontage along the Mystic River. The internal roadway providing access between the inland portions of #18 Rover Street and its Mystic River frontage is outside of the Project Site and will remain intact following Project construction.



Chelsea, MA
Everett, MA

Figure 5-1
Project Alignment in the Mystic River Designated Port Area
Source: Fort Point Associates, Inc., 2023; CZM 2021



Chelsea, MA
Everett, MA

Figure 5-2
Federal Navigation Channel
Source: Fort Point Associates, Inc., 2023

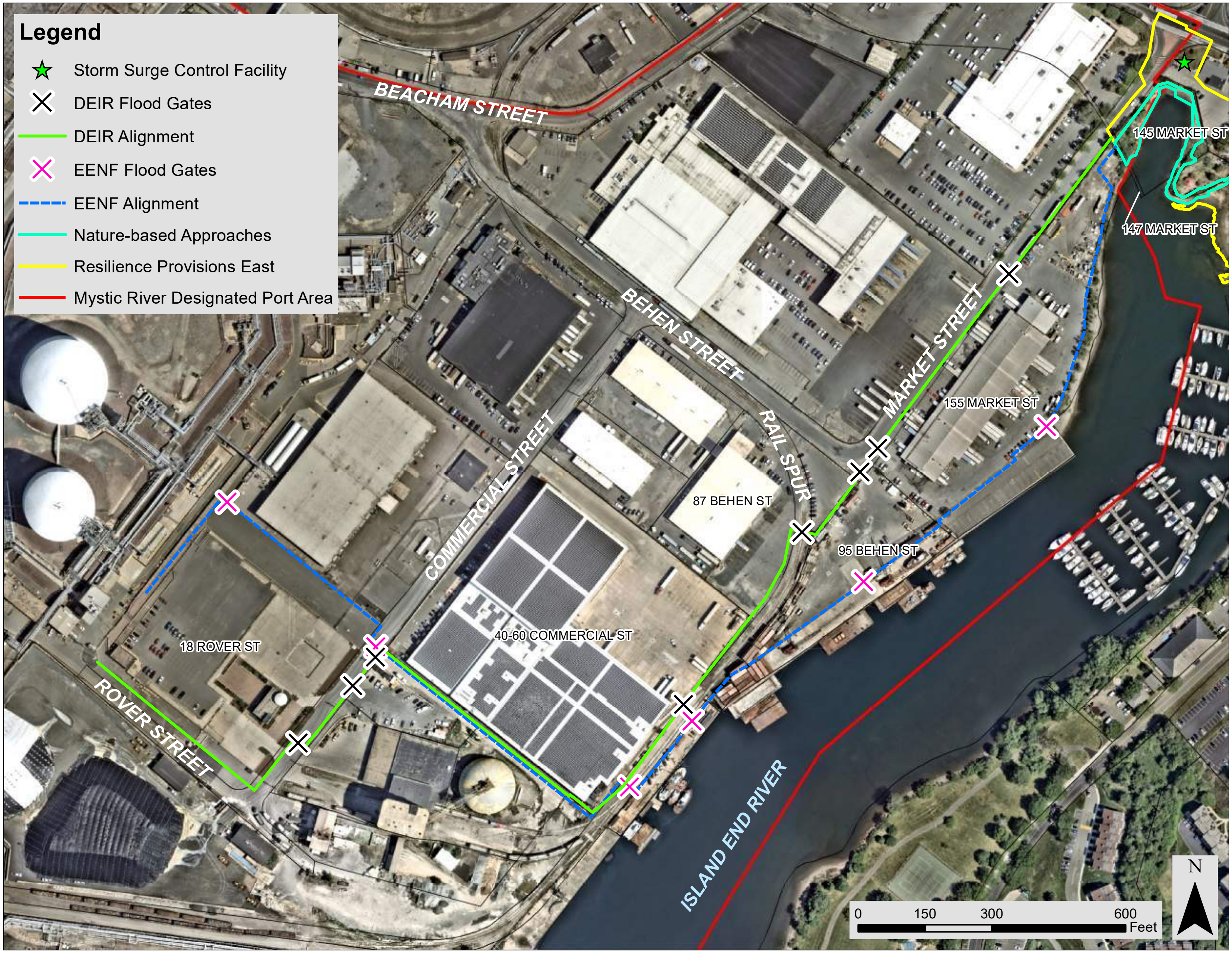


Figure 5-3
Comparison of Storm Surge Barrier Alignments in the Designated Port Area
Source: Fort Point Associates, Inc., 2023; CZM, 2021

Chapter 6

WETLANDS AND WATER QUALITY

CHAPTER 6: WETLANDS AND WATER QUALITY

6.1 INTRODUCTION

The Cities of Chelsea and Everett (the "Proponents") propose to construct coastal flood resilience measures along the Island End River ("IER") in the Cities of Chelsea and Everett (the "Project Site") consisting of a coastal storm surge barrier and flood gates, a storm surge control facility ("SSCF"), shoreline Nature-based Approaches ("NbA"), wetland enhancements, and improvements to Island End Park and the surrounding public realm (the "Project"). Due to the Project Site's location along the tidal IER, several coastal wetland resource areas protected under the Massachusetts Wetlands Protection Act ("WPA") and its implementing regulations at 310 CMR 10.00 (or, the "Wetlands Regulations") have been identified. This chapter discusses the Project components subject to WPA jurisdiction and addresses the Project's compliance with the 310 CMR 10.00.

6.2 WETLAND RESOURCES

Wetland resource areas at the Project Site were delineated by a Professional Wetland Scientist using the methodology discussed below and further detailed in Attachment F, Wetlands Delineation Report. Also see Figure 6-1, Wetland Resource Areas Map.

Land Subject to Coastal Storm Flowage

Land Subject to Coastal Storm Flowage ("LSCSF") is "land subject to any inundation caused by coastal storms up to and including that caused by the 100-year storm, surge of record, or storm of record, whichever is greater" (310 CMR 10.04). The 100-year flood elevation is identified on the Flood Insurance Rate Maps ("FIRM") produced by the Federal Emergency Management Agency ("FEMA").

Coastal Bank

Coastal Bank is defined at 310 CMR 10.30(2) as "the seaward face or side of any elevated landform, other than a coastal dune, which lies at the landward edge of a coastal beach, land subject to tidal action or other wetland."

Riverfront Area

Per 310 CMR 10.58, the Riverfront Area is a protected zone paralleling the tidal Island End River. For the Chelsea and Everett waterfronts, this zone extends 25 feet inland in a perpendicular direction from the mean high water.

Coastal Beach/Tidal Flat

A Tidal Flat, which is included in the Coastal Beach resource area, is "any nearly level part of a coastal beach which usually extends from the mean low water line landward to the more steeply sloping face of the coastal beach or which may be separated from the beach by land under the ocean" (310 CMR 10.27).

Land Containing Shellfish

The Wetlands Regulations define Land Containing Shellfish as "land under the ocean, tidal flats, rocky intertidal shores, salt marshes and land under salt ponds when any such land contains shellfish." (310 CMR 10.34).

According to the available GIS mapping available through MassMapper, portions of the project site are located within a Shellfish Suitability Area for Soft Shelled Clams. A shellfish survey was performed by BSC Group in 2022 confirming the de-minims impact to shellfish in the areas of temporary disturbance within the NbA scope of work. All areas within LUO, Tidal Flats, and Salt Marshes are included in the resource area, except the area surveyed (above MHW) in 2022 due to its results of little to no shellfish habitat.

Salt Marsh

Salt Marsh is defined as "a coastal wetland that extends landward up to the highest high tide line; that is, the highest spring tides of the year" (310 CMR 10.32). Salt Marsh is characterized by plants that are well adapted to or prefer living in saline soils. A Salt Marsh may contain tidal creeks, ditches, and pools. Based on elevation, a portion of the salt marsh is located landward of the historic high tide line ("HHTL"). This is due to material which has accumulated on top of the surface such as phragmites detritus, trash, debris which have accumulated over the years from seasonal and tidal cycles, as well as compacted urban fill material which is located in some areas under the existing boardwalk at the Project Site and is likely the result of years of adjacent roadway uses such as snowplowing. Based on these conditions, this area should be classified as salt marsh due to the conditions that would be present if not for the accumulated material. As such, the landward limit of salt marsh has been determined based on the presence of wetland vegetation and hydrology including sulfur odor, water staining, and saturation. The seaward limit of the salt marsh resource area was determined based on the presence of salt tolerant wetland vegetation and/or the presence of peat which once supported low marsh vegetation.

Land Under Ocean

Land Under Ocean ("LUO") is "land extending from the mean low water line seaward to the boundary of the municipality's jurisdiction and includes land under estuaries" as defined in 310 CMR 10.25(2).

Designated Port Area

Per 310 CMR 10.26, the Designated Port Area ("DPA") are areas designated in 301 CMR 25.00 and are portions of developed harbors with land forms that have been greatly altered from their natural shape with coastal engineering structures that often have replaced natural protection for upland areas from storm drainage and flooding. Portions of the Project Site are located within the Mystic River DPA.

6.3 NATURE-BASED APPROACHES

The goal of the riverbank stabilization Project component is to replace low value urban fill and non-coastal or invasive species along the IER with higher habitat value plants, and species that are more resilient to coastal conditions. These will be configured in ways that allow tidal plants to migrate landward to the extent feasible. The form of the existing landscape is anthropic with steep slopes to the physical limit of channelization, which risks erosion and limits terrestrial species movement.

The Project's Nature-based Approaches ("NbA") is to use cobble beach nourishment along the banks of the IER to mimic a natural cobble shingle tidal riverbank slope pre-eroded to the angle of repose and populated by a diverse spectrum of plant species with varying degree of saline environment affinity allowing it to evolve as conditions change. Achieving this stable plant community requires temporary and permanent erosion controls allowing root zones to establish. It also recognizes the need for adaptive management as the site is in an isolated urban environment and does not benefit from the natural seed and root inputs that a similarly disturbed site would receive if surrounded by natural landscapes. During the establishment period conditions will be observed and adjusted and supplemental seed and plant stock will be added. This will be followed by an adaptive management program to compensate for the added pressures of life in the urban environment such as litter invasive species, and isolation.

6.4 RIVERFRONT SLOPE STABILIZATION

The existing IER shoreline has low ecological value, steep slopes, observed sections of erosion, and is spatially constrained by the surrounding built environment. Planting soils are limited to the top of the embankment above El 8' and are dominated by invasive species, with sparse coastal vegetation between top of bank and MHW. This condition is due to the limitations of the urban fill soils of the channel, unstable slopes, and low water quality.

The proposed cobble beach nourishment with coir logs and plantings for shoreline stabilization limits work to minimal grading at the crest of the existing banks. This allows portions of upland to transition to stable intertidal/future intertidal slopes. Cobble beach nourishment includes removal of significant debris and placement of cobble over anchored coir envelopes, retaining bands of planting soil at multiple elevations allowing intertidal vegetation to transition with sea level rise ("SLR"). The slope will be stabilized further by rounded stone, matching the existing sizes, and a 3:1 slope limitation.

Sand-based planting media will be wrapped in coir, staked, and mulched with cobble and will act as temporary erosion control for the planting areas while root zones establish. In addition to terraced areas, plantings will be included between coir envelopes and primary planted terraces for transitional vegetative cover. The most significant grade changes are at the erodible crest of the slope which will be cut back and stabilized at the new 3:1 slope. This is the preferred option for shoreline stabilization from the alternatives analysis presented in Chapter 2 as it is the lowest risk and lowest cost alternative with some adaptation capacity for SLR. This option also allows for high utility in adaptive management during the establishment period.

6.5 WETLANDS ENHANCEMENTS

The Wetlands Enhancements component of the Project is located between the Island End Park and Admiral's Hill Marina within the City of Chelsea. See Figure 6-1, Wetland Resource Map. The existing Salt Marsh contains phragmites and bare spots with a peat substrate that shows evidence of prior vegetation growth further into the marsh. This area currently provides low-value habitat and minimizes public enjoyment of this natural resource area. Wetlands enhancements include treatment of invasive species, enhancement of existing salt marsh, and replication of salt marsh in currently paved areas.

Wetlands enhancements are being proposed to improve habitat and public enjoyment of the Salt Marsh and surrounding wetlands. The Project design focuses on removing and managing phragmites, lowering salinity tolerance levels for proposed plantings, and planting smooth cordgrass (Spartina alterniflora). During construction, all work related to these wetland enhancements will occur during low water conditions when water will not be present in the work area. Erosion control measures in the form of a silt curtain will be installed prior to any work on site.

The proposed phragmites management program includes the mowing of phragmites, herbicide treatment, and debris and detritus removal. Several weeks after these steps and once new sprouts are approximately two (2) feet in height, a herbicide will be applied locally in accordance with a state-authorized herbicide permit. Precautions will be taken to avoid chemical runoff or drift and impacts to pollinators and other nontarget species.

After the herbicide has taken affect (3 – 4 weeks after application), the accumulated plant material, detritus, and debris will be removed down to the soil surface. Once the soil surface is exposed the area will be seeded with a native salt-tolerant seed mix. Smooth cordgrass (Spartina alterniflora) will be planted in the low marsh areas. It will be conditioned by the supplier to thrive in the existing salinity level to maximize success of the replanted species. The planting season for smooth cordgrass within the enhancements area will extend from only after the last frost in the spring through mid-May, and from September 15 until November 30 in the fall. Extended or out-of-season planting requirements would include application of antitranspirant and extra water as needed. After the initial planting season, the marsh and wetlands areas will be monitored at a minimum of two times per year (spring and fall) for a minimum of two years by an ecologist consultant. The Project Site will be visited twice per year for two years for additional spot herbicide application on new phragmites sprouts to ensure successful eradication.

As described in Attachment F, Wetland Delineation Report, the area of Salt Marsh located along the shoreline area in Chelsea is dominated by the invasive Common Reed (Phragmites australis), which tolerates brackish water, thrives in disturbed areas, and is in mainly urban fill and influenced by coastal flooding. Within Resilience Provisions East, the proposed elevated boardwalk must permanently impact the existing Salt Marsh due to spatial constraints at the adjacent properties and to provide the community benefit it currently serves. Enhancement of the marginally functional Salt Marsh can provide a multitude of fisheries and wildlife benefits to the existing Salt Marsh in the Project Site, as well as within the IER. A replicated Salt Marsh will also provide additional storm damage protection and erosion control to the Project. Furthermore, the Proponents will be enhancing approximately 1,836 SF of Salt Marsh with approximately 2,375 SF of Salt Marsh, located next to the existing Salt Marsh on the northwest section of the existing riverwalk.

6.6 DREDGING AND DISPOSAL

6.6.1 BACKGROUND

The Project Site at the Beacham Street Drain and Market Street Culvert outlets, as well as land in the northern portion of the IER channel surrounding the outlets, within the #145 Market Street, Chelsea property. Sediments within the IER channel are known to be contaminated from historical industrial operations and various spills/releases that have occurred in the surrounding area. The main driver of area contamination was historical manufactured gas plant (“MGP") coal tar processing facility located in Everett around Market Street and Behen Street, which caused releases of coal tar and associated materials to the waterway, impacting river sediments. To support installation of the proposed storm surge control facility (“SSCF”), dredging of sediments in the vicinity of the culvert outfall will be required. Additionally, proposed bank restoration activities below the mean high tide elevation will similarly require removal of existing sediment. Background information on historical release conditions, anticipated sampling activities to characterize sediment for off-site disposal, and plans for managing these materials during construction are presented in the following sections.

6.6.2 HISTORY OF DREDGING

Work to assess and remediate the contamination has been ongoing since the late 1980's under an Administrative Consent Order with the responsible parties. Release Tracking Number (RTN) 3-309 has been assigned to the overall sediment release by MassDEP, which documents the sampling and remediation. Most recently, dredging work was completed in 2008, removing a significant volume of the most heavily impacted sediment from the IER channel and contained it within a Confined Disposal Facility bulkhead ("CDF") located along Everett's IER shoreline. Following this dredging, it was determined to be infeasible to remove additional sediment due to a number of factors, including lack of area for additional on-site containment (i.e. expansion of the CDF), and prohibitive costs for off-site disposal. As such, residual contamination remains in the channel, including the northern portions within the Chelsea City limits. This residual contamination has been documented in numerous submittals to MassDEP under RTN 3-309.

6.6.3 PROJECT DREDGING

The Project will include the construction of a new outlet structure for the proposed SSCF at the existing Market Street Culvert and Beacham Street Drain outlets, as well as construction of shoreline improvements below the MHW elevation of 4.33'. The required connection point for the SSCF to the Market Street culvert (elev. -7.5) is lower than the lowest elevation of the Island End River, which requires this level of dredging.

Dredging and disposal of sediment will be required to support these improvements, with approximately 613 cubic yards (CY) of sediment requiring precharacterization, management, and disposal. As part of this work, a MassDEP-approved sediment and analysis plan ("SAP") to support 401 Water Quality Certificate ("WQC") permitting is required. The #145 Market Street property was previously sampled in 1995 and 2005 as part of work under RTN 3-309, including chemical analysis for various coal tar constituents. However, an updated set of data is required to pre-characterize the data before Project construction to represent the maximum depths of excavation proposed in the program, and to support permitting requirements.

Sediment sampling in and of itself does not "trigger" additional notifications to MassDEP. Under the Massachusetts Contingency Plan ("MCP"), contamination in soil/groundwater must be reported (if a new condition is found), however sediment does not have this same stipulation. Therefore, the sampling portion of the program is not considered a liability risk for a new reporting condition or obligation under the MCP. This sampling was performed in October 2023 as described in the following sections.

6.6.4 DREDGING SAMPLING PLAN AND ACTIVITIES

An SAP was submitted to David Wong of MassDEP on May 31, 2023, and revised on September 11, 2023 to support collection of samples for laboratory analytical testing to determine chemical characteristics of the material to be removed. This information will be used to support 401 Water Quality Certification permitting. Disposal facilities require characterization samples for every 500 CY of material to be removed. The sampling program is broken up into four cells ("Disposal Cell"); three Disposal Cells in the northern mouth of the river near the existing culvert outlets, and one Disposal Cell in the east bank of IER within the proposed bank restoration limits. A detailed figure of this sampling plan is appended to this filing in Attachment G, Sediment Sampling Plan.

Following approval of the SAP from MassDEP and permitting of the sampling activities through the Chelsea Conservation Commission, sampling was conducted on October 24, 2023. A specialty subcontractor was engaged to provide a boat-based sampling platform in accordance with the SAP. Sediment cores were advanced from the boat deck via a vibrocore system capable of collecting cores up to six feet long in strata comprised of muds and sands. The cores were collected in 2 5/8-inch inside diameter polycarbonate core tubes and returned to the shore for processing and sampling.

In total, 12 Vibrocore locations were advanced as shown in Attachment G, Sediment Sampling Plan. Locations within Disposal Cell #3, located closest to the culvert on the northern portion of the IER could not be completed due to a surficial concrete slab, the culvert itself, and large riprap boulders armoring the slope. Five locations were completed in Disposal Cells #1 and #2, however boulders, concrete, or other debris limited exploration depths within these Disposal Cells. One sample per Disposal Cell was advanced to approximately 4 – 5 feet below existing grade to characterize deeper sediment to the maximum extent possible, as shown in the table below. Vibrocores from within Disposal Cell #4 were supplemented by three hand auger samples to approximately two feet below grade for five total locations within this Disposal Cell. A summary of the Vibrocore locations and depths is shown in Table 6-1.

Table 6-1, Vibrocore Location Depths

Disposal Cell	Station ID	Water Depth (ft)	Penetration (ft)	Recovery (ft)
1	STA-7	8.5	2.0	1.7
1	STA-13	6.0	5.0	4.0
1	STA-6	6.0	2.2	1.7
1	STA-10	5.9	2.2	1.8
1	STA-12	4.2	2.2	1.7
2	STA-8	8.6	1.5	1.2
2	STA-9	4.9	1.0	0.9
2	STA-15	4.1	3.0	2.5
2	STA-11	4.4	2.6	2.2
2	STA-14	4.5	4.5	3.8
4	STA-17	2.4	3.1	1.7
4	STA-17	2.4	0.9	0.9

Sediment samples throughout the investigation area were composed of organic silt (muck) with layers of peat. Bricks, glass, and concrete fragments were also observed throughout the study area. Samples were consistently found to be visibly stained (black in color) with a sheen and a petroleum-like odor observed in each location. PID readings ranged from 3.8 ppmV to 27 ppmV, corresponding generally to areas exhibiting the greatest visual evidence of sheen and staining. Following collection, samples were composited for laboratory analysis. Volatile Organic Compound (VOC) samples were collected from a location exhibiting elevated headspace readings from each Disposal Cell prior to compositing. Laboratory results are appended to this filing in Attachment G, Sediment Sampling Plan.

6.6.5 MATERIAL CHARACTERIZATION

Samples were submitted for the following disposal characterization analysis in general accordance with the 401 WQC Regulations at 314 CMR 9.07 and local disposal facility requirements, as well as the additional 401 WQC Regulations provided in 314 CMR 9.07(2)(b)(6).

- Total Petroleum Hydrocarbons (TPH) via EPA Method 8100
- Extractable Petroleum Hydrocarbons (EPH) via MassDEP Methodology
- Semi-Volatile Organic Compounds (SVOCs) via EPA Method 8270
- Total Metals (arsenic, barium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, and zinc) via EPA Method 6010B
- Polychlorinated Biphenyls (PCBs) via EPA Method 8082
- Conductivity, Total Organic Carbon, % Water, and Grain Size Distribution
- pH, Reactivity and Ignitability.

Laboratory and analytical reports are provided in Attachment G, Sediment Sampling Plan.

Sediment results were compared to applicable criteria outlined in DEP Interim Policy # COMM-94-007: "Interim Policy for Sampling, Analysis, Handling and Tracking Requirements for Dredged Sediment Reused or Disposed at Massachusetts Permitted Landfills." This policy outlines the criteria used to determine whether the sediment can be reused (i.e., Daily Cover) or must be disposed of at a landfill.

Additionally, results were compared to COMM-97-001 Criteria for in-state landfill reuse, as well as RCS-1 reportable concentrations. Although these standards do not directly apply to sediment, they are considered useful as a general benchmark to determine overall level of contamination and inform future disposal options.

In general, results indicated elevated PAH and TPH concentrations consistent with the historical MGP waste impacts identified in Section 5.5.2. Total PAH and TPH concentrations exceeded levels that can be reused at an in-state landfill facility in each of the three samples submitted. VOCs were not detected in the submitted samples.

Grain size analysis indicated that Disposal Cell 1 was primarily silt (51.5%), with some sand (43.8%) and minimal gravel (4.7%). Disposal Cell 2 and Disposal Cell 3 had comparatively lower silt percentages (34.8% and 41.2% respectively) and higher sand percentages (60.5% and 51.8% respectively). Overall, the submitted samples ranged from 51 to 67% solids, with Total Organic Carbon ranging from approximately 9 to 15%.

Low concentrations of PCBs were detected in each of the three submitted samples (from approximately 1 mg/kg to 5 mg/kg). No known point source of PCBs has been identified in the Project Area. As such, this material is not considered to be regulated under the Toxic Substances Control Act (TSCA).

Further discussion regarding ultimate disposal options for the sediment are provided in Section 6.6.6. Concentrations of lead exceeded RCRA 20x Rule Criteria, and as such, these samples have been reactivated for TCLP analysis to determine whether the material would represent a hazardous waste if generated. Final analytical results, when available, will be provided as part of the overall documentation for a 401 WQC permit submittal.

Information obtained during this investigation will be used to inform the final disposal location for dredged material, develop engineering plans, and for obtaining permit approvals during future phases of the Project.

6.6.6 DREDGING METHOLODOLOGY AND SEDIMENT HANDLING/DISPOSAL

Means and methods for sediment removal will be determined by the selected contractor, however it is anticipated that a temporary coffer dam will be constructed to isolate the work area at the culvert outfall, which will then be dewatered to support excavation of sediment to the required elevation "in the dry". Further information regarding the temporary cofferdam is provided in section 8.7.5. Following dewatering, a long-arm excavator will likely be utilized to remove the material for processing in a sediment handling area adjacent to the excavation. Sediment water content will likely be too high immediately after excavation for live-loading for transport to the ultimate receiving facility. To remove free liquids prior to transportation, drying of the sediment either through evaporation in open roll-offs / temporary dewatering cells or addition of an additive is anticipated. Environmental controls (straw wattles, silt fencing, bermed cells, etc.) will be utilized to prevent migration of sediment to abutting resource areas outside of the work zone.

Based on analytical data obtained during the October 2023 investigation, as well as previous sampling data obtained under RTN 3-309 and analytical data from abutting areas in the vicinity of the project, it is anticipated that sediment will require disposal at an out-of-state landfill facility. The ultimate disposal facility will be selected by the contractor based on the analytical testing information outlined under section 6.6.5. Additionally, greater levels of treatment (e.g., thermal desorption, asphalt batching or stabilization) may be required to facilitate sediment reuse / disposal due to the elevated PAH and TPH concentrations identified.

Sediment, groundwater, and soil management under the Project will also be subject to the provisions of the Massachusetts Contingency Plan (MCP – 310 CMR 40.0000). Prior to commencement of construction, one or more Release Abatement Measure (RAM) Plans will be submitted by the Project Team to MassDEP which will further outline provisions for the management of remediation waste generated under the Project. The Proponents note that discussions are ongoing with the MassDEP Bureau of Waste Site Cleanup regarding the potential for a Special Project Designation (SPD) which will streamline the submittal process under the Massachusetts Contingency Plan.

6.6.7 MITIGATION MEASURES

The Project Team has identified the following planning and construction measures to mitigate impacts due to dredging activities:

- Implement TOY restrictions as designated by the Massachusetts Division of Marine Fisheries (DMF).

- Install a bottom anchored turbidity curtain prior to dredging work. ($31,039)
- Minimize turbidity during dredging through use of a mechanical clamshell dredge with an environmental bucket.
- Conduct dredge sampling analysis to determine the best option for dredged material disposal.
- Follow all state and federal regulatory requirements regarding dredging and handling and disposal of dredged material.

6.7 WETLAND IMPACTS, COMPLIANCE, AND MITIGATION

6.7.1 IMPACTS

Project impacts to wetland resource areas are described Table 6-2 below. Also see Attachment H, Wetland Resource Area Impact Exhibits.

Table 6-2, Wetland Resource Area Impacts

Resource Area	Impact Area (Total)	Impact (Temporary/Permanent)
Land Subject to Coastal Storm Flowage	204,767 Square feet ("sf")	• 107,339 sf within LSCSF will be impacted temporarily within the Project Site. • 97,428 sf within LSCSF will be impacted permanently to construct the storm surge barrier, an elevated boardwalk, and material replacement.
Coastal Bank	964 linear feet ("lf")	• 499 lf seaward of the coastal bank line will be temporarily impacted within the Project Site. • 465 lf seaward of the coastal bank line will be impacted to construct the storm surge barrier, SSCF, and sheet pile-supported Resilient Riverwalk.
25' Riverfront Area	18,118 sf	• 14,165 sf will be temporarily impacted within sawcut and limits of excavation to construct the storm surge barrier wall, SSCF, sheet pile-supported Resilient Riverwalk and Phragmites control. This area is largely within the bounds of the FIRM 1% annual chance flood limits.

Resource Area	Impact Area (Total)	Impact (Temporary/Permanent)
		• 3,953 sf will be permanently impacted within sawcut and limits of excavation to construct the storm surge barrier wall, SSCF, and sheet pile-supported Resilient Riverwalk. This area is largely within the bounds of the FIRM 1% annual chance flood limits.
Tidal Flat/Coastal Beach	9,040 sf	• 5,118 sf will be impacted temporarily within Tidal Flats, part of the Coastal Beach resource area, to excavate and construct the SSCF and NbA and to perform Wetlands Enhancements. • 3,922 sf will be impacted permanently within Tidal Flats, part of the Coastal Beach resource area, due to construction of the SSCF.
Land Containing Shellfish	28,314 sf	• 21,916 sf will be impacted temporarily within the Land Containing Shellfish to excavate and construct the SSCF and NbA and to perform Wetlands Enhancements. • 6,398 sf will be impacted permanently within the Land Containing Shellfish due to construction of the SSCF. • While the MassGIS data layer indicates Land Containing Shellfish within the Project Site, this data layer was originally created in 1992 and represents the coastal conditions prior to the construction of a CDF, which was constructed after 2005. A shellfish survey was performed in 2022 confirming the de-minims impact to shellfish in the areas of temporary disturbance. All areas within LUO, Tidal Flats, and Salt Marshes are included in the resource area, except the area surveyed (above MHW) in 2022 due to its results of little to no shellfish habitat.
Salt Marsh	18,427 sf	• 16,591 sf will be temporarily impacted within the Salt Marsh for the debris/detritus removal, chemical phragmites treatment, and various plug plantings as part of the Wetlands Enhancements. • 1,836 sf will be permanently impacted within the Salt Marsh for sheet pile-

Resource Area	Impact Area (Total)	Impact (Temporary/Permanent)
		supported Resilient Riverwalk. • The Project will create 2,745 sf of new Salt Marsh to offset the permanent impacts to the resource area described above.
Land Under Ocean	847 sf	• 207 sf will be impacted temporarily within LUO by the dredging and construction of the SSCF outfall. • 613 cubic yards of dredge material will be removed and 640 sf will be impacted permanently within LUO to dredge and construct the SSCF and adjacent NbA along the IER shoreline.
Designated Port Area	847 sf	• 207 sf will be impacted temporarily within LUO and the Mystic River DPA by the dredging and construction of the SSCF outfall. • 613 cubic yards of dredge material will be removed and 640 sf will be impacted permanently within LUO and the Mystic River DPA to dredge and construct the SSCF and adjacent NbA along the IER shoreline.

6.7.2 COMPLIANCE WITH WPA PERFORMANCE STANDARDS

Land Subject to Coastal Storm Flowage

There are no regulatory performance standards for LSCSF under 310 CMR 10.00.

Coastal Bank

The Project will construct the storm surge barrier foundations, SSCF, sheet pile wall, NbA, and pile supported Resilient Riverwalk along the Coastal Bank of the Project Site. Existing wetland vegetation, landscaping, and rip rap will be replaced with planted flats, stabilized with coir envelopes, planted cobble bank, and cobble beach nourishment. This work will positively impact storm damage prevention and flood control and prevent sediment deposition within the coastal resource areas.

Table 6-3, Compliance with Performance Standards for Coastal Bank (310 CMR 10.30)

COASTAL BANK PERFORMANCE STANDARD	COMPLIANCE WITH PERFORMANCE STANDARD
310 CMR 10.30(6): Any project on such a coastal bank or within 100 feet landward of the top of such coastal bank shall have no adverse effects on the stability of the coastal bank	964 lf of coastal bank will be impacted within limits of excavation to construct the proposed storm surge barrier including foundations, and material replacement. Installation of the storm surge barrier will not have adverse effects on the stability of the coastal bank. Existing wetland vegetation, landscaping, and rip rap will be replaced with loam and seed and stabilized.
310 CMR 10.30(7): Bulkheads, revetments, seawalls, groins or other coastal engineering structures may be permitted on such a coastal bank except when such bank is significant to storm damage prevention or flood control because it supplies sediment to Coastal Beaches, coastal dunes, and barrier beaches.	The impacted coastal bank is not significant to storm damage prevention or flood control. The Project seeks to prevent storm damage to the Project Site and surrounding area.
310 CMR 10.30 (8): Notwithstanding the provisions of 310 CMR 10.30(3) through (7), no project may be permitted with which will have an adverse effect on specified habitat sites of rare vertebrate of invertebrate species, as identified by procedures established under 310 CMR 10.37.	The Project Site does not include specified habitat sites of rare vertebrate of invertebrate species and the Project will not impact such areas.

Riverfront Area

Work activities and uses within areas of Chapter 91 jurisdiction are exempt from the performance standards for the Riverfront Area pursuant to 310 CMR 10.58(6)(i) because a license will be obtained. Work outside of Chapter 91 jurisdiction must still comply with the standards of the Riverfront Area.

Projects within previously developed Riverfront Areas may occur providing the proposed work improves existing conditions and meets specific criteria including Stormwater Management standards, limits of proposed work to degraded area only, restoration of the area with preference to begin at the Riverfront Area bound (closest to the water), and mitigation that results in no significant adverse impact.

Table 6-4: Compliance with Performance Standards for Riverfront Area (310 CMR 10.58)

RIVERFRONT AREA PERFORMANCE STANDARD	COMPLIANCE WITH PERFORMANCE STANDARD
310 CMR 10.58(4): General Performance Standard. Where the presumption set forth in 310 CMR 10.58(3) is not overcome, the applicant shall prove by a preponderance of the evidence that there are no practicable and substantially equivalent economic alternatives to the proposed project with less adverse effects on the interests identified in M.G.L. c.131 § 40 and that the work, including proposed mitigation, will have no significant adverse impact on the riverfront area to protect the interests identified in M.G.L. c. 131 § 40. In the event that the presumption is partially overcome, the issuing authority shall make a written determination setting forth its grounds in the Order of Conditions and the partial rebuttal shall be taken into account in the application of 310 CMR 10.58 (4)(d)1.a. and c.; the issuing authority shall impose conditions in the Order that contribute to the protection of interests for which the riverfront area is significant.	18,118 sf will be impacted within sawcut and limits of excavation to construct the storm surge barrier wall, SSCF, and sheet pile supported riverwalk. This area is largely within the bounds of the FEMA FIRM 1% annual chance flood limits.

RIVERFRONT AREA PERFORMANCE STANDARD	COMPLIANCE WITH PERFORMANCE STANDARD
310 CMR 10.58(4)(a): Protection of Other Resource Areas. The work shall meet the performance standards for all other resource areas within the riverfront area, as identified in 310 CMR 10.30 (Coastal Bank), 10.32 (Salt Marsh), 10.55 (Bordering Vegetated Wetland), and 10.57 (Land Subject to Flooding). When work in the riverfront area is also within the buffer zone to another resource area, the performance standards for the riverfront area shall contribute to the protection of the interests of M.G.L. c. 131, § 40 in lieu of any additional requirements that might otherwise be imposed on work in the buffer zone within the riverfront area.	The Project meets the performance standards for all impacted resource areas.
310 CMR 10.58(4)(b): Protection of Rare Species. No project may be permitted within the riverfront area which will have any adverse effect on specified habitat sites of rare wetland or upland, vertebrate or invertebrate species, as identified by the procedures established under 310 CMR 10.59 or 10.37, or which will have any adverse effect on vernal pool habitat certified prior to the filing of the Notice of Intent	There are no rare species within the disturbed area; therefore, none will be impacted by the Project.
310 CMR 10.58(4)(c): Practicable and Substantially Equivalent Economic Alternatives. There must be no practicable and substantially equivalent economic alternative to the proposed project with less adverse effects on the interests identified in M.G.L. c. 131 § 40.	All practicable and/or substantially economic equivalent projects require greater adverse effects on these interests.
310 CMR 10.58(5): Redevelopment within Previously Developed Riverfront Areas; Restoration and Mitigation. Work to redevelop previously developed riverfront areas shall conform to the following criteria:	

RIVERFRONT AREA PERFORMANCE STANDARD	COMPLIANCE WITH PERFORMANCE STANDARD
(a) At a minimum, proposed work shall result in an improvement over existing conditions of the capacity of the riverfront area to protect the interests identified in M.G.L. c. 131 § 40.	The Project results in an improvement of the capacity of the riverfront area through the installation of storm surge control measures, improvements to the salt marsh, and further protection and landscape enhancement of the shoreline.
(b) Stormwater management is provided according to standards established by the Department.	The Project results in a decrease of impervious area thereby reducing stormwater runoff. The Project meets the stormwater management standards established by the Department.
(c) Within 200 foot riverfront areas, proposed work shall not be located closer to the river than existing conditions or 100 feet, whichever is less, or not closer than existing conditions within 25 foot riverfront areas, except in accordance with 310 CMR 10.58(5)(f) or (g).	The Project is not located closer to the river than existing conditions or 25 feet.
(d) Proposed work, including expansion of existing structures, shall be located outside the riverfront area or toward the riverfront area boundary and away from the river, except in accordance with 310 CMR 10.58(5)(f) or (g).	The Project is located as close to the riverfront area boundary away from the IER as practicable.
(e) The area of proposed work shall not exceed the amount of degraded area, provided that the proposed work may alter up to 10% if the degraded area is less than 10% of the riverfront area, except in accordance with 310 CMR 10.58(5)(f) or (g).	The Project does not exceed the amount of degraded area along the riverfront area.

RIVERFRONT AREA PERFORMANCE STANDARD	COMPLIANCE WITH PERFORMANCE STANDARD
(f) When an applicant proposes restoration on-site of degraded riverfront area, alteration may be allowed notwithstanding the criteria of 310 CMR 10.58(5)(c), (d), and (e) at a ratio in square feet of at least 1:1 of restored area to area of alteration not conforming to specific criteria.	The Project is proposing enhancements of a degraded riverfront area at a ratio in square feet of 1:1 of enhanced area to area of alteration.

Coastal Beach/Tidal Flat

The Project will require work within Tidal Flat, part of the Coastal Beach resource area, including the disturbance and excavation within the existing shoreline and the construction of a section of the elevated boardwalk, drainage outfalls, and shoreline stabilization and plantings.

Table 6-5: Compliance with Performance Standards for Coastal Beach (310 CMR 10.27)

COASTAL BEACH PERFORMANCE STANDARD	COMPLIANCE WITH PERFORMANCE STANDARD
310 CMR 10.27(3): Any project on a Coastal Beach, except any project permitted under 310 CMR 10.30(3)(a), shall not have an adverse effect by increasing erosion, decreasing the volume or changing the form of any such Coastal Beach or an adjacent or downdrift Coastal Beach.	The Project will not have any adverse effects on the Coastal Beach with the Project Site. The Project will improve erosion protection without altering the landform along the Coastal Beach.
310 CMR 10.27(4): Any groin, jetty, solid pier, or other such solid fill structure which will interfere with littoral drift, in addition to complying with 310 CMR 10.27(3), shall be constructed in accordance with 310 CMR 10.27 (a) through (c).	The Project does not propose any solid fill structure which will interfere with littoral drift within Coastal Beach. The proposed SSCF outfall structure will not affect the longshore transport of sediments.

COASTAL BEACH PERFORMANCE STANDARD	COMPLIANCE WITH PERFORMANCE STANDARD
310 CMR 10.27(5): Notwithstanding 310 CMR 10.27(3), beach nourishment with clean sediment of a grain size compatible with that on the existing beach may be permitted.	The Project does not include beach nourishment within the Coastal Beach.
310 CMR 10.27(6): In addition to complying with the requirements of 310 CMR 10.27(3) and 10.27(4), a project on a Tidal Flat shall if water-dependent be designed and constructed, using best available measures, so as to minimize adverse effects, and if non- water dependent, have no adverse effects, on marine fisheries and wildlife caused by:	
(a) Alterations to water circulation	The Project will not have any adverse effects on marine fisheries and wildlife caused by alterations to water circulation.
(b) Alterations in the distribution of sediment grain size	The Project will not have any adverse effects on marine fisheries and wildlife caused by alterations to distribution of sediment grain size.
(c) Changes in water quality, including, but not limited to, other than natural fluctuations in the levels of dissolved oxygen, temperature, or turbidity, or the addition of pollutants.	The Project will not have any adverse effects on marine fisheries and wildlife caused by changes to water quality. The Project will decrease the amount of impervious surface, increase the number of native plantings, and address issues of erosion and sedimentation on slopes of IER.
310 CMR 10.27(7): Notwithstanding the provisions of 310 CMR 10.27(3) through 10.27(6), no project may be permitted which will have any adverse effect on specified habitat sites or rare vertebrate or invertebrate species, as identified by procedures established under 310 CMR 10.37.	There are no rare species within the disturbed area; therefore, none will be impacted by the Project.

Land Containing Shellfish

The Project proposes work consisting of 21,916 sf of temporary impacts and 6,398 sf of permanent impacts within the Land Containing Shellfish resource area for the excavation and construction of the SSCF and Wetlands Enhancements, and SSCF outfall, respectively. Proposed work including trash/debris removal, plug plantings, and seeding in adjacent areas will not affect Land Containing Shellfish. While the MassGIS data layer indicates Land Containing Shellfish within the Project Site, this data layer was originally created in 1992 and represents the coastal conditions prior to the construction of a CDF along #155 Market Street and #95 Behen Street, which was constructed after 2005. A shellfish survey was performed in 2022 confirming the de-minims impact to shellfish in the areas of temporary disturbance. All areas within LUO, Tidal Flats, and Salt Marshes are included in the resource area, except the area surveyed (above MHW) in 2022 due to its results of little to no shellfish habitat.

Table 6-6: Compliance with Performance Standards for Land Containing Shellfish (310 CMR 10.34)

LAND CONTAINING SHELLFISH PERFORMANCE STANDARD	COMPLIANCE WITH PERFORMANCE STANDARD
310 CMR 10.34(4): Except as provided in 310 CMR 10.34(5), any project on land containing shellfish shall not adversely affect such land or marine fisheries by a change in the productivity of such land caused by:	
(a) alterations of water circulation;	The Project will not have any adverse effects on such land or marine fisheries caused by alterations to water circulation.
(b) alterations in relief elevation,	The Project will not have any adverse effects on such land or marine fisheries caused by alterations to relief elevation.
(c) the compacting of sediment by vehicular traffic,	The Project will not have any adverse effects on such land or marine fisheries caused by compaction of sediment by vehicular traffic.
(d) alterations in the distribution of sediment grain size,	The Project will not have any adverse effects on such land or marine fisheries caused by alterations to distribution of sediment grain size.

LAND CONTAINING SHELLFISH PERFORMANCE STANDARD	COMPLIANCE WITH PERFORMANCE STANDARD
(e) alterations in natural drainage from adjacent land, or	The Project will not have any adverse effects on such land or marine fisheries caused by alterations to natural drainage from adjacent land.
(f) changes in water quality, including, but not limited to, other than natural fluctuations in the levels of salinity, dissolved oxygen, nutrients, temperature or turbidity, or the addition of pollutants.	The Project will not have any adverse effects on such land or marine fisheries caused by alterations to water quality. The Project will decrease the amount of impervious surface, increase the number of native plantings, and address issues of erosion and sedimentation on slopes of the IER.
310 CMR 10.34(5): Notwithstanding the provisions of 310 CMR 10.34(4), projects which temporarily have an adverse effect on shellfish productivity but which do not permanently destroy the habitat may be permitted if the land containing shellfish can and will be returned substantially to its former productivity in less than one year from the commencement of work, unless an extension of the Order of Conditions is granted, in which case such restoration shall be completed within one year of such extension.	The Project will not have any temporary or permanent adverse effects on shellfish productivity.
310 CMR 10.34(6): In the case of land containing shellfish defined as significant in 310 CMR 10.34(3)(b) (i.e., those areas identified on the basis of maps and designations of the Shellfish Constable), except in Areas of Critical Environmental Concern, the issuing authority may, after consultation with the Shellfish Constable, permit the shellfish to be moved from such area under the guidelines of, and to a suitable location approved by, the Division of	The Project does not have land containing shellfish defined as significant within the Project Site.

LAND CONTAINING SHELLFISH PERFORMANCE STANDARD	COMPLIANCE WITH PERFORMANCE STANDARD
Marine Fisheries, in order to permit a proposed project on such land. Any such project shall not be commenced until after the moving and replanting of the shellfish have been commenced.	
310 CMR 10.34(7): Notwithstanding 310 CMR 10.34(4) through (6), projects approved by the Division of Marine Fisheries that are specifically intended to increase the productivity of land containing shellfish may be permitted. Aquaculture projects approved by the appropriate local and state authority may also be permitted.	The Project will not have any temporary or permanent adverse effects on shellfish productivity.
310 CMR 10.34(8): Notwithstanding the provisions of 310 CMR 10.34(4) through (7), no project may be permitted which will have any adverse effect on specified habitat of rare vertebrate or invertebrate species, as identified by procedures established under 310 CMR 10.37.	The Project will not have any temporary or permanent adverse effects on shellfish productivity.

Salt Marsh

The proposed project will result in 1,836 sf of impact to the salt marsh for the installation of the sheet pile-supported Resilient Riverwalk. This portion of the salt marsh is located below the existing boardwalk structure. A replication area is proposed which would replace 2,745 sf of salt marsh with a replication area, for a net increase of the resource area. Additional work in the salt marsh includes an area of 16,591 sf of proposed temporary impact for Phragmites treatment and Spartina alterniflora plugs.

Table 6-7: Compliance with Performance Standards for Salt Marsh (310 CMR 10.32)

SALT MARSH PERFORMANCE STANDARD	**COMPLIANCE WITH PERFORMANCE STANDARD**
310 CMR 10.32(3): A proposed project in a salt marsh, on lands within 100 feet of a salt marsh, or in a body of water adjacent to a salt marsh shall not destroy any portion of the salt marsh and shall not have an adverse effect on the productivity of the salt marsh. Alterations in growth, distribution and composition of salt marsh vegetation shall be considered in evaluating adverse effects on productivity. 310 CMR 10.32(3) shall not be construed to prohibit the harvesting of salt hay.	This project will result in a loss of 1,836 sf of salt marsh which is currently located under the existing boardwalk. A salt marsh replication area is proposed which would replace 2,745 sf of salt marsh for a net increase of the resource area. Proposed chemical treatment and plug plantings within the salt marsh will not have any adverse effects.
310 CMR 10.32(4): Notwithstanding the provisions of 310 CMR 10.32(3), a small project within a salt marsh, such as an elevated walkway or other structure which has no adverse effects other than blocking sunlight from the underlying vegetation for a portion of each day, may be permitted if such a project complies with all other applicable requirements of 310 CMR 10.21 through 10.37.	A shading analysis was conducted which indicated that the proposed replication area and existing salt marsh will experience negligible impact from shading. See Figure 6-2, Winter Solstice Shading Rendering (10 AM) and Figure 6-3, Summer Solstice Shading Rendering (10 AM).
310 CMR 10.32(5): Notwithstanding the provisions of 310 CMR 10.32(3), a project which will restore or rehabilitate a salt marsh, or create a salt marsh, may be permitted in accordance with 310 CMR 10.11 through 10.14, 10.24(8), and/or 10.53(4).	The Project will result in a net increase in the amount of salt marsh and an improvement to the salt marsh within the Wetlands Enhancements component of the scope of work.
310 CMR 10.32(6): Notwithstanding the provisions of 310 CMR 10.32(3) through (5), no project may be permitted which will have any adverse effect on specified habitat sites of Rare Species, as identified by procedures established under 310 CMR 10.37.	There are no rare species within the disturbed area; therefore, none will be impacted by the Project.

Land Under Ocean

Dredging and constructing the SSCF outfall will temporarily impact 207 sf and permanently impact 640 sf of the LUO. This impact area includes 613 cubic yards of material to be dredged, which will be disposed of at either a CDF or an off-site landfill depending on final sediment sampling and analysis results.

Table 6-8: Compliance with Performance Standards for Land Under Ocean (310 CMR 10.25)

LAND UNDER OCEAN PERFORMANCE STANDARD	COMPLIANCE WITH PERFORMANCE STANDARD
Improvement dredging for navigational purposes affecting land under the ocean shall be designed and carried out using the best available measures so as to minimize adverse effects on such interests caused by changes in …	The Project does not propose any dredging for navigational purposes.
Maintenance dredging for navigational purposes affecting land under the ocean shall be designed and carried out using the best available measures so as to minimize adverse effects on such interests caused by changes in marine productivity which will result from the suspension or transport of pollutants, increases in turbidity, the smothering of bottom organisms, the accumulation of pollutants by organisms, or the destruction of marine fisheries habitat or wildlife habitat.	The Project does not propose any dredging for navigational purposes.
Projects not included in 310 CMR 10.25(3) or (4) which affect nearshore areas of land under the ocean shall not cause adverse effects by altering the bottom topography so as to increase storm damage or erosion of coastal beaches, coastal banks, coastal dunes, or salt marshes.	The Project does not propose any dredging for navigational purposes.

LAND UNDER OCEAN PERFORMANCE STANDARD	COMPLIANCE WITH PERFORMANCE STANDARD
Projects not included in 310 CMR 10.25(3) which affect land under the ocean shall if water-dependent be designed and constructed, using best available measures, so as to minimize adverse effects, and if non-water-dependent, have no adverse effects, on marine fisheries habitat or wildlife habitat caused by …	The Project does not propose any dredging for navigational purposes.
Notwithstanding the provisions of 310 CMR 10.25(3) through (6), no project may be permitted which will have any adverse effect on specified habitat sites of rare vertebrate or invertebrate species, as identified by procedures established under 310 CMR 10.37.	There are no rare species within the disturbed area; therefore, none will be impacted by the Project.

Designated Port Area

Dredging and constructing the SSCF outfall will temporarily impact 207 sf and permanently impact 640 sf of the LUO within the Mystic River DPA. This impact area includes 613 cubic yards of material to be dredged, which will be disposed of at either a CDF or an off-site landfill depending on final sediment sampling and analysis results.

Table 6-9: Compliance with Performance Standards for Designated Port Area (310 CMR 10.32)

DESIGNATED PORT AREA PERFORMANCE STANDARD	COMPLIANCE WITH PERFORMANCE STANDARD
310 CMR 10.26(3): Projects shall be designed and constructed, using best practical measures, so as to minimize adverse effects on marine fisheries caused by changes in:	
(a) water circulation;	The Project will not alter water circulation.
(b) water quality, including, but not limited to, other than natural fluctuations in the levels of salinity, dissolved oxygen, nutrients, temperature or turbidity, or the addition of pollutants.	The Project will not alter water quality. The Project will decrease the amount of impervious surface, increase the number of native plantings, and address issues of erosion and sedimentation on slopes

DESIGNATED PORT AREA PERFORMANCE STANDARD	COMPLIANCE WITH PERFORMANCE STANDARD
	of the IER.
310 CMR 10.26(4): Projects shall be designed and constructed, using the best practical measures, so as to minimize, adverse effects on storm damage prevention or flood control caused by changes in such land's ability to provide support for adjacent coastal banks or adjacent coastal engineering structures.	The Project will not have any adverse effects on storm damage protection or flood control. The Project will improve existing flood protection through the storm surge barrier and SSCF and NbA to shoreline stabilization.

MITIGATION

Proposed mitigation on site includes salt marsh enhancements and a salt marsh wetland replication area. A Salt Marsh Wetland Replication Plan has been developed and is included in Attachment I, Salt Marsh Restoration Plan.

6.8 OPERATIONS, MAINTENANCE, AND ADAPTIVE MANAGEMENT

In order to address the adaptive management of invasive species on site, an Invasive Species Adaptive Management Plan has been developed and is included in Attachment M, Invasive Species Adaptive Management Plan. Additionally, the adaptive management program for the coastal bank within the Project Site is included in Attachment K, NbA Adaptive Management Plan.

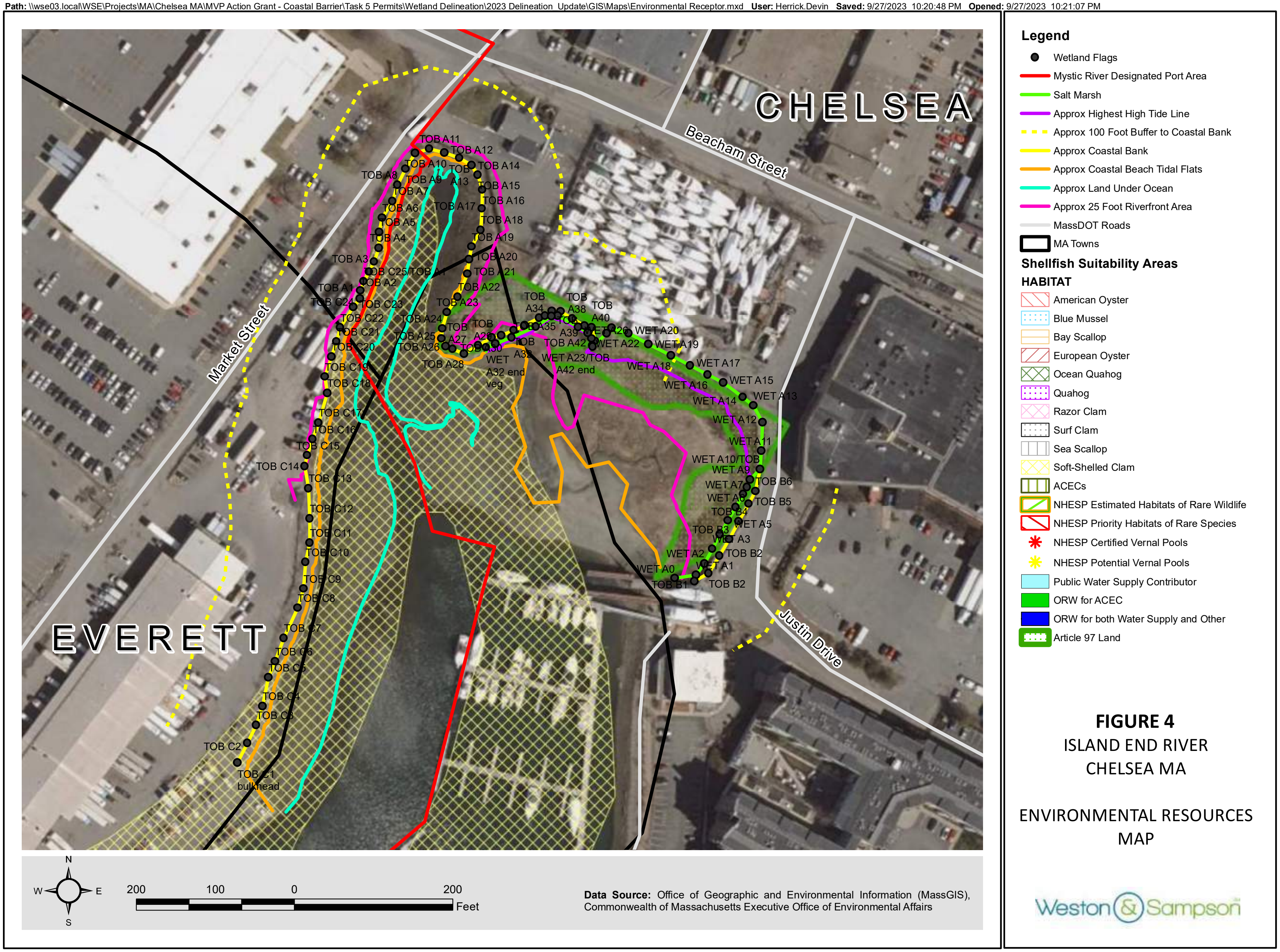


Figure 6-1
Wetland Resource Areas Map
Source: Weston & Sampson, Inc., 2023

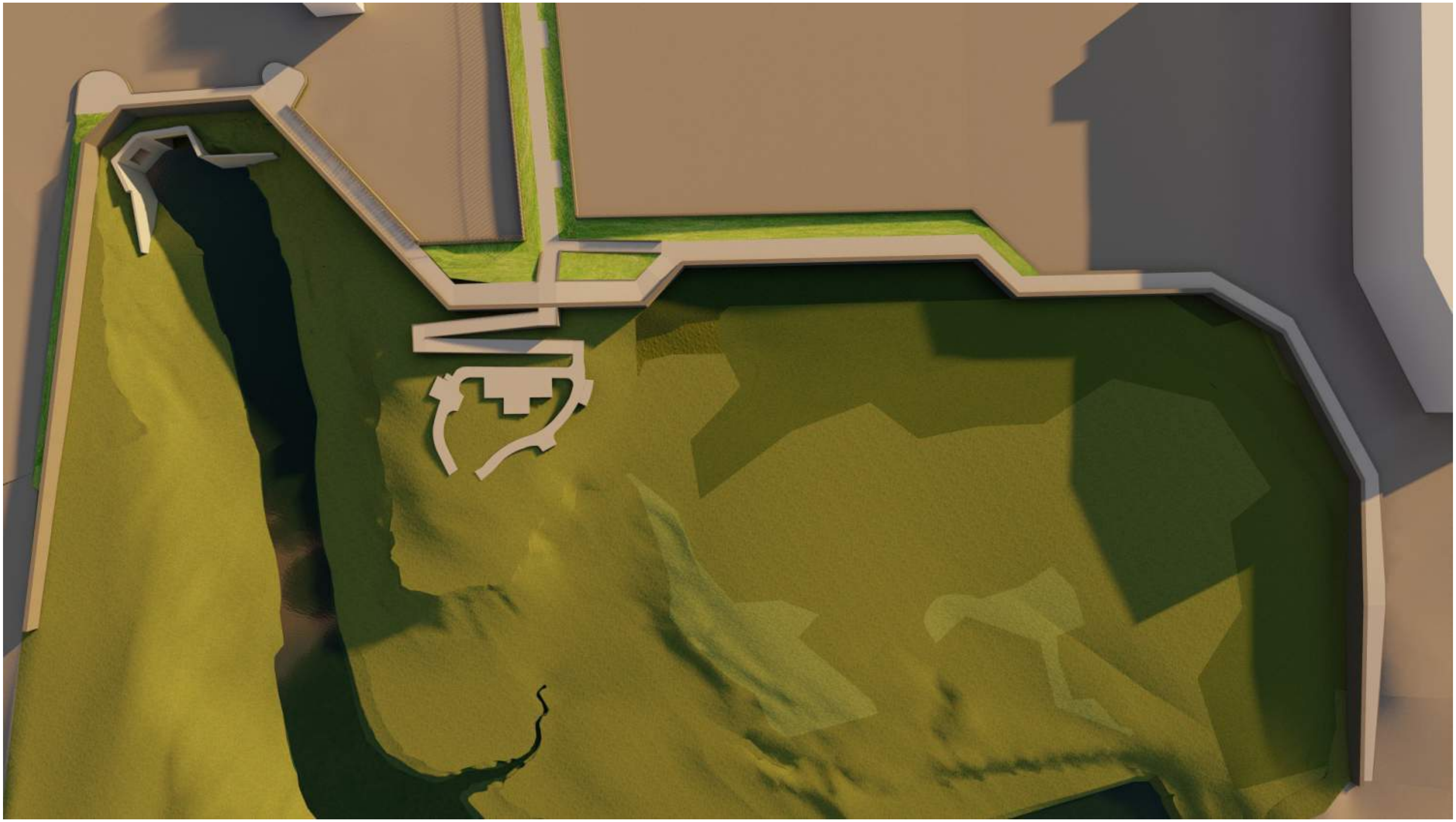


Figure 6-2
Winter Solstice Shading Rendering (10 AM)
Source: Weston & Sampson, Inc., 2023

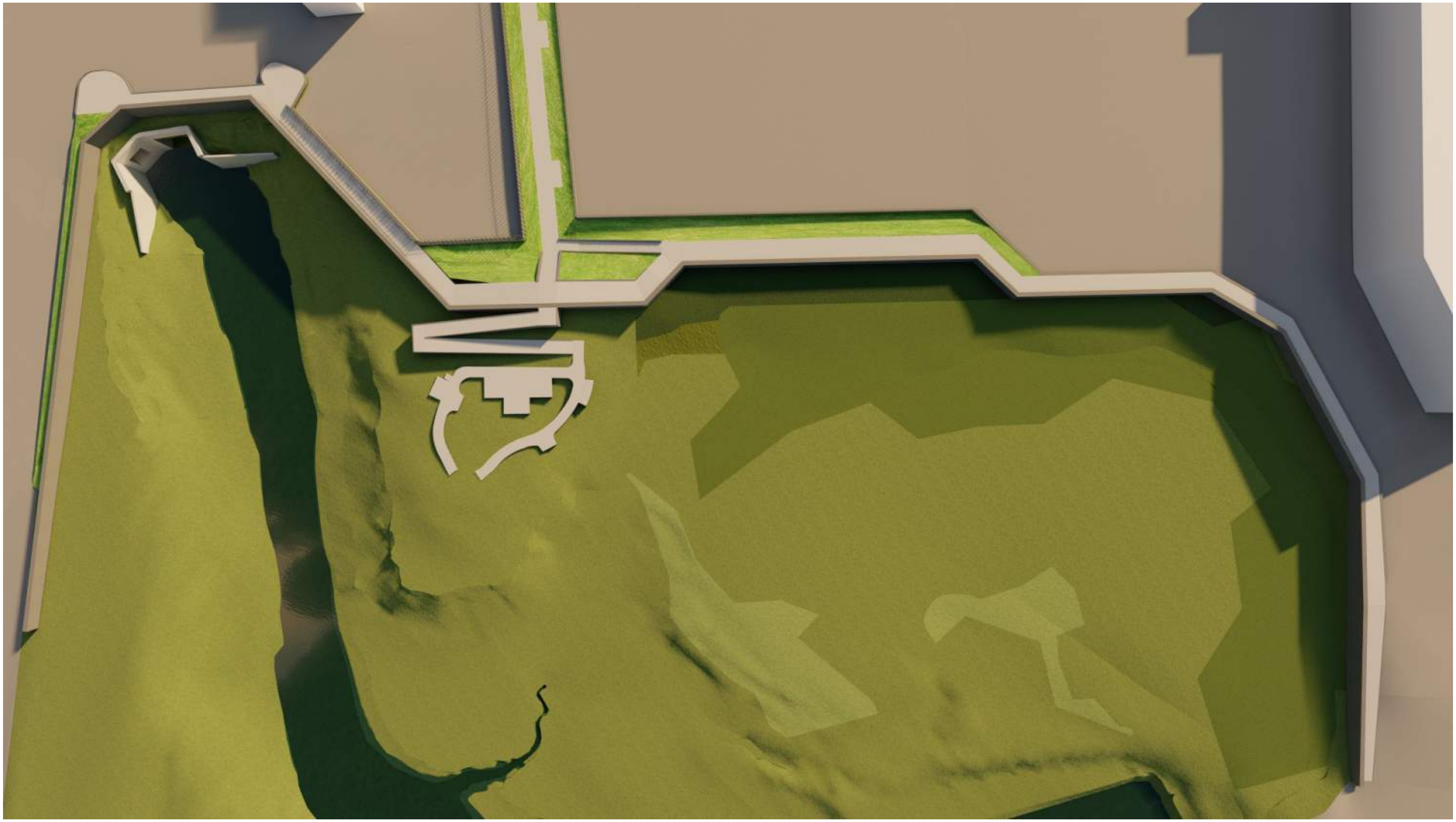


Figure 6-3
Summer Solstice Shading Rendering (10 AM)
Source: Weston & Sampson, Inc., 2023

Chapter 7

FLOOD RESILIENCY

CHAPTER 7: FLOOD RESILIENCY

7.1 INTRODUCTION

The regional Island End River Flood Resilience Project (the "Project") includes a linear foot storm surge barrier, an underground storm surge control facility ("SSCF"), various wetlands improvements and nature-based approaches ("NbA"), and community amenities including enhancements to Island End Park and a public riverwalk at the Island End River ("IER") in the Cities of Chelsea and Everett (the "Project Site"). The goal of the Project is to mitigate risk of coastal storm flowage in current and future conditions. This Project has selected for further review under the 2022 Federal Emergency Management Agency ("FEMA") Building Resilience Infrastructure and Communities ("BRIC") grant program to support construction funding starting in late 2025 and ending in late 2028. To support a potential federal funding grant award from FEMA, the Project will file a Conditional Letter of Map Revision submittal ("CLOMR") to document the Project's effectiveness to reduce currently mapped floodplain extents and depths within Middlesex and Suffolk County. This chapter discusses the existing coastal flooding conditions within the Project Site and evaluates the Project's performance in projected coastal storm events.

7.2 EXISTING COASTAL FLOODING CONDITIONS

Along with analyzing the Project's impact on stormwater and inland flood resiliency, the Project's performance against coastal flooding conditions was also reexamined based upon minor revisions to the Project alignment. The Project Site and significant assets within the Cities of Chelsea and Everett are located within the IER floodplain, as demonstrated in Figure 7-1, Critical Facilities and Infrastructure within Projected 2070 Floodplain. The Project Site also includes the footprint of the historic tidal IER, shown in Figure 7-2, Historical Island End River Boundaries, indicating low-lying areas that were previously tidal flats and salt marsh. In addition to the low-lying topography, the IER is located downstream of the Amelia Earhart Dam ("AED") and as such, is exposed to the full tidal range of Boston Harbor, coastal storm surge, and associated coastal processes (waves, wave setup, etc.) during coastal storm events. An elevation model for the floodplain is shown in Figure 7-3, Island End River Floodplain Elevation Model. Therefore, the region is prone to significant coastal-based flooding during coastal storms and during normal perigean spring tides ("king tides"). For example, the 2018 nor'easter events resulted in significant coastal flooding throughout the entire IER region. See Figure 7-4, January 2018 Flood in the Island End River District. Coastal flooding in the area is a regular occurrence during higher-than-normal water levels, not just storm events, and the risk of flooding is increasing under changing climate conditions.

The extent of flooding predicted under present day and future conditions can be detailed through various coastal flood mapping available for the region. The Federal Emergency

Management Agency ("FEMA") FIRM provides one view of potential coastal flooding extent by identifying areas that require flood insurance. As shown in Figure 18, FEMA FIRM 25025C0018J and 25017C044E, the currently effective FEMA FIRM for the region is a mix of the 2010 mapped flood area for Everett and the 2016 mapped flood area for Chelsea. Figure 1-19, Pending FIRM for the City of Everett, provides the preliminary FEMA FIRM for Everett rereleased in 2023, which has not yet been accepted as effective; however, is much more representative of the current coastal flooding risk in the area.

In addition, results from the Massachusetts Coast Flood Risk Model ("MC-FRM"), which provides a full physics-based approach to coastal flooding under changing climate conditions, indicates the IER area has significant inundation risk today and increasing risk under projected climate change conditions. The MC-FRM incorporates the state standard sea level rise conditions over time as presented by Massachusetts Coastal Zone Management and Resilient MA. Tropical storm intensification due to climate change is also incorporated within the MC-FRM. The model has, and is currently, being used for numerous coastal planning and design projects throughout Massachusetts and is recommended by the Commonwealth of Massachusetts Climate Resilience Design Standards as the basis for resilient coastal design.

Figure 7-5 presents MC-FRM annual coastal flood exceedance probabilities for 2030, 2050, and 2070 climate years using state standard sea level rise projections, which provide a reasonable representation of the upper limit of potential coastal flood risk (sea level rise at the 99.5% not to exceed level). These maps indicate the annual exceedance probability for the IER area. For example, in 2030 the results indicate there is approximately 5-10% annual exceedance probability (10 to 20 year return period) of flooding for much of the area. By 2050, the annual exceedance probabilities increase to 50-100% (1 to 2 year return period), indicating that flooding of the IER area from coastal waters would be expected to occur every year. These projections show a conservative estimate of the potential coastal flood risk in the future; however, the results do indicate the severe risk levels for coastal flooding do exist for the IER area.

Under existing conditions, the coastal flooding conditions are significant today, and that flooding condition is projected to get substantially more severe in the future. The extent of the coastal flooding aligns with the historic estuary, tidal flats, and wetland areas that had existed in the early 19th century. The Resilient MA Team ("RMAT") Climate Resilience Design Tool (the "RMAT Tool") output identifies the risk of sea level rise and storm surge, precipitation and urban flooding, and urban heat on the Project Site under existing conditions. The RMAT Tool outputs are included within Attachment L, Projected Coastal Flood Maps and RMAT.

7.3 POST-DEVELOPMENT COASTAL FLOODING CONDITIONS

To verify the performance of and assess potential impacts associated with the Project, the MC-FRM was utilized to simulate key, representative coastal flood events. In addition to focusing on the overall performance of the proposed adaptation, this evaluation also included influences of the proposed design on flood extents, flood depths, wave conditions, and velocities at both the site, and adjacent properties. The goal of this hydrodynamic modeling effort is to gauge the performance of the proposed design and to determine if there are significant adverse effects on neighboring properties under present day and changing climate conditions. The results presented herein provide the detailed assessment of the proposed flood control barrier within the MC-FRM overall framework, which is a high-resolution model of coastal flood dynamics. As the design process advances, refined sub-modeling within MC-FRM will continue to be conducted to provide further design details as needed. The Project, as shown in the figures referenced throughout this section, was integrated into the MC-FRM domain. In addition to the alignment itself, specific details on the alignment (slopes, heights, etc.) were included into the model as well.

7.3.1 PERFORMANCE MODELING SCENARIOS

The MC-FRM provides a probabilistic distribution of water surface elevations and waves for all coastal locations throughout Massachusetts based on thousands of storms. From these thousands of storm events, individual storms corresponding to specific return-periods water surface elevations were selected to evaluate the performance of the Project based on critical flood levels and/or time periods that represent key tipping points for flooding risk. For this modeling effort, two representative storms, at two different future climate horizons were simulated for existing conditions (existing elevations) and proposed conditions (with the proposed development constructed) withing the MC-FRM framework.
The two specific storm return period cases simulated were:

1. An approximate 1% annual exceedance probability (100-year return period) storm event in 2050
2. An approximate 1% annual exceedance probability (100-year return period) storm event in 2070

These two events represent targeted future storm levels for design of the Project. That is, the goal of the Project is to provide coastal flood protection up to these levels.

The peak stillwater levels, where no current or waves are observed, at this location associated with these storm events are listed in Table 7.1, Peak Water Levels Associates with 2050 and 2070 Storm Events. These values represent the peak stillwater level for these events and are not necessarily equivalent to the annual exceedance probability levels associated with the overall distribution determined from the modeling of thousands of storm events.

Table 7-1 - Peak Water Levels Associated with 2050 and 2070 Storm Events

Storm Event (Annual Exceedance Probability)	Climate Horizon	Peak Stillwater Level (ft, NAVD88)
1%	2050	12.0
1%	2070	13.6

7.3.2 CHANGES TO EXTENT OF COASTAL FLOODING

Flooding extents within the IER area were analyzed with and without the Project in place. Figure 7-6 presents the coastal flood extent under existing and proposed conditions for the representative 1% annual exceedance probability (AEP) storm in 2050. The results with the proposed barrier indicate that during the 2050 1% storm event, flooding from the Island End River flood pathway is fully mitigated. As such, the Project elements succeed at intercepting a significant flood pathway for both Chelsea and Everett for a projected 2050 storm. The results also were assessed to determine if the Project redirected any of the flood water to other areas, resulting in increased flooding in areas that were not flooded under existing conditions. Results indicated that the Project did not redirect flood waters to any adjacent areas that were not already flooded during existing conditions.

Figure 7-7 presents the coastal flood extent under existing and proposed conditions for the representative 1% annual exceedance probability (AEP) storm in 2070. For this scenario, the proposed barrier at IER has mitigated the flood pathway starting at the headwater of IER; however, flanking and overtopping of the areas in the vicinity of the Ameila Earhart Dam (AED) provide significant flood pathways that introduce enough coastal flood volume to inundate areas intended to be kept from flooding by the Project. Therefore, by 2070, the Project will no longer fully mitigate coastal flooding up to a 1% AEP level without interventions at/around the AED. The Project still may adequately function for more frequent (larger AEP) storm level events up to and beyond 2070. The Project does reduce the total volume of water entering the area during this event, as shown by the reduced extent of flooding for the region directly upland of the IER.

To ensure that the Project was functional in a 2070 1% AEP condition, a secondary model simulation was conducted that included projects intended to mitigate the other flood pathways near the AED. Some of these projects are already underway. For example, the Massachusetts DCR is conducting studies and designs to mitigate the flanking and overtopping of the AED. As such, it is a reasonable assumption that these additional flood pathways would be mitigated by 2070. Figure 7-8 presents the coastal flood extent under existing) and proposed conditions for the representative

1% annual exceedance probability (AEP) storm in 2070 with the other flood resiliency projects in place. These results indicate that the proposed mitigative strategy at IER does effectively contribute to the reduction of the flood risk in this area under a 2070 1% AEP conditional storm. Overall, the proposed adaptation does effectively perform at mitigating the flood risk in the area in concert with other regional flood resiliency projects. There is no redirection of flood extent into other areas or neighboring properties caused by the inclusion of the proposed adaptation measures for all cases evaluated.

7.3.3 CHANGES TO DEPTH OF COASTAL FLOODING

Potential changes to flood depths within the study area and on adjacent properties were analyzed with and without the Project in place. Figure 7-9 presents the depth of flooding (in feet) associated with the 2050 1% AEP storm under existing conditions compared to the 2050 1% AEP storm with the Project in place. Under existing conditions, a large area would be flooded with depths reaching up to 4 feet and most of the area flooded between 2-3 feet. For the representative 2050 1% AEP event, the Project eliminates flooding for the region landward of the barrier completely, and therefore coastal based flood depths are non-existent in this area. Additionally, the model results indicate that there is no change in the flood depths on adjacent properties.

Figure 7-10 provides the depth of flooding in the area for a representative 2070 1% AEP storm under existing conditions compared to 2070 1% AEP storm with the Project in place. Results indicate significant flooding throughout the area under existing conditions, with depths exceeding 4 feet throughout a majority of the region. Coastal-based flood waters enter the area from both the IER flood pathway, as well as from other areas (e.g., flood pathways surrounding the AED). With the Project in place, coastal waters flood behind the Project via other flood pathways. This is not due to flanking or overtopping the Project's flood barrier. These results also show that the Project does reduce the volume of flood waters that enters the area, which can be So while, the IER is no longer effective at complete mitigation of flooding in the area by itself (other mitigation projects well) for this level storm, the Project does reduce the extent of flooding in the area and the depth of flooding throughout the area. For example, most of the depths are now between 1-3 feet rather than greater than 4 feet (a reduction of 2-3 feet throughout the area). As was the case for the representative 2050 1% AEP storm, there is no change in the flood depths on adjacent properties.

Figure 7-11 shows the results of flooding in the area for a representative 2070 1% AEP storm event under existing conditions compared to flooding from such events with the Project in place and the other flood pathways (primarily from the AED area) mitigated. These results show that when combined with those additional measures, the Project does adequately function at eliminating the coastal flood risk in the intended area.

7.3.4 CHANGES TO OVERLAND VELOCITIES OF COASTAL FLOODING

As flood waters flow inland and interact with infrastructure (both existing and proposed), various patterns and potential redirection of flow can occur. The Project, while eliminating flow into the region, may also potentially alter the flow patterns and modify flow velocities in the area. To assess the impacts of the Project on these overland flow conditions, velocity magnitudes at the peak of the 1% AEP storm events were analyzed under 2050 and 2070 sea level rise conditions, on adjacent flooded properties seaward of the Project Site.

Coastal flood water velocity magnitudes (maximums during the passage of the storm) were subtracted from existing conditions flood water velocity magnitudes (maximums during the passage of the storm) to identify changes in velocity that may occur due to the presence of the proposed adaptation measures. Results from the model are presented in Figure 7-12 for a 1% AEP storm event in 2050 and in 2070 (with mitigation at the AED included), respectively. Overall, the velocity changes throughout the area are minor. However, there is a velocity increase of approximately 1 ft/s for the proposed conditions compared to existing conditions. This increase in velocity occurs in both the 2050 and 2070 1% AEP events, at the point where the Everett alignment turns inland and parallels the 202 Rover Street property, before crossing Commercial Street. The magnitude of the velocity went from approximately 0.2 feet per second in this area under existing conditions to approximately 1.3 feet per second in this area for proposed conditions. These increases are similar in both the 2050 and 2070 1% AEP storm events. At this location there are ephemeral mounds of materials and supplies (e.g., sand, gravel), as well as infrastructure (buildings and storage tanks) located directly adjacent to the adaptation barrier that create a slightly narrower area of flow between the physical barriers (contraction flow) once the barrier is in place. However, this reduction in width is only approximately 10-15 feet (40 feet with to approximately 27 feet width) in this area as there is already an existing building at this location that may already cause flow channelization. While it is unlikely that this magnitude of increase (approx. 1 foot per second) will result in any significant erosion or scour concerns as these velocities occur primarily in impervious and heavily compacted surfaces, this area may warrant further investigated in a refined modeling effort that will include buildings and other elevational anthropogenic features to identify influences on velocities in this area. This would be conducted in parallel with further design phases to ensure flow velocities during the flood events are not exacerbated.

7.3.5 WAVE IMPACTS

The Project has also been evaluated to identify any potential impacts on the storm waves in the region. Although these waves are relatively small, processes such as wave overtopping and reflection may influence the area differently than under current conditions and have been analyzed further. While the storm surge stillwater surface elevation is relatively consistent spatially within the IER water body, waves are spatially variable throughout the water body. Due to this spatial distribution, wave overtopping and reflection will vary along the Project. Significant wave heights are relatively small, even during storm events, within IER. Along most of the barrier, waves are approximately 1 foot or smaller at the barrier even during a 2070 1% AEP event. The southernmost corner of the Project Site; however, has a marked increase in the experienced wave heights compared to the rest of the alignment. This area experiences a longer fetch distance with deeper water from the Mystic River, and therefore, larger waves are generated in this area, with storm waves approaching 2.5 feet.

Wave overtopping occurs when the waves approaching land impact the shoreline, natural feature, or anthropogenic structure. When the waves impact the slope, water is propelled upward causing some portion of the water in the wave to impact the land behind the structure. Overtopping is quantified as the volumetric flow rate of water over shore barrier crests per unit length along the shore barrier. In many cases, this results in a small amount of water that is sprayed over the crest of the shoreline peak (dune, seawall, etc.). However, large overtopping rates can produce unsafe conditions and result in damage to the coastal structure and landward buildings. Rates of overtopping can be used to determine potential safety and damage concerns. To calculate the overtopping rates along the proposed adaptation alignment structure, equations from the Eurotop Manual (Van der Meer et al., 2018) were utilized.

For most sections of the Project, there is minimal or insignificant overtopping. However, during larger storm events in 2070 (1% AEP), overtopping at the southernmost corner of the Project Site, overtopping rates can become sufficiently high to produce damage and safety concerns on the landward side of the Project. Therefore, this section of the barrier will be constructed to higher design elevations and will incorporate options for flexible/adaptable strategies to be enhanced in the future if necessary.

Wave reflection calculations were also completed for the Project. Results indicate wave transformations and reflections along the proposed barrier remain relatively insignificant during most storm conditions. Most of the sections of the proposed barrier have small incoming waves, and thus small reflection effects. Due to the short period nature of the wind-generated waves, any reflected wave energy remains adjacent to the proposed barrier and would potentially only induce scour adjacent to the barrier and not transform across the estuary to other areas or properties. In the area where reflected energy is highest and may cause scour and erosional concerns (southernmost corner of the barrier) the wall is set back from the shoreline and the reflected energy occurs on the impervious upland areas adjacent to the barrier. As such, no significant erosion is expected.

7.3.6 FLOOD IMPACTS ASSOCIATED WITH THE STORM SURGE CONTROL FACILITY

Much of the Project consists of a structure intended to keep water out of the lower lying upland areas, both under future sea level rise conditions and coastal storms. However, there is also a storm surge control facility (SSCF) that is intended to let normal tidal conditions through a portion of the barrier into a small drainage channel that currently experiences tidal exchange. See Figure 7-1, Island End River Floodplain Elevation Model. The SSCF is positioned at the current outfall that conveys flow not only the drainage channel, but also for the piped infrastructure stormwater system. Under present day normal tidal conditions, this system will operate like the existing outfall, allowing coastal waters into and out of the drainage channel and areas of the stormwater system that do not have existing check values or tide gates. However, during uncommonly higher tides and storm events the SSCF will close and keep the coastal waters out of the upland areas; thereby creating a completely closed barrier to coastal waters. A preliminary review of low-elevation surcharge sites observes that critical food distribution facilities are first subject to flood risk around elevation 6.0′ NAVD88; that they are subject to moderate operational impacts and equipment risk beginning around elevation 7.0′ NAVD88; and that they are subject to significant operations and infrastructure risks (including viability of site for operations, loss of produce associate with delays, worker safety risks, and equipment risks) around elevation 7.5′ NAVD88. Topographic elevations for the area and the drainage channel are shown in Figure 7-1. As such, for the purposes of this analysis, the SSCF closure to coastal waters was set at 7.0 feet NAVD88.

The evaluation of the performance of the SSCF in terms of flooding implications needs to consider a variety of situations related to coastal flooding, including present day and future conditions. A comparison between existing conditions and the conditions with the Project in place are summarized herein to identify if the proposed infrastructure would impact existing flooding conditions for each situation.

The frequency of closure is an important aspect to consider in terms of the overall functionality of the SSCF over time. Details in the closure frequency through time for non-storm conditions are presented in Chapter 8, Infrastructure and Transportation, Table 8-1, Estimated Gate Closure Frequency. By 2050, the SSCF will be closed two times a day for over an hour during each occurrence, and longer than this for certain portions of the tidal cycle. This data indicates that sometime between 2030 and 2050 the stormwater system may require a pump station to adequately handle stormwater flows, at least when applying the state standard sea level rise projections. If the sea level rise does not advance as swiftly as projected, the overall functionality of the system may last longer prior to needing a pump system. Therefore, the comparison between existing conditions and the conditions with the Project in place focuses on the present day and near-term (2030 to 2050) timeframe in the following scenarios:

- **Sunny day, normal tidal conditions** – The current outfalls at the head of the IER consists of two individual arch culverts with invert elevations of approximately -7.2 to -7.5 feet NAVD88 (Market Street Culvert outfall) and -4.0 to -5.6 feet NAVD88 (Beacham Street Drain outfall). The current invert elevations span a range of values due to variations in sedimentation that exists at the outfalls. It is likely that this may fluctuate seasonally or following storm events (both high discharge and/or coastal storm events). Under existing conditions, coastal tides are allowed to enter the system and would begin to flood upland areas when reaching an elevation of approximately 6.5 feet. The SSCF has a proposed invert of -7.5 feet NAVD88 and an obvert of 8.0 feet NAVD88, so has a similar invert and improved drainage capacity compared to existing conditions. For the proposed conditions, the SSCF would close at around 7.0 feet NAVD88 and limit tide based coastal flooding in the upland area compared to existing conditions. As such, the proposed conditions represent an improvement in flood management.

- **Coastal storm conditions without significant precipitation –** Under existing conditions, the entire upland area would flood significantly in a coastal storm event. The Project mitigates this coastal flooding and the SSCF, which would be closed in this situation, does not change these results presented herein. Therefore, the proposed conditions represent a drastic improvement in flood management for this scenario both currently and in the future.

- **Precipitation events with normal tidal conditions** – The "Island End River Flood Mitigation Needs Analysis" study conducted on behalf of the Proponents in April 2022 presented several potential scenarios of precipitation events and the flooding that would occur under existing conditions. Precipitation-based flooding does occur throughout the entire region due to poor drainage and stormwater system capacity limitations under current conditions. The extent and depth of flooding will get worse in 2030 due to the unimpeded tidal levels entering the stormwater system and drainage channel without the Project. The proposed SSCF can only reduce these flooding levels upstream by removing the coastal volume contribution in the inland drainage system. The tailwater (downstream) conditions remain the same for both existing and proposed conditions since the SSCF combination gate will allow gravity-based flow to discharge like existing conditions. By within the projected 2030-2050 time horizon, a pump station may be required (either with or without the proposed SSCF in place) to discharge excess stormwater that would be inhibited by downstream elevated tidal conditions and limited drainage times.

- **Combination events of precipitation coupled with coastal storm surge** – Under existing conditions, the extent and depth of coastal flooding will dominate the flood levels under both present day and near-term climate change conditions. Adding precipitation to the volume contribution will not make a significant difference in the flooding, as demonstrated in previous hydrologic and hydraulic ("H&H") studies conducted for the Proponents. With the Project in place, the coastal flood volume will no longer be able to contribute to the overall flooding in the area and precipitation will also not be allowed to drain during the coastal surge event. However, this precipitation-based volume also had nowhere to go under existing conditions. Therefore, the removal of the coastal flooding represents a significant improvement relative to existing conditions. While the overall flooding will be reduced, the precipitation-based flooding will still exist in the area at similar levels to the precipitation only based conditions, but to a lesser degree than existing conditions since the SSCF will relieve volume from the system.

In conclusion, the SSCF will not exacerbate inland flooding conditions, even when the control gates area closed. Its gates are only actuated when tidal conditions exceed high tide conditions, where the Market Street Culvert would typically be surcharging by seawater in existing conditions and not operating in a free-flowing drainage condition. For a more detailed surcharge analysis for the SSCF, see Chapter 8, Section 8.7.1. For the inland drainage channel specifically, the flood risk is reduced in all scenarios. For additional stormwater considerations, see Chapter 8, Infrastructure and Transportation.

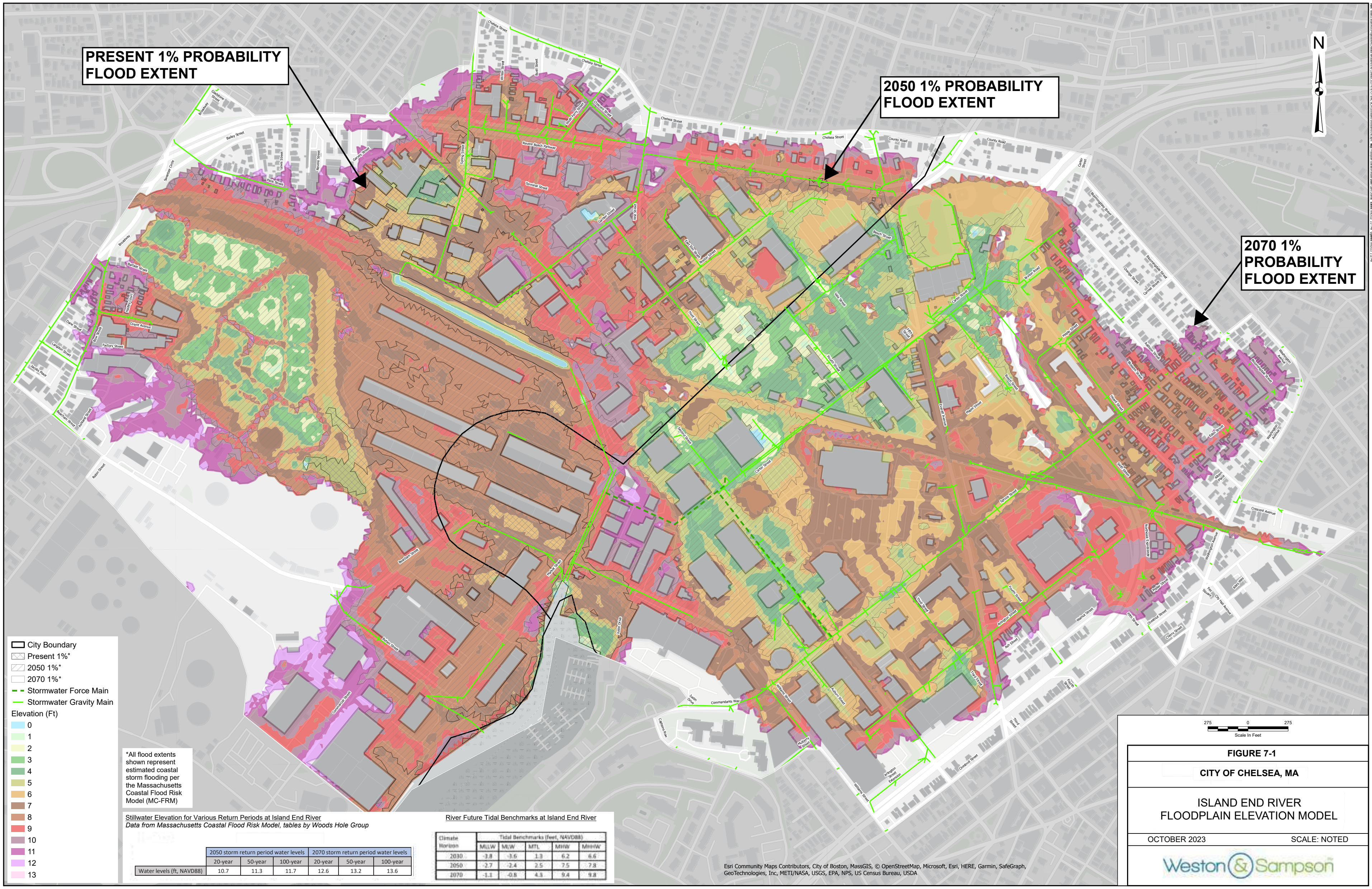
7.4 CONCLUSION

The Project Team modeled performance of the proposed system (using MC-FRM and attributes of the proposed storm surge barrier intervention) and concluded that the project effectively eliminated coastal storm surge flooding for the 2050 1% probability coastal storm event (closed key flood pathway) and that the Project effectively performs for the 2070 1% coastal storm event, but to be fully effective needs to be combined with other flood mitigation solutions around the AED. AED improvements are currently being designed as part of a separate program led by a state agency. Outputs from flood modeling are provided in Attachment L, Projected Coastal Flood Maps and RMAT. The Project independently mitigates coastal storm surge flood risk in approximately 300 acres of the City of Chelsea and approximately 200 acres of the City of Everett over project lifecycle.

To support a potential federal funding grant award from FEMA, the Project will file a Conditional Letter of Map Revision submittal ("CLOMR") to document the Project's effectiveness to reduce currently mapped floodplain extents and depths within Middlesex and Suffolk County. During this submittal, the existing inland drainage channel will be evaluated by FEMA as an inland riverine environment for any localized remaining flood vulnerabilities and remapped accordingly. The Project will ultimately reduce the overall flood risk (from both precipitation and coastal sources) throughout this 500-acre floodplain as detailed above.

Figure 7-1
Critical Facilities and Infrastructure within Projected 2070 Floodplain
Source: Fort Point Associates, Inc., 2022

Figure 7-2
Historical Island End River Boundaries
Source: Woods Hole Group, 2022



	2050 storm return period water levels			2070 storm return period water levels		
	20-year	50-year	100-year	20-year	50-year	100-year
Water levels (ft, NAVD88)	10.7	11.3	11.7	12.6	13.2	13.6

Climate Horizon	Tidal Benchmarks (feet, NAVD88)				
	MLLW	MLW	MTL	MHW	MHHW
2030	-3.8	-3.6	1.3	6.2	6.6
2050	-2.7	-2.4	2.5	7.5	7.8
2070	-1.1	-0.8	4.3	9.4	9.8

Figure 7-3
Island End River Floodplain Elevation Model
Source: Weston & Sampson, Inc., 2023

Figure 7-4
January 2018 Flood in the Island End River District
Source: Greg St. Louis, 2018; GreenRoots, 2018

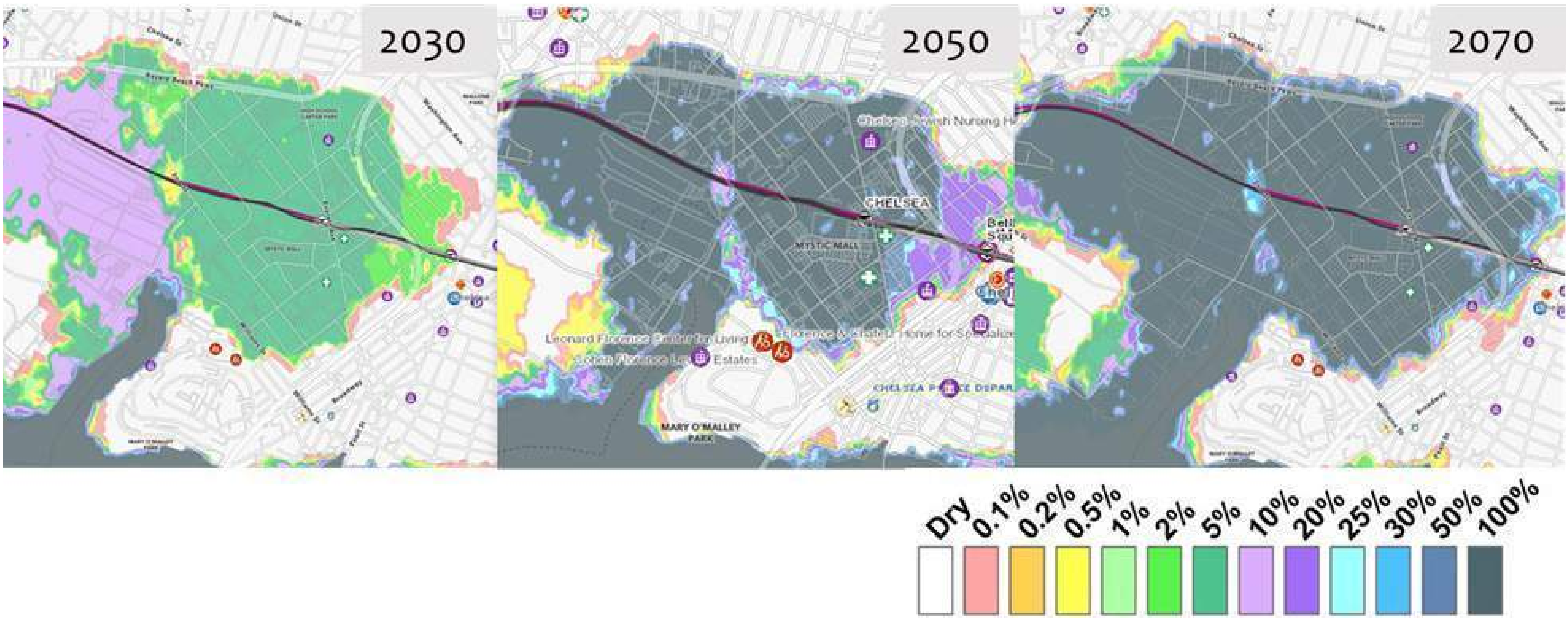
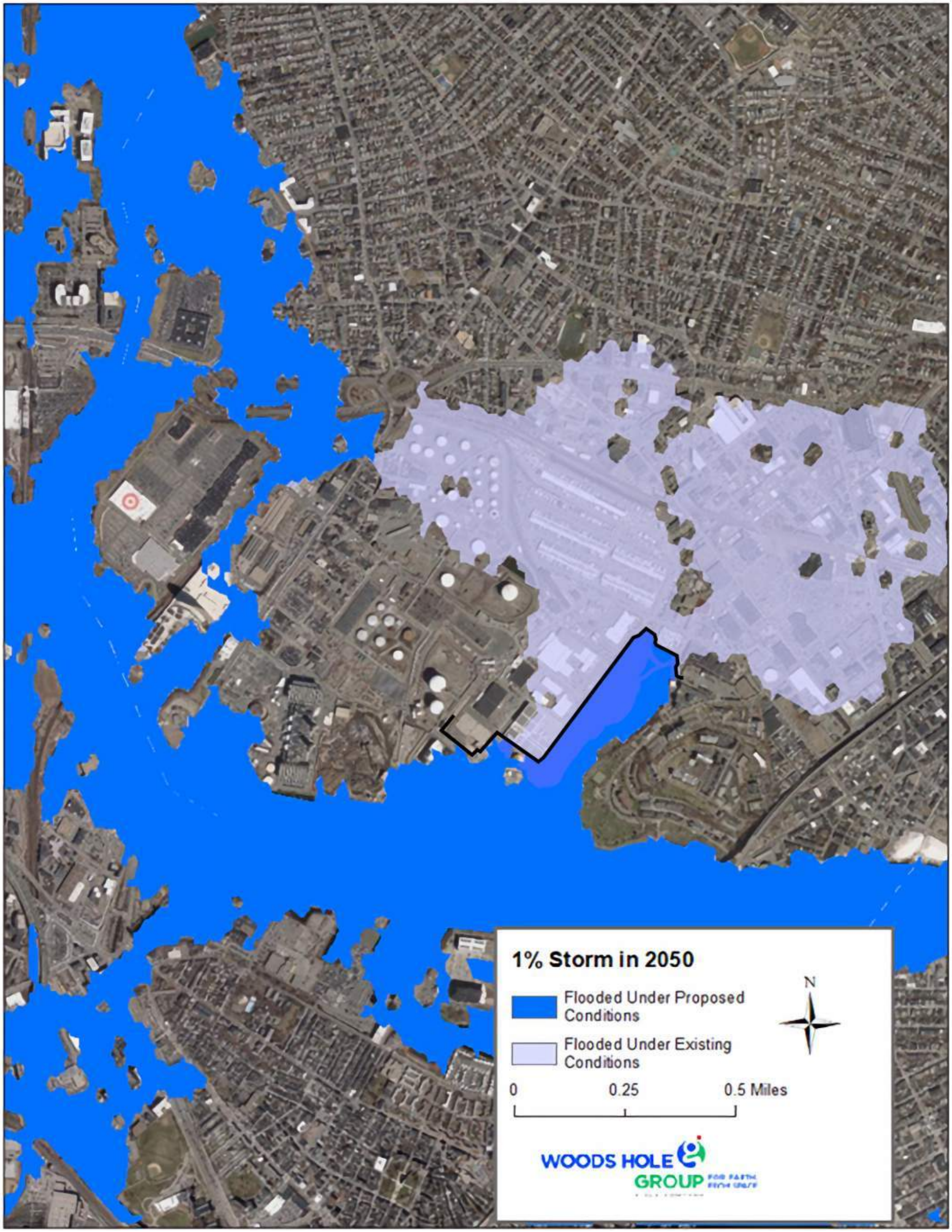
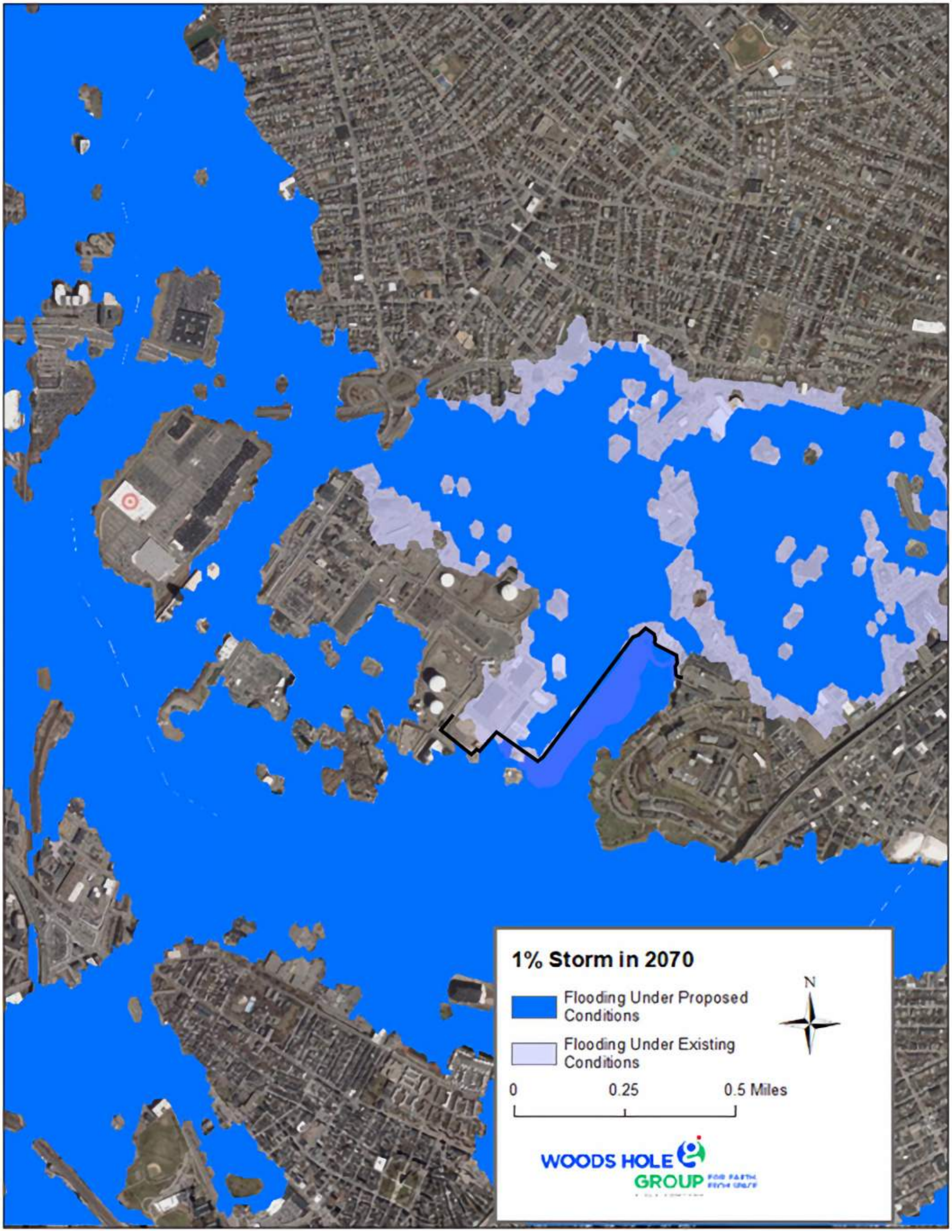


Figure 7-5
MC-FRM Annual Coastal Flood Exceedance Probabilities for 2030, 2050, and 2070
Source: Woods Hole Group, 2023



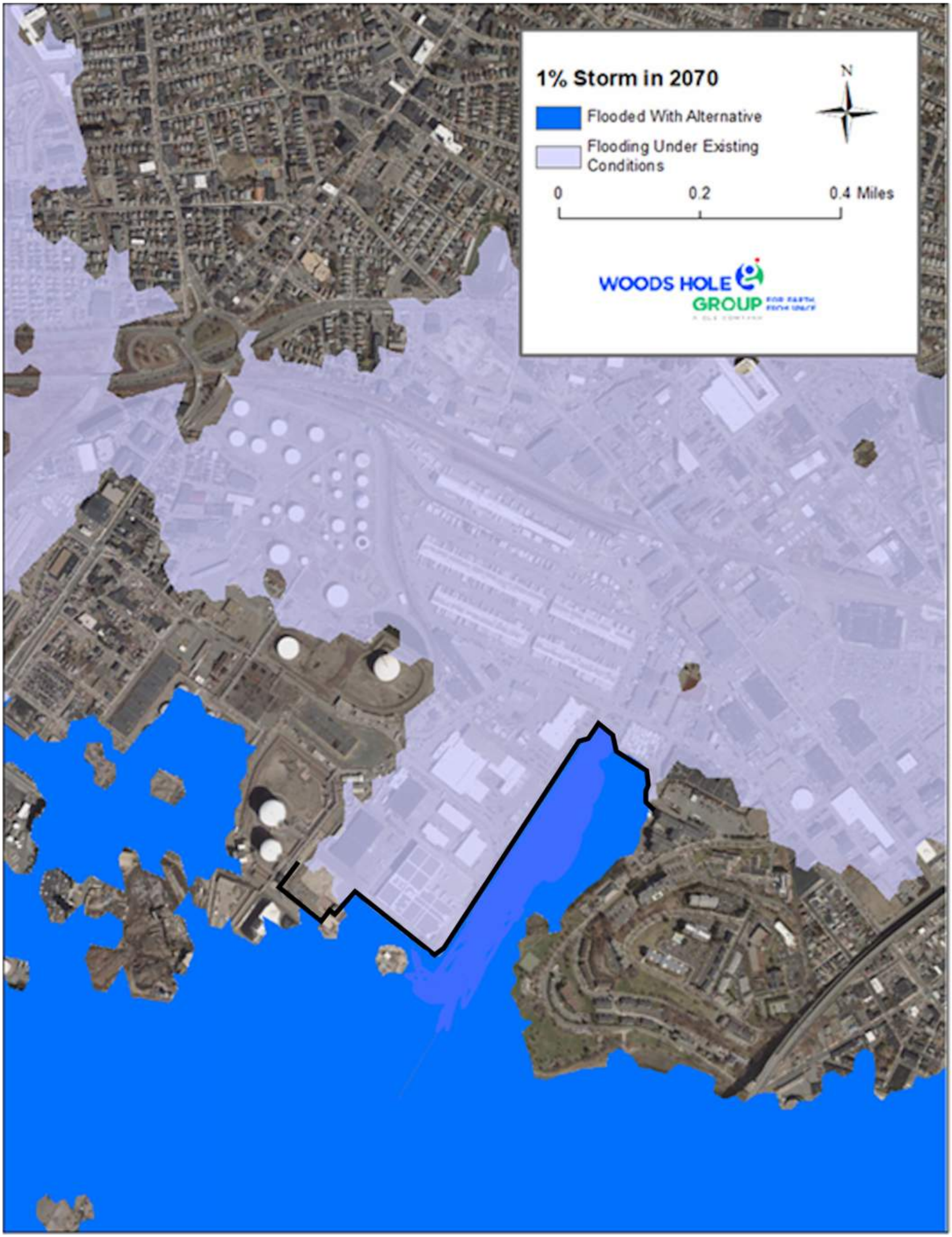
Chelsea, MA
Everett, MA

Figure 7-6
Existing and Proposed Flood Extents during a 1% Annual Exceedance Probability Storm in 2050
Source: Woods Hole Group, 2023



Chelsea, MA
Everett, MA

Figure 7-7
Existing and Proposed Flood Extents during a 1% Annual Exceedance ProbabilityStorm in 2070
Source: Woods Hole Group, 2023



Chelsea, MA
Everett, MA

Figure 7-8
Existing and Proposed Flood Extents during a 1% Annual Exceedance Probability Storm in 2070 with Amelia Earhart Dam Project
Source: Woods Hole Group, 2023

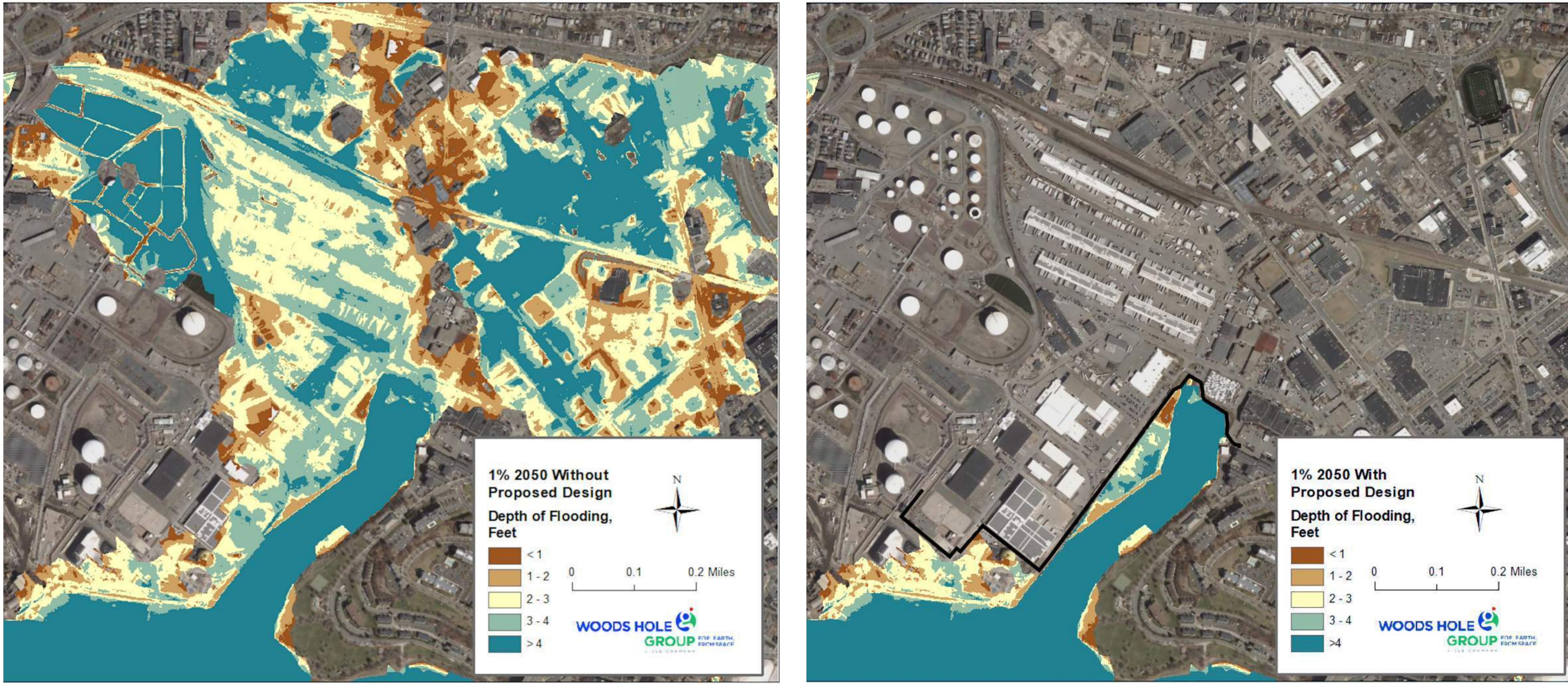
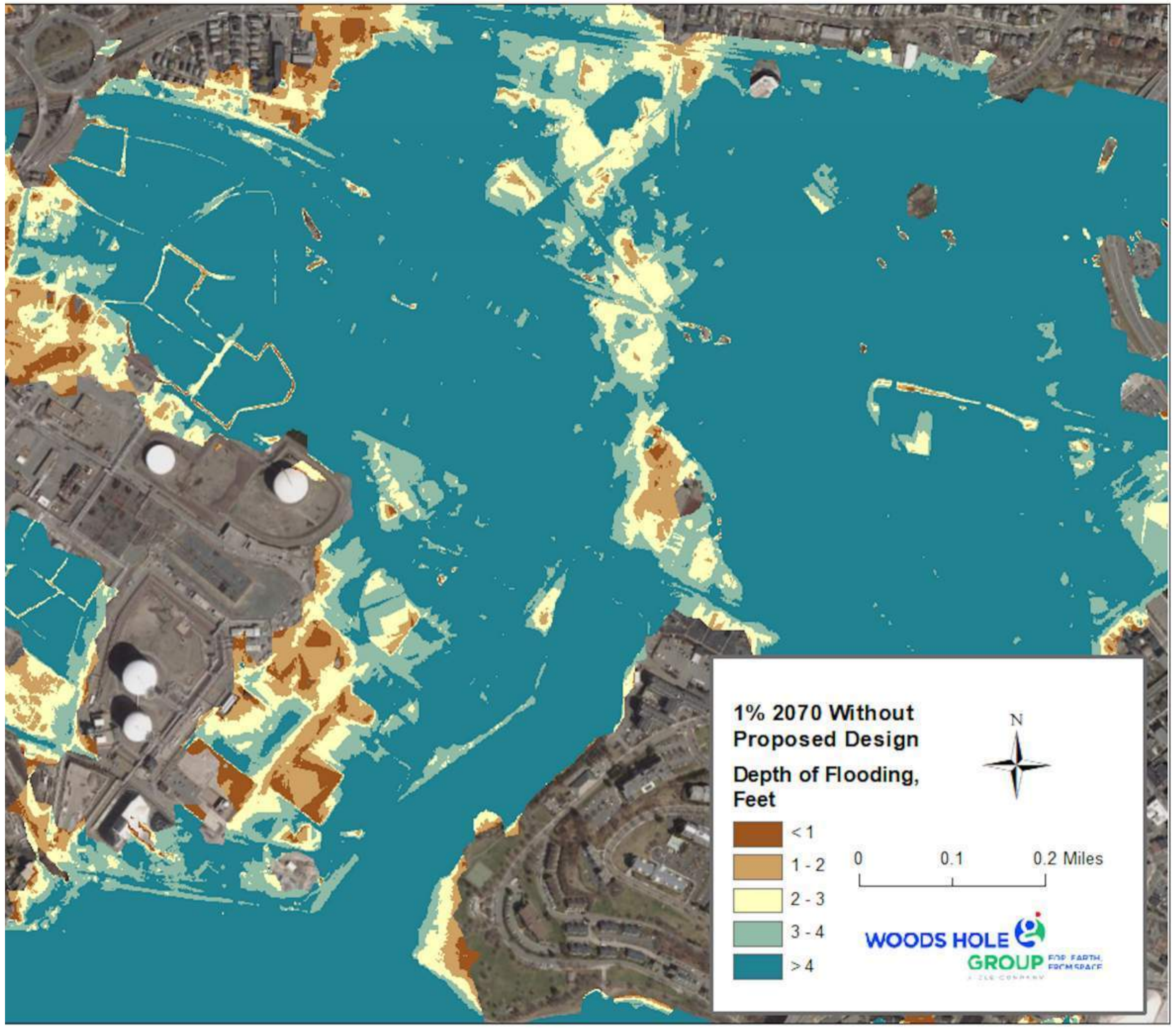


Figure 7-9
Existing and Proposed Flood Depths during a 1% Annual Exceedance Probability Storm in 2050
Source: Woods Hole Group, 2023



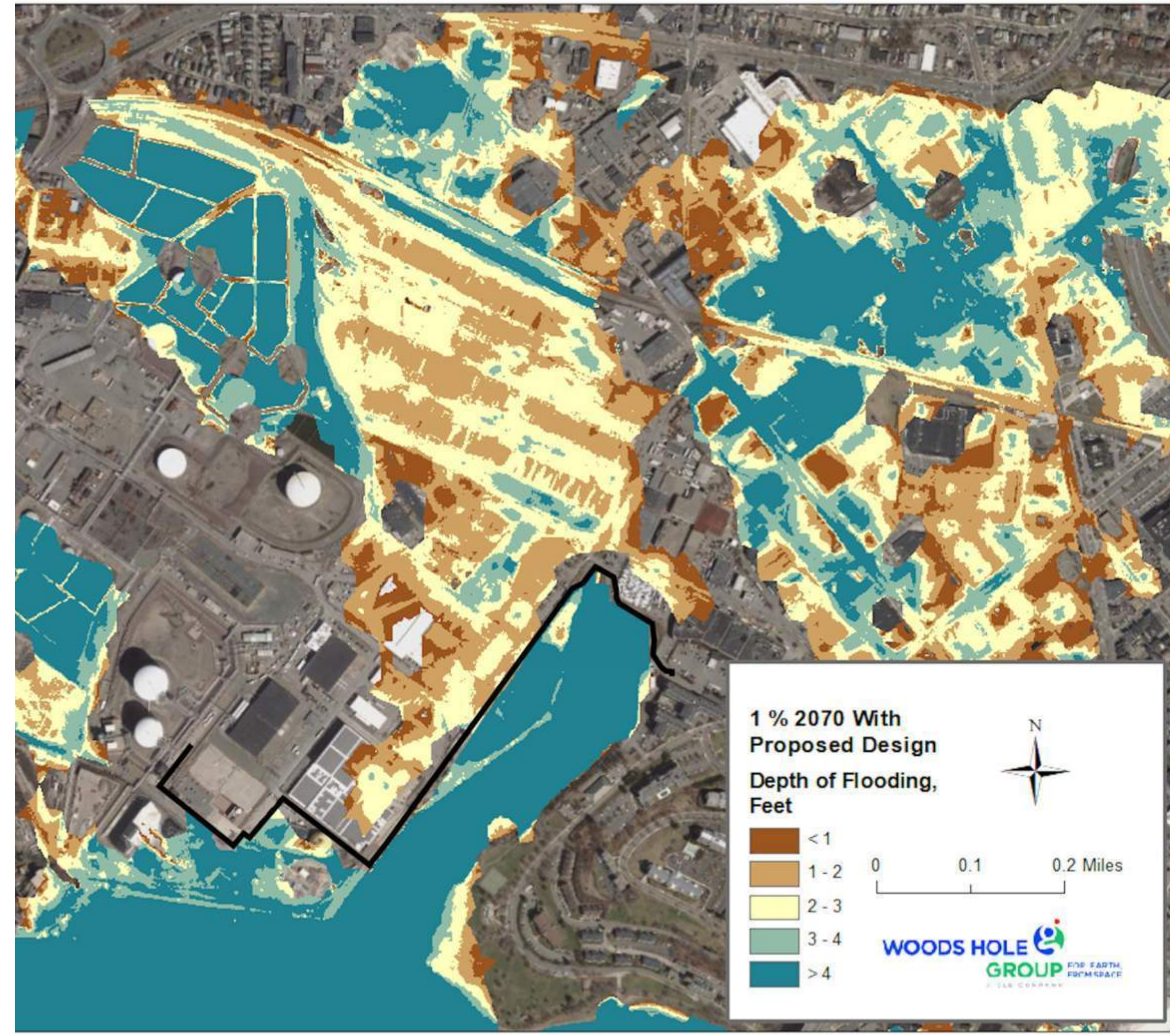
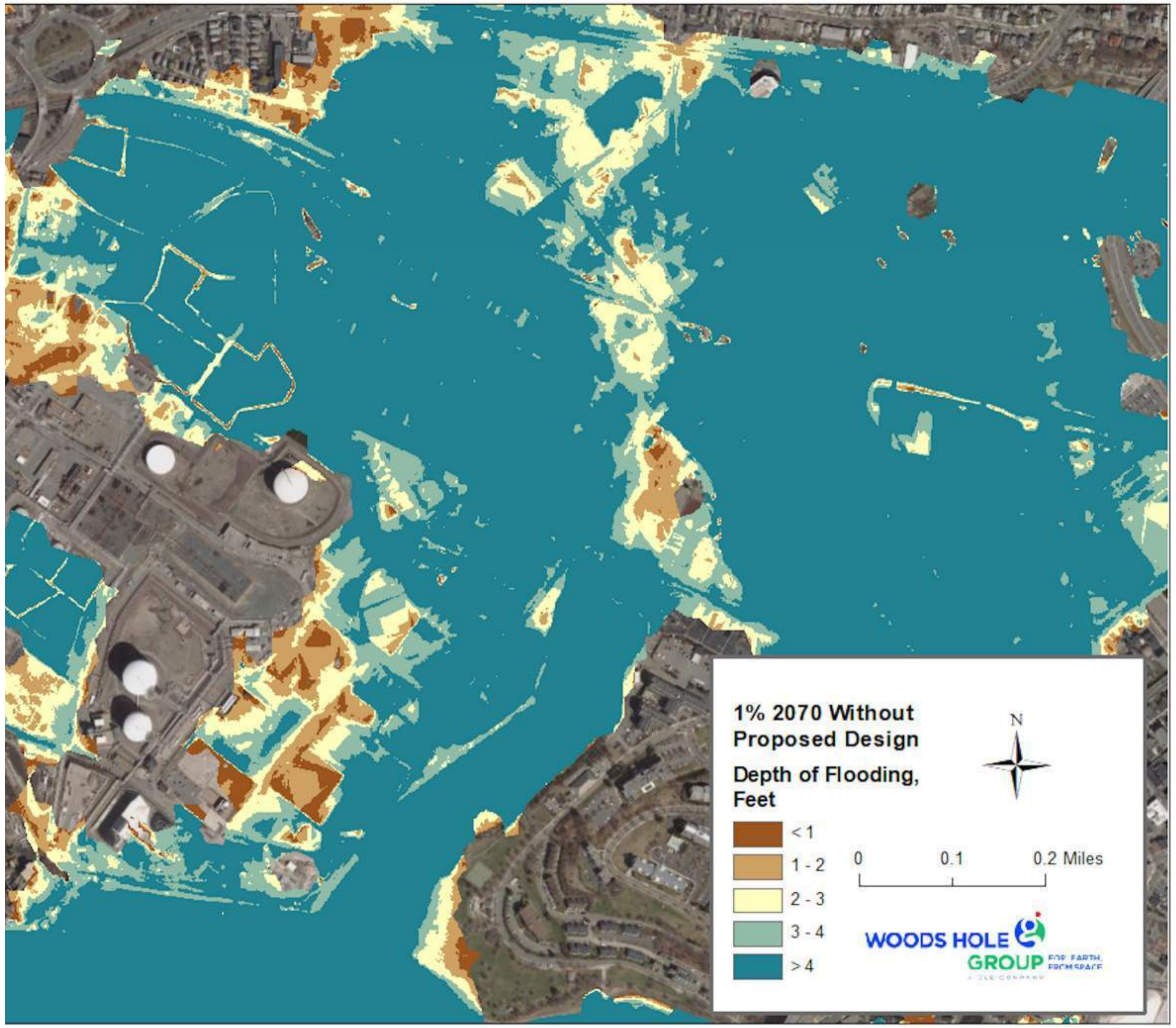


Figure 7-10
Existing and Proposed Flood Depths during a 1% Annual Exceedance Probability Storm in 2070
Source: Woods Hole Group, 2023



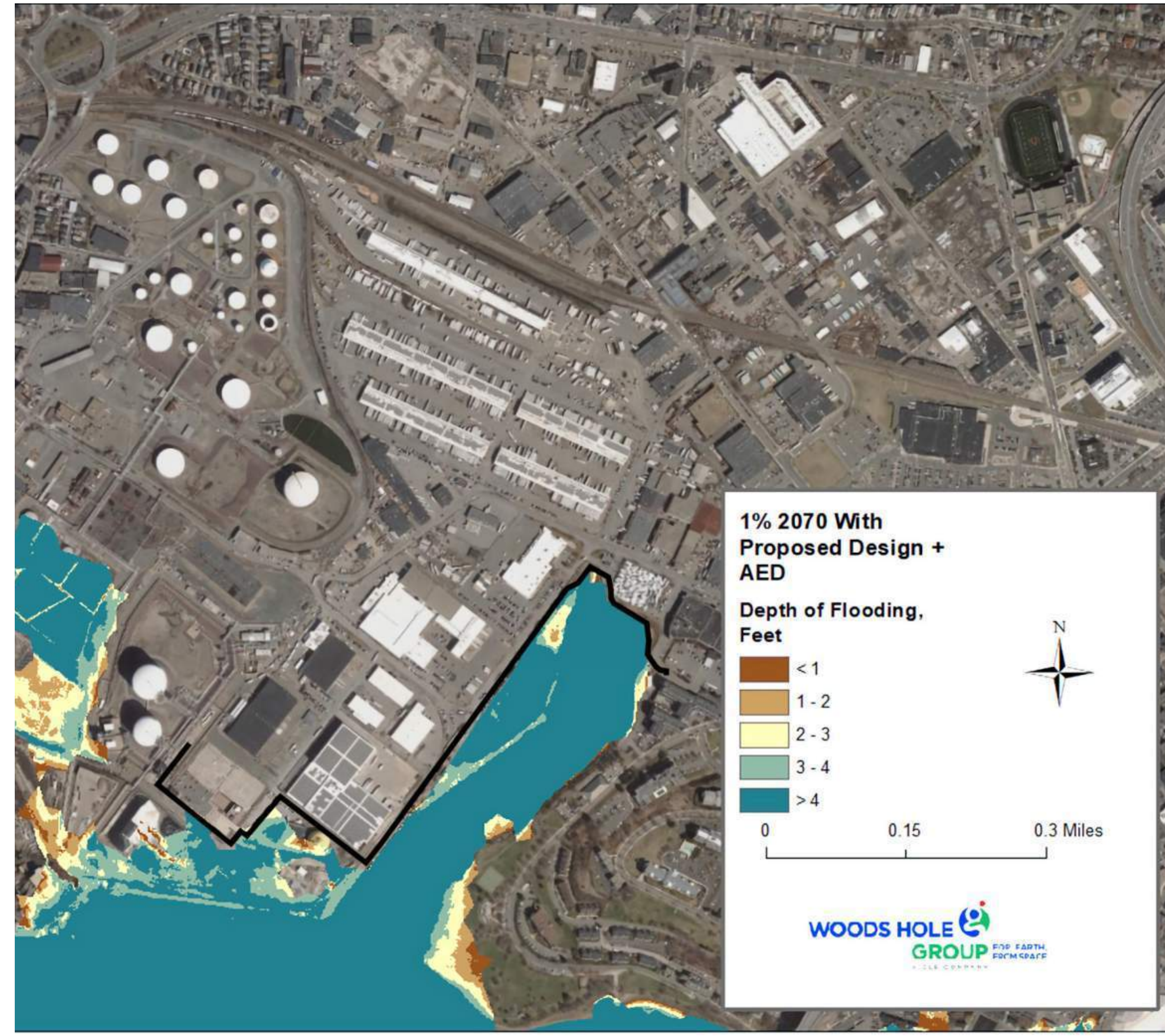


Figure 7-11
Existing and Proposed Flood Depths during a 1% Annual Exceedance Probability Storm in 2070 with Amelia Earhart Dam Project
Source: Woods Hole Group, 2023

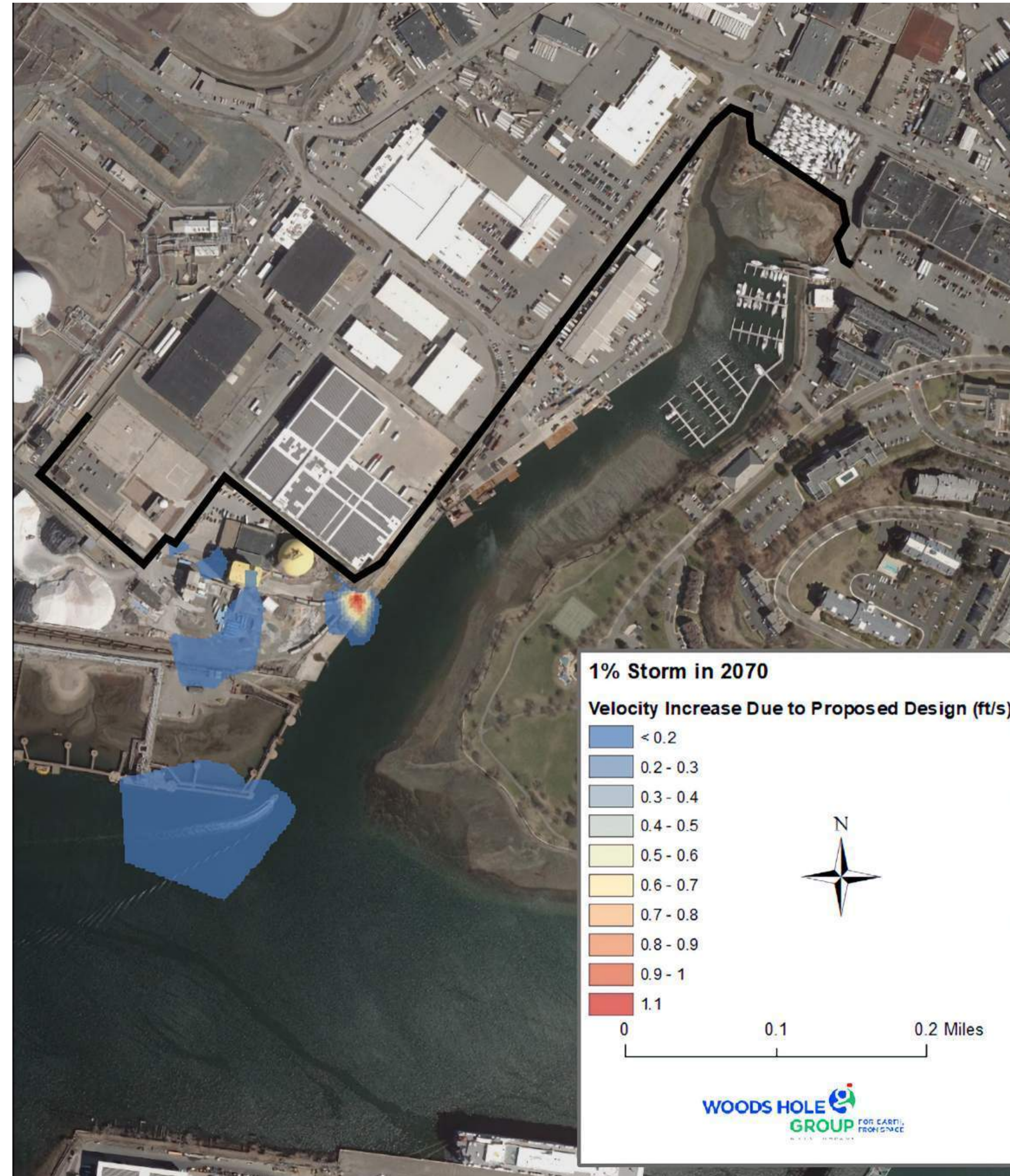


Figure 7-12
Potential Velocity Increases in Floodwater Evaluation Results – 2050 and 2070
Source: Woods Hole Group, 2023

Chapter 8

INFRASTRUCTURE AND TRANSPORTATION

CHAPTER 8: INFRASTRUCTURE AND TRANSPORTATION

8.1 INTRODUCTION

The IER Flood Resilience Project (the "Project"), proposed by the Cities of Chelsea and Everett (the "Proponents"), will construct various coastal flood resilience measures consisting of a coastal storm surge barrier, storm surge control facility ("SSCF"), nature-based approaches ("NbA"), and related amenities at the Island End River ("IER") in the Cities of Chelsea and Everett (the "Project Site"). The existing Project Site encompasses an area comprised of commercial, industrial, and recreational land uses and is supported by roadway, industrial rail spur (the "DPA Rail Spur"), and utility infrastructure, both publicly and privately-owned.

This chapter summarizes the existing utility and transportation infrastructure, describes proposed utility and transportation infrastructure improvements, and identifies any additional potential impacts on existing infrastructure as proposed by the Project. The construction, operation, and maintenance of proposed infrastructure within the Project Site requires limited improvements to existing infrastructure to ensure effective maintenance and efficacy of the proposed flood barrier, SSCF, and other aspects of the Project. This chapter will outline utility systems, transportation systems, such as roadways and the DPA Rail Spur, and construction-related impacts on the Project Site. This chapter details further relevant existing stormwater system conditions and Project coordination with district regional stormwater improvements plans. Results from Project pluvial and coastal storm hydraulic modeling, between existing and proposed conditions, are also presented and interpreted.

8.2 EXISTING CONDITIONS

The Project Site is currently being serviced by public and private utilities such as storm drainage, water, wastewater, electrical and telecommunication, and natural gas. These utilities traverse public and private rights of way as well as private off-street parcels. Storm drainage infrastructure consists of catch basin collection systems along Commercial Street, Market Street, Behen Street, Beacham Street, and Justin Drive, with manholes, piping and outfalls feeding to IER and Mystic River. Storm drainage, water, and wastewater infrastructure within Commercial Street was constructed by private entities. The City of Everett has conducted limited maintenance of this infrastructure when necessary to protect public health and safety. Other utilities within the Project Site are privately held, including the electrical and telecommunication lines and natural gas infrastructure.

The existing Project Site also contains various forms of transportation infrastructure, including roadways and the DPA Rail Spur, to service the IER Business District. Commercial Street and a portion of Rover Street are privately owned rights of way, but the City of Everett has conducted limited maintenance of the Commercial Street and Rover Street roadways when necessary to protect public health and safety. Market Street and Beacham Street are public ways within the Project Site that are maintained by the Cities of Chelsea and Everett. Behen Street is a public way that is maintained by the City of Everett. Justin Drive is also a public way that is maintained by the City of Chelsea. The DPA Rail Spur within this district is a right of way owned by Constellation Energy.

8.3 PROPOSED CONDITIONS

8.3.1 STORMWATER SYSTEM

The Project will install various inlet structures and regrade where necessary throughout the Project Site to ensure positive drainage where the Project interrupts existing drainage patterns. Additionally, the Project will install water quality treatment devices where no treatment is currently provided prior to discharge to IER or Mystic River. The Proponents will continue to identify existing drainage pipe crossings and provide backflow preventors on existing pipes that may be susceptible to surcharge. The Project will provide cutouts within the barrier footing and encase existing water pipes in concrete to avoid structural influence on water infrastructure, once the depth and location are field confirmed. Surfaces and stormwater catchment systems will be designed in accordance with best management practices to capture solids, screen floatables, and support responsible O&M.

Management of Surface Water Runoff – Chelsea

The Project includes new storm drain collector pipes, catch basins, and surface grading to capture surface water runoff that would otherwise be impounded by the introduction of a barrier. The existing surface water catchment areas within the Project Site in Chelsea are shown in Figure 8-4, Stormwater Catchment Areas - Chelsea. This includes capture of some private property parking lot runoff that previously flowed directly to the Island End River via over-land flow, such as at the rear parking area at #357 Beacham Street and replacement of deficient collection systems that have passed their useful life, need to be upsized, or need to be adjusted to accommodate the Project (such as area near the northern portion of Justin Drive). New Project stormwater collection systems will improve waterfront private property accessibility to drains and reduce sediment pollutants currently entering the marsh via surface runoff. The Project also includes underdrainage to manage risk of periodic/seasonal surfacing of groundwater impounded behind the wall. These systems will be configured for accessible O&M and treatment tailored to site conditions.

Management of Surface Water Runoff – Everett

The Project includes upgrades to existing drainage infrastructure and installation of new drainage infrastructure to manage the surface water runoff that would otherwise be impounded by the introduction of a barrier. The stormwater catchment areas within the Project Site in Everett are shown in Figure 8-5, Stormwater Catchment Areas – Everett. Along Market Street, the existing drainage infrastructure will be upgraded to capture surface runoff from the regraded roadway. This will consist of new catch basins and trench drains along the flood barrier. Along the seaward side of the barrier along Market Street, trench drains will be installed to capture runoff that flows off the property into Market Street and directly into the existing drainage system. For all drain lines that pass under the flood barrier, backflow prevention devices will be installed. Between #95 Behen and #60 Commercial Street, the area adjacent to the flood protection wall will be regraded to direct flow away from the barrier, and new drainage infrastructure will be added to capture any low points behind the wall. The area along the waterfront of #60 Commercial Street will continue to drain to an existing outfall under the wharf. Similarly, areas along Commercial and Rover Street will be regraded and have drainage infrastructure to capture surface runoff behind the wall. See Figure 8-1, Existing Stormwater Infrastructure Exhibit.

8.3.2 WATER SYSTEM

The Project will include the installation of 2″ PVC irrigation piping to service landscaping within the Resilience Provisions East portion of the Project. The Resilience Provisions West portion of the Project will cross a 12″ water main within Commercial Street. The Project will provide cutouts within the barrier footing and encase existing water pipes in concrete to avoid structural influence on water infrastructure, once the depth and location are field confirmed. See Figure 8-2, Existing Water Infrastructure Exhibit.

8.3.3 WASTEWATER SYSTEM

The Resilience Provisions West portion of the Project will cross three 4″ sewer pipes within Commercial Street. The Project will provide cutouts within the barrier footing and encase existing sewer pipes in concrete to avoid structural influence on sewer infrastructure, once the depth and location are field confirmed. The Project will also install backwater prevention valves on these lines and water proofing of sewer manhole covers for structures outside of the flood protection zone. See Figure 8-3, Existing Wastewater Infrastructure Exhibit.

8.3.4 ELECTRICAL AND TELECOMMUNICATION SERVICES

The Project will limit the interruptions to electrical and telecommunications services during construction and post-construction. Any overhead electrical services that will be within the work area for the flood barrier will be protected, where possible and replaced with temporary electrical service in coordination with private utility providers and the property owners affected. Construction of the Project will include the replacement of overhead electrical infrastructure at 40-60 Commercial Street along the proposed barrier to adjust its alignment and reinstall underground within the 80 Commercial Street driveway to accommodate the barrier location. In other areas of the Project Site, the Proponents will remove, stack, and replace existing light poles and rewire overhead electric supply appropriately to allow for barrier installation appropriately. As part of the DPA Rail Spur crossing flood barrier gate, the Project will also install electrical service to proposed warning gates and lighting along the railroad alignment adjacent to 87 Behen Street and 95 Behen Street.

8.3.5 NATURAL GAS SYSTEM

The Project will not require natural gas service but will cross the multiple Algonquin gas lines, up to 30″ diameter, within Commercial Street and the 18 Rover Street parcel. As part of preconstruction investigations, the Proponents will perform confirmatory test pits with the property owners on the exact location of these service lines to detail barrier installation considerations. The Project will provide cutouts within the barrier footing and encase existing gas pipes in concrete to avoid structural influence on gas infrastructure, once the depth and location are field confirmed.

8.3.6 TRAFFIC AND TRANSPORTATION

As part of the Project, the Proponents will reconstruct the Market Street corridor from its southern extent to the border between the Cities of Chelsea and Everett. The roadway in this section will need to be rebuilt to install the proposed flood barrier with modified vehicular travel lanes, improve drainage patterns, and improve roadway safety. This will consist of the full-depth reconstruction of the roadway, regrading of the roadway crown, and guardrail and barrier installation within the City of Everett right of way.

The DPA Rail Spur right of way will also be impacted by the installation of a flood barrier and gate crossing. Additionally, the Project will include the placement of warning gates, signing, and lighting to provide proper warning for train operators along the right of way.

Management of Transportation and Property Access – Flood Gates

The Project includes eight flood barrier gates that will allow continued access along roadways, DPA Rail Spur, and into private properties. These gates include one passive gate at a roadway crossing at Commercial Street, two active gates that will cross the DPA Rail Spur at 87 Behen and 60 Commercial Street, and five active gates at vehicular driveways along Market Street, 95 Behen, 80 Commercial Street, and 100 Commercial Street.

The active crossings at the DPA Rail Spur and existing driveways will consist of active gates that will need to be manually deployed by the Proponents prior to forecasted coastal flooding events. These gates will range in length from 20 feet to 56 feet, and range in height from 4.5 feet to 7 feet. The active gates will be constructed of steel gates that will close to create a seal along the bottom and sides of the gate to create a water-tight, continuous barrier with the flood wall. After flooding recedes, the gates will need to be manually opened to restore access to the property driveways and crossings. The gates will need routine maintenance and cleaning after flood events to keep the gates and its infrastructure clear of rust. Regular maintenance of the flood gates is also recommended to clear away any debris and sediment that may restrict gate movement over time. This maintenance will ensure a water-tight seal when the gate is deployed.

The passive crossing will be located at the crossing at Commercial Street. This gate will be 27 feet wide and 3.5 feet tall. The gate will consist of a steel passive gate that is deployed as flood water rises during a coastal storm event. This gate does not require any manual deployment or re-opens as the flood waters recede. The gate will be recessed into the ground to create a continuous surface with the roadway and will not create a conflict with regular traffic along Commercial Street. The recessed area will have an inlet that captures water that ponds in the gates setting. This area will need to be cleared of any sediment or debris that may settle in the recess as flood waters recede after a coastal storm event. The gate will need routine maintenance and cleaning after flood events to clear the gate and the recessed setting of any debris and sediment that may prevent the gate from lying flat against the existing surfaces. The gate should also be routinely checked for damage to the face of the gate and checked for the presence of rust and wear. These should be remedied as soon as possible to ensure that the gate is able to create a water-tight seal when deployed.

8.4 CONSTRUCTION PERIOD

The construction program will occupy public and private rights of way, municipally owned parcels, and private lands. Temporary and permanent easements will be pursued for work in private lands. See Section 1.6, Project Implementation, for discussion on temporary and permanent easements. The Proponents are engaging with a Pre-Construction Manager to further detail the Project's construction period activities in the context of existing IER Business District operations.

Construction phasing of the SSCF is indicated in Attachment C, Project Plans, Sheets SSCF-C-101 and SSCF-C-102. Work will include culvert and drain improvements in Beacham Street and Market Street, pile driving for structural support, headwall and scour pad construction at the waterfront, buried structure and culvert construction, and electrical/mechanical construction within the facility envelope. Given the linear nature of the Resilience Provisions East ("RPE") barrier and riverwalk system, work will involve several sequenced phases delivered in-series along a progressing work zone. Work will require site and utility preparation, construction of the barrier sheet pile core, construction of barrier cap and walks, and finishing of riverwalk amenities. Work zone boundaries and controls will be erected and maintained around active work zones, narrowed outside of working hours, and removed from areas not subject to active operations. The barrier, NbA, and SSCF construction operations will require careful coordination to avoid rework, nuisance conditions, and conflict with site operations.

The Proponents will work to maintain adequate service in each Beacham Street and Market Street during construction. Beacham Street is designated by the Federal Highway Association ("FHWA") a Critical Urban Freight Corridor ("CUFC"). A CUFC is defined "public roads in urbanized areas which provide access and connection to the Primary Highway Freight System and the Interstate with other ports, public transportation facilities, or other intermodal transportation facilities". Beacham Street connects the City of Chelsea and City of Everett industrial and port resources with state collectors including Route 1, Route 16, and Route 99. Demand on road and utility infrastructure is understood to be continuous, with 24-hour production and freight demands, seven days per week. Work zone management in public ways will be delivered in accordance with the following provisions:

- Market Street: Allowing alternating traffic during the workday supported by uniformed officers. A minimum 14-foot zone for alternating traffic will be maintained. All traffic control devices will be fully removed from the roadway at the close of each work day and the roadway should be opened to two-way traffic off-hours.
- Beacham Street: The work zone will seek to maintain two-way traffic, with a minimum 28-foot path of travel, at all times. Exception might be granted for off-peak performance of work, which is generally 6pm to 12am in this district.
- Staged work zones: In each Beacham and Market Street, staging construction of drain work zones will be required to limit traffic impacts and risk around open excavations. Traffic management plans will be prepared for each stage of work.
- Maintenance of roadway surface: All excavations in the roadway will be closed at the conclusion of each work shift. This will include appropriately rated plates pinned and recessed. Systems will be designed to carry heavy freight traffic. Temporary pavement will be applied as soon as practical after performance of work. Permanent pavement, minimum 7.5″ with cutbacks and infrared repair, will be applied after a settlement period.
- Timing of work: Work will require careful coordination with weather and with tides in order to minimize risk, duration of events, and impact to roadway and abutter stakeholders.

- Multi-modal path (Beacham Street) detours: When the proposed construction activities encroach on the multi-modal shared use path a detour for the affected access will be provided.
- All traffic control will be managed in accordance with the latest edition of the Manual of Uniform Traffic Control Devices (MUTCD).
- If lane shifting is utilized for a long period, temporary pavement markings should be applied to clearly indicate the travel lane.

The Proponents anticipate maintaining a pathway from Market Street to Justin Drive to host periodic construction operations, workday staging along the barrier alignment, and motility of equipment and materials. This will help minimize obstruction of roadway with equipment and materials. Excavated material spoils will be handled in accordance with regulation and best management practices. Spoils will be handled within confines of their relevant disposal site, "load and go" soil management will be employed when practical to minimize holding time and volume, and covered containerized storage will be employed where appropriate to minimize risk of nuisance conditions and support control and management. The team intends to precharacterize wastes to allow for facility acceptance ahead of generation, where practical, which will support minimizing need for on-site storage.

During the construction phase, off-street land use will be constrained between space required for construction operations and space required to maintain minimum provisions for business occupation at each property. For instance, a four-phase construction work zone plan has been considered for one property to maintain minimum space required to provide for vehicle access to ongoing business operations. See Figure 8-6, Example Construction Work Zone in Single-Phase SSCF Construction. Similar phases construction and work zone management plans will be prepared for properties to maintain minimum property service requirements through the various phases of construction. The Proponents will continue to work with individual property owners during the next design phase to understand property land use requirements, special vulnerabilities, and constraints around time-of-day and season.

NbA construction will require excavation and disposal of urban fill and debris and replacement by a similar volume of cobble stone, sand and planting material. This excavation will be phased relative to work adjacent to tidal influence, where materials will be removed and immediately replaced. Work adjacent to barrier construction and related upland site activities will include existing soils and vegetation removed with replacement surface materials temporarily stockpiled in adjacent upland for placement against the outside edge of the flood barrier upon its completion. This work includes standard construction excavation equipment. Pickup and delivery of material may be staged outside of roadways in the open area off Market Street in Everett, and in Island End River Park but will require delivery access via Market Street and the abutting properties on Beacham Street.

Due to the underlying soils within Everett, the flood barrier will be constructed on deep foundations. The deep foundations will consist of piles driven down below the roadway between 50-100 feet and integrated into the reinforced footings of the wall. The installation of the piles to this depth will require large cranes, pile driving equipment, and associated safety clearances. Along Market Street, it is assumed that during excavation of the foundations for the wall, one lane of the roadway will need to be closed. Once pile driving commences, the portions of the roadway will be closed to ensure adequate space is provided for the equipment. The Proponents will coordinate with the adjacent property owners for access to their driveways during construction along Market Street. During times of any partial closures of Market Street, traffic is anticipated to be routed west on Behen Street to Beacham Street.

The construction of the wall south of Behen Street and Market Street will involve temporary impacts to the DPA Rail Spur along 87 Behen Street and 60 Commercial Street. Access to the work area will also be required from Behen Street, Commercial Street, and Rover Street. The Proponents will coordinate with the property owners for access to facilitate temporary easement areas for staging areas and access to the work area. The Proponents will coordinate with the adjacent property owners for access to their driveways during construction along these roadways.

The Proponents and their representatives will also coordinate temporary and permanent utility relocations during construction period. At 60 Commercial Street, existing overhead power lines along the western edge of the property will need to be relocated prior to the commencement of work in that area. At the Commercial Street flood gate, the existing water line and low-pressure gas service line may need to be relocated to facilitate construction of the Project. Lastly, it is anticipated that there will be a need for dewatering operations during construction and associated staging areas along Commercial and/or Market/Behen Street for the dewatering treatment system. The typical equipment associated with dewatering are frac tanks and vessels for treatment along with pumps.

8.5 STORMWATER HYDROLOGIC AND HYDRAULIC STUDY

The IER floodplain protected by the Project contains an extensive stormwater collection system and an open-air inland drainage swale connected to the waterfront via culvert. The risk associated with pluvial flooding will increase over time as sea level rise elevates tidal cycles, and as the intensity of storm surge and rainfall increases. These forces will increase backwater pressure at stormwater outfalls and reduce the capacity of stormwater systems to convey stormwater. This issue is exacerbated by the fact that portions of the IER district's stormwater collection systems in Chelsea and Everett are aging, deteriorated, and undersized for current and future conditions.

The Proponents have each invested significantly in studying the IER district's hydrologic and hydraulic ("H&H") and planning prospective collection system hydraulics improvements. This process has developed understanding of pluvial flood risk in the district and prepared the Proponents for coordination of capital improvements programs and district asset management. Relevant studies in the past five years have included:

- "Market Street Culvert Preliminary Engineering Report", October 31, 2017, prepared by Tighe and Bond for the City of Everett
- "Stormwater Infrastructure Review…", June 21, 2019, prepared by Weston & Sampson Engineers for the City of Chelsea
- "Market Street and Beacham Street Culvert Evaluations", February 14, 2020, prepared by Dewberry Engineers for the City of Chelsea
- "Commercial Triangle Flooding Analysis", April 19, 2021, Prepared by Dewberry Engineers for the City of Everett
- "City-Wide Sewer Separation Master Plan", October 18, 2021, Prepared by Dewberry Engineers for the City of Chelsea
- "Island End River Flood Mitigation Needs Analysis", April 29, 2022, Prepared by Dewberry Engineers for the City of Chelsea

These studies and associated regional collaboration helped to inform the extent and scale of stormwater systems to include in this coastal flood resilience project, and to help the coordinate Project infrastructure with future IER district stormwater infrastructure capital planning.

8.6 WATERSHED DELINEATION

Four significant stormwater tributary areas exist within the IER floodplain and the Project. These tributary areas extend significantly outside of the current and future floodplain into densely settled areas of Chelsea and Everett and outfall to the Island End River, each inside and outside of the Project area. Approximate stormwater tributary areas serving and conveying through the floodplain are shown in Figure 8-8, Island End River Stormwater Collection System & Tributary Areas Over Floodplain. Stormwater tributary areas are herein referred to by the street name of their most-significant downgradient pipe or culvert segment. The four significant tributary areas include the Market Street Culvert, the Beacham Street Drain, the Behen Street Drain, and the Spruce Street Drain, and are described as follows.

- **Market Street Culvert:** The Market Street Culvert tributary area is approximately 420 acres. The tributary area is predominantly in the City of Everett, but also includes portions of Market Street, Beacham Street, and the New England Produce Center in Chelsea. The culvert has a section of open-air drainage swale upgradient of Market Street which is subject to tidal exchange. The culvert pipe and drainage swale system total approximately 2,970 linear feet ("lf"), including 900 lf of 15′6″ by 9′5″ corrugated metal arch culvert, 330 lf of 16′ by 12′ reinforced concrete box culvert, and 1,740 lf of open-air drainage swale (from downgradient to upgradient). The banks of the drainage swale are comparatively low elevation at approximately elevation ("El.") 8 (feet NAVD88, for all elevations expressed herein unless indicated otherwise) with significant flood pathways extending from the drainage swale into Chelsea and Everett. The Market Street Culvert outfall does not have gates to arrest tides or storm surge. A small portion of the local drains directly connected to the culvert have backwater prevention devices.

- **Beacham Street Drain:** The Beacham Street Drain tributary area is approximately 170 acres. The tributary area is predominantly in the City of Everett, but also includes portions of Market Street, Beacham Street, and the New England Produce Center in Chelsea. The dominant lands served in Everett include the Exxon Fuel Terminal, which is over 100 acres and regulated under NPDES Permit MA0000833. The Exxon site system is fully managed, with flow impounded in the site, treated in a lagoon, and discharged manually via operation of a normally closed valve coordinated with low tides. The outfall of the Beacham Street Drain does not have gates to arrest tides or storm surge. Backwater prevention devices are installed in-line in portions of the collection system.

- **Spruce Street Drain:** The Spruce Street Drain tributary area is approximately 430 acres. The tributary area is wholly within the City of Chelsea. A sub-watershed of the tributary area passes through the Carter Street Pump Station (which was originally built by MassDOT with construction of Route 1) before being pumped to the Spruce Street Drain. The Spruce Street Drain has dual flap gates at its outfall near the marina at Commandants Way. There are no known backwater prevention systems otherwise installed in this collection system.

- **Behen Street Drain:** The Behen Street Drain tributary area is approximately 40 acres in the City of Everett. This drain collects from the Behen Street and Market Street area in Everett. This drain outfall is not understood to have gates to arrest tides or storm surge. The extent of backwater prevention devices on local collector pipe is unknown.

The total stormwater tributary area crossing the floodplain is approximately 1,060 acres. This total tributary area is relevant to the Project's coastal storm surge protection program because rainfall-induced pluvial flooding in low elevation areas will persist in future periods with high river tailwater post-construction. The Proponents acknowledge this risk and are collaboratively developing a regional stormwater capital plan to support long-term risk management, as discussed later in this section. While the project does not propose to reconstruct the collection systems upgradient, the Project will reconstruct outfall pipe and discharge assemblies associated with the Market Street Culvert, Beacham Street Drain, and Behen Street Drain, each of which penetrate the Project barrier within its proposed work area.

8.7 STORM SURGE CONTROL FACILITY DESIGN & ANALYSIS

The Project has interfaces with existing stormwater systems around outfalls, pipe crossings of the proposed storm surge barrier, existing surface water runoff patterns and associated catchment. Consideration of these matters formed the basis for design of the storm surge barrier and SSCF architecture and configuration, as discussed below.

8.7.1 SSCF SYSTEM SURCHARGE ANALYSIS

The tributary area of the Market Street Culvert is shown in Figure 8-8, Island End River Stormwater Collection System & Tributary Areas Over Floodplain within a yellow boundary. The elevation of those areas is shown in Figure 7-1, Island End River Floodplain Elevation Model. Areas subject to noteworthy risk from culvert-pipe backwater surcharge include Market Streetand the eastern third of the New England Produce Center. Areas in Everett's Commercial Triangle are currently subject to significant storm surge surcharge upgradient of the swale (due to extremely low surface elevations), however the City of Everett plans to install inline check valves at the MBTA commuter rail tracks. As a result, these areas are more subject to risk via overland surcharge across the banks of the swale and MBTA tracks.

Points subject to surcharge generally include manholes, catch basins, and open-air segments directly connected to the river via culvert less any separate check valve. The public rights of way ("ROW") in the Market Street Culvert tributary area between the outfall and the swale generally vary in elevation from approximately El. 7.5′ to 9.0′ NAVD88. Surcharge of Market Street Culvert structures would quickly fill relatively low areas abutting the Beacham Street and Market Street intersection, such as the area around #359 Beacham Street where the center of road is approximately El. 7.8′ and the roadway gutter is as low as El. 6.9′. Roadway flooding would effectively obstruct passage in this CUFC. The New England Produce Center, a regionally critical fresh food distribution facility off Beacham Street, has low spot elevations of around 6.5′, and consistent Beacham Street frontage elevations of around 7.0′. This site currently experiences flooding impactful to site motility during current king tides. The open-air section of culvert generally has banks at El. 7.5′ to 9′ and provides a high-capacity avenue to flooding the abutting facilities and the community beyond.

The Beacham Street Drain conveys catchment from Beacham Street northward to the border between the Cities, abutting properties, the westerly two-thirds of the New England Produce Center Site, and the Exxon facility to the north. A minority of collection system reaches in the Beacham Street Drain tributary area are protected from localized tidal flooding due to inline stormwater check valves in small diameter pipe. Unprotected areas include the New England Produce Center, portions of Beacham Street, and portions of the Exxon terminal. Elevations in the primary egress to the New England Produce Center vary from around 7′ to 8′, with undulation around stormwater catchment. The 110-acre Exxon facility houses sensitive energy industry infrastructure and is of special concern to the abutting community and fresh produce activities. Flooding of Beacham Street Culvert would impact roadway users and nearby port facilities as well as result in flooding of the US Postal Service Facility.

Preliminary review of low-elevation surcharge sites reveals that critical food distribution facilities are first subject to flood risk around El. 6.0′; that they are subject to moderate operational impacts and equipment risk beginning around El. 7.0′; and that they are subject to significant operations and infrastructure risks (including viability of site for operations, loss of produce associate with delays, worker safety risks, and equipment risks) around El. 7.5′. This study observes that the CUFC roadways, Beacham Street and Market Street, begin to see stormwater ponding at approximate El. 6.9′; that passage by regional freight, passenger, and emergency vehicles will be limited at approximate El. 8.0′; and that passage will be completely obstructed, and at risk of stranding roadway users, by surcharge to approximate El. 8.5′.

8.7.2 SSCF GATE OPERATIONS

It is estimated that coastal storm events with water levels exceeding El. 7.0′, in current climate conditions, would require closure of the combination gates approximately 2 times per year for only a few hours each event. Based on current climate change projections, the frequency of closures would increase to twice a day over time. Likewise, the duration of tide gate closures would increase from less than an hour, in current conditions, to more than three hours per closure, in 2070. These estimates are based on normal tide cycles and do not reflect storms. See Table 8-1, Estimated Gate Closure Frequency.

Table 8-1: Estimated Gate Closure Frequency

Climate Horizon Closure Time	Exceedance Frequency	Avg. Peak Water/Avg. Est.
Present Day	1.78/year	7.39 ft NAVD88
2030	38.6/year	7.45 ft NAVD88
2050	2/day	>1.2 hours
2070	2/day	>3 hours

8.7.3 SSCF HYDRAULIC BASIS OF DESIGN

The SSCF effectively removes and replaces 180 lf of outfall pipe and outfall assembly for each the Beacham Street Drain and the Market Street Culvert. The Market Street Culvert was originally constructed in 1965 and has an extensive history of impactful collapse and emergency response repairs. In recent years, approximately 725 lf was reconstructed as an open-air channel, or "daylighted", in private property proximate to the New England Produce Center. The Project serves this critical need for infrastructure maintenance while updating Beacham Street Drain and Market Street Culvert configuration for coordination with best available climate data and resilient design standards.

The SSCF design was informed by H&H modeling performed on behalf of the Proponents as part of the February 2020 "Market Street and Beacham Street Culvert Evaluations" and the April 2022 "Island End River Flood Mitigation Needs Analysis" studies. These efforts developed a coordinated Chelsea and Everett stormwater model across the IER Floodplain to inform sizing the Market Street Culvert and related systems.

The February 2020 study exercised the model to determine design flow rates and to evaluate performance of various pipe sizes and geometries to serve the replacement needs of the Market Street Culvert. The study observed that capacity to convey flows without surcharging at the swale significantly reduced in efficacy at certain points despite increasing pipe size. This conclusion is presented below in Table 8-2, Tabulation of Hydraulic Modeling Results (Excerpt).

Table 8-2: Tabulation of Hydraulic Modeling Results (Excerpt)

Description of Size Alternative	Flow Rate to Maintain Hydraulic Grade Line Equal to Lowest Elevation of the Railroad Tracks
Existing Culvert Size and Shape	443 cfs
12'x10' Concrete Box Culvert	600 cfs
12'x12' Concrete Box Culvert	650 cfs
18'x11' Concrete Box Culvert	725 cfs
16'x12' Concrete Box Culvert	725 cfs
20'x11' Concrete Box Culvert	740 cfs
25'x11' Concrete Box Culvert	750 cfs

The study also identified that the subgrade conditions, elevation constraints, and urban infrastructure utility constraints would make any significant increase in culvert size infeasible from a constructability perspective. Therefore, the study advised replacement of the Market Street Culvert with a 16' by 12' reinforced concrete box culvert, which it estimated could convey approximately the theoretical 25-year 24-hour peak flow for the culvert tributary area.

The April 2022 study later refined estimated design flow rates with an updated district hydraulic model. This study modeled peak flow rates for a "baseline condition" at the SSCF which included various scheduled stormwater improvements and sediment maintenance activities intended to improve system flow capacity. The simulated peak flow rates returned for the model exercise, expressed in million gallons per day ("MGD") are presented in Table 8-3 below, and the baseline condition used for modeled flow rates at the SSCF are described in the narrative that follows.

Table 8-3: Simulated Peak Flow (MGD) at SSCF under Baseline Conditions

Precipitation Event	Beacham Street Drain	Market Street Culvert
10-Year, 24-Hour (present day)	63.4	225.4
25-Year, 24-Hour (present day)	87.6	269.3
50-Year, 24-Hour (present day)	94.9	312.5
100-Year, 24-Hour (present day)	112.2	367.1
10-Year, 24-Hour (2030)	87.4	241.5
25-Year, 24-Hour (2030)	96.6	318.3
50-Year, 24-Hour (2030)	105.8	391.6
100-Year, 24-Hour (2030)	122.9	550.5
10-Year, 24-Hour (2070)	87.6	277.7
25-Year, 24-Hour (2070)	106.4	348.6
50-Year, 24-Hour (2070)	115.2	481.0
100-Year, 24-Hour (2070)	135.5	629.5

Baseline Conditions:

- Sediment removal on tributary storm drains upstream of the MBTA railroad tracks in Everett.
- Daylighted section of the Market Street Culvert.
- Conversion of the existing culvert under the MBTA's railroad tracks to a circular 60-inch culvert.
- Addition of three (3) double-barrel 60-inch circular culverts under the MBTA tracks. Thus, in total it considers six (6) 60-inch circular culverts.
- Upsizing of the Market Street Culvert to the size recommended in their 2020 Dewberry study (16'x12')
- Addition of Project gate systems at the outfalls of the Market Street Culvert and Beacham Street Drain.
- Addition of coastal storm surge barrier with a top elevation of 14' in place in Chelsea and Everett.

Consistent with the upstream culvert, the SSCF is designed to support the peak flow rate associated with the 2070 25-year, 24-hour storm, or peak design flow of 350 MGD (650 cubic feet per second). This is consistent with the recommendation of the

Resilient MA Action Team's Statewide Climate Resilience Design Standards Tool (the "Design Standards Tool") for a Moderate Criticality Stormwater Utility Asset. Like the Market Street Culvert, the Beacham Street Drain is sized to accommodate the peak flow rate for the 2070 25-year, 24-hour storm. The 2070 25-year, 24-hour storm used in modeling assumed a total rainfall depth of 8.22-inches and a peak intensity over a 1-hour interval of 2.06 inches per hour.

The Proponents seek to make the system adaptable to accommodate the 2070 50-year design in the future, which is the RMAT Design Standards Tool's recommended standard for a High Criticality Stormwater Utility Asset. One way to do this is to equip the SSCF for future incorporation of pumping, which would effectively reduce the hydraulic grade line and increase the conveyance capacity of the system upgradient of the SSCF before surcharge. The Project SSCF is designed spatially to provide for future intake to a pump station, should it be required. This prospective pump station intake site is comprised of a 7′ square "knockout panel" in the east wall upgradient of the combination gate assembly. The need, orientation, and scale of a prospective pump intake will be further developed in an upcoming regional stormwater infrastructure planning process, described in Section 8.8.

The SSCF is proposed to employ combination gates which will be deployed when tidal water surface elevation reaches El. 7.0′. This elevation is above current highest high tides but below the typical bank elevation of the open-air drainage swale and right of way manholes and catch basins. Combination gates are effectively flap gates on a frame that can be manually lowered and raised. The benefit of this system is that once lowered it will arrest incoming coastal storm surge and limit upgradient exposure, but if upgradient runoff impounds higher than coastal water level (for instance, with receding surge), the differential pressure across the flap gate will automatically open to relieve impounded upgradient pressure. The combination gate reduces the risk that the gate system will significantly exacerbate flood risk during typical operation if sized and maintained correctly. The preliminary design provides for three 96″ x 96″ combination flap gates. The cross-sectional area of the three gates is equal to that of the proposed 16′ by 12′ culvert referenced previously (192 square feet) and is significantly greater than the cross-sectional area of the aging, sediment-laden corrugated metal arch culvert that exists currently.

8.7.4 SSCF OPERATION AND MAINTENANCE PLAN

There is the potential for sediment to collect in the "bowl" area downstream of the SSCF headwall due to the elevations of the IER and Market Street Culvert. The volume of sediment that may collect will vary depending on the tidal cycle, wherein sediment may accumulate during the incoming tide and then be washed away from the high velocities of the culvert discharge flows during low tides. Within the SSCF, rock traps are provided on both sides of the gates to facilitate maintenance of sediment and heavy debris, should it become necessary. A description of SSCF components and operation and maintenance ("O&M") is provided in Attachment M, Storm Surge Control Facility Operation and Maintenance Plan.

8.7.5 TEMPORARY COFFERDAM CONSTRUCTION

The contractor will be responsible for detailed design and implementation of shoring systems, as part of construction means and methods. The soil condition and high groundwater levels compared to the depth of construction will drive selection of shoring and excavation systems. To minimize work in the river, it is assumed the contractor will use a cofferdam designed to resist tidal and some storm-driven river water surface fluctuations. The cofferdam will secure working areas and allow construction to be performed in the dry. The cofferdam is a temporary feature that will be removed upon completion of work.

The cofferdam should consist of interlocking steel sheeting, or a similarly water-tight system, embedded into the native clay soils for groundwater cutoff. Multiple levels of bracing, such as with internal struts and walers, will likely be required to support the full excavation height. Sheet piles should be installed by a qualified contractor using a vibratory hammer capable of advancing the piles to their required termination depths. Construction vibrations during sheet pile driving may result in densification and settlement of surrounding soils, particularly loose granular fill soils. Vibration and deformation monitoring will be performed during sheet pile installation. The design of cofferdams will be the responsibility of the contractor, who is in the best position to choose a system that fits the plan of operation.

The cofferdam will be installed in two phases in synchronization with the two parts of the headwall, as described below:

Phase 1 will be a cofferdam around the Beacham Street Culvert side of the work in Island End River. All work related to the Beacham Street Culvert side of the headwall will occur while this cofferdam is in place. The existing Beacham Street and Market Street culverts will remain in service during this work.

Phase 2 will be a cofferdam around the Market Street Culvert side of the work in Island End River. All work related to the Market Street Culvert side of the headwall will occur while this cofferdam is in place. During this work, drainage flow from both the Market Street Culvert and the Beacham Street Culvert will be conveyed through the newly constructed Beacham Street Culvert and discharged to the Island End River through the Beacham Street side of the headwall. Supplementary temporary pumping will be on-site and available to convey surplus flows when needed.

Approximate cofferdam locations are shown on sheets SSCF-C-101 and SSCF-C-102.

8.7.6 CONSTRUCTION METHOD AND SEQUENCE OF ACTIVITIES

The SSCF headwall, wingwalls, and scour assembly that is subject to dredging will be constructed in two phases. The first phase will focus on the Beacham Street Drain, and the second phase will focus on the Market Street Culvert. During phase 1, a new culvert will be constructed between the existing Beacham Street Drain in the Beacham Street/Market Street intersection and the future storm surge barrier wall. Then, a hole will be cut through the pile driven storm surge barrier wall, and a cofferdam will be constructed around the mouth of IER. At this point, the work area will be dewatered and prepared for dredging in advance of the headwall and outlet structure installation, which is designed to an approximate elevation of -12.5 at the bottom of the concrete slab.

The Proponents note that due to the likely presence of coal tar and petroleum impacted sediment, dewatering within the cofferdam area will require a USEPA Remediation General Permit (RGP) for discharge to a storm drain or surface water. Treatment will be required to meet effluent limits under this permit, which will likely include a fractionation tank to remove floating petroleum and settle out sediment, as well as granular activated carbon (GAC) units to further reduce petroleum constituents. A bag filter will also likely be required as a final step to reduce metals concentrations below applicable standards. Design and furnishing of the dewatering treatment train will be performed as part of final design activities, and will be the responsibility of the ultimately selected contractor.

After dredging and installation of the new Beacham Street headwall and outlet structure, a temporary plug will be installed upstream of the connection point in the existing Beacham Street Drain. At the connection point, a connection structure will be installed with two outlets, one to the new Beacham Street Drain, which will be a permanent connection, and towards the Market Street Culvert as a temporary connection. At this point, the new Beacham Street Drain will be fully operational, the plug upstream will be removed, and the existing Beacham Street Drain will be abandoned in place.

Phase 2 begins after the installation of the connection point on the Beacham Street Drain. A temporary plug is installed upstream on the Market Street Culvert, and then a connection pipe is constructed from the temporary Beacham culvert invert and existing Market Street Culvert. This connection allows upstream flow from the Market Street Culvert to be diverted into the Beacham Street Drain, then eventually into the IER. A cofferdam will then be installed around the Market Street Culvert side of the IER, isolating the culvert between the river and Beacham Street. At this point, dredging will occur to an approximate elevation of -12.5 before the headwall and outlet structure construction. The cofferdam will also remain in place while the SSCF is being installed. After the SSCF is installed, the cofferdam and temporary plugs will be removed and the flood mitigation measures at the outlets will be operational.

8.8 REGIONAL STORMWATER INITIATIVES

Separate from the proposed Project, it is the Proponents' intent to continue to review, evaluate and implement a coordinated regional IER district stormwater infrastructure plan between the two Cities to support planning and delivery of the large-scale stormwater hydraulics improvements required to responsibly maintain the floodplain collection systems through changing climate conditions. The goal of this ongoing effort is to enhance the ability of each City to address storm drainage challenges through regional partnerships and coordinated approaches to architecture, budget, design standards, and implementation.

H&H studies performed over the past five years have developed a concept for what might comprise regional stormwater improvements in the IER district. The coming exercise will further develop the concepts, screen for most advantageous configuration, and frame projects sufficient to memorialize and actuate long-term plans for advancing through segmented planning, design, and delivery. District H&H studies suggest long-term IER district stormwater hydraulics improvements should include:

- New Market Street Pump Station with Storage: This system would serve the Market Street Culvert, the Beacham Street Drain, and the Behen Street Drain tributary areas. The system would supplement capacity via addition of storage and pumping leveraged during periods of high backwater pressure that would otherwise inhibit gravity discharge. Prospective sites for future pumping may include any parcel in the general vicinity of the Beacham Street and Market Street intersection. Feasibility of adding storage will be a critical piece in planning the scale of this pumping system, as will the architecture/interdependence with proximate district pumping systems.

- Upgrade the Chelsea Carter Street Pump Station: This 1950's pump station, and its associated collection and discharge piping, is undersized in future flow scenarios. This station will need upgrades coordinated with the broader Market Street Culvert and Spruce Street Drain tributary area improvements so that optimal routing may be determined and efficiency in scale may be achieved. The City of Chelsea Sewer Separation Master Plan suggests capacity should be upgraded to 50 million gallons per day (MGD), though depending on its role in the broader suite of pumping and storage systems, additional upgrades to further increase capacity may be required.

- New Spruce Street Pump Station with Storage: This pump station was identified in the City of Chelsea Sewer Separation Master Plan with indication that its's capacity may need to be 25 MDG. The need for this station is dependent on the configuration of hydraulics improvements and scale of proximate district pump stations and may be eliminated with addition of interceptors and upsizing other pumping improvements.

- Interceptor & Force Main: The key district-scale pipeline improvements may include 1) a new interceptor pipe to connect the Behen Street Drain collection system to the intersection of Beacham Street and Market Street (where pumping would be configured), 2) new interceptor pipe to connect the Spruce Street Drain to the Carter Street Pump Station site (for relief/overflow potentially in-lieu of pumping), and 3) new or upgraded force main discharge from each pumping station, from the pump stations to discharge at the IER Island End River.

- Local Collector Pipe: A variety of local street pipeline improvements will be required in the district to maintain aging infrastructure and support performance in climate change event scenario.

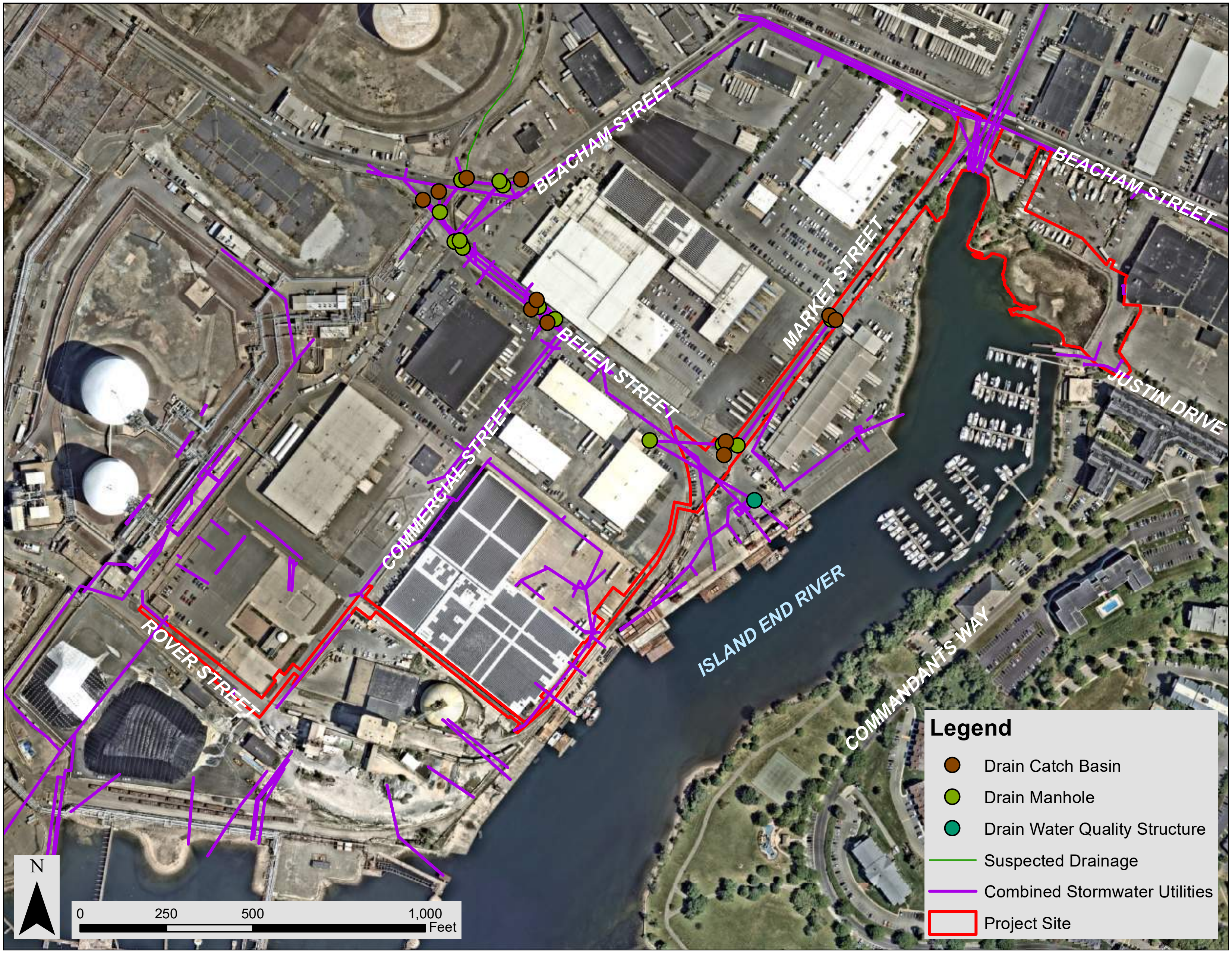


Figure 8-1
Existing Stormwater Infrastructure Exhibit
Source: Fort Point Associates, Inc., 2023

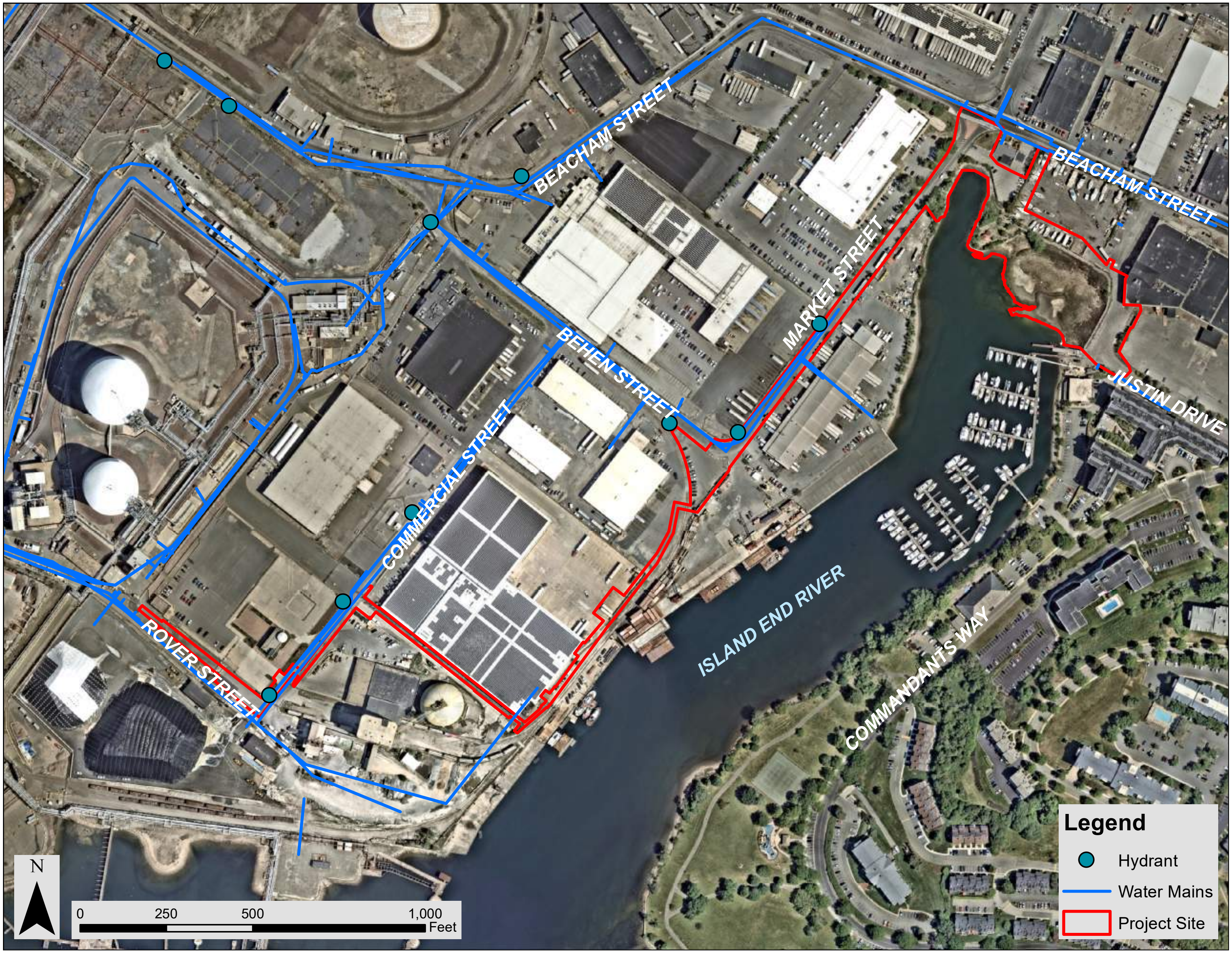


Figure 8-2
Existing Water Infrastructure Exhibit
Source: Fort Point Associates, Inc., 2023

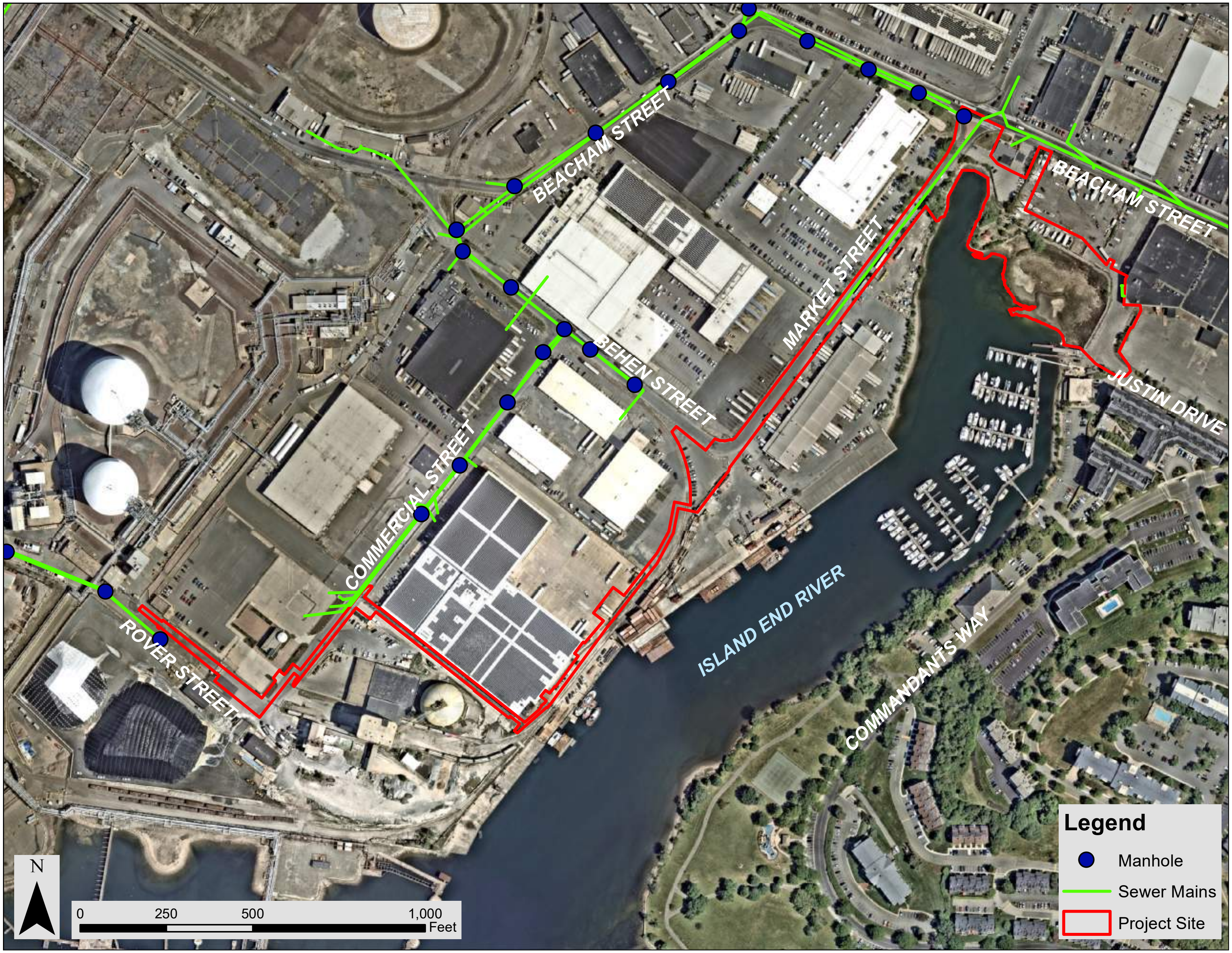


Figure 8-3
Existing Wastewater Infrastructure Exhibit
Source: Fort Point Associates, Inc., 2023

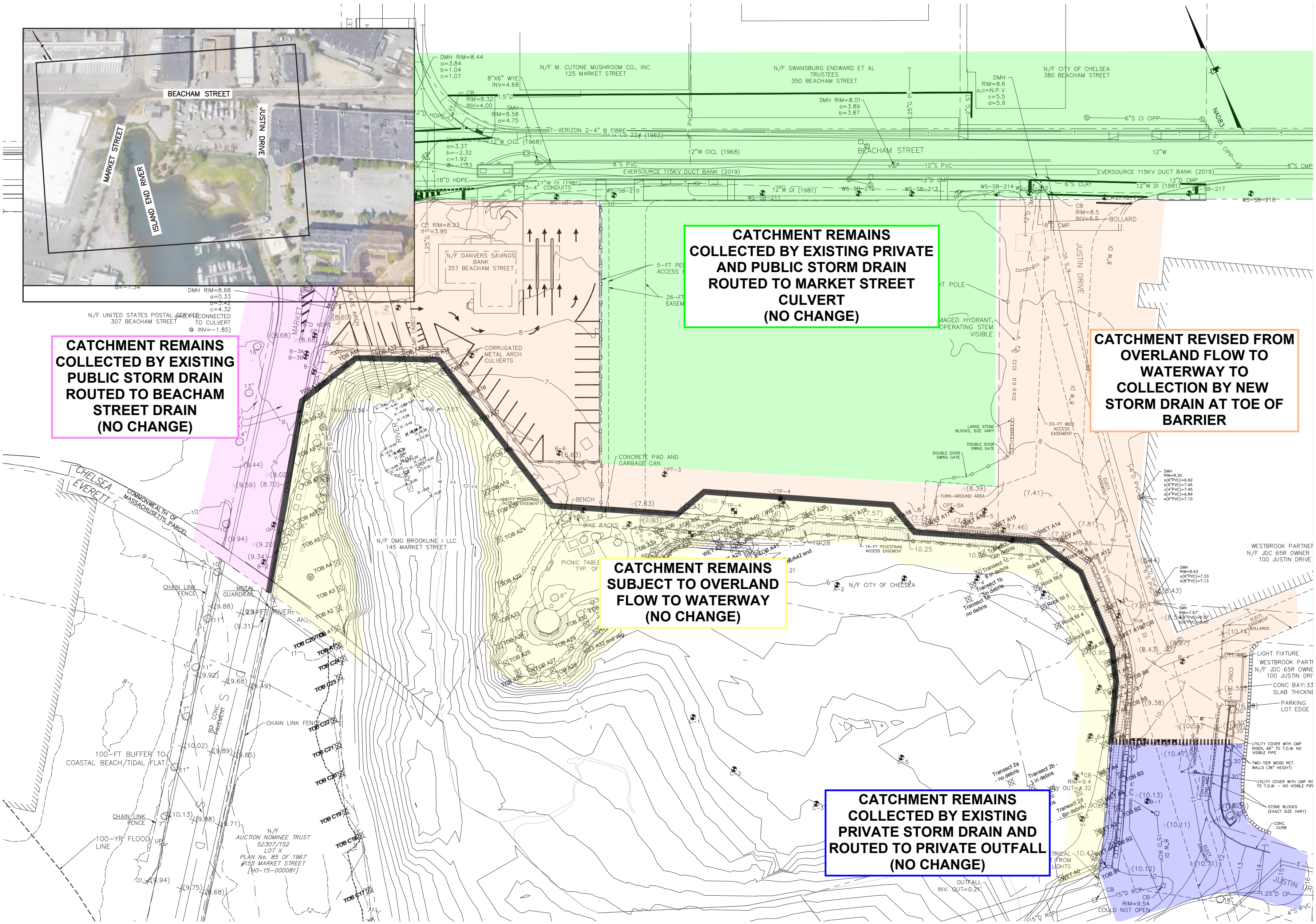


Figure 8-4
Stormwater Catchment Areas - Chelsea
Source: Weston & Sampson, Inc., 2023

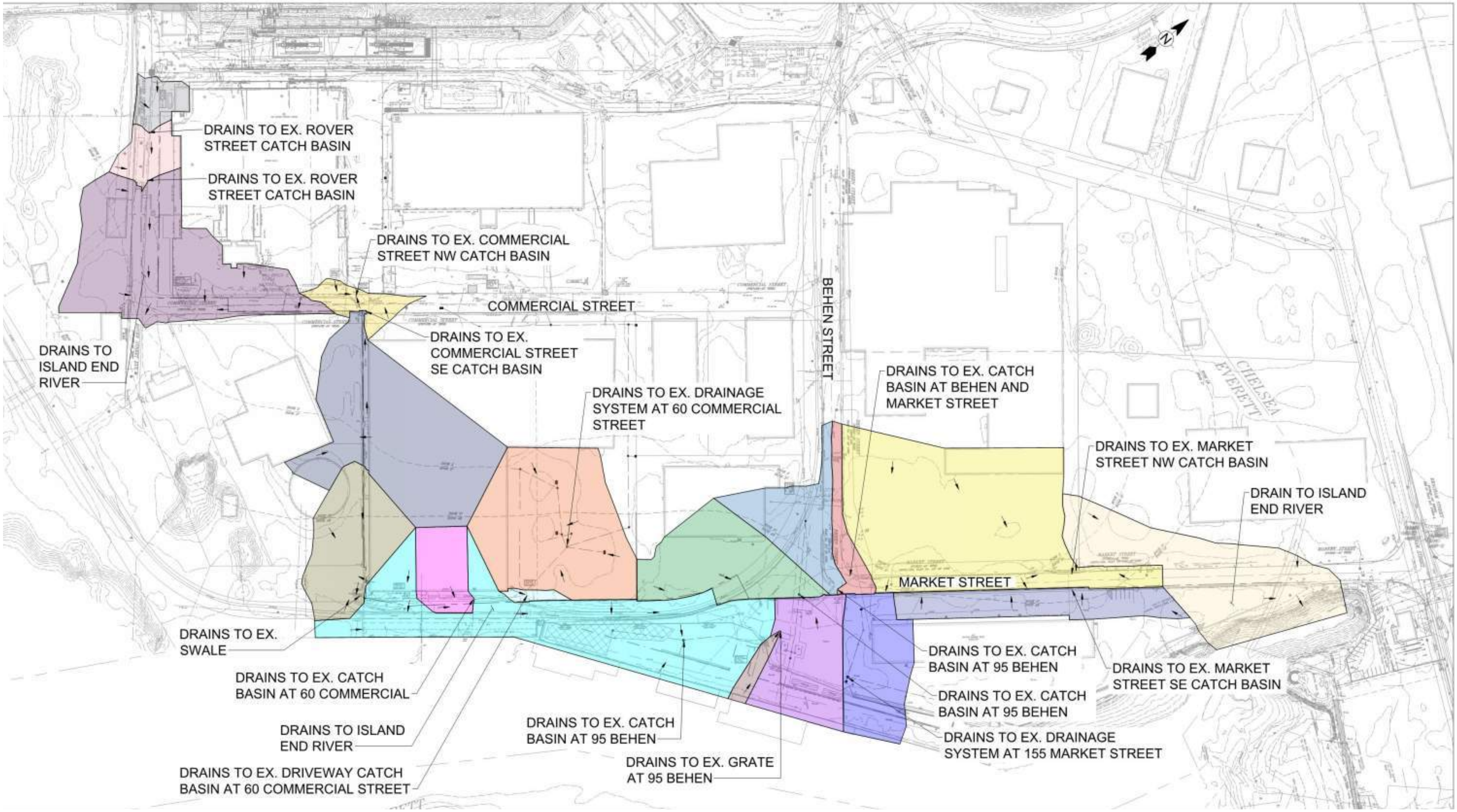


Figure 8-5
Stormwater Catchment Areas - Everett
Source: Tetra Tech, 2023

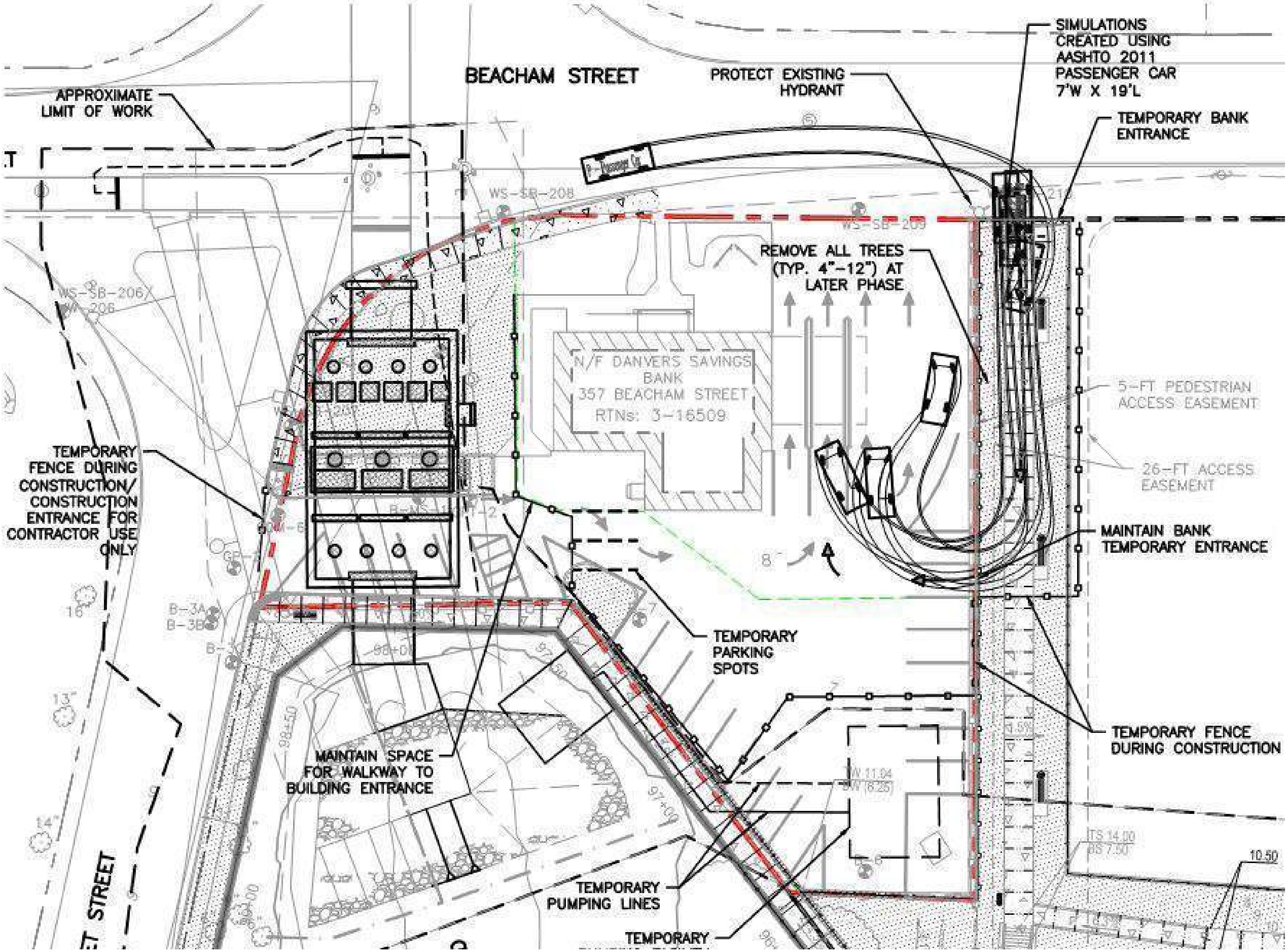


Figure 8-6
Example Construction Work Zone in Single-Phase SSCF Construction
Source: Weston & Sampson, Inc., 2023

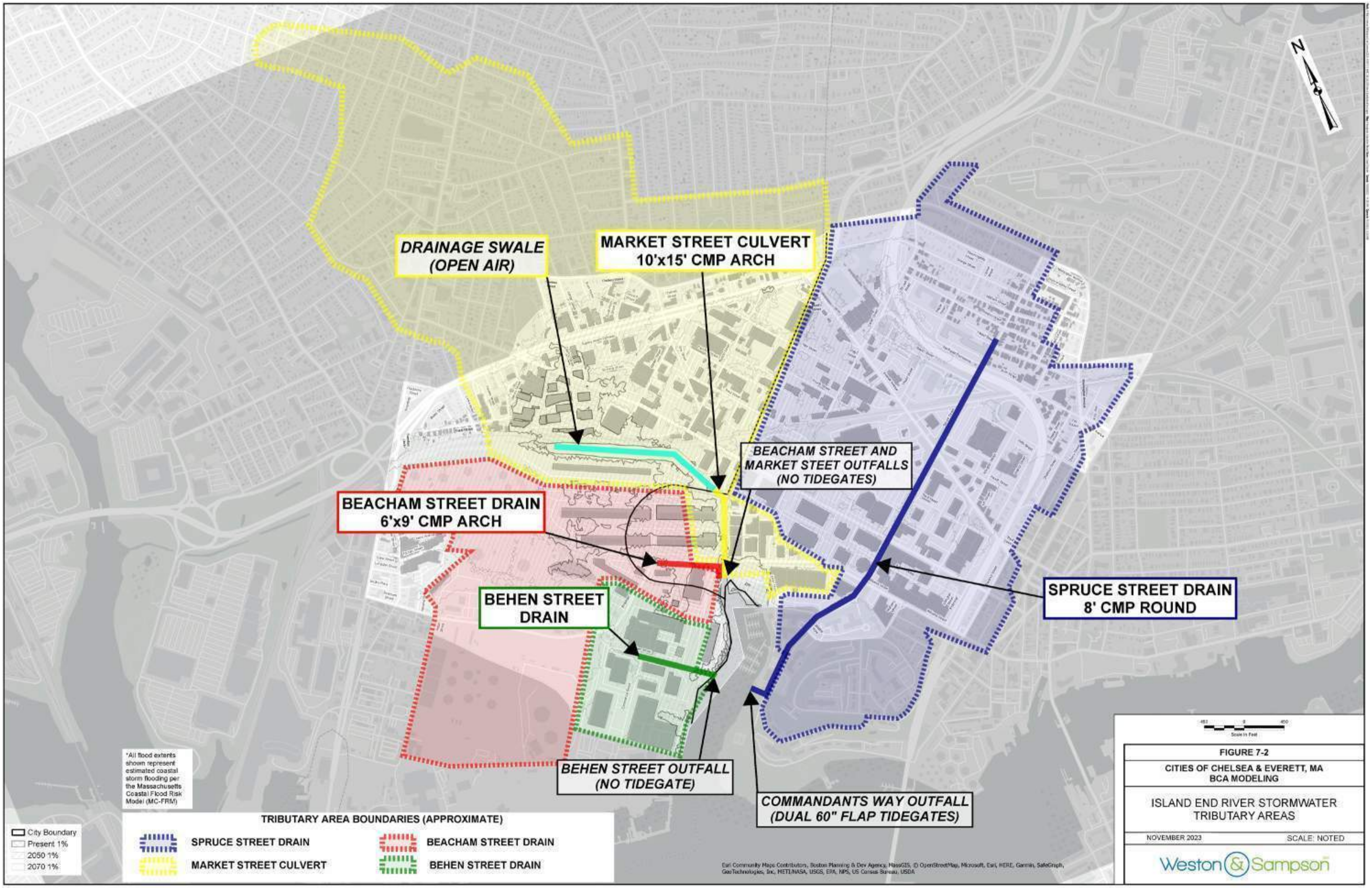


Figure 8-7
Island End River Stormwater Collection System & Tributary Areas Over Floodplain
Source: Weston & Sampson, Inc., 2023

Chapter 9

MITIGATION AND DRAFT SECTION 61 FINDINGS

CHAPTER 9: MITIGATION AND DRAFT SECTION 61 FINDINGS

9.1 INTRODUCTION

The Project as described in the previous chapters has incorporated numerous public benefits and mitigation measures that respond to potential impacts related to environmental justice ("EJ"), tidelands, wetlands and water quality, dredging and disposal, stormwater and flood resiliency, infrastructure and transportation, and the construction period.

The following section addresses the public benefit determination required pursuant to M.G.L. c. 91, § 18B and 301 CMR 13.02(1). Throughout the rest of this chapter, the public benefits and mitigation measures included in the Project are presented for each subject matter area and correspond with the preceding chapters of this DEIR. Cost estimation is included to accompany benefits and measures where possible at this stage of the Project. The tables include the associated agency action or permit as applicable and the parties responsible for implementation. The chapter concludes with draft Massachusetts General Laws, Chapter 30, section 61 ("Section 61") findings for each agency action required for approval of the Project.

9.2 COMPLIANCE WITH PUBLIC BENEFIT DETERMINATION REGULATIONS

In accordance with M.G.L. c. 91, § 18B and 301 CMR 13.02(1), the Secretary of Energy and Environmental Affairs ("EEA") must conduct a public benefit determination for projects that 1) files an environmental notification form after November 15, 2007; 2) is required to file an environmental impact report; and 3) is completely or partially located in tidelands or landlocked tidelands. This section has been prepared to address the applicable benefits the Secretary may consider when preparing the determination.

As discussed in Chapter 4, the Project is water-dependent and therefore is presumed to meet the criteria listed in 301 CMR 13.04 and provide adequate public benefits. The Project will provide regional protection in the Cities of Chelsea and Everett against current and projected elevations of future mean high and high tide elevations and coastal storm surge flooding events. Properties within the area of flood protection provided by the Project include critical facilities such as healthcare providers, public safety facilities, a public school, and a grocery store, as well as residences of under-served EJ communities and important regional employment centers that provide thousands of jobs to local residents.

The Project has been carefully designed to maintain the function of existing and potential future water-dependent industrial uses in the Mystic River Designated Port Area ("DPA") while still achieving its flood protection goals for both water-dependent industrial uses ("WDIUs") and other land use types. It achieves this balance by incorporating eight flood gates into the storm surge barrier alignment to provide continued access to DPA properties while protecting inland areas, The Project's alignment and design both within and outside of the Mystic River DPA was informed by continued coordination with surrounding property owners at outreach events including but not limited group and individual meetings and site walks.

Outside of the Mystic River DPA limits, the Project will substantially benefit the public trust rights in tidelands by providing enhanced access to the Island End River ("IER") waterfront at Island End Park. Americans with Disabilities Act (ADA)-accessible sidewalks, bike racks, a new boardwalk, and an overall redesigned Island End Park will provide an inviting location for the public to access the water's edge, engage with the local area through multilingual interpretive signage, and enjoy environmental resource areas in what is otherwise a largely hardscaped industrial district.

Finally, the Project will protect and enhance the natural environment of the Project Site through a variety of measures. Along the east and west IER shorelines, Nature-based approaches ("NbA") consisting of cobble beach nourishment and coastal plantings will stabilize the severely eroded coastal bank and coastal beach between Market Street and the IER and improve ecological functions and values. The salt marsh southeast of Island End Park will be improved through removal of debris and invasive species and replanting of these areas with native salt marsh vegetation. This will effectively expand the footprint of the salt marsh and in turn, bring benefits to water quality and wildlife habitat.

The public benefits noted above, as well as others discussed throughout the rest of this chapter, demonstrate that the Project complies with the public benefits standards codified at 301 CMR 13.04. Accordingly, the Proponents respectfully request that the Secretary issue a public benefit determination finding that the IER Flood Resilience Project will have a public benefit.

9.3 PUBLIC BENEFITS

As described in Chapter 1 and throughout this DEIR, the Project will bring substantial public benefits to the Chelsea and Everett communities once constructed. These public benefits are summarized below and will help mitigate any adverse impacts associated with the Project.

Subject Matter	Improvement Measure	Schedule
Public Benefits	• Storm surge Barrier and storm surge control facility ("SSCF") flood resilience infrastructure: Protect residential, industrial, and commercial properties	Operations period

Subject Matter	Improvement Measure	Schedule
	and critical regional facilities across 500 acres in the Cities of Chelsea and Everett from damage caused by coastal flooding and sea level rise. (approximately $57M+)	
	• NbA: Enhance ecological functions in and around the IER through incorporating Nature-based Approaches and wetlands enhancements that will improve habitat for birds, pollinators, and shellfish over time. (approximately $2M+)	Operations period
	• Introduce community stewardship opportunities at the Island End Park.	Operations period
	• Increase public access to the IER waterfront through investments in Island End Park including new accessways, interpretive signage in multiple languages, new benches, bike racks, and other site furnishings, and new native groundcover and tree plantings. (approximately $3M+)	Operations period
	• Create between 670 and 1,000 construction jobs over the projected 36 months of Project construction.	Construction period
	• Provide frequent and meaningful opportunities for community involvement and participation in the Project through the Community Advisory Group, the Stakeholder Working Group, and numerous other community engagement activities.	Planning period

9.4 ENVIRONMENTAL JUSTICE MITIGATION

As described in Chapter 3, the Project will substantially benefit EJ communities in Chelsea and Everett by protecting over the homes of over 5,000 residents in census block groups designed as EJ Populations, as well as regional job centers and critical facilities and infrastructure. The Project will also expand access to and improve the public realm of the IER waterfront. Impacts to EJ communities during the construction period will be mitigated through the following measures.

Subject Matter	Improvement Measure	Schedule
Environmental Justice	• Construct a Project that will introduce climate resiliency measures to help protect over 500 acres of land with EJ communities and job centers from future climate change impacts including projected MHW, coastal high tide and storm surge flooding. (total project estimated construction cost = approximately $67M+) • Create enhanced greenspace at Island End Park and improve the surrounding public realm to increase access to the IER waterfront and mitigate urban heat island effect. (approximately $3M+) • Reduce construction period impacts through use of diesel retrofitted equipment, turning off idling equipment, wetting down areas during construction, monitoring airborne dust levels, employing appropriate mufflers on all equipment to reduce noise, replacing specific operations and techniques with less noisy ones, deploying traffic flaggers and traffic protection measures on roadways impacted by construction, following transportation demand measures for construction equipment and workers, implementing a Construction Management Plan ("CMP"), and	Operations period Operations period Construction period

Subject Matter	Improvement Measure	Schedule
	following all local, state, and federal regulations concerning construction. (approximately $2M+) • Engage with residents, community-based organizations, tribal organizations, government agencies and other relevant stakeholders throughout the Project's planning and design, construction, and operation, including by providing ongoing community stewardship opportunities at Island End Park.	Planning, construction, and operations period

9.5 TIDELANDS AND DESIGNATED PORT AREA MITIGATION

As described in Chapters 4 and 5, the Project incorporates substantial mitigation measures to preserve sites in the Mystic River DPA for existing and future WDIUs, as well as to minimize impacts to tidelands within and outside of the DPA and comply with the public trust rights in tidelands.

Subject Matter	Improvement Measure	Schedule
Tidelands and Designated Port Area	• Establish a Stakeholder Working Group including DPA property owners to solicit input and feedback on the Project throughout the planning and design stages. • Redesign the storm surge barrier to shift its alignment inland and retain the capacity of DPA properties to support current and future water-dependent industrial uses. • Provide eight flood gates serving key roadways and individual properties to provide continued access to waterfront industrial and general industrial properties in the Mystic River DPA. (approximately $3M+)	Planning period Planning period Operations period

Subject Matter	Improvement Measure	Schedule
	• Enhance public access to tidelands at Island End Park in accordance with the public trust doctrine.	Operations period

9.6 WETLANDS AND WATER QUALITY MITIGATION

As described in Chapter 6, the Project includes salt marsh restoration, incorporation of additional NbA along the IER shoreline, and other measures to mitigate adverse impacts to wetlands and water quality caused by the Project.

Subject Matter	Improvement Measure	Schedule
Wetlands and Water Quality	• Restore the degraded salt marsh between Island End Park and Justin Drive by removing invasive species and accumulated debris, reestablishing salt marsh vegetation, and improving ecological functions. (approximately $700,000) • Incorporate NbA along the east and west IER shoreline to prevent further erosion while improving water quality and wildlife habitat. (approximately $2M+) • Minimize environmental impacts while improving public access to Island End Park by constructing a pile-supported rather than solid fill access ramp over the storm surge barrier. • Use efficient design and construction practices to minimize Project Site area to the extent practicable and avoid unnecessary wetland impacts. • Implement best management practices during construction such as turbidity curtains, slow start pile driving, following time-of-year ("TOY") restrictions, dredging with an environmental bucket, wetting down	Operations period Operations period Operations period Planning and construction period Constriction period

Subject Matter	Improvement Measure	Schedule
	areas to control dust, coir logs, and catch basin inlet protection.	

9.7 DREDGING AND DISPOSAL MITIGATION

As described in Chapter 6, dredging and marine construction activities will follow applicable local, state, and federal regulations for dredging and disposal of dredge spoils.

Subject Matter	Improvement Measure	Schedule
Dredging and Disposal	• Implement TOY restrictions as designated by the Massachusetts Division of Marine Fisheries (DMF).	Construction period
	• Install a bottom anchored turbidity curtain prior to dredging work. (approximately $31,000)	Construction period
	• Minimize turbidity during dredging through use of a mechanical clamshell dredge with an environmental bucket.	Construction period
	• Conduct dredge sampling analysis to determine the best option for dredged material disposal.	Planning period
	• Follow all state and federal regulatory requirements regarding dredging and handling and disposal of dredged material.	Construction period

9.8 FLOOD RESILIENCY MITIGATION

As described in Chapter 7, the Project is informed by extensive study of longstanding existing and projected future coastal and stormwater flooding issues in Chelsea and Everett.

Subject Matter	Improvement Measure	Schedule
Stormwater and Flood Resiliency	• Proactively identify stormwater management opportunities in the IER watershed to plan for future implementation of provisions that will address longstanding pluvial flooding issues in the Chelsea and Everett industrial districts.	Planning period
	• Assemble regional collaboration meetings involving the Cities of Chelsea and Everett and community-based organization to identify funding opportunities to address other resiliency needs in the Cities.	Planning period
	• Design the SSCF with sufficient capacity to enable future incorporation of stormwater pumping system as needed.	Planning and operations period

9.9 INFRASTRUCTURE AND TRANSPORTATION MITIGATION

As described in Chapter 8, the Project will provide substantial improvements to the stormwater infrastructure in the vicinity of the Project Site and impacts to the surrounding transportation network will be minimal during normal conditions when the flood gates are open. Mitigation measures for any adverse impacts to infrastructure and transportation systems are outlined below.

Subject Matter	Improvement Measure	Schedule
Infrastructure and Transportation	• Replace the existing Beacham Street and Market Street culverts with a SSCF to reduce tidal backflow into upstream drainage systems, including at the daylit portion of the Market Street system. (approximately $20M+)	Operations period

Subject Matter	Improvement Measure	Schedule
	• Construct and/or replace catch basins, drainage pipes, outfall structures, and backflow prevention devices for drainage systems proximate to the storm surge barrier. (approximately $2M+) • Incorporate eight flood gates at strategically selected locations along the flood wall alignment to allow for continued access to properties on Market Street, Behen Street, Commercial Street, and Rover Street by trucks, passenger vehicles, and freight trains. (approximately $3M+) • Enhance multimodal transportation access to Island End Park through constructing ADA-accessible sidewalks and walkways and installing bike racks. (approximately $2M+)	Operations period Operations period Operations period

9.10 CONSTRUCTION PERIOD MITIGATION

To address construction period impacts associated with the Project, the Proponent are committed to the following mitigation measures.

Subject Matter	Improvement Measure	Schedule
Construction Period	• Prepare and implement a construction management plan that will address reduction of construction period impacts. • Prepare and implement a Stormwater Pollution Prevention Plan to minimize erosion and prevent sediment laden discharges from the active work zones. • Reduce air quality impacts during the construction-period, including through the use of diesel retrofitted equipment,	Planning and construction period Construction period Construction period

Subject Matter	Improvement Measure	Schedule
	wetting down areas during construction, turning off idling equipment, and monitoring airborne fugitive dust levels. • Deploy traffic flaggers and traffic protection measures on roadways impacted by construction. (approximately $2M+) • Establish designated parking areas for construction employees. • Schedule construction start and stop times and deliveries of materials to coincide with off-peak travel periods of nearby roadways. • Use slow start pile driving.	Construction period Construction period Construction period Construction period

9.11 DRAFT SECTION 61 FINDINGS

Massachusetts General Laws Chapter 30, Section 61, requires state agencies and authorities, when approving, providing land or funding for, or undertaking a project, to evaluate and determine whether the project causes any damage to the environment, and to make a written finding describing that determination and confirming that all feasible measures have been taken to avoid, minimize, and mitigate any damage to the environment. Under the Massachusetts Environmental Policy Act (MEPA) regulations, an agency's Section 61 findings are directed to those aspects of the project that are within the subject matter scope of the agencies respective permit or within the geographic area subject to a land transfer.

State agencies expected to make Section 61 findings for the Project prior to issuing approvals for implementing the Project include the Massachusetts Department of Environmental Protection (MassDEP) and the Massachusetts Office of Coastal Zone Management (MCZM). This DEIR addresses and provides draft Section 61 Findings for these agencies.

The following draft Section 61 findings reflect the mitigation measures related to each of the following agencies' jurisdictions as they may be implemented. All such mitigation shall be subject to the Proponent obtaining all federal, state, and local approvals. As required by the Secretary's Certificate on the Expanded ENF, the implementation schedules for these mitigation measures are included in the draft Section 61 findings.

FINDING BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION

BUREAU OF RESOURCE PROTECTION – WETLANDS AND WATERWAYS

FOR A WATER QUALITY CERTIFICATION UNDER M.G.L. C. 30, S. 61

Introduction

Massachusetts General Laws, Chapter 30, section 61 ("Section 61") requires that "[a]ll agencies, departments, boards, commission and authorities of the commonwealth shall review, evaluate, and determine the impact on the natural environment of all works, projects, or activities conducted by them and shall use all practical means and measures to minimize damage to the environment. Unless a clear contrary intent is manifested, all statutes shall be interpreted and administered so as to minimize and prevent damage to the environment. Any determination made by an agency of the commonwealth shall include a finding describing the environmental impact, if any, of the project and a finding that all feasible measures have been taken to avoid or minimize said impact." The finding required by Section 61 "shall be limited to those matters which are within the scope of the environmental impact report, if any, required [on a project]." M.G.L. c. 30. S. 62A.

Construction of the Island End River Flood Resilience Project is anticipated to require a 401 Water Quality Certification from MassDEP for the discharge of fill in and dredging of state waters. Therefore, the MassDEP must issue a Section 61 Finding.

MEPA Review

An Expanded Environmental Notification Form (EENF) for the Project was prepared and filed on February 15, 2023. The Secretary of the Executive Office of Environmental Affairs (the "Secretary") issued a Certificate on the EENF specifying the scope for a Draft Environmental Impact Report (DEIR) on April 14, 2023. The DEIR was filed with the Secretary on November 15, 2023. The Secretary issued the Certificate on the DEIR on [DATE] _____ 2023.

Project Description

The Cities of Chelsea and Everett propose to construct an approximately 4,560-linear-foot coastal storm surge barrier, an approximately 3,000-square-foot storm surge control facility, approximately 18,000 square feet of nature-based approaches along the Island End River ("IER") east and west shorelines, and associated wetland and public access improvements at Island End Park in the Cities of Chelsea and Everett (the "Project"). The intent of the Project is to introduce protection from coastal flooding events associated with sea level rise to over 500-acres of low-lying land within these cities including the residences of under-served EJ communities, regional job centers, significant transportation (rail and roadway) infrastructure, health care facilities, a grocery store, and a public high school, all of which will become part of the projected IER floodplain by 2070.

Mitigation Measures

- Implement time-of-year restrictions as designated by the Massachusetts Division of Marine Fisheries;
- Install a bottom-anchored turbidity curtain prior to dredging work;
- Minimize turbidity during dredging through use of a mechanical clamshell dredge with an environmental bucket;
- Conduct a dredge sampling analysis to determine the best option for dredged material disposal; and
- Follow all state and federal regulatory requirements regarding dredging and handling and disposal of dredged material.

Conclusion

Now, therefore, the DEP-BRP, having reviewed the MEPA filings for the Island End River Flood Resilience Project and the mitigation measures proposed, finds pursuant to M.G.L. c. 30, section 61 that with the implementation of the aforesaid measures, all practical and feasible means and measures will have been taken to avoid or minimize potential damage to the environment from the Project.

MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION – BUREAU OF RESOURCE PROTECTION – WETLANDS AND WATERWAYS

__________________________ ________________________________

Date By

FINDING BY DEPARTMENT OF ENVIRONMENTAL PROTECTION

BUREAU OF RESOURCE PROTECTION – WATERWAYS REGULATION PROGRAM

FOR A CHAPTER 91 LICENSE UNDER M.G.L. C. 30, S. 61

Introduction

Massachusetts General Laws, Chapter 30, section 61 ("Section 61") requires that "[a]ll agencies, departments, boards, commission and authorities of the commonwealth shall review, evaluate, and determine the impact on the natural environment of all works, projects, or activities conducted by them and shall use all practical means and measures to minimize damage to the environment. Unless a clear contrary intent is manifested, all statutes shall be interpreted and administered so as to minimize and prevent damage to the environment. Any determination made by an agency of the commonwealth shall include a finding describing the environmental impact, if any, of the project and a finding that all feasible measures have been taken to avoid or minimize said impact." The finding required by Section 61 "shall be limited to those matters which are within the scope of the environmental impact report, if any, required [on a project]." M.G.L. c. 30. S. 62A.

The development of the Island End River Flood Resilience Project may require a Chapter 91 license from MassDEP for the structures, fill, and uses, in filled and flowed tidelands of the commonwealth. Therefore, the DEP-BRP must issue a Section 61 Finding.

MEPA Review

An Expanded Environmental Notification Form (EENF) for the Project was prepared and filed on February 15, 2023. The Secretary of the Executive Office of Environmental Affairs (the "Secretary") issued a Certificate on the EENF specifying the scope for a Draft Environmental Impact Report (DEIR) on April 14, 2023. The DEIR was filed with the Secretary on November 15, 2023. The Secretary issued the Certificate on the DEIR on [DATE] _____ 2023.

Project Description

The Cities of Chelsea and Everett propose to construct an approximately 4,560-linear-foot coastal storm surge barrier, an approximately 3,000-square-foot storm surge control facility, approximately 18,000 square feet of nature-based approaches along the Island End River ("IER") waterfront, and associated wetland and public access improvements at Island End Park in the Cities of Chelsea and Everett (the "Project"). The intent of the Project is to introduce protection from coastal flooding events associated with sea level rise to over 500-acres of low-lying land these cities including the residences of under-served EJ communities, regional job centers, significant transportation (rail and roadway) infrastructure, health care facilities, a grocery store, and a public high school, all of which will become part of the projected IER floodplain by 2070.

Mitigation Measures

- Establish a Stakeholder Working Group including Designated Port Area ("DPA") property owners to solicit input and feedback on the Project throughout the planning and design stages;
- Redesign the storm surge barrier to shift its alignment inland and retrain the capacity of DPA properties to support current and future water-dependent industrial uses;
- Provide flood gates serving key roadways and individual properties to provide continued access to waterfront industrial and general industrial properties in the Mystic River DPA; and
- Enhance public access to tidelands at Island End Park in accordance with the public trust doctrine.

Conclusion

Now, therefore, the DEP-BRP, having reviewed the MEPA filings for the Island End River Flood Resilience Project and the mitigation measures proposed, finds pursuant to M.G.L. c. 30, section 61 that with the implementation of the aforesaid measures, all practical and feasible means and measures will have been taken to avoid or minimize potential damage to the environment from the Project.

MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION – BUREAU OF RESOURCE PROTECTION – WATERWAYS REGULATION PROGRAM

__________________________ ________________________________

Date By

Attachment A

DISTRIBUTION LIST

ATTACHMENT A: DISTRIBUTION LIST

Table 1: Agencies

Agency	Contact	
	Email Address	**Address**
Massachusetts Environmental Policy Act (MEPA) Office	MEPA@mass.gov eva.vaughan@mass.gov	MEPA Office 100 Cambridge Street, Suite 900 Boston, MA 02114
Department of Environmental Protection, Boston Office	helena.boccadoro@mass.gov DEP.Waterways@mass.gov DEP.Wetlands@mass.gov	MassDEP Commissioner's Office 100 Cambridge Street, 9th Floor Boston, MA 02114 DEP Waterways Program Attn: Daniel J. Padien 100 Cambridge Street, 9th Floor Boston, MA 02114
Department of Environmental Protection, Northeast Regional Office	john.d.viola@mass.gov	MassDEP Northeast Regional Office Attn: MEPA Coordinator 150 Presidential Way Woburn, MA 01801
Massachusetts Department of Transportation – Boston	MassDOTPPDU@dot.state.ma.us	MassDOT Public/Private Development Unit 10 Park Plaza, Suite #4150 Boston, MA 02116
Massachusetts Department of Transportation – District 6 Office	michael.garrity@dot.state.ma.us	MassDOT, District 6 Office Attn: MEPA Coordinator 185 Kneeland Street Boston, MA 02111
Massachusetts Historical Commission	Mail a hard copy of the filling	The MA Archives Building 220 Morrissey Boulevard Boston, MA 02125
Massachusetts Office of Coastal Zone Management	joanna.m.yelen@state.ma.us patrice.bordonaro@mass.gov	Coastal Zone Management Attn: Project Review Coordinator 251 Causeway Street, Suite 800 Boston, MA 02114

Agency	**Contact**	
	Email Address	**Address**
EEA Environmental Justice Director[1]	MEPA-EJ@mass.gov	MEPA Office Attn: EEA EJ Director 100 Cambridge Street, Suite 900 Boston, MA 02114
Massachusetts Division of Marine Fisheries	DMF.EnvReview-North@mass.gov Kate.frew@mass.gov	DMF – North Shore Attn: Environmental Reviewer 30 Emerson Avenue Gloucester, MA 01930
Massachusetts Water Resources Authority (MWRA)	Katherine.ronan@mwra.com	Massachusetts Water Resource Authority Attn: MEPA Coordinator 100 First Avenue Boston, MA 02129
Metropolitan Area Planning Council (MAPC)	afelix@mapc.org mpillsbury@mapc.org	Metropolitan Area Planning Council 60 Temple Place, 6th Floor Boston, MA 02111
City of Everett City Council	Councilors@ci.everett.ma.us	Everett City Council 484 Broadway, Room 38 Everett, MA 02149
City of Everett Director of the Planning & Development Department	Matt.Lattanzi@ci.everett.ma.us	Everett Planning & Development Office 484 Broadway, Room 25 Everett, MA 02149
City of Everett Conservation Commission	Tom.Philbin@ci.everett.ma.us	Everett Conservation Commission 484 Broadway, Room 25 Everett, MA 02149
City of Everett Board of Health	Sabrina.firicano@ci.everett.ma.us	Everett Board of Health 484 Broadway, Room 20 Everett, MA 02149
City of Chelsea City Council	citycouncil@chelseama.gov fmelara@chelseama.gov	Chelsea City Council Chelsea City Hall, Room #306 500 Broadway Chelsea, MA 02150

[1] Advance notice of filing of this DEIR was submitted to community-based organizations and tribes based on a recommended list provided by the EEA EJ Director in accordance with the Final MEPA Public Involvement Protocol for Environmental Justice Populations (effective January 1, 2022).

Agency	**Contact**	
	Email Address	**Address**
City of Chelsea Permitting & Land Use Planning Board	jdpriest@chelseama.gov	Chelsea Permitting & Land Use Planning Board Chelsea City Hall, Room #101, 500 Broadway Chelsea, MA 02150
City of Chelsea Conservation Commission	jdpriest@chelseama.gov	Chelsea Conservation Commission Chelsea City Hall, Room #101-104 500 Broadway Chelsea, MA 02150
City of Chelsea Department of Public Health	famaya@chelseama.gov	Chelsea Department of Public Health Chelsea City Hall, Room #100B 500 Broadway Chelsea, MA 02150
United States Army Corps of Engineers	paul.j.sneeringer@nae02.usace.army.mil	United States Army Corps of Engineers New England District Attn: Paul Sneeringer 696 Virginia Road Concord, MA 01742
United States National Marine Fisheries Service	Kaitlyn.shaw@noaa.gov	NOAA GARFO Attn: Kaitlyn Shaw 55 Great Republic Drive Gloucester, MA 01930
United States Environmental Protection Agency	Croy.Rachel@epa.gov reiner.ed@epa.gov	EPA New England Attn: Rachel Croy and Ed Reiner 5 Post Office Square, Suite 100 Boston, MA 02109
Federal Aviation Administration	kenneth.patterson@faa.gov	Email only

Table 2: Additional Expanded Environmental Notification Form Commenters

<table>
<tr><th rowspan="2">Organization</th><th colspan="2">Contact</th></tr>
<tr><th>Email Address</th><th>Address</th></tr>
<tr><td>Boston Harbor Now</td><td>kabbott@bostonharbornow.org</td><td>Boston Harbor Now
Attn: Kathy Abbott
15 State Street, Suite 1100
Boston, MA 02109</td></tr>
<tr><td>Auction Nominee Trust</td><td>stephanie@torski.com
kbuyuk@lwelaw.com</td><td>Lyne, Woodworth Evarts, LLP
Attn: E. Kate Buyuk, Esq.
12 Post Office Sq., 2nd Floor
Boston, MA 02109</td></tr>
</table>

Attachment B

RESPONSE TO COMMENTS

ATTACHMENT B: RESPONSE TO COMMENTS

The Secretary's Certificate on the Expanded Environmental Notification Form ("EENF"), which included the Scope for the Draft Environmental Impact Report ("DEIR"), was issued on April 14, 2023. The comment period for the EENF closed on April 7, 2023. The Certificate on the EENF included seven comment letters from state resource agencies, a local waterfront advocacy group, and an owner of a property in the vicinity of the Project Site.

The following pages contain tables with alphanumerically coded responses to the comments received, which are followed by copies of each comment letter. The letters are presented in the order in which they were attached to the Secretary's Certificate for the EENF. References to additional and technical detailed material elsewhere in this DEIR are also noted in these responses.

A. Massachusetts Office of Coastal Zone Management (CZM); April 6, 2023

#	Response
A-1	The area located west of the existing culverts is constrained by the heavily trafficked Beacham and Market Street rights-of-way, the existing culvert pipe alignments, the critical need for the proximate underground Storm Surge Control Facility ("SSCF") on adjacent private property, and other land acquisition/easement considerations. The Proponent has made a significant effort to locate most of the flood barrier system above the High Tide Line (HTL) to minimize adjacent resource area impacts. Where impacts are unavoidable, the Proponents have proposed offsetting mitigation in the form of resource area enhancement of the existing highly degraded riverbank and ample plantings to promote slope stability and habitat restoration. See Attachment C, Project Plans for additional information.
A-2	Based upon feedback from state agencies related to the prior Nature-based Approach (NBA) utilizing concrete planter technologies, the Proponents have revised the proposed design to eliminate the use of concrete planters and to incorporate a wider range of NBA along the riverfront. Proposed NBA include cobble nourishment, top-dressing of slopes with compatible sediments and vegetation, robust planting plan consisting of salt-tolerant species and other hardy vegetation types, and other approaches in addition to removal of debris from widespread areas of the Coastal Bank. These approaches are described in detail in Chapter 6, Wetlands and Water Quality. See Attachment C, Project Plans for additional information.
A-3	The Proponents have provided an updated Alternatives Analysis focused on NBA along the Island End River ("IER"). See Chapter 2, Alternatives Analysis for additional information.
A-4	Additional detail has been provided regarding proposed stabilization around SSCF outfall headwall system in Chapter 6, Wetlands and Water Quality. See for See Attachment C, Project Plans for additional information.
A-5	The access ramps to Island End Park have been redesigned to incorporate a pile-supported ramp foundation rather than solid fill and retaining walls to reduce the impacts to coastal resource areas. See Attachment C, Project Plans for additional information.

#	Response
A-6	A sediment sampling plan for the Project is provided in Attachment G, Sediment Sampling Plan, along with a full set of Project plans for details of the riprap apron at the SSCF outlet. See for See Attachment C, Project Plans for additional information.
A-7	An Operations & Maintenance (O&M) draft plan has been prepared for the SSCF and is provided as Attachment M, SSCF O&M Plan.
A-8	The Proponents continue to advance regional stormwater source reduction and treatment initiatives in the areas surrounding the Project Site. See Chapter 8, Infrastructure and Transportation for additional information.
A-9	Additional detail has been provided regarding wetlands enhancements, including salt-tolerant plantings and seed mixes list, in Chapter 6, Wetlands and Water Quality, as well as in the Attachment I, Salt Marsh Wetland Replication Plan, and Attachment J, Adaptive Management Plan for the Control of Invasive Species. See for See Attachment C, Project Plans and Attachment I, Salt Marsh Wetland Replication Plan, and Attachment J, Adaptive Management Plan for additional information.
A-10	An Adaptive Management draft plan has been prepared for proposed wetlands enhancements and is provided as Attachment F, Wetlands Delineation Report, Attachment I, Salt Marsh Restoration Plan, and Attachment J, Invasive Species Adaptive Management Plan.
A-11	Project plans have been updated to provide additional detail on proposed walkways associated with Resilience Provisions East ("RPE"). See Attachment C, Project Plans for additional information.
A-12	Additional detail has been provided regarding the Project design suitability for promoting both water-dependent industrial uses and flood resilience in a Designated Port Area (DPA) in Chapter 5, Mystic River Designated Port Area.
A-13	The Project list of permits has been updated to include CZM Federal Consistency Review as the recently updated U.S. Army Corps. of Engineers (USACE) New England District General Permit has been released. See Chapter 1, Project Summary for additional information.

B. Massachusetts Division of Marine Fisheries (DMF); April 6, 2023

#	Response
B-1	The Proponents acknowledge that upcoming USACE permitting review may result in additional mitigation associated with temporary and permanent impacts to subtidal and tidal flats.
B-2	The Project will sequence intertidal work during dry (i.e., low tide) conditions with stabilization of sediment prior to the return of water. All work within subtidal areas will be sequenced to occur in the dry behind cofferdams to minimize turbidity impacts.
B-3	The Project will comply with time of year restrictions (TOY) to protect marine fisheries and habitat.
B-4	An Adaptive Management draft plan has been prepared for proposed Nature-based Approaches and is provided as Attachment K, NbA Adaptive Management Plan.

C. Massachusetts Department of Environmental Protection (MassDEP), Waterways Regulatory Program (WRP); April 6, 2023

#	Response
C-1	Additional detail has been provided regarding the Project design suitability for promoting both water-dependent industrial uses and flood resilience in a Designated Port Area (DPA) in Chapter 5, Mystic River Designated Port Area.
C-2	The Proponents have continued stakeholder engagement efforts since submission of the EENF. Documentation of correspondence with property owners and stakeholders are provided as Attachment E, DPA Site Plans & Stakeholder Coordination Table.
C-3	Refer to detailed analysis of the Project's compliance with the categorical restrictions for work within DPAs at 310 CMR 9.32(1)(b) in Chapter 4, Tidelands.
C-4	Additional detail has been provided regarding the Project design suitability for promoting both water-dependent industrial uses and flood resilience in a Designated Port Area (DPA) in Chapter 5, Mystic River Designated Port Area. Proposed access points and walkways to promote public access to the Chelsea waterfront and Island End Park are located outside of the Mystic River DPA.
C-5	Additional detail has been provided regarding the Project design suitability for promoting both water-dependent industrial uses and flood resilience in a Designated Port Area (DPA) in Chapter 5, Mystic River Designated Port Area.
C-6	Additional detail has been provided regarding the Project design suitability for promoting both water-dependent industrial uses and flood resilience in a Designated Port Area (DPA) in Chapter 5, Mystic River Designated Port Area.
C-7	Additional detail, including site plans showing each individual property within the DPA, has been provided regarding the Project design suitability for promoting both water-dependent industrial uses and flood resilience in a Designated Port Area (DPA) in Chapter 5, Mystic River Designated Port Area.

D. Massachusetts Department of Environmental Protection (MassDEP), Wetlands Program as drafted by Thomas Maguire April 6, 2023

#	Response
D-1	The catchment area for stormwater infrastructure is described in Chapter 8, Infrastructure & Transportation. The Market Street Culvert catchment is approximately 420 Acres. The combined catchment for all stormwater systems that pass through the floodplain is approximately 1,060 acres. The SSCF has been sized with a calibrated understanding of the watershed informed by a Hydrologic & Hydraulic Study (H&H).
D-2	Based upon review of current the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs) associated with the Project Site and all approved map amendments/revisions as published by FEMA to date, the Island End River does not currently have a regulatory floodway established by FEMA. Additionally, no new regulatory floodway is proposed in the pending FEMA FIRM 25017C0443F, which is part of the FEMA Middlesex County FIRM updates (originally scheduled for release in 2020). The only regulatory floodway that includes portions of the City of Everett is located on the Mystic River upstream of the Amelia Earhart Dam. Coastal modeling has been performed to evaluate the performance of the proposed flood barrier in current and future scenarios and to evaluate the potential for any impacts to adjacent portions of the riverfront area. See Chapter 7, Flood Resiliency and Attachment L,

#	Response
	Projected Coastal Flood Maps & RMAT.
D-3	In the design of this coastal resilience project, the Proponents utilized best available flood mapping for the current and future scenarios. In 2016, FEMA issued updated FIRMs and Flood Insurance Study (FIS) for Suffolk County that clearly identified the Island End River as a coastal flood risk for Chelsea properties as Land Subject to Coastal Storm Flowage (LSCSF) resource areas. Since 2018, FEMA has been in the process of issuing updated FIRMs and FIS for Middlesex County. Pending maps that were distributed to the City of Everett (most recently in January 2023) clearly identify the Island End River as a coastal flood risk for Everett properties within the Project Site as LSCSF resource areas. See Figure 1-19, Pending FIRM for the City of Everett for additional information.

E. Auction Nominee Trust – Property Owner of 155 Market Street, Everett; April 7, 2023

#	Response
E-1	Based upon feedback from the property owner of 155 Market Street, the Proponents have updated the proposed flood barrier alignment to site all proposed infrastructure within the Market Street right-of-way. Access to the 155 Market Street site will be maintained through two flood gates at curb cuts located at either end of the existing facility.

F. Boston Harbor Now; April 7, 2023

#	Response
F-1	The Proponents thank Boston Harbor Now for their comment letter and participation in the MEPA Remote Site Consultation for this project. The Proponents intend to continue their partnerships with community organizations to enhance stakeholder outreach and to promote environmental stewardship opportunities.
F-2	Based upon feedback from state agencies related to the prior Nature-based Approach (NBA) utilizing concrete planter technologies, the Proponents have revised the proposed design to eliminate the use of concrete planters and to incorporate a wider range of NBA along the riverfront. Proposed NBA include cobble nourishment, top-dressing of slopes with compatible sediments and vegetation, robust planting plan consisting of salt-tolerant species and other hardy vegetation types, and other approaches in addition to removal of debris from widespread areas of the Coastal Bank. These approaches are described in detail in Chapter 6, Wetlands and Water Quality. See Attachment C, Project Plans for additional information. The Proponents will continue to identify opportunities for community stewardship at the adjacent Island End Park and throughout the community.

G. Massachusetts Department of Environmental Protection (MassDEP), April 7, 2023

#	Response
G-1	The area located west of the existing culverts is constrained by the heavily trafficked Beacham and Market Street rights-of-way, the existing culvert pipe alignments, the critical need for the proximate underground Storm Surge Control Facility ("SSCF") on adjacent private property, and other land acquisition/easement considerations. The Proponent has made a significant effort to locate most of the flood barrier system above the High Tide Line (HTL) to minimize adjacent resource area impacts. Where impacts are unavoidable, the Proponents have proposed offsetting mitigation in the form of resource area enhancement of the existing highly degraded riverbank and ample plantings to promote slope stability and habitat restoration. See Attachment C, Project Plans & Details for

#	Response
	additional information.
G-2	A sediment sampling plan for the Project is provided in Attachment G, Sediment Sampling Plan, along with a full set of Project plans for details of the riprap apron at the SSCF outlet. See for See Attachment C, Project Plans & Details for additional information. An Operations & Maintenance (O&M) draft plan has been prepared for the SSCF and is provided as Attachment M, SSCF O&M Plan. This draft plan includes an inspection schedule, maintenance requirements, operational triggers/frequency, and other parameters.
G-3	An Operations & Maintenance (O&M) draft plan has been prepared for the SSCF and is provided as Attachment M, SSCF O&M Plan. The SSCF maintains combination gate cross sectional area equal to a culvert section, which was sized as part of an extensive H&H study. See Chapter 7 Flood Resiliency, for additional information on evaluation of the SSCF in a multitude of scenarios that identify that the proposed combination gate system will not result in increased inland flooding conditions. See Chapter 8, Infrastructure and Transportation for regional stormwater analysis to date and long-term stormwater management initiatives within the watershed.
G-4	The Proponents anticipate starting the preparation of a Conditional Letter of Map Revision (CLOMR) in 2024 in accordance with potential construction funding requirements by federal agencies.
G-5	Based upon feedback from state agencies related to the prior Nature-based Approach (NBA) utilizing concrete planter technologies, the Proponents have revised the proposed design to eliminate the use of concrete planters and to incorporate a wider range of NBA along the riverfront. Proposed NBA include cobble nourishment, top-dressing of slopes with compatible sediments and vegetation, robust planting plan consisting of salt-tolerant species and other hardy vegetation types, and other approaches in addition to removal of debris from widespread areas of the Coastal Bank. These approaches are described in detail in Chapter 6, Wetlands and Water Quality. See Attachment C, Project Plans for additional information.
G-6	Based upon feedback from state agencies related to the prior Nature-based Approach (NBA) utilizing concrete planter technologies, the Proponents have revised the proposed design to eliminate the use of concrete planters and to incorporate a wider range of NBA along the riverfront. Proposed NBA include cobble nourishment, top-dressing of slopes with compatible sediments and vegetation, robust planting plan consisting of salt-tolerant species and other hardy vegetation types, and other approaches in addition to removal of debris from widespread areas of the Coastal Bank. These approaches are described in detail in Chapter 6, Wetlands and Water Quality. See Attachment C, Project Plans for additional information
G-7	The access ramps to Island End Park have been redesigned to incorporate a pile-supported ramp foundation rather than solid fill and retaining walls to reduce the impacts to coastal resource areas. See Attachment C, Project Plans for additional information.
G-8	Additional detail has been provided regarding wetlands enhancements, including salt-tolerant plantings and seed mixes list, in Chapter 6, Wetlands and Water Quality. See for See Attachment C, Project Plans for additional information. An Adaptive Management draft plan has been prepared for proposed wetlands enhancements and is provided as Attachment F, Wetlands Delineation Report, Attachment I, Salt Marsh Restoration Plan, and Attachment J Invasive Species Adaptive Management Plan.
G-9	The Project has been further revised to propose replication of salt marsh, as described in Attachment I Salt Marsh Wetland Replication Plan.

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS
OFFICE OF COASTAL ZONE MANAGEMENT
100 Cambridge Street, Suite 900, Boston, MA 02114

MEMORANDUM

TO:	Rebecca Tepper, Secretary, EEA
ATTN:	Eva Vaughn, MEPA Office
FROM:	Lisa Berry Engler, Director, CZM
DATE:	April 7, 2023
RE:	EEA- 16667, Island End River; Chelsea and Everett

Lisa Berry Engler

The Massachusetts Office of Coastal Zone Management (CZM) has completed its review of the above-referenced Expanded Environmental Notification Form noticed in the *Environmental Monitor* dated February 24, 2023, and recommends the development of an Environmental Impact Report (EIR) to better assess the environmental impacts of the proposed project and to ensure that they have been appropriately minimized.

Project Description

The Cities of Chelsea and Everett propose to construct a coastal storm surge barrier, storm surge control facility, riverfront nature-based solutions, and related amenities at the Island End River in the Cities of Chelsea and Everett. The approximately 9.5-acre project site is currently composed of a mix of commercial and industrial uses and supporting roadway and utility infrastructure. The existing banks of the river are highly degraded by legacy industrial uses and are comprised of hardened slope stabilization measures and littered with debris. The proposed project includes an approximately 4,640 linear-foot storm surge barrier, an approximately 2,900 square-foot (sf) underground storm surge control facility, approximately 50,000 sf of nature-based solutions along the riverfront, and associated wetland and public access improvements along the Island End River.

Project Comments

Climate Resiliency

Since the original design, the proposed flood barrier has been moved landward of the high tide line along the majority of the project site length. This improvement to the project will reduce the impacts of the vertical wall on fronting coastal resource areas. There is one area west of the culverts that remains in close proximity to Mean High Water (MHW). Based on the information provided in the plans, it appears this area could be shifted landward so it is also located landward of the high tide line. A-1

Based on the Resource Area Impact Plans in the EENF, the proposed project includes placing stone sills and concrete planters on the coastal bank, coastal beach, and in the intertidal area. Placing planters in those areas will have permanent adverse impacts on those resource areas by decreasing their storm damage protection and flood control functions. The existing coastal beach has a sloping granular surface that naturally dissipates energy associated with floodwater and storms. The proposed solid structures will increase scour and erosion around them, resulting in changes to the form of the beach. Currently, the coastal banks are eroding, providing sediment to the fronting beaches. The EENF identifies some of the erosion on the east and west banks of the river, as well as around the stormwater outfall. The proposed sills and concrete planters will cause scour, making stabilization of the site more difficult. Several of the alternatives identified in the Supplemental Information, dated March 24, 2023, involve structural toe stabilization and vegetation within the coastal beach and intertidal areas. Since the proposed structural components would have adverse effects on the beneficial A-2 functions of the coastal beach and coastal bank, other options with fewer impacts should be identified to achieve the project goals. These include removing debris from the coastal beach to improve the aesthetics, and top-dressing these areas with clean, compatible sediments, which will improve storm damage protection and flood control functions as well as habitat.

To address the erosion along the coastal banks, the EIR should include a detailed alternatives A-3 analysis of non-structural alternatives for stabilizing bank erosion on the east and west banks, and the area adjacent to the outfall. This analysis should include options to remove the debris and concrete at the top of the slope, regrade the existing scarped coastal bank to a more stable slope (e.g., 3:1), and use of natural fiber blankets and native, salt-tolerant plants with deep root systems to stabilize the soils on the coastal bank. If toe protection is needed, coir rolls could be considered to provide a buffer at the toe while plants become established. More details should be provided regarding the proposed stabilization around the new outfall wing walls, including information on how that stabilization will A-4 tie into the adjacent banks without exacerbating erosion. This information should consider including tapering the outfall protection to avoid a blunt end that is more likely to cause end scour.

The proposed access ramps to the park on the east side of the river appear to be solid fill with retaining walls. To minimize reflection of floodwaters, the proponent should consider an alternative A-5 of pile-supported ramps and walkways seaward of the flood barrier. The plans also appear to show riprap seaward of the ramps. The use of pervious surfaces should be employed to help slow floodwaters. Alternatives to the riprap should be included in the EIR.

The project includes the dredging of sediments in the river adjacent to the proposed outfall. Sampling of these sediments should be conducted to determine grain size and possible contamination A-6 to inform construction protocols and disposal options. Details for the riprap apron proposed seaward of the headwall should also be provided.

Stormwater

The proponent should expand on the Island End River Storm Surge Control Facility A-7 Inspection and Maintenance Schedule provided in the filing and include specific details on an operations and maintenance plan. Continued evaluation of stormwater source reduction and treatment A-8 opportunities in the surrounding watershed to improve water quality and habitat in the Island End River and Mystic River should be pursued.

Salt marsh restoration

The proponent will remove debris to a depth of up to 12 inches in the salt marsh with resulting elevations close to and/or below MHW. That debris removal should be limited to the minimum area necessary for restoration. Situations where the resulting marsh platform will be significantly lower than existing and/or lower than MHW should be avoided in consideration of reduced resiliency of the salt A-9 marsh platform to sea level rise and risk of degradation. Seeded and planted areas of the marsh will take time to establish and stabilize the existing sediment of the marsh platform. These areas should be closely monitored post-construction for subsidence and erosion in addition to vegetation establishment.

Areas where seed mixes are proposed for application and areas proposed for direct planting, require additional clarification. RPE-L-102 depicts the use of salt-tolerant seed mix, while RPE-L-103 depicts herbaceous species. Species included in the salt-tolerant seed mix should be specified to evaluate the appropriateness for a tidal application.

The proponent should provide a detailed monitoring and adaptative management plan with a clear monitoring schedule and requirements for reporting to applicable agencies, which specifies monitoring of the restoration actions including invasive species management. The adaptive management plan should detail actions that will be taken if restoration goals are not met within the planned timeframe. A-10

Two sets of 10-foot walkways are depicted at cross sections C and A in plan set 16 RPE-L-102 but are not described in the document. Additional information regarding these walkways should be provided in the EIR. A-11

Designated Port Area

The proponent should demonstrate that the flood control barrier along the DPA shoreline on the Everett side of the project does not diminish the DPA's function or take away potential future use by water-dependent industrial users. The proponent should address the following information in the EIR: A-12

- Identify alternatives for the location of, configuration of, or type of flood barrier along the DPA shoreline which would minimize impacts to the functionality of the DPA. If no other alternatives are feasible, describe why.
- Demonstrate that the proponent has communicated with the existing water-dependent industrial users regarding the equipment they require to access the waterfront and how the proposed flood control barrier may affect ongoing DPA uses.
- Overall narrative explaining how the proposed flood control barrier does not diminish the DPA's purpose and current use.

Federal Consistency

The list of permits included in the EENF did not include CZM federal consistency review. Since this project triggers a MEPA review and will require an Individual Permit from the U.S. Army Corps of Engineers, it will also require a federal consistency review. For further information on this process, please contact Robert Boeri, Project Review Coordinator, at robert.boeri@mass.gov or visit the CZM website at https://www.mass.gov/federal-consistency-review-program. A-13

LE/rh/ap/jy

cc: Jill Provencal, MassDEP
Phil DiPietro, MassDEP
Daniel Padien, Waterways Program, MassDEP
Frank Taormina, Waterways Program, MassDEP

The Commonwealth of Massachusetts
Division of Marine Fisheries

251 Causeway Street, Suite 400, Boston, MA 02114
p: (617) 626-1520 | f: (617) 626-1509
www.mass.gov/marinefisheries

April 7, 2023

Rebecca Tepper
Executive Office of Energy and Environmental Affairs
Attn: MEPA Office, Eva Vaughan
100 Cambridge Street, suite 900
Boston, Ma 02114

RE: EEA# 16667 Island End River Flood Resilience Project

Dear Secretary Tepper:

The Massachusetts Division of Marine Fisheries (MA DMF) has reviewed the Expanded Environmental Notification Form (EENF) for the flood resilience project, EEA# 16667, located along Island End River in Chelsea and Everett, MA proposed by the Cities of Chelsea and Everett. The proposed project includes the construction of a coastal storm surge barrier, storm surge control facility, and nature-based solutions.

The project proposes impacts to the following marine fisheries resources:

- 1,357 sf of permanent impacts and 252 sf of temporary impacts to subtidal and intertidal area mapped as shellfish habitat by DMF for soft-shell clam (*Mya arenaria*) within shellfish growing areas GBH4.0, classified as Prohibited for shellfish harvest. The shellfish survey at the project site on October 28, 2022 identified the presence of low numbers of live soft-shell clams (*Mya arenaria*) and eastern oyster (*Crassostrea virginica*) present in intertidal areas. The shellfish survey also noted the presence of soft-shell clam, eastern oyster, and blue mussel (*Mytilus edulis*) shells.
- 8,502 sf of permanent impacts and 3,055 sf of temporary impacts to intertidal area mapped as tidal flats by the MA DEP Wetlands Conservancy Program.
- 12,585 sf of permanent impacts and 4,902 sf of temporary impacts to subtidal area mapped as essential habitat for the spawning and early development of winter flounder (*Pseudopleuronectes americanus*) by DMF. These impacts include the dredging of 1,438 cy of material anticipated to be disposed in an upland area offsite.
- 22,812 sf of temporary impacts to salt marsh. Creation of 800 sf of new salt marsh.

The Proponents are requesting a Single Environmental Impact Report. Based on the information provided in the EENF, we offer the following recommendations and comments:

- Mitigation may be required for temporary and permanent impacts to subtidal areas and tidal flats. B-1

- We recommend all work in intertidal areas be sequenced to occur in the dry (i.e. during low tide) and sediments be stabilized prior to the return of the water and all work in subtidal areas be sequenced to occur in the dry behind cofferdams to minimize turbidity impacts. B-2

- A time of year restriction (TOY) may be needed for in-water silt-producing work to minimize impact to winter flounder and shellfish resources from February 15 to September 30 of any given year. More about time of year restrictions can be found on our website under Time of Year Restriction Guidelines Appendix A and B 2015 Revisions. http://www.mass.gov/eea/agencies/dfg/dmf/programs-and-projects/technical-review.html [1]. B-3

- We concur with the proposed adaptive management approach to the installation, maintenance, and monitoring the Nature-based Solutions components of the project. We recommend a detailed monitoring plan and explicit success criteria be developed as part of this adaptive management plan. We request copies of all monitoring reports be provided to MA DMF. B-4

Thank you for considering our comments. If you have questions about this review, please email Forest Schenck at Forest.Schenck@mass.gov.

Sincerely,

Daniel J McKiernan

Daniel J. McKiernan
Director

DM/fs/sd

cc.
C. Jacek, USACE
R. Boeri, MA CZM
K. Shaw, NMFS
E. Reiner, EPA
R. Joyce, MA DMF
K. Moniz, Fort Point Associates, Inc.

References:
[1] Evans, NT, KH Ford, BC Chase and JJ Sheppard (2011). Recommended Time of Year Restrictions (TOYs) for Coastal Alteration Projects to Protect Marine Fisheries Resources in Massachusetts. Technical Report DMF TR-47.

MassDEP
Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs
Department of Environmental Protection
100 Cambridge Street 9th Floor Boston, MA 02114 • 617-292-5500

Maura T. Healey
Governor

Kimberley Driscoll
Lieutenant Governor

Rebecca L. Tepper
Secretary

Bonnie Heiple
Commissioner

Memorandum

To: Eva Vaughan, MEPA Unit

From: Susan You, Waterways Regulation Program, MassDEP/Boston

cc: Daniel Padien, Program Chief, MassDEP/Boston

Re: Chapter 91 Waterways Regulation Program Comments on the Island End River Flood Resilience Project, Cities of Chelsea and Everett, EENF EEA #16667

Date: April 5, 2023

The Department of Environmental Protection Waterways Regulation Program (the "Department") has reviewed the above referenced Expanded Environmental Notification Form (EENF) (EEA #16667), submitted by Fort Point Associates, Inc. on behalf of the City of Chelsea Department of Housing and Community Development (the "Proponent") for the Island End River Flood Resilience Project, partially located within Filled and Flowed Tidelands of the Mystic River at Beacham Street and Market Street in the Cities of Chelsea and Everett (the "project site"). The proposed project includes the construction of an approximately 4,640-linear foot flood barrier in the forms of vegetated berms, concrete walls, and flood gates, an approximately 2,900-square foot underground Storm Surge Control Facility, approximately 50,000 square feet of nature-based solutions along the riverfront, associated wetland habitat restoration, a 940 linear-foot elevated boardwalk and sidewalk, and will include 14,464 square feet of improvement dredging. Portions of the project site are located within the Mystic River Designated Port Area.

Water Dependency:

This project appears to be a water-dependent use project pursuant to 310 CMR 9.12(2)(a)4, 9, 11, and 12, and 13. However, in order to be eligible for licensing within a Designated Port Area (DPA), water-dependent use projects involving installation of fill and/or structures must either be water-dependent industrial (WDI) uses, or otherwise comply with the standards at 310 CMR 9.32(2)(b). It is recommended that the Proponent provide supporting documentation as to whether the scopes of work that appear water-dependent pursuant to 310 CMR 9.12(2)(a)11 and 12 may be determined by the Department to also meet the standard for water-dependent industrial use at 310 CMR 9.12(2)(b)7., by being associated with the operation of a Designated Port Area. C-1

Chapter 91 Jurisdiction:
The project site includes Filled and Flowed Tidelands, which are subject to Chapter 91 jurisdiction pursuant to 310 CMR 9.04. A portion of the project site within Chapter 91 jurisdiction is also located within the boundaries of the Mystic River DPA, and subject to all regulatory standards applicable to DPAs as set forth at 310 CMR 9.00.

Chapter 91 Comments:
Based on a review of the EENF, the Department finds that the portions of the proposed project located within Chapter 91 jurisdiction require a Waterways License and Permit pursuant to 310 CMR 9.05(2)(b) and 9.05(1)(a).

Based on a review of property assessors' data, there are multiple owners of properties within the project site. The Proponent is advised that the Chapter 91 application form will be required to be signed by all landowners within the project site, unless other evidence of legal authority to submit an application for the project site is provided. It is recommended that the Proponent coordinate with the Department as early as possible to discuss this regulatory standard, which is required to be satisfied in order for the Department to initiate the Chapter 91 application review. C-2

Projects eligible for licensing outside of a DPA and within a DPA are required to comply with the standards for categorical restrictions at 310 CMR 9.32(1)(a) and (b), respectively. Based on the Department's preliminary review, certain components of the work proposed outside of the DPA appear to comply with the referenced standards. However, the information submitted with the EENF does not include adequate documentation that the work subject to Chapter 91 within the DPA complies with the categorical restrictions at 310 CMR 9.32. The Environmental Impact Report should address project compliance with the referenced standards for all project elements subject to Chapter 91 proposed outside and within the DPA. C-3

The EENF discusses the project's compliance with the standards at 310 CMR 9.35. The Department's comprehensive review will occur during licensing; however, certain statements that were included should be clarified in the Environmental Impact Report (EIR). In the section relating to compliance with 310 CMR 9.35(3)(b) as it relates to private tidelands, the EENF states, "*There will also be several breaks along the western side of the IER within the DPA, which will allow pedestrian and vehicular access to the edge of the water. The water will be accessible to the public 24 hours per day, 7 days per week unless there are emergency or construction activities that warrant its temporary closure or restricted access.*" It is important to note that 310 CMR 9.36(5)(b) requires that reasonable arrangements shall be made to prevent commitments of space or facilities that would significantly discourage present or future water-dependent-industrial activity on the project site or elsewhere in the DPA. The EIR should include a site plan that specifies the proposed locations for all pedestrian and/or vehicular access locations, the property address, Chapter 91 license number and licensed uses at the property, and documentation by the individual operators at each property where public access is proposed that adequately ensures such access will not interfere with their operations. Although the Department will consider any proposed public access sites within the DPA during its review of the Chapter 91 application, the Proponent is hereby advised that the locations and/or unrestricted access described in the EENF may not comply with the applicable Chapter 91 standards and may require relocation, elimination, and/or restrictions on the timing and frequency of use. C-4

The project proposes the installation of fill and structures along the shoreline which are intended to provide flood protection, enhancement of natural resources and improvement to public access. The Department acknowledges the value of this proposed project and these goals. However, certain design features appear to result in potential impacts to the functionality of the DPA. As discussed with the Proponent at the meeting with Department staff on March 15, 2023, the EENF does not sufficiently demonstrate that the project will avoid significant interference with current or future WDI uses in the DPA. C-5

The EENF includes conclusory statements that the project will not impact the DPA use such as, "*…the project will not interfere with the function or purpose of the DPA*" but does not include sufficient documentation to substantiate those statements. The EIR should include site-specific details relating to the operations and use of current WDI uses at each property, contemplate potential future WDI uses at each property, including any sites where there are not currently WDI uses. In addition, the Proponent should demonstrate that they have communicated with the existing WDI users regarding the equipment required to access the waterfront and how the proposed flood control barrier may affect ongoing WDI uses within the DPA. This is specifically relevant with respect to project compliance with the standards at 310 CMR 9.36(3), (4), and (5). C-6

The Proponent should address the standards referenced above, specifically as they relate to the portion of the proposed project that will be located at 145 and 147 Market Street, where it appears to eliminate any potential future WDI use of those properties. In the event that the project is determined to not comply with the standards at 310 CMR 9.36, the Proponent would need to identify alternatives for the location, configuration and/or type of flood barrier to be installed along the DPA shoreline which would avoid, minimize and/or mitigate impacts to the functionality of the DPA. C-7

The Department looks forward to continued coordination with the Proponent to provide any necessary guidance relating to the regulatory standards applicable to the project as they prepare the EIR and Chapter 91 application. It is recommended that the Proponent coordinate with the Department to schedule a meeting to further discuss the information being requested, prior to any subsequent MEPA filing or submittal of a Chapter 91 application.

If you have any questions regarding the Department's comments, please contact me at susan.you@mass.gov or at (857) 972-5638.

From: Maguire, Thomas (DEP)
To: Vaughan, Eva (EEA)
Cc: Rhodes, Lisa (DEP); Provencal, Jill (DEP); DiPietro, Philip (DEP); Evans, N.Tay (DEP); Hilgeman, David (DEP); Wu, Christina Y (DEP)
Subject: MEPA, EENF, EOEA #16667 – Island End River Flood Resilience Project - Chelsea, Everett
Date: Thursday, April 6, 2023 6:00:38 PM

Please accept these comments on behalf of the Massachusetts Department of Enviornmental Protection Wetlands Program to supplement our comment letter dated April 5, 2023.

Catchment Area: The EENF indicates the catchment area is 200 acres. MassDEP believes it is much larger (378 acres to 1,110 acres) based on review of the urban drainage system and topographic divides. If the Storm Surge Control Facility proposed to be constructed in this tidal stream was sized based only using a 200-acre catchment area, it will be undersized. Potentially, this could cause increased pluvial flooding in the neighborhoods, if the tide gates in the Storm Surge Control Facility are closed at the same time it is raining. The provisions to prevent backflow to the Beacham Street drainage system do not address this issue. Basically, when it is raining or there is snow melt, the runoff will have nowhere to drain when those gates are closed, the vault and pipes do not provide sufficient storage, so stormwater will surcharge backwards through the drainage system, flooding the streets and possibly basements. D-1

FLOODWAY: Potentially there may have been a floodway established by FEMA in the Island End River in Everett. The proponent needs to determine whether a FEMA designated floodway exists, and if so, conduct a no rise flood analysis. D-2

LSCSF or BLSF: Proper delineation of resource areas that are subject to flooding is essential. It appears the Everett side of the Island End River may be BLSF and the Chelsea side LSCSF. The proponent is directed to investigate this further, to determine which Performance Standards should be applied to the proposed construction. D-3

Thomas Maguire
Senior Wetlands Resiliency Coordinator
Massachusetts Department of Enviornmental Protection
Wetlands Program
100 Cambridge Street
Boston MA 02114

EEA Number – 16667
Project Name – Island End River Flood Resilience Project
Document – EENF
Comments by – Stephanie Condakes Torski on behalf of Auction Nominee Trust, which owns the property at 155 Market Street in Everett. ("The Property")
Reference – pg 76 of EENF shows 155 Market St. ("The Property")

I am writing to inform you that based on the information contained in the recently submitted Expanded Environmental Notification Form ("EENF"), the Trust does not support the IER Flood Resilience Project ("Project") in its current form. The short and long-term impacts to 155 Market Street ("The Property") are simply unacceptable. The Property is being asked to uniquely bear the brunt of this Project for the benefit of the greater Everett and Chelsea communities, without receiving an equal benefit in return. E-1

The Property does not experience flooding and sits between 1 foot and 4 feet above sea level. It has never experienced any flooding effects during storm surges nor during king tides. The topography of 155 Market St. provides a natural flood barrier and will continue to do so for at least 50 years given global warming projections. Hence, there are no discernable benefits to The Property from this Project.

The EENF makes it clear that the Project renders the Property unusable for ordinary business operations for months – if not years – during construction. Nothing in the proposed Project purports to compensate the Trust for the loss of use. Furthermore, the Property is leased out to numerous tenants for their food warehousing and distribution businesses. How are these tenants supposed to carry out their business during the months or years that 155 Market Street becomes functionally unusable for their purposes? The Trust has leases with its tenants and has legal obligations to them. The Project ignores these issues entirely.

From my review of the EENT, 155 Market Street is the only property being asked to carry this uncompensated, intrusive burden. As stated on page 1-13 of the EENT Project Summary: "Access to #155 Market Street will be impacted during construction, causing entrance on the east side to be inaccessible. The loading dock in the back of #155 Market Street will also be inaccessible during construction of the east portion of the storm surge barrier. The storm surge barrier wall will be constructed at #155 Market Street first, in order to reconstruct the entrances and loading docks, to allow those to be opened back up for operational use. This phase of the construction will require the parking lot on the south to be accessed only using the entrance from #95 Behen Street. Once the storm surge barrier at #155 Market Street is completed, the north parking lot will be reopened, and the south entrance will be closed for the next phase of construction."

Beyond the short-term impacts which render the Project unworkable, the design and long-term impacts on the Property are similarly unacceptable. The proposed wall permanently negates access to the water along the northeast end of the Property. It also unacceptably encroaches on space used and needed for existing business operations, including impairing the ability of trucks and tractor trailers to safely maneuver around the Property.

In short, this Project is much more of a burden to 155 Market Street than to any other impacted owner. The Trust is being asked to suffer uncompensated temporary and permanent impacts, both financially and with regard to loss of use, which are simply unacceptable.

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April 7, 2023 Via email: Eva.Vaughan@mass.gov

Ms. Rebecca Tepper, Secretary
Massachusetts Environmental Policy Act (MEPA) Office
100 Cambridge Street, 9th Floor
Boston, MA 02114

Attn: Eva Vaughn

Re: Island End River Flood Resilience Project Expanded Environmental Notification Form

Dear Ms. Vaughn,

Boston Harbor Now respectfully submits the following comments on the *Island End River (IER) Flood Resilience Project Expanded Environmental Notification Form* prepared by the Cities of Chelsea and Everett. Boston Harbor Now staff has been following this project and have most recently attended the March 14, 2023 MEPA Public Meeting and reviewed the Supplemental Information Packet.

As longtime stewards of the Harborwalk in and around Boston, Boston Harbor Now is committed to ensuring that the coastline changes built today are designed for a more resilient and inclusive future. We use the term "Harborwalk 2.0" to capture the aspirations of this work to ensure the waterfront is accessible and welcoming; is prepared for the coastal impacts of climate change; and centers equity and inclusion in the development of its design, construction, and programming. An accessible waterfront should have connections between the community and the water as well as numerous activation strategies to serve all residents. A resilient waterfront includes a variety of climate adaptation strategies to protect and serve Chelsea and Everett at a district scale. To center equity in waterfront design is to focus on strategies that make the waterfront feel safe and inclusive through lighting, multi-lingual signage, full ADA accommodations, and the elimination of features that make users feel unwelcome or excluded.

The IER Flood Resilience Project is an impressive collaboration between the City of Everett and City of Chelsea to build climate adaptation and flood protection measures that can meet the needs of a variety of stakeholders. We applaud the inter-municipal collaboration that generated and will fund this proposal as well as the thoughtful design considerations for future waterfront park goers, water-dependent industrial uses, and ecosystem improvements. As the proponent moves forward with their designs, we

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hope they continue to prioritize their partnership with community organizations to ensure that the stewardship program and coordinated stakeholder engagement is continued along with the advancement of nature-based approaches (NBAs) that provide flood risk reduction and other co-benefits. F-1

Inter-Municipal Collaboration

This proposal has the unique challenge of needing to balance the needs and requirements of two different municipalities and competing land uses. Despite these complications, the project is stronger for the mixed and matched flood strategies used to address these divergent needs. Flood resilience on the Chelsea side is geared towards improving the human experience. The Chelsea side of the site is surrounded primarily by commercial uses and is home to Island End Park, a small park along the IER that affords visitors a place to relax and look out at the water. Here, NBAs and wetland enhancements are paired with resilient riverwalk amenities and finishings on the Chelsea side to create an engaging visitor experience that the public can enjoy.

The Everett waterfront is home to the New England Produce Center and other water-dependent industrial uses. This side of the project is located within a Designated Port Area (DPA), so the proposed interventions are designed around the operations of the working waterfront businesses in the DPA. The proponent has opted for concrete storm surge barrier walls with passive and active storm surge barrier gates along the whole Everett side of the site, while also installing some NBAs along a smaller portion where feasible. The Everett alignment is designed to prevent overland storm surge flooding while allowing water-dependent industrial operations to continue to function.

While the tailored strategies for each side of the site are impressive, the two municipalities' successful coordination is perhaps the most laudable aspect. Thanks to both cities' coordinated efforts, the varied adaptation strategies are properly tied together to ensure district-wide flood protection. The two cities' efforts to coordinate will also ensure that construction and phasing minimize the risk of channelization that might otherwise have occurred if the cities each proposed their own flood measures.

Community Engagement through Nature-Based Approaches

As co-leaders of the Stone Living Lab and advocates of multi-benefit coastal adaptation strategies we are encouraged to see NBAs incorporated into the

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site's flood resilience strategies. NBAs can mimic naturally occurring shorelines, help restore ecosystems, reduce flood risk, and provide a host of other co-benefits, including improved suitability for public access. We appreciate that this project leverages its NBAs to help foster community connection to the waterfront. The IER proposal references a strong partnership with MyRWA, GreenRoots, and the City of Everett's Mayor's Youth Employment Intern program. This program proposes that NBAs will provide community members with environmental education and stewardship opportunities that will empower community advocates to help implement and maintain the NBAs by contributing to planting, nest-building, and plant management. We believe this unique programmatic model fosters connections between the community and the natural environment, and we will monitor it in the hopes that it can l be replicated effectively with other resilience projects.

We highlight these design elements because potential permitting challenges faced by eliminating the proposed planters and phragmites removal could jeopardize the community's involvement in this project. As described in the filing, the community's stewardship opportunity seems to hinge upon a hybrid system of planters to introduce vegetation would not survive the soils on site that have been degraded by urban uses. While alternatives have been offered to the original planter proposal, we believe the long term community engagement afforded by the inclusion of NBAs is an important benefit. We would support proposed alternatives if they were still able to ensure the community stewardship program will be able to move forward. Similarly, we see the removal of phragmites and return to native plantings as an educational opportunity for the community and best practice in ecological restoration. We would like to see both aspects of the project maintained; however, if changes are necessary during the ongoing permitting process, we hope the proponent will coordinate with their community partners to find an acceptable alternative. F-2

We appreciate the opportunity to comment on this project and look forward to following its progress toward implementation. We would be happy to speak with you or the proponent further if there are additional questions.

Sincerely,

Kathy Abbott
President and CEO
Boston Harbor Now

MassDEP
Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

Northeast Regional Office • 150 Presidential Way Woburn, MA 01801 • 978-694-3200

April 7, 2023

Rebecca L. Tepper, Secretary
Executive Office of
Energy & Environmental Affairs
100 Cambridge Street
Boston MA, 02114

RE: Everett, Chelsea
Island End River Flood Resilience Project
EEA # 16667

Attn: MEPA Unit

Dear Secretary Tepper:

The Massachusetts Department of Environmental Protection Northeast Regional Office (MassDEP-NERO) has reviewed the Expanded Environmental Notification Form (EENF) for the proposed Island End River Flood Resilience Project in Everett and Chelsea. MassDEP provides the following comments.

Wetlands

An Expanded Environmental Notification Form_(EENF) has been filed with EOEA on behalf of the Cities of Chelsea and Everett for the construction of a flood barrier, Storm Surge Control Facility, salt marsh restoration, bank restoration and an associated Riverwalk. The goal of the project is to provide flood protection and resiliency to the low-lying areas of Chelsea and Everett, while providing an opportunity for the community to engage in the natural resources of the Island End River (IER). MassDEP has completed its review of the EENF and recommends the development of an Environmental Impact Report (EIR) to explore alternatives reducing the environmental impacts projected by the EENF.

The project proposes impacts to Land Subject to Coastal Storm Flowage (LSCSF), Bordering Vegetated Wetlands (BVW), Land Under the Ocean, Salt Marsh, Land Containing Shellfish, Coastal Beach, and Coastal Bank.

The project proposes the following temporary and permanent impacts to resource areas: i) 346,510 square feet (sf) of LSCSF with 211,496 sf permanent impacts and 125,014 temporary; ii) 967 feet of Coastal Bank with 759 permanent and 208 temporary; iii) 22,812 sf of temporary impacts to Salt Marsh; iv) 1609 sf of Land Containing Shellfish with 1,357 sf permanent and 252 temporary; v) 11,557 sf of Coastal Beach with 8,502 permanent and 3,055 temporary; vi) 7,377 sf of BVW with 1,656 sf permanent and 5,718 temporary and vii) 22,707sf of Riverfront Area with 7,226 permanent and 7226 temporary. There are no permanent impacts to Salt Marsh proposed as part of this project.

The proposed work in BVW includes an area of 5,718 SF of temporary impacts including proposed *Spartina Alterniflora* plugs and native salt tolerant seed mix plantings. The Project will replicate the 1,650 SF of BVW lost with a 2,674 SF area adjacent to the Island End Park and #359 Beacham Street property.

The project includes the construction of a storm surge flood barrier wall, measuring 4,640 lf, on the west side of the IER abutting Market Street. The project was responsive to agency comments during the MEPA process for the since-withdrawn ENF for the project under EOEA #16363, which encouraged moving the barrier wall landward from the High Tide Line (HTL) and Bank, and removal of berms that were proposed landward of it. The proposed boardwalk has also been moved landward of the flood barrier in response to agency comments. A portion of the flood barrier wall remains located below the HTL and on Coastal Bank. Alternatives should be explored in the EIR to move the wall completely landward of the Coastal Bank and HTL. G-1

The proposal includes construction of a 2,900 sf Storm Surge Control Facility (SSCF). Dredging and constructing the SSCF outfall will temporarily impact 4,902 SF and permanently impact 12,585 SF of the Land Under Ocean within the Designated Port Area (DPA). This impact area includes 1,438 cubic yards of material to be dredged, which will be disposed of at either a Confined Disposal Facility or an off-site landfill depending on final sediment sampling and analysis results. The SSCF is designed to maintain the existing hydrologic connection and allow for uninterrupted tidal flows in typical conditions. The SSCF gates will only close when coastal storm event surge conditions exceed the current HTL elevation and will reopen when the IER water elevation drops below Elevation 7.0 NAVD88. Details should be developed regarding the extent and type of rip rap proposed downstream, or seaward, of the headwall to the IER. While the EENF includes an inspection and maintenance schedule for the SSCF, a more detailed operations and maintenance plan should be developed in the EIR. The O and M plan should identify any other criteria and the projected frequency with which the tide gate will be opened and closed. The projected frequency of operation of the tide gate can limit salinity upstream and impact existing and restored upstream resource areas. Include who will be responsible for the long-term operations and maintenance. A more comprehensive discussion and evaluation of the relationship between the SSCF and the recently daylighted and expanded portion of the upstream Market Street culvert should be developed, in conjunction with an evaluation of further opportunities in the upgradient watershed to treat and detain stormwater. G-2 G-3

Stormwater design calculations and plans should be submitted to confirm storage capacity of the stormwater surge facility to demonstrate that a closed tide gate will not increase interior flooding. A joint probability analysis should be included assessing interior drainage of the 100-year, 24-hour storm when the tide gate is closed. When the tide gate is closed, the resource areas adjacent to the upstream portions of the IER effectively function as Bordering Land Subject to Flooding (BLSF). A Letter of Map Amendment should be with FEMA for all associated floodplain elevation amendments that will occur due to the installation of the flood wall and operation of the tidal gate in accordance with the O and M Plan to be submitted. G-4

The shoreline area of the IER downstream of the culverts is classified as Coastal Beach and Coastal Bank. The Coastal Banks are eroding and provide sediment to the Coastal Beach downgradient or downstream of them and are therefore significant to the protected interests of flooding and storm damage prevention, as is the Coastal Beach itself. Both banks of the IER are eroding, as are the areas around the existing stormwater outfalls. The EENF proposes the installation of concrete planters lined with wood and stone sills on the Coastal Bank, Coastal Beach, and in the intertidal zone. This amounts to effectively hardening the surfaces of these coastal resource areas, causing adverse impacts to them by decreasing their ability to provide storm damage protection and flood control functions. The sills and concrete planters will cause scour and erosion, adversely impacting the protected functions of the coastal resource areas, changing the form and volume of the Coastal Beach, and making stabilization of the Coastal Bank and Coastal Beach of the IER more problematic. This concern, as raised at the MEPA site visit by MassDEP, resulted in the development of a supplemental submission by the applicant dated March 24, 2023, showing other options for shoreline treatments. All of the presented alternatives incorporate structural toe stabilization and hard structural components on the Coastal Bank and Coastal Beach to facilitate supplemental vegetation plantings within the Coastal Beach and intertidal areas. These proposed structural components all appear to have projected adverse effects on the protected functions of Coastal Beach and Coastal Bank. While debris removal from the Coastal Banks and Coastal Beach of the IER is encouraged, the toe stabilization and hard structural solutions proposed to facilitate vegetation of the Coastal Banks and Coastal Beach of the IER that currently provides storm damage protection and flood control functions is not allowable under the Regulations. The adverse effects of these alternative shoreline treatments are the principal reason for MassDEP's recommendation that the project file an EIR. G-5

The EIR should include an alternatives analysis focusing on stabilizing the erosion on Coastal Banks and outfall of the IER, with emphasis on non-structural measures. Alternatives should include options to remove the debris on the Coastal Bank and Coastal Beach, regrading of the Coastal Bank to a gentler and stable 3:1 slope, and incorporation of more natural solutions to stabilize the regraded Coastal Bank. Such nature-based solutions include fiber blankets, coir rolls at the toe of slope, and native, salt-tolerant plantings to stabilize the Coastal Bank soils. Stabilization around the new outfall wing walls should be refined to include information on how the wingwall stabilization will tie into the banks of the IER without causing or increasing erosion. G-6

As discussed at the site visit, the proposed access ramps to the park on the east side of the IER have been designed as solid fill with retaining walls and should be redesigned as pile-supported ramps and walkways because they are seaward of the flood barrier; and, as currently G-7 designed would cause wave reflection and refraction. The riprap shown adjacent to the ramps should be eliminated to the extent practicable, with alternatives included in the EIR.

The EENF proposes enhancement of the existing salt marsh south of the existing boardwalk by removing debris and trash removal to depths of approximately 12 inches. This will result in elevations of the restored marsh near and below MHW. The proposed elevations should be refined to ensure the marsh will become reestablished and that portions of it at the lowest proposed elevations do not become mudflat due to proposed elevations being too low in conjunction with projected sea level rise. The proposed monitoring plan should include observation for these possible effects on the salt marsh restoration area. As stated in MassDEP's original comments to the withdrawn ENF, species included in the salt-tolerant seed mix should be specified and refined to ensure vigor for this intertidal use. G-8

At the site visit, MassDEP commented on the possible difficulty of replicating the approximately 1,650 square foot BVW area under and adjacent to the boardwalk, and adjacent to the salt marsh. Given the hydrology of this portion of the project, it may be possible to replicate the lost BVW more easily as salt marsh. To accomplish this regulatorily, the proponent would have to file for this portion of the larger project as a separate Ecological Restoration Limited Project [see the eligibility criteria in 310 CMR 10.24(8)]. G-9

The project will require Orders of Conditions issued by the Cities of Chelsea and Everett for impacts to wetland resource areas. The project will also require a Section 401 Water Quality Certification for impacts to salt marsh and greater than 5000 sf of impacts, including temporary impacts, to BVW.

The MassDEP appreciates the opportunity to comment on this proposed project. Please contact Kristin.Divris@mass.gov at (508) 887-0021 for further information on wetlands issues. If you have any general questions regarding these comments, please contact me at John.D.Viola@mass.gov or at (857) 276-3161.

Sincerely,

This final document copy is being provided to you electronically by the Department of Environmental Protection. A signed copy of this document is on file at the DEP office listed on the letterhead.

John D. Viola
Deputy Regional Director

cc: Brona Simon, Massachusetts Historical Commission,
Eric Worrall, Kristin Divris, Jill Provencal, MassDEP-NERO

Attachment C

PROJECT PLANS

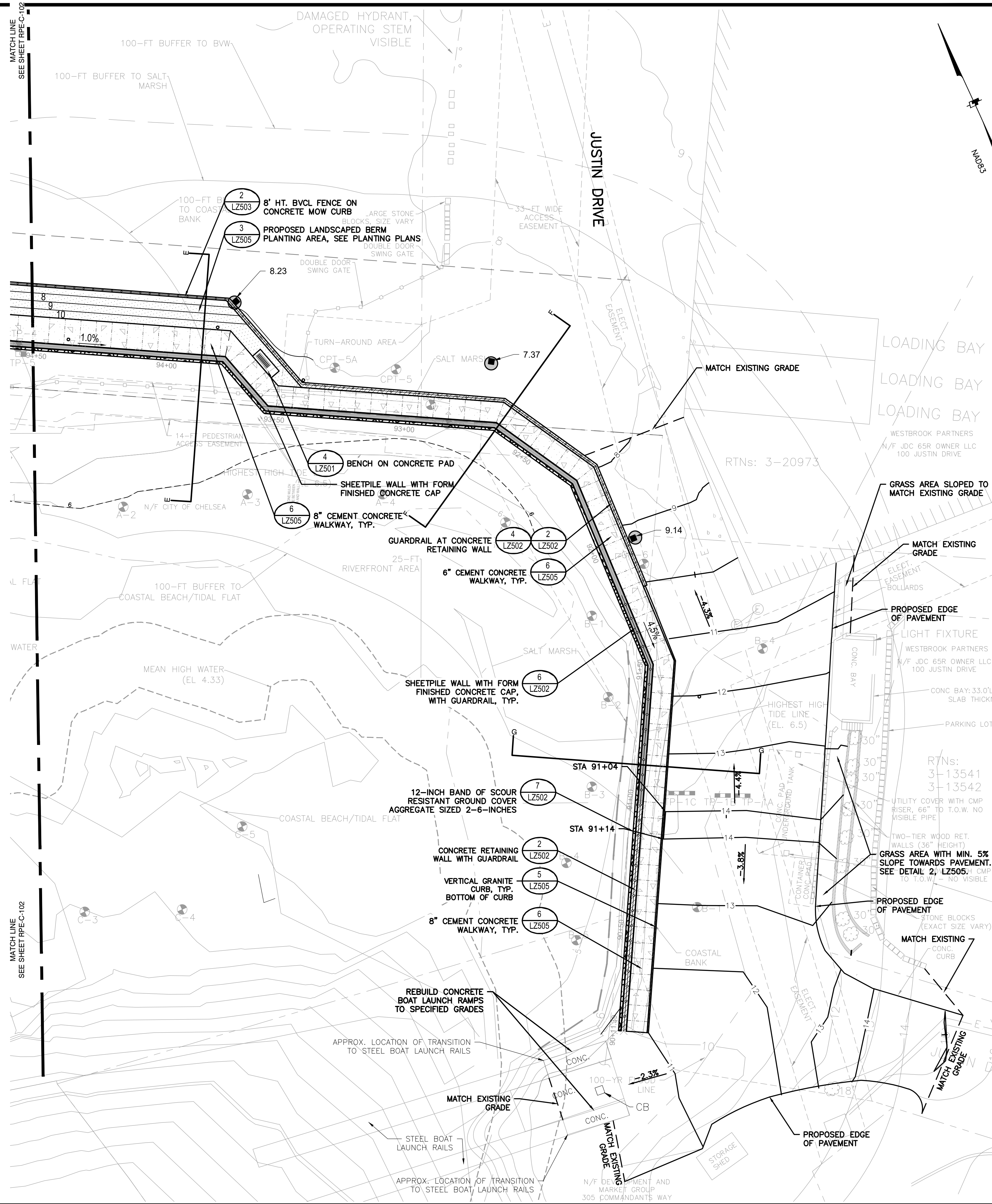
Island End River Flood Resilience Program
City of Chelsea, MA / City of Everett, MA

Appendix C: Project Plans

Appendix C: Project Plans

Page	Sheet No.	Drawing Title	Location
30	RPE-S-201	STRUCTURAL ELEVATION - 1	RESILIENCE PROVISIONS EAST
31	RPE-S-202	STRUCTURAL ELEVATION - 2	RESILIENCE PROVISIONS EAST
32	RPE-S-203	STRUCTURAL ELEVATION - 3	RESILIENCE PROVISIONS EAST
33	SSCF-C-301	HEADWALL SECTIONS	STORM SURGE CONTROL FACILITY
34	SSCF-C-302	CONTROL STRUCTURE SECTION	STORM SURGE CONTROL FACILITY
35	NBA-L-302	PLANTING SECTIONS - 2	NATURE-BASED APPROACHES
36	RPW-S-301	STRUCTURAL SECTIONS	RESILIENCE PROVISIONS WEST

KEY MAP
SCALE: 1"=150'



LEGEND

- PROPERTY LINE
- MATCH LINE
- PEDESTRIAN EASEMENT
- BITUMINOUS CONCRETE PAVEMENT
- CEMENT CONCRETE PAVEMENT
- PLANTING AREA, SEE PLANTING PLAN
- SHEET PILE WALL WITH FORM FINISHED CAP WITH ARCHITECTURAL FINISH CONCRETE CAP
- CIP CONCRETE RETAINING WALL
- CORTEN STEEL RETAINING WALL
- EXPANSION JOINT (EJ)
- SCORE JOINT (EJ)
- GUARDRAIL
- WOOD GUARDRAIL
- BVCL FENCE
- PEDESTRIAN LIGHT
- BIKE RACKS ON CONCRETE PAD
- BENCH

20 10 0 20 40
SCALE: 1"=20'

Project:
ISLAND END RIVER FLOOD RESILIENCE PROVISIONS EAST

Weston & Sampson
Weston & Sampson Engineers, Inc.
55 Walkers Brook Drive, Suite 100
Reading, MA 01867
978.532.1900 800.SAMPSON
www.westonandsampson.com

Consultants:

Revisions:

No.	Date	Description

Seal:

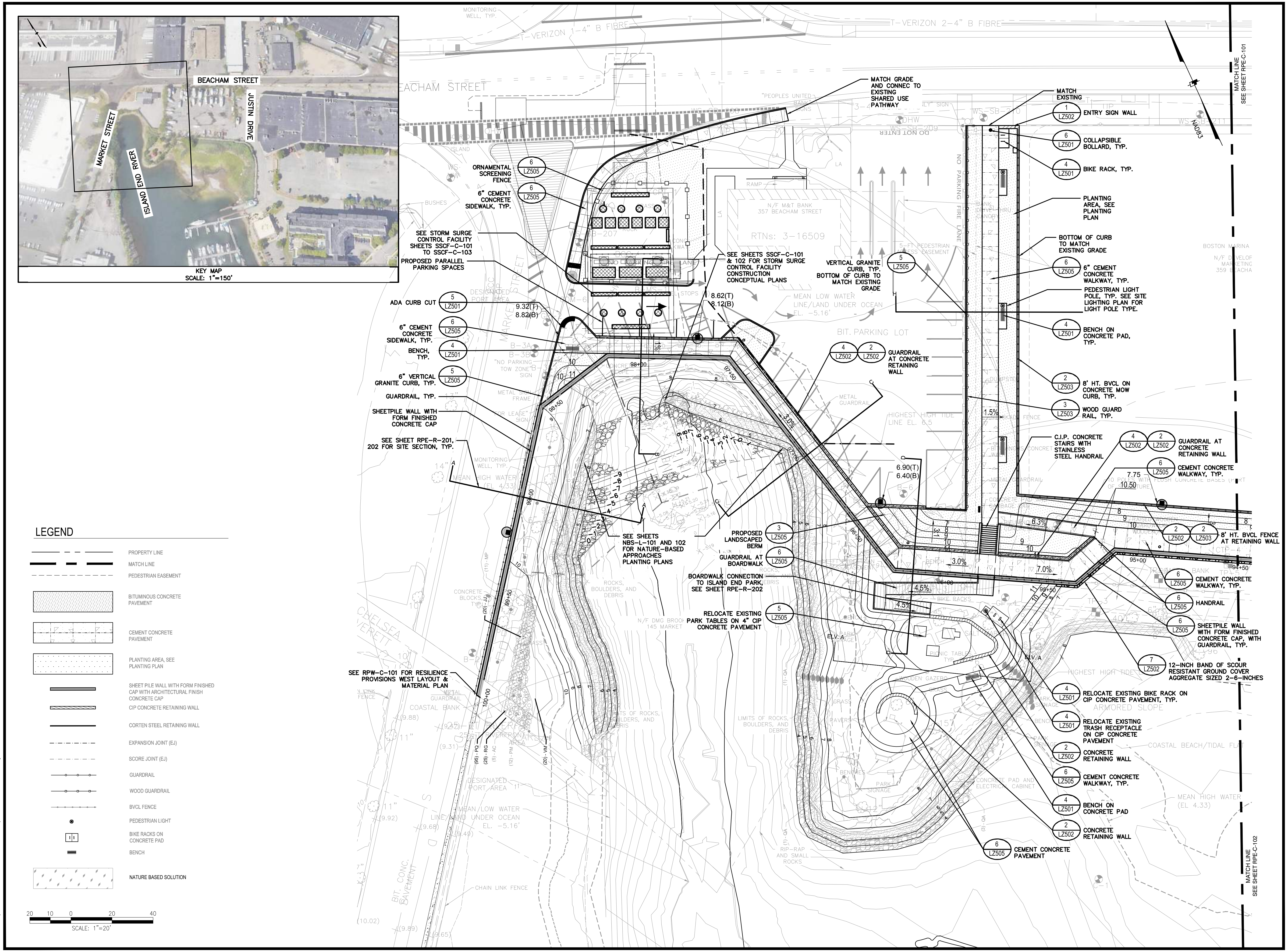
Issued For:
PROGRESS PRINT

Scale:	AS NOTED
Date:	NOVEMBER 2023
Drawn By:	FD
Reviewed By:	BK
Approved By:	BWA
W&S Project No.:	-
W&S File No.:	

Drawing Title:
LAYOUT AND MATERIALS PLAN - 1 (STA. 91+11 - 94+50)

Sheet Number:
RPE-C-101

Rev. 1.8 Date: 11/2023



Project:
ISLAND END RIVER FLOOD RESILIENCE PROVISIONS EAST

CHELSEA · SETTLED 1624 · A TOWN 1739 · A CITY 1857 · WINNISIMMET

Weston & Sampson

Weston & Sampson Engineers, Inc.
55 Walkers Brook Drive, Suite 100
Reading, MA 01867
978.532.1900 800.SAMPSON
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Consultants:

Revisions:

No.	Date	Description

Seal:

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Scale:	AS NOTED
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Drawn By:	FD
Reviewed By:	BK
Approved By:	BWA
W&S Project No.:	-
W&S File No.:	

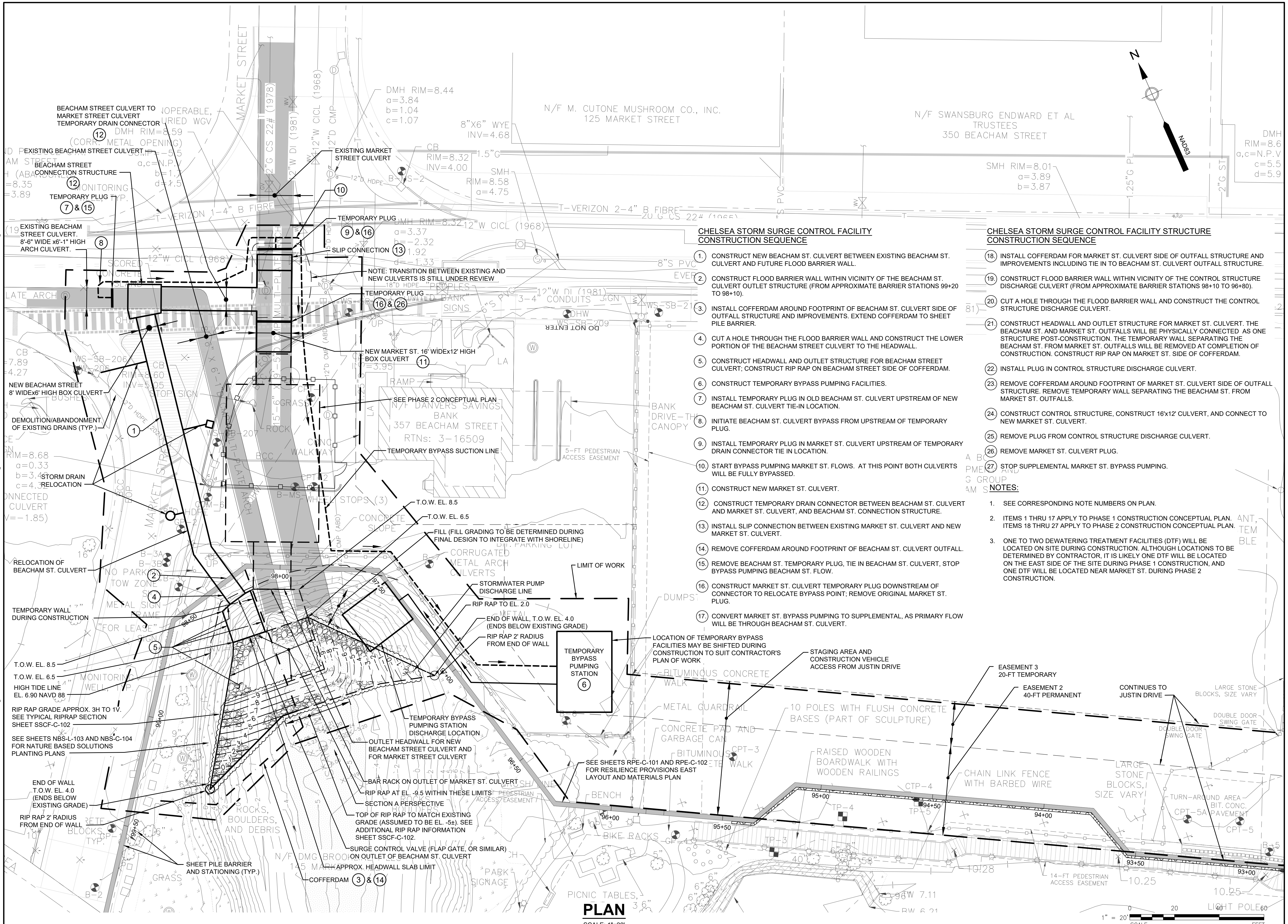
Drawing Title:

LAYOUT AND MATERIALS PLAN - 2 (STA. 94+50 - 100+00)

Sheet Number:

RPE-C-102

Rev. 1.6 Date: 11/2023



PLAN

SCALE: 1"=20'

CHELSEA STORM SURGE CONTROL FACILITY CONSTRUCTION SEQUENCE

1. CONSTRUCT NEW BEACHAM ST. CULVERT BETWEEN EXISTING BEACHAM ST. CULVERT AND FUTURE FLOOD BARRIER WALL.
2. CONSTRUCT FLOOD BARRIER WALL WITHIN VICINITY OF THE BEACHAM ST. CULVERT OUTLET STRUCTURE (FROM APPROXIMATE BARRIER STATIONS 99+20 TO 98+10).
3. INSTALL COFFERDAM AROUND FOOTPRINT OF BEACHAM ST. CULVERT SIDE OF OUTFALL STRUCTURE AND IMPROVEMENTS. EXTEND COFFERDAM TO SHEET PILE BARRIER.
4. CUT A HOLE THROUGH THE FLOOD BARRIER WALL AND CONSTRUCT THE LOWER PORTION OF THE BEACHAM STREET CULVERT TO THE HEADWALL.
5. CONSTRUCT HEADWALL AND OUTLET STRUCTURE FOR BEACHAM STREET CULVERT; CONSTRUCT RIP RAP ON BEACHAM STREET SIDE OF COFFERDAM.
6. CONSTRUCT TEMPORARY BYPASS PUMPING FACILITIES.
7. INSTALL TEMPORARY PLUG IN OLD BEACHAM ST. CULVERT UPSTREAM OF NEW BEACHAM ST. CULVERT TIE-IN LOCATION.
8. INITIATE BEACHAM ST. CULVERT BYPASS FROM UPSTREAM OF TEMPORARY PLUG.
9. INSTALL TEMPORARY PLUG IN MARKET ST. CULVERT UPSTREAM OF TEMPORARY DRAIN CONNECTOR TIE IN LOCATION.
10. START BYPASS PUMPING MARKET ST. FLOWS. AT THIS POINT BOTH CULVERTS WILL BE FULLY BYPASSED.
11. CONSTRUCT NEW MARKET ST. CULVERT.
12. CONSTRUCT TEMPORARY DRAIN CONNECTOR BETWEEN BEACHAM ST. CULVERT AND MARKET ST. CULVERT, AND BEACHAM ST. CONNECTION STRUCTURE.
13. INSTALL SLIP CONNECTION BETWEEN EXISTING MARKET ST. CULVERT AND NEW MARKET ST. CULVERT.
14. REMOVE COFFERDAM AROUND FOOTPRINT OF BEACHAM ST. CULVERT OUTFALL.
15. REMOVE BEACHAM ST. TEMPORARY PLUG, TIE IN BEACHAM ST. CULVERT, STOP BYPASS PUMPING BEACHAM ST. FLOW.
16. CONSTRUCT MARKET ST. CULVERT TEMPORARY PLUG DOWNSTREAM OF CONNECTOR TO RELOCATE BYPASS POINT; REMOVE ORIGINAL MARKET ST. PLUG.
17. CONVERT MARKET ST. BYPASS PUMPING TO SUPPLEMENTAL, AS PRIMARY FLOW WILL BE THROUGH BEACHAM ST. CULVERT.

CHELSEA STORM SURGE CONTROL FACILITY STRUCTURE CONSTRUCTION SEQUENCE

18. INSTALL COFFERDAM FOR MARKET ST. CULVERT SIDE OF OUTFALL STRUCTURE AND IMPROVEMENTS INCLUDING TIE IN TO BEACHAM ST. CULVERT OUTFALL STRUCTURE.
19. CONSTRUCT FLOOD BARRIER WALL WITHIN VICINITY OF THE CONTROL STRUCTURE DISCHARGE CULVERT (FROM APPROXIMATE BARRIER STATIONS 98+10 TO 96+80).
20. CUT A HOLE THROUGH THE FLOOD BARRIER WALL AND CONSTRUCT THE CONTROL STRUCTURE DISCHARGE CULVERT.
21. CONSTRUCT HEADWALL AND OUTLET STRUCTURE FOR MARKET ST. CULVERT. THE BEACHAM ST. AND MARKET ST. OUTFALLS WILL BE PHYSICALLY CONNECTED AS ONE STRUCTURE POST-CONSTRUCTION. THE TEMPORARY WALL SEPARATING THE BEACHAM ST. FROM MARKET ST. OUTFALLS WILL BE REMOVED AT COMPLETION OF CONSTRUCTION. CONSTRUCT RIP RAP ON MARKET ST. SIDE OF COFFERDAM.
22. INSTALL PLUG IN CONTROL STRUCTURE DISCHARGE CULVERT.
23. REMOVE COFFERDAM AROUND FOOTPRINT OF MARKET ST. CULVERT SIDE OF OUTFALL STRUCTURE. REMOVE TEMPORARY WALL SEPARATING THE BEACHAM ST. FROM MARKET ST. OUTFALLS.
24. CONSTRUCT CONTROL STRUCTURE, CONSTRUCT 16'x12' CULVERT, AND CONNECT TO NEW MARKET ST. CULVERT.
25. REMOVE PLUG FROM CONTROL STRUCTURE DISCHARGE CULVERT.
26. REMOVE MARKET ST. CULVERT PLUG.
27. STOP SUPPLEMENTAL MARKET ST. BYPASS PUMPING.

NOTES:

1. SEE CORRESPONDING NOTE NUMBERS ON PLAN.
2. ITEMS 1 THRU 17 APPLY TO PHASE 1 CONSTRUCTION CONCEPTUAL PLAN. ITEMS 18 THRU 27 APPLY TO PHASE 2 CONSTRUCTION CONCEPTUAL PLAN.
3. ONE TO TWO DEWATERING TREATMENT FACILITIES (DTF) WILL BE LOCATED ON SITE DURING CONSTRUCTION. ALTHOUGH LOCATIONS TO BE DETERMINED BY CONTRACTOR, IT IS LIKELY ONE DTF WILL BE LOCATED ON THE EAST SIDE OF THE SITE DURING PHASE 1 CONSTRUCTION, AND ONE DTF WILL BE LOCATED NEAR MARKET ST. DURING PHASE 2 CONSTRUCTION.

AECOM

PROJECT

ISLAND END RIVER RESILIENCY PROJECT STORM SURGE CONTROL FACILITY

CLIENT

CITY OF CHELSEA, MA
500 BROADWAY
CHELSEA, MA 02150

CONSULTANT

AECOM TECHNICAL SERVICES, INC.
250 APOLLO DRIVE
CHELMSFORD, MA 01824
PHONE: (978) 905-2100
www.aecom.com

REGISTRATION

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ISSUE/REVISION

I/R	DATE	DESCRIPTION

PROJECT NUMBER

60669652

Designed By:	M. MESERVE
Drawn By:	M. THIBODEAU
Dept Check:	C. BENZIGER
Proj Check:	T. HARRISON
Date:	DECEMBER 2022
Scale:	AS NOTED

DISCIPLINE

CIVIL

SHEET TITLE

PHASE 1 CONSTRUCTION CONCEPTUAL PLAN

SHEET NUMBER

SSCF-C-101

PATH\FILENAME: L:\DCS\PROJECTS\WTR\60669652_ISLANDENDRIVER\900_CAD_GIS\910_CAD\20-SHEETS\C00 C-101.DWG
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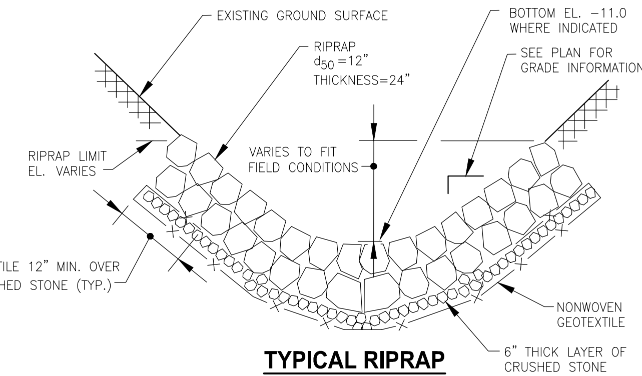
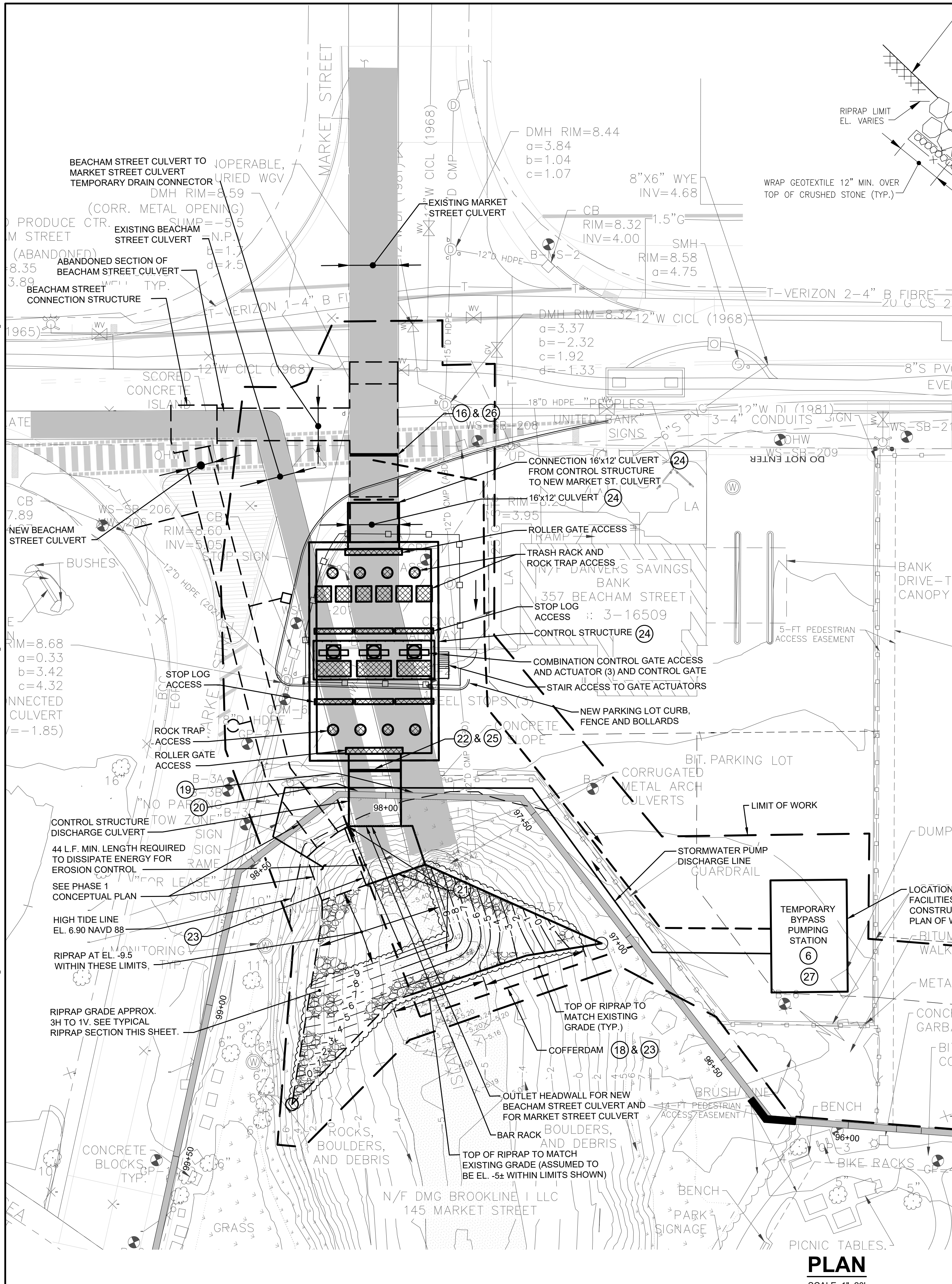
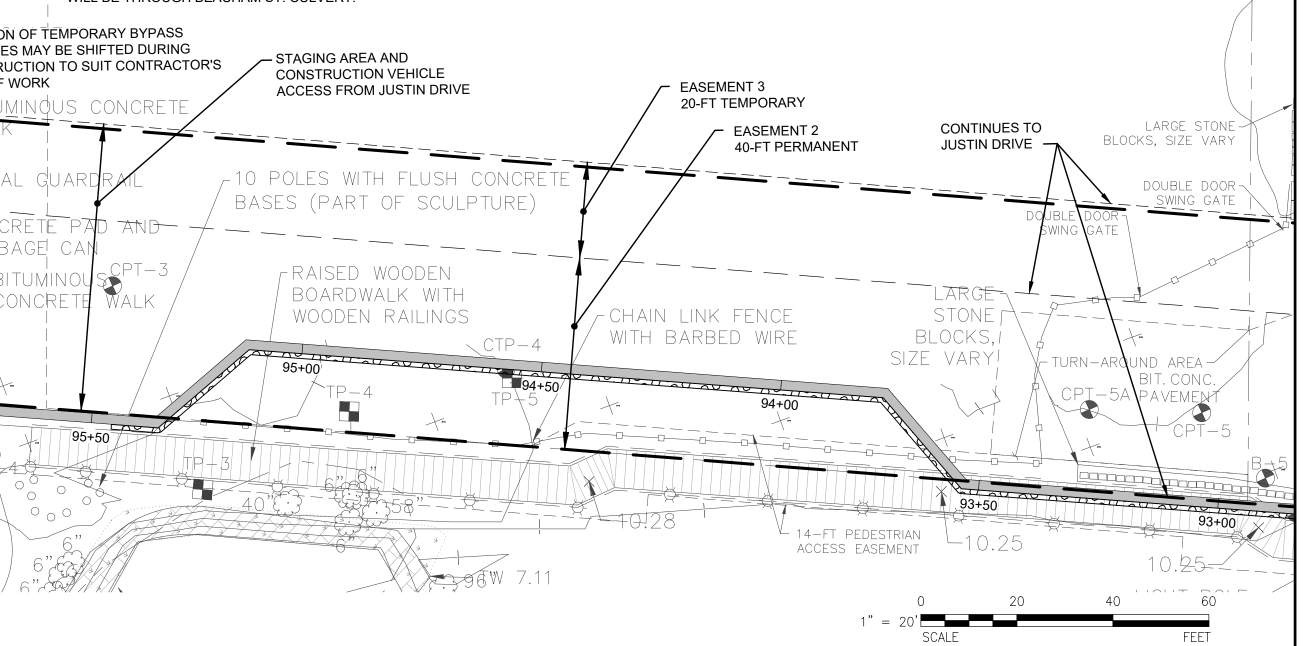
PLOT DATE: Friday, November 3, 2023 9:46:41 AM



TYPICAL RIPRAP SECTION

NTS





PLAN

SCALE: 1"=20'

CHELSEA STORM SURGE CONTROL FACILITY CONSTRUCTION SEQUENCE

1. CONSTRUCT NEW BEACHAM ST. CULVERT BETWEEN EXISTING BEACHAM ST. CULVERT AND FUTURE FLOOD BARRIER WALL.
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NOTES:

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AECOM

PROJECT

ISLAND END RIVER RESILIENCY PROJECT STORM SURGE CONTROL FACILITY

CLIENT

CITY OF CHELSEA, MA
500 BROADWAY
CHELSEA, MA 02150

CONSULTANT

AECOM TECHNICAL SERVICES, INC.
250 APOLLO DRIVE
CHELMSFORD, MA 01824
PHONE: (978) 905-2100
www.aecom.com

REGISTRATION

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ISSUE/REVISION

I/R	DATE	DESCRIPTION

PROJECT NUMBER

60669652

Designed By:	M. MESERVE
Drawn By:	M. THIBODEAU
Dept Check:	C. BENZIGER
Proj Check:	T. HARRISON
Date:	DECEMBER 2022
Scale:	AS NOTED

DISCIPLINE

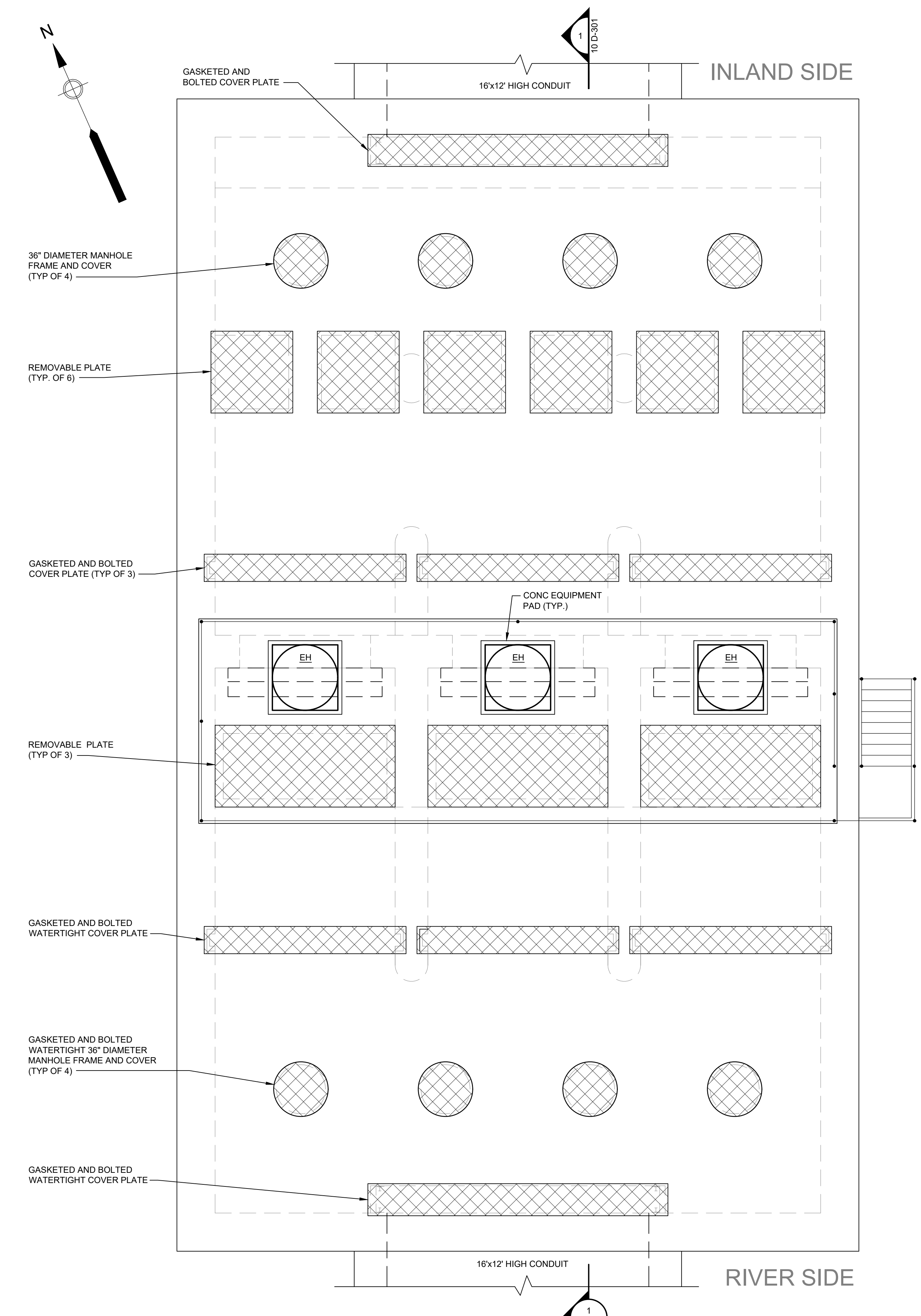
CIVIL

SHEET TITLE

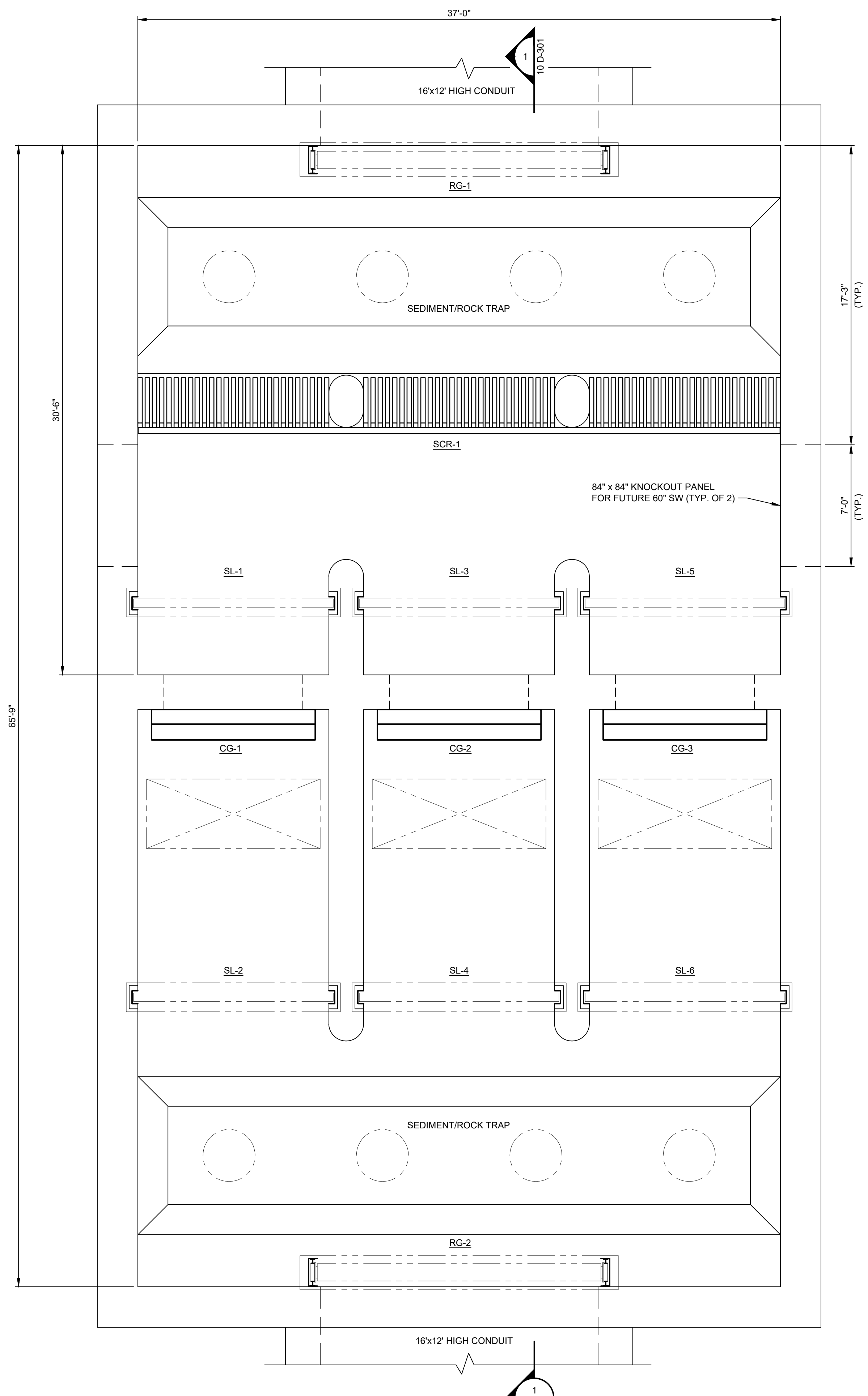
PHASE 2 CONSTRUCTION CONCEPTUAL PLAN

SHEET NUMBER

SSCF-C-102



UPPER PLAN



LOWER PLAN

1/4"=1'-0" SCALE 0 4 8 12 FEET

AECOM

PROJECT

ISLAND END RIVER RESILIENCY PROJECT STORM SURGE CONTROL FACILITY

CLIENT

CITY OF CHELSEA, MA
500 BROADWAY
CHELSEA, MA 02150

CONSULTANT

AECOM TECHNICAL SERVICES, INC.
250 APOLLO DRIVE
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ISSUE/REVISION

I/R	DATE	DESCRIPTION

PROJECT NUMBER

60669652

Designed By:	P.M.
Drawn By:	M.B.
Dept Check:	K.B.
Proj Check:	T. HARRISON
Date:	DECEMBER 2022
Scale:	AS SHOWN

DISCIPLINE

MECHANICAL PROCESS

SHEET TITLE

CONTROL STRUCTURE PLANS

SHEET NUMBER

SSCF-C-103

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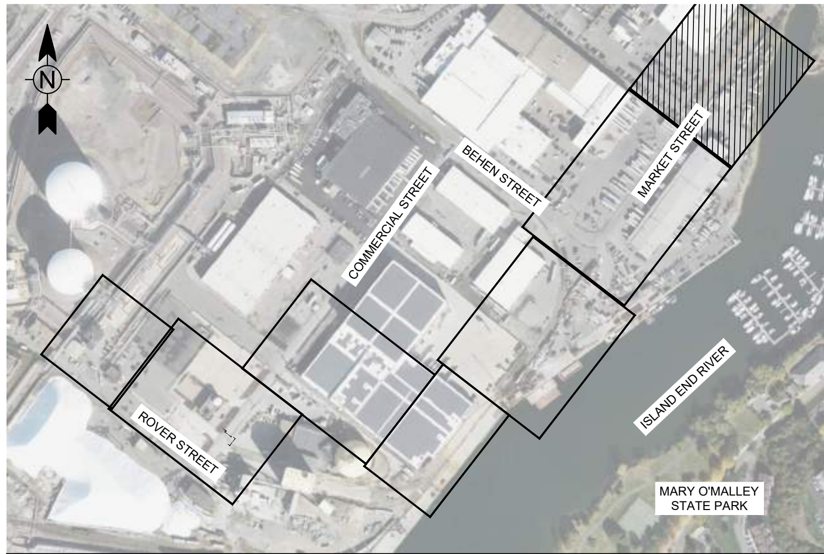
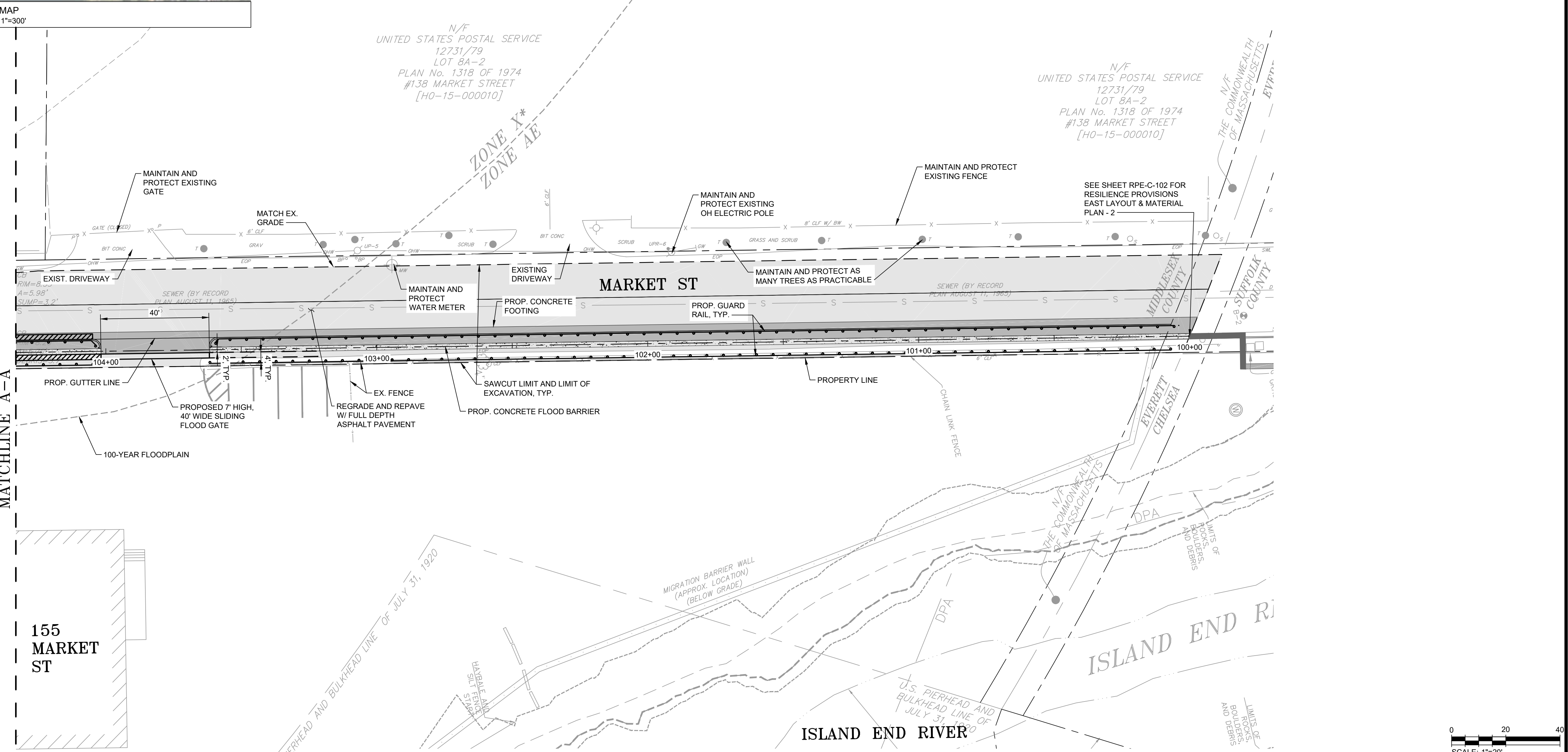
PLOT DATE: Friday, October 13, 2023 1:25:19 PM



KEY MAP
SCALE: 1"=300'



TETRA TECH
www.tetratech.com
498 7TH AVENUE, 15TH FLOOR
NEW YORK, NY 10018
PHONE: (646) 576-4034

MARK	DATE	DESCRIPTION	BY

CITY OF EVERETT
ISLAND END RIVER FLOOD PROVISIONS WEST

LAYOUT AND MATERIALS PLAN - 1
(STA. 100+00 - 104+25)

PROJ:	200-01291-22002
DESN:	TC
DRWN:	TC
CHKD:	AR

RPW-C-101

Bar Measures 1 inch, otherwise drawing not to scale

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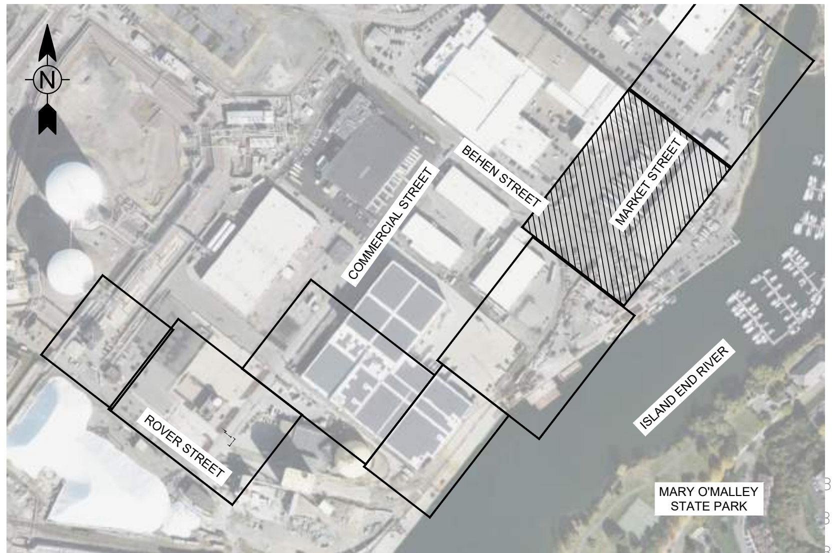
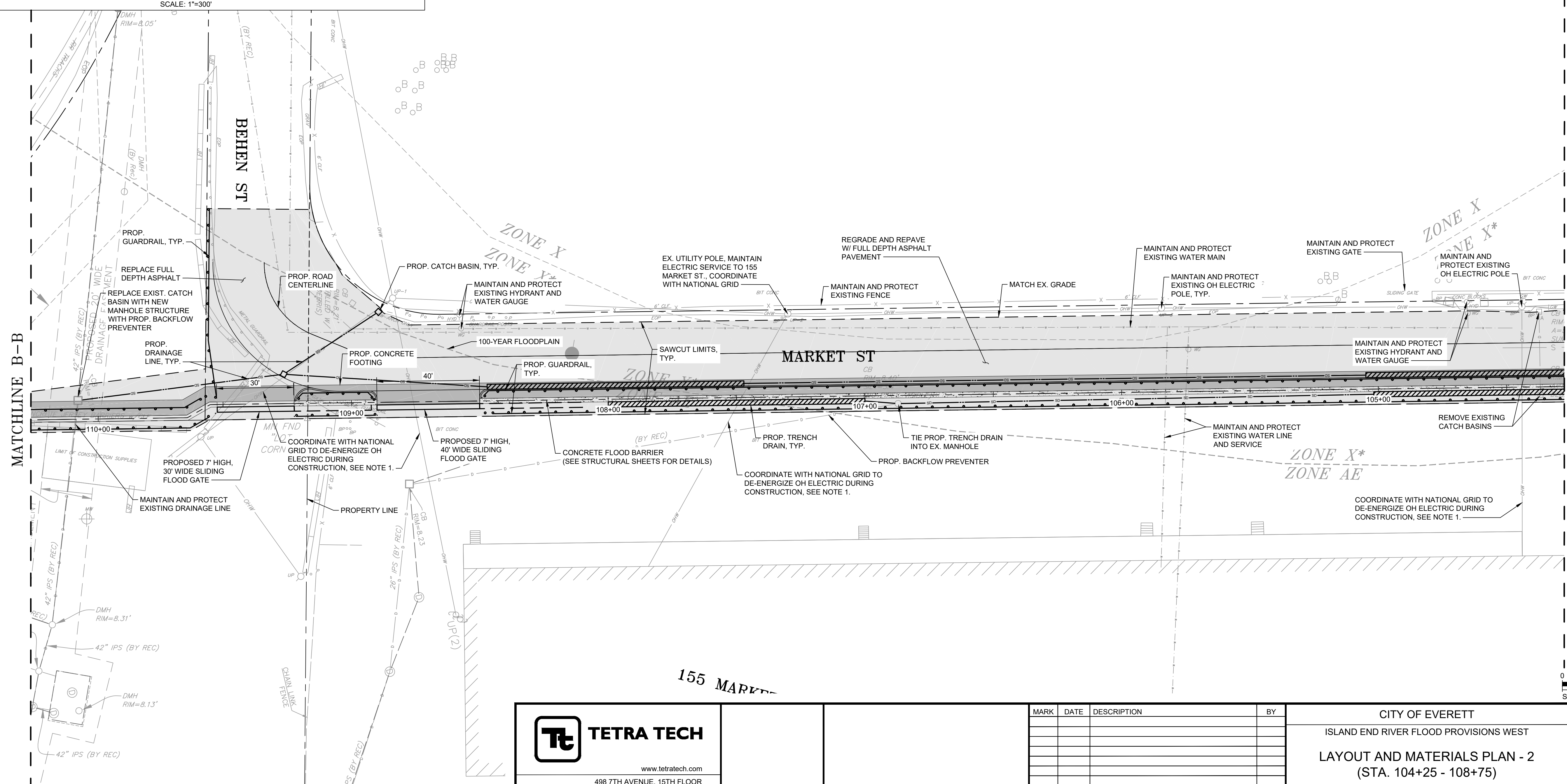


KEY MAP
SCALE: 1"=300'

NOTES:
1. ELECTRIC SERVICE TO BE MAINTAINED DURING CONSTRUCTION. COORDINATE WITH NATIONAL GRID TO ENSURE CONTINUED SERVICE TO PROPERTIES DURING CONSTRUCTION.



TETRA TECH
www.tetratech.com
498 7TH AVENUE, 15TH FLOOR
NEW YORK, NY 10018
PHONE: (646) 576-4034

MARK	DATE	DESCRIPTION	BY

CITY OF EVERETT

ISLAND END RIVER FLOOD PROVISIONS WEST

LAYOUT AND MATERIALS PLAN - 2
(STA. 104+25 - 108+75)

PROJ:	200-01291-22002
DESN:	TC
DRWN:	TC
CHKD:	AR

RPW-C-102

Bar Measures 1 inch, otherwise drawing not to scale

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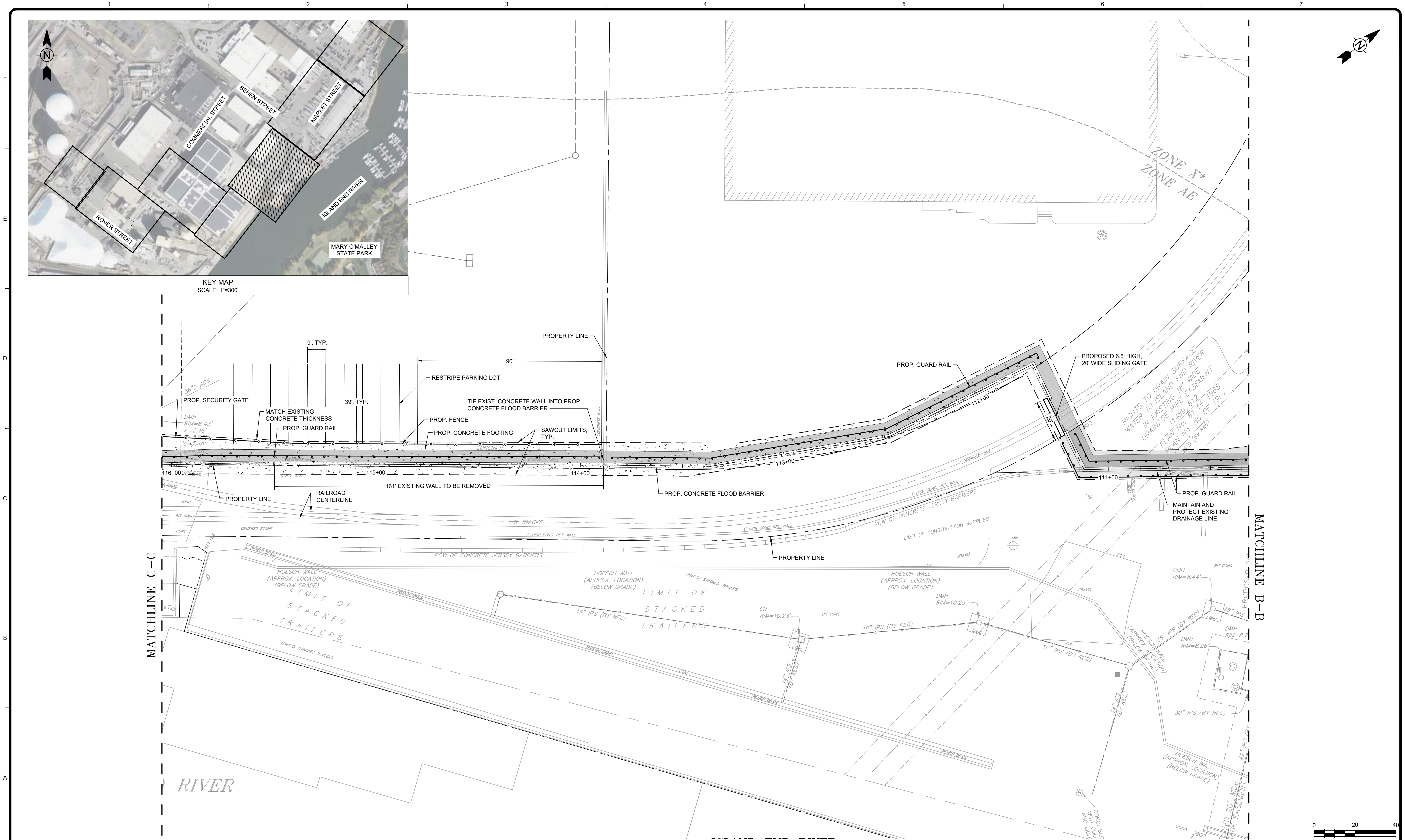

TETRA TECH	www.tetratech.com 498 7TH AVENUE, 15TH FLOOR NEW YORK, NY 10018 PHONE: (646) 576-4034

MARK	DATE	DESCRIPTION	BY

CITY OF EVERETT

ISLAND END RIVER FLOOD PROVISIONS WEST

LAYOUT AND MATERIALS PLAN - 3
(STA. 108+75 - 116+25)

PROJ:	200-01291-22002
DESN:	TC
DRWN:	TC
CHKD:	AR

RPW-C-103

Bar Measures 1 inch, otherwise drawing not to scale

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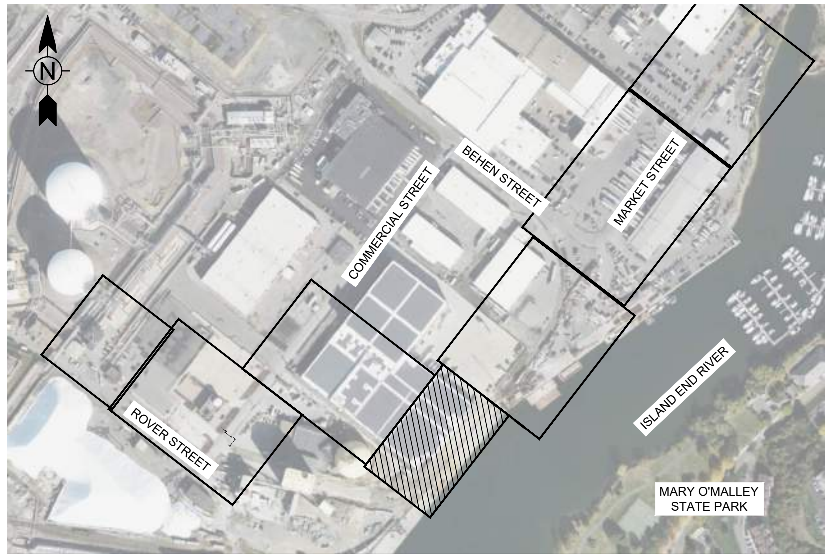
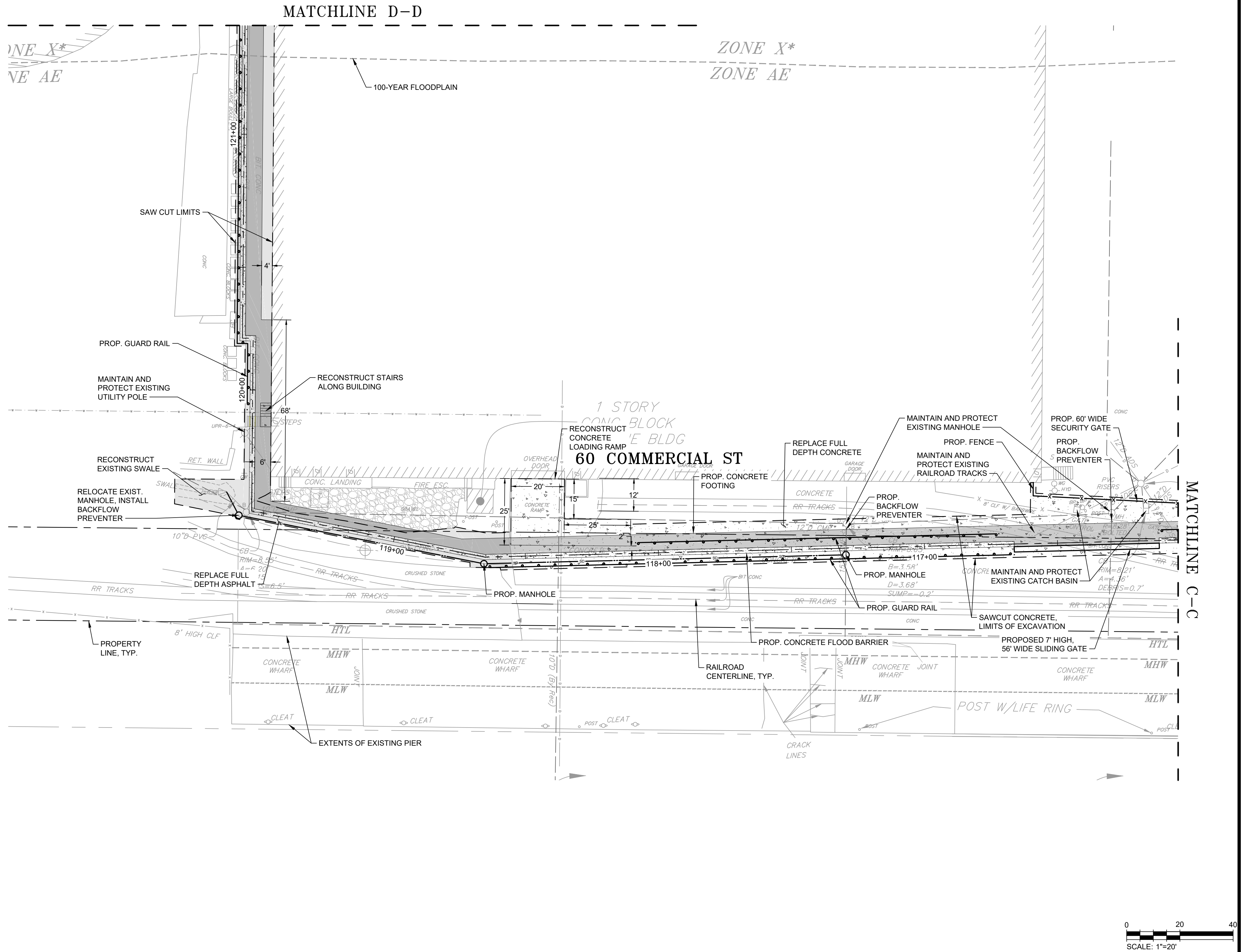


KEY MAP
SCALE: 1"=300'



TETRA TECH
www.tetratech.com
498 7TH AVENUE, 15TH FLOOR
NEW YORK, NY 10018
PHONE: (646) 576-4034

MARK	DATE	DESCRIPTION	BY

CITY OF EVERETT
ISLAND END RIVER FLOOD PROVISIONS WEST

LAYOUT AND MATERIALS PLAN - 4
(STA. 116+25 - 120+50)

PROJ:	200-01291-22002
DESN:	TC
DRWN:	TC
CHKD:	AR

RPW-C-104

Bar Measures 1 inch, otherwise drawing not to scale

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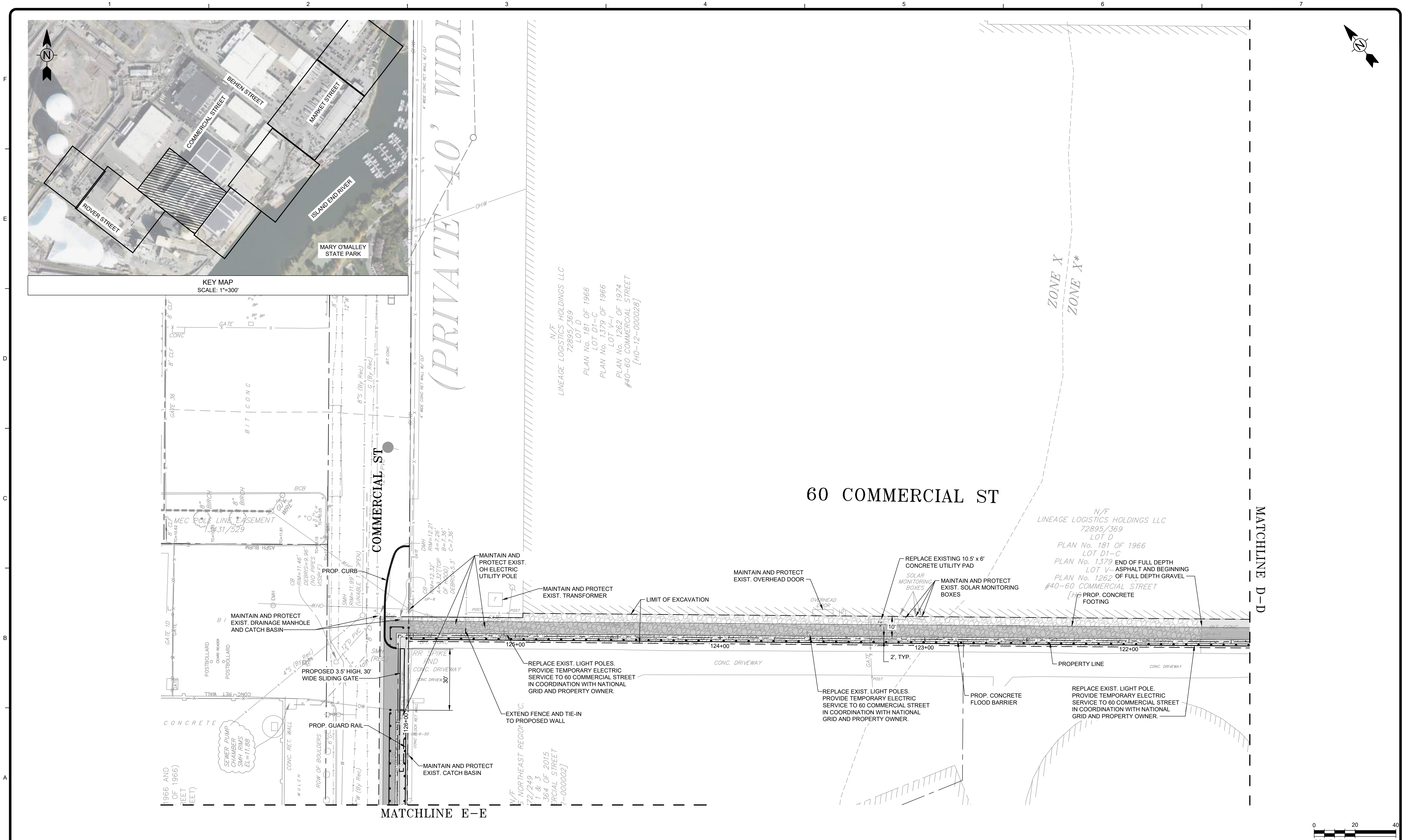

TETRA TECH

www.tetratech.com
498 7TH AVENUE, 15TH FLOOR
NEW YORK, NY 10018
PHONE: (646) 576-4034

MARK	DATE	DESCRIPTION	BY

CITY OF EVERETT

ISLAND END RIVER FLOOD PROVISIONS WEST

LAYOUT AND MATERIALS PLAN - 5
(STA. 120+50 - 126+00)

PROJ:	200-01291-22002
DESN:	TC
DRWN:	TC
CHKD:	AR

RPW-C-105

Bar Measures 1 inch, otherwise drawing not to scale

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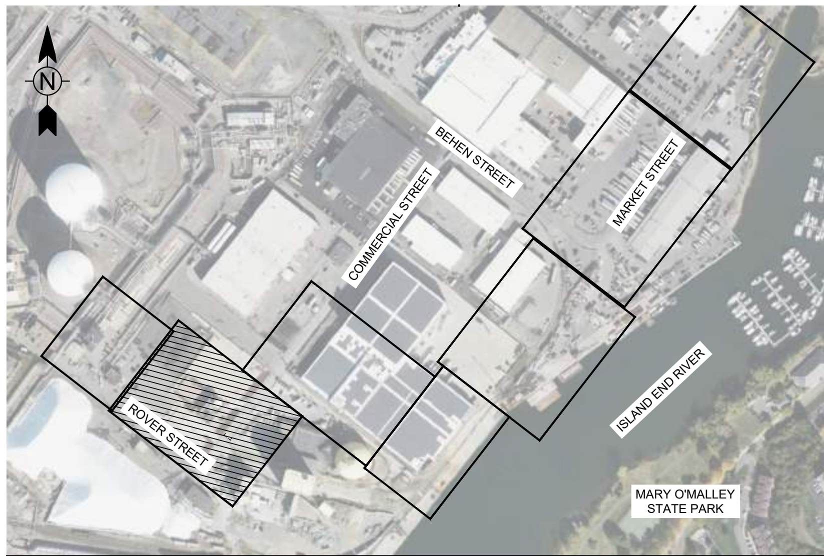
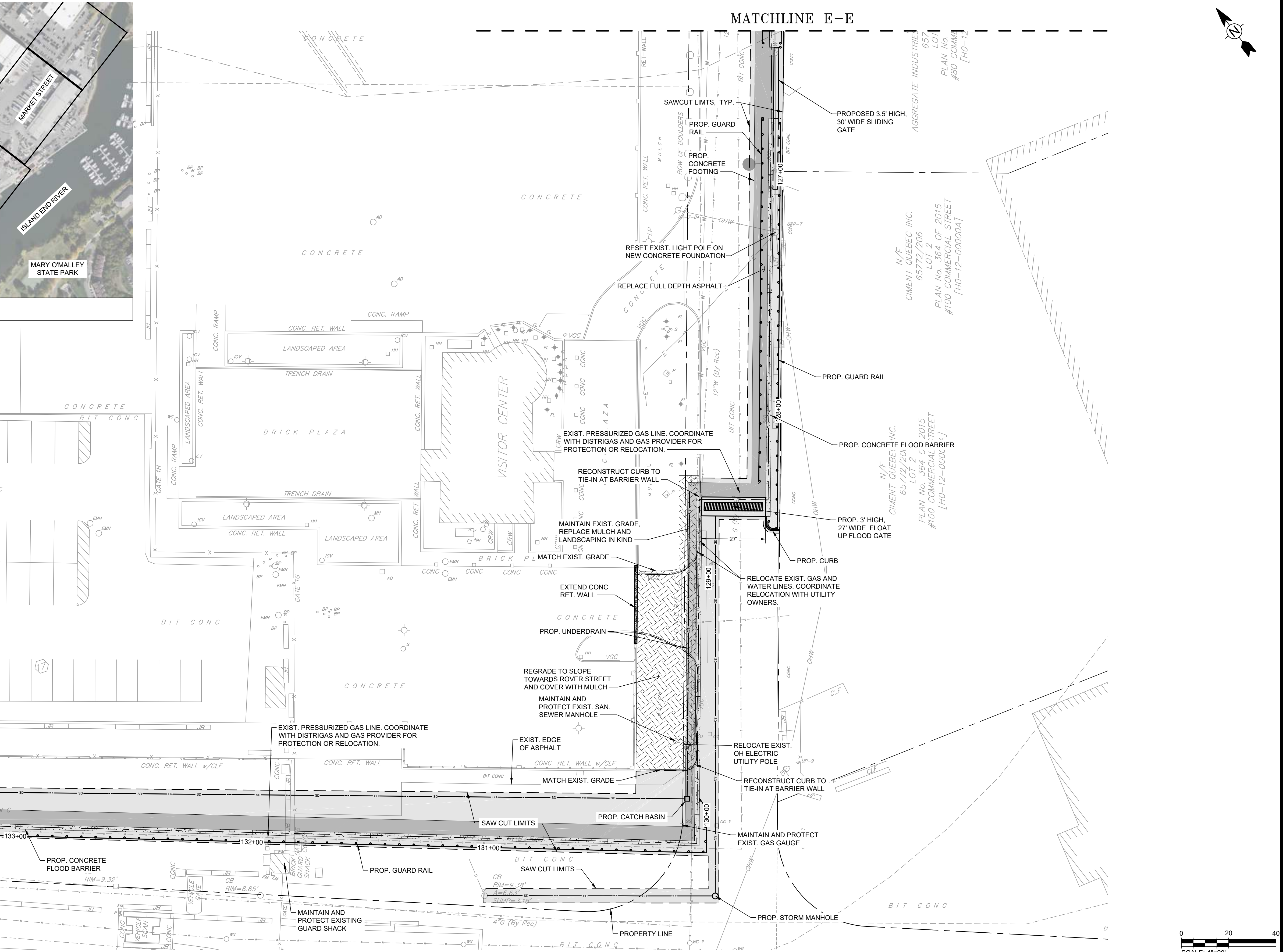


KEY MAP
SCALE: 1"=300'



TETRA TECH
www.tetratech.com
498 7TH AVENUE, 15TH FLOOR
NEW YORK, NY 10018
PHONE: (646) 576-4034

MARK	DATE	DESCRIPTION	BY

CITY OF EVERETT
ISLAND END RIVER FLOOD PROVISIONS WEST

LAYOUT AND MATERIALS PLAN - 6
(STA. 127+50 - 133+75)

PROJ:	200-01291-22002
DESN:	TC
DRWN:	TC
CHKD:	AR

RPW-C-106

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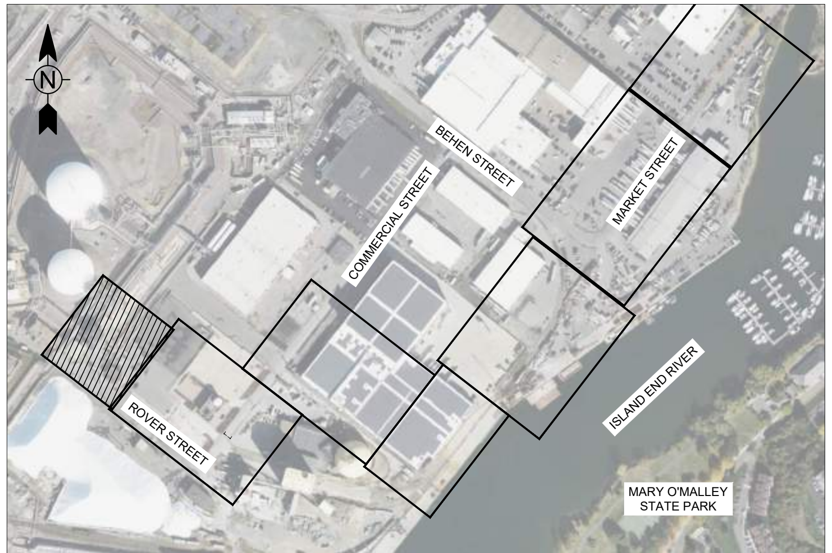
Bar Measures 1 inch, otherwise drawing not to scale



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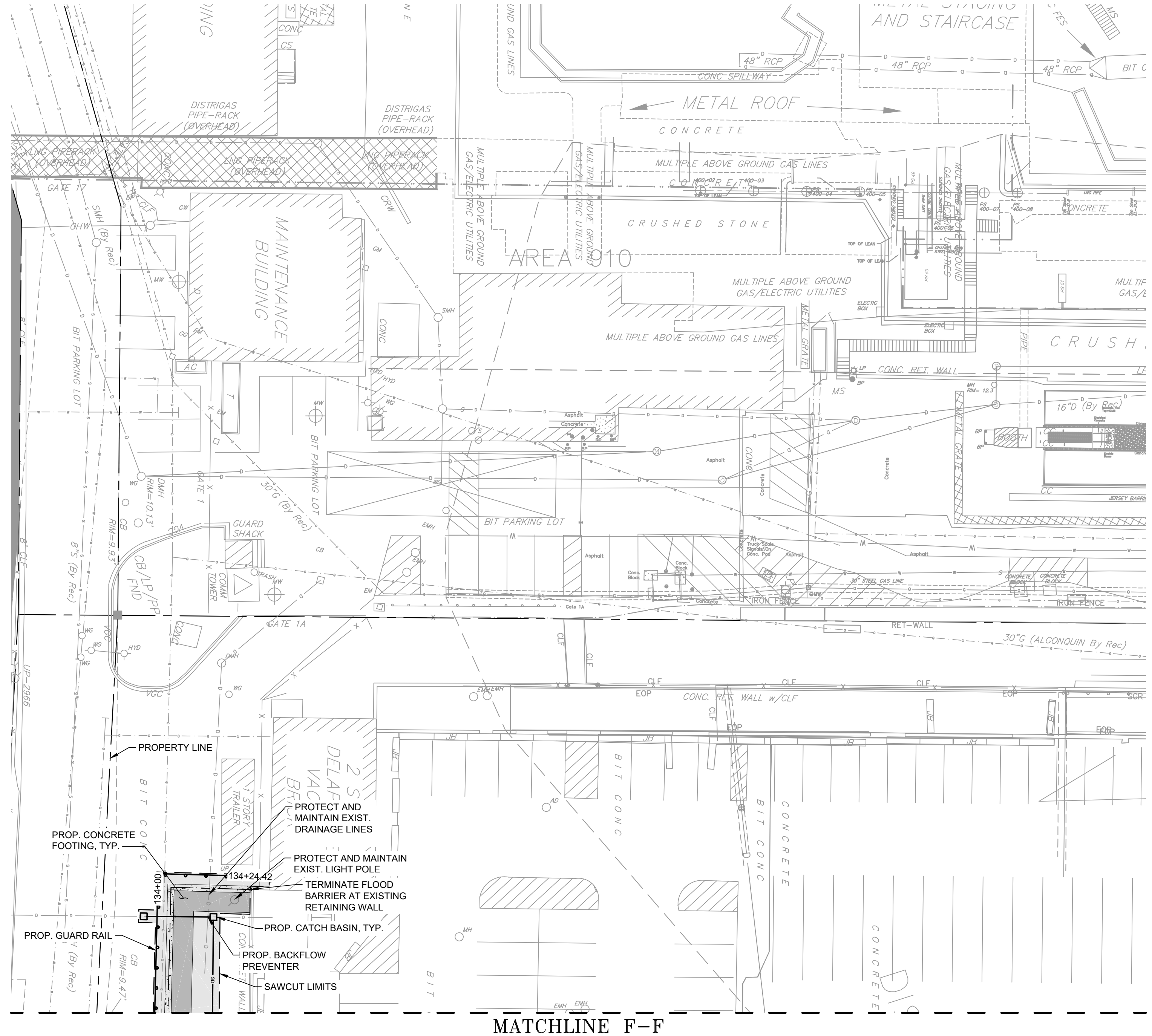

0 20 40
SCALE: 1"=20'

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PHONE: (646) 576-4034

MARK	DATE	DESCRIPTION	BY

CITY OF EVERETT
ISLAND END RIVER FLOOD PROVISIONS WEST

LAYOUT AND MATERIALS PLAN - 7
(STA. 133+75 - 137+09)

PROJ:	200-01291-22002
DESN:	TC
DRWN:	TC
CHKD:	AR

RPW-C-107

Bar Measures 1 inch, otherwise drawing not to scale

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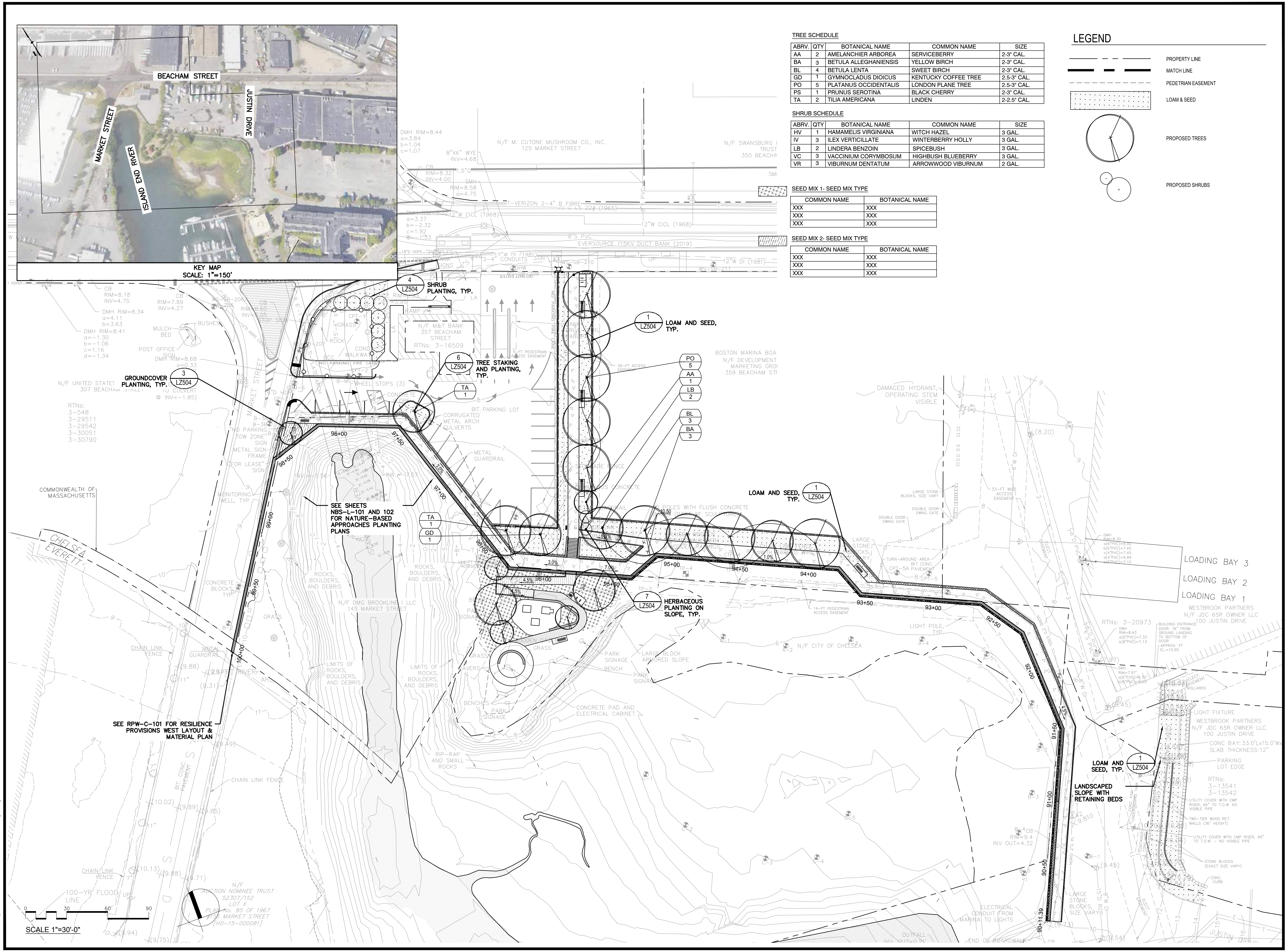

TREE SCHEDULE

ABRV.	QTY	BOTANICAL NAME	COMMON NAME	SIZE
AA	2	AMELANCHIER ARBOREA	SERVICEBERRY	2-3" CAL.
BA	3	BETULA ALLEGHANIENSIS	YELLOW BIRCH	2-3" CAL.
BL	4	BETULA LENTA	SWEET BIRCH	2-3" CAL.
GD	1	GYMNOCLADUS DIOICUS	KENTUCKY COFFEE TREE	2.5-3" CAL.
PO	5	PLATANUS OCCIDENTALIS	LONDON PLANE TREE	2.5-3" CAL.
PS	1	PRUNUS SEROTINA	BLACK CHERRY	2-3" CAL.
TA	2	TILIA AMERICANA	LINDEN	2-2.5" CAL.

SHRUB SCHEDULE

ABRV.	QTY	BOTANICAL NAME	COMMON NAME	SIZE
HV	1	HAMAMELIS VIRGINIANA	WITCH HAZEL	3 GAL.
IV	3	ILEX VERTICILLATE	WINTERBERRY HOLLY	3 GAL.
LB	2	LINDERA BENZOIN	SPICEBUSH	3 GAL.
VC	3	VACCINIUM CORYMBOSUM	HIGHBUSH BLUEBERRY	3 GAL.
VR	3	VIBURNUM DENTATUM	ARROWWOOD VIBURNUM	2 GAL.

SEED MIX 1- SEED MIX TYPE

COMMON NAME	BOTANICAL NAME
XXX	XXX
XXX	XXX
XXX	XXX

SEED MIX 2- SEED MIX TYPE

COMMON NAME	BOTANICAL NAME
XXX	XXX
XXX	XXX
XXX	XXX

LEGEND

PROPERTY LINE
MATCH LINE
PEDETRIAN EASEMENT
LOAM & SEED
PROPOSED TREES
PROPOSED SHRUBS

Project:
ISLAND END RIVER FLOOD RESILIENCE PROVISIONS EAST

Weston & Sampson

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Approved By: BK
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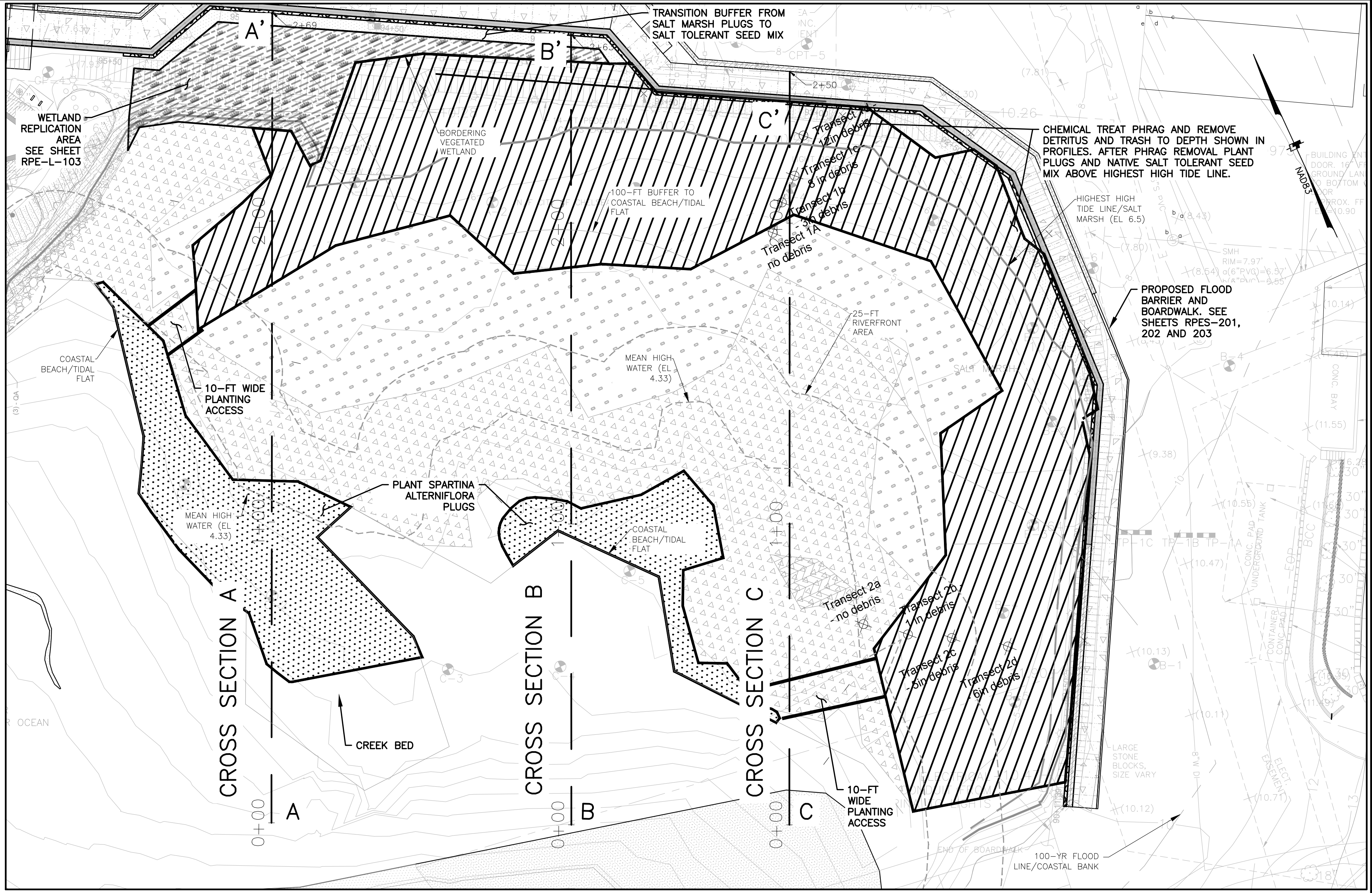
W&S File No.:

Drawing Title:
PLANTING PLAN - 1

Sheet Number:
RPE-L-101

Rev: 1.6 Date: 11/2023

KEY MAP
SCALE: 1"=150'



SCALE: 1"=20'

LEGEND

VEGETATION/SOIL PROPOSED

- PLUG PLANTINGS WITH A MIX OF SALTGRASS (DISTICHLIS SPICATA) AND SALT MARSH HAY (SPARTINA PATENS). SEED WITH NATIVE SALT TOLDERANT SEED MIX ONLY IF ABOVE HIGHEST HIGH TIDE LINE
- SPARTINA ALTERNIFLORA PLUGS
- DISTICHLIS SPICATA, SPARTINA PATENS, SPARTINA ALTERNIFLORA

VEGETATION/SOIL EXISTING

- DISTICHLIS SPICATA
- DISTICHLIS SPICATA/ SPARTINA ALTERNIFLORA
- SPARTINA ALTERNIFLORA
- CREEK CENTER
- GRAVEL OVER MUCK
- MUCK
- LOAM AND ORGANIC MATTER
- FIBRIC ORGANIC MATTER

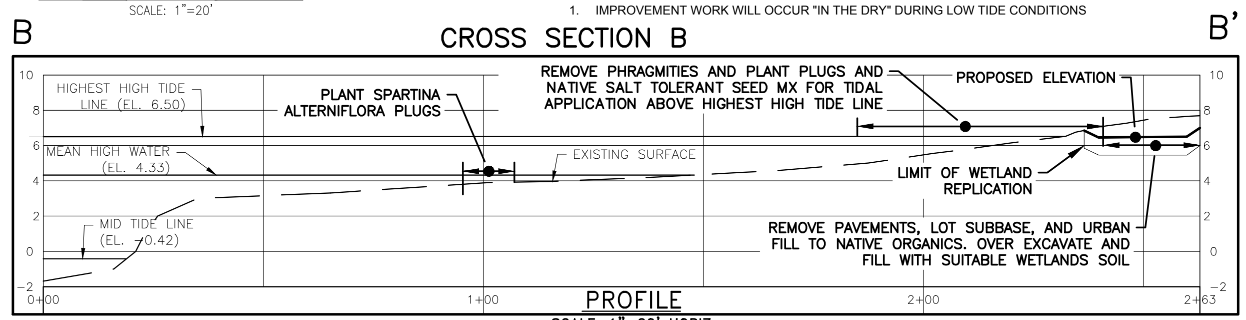
NOTES:

1. IMPROVEMENT WORK WILL OCCUR "IN THE DRY" DURING LOW TIDE CONDITIONS

Debris Depths

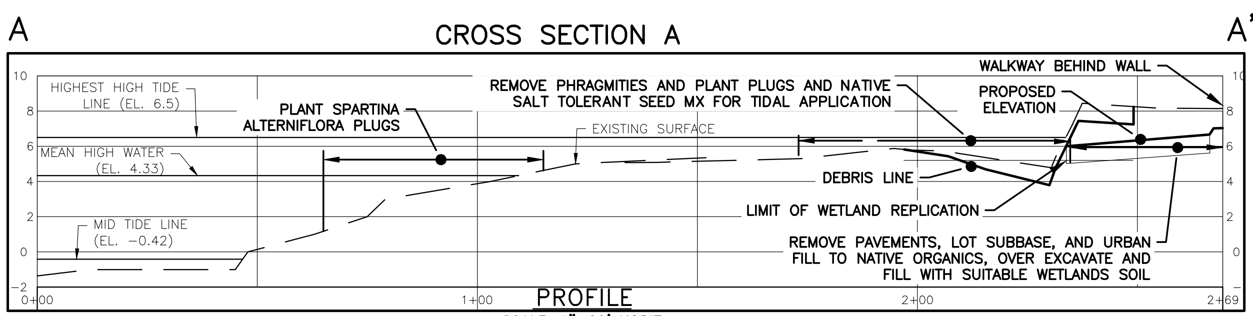
Point ID	Existing Surface Elevation (ft)	Depth (in) of Trash Removal	Proposed Elevation (ft)
1a	5.47	0	5.47
1b	5.61	3	5.36
1c	6.04	8	5.37
1d	6.67	12	5.67
2a	4.5	0	4.5
2b	4.54	1	4.46
2c	4.7	5	4.28
2d	4.86	6	4.36

CROSS SECTION B



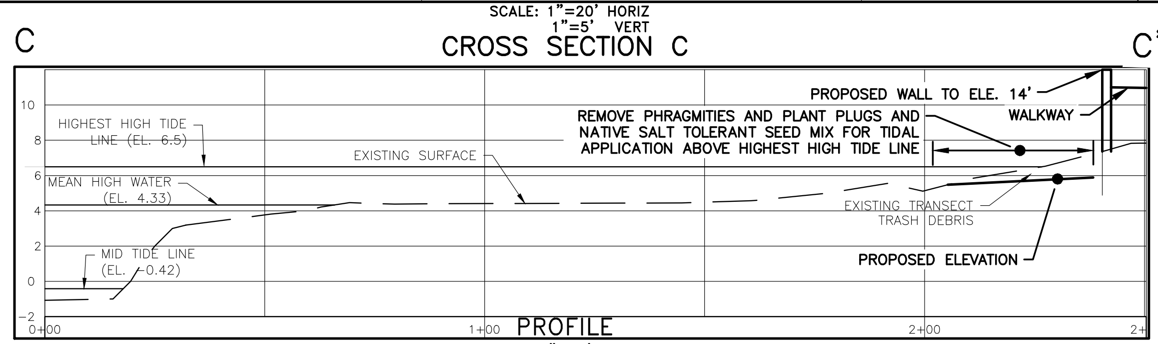
SCALE: 1"=20' HORIZ
1"=5' VERT

CROSS SECTION A



SCALE: 1"=20' HORIZ
1"=5' VERT

CROSS SECTION C



SCALE: 1"=20' HORIZ
1"=5' VERT

Project:
ISLAND END RIVER FLOOD RESILIENCE PROVISIONS EAST

Weston & Sampson

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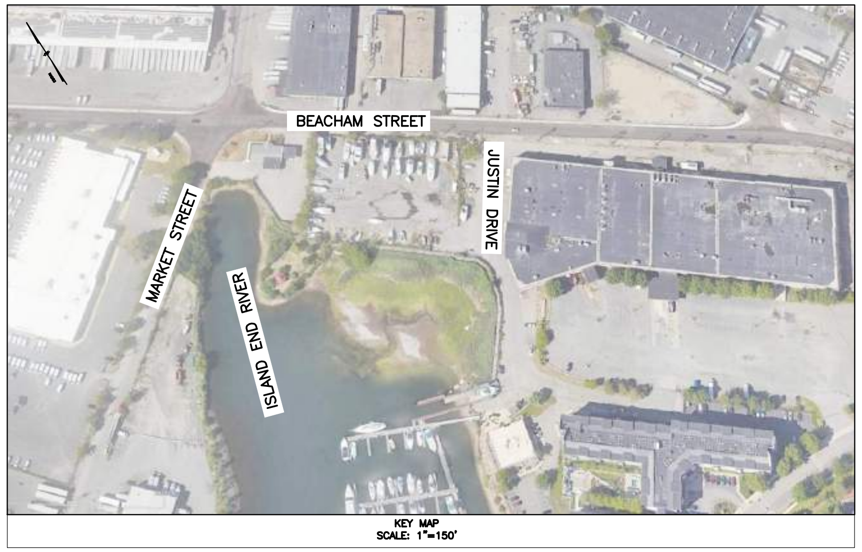
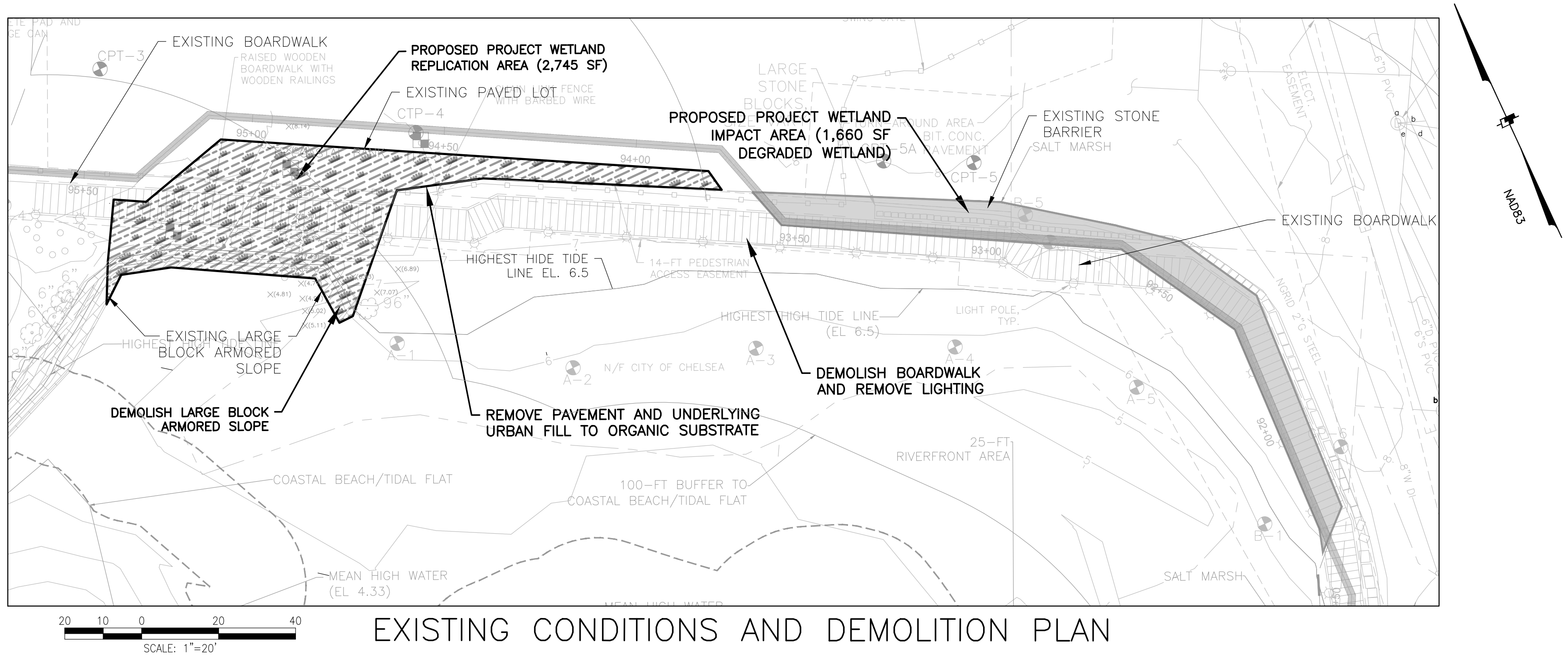
W&S File No.:

Drawing Title:
PLANTING PLAN - 2

Sheet Number:
RPE-L-102





EXISTING CONDITIONS AND DEMOLITION PLAN

SEE SHEET RPE-R-101 RESOURCE AREA IMPACT PLAN FOR RESOURCE BOUNDARIES AND WETLANDS FLAGS

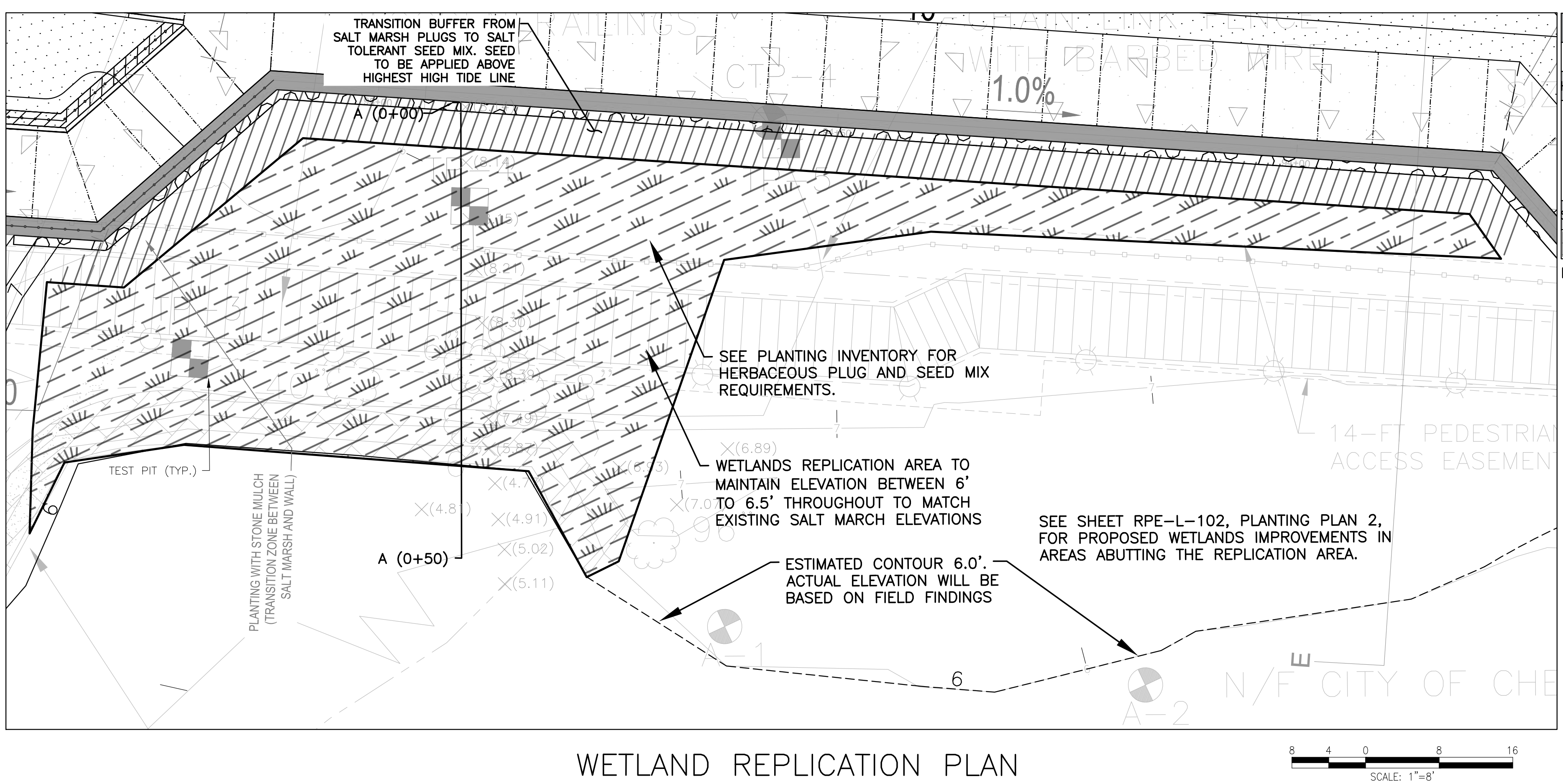
SEE SHEET RPE-L-102, PLANTING PLAN-2, FOR EXISTING CONDITIONS IN AREAS ABUTTING THE REPLICATION AREA.

LEGEND:

= PROPOSED SALT MARSH REPLICATION

= PROPOSED SALT MARSH IMPACT AREA

= PROPOSED SALT TOLERANT SEED MIX

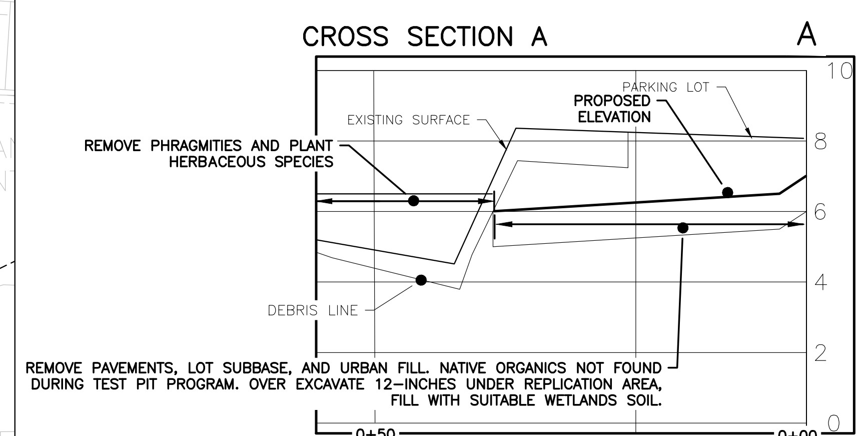


WETLAND REPLICATION PLAN

Planting Inventory						
Symbol	Type	Latin Name	Common Name	Quantity	Size	Spacing
HERBACEOUS						
	DS	Distichlis Spicata	Saltgrass	230	Plug	2'-0" O.C.
	SP	Spartina Patens	Saltmarsh Hay	230	Plug	2'-0" O.C.
	SA	Spartina Alterniflora	Smooth Cordgrass	230	Plug	2'-0" O.C.
SEED						
	New England Coastal Salt Tolerant Grass Mix for Tidal Application - New England Wetland Plants, Inc.					1 lb./1250 sq. ft.

NOTE: SPECIES SHOULD BE PLANTED IN AN ALTERNATING PATTERN ACROSS THE PROPOSED PLANTING AREA.

CROSS SECTION A



PROFILE
SCALE: 1"=10' HORIZ
1"=2.5' VERT

Project:
ISLAND END RIVER FLOOD RESILIENCE PROVISIONS EAST

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Drawing Title:
PLANTING PLAN - 3

Sheet Number:
RPE-L-103

Rev. 1.6 Date: 11/2023

PLANTING NOTES:

1. PLANT MATERIAL SHALL CONFORM TO THE GUIDELINES ESTABLISHED BY THE "AMERICAN STANDARD FOR NURSERY STOCK" PUBLISHED BY THE AMERICAN ASSOCIATION OF NURSERYMEN, LATEST EDITION. PLANTINGS MAY ALSO INCLUDE BARE ROOT AND LIVE STAKE PLANTINGS WHERE FEASIBLE AND DESIRABLE PER PLANTING CONDITIONS
2. PROVIDE ORGANIC WEED FREE PLANTING MEDIUM PER SPECIFICATIONS
3. PROVIDE SPECIFIED COURSE SAND FILL FOR TOP DRESSING TIDAL PLANTINGS
4. ALL PLANTS ARE SUBJECT TO THE APPROVAL OF ENVIRONMENTAL SCIENTIST BEFORE, DURING, AND AFTER INSTALLATION.
5. PLANTING WILL BE CONDUCTED WITH OVERSIGHT BY AN ENVIRONMENTAL SCIENTIST AND PLANTS WILL BE SPACED AND GROUPED AS DIRECTED. CONTRACTOR SHALL PROVIDE CLEAN WATER, HOSES AND ALL NECESSARY EQUIPMENT FOR WATERING ASSOCIATED WITH THE PLANTING AND SEEDING OPERATIONS AND TEMPORARY IRRIGATION DURING THE ESTABLISHMENT PERIOD.
6. ANY PLANT MATERIAL WHICH DIES, TURNS BROWN, OR DEFOLIATES (PRIOR TO TOTAL ACCEPTANCE OF THE WORK) SHALL BE REPLACED WITH MATERIAL APPROVED BY THE ENVIRONMENTAL SCIENTIST.
7. THE CONTRACTOR SHALL COMPLETELY GUARANTEE ALL PLANT MATERIAL FOR A PERIOD OF ONE (1) YEAR BEGINNING ON THE DATE OF ACCEPTANCE. CONTRACTOR SHALL REQUEST REVIEW AND FORMAL NOTICE OF ACCEPTANCE IN WRITING. THE CONTRACTOR SHALL MAKE ALL REPLACEMENTS AT THE BEGINNING OF THE FOLLOWING GROWING SEASON. PLANTINGS BELOW TOP OF BANK MUST BE COMPLETED BEFORE JULY 1..
8. REPLACEMENT SCHEDULE AND CONTENT FOR UPLAND PLANTINGS MAY BE ADJUSTED BY MUTUAL AGREEMENT BASED ON PLANTING SEASON AND AVAILABILITY, AS APPROVED BY THE OWNER.
9. THE CONTRACTOR SHALL PROVIDE A TEMPORARY IRRIGATION SYSTEM TO REMAIN IN OPERATION FOR THE FIRST THREE GROWING SEASONS AT A MINIMUM TO ENSURE ESTABLISHMENT AND AS NEEDED TO LIMIT DROUGHT DAMAGE.
10. LIVING SHORELINE PLANTING REQUIRES ADAPTIVE MANAGEMENT BY THE OWNER; INCLUDING SUBSEQUENT ROUNDS OF SUPPLEMENTAL PLANTING, INVASIVE SPECIES CONTROL, IRRIGATION, WASTE REMOVAL, HABITAT FEATURE MANAGEMENT, AND SOIL MONITORING. SEE MANAGEMENT PLAN AND GUIDE.

PLANT SCHEDULE

TREES	QTY	BOTANICAL / COMMON NAME	CONT	SIZE	REMARKS
AC	5	AMELANCHIER CANADENSIS CANADIAN SERVICEBERRY	5 GAL		
BD	5	BETULA DELTOIDES GREY BIRCH	5 GAL		
PO	5	PLATANUS OCCIDENTALIS AMERICAN SYCAMORE	15 GAL	2"CAL	
PH	2	POPULUS DELTOIDES EASTERN COTTONWOOD	5 GAL	1.5"CAL	
QA	5	QUERCUS ALBA WHITE OAK	15 GAL	2"CAL	

SHRUBS	QTY	BOTANICAL / COMMON NAME	CONT	SIZE	NOTES
MP	11	MYRICA PENSYLVANICA	1 GAL		
PM	22	PRUNUS MARITIMA	2 GAL		

SHRUB AREAS	QTY	BOTANICAL / COMMON NAME	CONT	
JJ	25	JUNIPERUS COMMUNIS COMMON JUNIPER	1 GAL	42" o.c.
PQ	135	PARTHENOCISSUS QUINQUEFOLIA	1 GAL	36" o.c.
RG	25	RHUS AROMATICA	1 GAL	36" o.c.
VM	20	VACCINIUM MACROCARPON AMERICAN CRANBERRY	1 GAL	30" o.c.

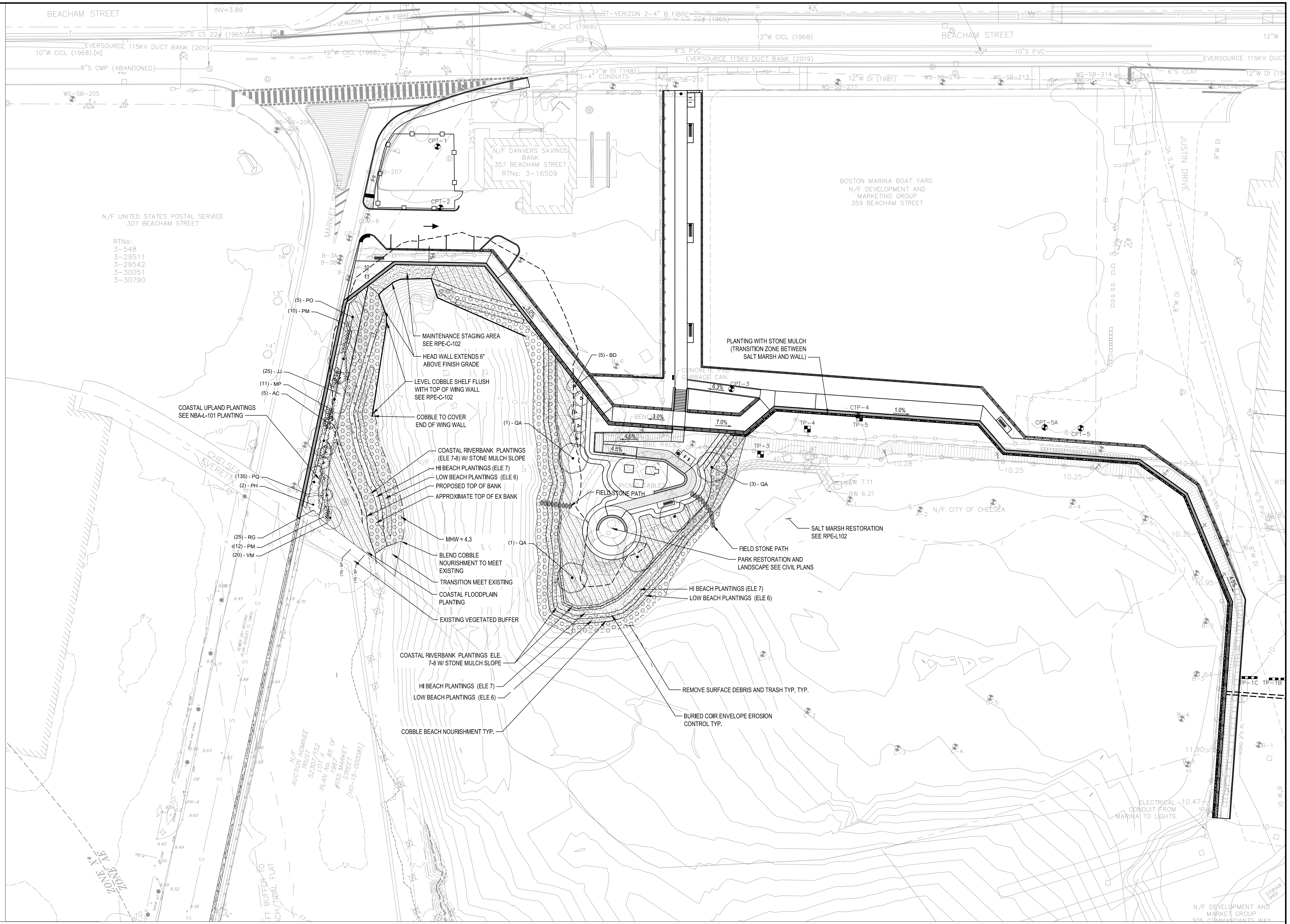
GROUND COVERS	QTY	BOTANICAL / COMMON NAME	CONT	SIZE
	5,750	COASTAL FLOOD PAIN MIX 8+	PLUG & SEED	18" o.c.
	4,000	HI BEACH MIX ELE. 7+	CULM & PLUG	36" o.c.
	1,700	LOW BEACH MIX ELE. 6+/-	PLUG	12" o.c.

SEED AND PLUG MIX
FINAL LIST BASED ON AVAILABILITY
MODIFIED AND AMENDED ANNUALLY DURING ESTABLISHMENT PER ADAPTIVE MANAGEMENT

SHELTERED COASTAL PLAIN (SEED PLUG CULM)
"AMMOPHILA BREVILIGULATA AMERICAN BEACHGRASS"
"SOLIDAGO SEMPERVIRENS SEASIDE GOLDENROD"
"SALICORNIA VIRGINICA PICKLEWEED"
"ANDROPOGON GERARDII BIG BLUESTEM"
"ASCLEPIAS TUBEROSA BUTTERFLY MILKWEED"
"ASTER LONACTIS STIF LEAVED ASTER"
"COREOPSIS MAJOR GREAT TICKSEED"
"DESCHAMPSIA FLEXUOSA WAVY HAIR GRASS"
"EURYBIA SPECTABILIS EASTERN SHOWY ASTER"
"LATHYRUS JAPONICUS MARITIMUS BEACH PEA"
"LEYMUS MOLLIS AMERICAN DUNEGRASS"
"PANICUM AMARUM BITTER PANICGRASS"
"SCHIZACHYRIUM SCOPARIUM LITTLE BLUESTEM"
"SYMPHYOTRICHUM PILOSUM FROST ASTER"

HI BEACH MIX (PLUGS)
70%"SPARTINA PATENS SALTMEADOW CORDGRASS"
30% OTHER
"SALICORNIA DEPRESSA VIRGINIA GLASSWORT"
"SALICORNIA VIRGINICA PICKLEWEED"
"IVA FRUTCTESCENS MARSH ELDER"
"JUNCUS GERARDII SALTMARSH RUSH"
"DISTICHLIS SPICATA SALTGRASS"
"LIMONIUM CAROLINIANUM CAROLINA SEA LAVENDER"
"CAKILE EDENTULA AMERICAN SEAROCKET"
"HONCKENYA PEPLOIDES SEABEACH SANDWORT"

LOW BEACH (PLUGS)
80% "SPARTINA ALTERNIFLORA SALT MARSH GRASS"
20%"SPARTINA PATENS SALTMEADOW CORDGRASS"



Legend

COBBLE BEACH NOURISHMENT/ STABILIZATION
COASTAL RIVERBANK PLANTED WITH COBBLE MULCH
COSTAL BEACH (LOW, HI) PLANTING
COSTAL FLOODPLAIN PLANTING SALT FLOOD TOLERANT UPLAND PLANTINGS

Mass EOEA

Island End River
PLANTING PLAN
Everett & Chelsea, MA

SHEET - NBA-L-101
DEIR

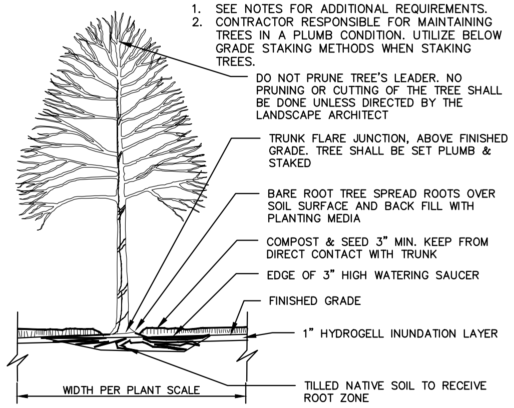
SCALE: 1" = 30'
0 15 30 60 FEET

BSC GROUP
803 Summer Street
Boston, Massachusetts
02127
617 896 4300

DATE: 10 / 26 / 2023
FILE AT: \\bscbos\wor\Projects-WOR\8956105\...

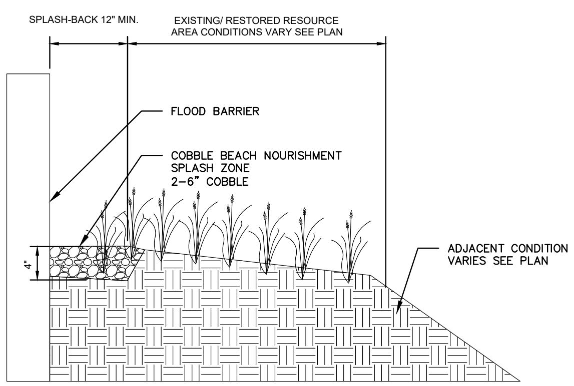
NOTES:

1. SEE NOTES FOR ADDITIONAL REQUIREMENTS.
2. CONTRACTOR RESPONSIBLE FOR MAINTAINING TREES IN A PLUMB CONDITION. UTILIZE BELOW GRADE STAKING METHODS WHEN STAKING TREES.



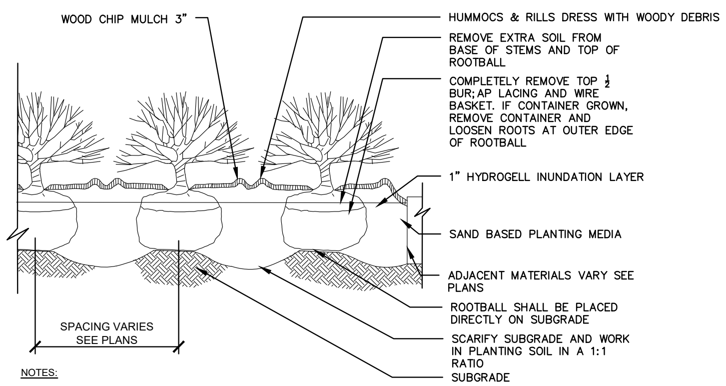
BARE ROOT PLANTING

SCALE: NONE



PLANTING STONE MULCH TRANSITION ZONE

SCALE: NONE

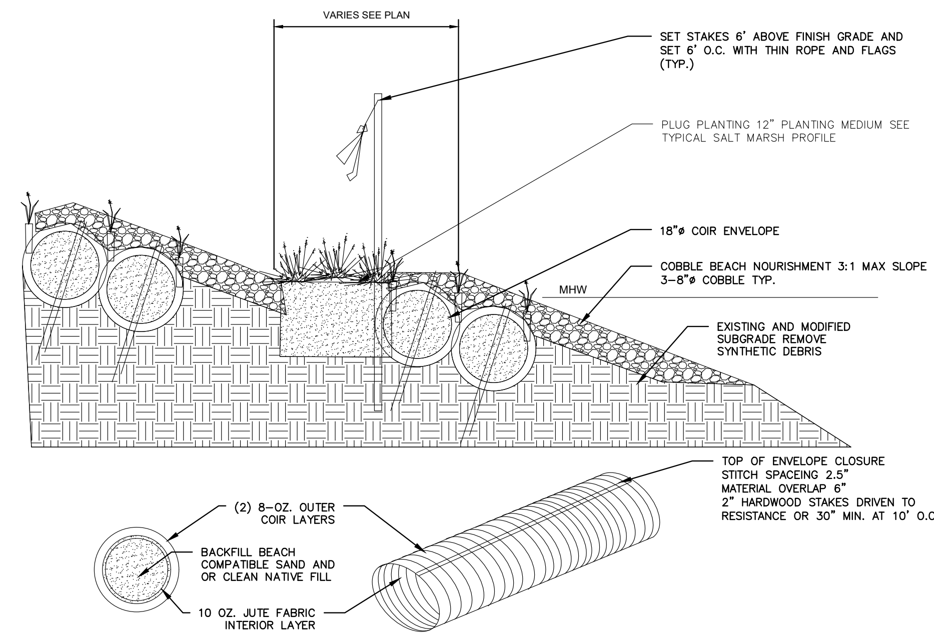


NOTES:

1. SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
2. NO PRUNING OR CUTTING UNLESS DIRECTED BY THE LANDSCAPE ARCHITECT.
3. SAUCER SHALL BE FLOODED TWICE DURING THE FIRST 24 HOURS AFTER PLANTING.
4. REMOVE ALL CONTAINERS OR SYNTHETIC WRAPPINGS

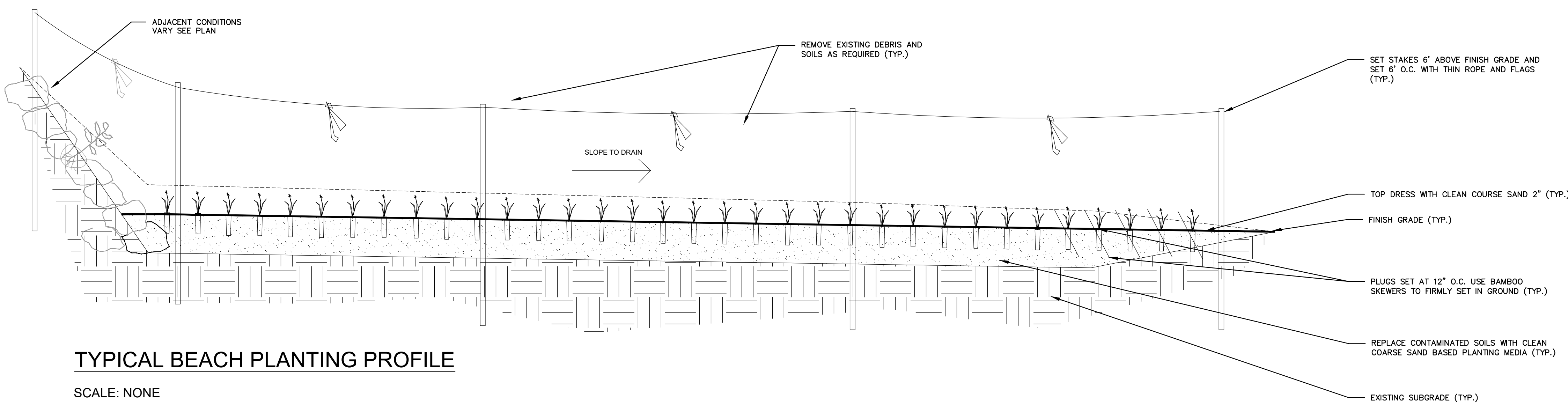
SHRUB/ TREE COASTAL REPLICATION PLANTING DETAIL

SCALE: NONE



COIR ENVELOPE AND COBBLE BEACH

SCALE: NONE



TYPICAL BEACH PLANTING PROFILE

SCALE: NONE

Island End River

PLANTING DETAILS

Everett & Chelsea, MA

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DEIR

Mass EOEA

FEET

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Boston, Massachusetts
02127
617 896 4300

DATE: 10 / 26 / 2023
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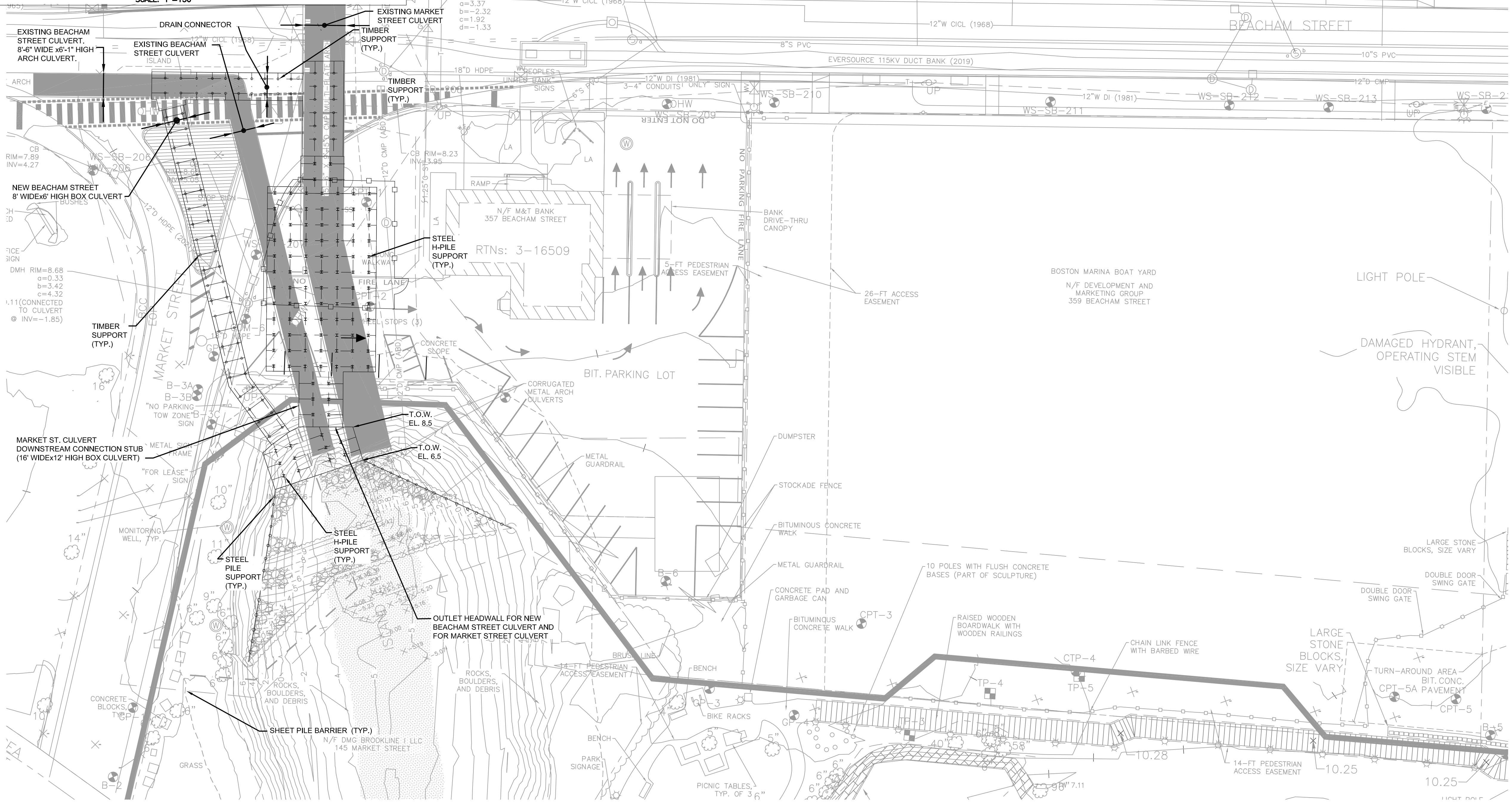
KEY MAP
SCALE: 1"=150'



PLAN
SCALE: 1"=20'

LAST UPDATE: Friday, October 27, 2023 1:05:36 PM
PLOT DATE: Monday, November 6, 2023 3:37:03 PM

Project:
ISLAND END RIVER FLOOD RESILIENCE PROVISIONS EAST

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STRUCTURAL PLAN

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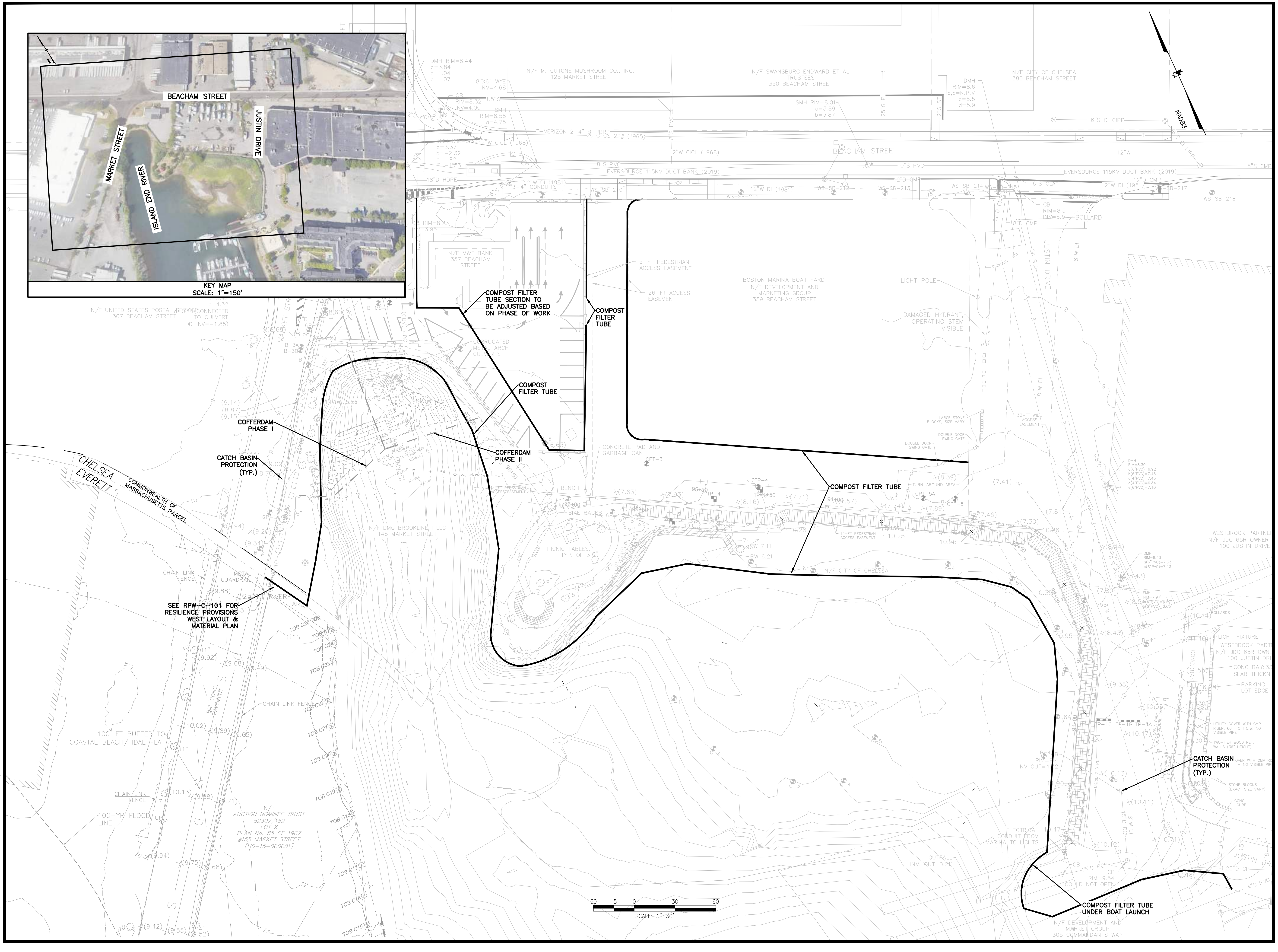

Project:

ISLAND END RIVER FLOOD RESILIENCE PROVISIONS EAST

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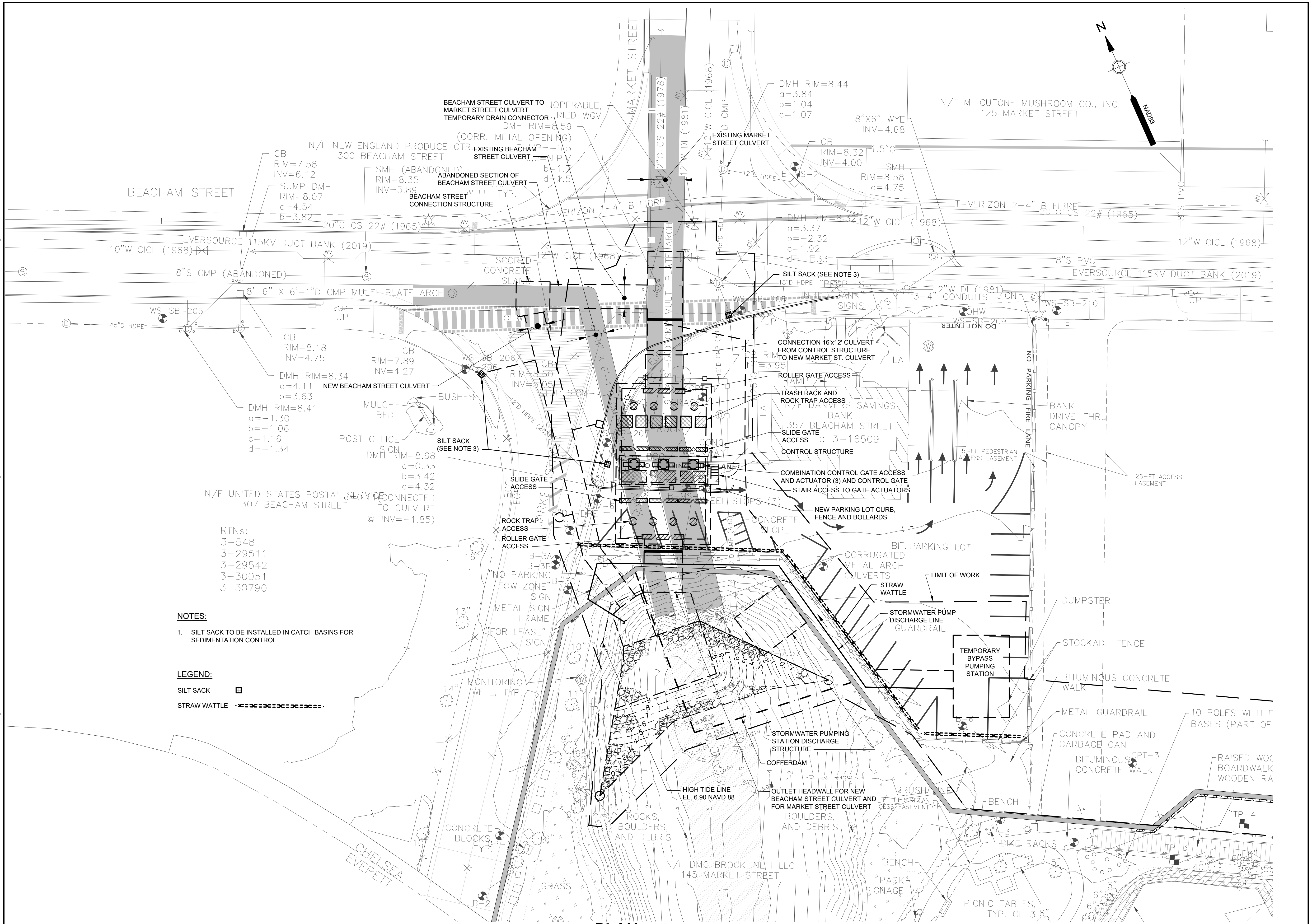
EROSION AND SEDIMENT CONTROL PLAN (STA. 90+11 - 100+00)

Sheet Number:

RPE-ES-101

Rev. 1.6 Date: 11/2023



NOTES:

1. SILT SACK TO BE INSTALLED IN CATCH BASINS FOR SEDIMENTATION CONTROL.

LEGEND:

SILT SACK

STRAW WATTLE

PLAN

SCALE: 1"=20'

1" = 20' SCALE 0 20 40 60 FEET

AECOM

PROJECT

ISLAND END RIVER RESILIENCY PROJECT STORM SURGE CONTROL FACILITY

CLIENT

CITY OF CHELSEA, MA
500 BROADWAY
CHELSEA, MA 02150

CONSULTANT

AECOM TECHNICAL SERVICES, INC.
250 APOLLO DRIVE
CHELMSFORD, MA 01824
PHONE: (978) 905-2100
www.aecom.com

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60669652

Designed By:	M. MESERVE
Drawn By:	S. NAPOLITANO
Dept Check:	C. BENZIGER
Proj Check:	T. HARRISON
Date:	DECEMBER 2022
Scale:	AS NOTED

DISCIPLINE

CIVIL

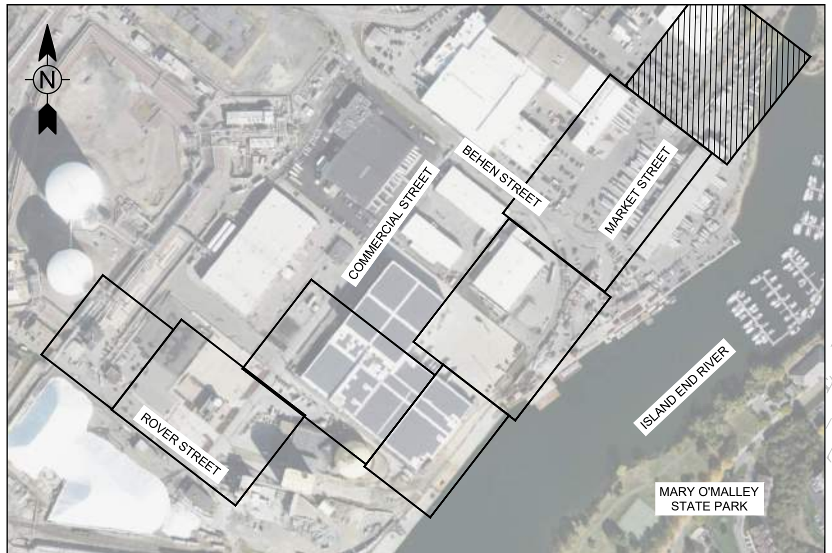
SHEET TITLE

EROSION AND SEDIMENTATION CONTROL

SHEET NUMBER

SSCF-ES-101

PATHFILENAME: L:\DCS\PROJECTS\WTR\60669652_ISLANDENDRIVER\900_CAD_GIS\910_CAD\20-SHEETS\C00 C-103.DWG
LAST UPDATE: Friday, October 13, 2023 2:06:52 PM
PLOT DATE: Friday, November 3, 2023 10:07:17 AM



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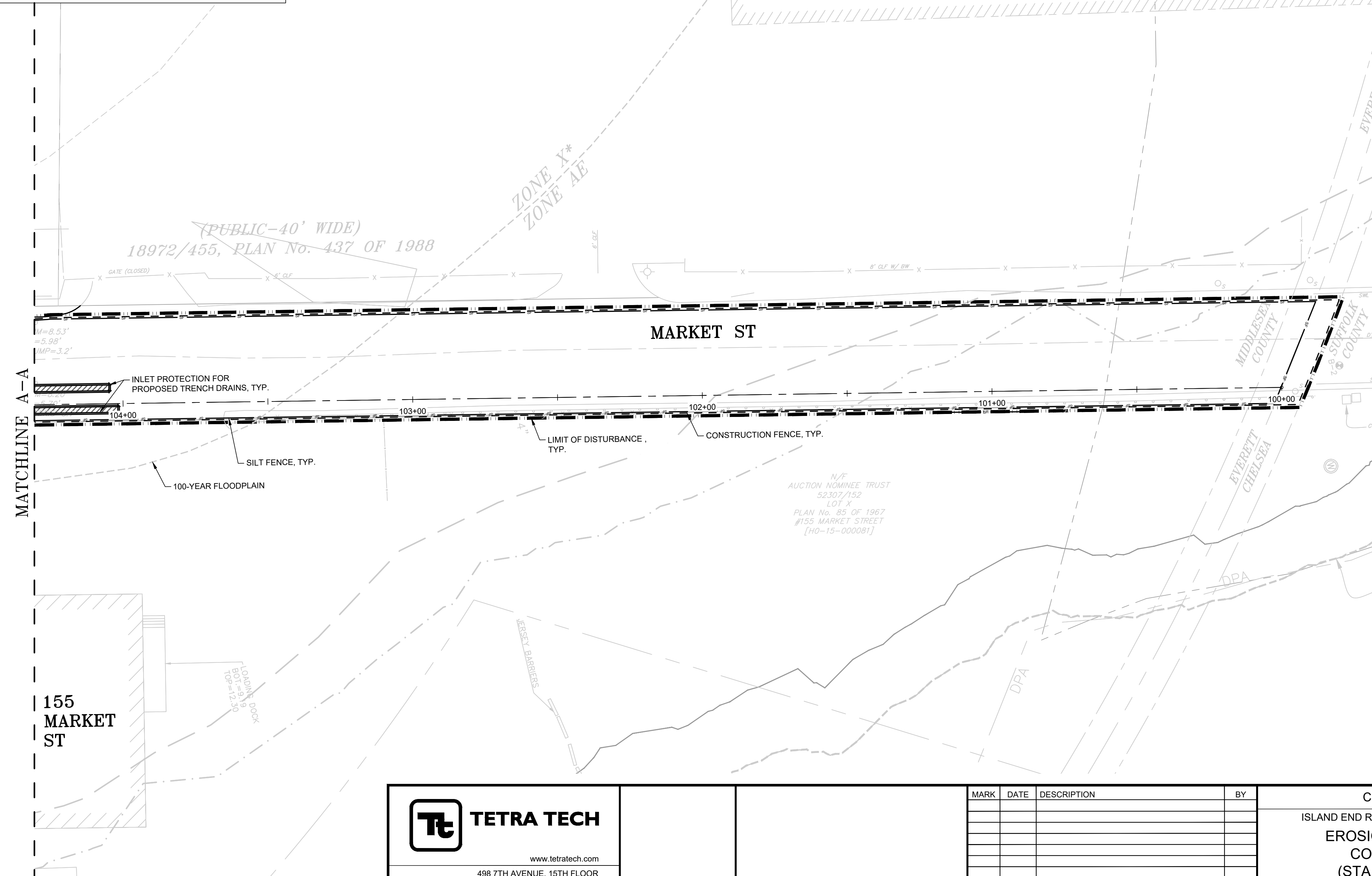

NOTES:
1. PROVIDE EROSION CONTROL MEASURES IN NEWLY INSTALLED DRAINAGE STRUCTURES UNTIL THE SITE IS STABILIZED.

TETRA TECH

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NEW YORK, NY 10018
PHONE: (646) 576-4034

MARK	DATE	DESCRIPTION	BY

CITY OF EVERETT

ISLAND END RIVER FLOOD PROVISIONS WEST

EROSION AND SEDIMENT
CONTROL PLAN - 1
(STA. 100+00 - 105+00)

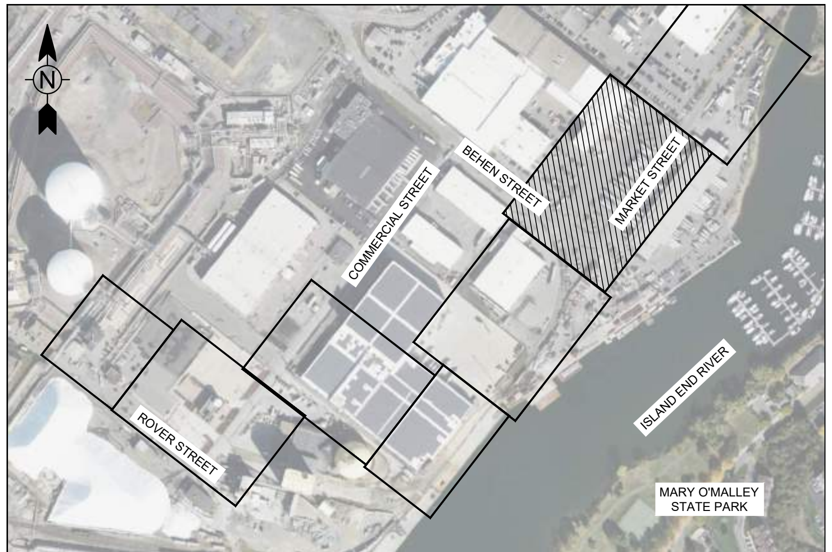
PROJ:	200-01291-22002
DESN:	TC
DRWN:	TC
CHKD:	AR

RPW-ES-101

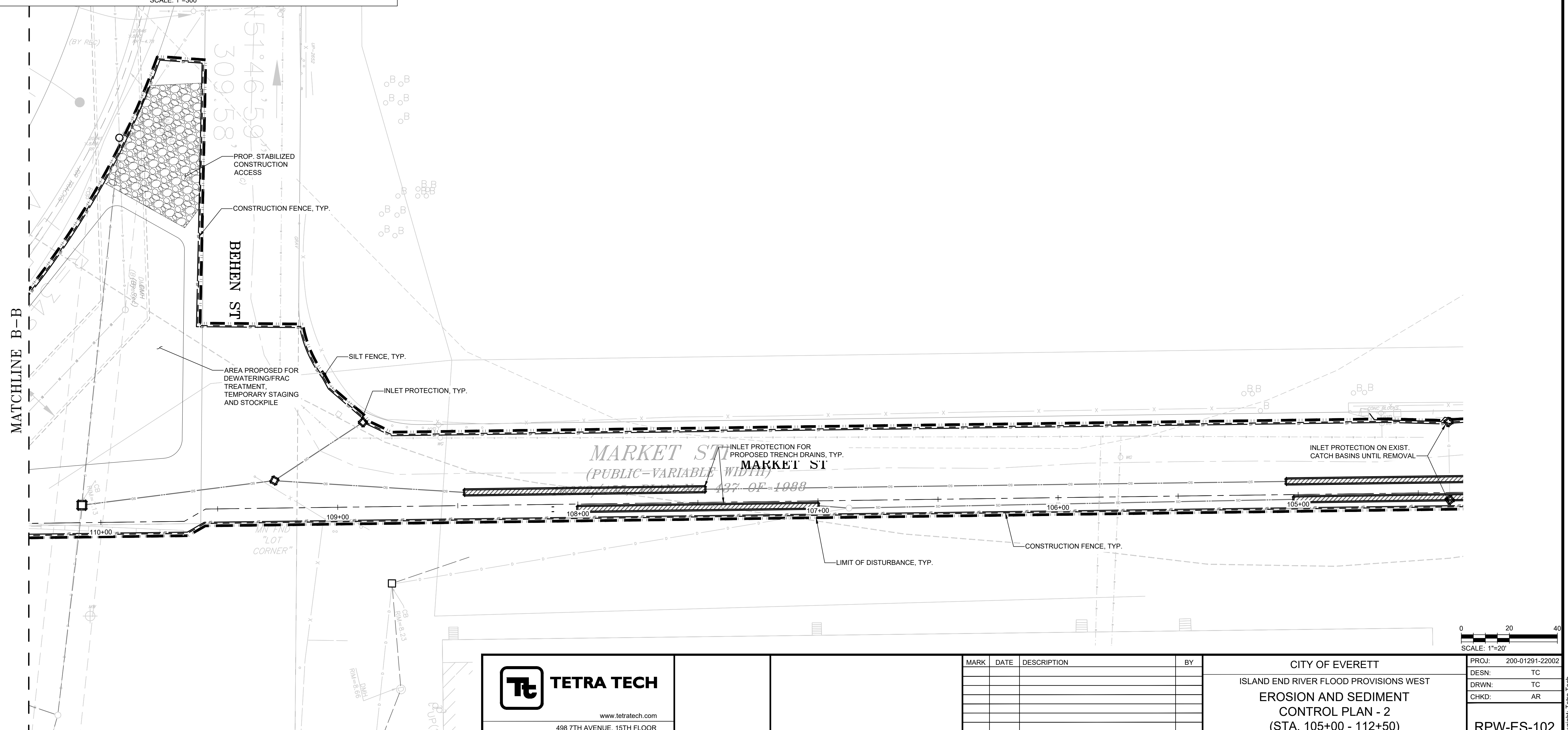
Bar Measures 1 inch, otherwise drawing not to scale

10/23/2023 4:39:54 PM - O:\PROJECTS\NEW YORK\01291\200-01291-22002\CAD\SHEETFILES\C-301 SOIL EROSION AND SEDIMENT CONTROL PLAN.DWG - CHEN, TOLA

NOTES:
1. PROVIDE EROSION CONTROL MEASURES IN NEWLY INSTALLED DRAINAGE STRUCTURES UNTIL THE SITE IS STABILIZED.



KEY MAP
SCALE: 1"=300'



TETRA TECH	www.tetratech.com 498 7TH AVENUE, 15TH FLOOR NEW YORK, NY 10018 PHONE: (646) 576-4034

MARK	DATE	DESCRIPTION	BY

CITY OF EVERETT

ISLAND END RIVER FLOOD PROVISIONS WEST

EROSION AND SEDIMENT CONTROL PLAN - 2 (STA. 105+00 - 112+50)

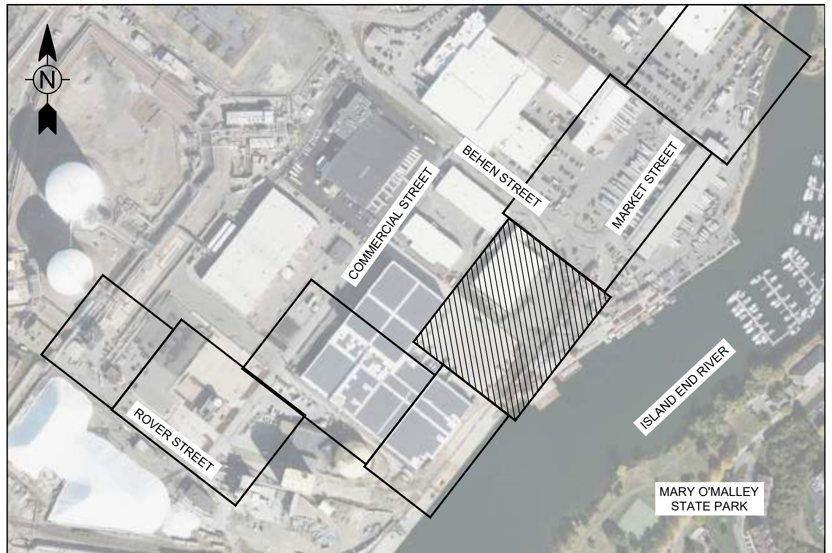
PROJ:	200-01291-22002
DESN:	TC
DRWN:	TC
CHKD:	AR

RPW-ES-102

10/23/2023 4:41:28 PM - O:\PROJECTS\NEW YORK\01291\200-01291-22002\CAD\SHEETFILES\C-301 SOIL EROSION AND SEDIMENT CONTROL PLAN.DWG - CHEN, TOLA

Bar Measures 1 inch, otherwise drawing not to scale

NOTES:
1. PROVIDE EROSION CONTROL MEASURES IN NEWLY INSTALLED DRAINAGE STRUCTURES UNTIL THE SITE IS STABILIZED.



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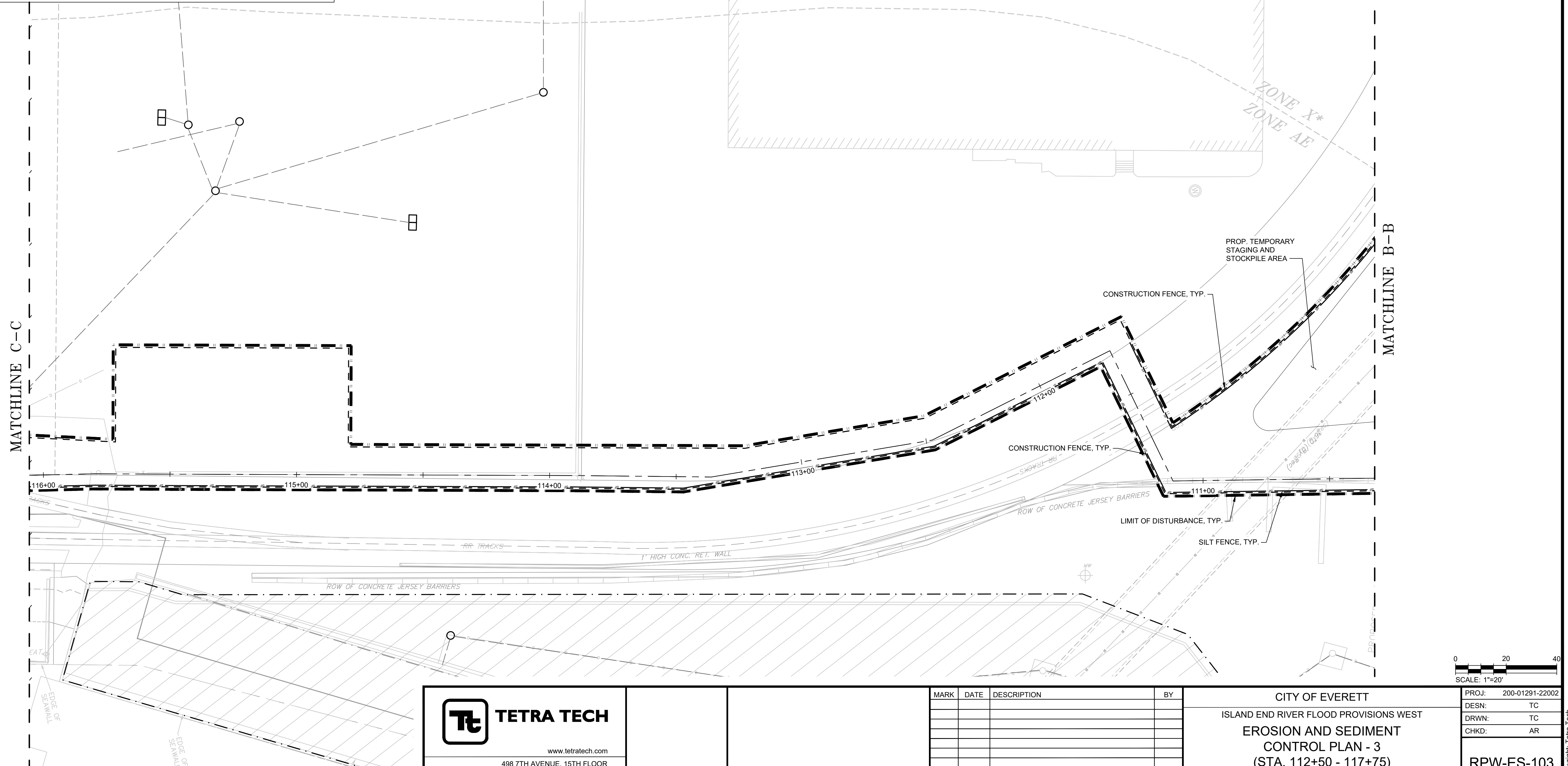

SCALE: 1"=20'

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NEW YORK, NY 10018
PHONE: (646) 576-4034

MARK	DATE	DESCRIPTION	BY

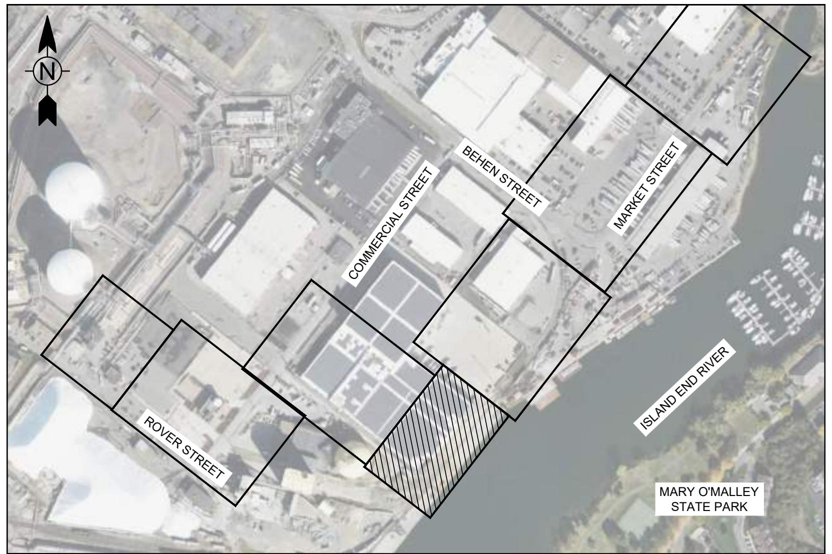
CITY OF EVERETT
ISLAND END RIVER FLOOD PROVISIONS WEST
EROSION AND SEDIMENT CONTROL PLAN - 3
(STA. 112+50 - 117+75)

PROJ:	200-01291-22002
DESN:	TC
DRWN:	TC
CHKD:	AR

RPW-ES-103

Bar Measures 1 inch, otherwise drawing not to scale

10/23/2023 4:43:00 PM - O:\PROJECTS\NEW YORK\01291\200-01291-22002\CAD\SHEETFILES\C-301 SOIL EROSION AND SEDIMENT CONTROL PLAN.DWG - CHEN, TOLA



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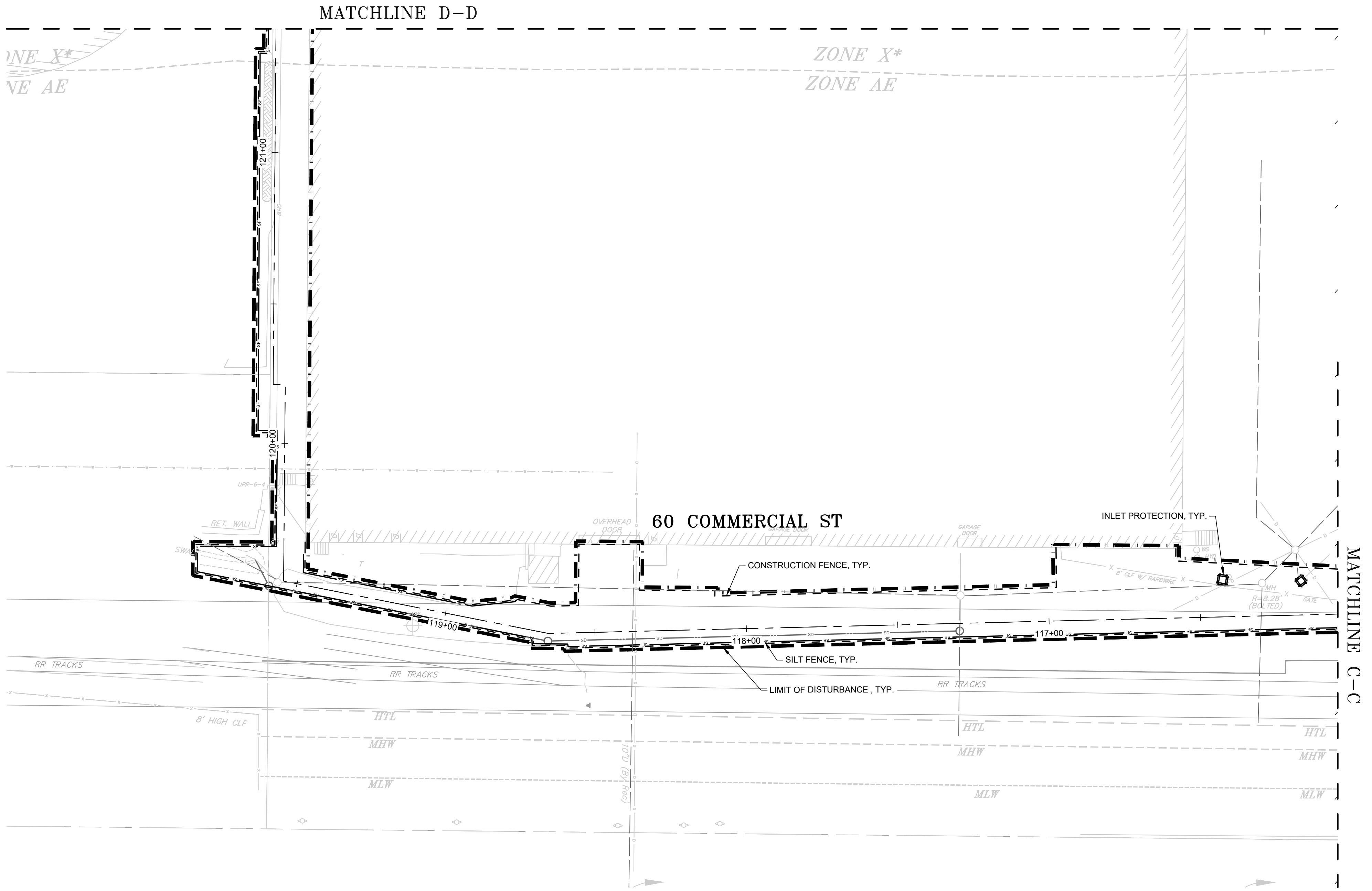
SCALE: 1"=300'



NOTES:
1. PROVIDE EROSION CONTROL MEASURES IN NEWLY INSTALLED DRAINAGE STRUCTURES UNTIL THE SITE IS STABILIZED.

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NEW YORK, NY 10018
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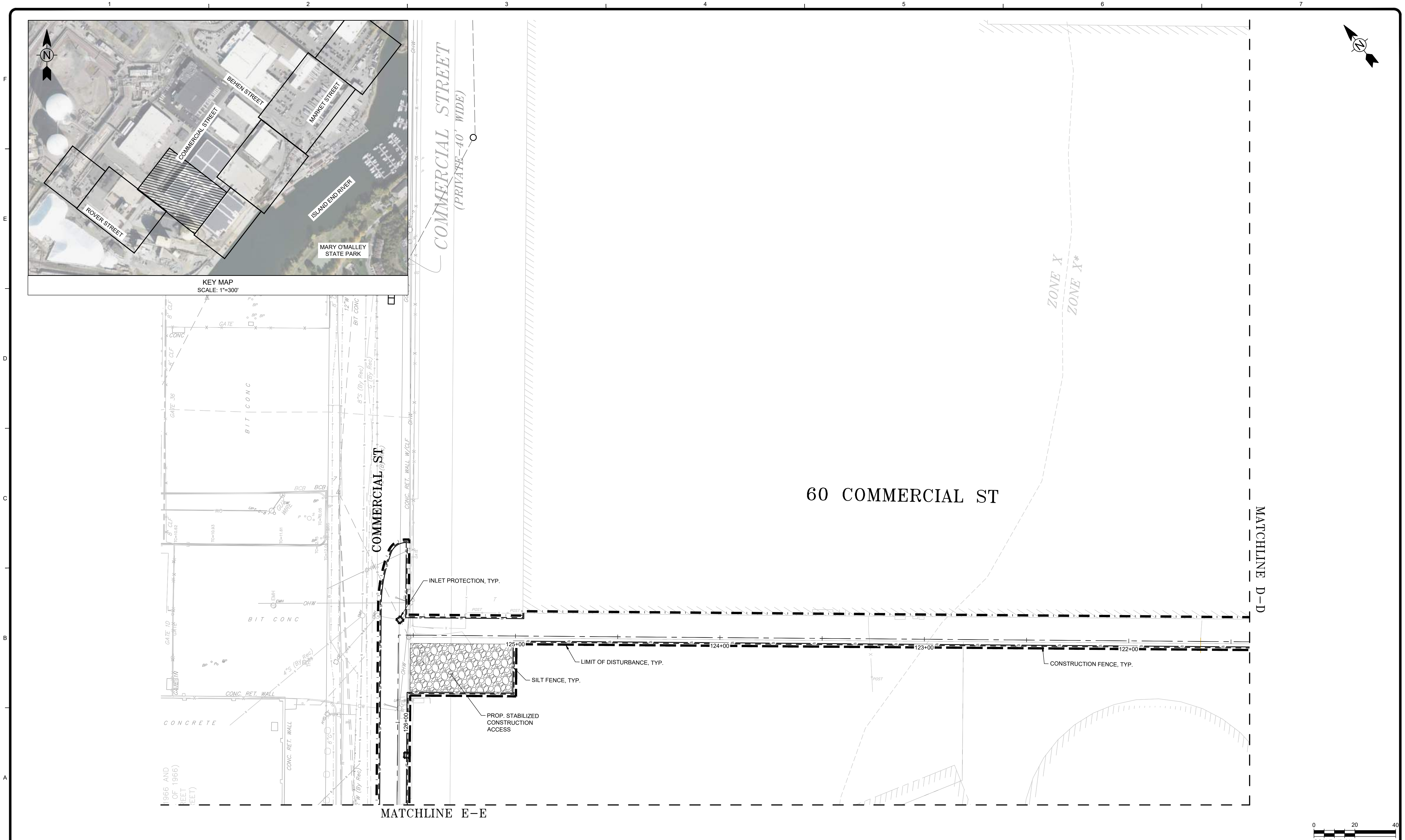
MARK	DATE	DESCRIPTION	BY

CITY OF EVERETT
ISLAND END RIVER FLOOD PROVISIONS WEST
EROSION AND SEDIMENT CONTROL PLAN - 4
(STA. 117+75 - 122+00)

PROJ:	200-01291-22002
DESN:	TC
DRWN:	TC
CHKD:	AR

RPW-ES-104



NOTES:
1. PROVIDE EROSION CONTROL MEASURES IN NEWLY INSTALLED DRAINAGE STRUCTURES UNTIL THE SITE IS STABILIZED.

TETRA TECH
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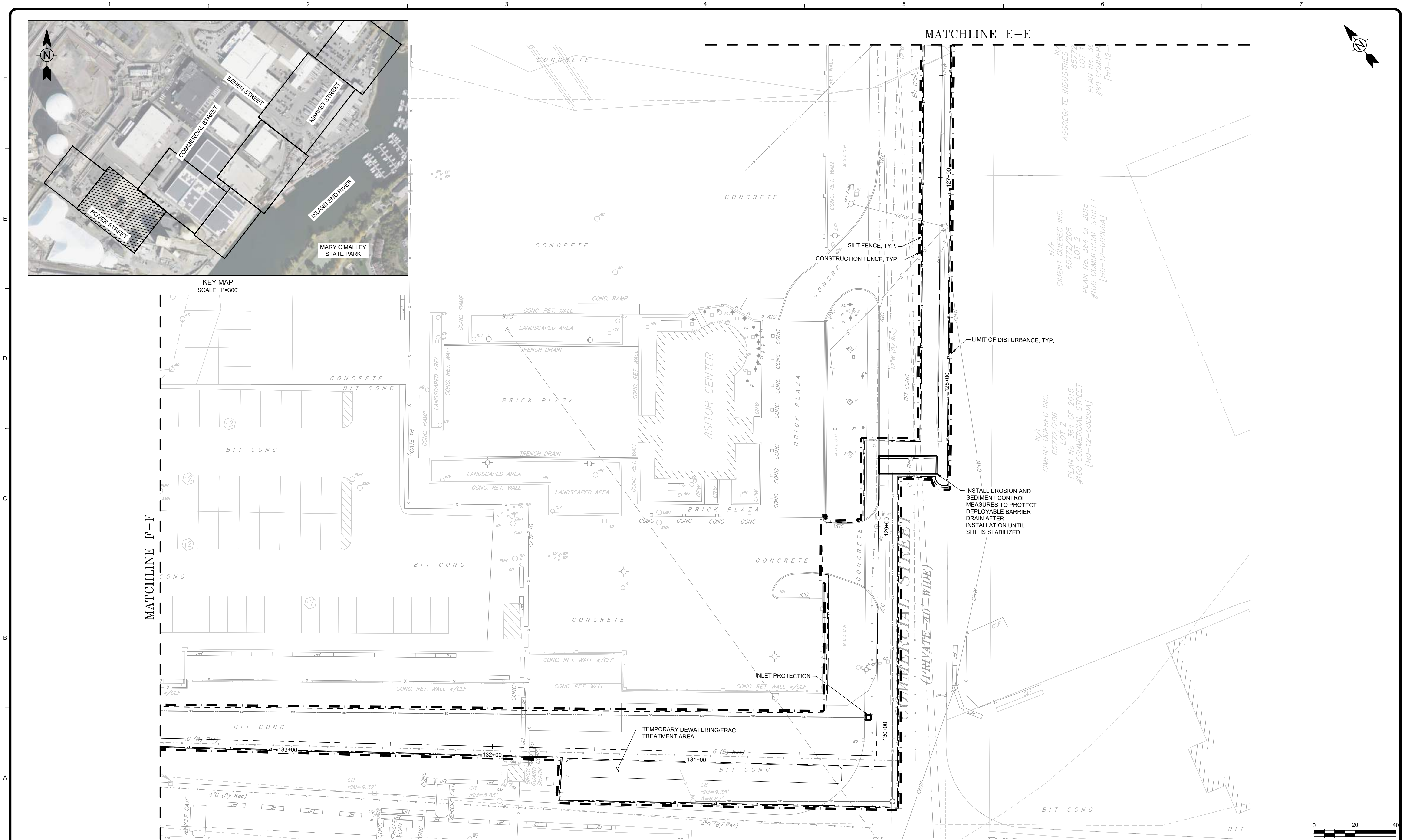
MARK	DATE	DESCRIPTION	BY

CITY OF EVERETT
ISLAND END RIVER FLOOD PROVISIONS WEST
EROSION AND SEDIMENT CONTROL PLAN - 5
(STA. 122+00 - 127+50)

PROJ:	200-01291-22002
DESN:	TC
DRWN:	TC
CHKD:	AR

RPW-ES-105

Bar Measures 1 inch, otherwise drawing not to scale



NOTES:
1. PROVIDE EROSION CONTROL MEASURES IN NEWLY INSTALLED DRAINAGE STRUCTURES UNTIL THE SITE IS STABILIZED.

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PHONE: (646) 576-4034

MARK	DATE	DESCRIPTION	BY

CITY OF EVERETT

ISLAND END RIVER FLOOD PROVISIONS WEST

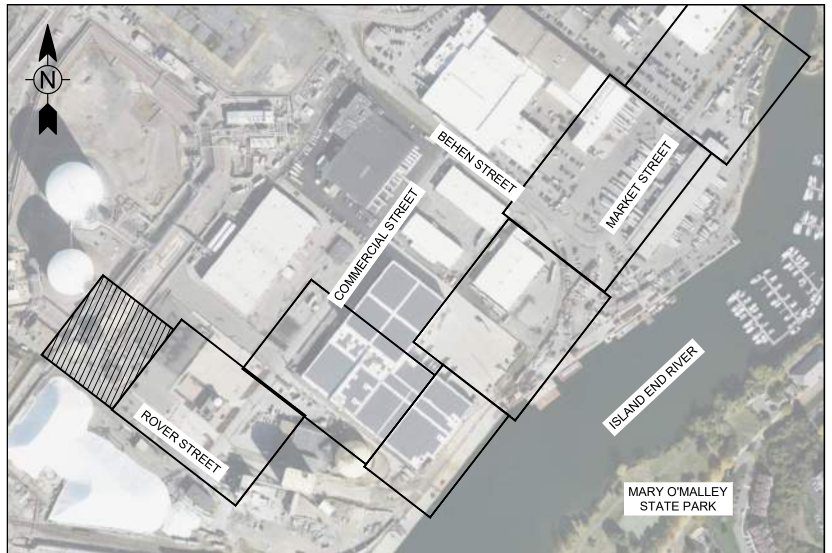
EROSION AND SEDIMENT CONTROL PLAN - 6
(STA. 127+50 - 133+75)

PROJ:	200-01291-22002
DESN:	TC
DRWN:	TC
CHKD:	AR

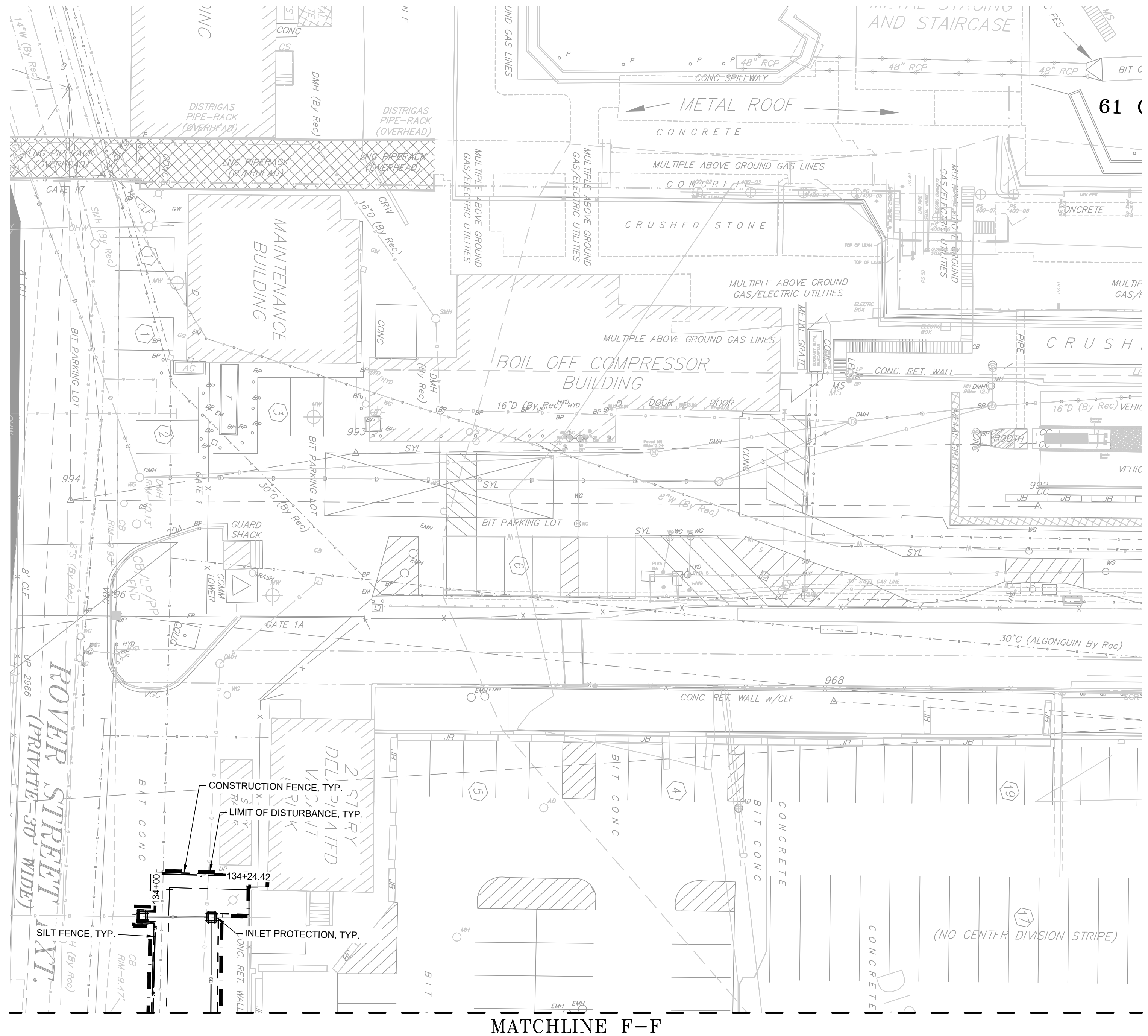
RPW-ES-106

Bar Measures 1 inch, otherwise drawing not to scale

11/6/2023 2:06:37 PM - O:\PROJECTS\NEW YORK\01291\200-01291-22002\CAD\SHEETFILES\C-301 SOIL EROSION AND SEDIMENT CONTROL PLAN.DWG - CHEN, TOLA



KEY MAP
SCALE: 1"=300'



SCALE: 1"=20'

NOTES:
1. PROVIDE EROSION CONTROL MEASURES IN NEWLY INSTALLED DRAINAGE STRUCTURES UNTIL THE SITE IS STABILIZED.

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NEW YORK, NY 10018
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MARK	DATE	DESCRIPTION	BY

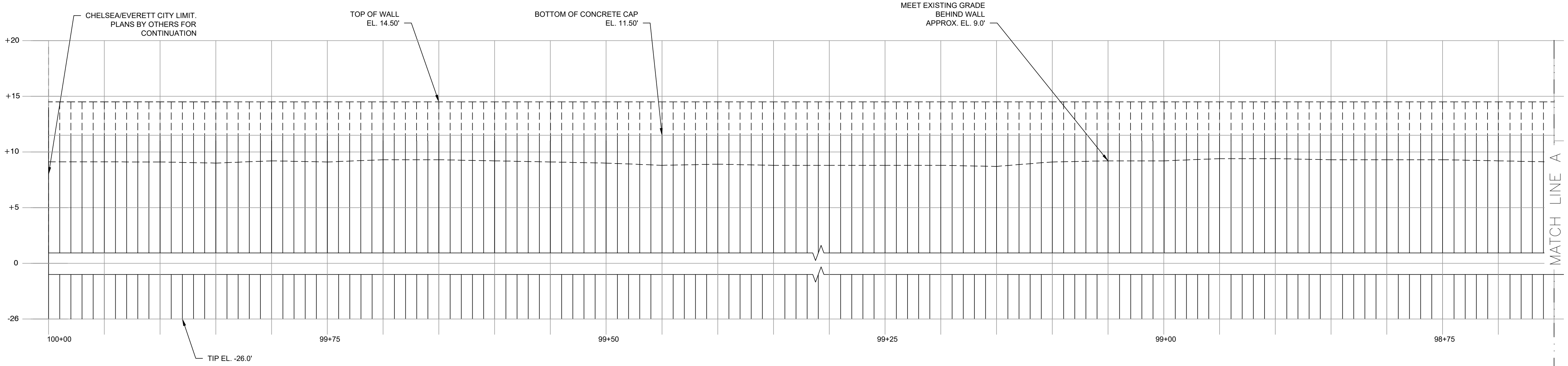
CITY OF EVERETT
ISLAND END RIVER FLOOD PROVISIONS WEST
EROSION AND SEDIMENT CONTROL PLAN - 7
(STA. 133+75 - 135+81))

PROJ:	200-01291-22002
DESN:	TC
DRWN:	TC
CHKD:	AR

RPW-ES-107

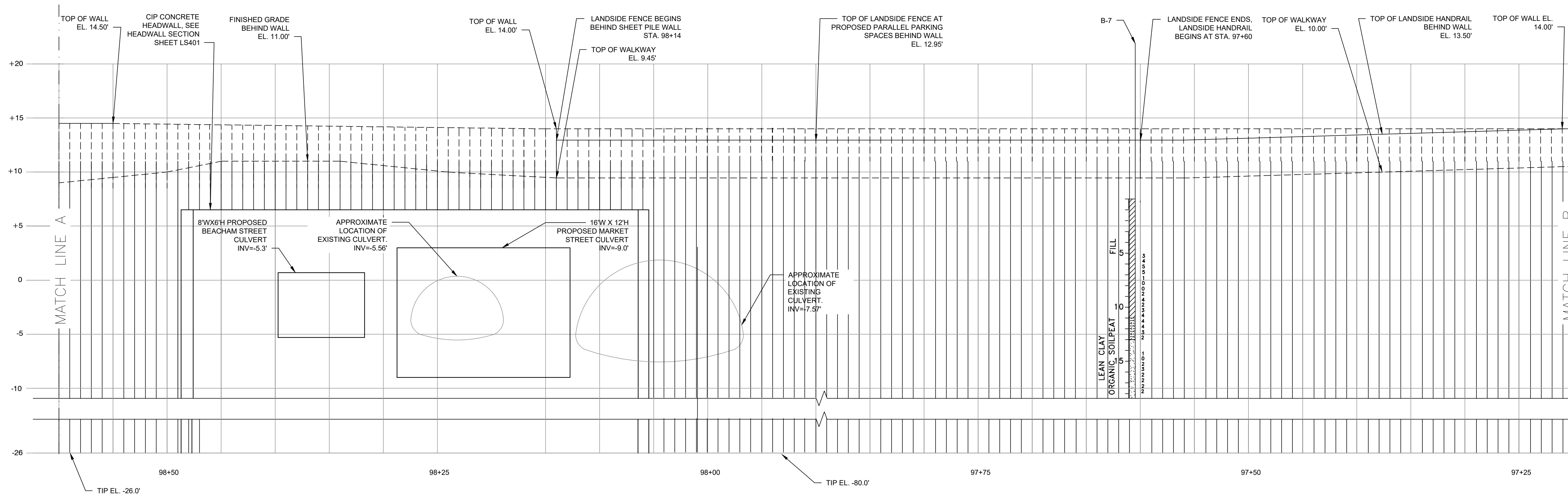
Bar Measures 1 inch, otherwise drawing not to scale

11/6/2023 1:58:56 PM - O:\PROJECTS\NEW YORK\01291\200-01291-22002\CAD\SHEETFILES\C-301 SOIL EROSION AND SEDIMENT CONTROL PLAN.DWG - CHEN, TOLA



FLOOD WALL DEVELOPED ELEVATION
STA. 100+00 – 98+60

VERTICAL AND HORIZONTAL
SCALE: 1" = 5'-0"



FLOOD WALL DEVELOPED ELEVATION
STA. 98+60 – 97+20

VERTICAL AND HORIZONTAL
SCALE: 1" = 5'-0"

5 2.5 0 5 10
VERTICAL AND HORIZONTAL SCALE: 1"=5'

Project:
ISLAND END RIVER FLOOD RESILIENCE PROVISIONS EAST

Weston & Sampson

Weston & Sampson Engineers, Inc.
55 Walkers Brook Drive, Suite 100
Reading, MA 01867
978.532.1900 800.SAMPSON
www.westonandsampson.com

Consultants:

Revisions:

No.	Date	Description

Seal:

Issued For:
PRELIMINARY DESIGN

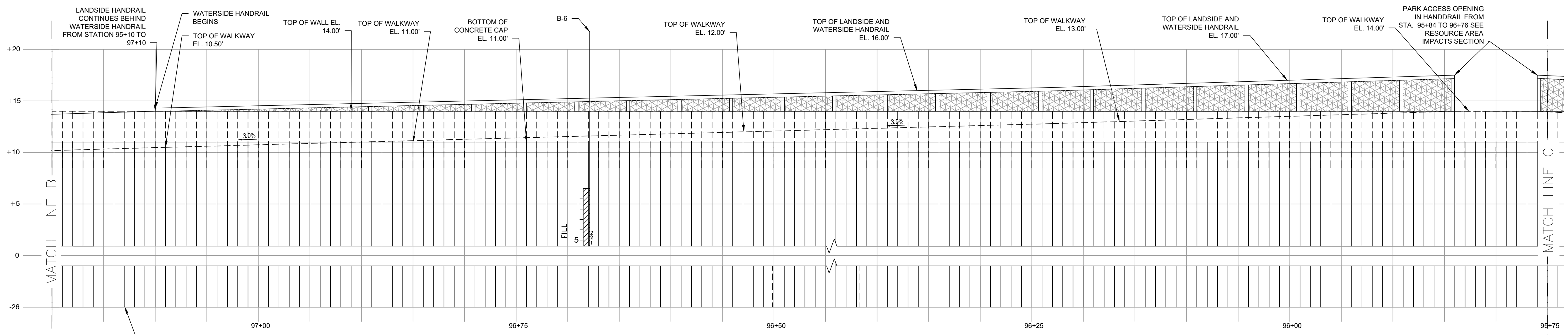
Scale: AS NOTED
Date: FEBRUARY 2023
Drawn By: GN
Reviewed By: MEA
Approved By: MEA

W&S Project No.:
W&S File No.:

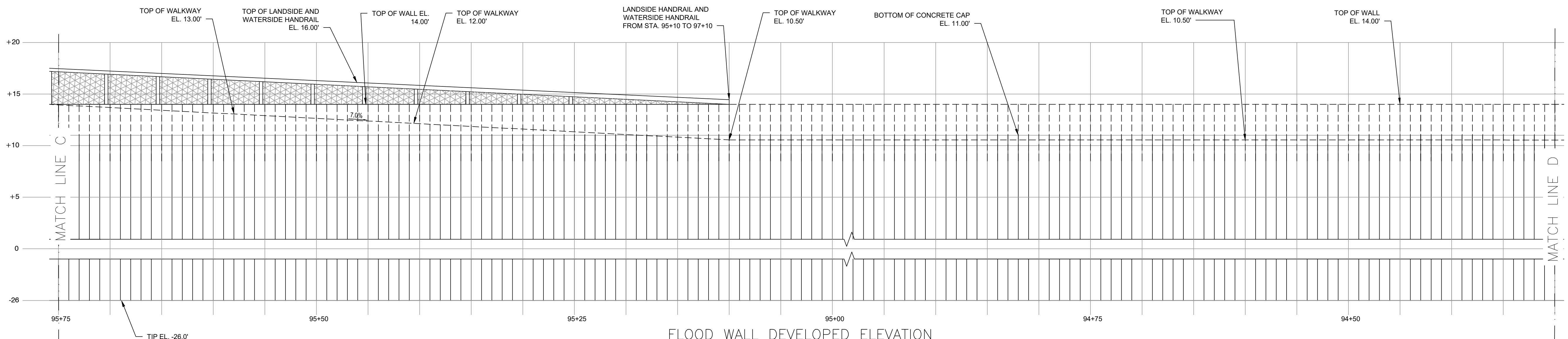
Drawing Title:
STRUCTURAL ELEVATION - 1

Sheet Number:
RPE-S-201

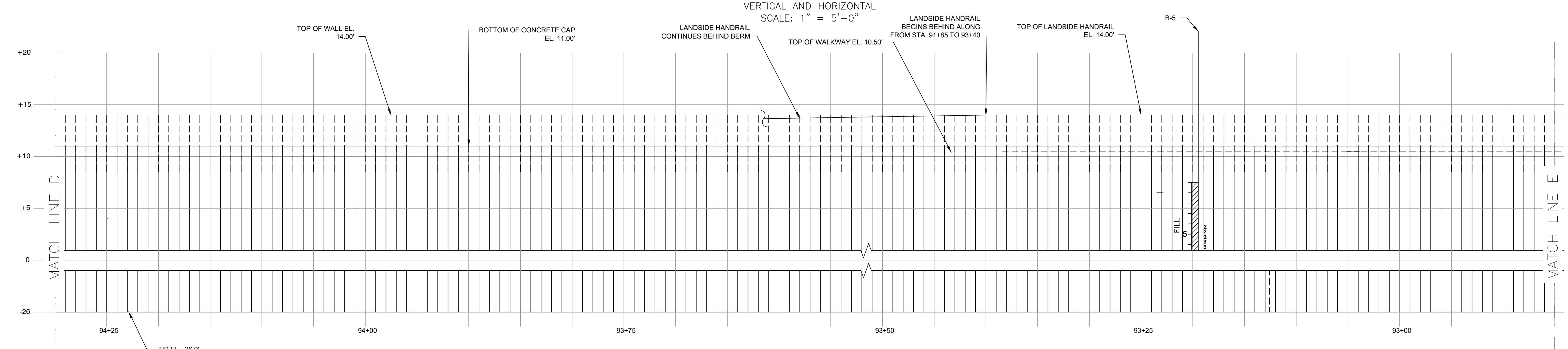
Rev. 1.6 Date: 02/2023



FLOOD WALL DEVELOPED ELEVATION
STA. 97+20 – 95+75
VERTICAL AND HORIZONTAL
SCALE: 1" = 5'-0"



FLOOD WALL DEVELOPED ELEVATION
STA. 95+75 – 94+30
VERTICAL AND HORIZONTAL
SCALE: 1" = 5'-0"



FLOOD WALL DEVELOPED ELEVATION
STA. 94+30 – 92+85
VERTICAL AND HORIZONTAL
SCALE: 1" = 5'-0"

5 2.5 0 5 10
VERTICAL AND HORIZONTAL SCALE: 1"=5'

Project:
ISLAND END RIVER FLOOD RESILIENCE PROVISIONS EAST

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Consultants:

Revisions:

No.	Date	Description

Seal:

Issued For:
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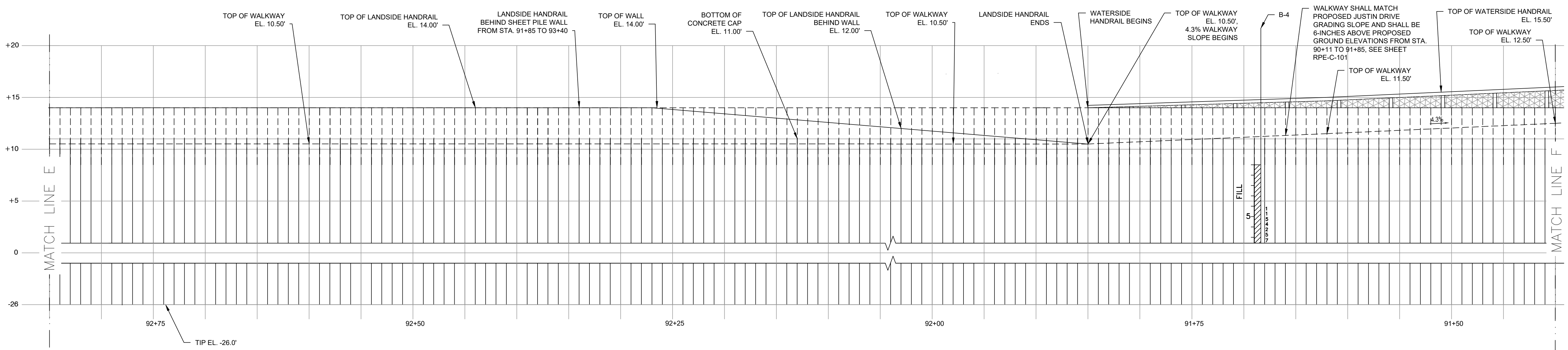
Scale: AS NOTED
Date: FEBRUARY 2023
Drawn By: GN
Reviewed By: MEA
Approved By: MEA
W&S Project No.:
W&S File No.:

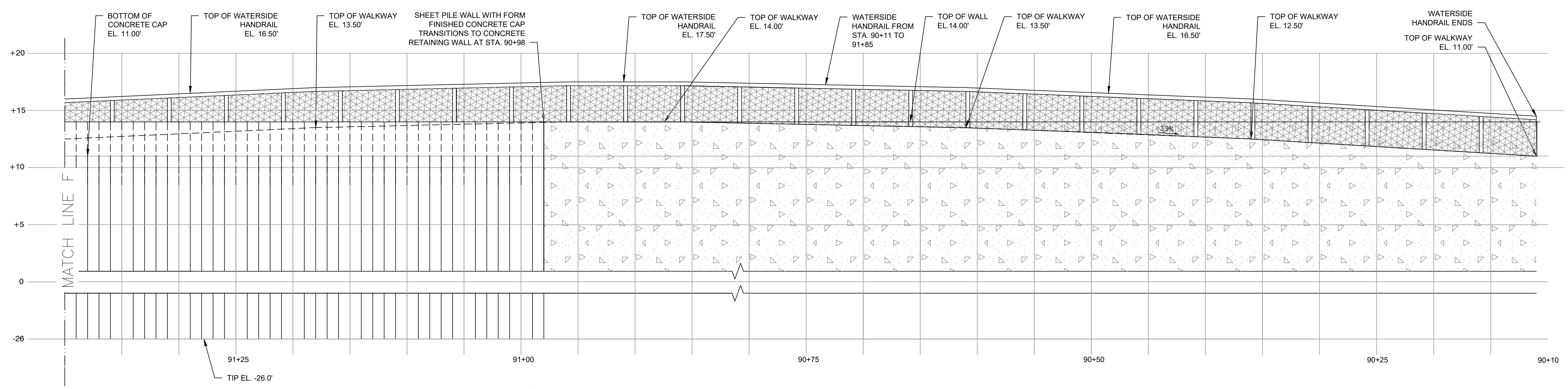
Drawing Title:
STRUCTURAL ELEVATION - 2

Sheet Number:
RPE-S-202

Rev. 1.6 Date: 02/2023



FLOOD WALL DEVELOPED ELEVATION
STA. 92+85 – 91+40
VERTICAL AND HORIZONTAL
SCALE: 1" = 5'–0"



FLOOD WALL DEVELOPED ELEVATION
STA. 91+40 – 90+10
VERTICAL AND HORIZONTAL
SCALE: 1" = 5'–0"

5 2.5 0 5 10
VERTICAL AND HORIZONTAL SCALE: 1"=5'

Project:
ISLAND END RIVER FLOOD RESILIENCE PROVISIONS EAST

Weston & Sampson

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Consultants:

Revisions:

No.	Date	Description

Seal:

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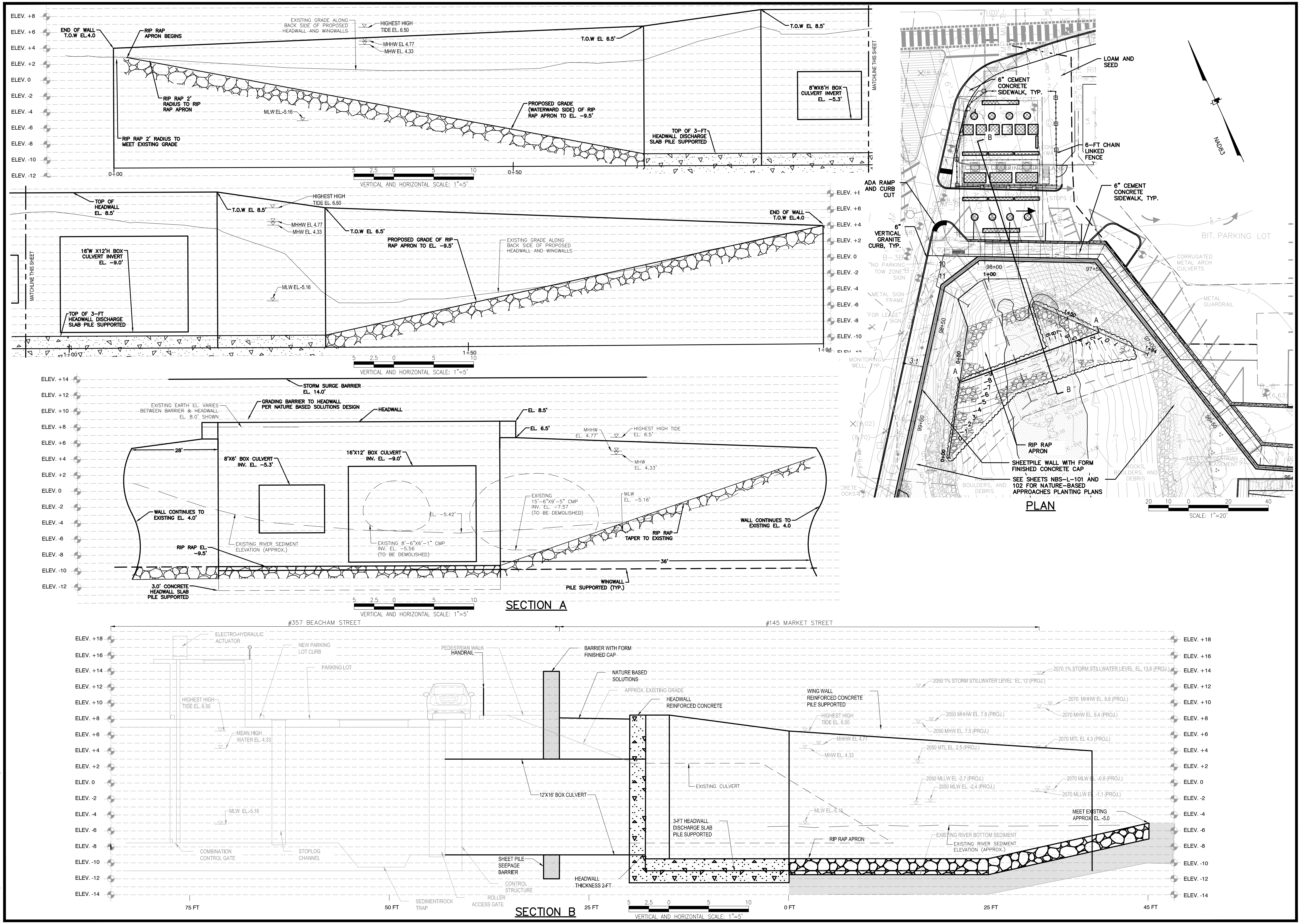
PRELIMINARY DESIGN

Scale: AS NOTED
Date: FEBRUARY 2023
Drawn By: GN
Reviewed By: MEA
Approved By: MEA
W&S Project No.:
W&S File No.:

Drawing Title:
STRUCTURAL ELEVATION - 3

Sheet Number:
RPE-S-203

Rev. 1.6 Date: 02/2023



Project:

ISLAND END RIVER FLOOD RESILIENCE PROVISIONS EAST

CHELSEA · SETTLED 1624 · A TOWN 1739 · A CITY 1857 · WINNISIMMET

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Consultants:

Revisions:

No.	Date	Description

Seal:

Issued For:

PROGRESS PRINT

Scale:	AS NOTED
Date:	OCTOBER 2023
Drawn By:	CFW
Reviewed By:	TPC
Approved By:	BWA
W&S Project No.:	-
W&S File No.:	

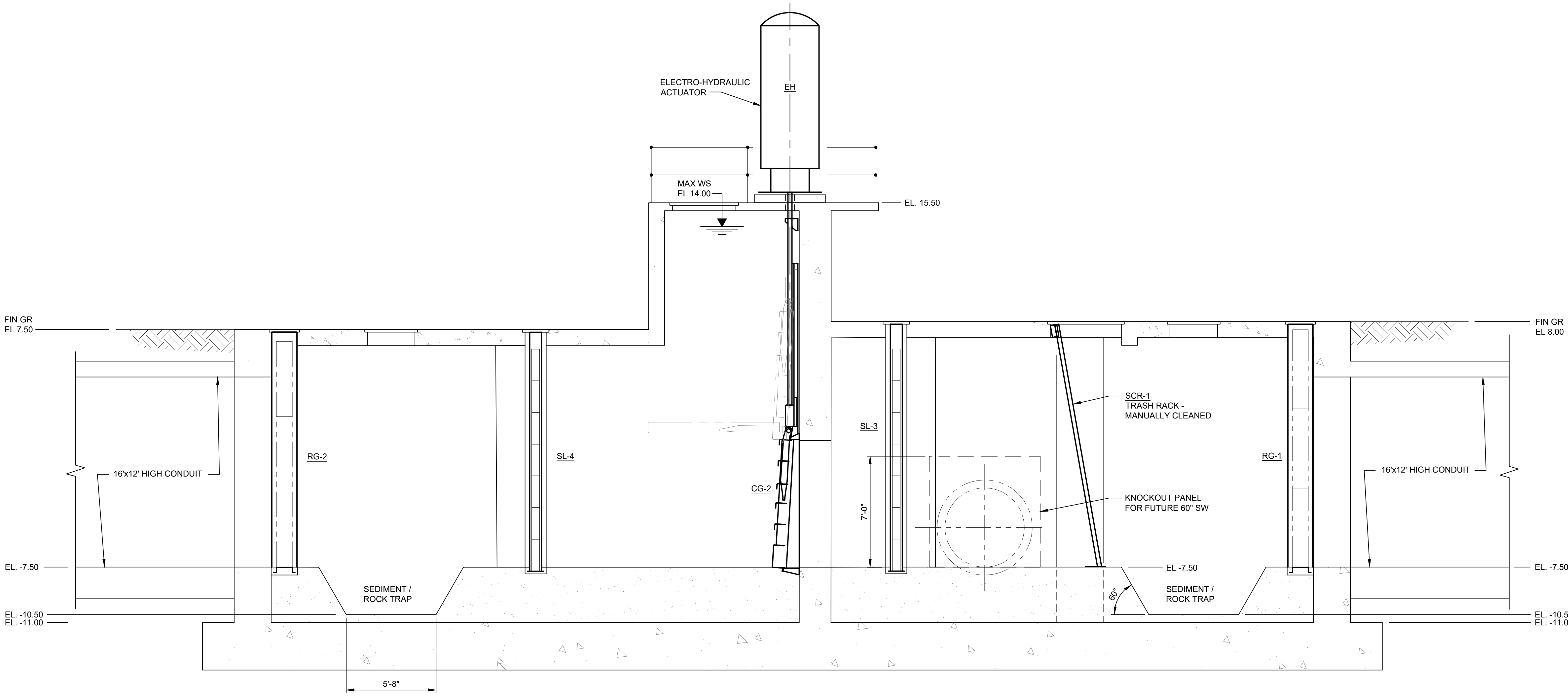
Drawing Title:

HEADWALL SECTIONS

Sheet Number:

SSCF-C-301

Rev. 1.6 Date: 10/2023



SECTION 1
SCALE: 1/4"=1'-0"
10 D-101

1/4"=1'-0" 0 4 8 12 SCALE FEET

AECOM

PROJECT
ISLAND END RIVER RESILIENCY PROJECT STORM SURGE CONTROL FACILITY

CLIENT
CITY OF CHELSEA, MA
500 BROADWAY
CHELSEA, MA 02150

CONSULTANT
AECOM TECHNICAL SERVICES, INC.
250 APOLLO DRIVE
CHELMSFORD, MA 01824
PHONE: (978) 905-2100
www.aecom.com

REGISTRATION

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ISSUE/REVISION

I/R	DATE	DESCRIPTION

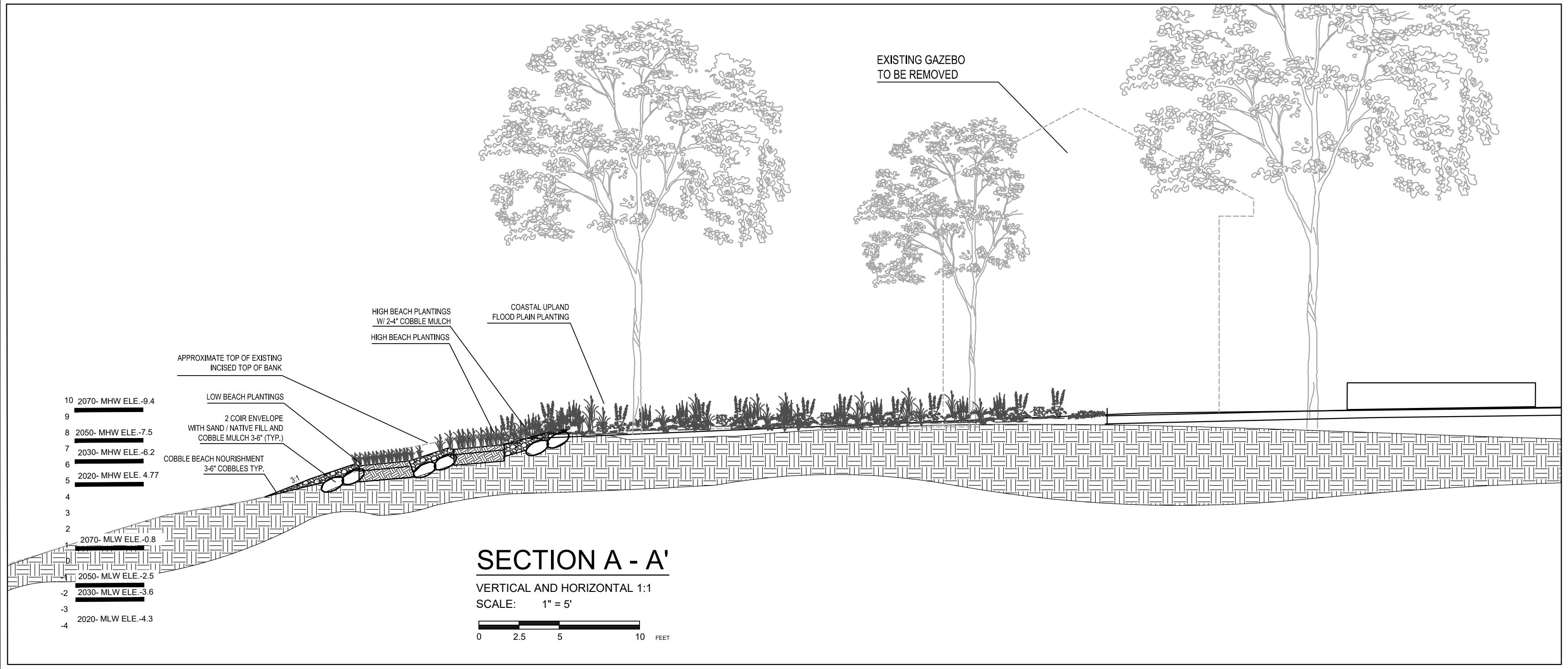
PROJECT NUMBER
60669652

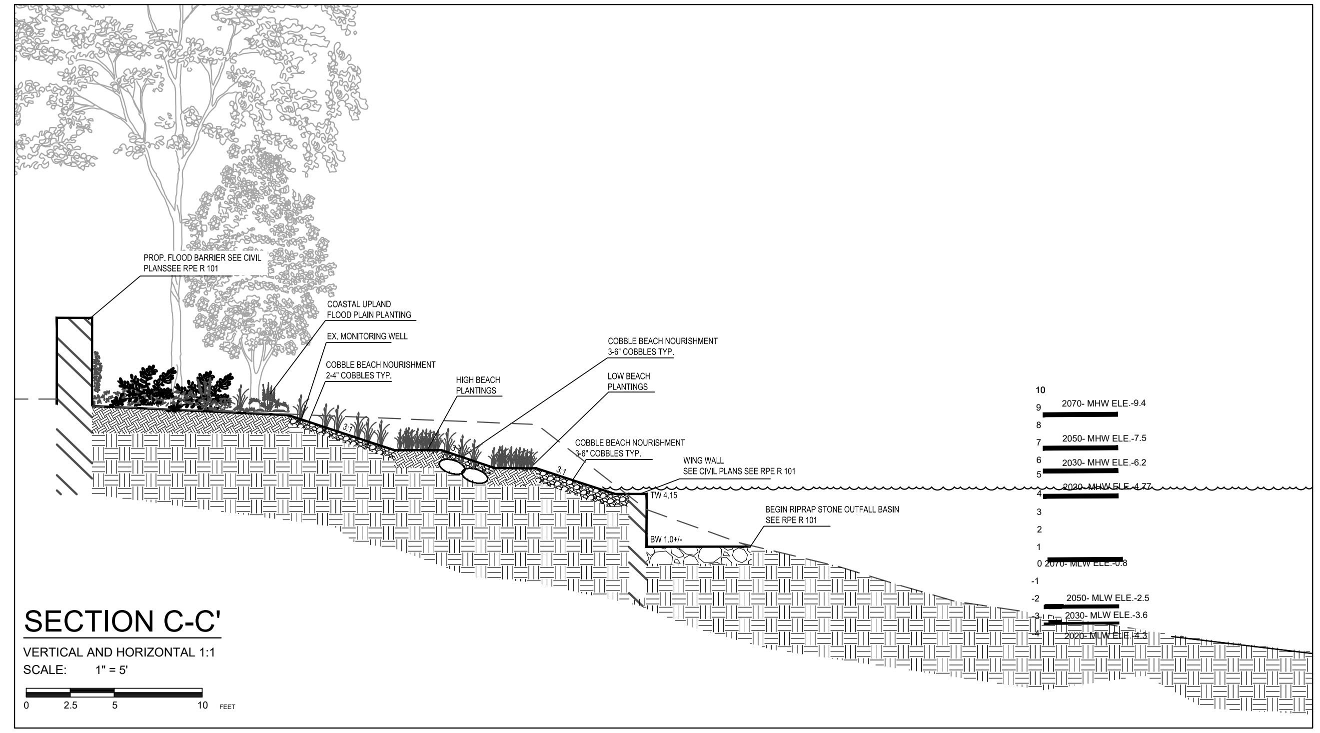
Designed By:	P.M.
Drawn By:	M.B.
Dept Check:	K.B.
Proj Check:	T. HARRISON
Date:	DECEMBER 2022
Scale:	AS SHOWN

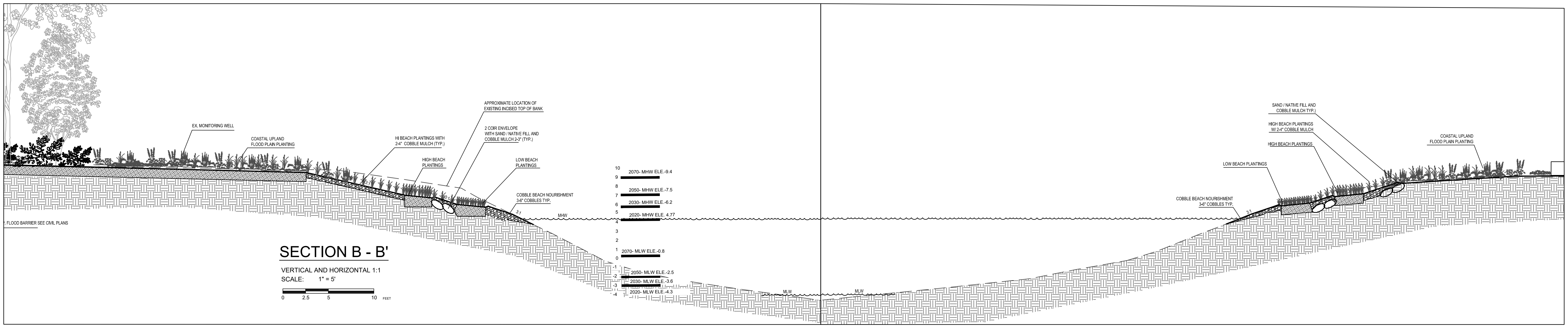
DISCIPLINE
MECHANICAL PROCESS

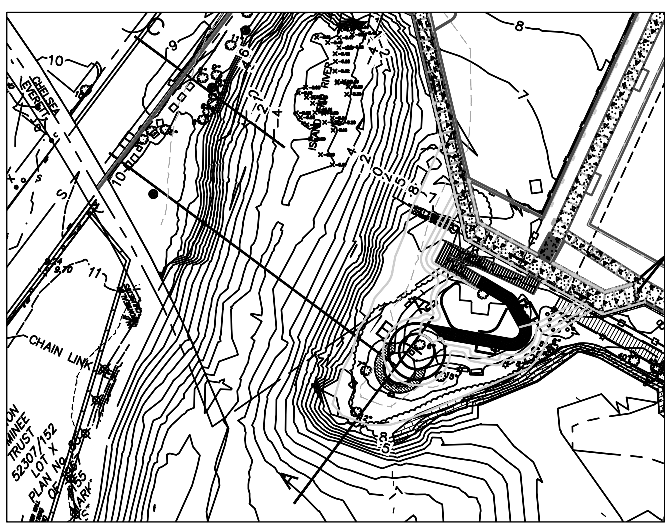
SHEET TITLE
CONTROL STRUCTURE SECTION

SHEET NUMBER
SSCF-C-302









KEY PLAN
SCALE : 1" = 50'

Mass EOEA

Island End River
PLANTING SECTIONS
Everett & Chelsea, MA

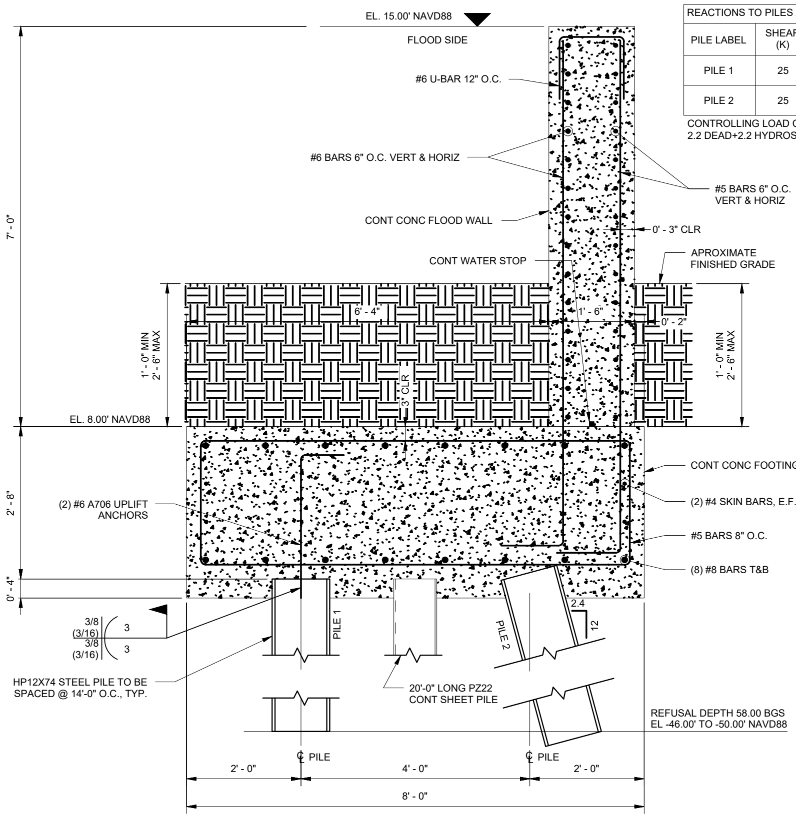
SHEET - NBA- L-201

BSC GROUP
803 Summer Street
Boston, Massachusetts
02127
617 896 4300

DATE: 10 / 26 / 2023

REACTIONS TO PILES ALONG LENGTH OF WALL			
PILE LABEL	SHEAR (K)	COMP (K)	TENSION (K)
PILE 1	25	-	47
PILE 2	25	236	-

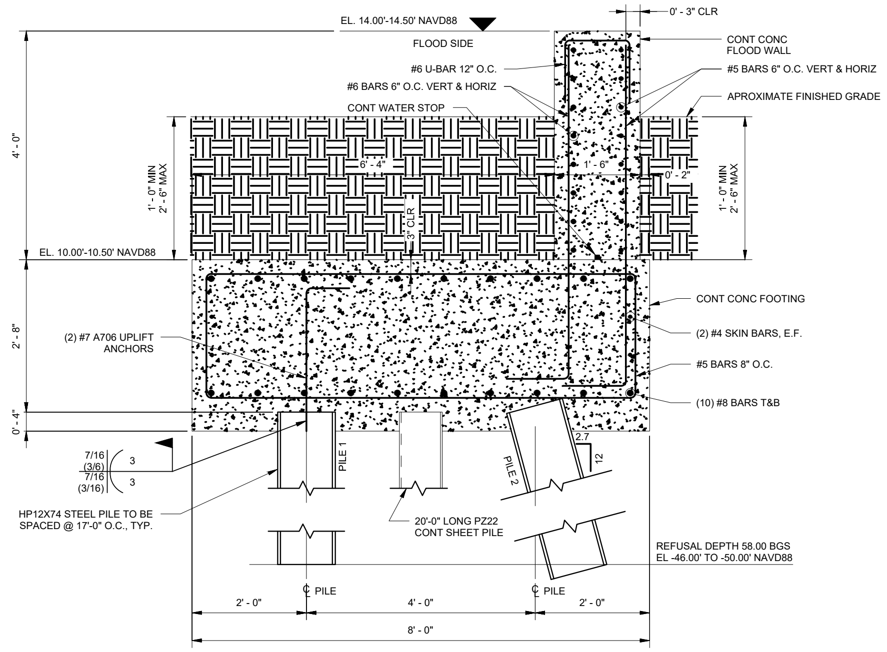
CONTROLLING LOAD COMBINATION:
2.2 DEAD+2.2 HYDROSTATIC+2.2 HYDRODYNAMIC



1 FLOOD BARRIER SECTION - TYPE 1

REACTIONS TO PILES ALONG LENGTH OF WALL			
PILE LABEL	SHEAR (K)	COMP (K)	TENSION (K)
PILE 1	30	-	50
PILE 2	30	255	-

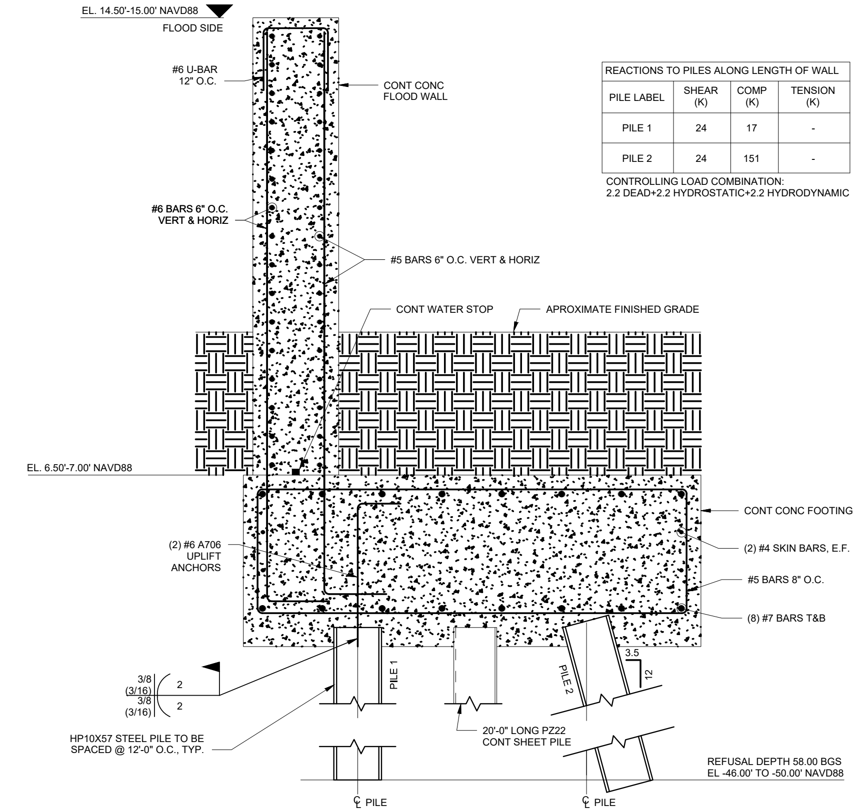
CONTROLLING LOAD COMBINATION:
2.2 DEAD+2.2 HYDROSTATIC+2.2 HYDRODYNAMIC



2 FLOOD BARRIER SECTION - TYPE 2

REACTIONS TO PILES ALONG LENGTH OF WALL			
PILE LABEL	SHEAR (K)	COMP (K)	TENSION (K)
PILE 1	24	17	-
PILE 2	24	151	-

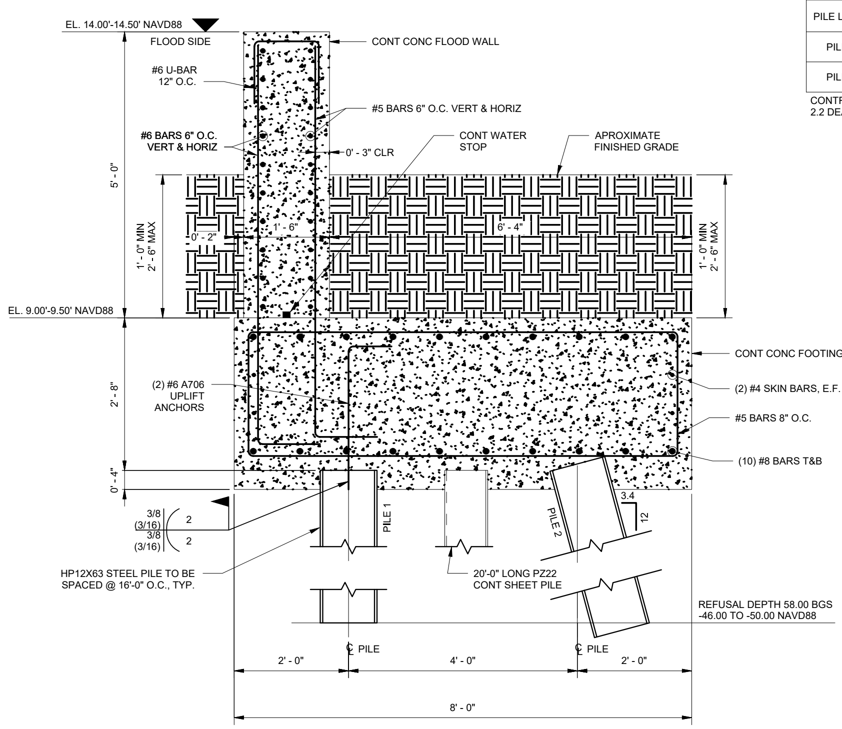
CONTROLLING LOAD COMBINATION:
2.2 DEAD+2.2 HYDROSTATIC+2.2 HYDRODYNAMIC



3 FLOOD BARRIER SECTION - TYPE 3

REACTIONS TO PILES ALONG LENGTH OF WALL			
PILE LABEL	SHEAR (K)	COMP (K)	TENSION (K)
PILE 1	28	12	-
PILE 2	28	189	-

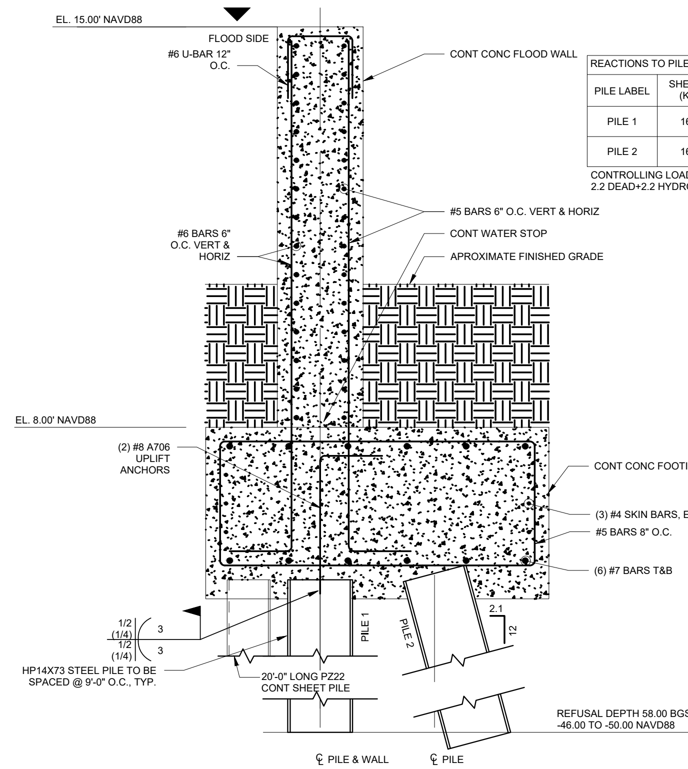
CONTROLLING LOAD COMBINATION:
2.2 DEAD+2.2 HYDROSTATIC+2.2 HYDRODYNAMIC



4 FLOOD BARRIER SECTION - TYPE 4

REACTIONS TO PILES ALONG LENGTH OF WALL			
PILE LABEL	SHEAR (K)	COMP (K)	TENSION (K)
PILE 1	16	-	66
PILE 2	16	165	-

CONTROLLING LOAD COMBINATION:
2.2 DEAD+2.2 HYDROSTATIC+2.2 HYDRODYNAMIC



5 FLOOD BARRIER SECTION - TYPE 5

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498 7TH AVENUE, 15TH FLOOR
NEW YORK, NY 10018
PHONE: (646) 576-4034

MARK	DATE	DESCRIPTION	BY

CITY OF EVERETT
ISLAND END RIVER FLOOD PROVISIONS WEST
STRUCTURAL SECTIONS

PROJ:	200-01291-22002
DESN:	JA
DRWN:	CY
CHKD:	JO

RPW-S-301

Bar Measures 1 inch, otherwise drawing not to scale

1/25/2023 2:39:59 PM - O:\PROJECTS\NEW YORK\01291\200-01291-22002\CAD\SHEETFILES\S-301 STRUCTURAL SECTIONS.DWG - MCCORMICK, ANDREW

Attachment D

EJ SCREENING FORM & POPULATIONS LIST

Environmental Justice Screening Form

Project Name	Island End River Flood Resilience Project
Anticipated Date of MEPA Filing	10/27/2023
Proponent Name	City of Chelsea City of Everett
Contact Information (e.g., consultant)	**Proponents:** Alexander Train City of Chelsea- Department of Housing and Community Development: 500 Broadway, Chelsea, MA 02150 Erik Swanson City of Everett- Engineering Department: 484 Broadway, Everett, MA 02149 **Planning and Permitting Consultant**: Katie Moniz Fort Point Associates, Inc A Tetra Tech Company 31 State Street, 3rd Floor, Boston, MA 02109 kmoniz@fpa-inc.com (617) 279-4388 **Community Services:** Bianca Bowman GreenRoots 227 Marginal Street, Suite1, Chelsea, MA 02150 biancab@greenrootschelsea.org 617-466-3076 x121
Public website for project or other physical location where project materials can be obtained (if available)	City of Chelsea: https://www.chelseama.gov/housing-and-community-development-department City of Everett: https://cityofeverett.com/city-hall/departments/planning-development/conservation-commission/ coUrbanize: https://www.islandendriver.com/home
Municipality and Zip Code for Project (if known)	Chelsea, MA 02150 Everett, MA 02149
Project Type* (list all that apply)	Coastal Infrastructure
Is the project site within a mapped 100-year FEMA flood plain? Y/N/yet unknown	Yes
Estimated GHG emissions of conditioned spaces if known (click **here** for GHG Estimation tool)	N/A

Project Description

1. Provide a brief project description, including overall size of the project site and square footage of proposed buildings and structures if known.

   The Cities of Chelsea and Everett (the "Proponents") propose to construct a coastal flood barrier, outlet control structure, and related amenities at Island End River ("IER") in the Cities of Chelsea and Everett (the "Project Site"). The approximately 6.5-acre Project Site is located on the IER and is currently comprised of a mix of commercial and industrial uses and supporting roadway and utility infrastructure. The proposed IER Flood Resilience Project (the "Project") will construct a new 4,640 linear-foot (lf) flood barrier, 192 square-foot underground surge control structure, and associated wetland and public access improvements along the IER.

2. List anticipated MEPA review thresholds (301 CMR 11.03) (if known)

   - 301 CMR 11.03(3)(b)1.a: Alteration of a coastal bank
   - 301 CMR 11.03(3)(b)1.c: Alteration of 1,000 or more sf of salt marsh or outstanding resource waters
   - 301 CMR 11.03(3)(b)1.d: Alteration of 5,000 or more sf of bordering or isolated vegetated wetland
   - 301 CMR 11.03(3)(b)1.f: Alteration of one half acre or more of any other wetlands
   - 301 CMR 11.03(3)(f)6: Construction, reconstruction, or expansion of an existing solid fill structure of 1,000 or more sf base area

3. List all anticipated state, local and federal permits needed for the project (if known)

Agency	Approval
Local	
City of Everett	• Utility Connection Permits
City of Chelsea	• Utility Connection Permits
Everett Conservation Commission	• Order of Conditions
Chelsea Conservation Commission	• Order of Conditions
State	
Executive Office of Energy and Environmental Affairs	• Secretary's MEPA Certificate
Massachusetts Department of Environmental Protection	• Chapter 91 License • 401 Water Quality Certification
Massachusetts Historical Commission	• Determination of No Adverse Impact
Federal	
Army Corps of Engineers	• General Permit
Environmental Protection Agency	• NPDES Construction/Stormwater General Permit

4. Identify EJ populations and characteristics (Minority, Income, English Isolation) within 5 miles of project site (can attach map from EJ Maps Viewer in lieu of narrative)

Within a 5-mile radius of the Project Site, there are 623 census block groups that trigger seven EJ criteria. These criteria include: Minority; Income; English Isolation, Income and Minority; Minority and English Isolation; Income and English Isolation; and Minority, Income, and English Isolation.

5. Identify any municipality or census tract meeting the definition of "vulnerable health EJ criteria" in the DPH EJ Tool located in whole or in part within a 1 mile radius of the project site:

Heart Attack

- Chelsea
- Everett

Childhood Asthma:

- Boston
- Chelsea
- Everett
- Somerville

Childhood Blood Lead (Census Tracts 2010)

- 25025160101
- 25017342500
- 25017342101
- 25025160200
- 25025050101
- 25025160502
- 25025050901
- 25025160501
- 25017351403

Low Birth Weight (Census Tracts 2010)

- 25017350104
- 25025040600
- 25017342400
- 25025160602
- 25025050101
- 25025160601
- 25017351403
- 25025160200
- 25025040401
- 25025160502
- 25025160400
- 25025050901
- 25025160501

6. Identify potential short-term and long-term environmental and public health impacts that may affect EJ Populations and any anticipated mitigation

The Project is not expected to result in potential permanent adverse environmental or public health impacts that may affect EJ populations.

Temporary construction-period air quality impacts are a potential source of negative environmental and public health impacts for the local community. To avoid or minimize the effects of fugitive dust and exhaust emissions from construction vehicles, appropriate mitigation measures will be employed, such as the use of diesel retrofitted equipment and wetting down areas during construction. To avoid, mitigate, or minimize temporary construction-period noise pollution impacts, the Project will comply with the City of Everett Noise and Work Ordinance. Efforts will be made to minimize the noise impact of construction activities, including appropriate mufflers on all equipment such as air compressors and welding equipment, maintenance of intake and exhaust mufflers, turning off idling equipment, replacing specific operations and techniques with less noisy ones, and other appropriate noise reduction measures. Construction management and scheduling will minimize impacts on the surrounding environment and will include plans for construction worker commuting, routing plans for trucking and deliveries, and control of noise and dust. Designated truck routes will be established to govern where construction trucks access and egress the Project Site to minimize construction related traffic. The contractor will still use best management practices, including a turbidity curtain, to minimize disturbance to the IER. To ensure public safety in and around the public park, appropriate signage will be employed to show safe passageways to access the park and notify the community of construction related activity.

7. Identify project benefits, including "Environmental Benefits" as defined in 301 CMR 11.02, that may improve environmental conditions or public health of the EJ population

The Project is anticipated to provide several economic and environmental benefits. Environmental benefits of the Project include an improved public realm, enhanced pedestrian safety conditions, ecological improvements such as improved water quality, and flood protection. The Project will provide additional community benefits including, new sidewalks with street trees, scenic overlooks, and bike racks and benches, and include a 1/5-mile riverfront park to access the waterfront and provide expanded public open space. This landscaping will contribute to a reduction in the overall impervious surface area and urban heat island effect on the Project Site. Flood protection measures will protect over 500 acres of densely developed urban neighborhoods in Chelsea and Everett.

8. Describe how the community can request a meeting to discuss the project, and how the community can request oral language interpretation services at the meeting. Specify how to request other accommodations, including meetings after business hours and at locations near public transportation.

Members of the community can request a meeting or obtain information, including translated materials, by contacting Bianca Bowman at 617-466-3076 x121 or biancab@greenroots.org . Requests for accommodations, including meetings after business hours and at locations near public transportation, can also be sent to Bianca Bowman.

Project information in English, Arabic, Spanish or Spanish Creole, Chinese, French Creole, and Portuguese or Portuguese Creole will be maintained on the websites below:

City of Chelsea: https://www.chelseama.gov/housing-and-community-development-department

City of Everett: https://cityofeverett.com/city-hall/departments/planning-development/conservation-commission/

coUrbanize: https://www.islandendriver.com/home

SPANISH

Formulario de evaluación de justicia ambiental

Nombre del proyecto	Proyecto de resistencia a las inundaciones del río Island End
Fecha prevista de presentación de MEPA	27/10/2023
Nombre del proponente	Ciudad de Chelsea Ciudad de Everett
Información de contacto (por ejemplo, asesor)	**Proponentes:** Tren Alexander Ciudad de Chelsea- Departamento de Vivienda y Desarrollo Comunitario: 500 Broadway, Chelsea, MA 02150 Erik Swanson Ciudad de Everett- Departamento de Ingeniería: 484 Broadway, Everett, MA 02149 **Consultor de Planificación y Permisos**: Katie Moniz Fort Point Associates, Inc. A Tetra Tech Company 31 State Street, 3rd Floor, Boston, MA 02109 kmoniz@fpa-inc.com (617) 279-4388 **Servicios comunitarios:** Bianca Bowman GreenRoots 227 Marginal Street, Suite1, Chelsea, MA 02150 biancab@greenrootschelsea.org 617-466-3076 x121
Sitio web público del proyecto u otro lugar físico donde se pueda obtener material del proyecto (si está disponible)	Ciudad de Chelsea: https://www.chelseama.gov/housing-and-community-development-department Ciudad de Everett: https://cityofeverett.com/city-hall/departments/planning-development/conservation-commission/ coUrbanize: https://www.islandendriver.com/home
Municipio y código postal del proyecto (si se conoce)	Chelsea, MA 02150 Everett, MA 02149
Tipo de proyecto* (enumere todos los que correspondan)	Infraestructura costera
¿Se encuentra el lugar del proyecto dentro de un terreno inundable de 100 años mapeado por FEMA? Sí/No/Todavía se desconoce	Sí

Emisiones estimadas de GEI de los espacios acondicionados, si se conocen (hacer clic **aquí** para acceder a la herramienta de estimación de GEI)	N/A

Descripción del proyecto

1. Proporcione una breve descripción del proyecto, incluido el tamaño general del sitio del proyecto y la superficie en pies cuadrados de los edificios y estructuras propuestos, si se conocen.

   Las ciudades de Chelsea y Everett (los "proponentes") proponen la construcción de una barrera para las inundaciones costeras, una estructura de control de desagüe y servicios relacionados en el río Island End ("IER") en las ciudades de Chelsea y Everett (el "sitio del proyecto"). El emplazamiento del proyecto, de aproximadamente 6,5 acres, está situado en el IER y actualmente consta de una mezcla de usos comerciales e industriales y de infraestructuras viarias y de servicios públicos de apoyo. El proyecto propuesto de resistencia a las inundaciones del IER (el "proyecto") construirá una nueva barrera contra inundaciones de 4.640 pies lineales (lf), una estructura subterránea de control de oleaje de 192 pies cuadrados y las mejoras asociadas de humedales y acceso público a lo largo del IER.

2. Indique los umbrales de revisión de MEPA anticipados (301 CMR 11.03) (si se conocen).

   - 301 CMR 11.03(3)(b)1.a: Alteración de un banco costero
   - 301 CMR 11.03(3)(b)1.c: Alteración de 1.000 pies cuadrados o más de marismas o aguas de recursos excepcionales
   - 301 CMR 11.03(3)(b)1.d: Alteración de 5.000 pies cuadrados o más de un humedal con vegetación aislada o limítrofe
   - 301 CMR 11.03(3)(b)1.f: Alteración de medio acre o más de cualquier otro humedal
   - 301 CMR 11.03(3)(f)6: Construcción, reconstrucción o ampliación de una estructura de relleno sólido existente de 1.000 pies cuadrados o más de superficie base

3. Enumere todos los permisos estatales, locales y federales previstos necesarios para el proyecto (si se conocen).

Agencia	**Aprobación**
Local	
Ciudad de Everett	• Permisos de conexión de servicios
Ciudad de Chelsea	• Permisos de conexión de servicios
Comisión de Conservación de Everett	• Orden de las condiciones
Comisión de Conservación de Chelsea	• Orden de las condiciones
Estado	
Oficina Ejecutiva de Energía y Asuntos Ambientales	• Certificado MEPA del Secretario

Departamento de Protección Ambiental de Massachusetts	• Capítulo 91 Licencia • Certificación 401 de la calidad del
Comisión Histórica de Massachusetts	• Determinación de la ausencia de impacto adverso
Federal	
Cuerpo de Ingenieros del Ejército	• Permiso general
Agencia de Protección Ambiental	• Permiso general de construcción/aguas pluviales NPDES

4. Identifique las poblaciones y las características de justicia ambiental (EJ) (minorías, ingresos, aislamiento por el idioma inglés) en un radio de 5 millas del sitio del proyecto (puede adjuntar un mapa de EJ Maps Viewer en lugar de una descripción).

En un radio de 5 millas del emplazamiento del proyecto, hay 623 grupos de bloques censales que activan siete criterios de justicia ambiental. Estos criterios incluyen: minoría; ingresos; aislamiento por el idioma inglés, ingresos y minoría; minoría y aislamiento por el idioma inglés; ingresos y aislamiento por el idioma inglés; y minoría, ingresos y aislamiento por el idioma inglés.

5. Identifique cualquier municipio o zona censal que cumpla con la definición de "criterios de justicia ambiental por salud vulnerable" en la herramienta DPH Ej Tool que se encuentre total o parcialmente dentro de un radio de 1 milla del sitio del proyecto.

Ataque al corazón
- Chelsea
- Everett

Asma infantil:
- Boston
- Chelsea
- Everett
- Somerville

Plomo en sangre en la niñez (secciones censales de 2010)
- 25025160101
- 25017342500
- 25017342101
- 25025160200
- 25025050101
- 25025160502
- 25025050901
- 25025160501
- 25017351403

Bajo peso al nacer (secciones censales de 2010)
- 25017350104

- 25025040600
- 25017342400
- 25025160602
- 25025050101
- 25025160601
- 25017351403
- 25025160200
- 25025040401
- 25025160502
- 25025160400
- 25025050901
- 25025160501

6. Identifique los posibles impactos al medio ambiente y a la salud pública a corto y largo plazo que podrían afectar poblaciones de justicia ambiental y cualquier mitigación prevista. No se espera que el proyecto provoque posibles impactos permanentes al medio ambiente o a la salud pública que puedan afectar poblaciones de justicia ambiental. Una posible fuente de impactos negativos para la salud de la comunidad local podría ser impactos temporales sobre la calidad del aire durante el periodo de construcción. Para evitar o minimizar los efectos de emisiones fugitivas de polvo y escape de los vehículos de construcción, se emplearán medidas de mitigación adecuadas, como usar equipos diésel retroadaptados y humedecer las zonas durante la construcción. Para evitar, mitigar o minimizar los impactos temporarios de contaminación sonora durante el periodo de construcción, el proyecto cumplirá con la Ordenanza de Ruido y Trabajo de la Ciudad de Everett. Se realizarán esfuerzos para minimizar el impacto sonoro de las actividades de construcción, incluyendo silenciadores adecuados en todos los equipos, como compresores de aire y equipo de soldadura, mantenimiento de silenciadores de admisión y escape, apagado de equipos inactivos, sustitución de operaciones y técnicas específicas por otras menos ruidosas y otras medidas adecuadas de reducción de ruido. La gestión y la programación de la construcción minimizarán el impacto en el entorno circundante e incluirán planes para el desplazamiento de los trabajadores de la construcción, planes de ruta para los camiones y las entregas, y el control del ruido y el polvo. Se establecerán rutas de camiones designadas para regular el acceso y la salida de los camiones de construcción del sitio del proyecto para minimizar el tráfico relacionado con la construcción. El contratista seguirá utilizando las mejores prácticas de gestión, incluida una cortina de turbidez, para minimizar las perturbaciones en el IER. Para garantizar la seguridad pública dentro y alrededor del parque público, se empleará una señalización adecuada para mostrar los pasajes seguros para acceder al parque y notificar a la comunidad de las actividades relacionadas con la construcción.
7. Identifique los beneficios del proyecto, incluidos los "beneficios ambientales" conforme a la definición en 301 CMR 11.02, que podrían mejorar las condiciones ambientales o la salud pública de la población de justicia ambiental. Se prevé que el proyecto proporcione varios beneficios económicos y ambientales. Los beneficios ambientales del proyecto incluyen mejoras en el espacio público, mejoras en las condiciones de seguridad de los peatones, mejoras ecológicas, como la mejora de la calidad del agua y la protección contra las inundaciones. El proyecto proporcionará beneficios adicionales a la comunidad, incluidas nuevas aceras con árboles en las calles, miradores, aparcamientos para bicicletas y bancos, e incluirá un parque de 1/5 millas frente al río para acceder al paseo marítimo y proporcionar un espacio público abierto ampliado. Este paisaje contribuirá a reducir la superficie impermeable global y el efecto de isla de calor urbano en el emplazamiento del proyecto. Las medidas de protección contra las inundaciones protegerán más de 500 acres de barrios urbanos densamente desarrollados en Chelsea y Everett.
8. Describa cómo la comunidad puede solicitar una reunión para discutir el proyecto y cómo puede solicitar servicios de interpretación oral de idiomas en la reunión. Especifique cómo solicitar otras adaptaciones, incluidas las reuniones fuera del horario laboral y en lugares cercanos al transporte público.

Los miembros de la comunidad pueden solicitar una reunión u obtener información, incluido el material traducido, poniéndose en contacto con Bianca Bowman a través del teléfono 617-466-3076 x121 o del correo electrónico biancab@greenroots.org . Las solicitudes de ajustes, incluidas las reuniones fuera del horario laboral y en lugares cercanos al transporte público, también pueden dirigirse a Bianca Bowman.

La información del proyecto en inglés, árabe, español o criollo español, chino, criollo francés y portugués o criollo portugués se mantendrá en los sitios web que se indican a continuación:

Ciudad de Chelsea: https://www.chelseama.gov/housing-and-community-development-department

Ciudad de Everett: https://cityofeverett.com/city-hall/departments/planning-development/conservation-commission/

coUrbanize: https://www.islandendriver.com/home

PORTUGUESE

Formulário de Triagem de Justiça Ambiental

Nome do Projeto	Projeto de Resiliência a Inundações do Island End River
Data prevista para a submissão do MEPA	27/10/2023
Nomes do Proponentes	Cidade de Chelsea Cidade de Everett
Informações de contato (por exemplo, consultor)	**Proponentes:** Alexander Train Cidade de Chelsea- Departamento de Habitação e Desenvolvimento Comunitário: 500 Broadway, Chelsea, MA 02150 Erik Swanson Cidade de Everett- Departamento de Engenharia 484 Broadway, Everett, MA 02149 **Consultor de Planejamento e Permissões:** Katie Moniz Associados Fort Point, Inc. Uma empresa da Tetra Tech 31 State Street, 3rd Floor, Boston, MA 02109 kmoniz@fpa-inc.com (617) 279-4388 **Serviços Comunitários** Bianca Bowman GreenRoots 227 Marginal Street, Suite1, Chelsea, MA 02150 biancab@greenrootschelsea.org 617-466-3076 x121
Site público para projeto ou outro local físico onde o material do projeto pode ser obtido (se disponível)	Cidade de Chelsea: https://www.chelseama.gov/housing-and-community-development-department Cidade de Everett: https://cityofeverett.com/city-hall/departments/planning-development/conservation-commission/ coUrbanize: https://www.islandendriver.com/home
Município e Código Postal do Projeto (se conhecido)	Chelsea, MA 02150 Everett, MA 02149
Tipo de projeto* (liste todos os que se aplicam)	Infraestrutura costeira
O local do projeto está dentro de uma planície de inundação mapeada pela FEMA por 100 anos? Sim/Não/ainda desconhecido	Sim

Emissões estimadas de GEE de espaços condicionados, se conhecidas (click (clique aqui para a ferramenta de estimativa de GHG)	N/A

Descrição do projeto

1. Forneça uma breve descrição do projeto, incluindo o tamanho total do local do projeto e o tamanho das construções e estruturas propostas, se conhecidos.

   As Cidades de Chelsea e Everett (os "Proponentes") propõem a construção de uma barreira costeira contra enchentes, estrutura de controle de escoadouros e comodidades relacionadas no Island End River ("IER") nas Cidades de Chelsea e Everett (o "Local do Projeto"). O Local do Projeto de aproximadamente 6,5 acres está localizado no IER e é atualmente composto de uma mistura de usos comerciais e industriais, de infraestrutura viária, e de serviços públicos de apoio. O Projeto de Resiliência a Inundações proposto pela IER (o "Projeto") construirá uma nova barreira de inundação de 4.640 pés lineares (lf), uma estrutura de controle de sobretensões subterrâneas de 192 pés quadrados, e melhorias no acesso público associadas a zonas úmidas ao longo do IER.

2. Liste os limites de revisão do MEPA antecipadps (301 CMR 11.03) (se conhecidos)

   - 301 CMR 11.03(3)(b)1.a: Alteração de um banco da costa
   - 301 CMR 11.03(3)(b)1.c: Alteração de 1.000 ou mais sf de pântanos salgados ou águas de recursos excepcionais
   - 301 CMR 11.03(3)(b)1.d: Alteração de 5.000 ou mais sf de zona úmida com vegetação limítrofe ou isolada
   - 301 CMR 11.03(3)(b)1.f: Alteração de meio acre ou mais de qualquer outro pântano
   - 301 CMR 11.03(3)(f)6: Construção, reconstrução ou expansão de uma estrutura de preenchimento sólido existente de 1.000 ou mais sf de área de base

3. Liste todas as licenças estaduais, locais e federais previstas necessárias para o projeto (se conhecidas)

Agência	**Aprovação**
Local	
Cidade de Everett	• Licenças de conexão de utilidades
Cidade de Chelsea	• Licenças de conexão de utilidades
Comissão de Conservação do Everett	• Ordem de condições
Comissão de Conservação do Chelsea	• Ordem de condições
Estado	
Escritório Executivo de Energia e Assuntos Ambientais	• Certificate do Secretário da MEPA
Escritório Executivo de Assuntos Energéticos e Ambientais	• Licença do Capítulo 91 • Certificação 401 de Qualidade da

Comissão Histórica de Massachusetts	• Determinação da ausência de impacto
Federal	
Corpo de Engenheiros do Exército	• Autorização geral
Agência de Proteção Ambiental	• Licença NPDES Geral de Construção e Águas de Tempestades

4. Identifique populações e características do EJ (Minoria, Renda, Isolamento de inglês) dentro de 5 milhas do local do projeto (pode anexar mapa do EJ Maps Viewer no lugar da narrativa)

Dentro de um raio de 5 milhas do local do projeto, existem 623 grupos de blocos censitários que acionam sete critérios EJ. Estes critérios incluem: Minoria; Renda; Isolamento de inglês, Renda e Minoridade; Isolamento de Inglês e Minoridade; Renda e Isolamento de inglês; e Isolamento de inglês, Renda e Minoridade.

5. Identificar qualquer município ou trato censitário que corresponda à definição de "critérios de EJ de saúde vulnerável" na Ferramenta DPH EJ Tool localizada no todo ou em parte dentro de um raio de 1 milha do local do projeto:

Ataque Cardíaco
- Chelsea
- Everett

Asma infantil:
- Boston
- Chelsea
- Everett
- Somerville

Chumbo em sangue infantil (Tractos do Censo de 2010)
- 25025160101
- 25017342500
- 25017342101
- 25025160200
- 25025050101
- 25025160502
- 25025050901
- 25025160501
- 25017351403

Baixo Peso de Nascimento (Tractos do Censo de 2010)
- 25017350104
- 25025040600
- 25017342400
- 25025160602
- 25025050101
- 25025160601
- 25017351403
- 25025160200

- 25025040401
- 25025160502
- 25025160400
- 25025050901
- 25025160501

6. Identifique potenciais impactos ambientais e de saúde pública a curto e longo prazos que possam afetar as populações de EJ e qualquer mitigação antecipada Não se espera que o projeto resulte em impactos ambientais ou de saúde pública potencialmente adversos permanentes que possam afetar as populações de EJ. Os impactos temporários na qualidade do ar durante o período de construção são uma fonte potencial de impactos ambientais e de saúde pública negativos para a comunidade local. Para evitar ou minimizar os efeitos da poeira fugitiva e das emissões de escape dos veículos de construção, serão empregadas medidas apropriadas de mitigação, tais como o uso de equipamentos a diesel recondicionados e o molhamento de áreas baixas durante a construção. Para evitar, mitigar ou minimizar os impactos temporários da poluição sonora durante a construção, o Projeto cumprirá a Portaria sobre Ruído e Trabalho da Cidade de Everett. Serão feitos esforços para minimizar o impacto do ruído das atividades de construção, incluindo silenciadores apropriados em todos os equipamentos, tais como compressores de ar e equipamentos de solda, manutenção dos silenciadores de admissão e escape, desligamento de equipamentos ociosos, substituição de operações e técnicas específicas por outras menos ruidosas, e outras medidas apropriadas de redução de ruído. A gestão e programação da construção minimizará os impactos no ambiente ao redor e incluirá planos para o deslocamento dos trabalhadores da construção, planos de roteamento para caminhões e entregas, e controle de ruído e poeira. Serão estabelecidas rotas de caminhões designadas para governar onde os caminhões de construção acessam e saem do local do projeto para minimizar o tráfego relacionado à construção. O empreiteiro ainda usará as melhores práticas de gerenciamento, incluindo uma cortina de turbidez, para minimizar os distúrbios ao RIC. Para garantir a segurança pública dentro e ao redor do parque público, será utilizada sinalização apropriada para mostrar passagens seguras para acessar o parque e notificar a comunidade sobre atividades relacionadas à construção.
7. Identifique benefícios do projeto, incluindo "Benefícios Ambientais", conforme definido no 301 CMR 11.02, que vão melhorar as condições ambientais ou a saúde pública da população do EJ Espera-se que o projeto proporcione vários benefícios econômicos e ambientais. Os benefícios ambientais do projeto incluem um melhor domínio público, melhores condições de segurança para os pedestres, melhorias ecológicas, como a melhoria da qualidade da água e a proteção contra enchentes. O projeto proporcionará benefícios adicionais para a comunidade, incluindo novas calçadas com árvores de rua, mirantes panorâmicos, e bicicletários e bancos, e incluirá um parque à beira do rio de 1/5 de milha para acessar a orla e proporcionar maior espaço público aberto. Este paisagismo contribuirá para a redução da área total impermeável e do efeito ilha de calor urbano no local do projeto. Medidas de proteção contra enchentes protegerão mais de 500 acres de bairros urbanos densamente desenvolvidos em Chelsea e Everett.
8. Descreva como a comunidade pode solicitar uma reunião para discutir o projeto, e como a comunidade pode solicitar serviços de interpretação oral na reunião. Especificque como solicitar outras acomodações, incluindo reuniões após o horário comercial e em locais próximos ao transporte público. Os membros da comunidade podem solicitar uma reunião ou obter informações, incluindo materiais traduzidos, entrando em contato com Bianca Bowman pelo telefone 617-466-3076 x121 ou biancab@greenroots.org . Os pedidos de acomodação, incluindo reuniões após o horário comercial e em locais próximos ao transporte público, também podem ser enviados para Bianca Bowman.

Informações do projeto em inglês, árabe, espanhol ou crioulo espanhol, chinês, crioulo francês e crioulo português ou português serão mantidas nos sites abaixo:

Cidade de Chelsea: https://www.chelseama.gov/housing-and-community-development-department

Cidade de Everett: https://cityofeverett.com/city-hall/departments/planning-development/conservation-commission/

coUrbanize: https://www.islandendriver.com/home

CHINESE

环境公平筛查表

项目名称	岛尾河洪灾复原力项目
MEPA备案预计日期	2023/10/23
动议方姓名	切尔西市 埃弗雷特市
联系人信息（如顾问）	**动议人：** Alexander Train 切尔西市- 住房和社区发展部： 500 Broadway, Chelsea, MA 02150 Erik Swanson 埃弗雷特市-工程部： 484 Broadway, Everett, MA 02149 **规划和许可顾问：** Katie Moniz 德聪公司旗下角岬联合公司 31 State Street, 3rd Floor, Boston, MA 02109 kmoniz@fpa-inc.com (617) 279-4388 **社区服务：** Bianca Bowman GreenRoots 227 Marginal Street, Suite1, Chelsea, MA 02150 biancab@greenrootschelsea.org 617-466-3076 x121
项目的公开网站，或可以获取项目材料的其他实体地点（如有）	切尔西市： https://www.chelseama.gov/housing-and-community-development-department 埃弗雷特市：https://cityofeverett.com/city-hall/departments/planning-development/conservation-commission/ coUrbanize: https://www.islandendriver.com/home
项目所在市镇及项目的邮政编码（如已知）	麻州切尔西市02150 麻州埃弗雷特市
项目类型*（列出所有适用类型）	沿海基础设施
项目地点是否位于百年一遇级别FEMA洪泛平原之内？是/否/未知	是

室内空调温室气体排放量估算，如已知 (点击 **这里**获取温室气体估算工具)	N/A

项目描述

1.请简要描述项目，包括项目场地的总体规模和拟议建筑物的面积和结构（如已知）。

切尔西市和埃弗雷特市（“动议方”）提议在切尔西和埃弗雷特市（“项目现场”）的岛尾河（“IER”）建造沿海防洪堤、泄水控制构建物和相关设施。该项目占地约6.5英亩，位于岛尾河（IER）上，目前是商业和工业用途以及配套的道路和公用事业基础设施。拟议的IER洪灾复原力项目（“项目”）将沿IER新造一条4640英尺直线长度（lf）的防洪堤，192平方英尺的地下浪涌控制结构，同时改善相应的湿地和公众通道。

2.列出预期的 MEPA 审查阈值 (301 CMR 11.03)（如已知）

- 301 CMR 11.03(3)(b)1.a:沿海堤坝的改建
- 301 CMR 11.03(3)(b)1.c:改变1000平方英尺及以上的盐沼或突出资源水域
- 301 CMR 11.03(3)(b)1.d:改变5000平方英尺及以上临界或孤立植被湿地
- 301 CMR 11.03(3)(b)1.f:改变半英亩及以上其他湿地
- 301 CMR 11.03(3)(f)6:建造、重建或扩建占地 1000 平方英尺及以上的现有实体填充结构

3.列出项目预期所需的所有州政府、地方政府和联邦政府许可证（如已知）

审批机构	**审批内容**
当地	
埃弗雷特市	• **公共**设施连接许可
切尔西市	• **公共**设施连接许可
埃弗雷特保护委员会	• **保持**现状令
切尔西保护委员会	• **保持**现状令
州政府	
能源和环境事务执行办公室	• MEPA证书
麻州环境保护部	• **第**91**章**许可 • 401水质认证
麻州历史委员会	• **确定无不良影响**
麻州政府	

陆军工程兵团	• 一般许可
国家环境保护局	• NPDES**建筑/雨水一**般许可

4.说明项目场地 5 英里范围内的 EJ（环境公平）人口及其特征（少数族裔、收入、英语不通）（可以使用EJ（环境公平）地图查看器 附图代替文字叙述）

项目站点的 5 英里半径范围内，有 623 个普查区块组涉及到七个 EJ 标准。相应标准包括：少数族裔；收入；英语不通，收入和少数族裔；少数族裔和英语不通；收入和英语不能；以及少数族裔、收入和英语不通。

5.使用DPH EJ（环境公平）工具说明全部位于或部分位于项目场地 1 英里半径范围内，符合"弱势健康环境公平标准"定义的城市或人口普查区

心脏病

- 切尔西
- 埃弗雷特

儿童哮喘：

- 波士顿
- 切尔西
- 埃弗雷特
- 萨默维尔

儿童血铅（2010年人口普查）

- 25025160101
- 25017342500
- 25017342101
- 25025160200
- 25025050101
- 25025160502
- 25025050901
- 25025160501
- 25017351403

低出生体重（2010年人口普查）

- 25017350104
- 25025040600
- 25017342400
- 25025160602
- 25025050101
- 25025160601
- 25017351403

- 25025160200
- 25025040401
- 25025160502
- 25025160400
- 25025050901
- 25025160501

6.说明可能影响环境公平人口的潜在的短期和长期环境及公共卫生因素，以及相应的预期缓解措施 该项目预计不会产生可能影响EJ人群的潜在永久性不利环境或公共卫生因素。 施工期暂时的空气质量影响是对当地社区的环境和公共健康产生负面影响的一个潜在来源。为避免或尽量减少工程车辆逸散性粉尘及废气排放的影响，我们会采取适当的纾缓措施，如使用柴油改装设并在施工期间加湿相应的工作区域。为避免、减轻或尽量减少施工期暂时的噪音污染影响，本项目将遵守《埃弗雷特市噪音及工作条例》。项目将努力尽量减少施工活动的噪音影响，包括在所有设备上安装适当的消声器，如空气压缩机和焊接设备，养护进排气消声器，关闭空转设备，采用噪音较小的施工方式和技术设备，以及其他适当的降噪措施。施工管理和调度将最大限度地减少对周围环境的影响，并将制定施工人员通勤计划，卡车运输和交付路线计划以及噪音和灰尘控制措施。 项目将设计专门的卡车路线，用于管理施工卡车进出项目场地，尽量减少因施工发生的交通。承包商仍将使用最佳工程管理实践，包括使用浊度幕，尽量减少对岛尾河的干扰。为确保公园内及周边的公共安全，我们会使用适当的标牌，指示进入公园的安全通道，并告知社区相关的施工活动。
7.明确项目效益，包括《麻州通法301 CMR 11.02》定义的“环境效益”，改善环境公平人口的环境条件或公共卫生 预计该项目将带来若干经济和环境效益。项目的环境效益包括改善公共区域、改善行人安全条件，并具有改善生态的作用，如改善水质和防洪。项目还将具有额外的社区效益，包括栽种行道树的新的人行道，优美的景观、自行车停放架、长椅，同时还建有一个1/5英里的河滨公园，供人们进入河滨并扩大公共开放空间。这种景观设计将有助于减少项目现场的整体不透水面积和城市热岛效应。防洪措施将保护切尔西和埃弗雷特超过500英亩的密集发展城市社区。
8.描述社区要求召开会议讨论项目的程序，以及社区要求会议提供口语翻译服务的程序。说明公众如何申请其他特殊安置措施，包括下班时间之后的公众会议，以及邻近公交地点的公众会议。 社区成员可以拨打 617-466-3076 x121 或致电邮biancab@greenroots.org联系比安卡·鲍曼（ Bianca Bowman），要求召开会议或索要相关材料。特殊安置措施，包括要求在下班时间之后举行公众会议，以及在邻近公交地点举行公众会议，也可以联系比安卡·鲍曼。 项目信息的英语、阿拉伯语、西班牙语或西班牙语克里奥尔语、中文、法语克里奥尔语以及葡萄牙语或葡萄牙语克里奥尔语版本将在以下网站上维护： 切尔西市： https://www.chelseama.gov/housing-and-community-development-department

埃弗雷特市：https://cityofeverett.com/city-hall/departments/planning-development/conservation-commission/

coUrbanize: https://www.islandendriver.com/home

ARABIC

نموذج الفحص الخاص بالعدالة البيئية

اسم المشروع	مشروع آيلاند ايند ريفر لصد الفيضانات (Island End River Flood Resilience Project)
التاريخ المتوقع لتقديم النموذج الخاص بقانون السياسة البيئية لولاية ماساتشوستس	2023/10/27
اسم الجهة:	مدينة تشيلسي مدينة إيفيريت
معلومات الاتصال: (مثل، المستشار)	**الجهات:** Alexander Train City of Chelsea- Department of Housing and Community Development: 500 Broadway, Chelsea, MA 02150 **الشخص المعني:** Erik Swanson City of Everett- Engineering Department: 484 Broadway, Everett, MA 02149 **مستشار التخطيط وإصدار الرخص:** Katie Moniz Fort Point Associates, Inc A Tetra Tech Company 31 State Street, 3rd Floor, Boston, MA 02109 kmoniz@fpa-inc.com (617) 279-4388 **خدمات المجتمع المحلي:** Bianca Bowman GreenRoots 227 Marginal Street, Suite1, Chelsea, MA 02150 biancab@greenrootschelsea.org 617-466-3076 وبعد ذلك اضغط الرقم 121
الموقع الإلكتروني العام للمشروع أو عنوان المكان الذي يمكن من خلاله الاطلاع على المواد المعلّقة بالمشروع (إن وجدت)	مدينة تشيلسي: https://www.chelseama.gov/housing-and-community-development-department مدينة إيفيريت: https://cityofeverett.com/city-hall/departments/planning-development/conservation-commission/ coUrbanize: https://www.islandendriver.com/home
البلدية والرمز البريدي (الزبكود) للمشروع (إذا كان معروفا)	مدينة تشيلسي، ولاية ماساتشوستس. الرمز البريدي (02150) مدينة إيفيريت، ولاية ماساتشوستس. الرمز البريدي (02149)
نوعية المشروع* (يُرجى ادراج كل ما ينطبق)	البنى التحية للشاطئ
هل موقع المشروع ضمن سهل مُعرض للفيضان أدرجته الوكالة الفيدرالية لإدارة الطوارئ للـ 100 سنة المقبلة؟ تكون الإجابة بـ "نعم"، أو "كلا"، أو "غير معروف"	نعم

تقديرات انبعاثات غازات الدفيئة في الأماكن المُكيفة (يُرجى النقر هنا للحصول على الأداة الخاصة بانبعاثات غازات الدفيئة)	لا ينطبق

وصف المشروع

1. يُرجى تقديم وصف للمشروع، بما في ذلك الحجم الكلي لموقع المشروع والمساحة المربعة للمباني والهياكل المقترحة إذا كانت معروفة.

تقترح مدينتا تشيلسي وإيفيريت ("الجهتان المعنيتان") بناء حاجز ساحلي للفيضانات، وهيكل خارجي للسيطرة، والمرافق ذات الصلة في آيلاند ايند ريفر في مدينتي تشيلسي وإيفريت ("موقع المشروع"). يقع موقع المشروع الذي تبلغ مساحته 6.5 فدان تقريبا في آيلاند ايند ريفر ويتألف حاليا من مزيج من الاستخدامات التجارية والصناعية والطرق الداعمة والبنية التحتية للمرافق. سيقوم مشروع آيلاند ايند ريفر المقترح لصد الفيضانات ("المشروع") ببناء حاجز للفيضانات بطول 4640 قدما طوليا، وهيكل للسيطرة تحت الأرض بمساحة 192 قدما مربعا، وما يرتبط بها من تحسينات في الأراضي الرطبة والوصول العام على طول آيلاند ايند ريفر.

2. يُرجى إدراج العتبات المتوقعة والخاصة بمراجعة قانون السياسة البيئية لولاية ماساتشوستس (301 CMR 11.03) (إذا كانت معروفة)

- 301 CMR 11.03(3)(b)1.a: تعديل الضفة الساحلية.
- 301 CMR 11.03(3)(b)1.c: تعديل 1000 قدم مربع أو أكثر من المستنقعات المالحة أو مياه الموارد غير المؤهلة.
- 301 CMR 11.03(3)(b)1.d: تعديل 5000 قدم مربع أو أكثر من الأراضي الرطبة النباتية المتاخمة أو المعزولة.
- 301 CMR 11.03(3)(b)1.f: تعديل نصف فدان أو أكثر من أي أراضي رطبة أخرى.
- 301 CMR 11.03(3)(f)6: إنشاء أو إعادة بناء أو توسيع هيكل حشو صلب قائم بمساحة 1000 قدم مربع أو أكثر من المنطقة الأساسية.

3. يُرجى إدراج جميع التراخيص الخاصة بالولاية والتراخيص المحلية والفيدرالية التي من المتوقع أن يتم الحصول عليها لتنفيذ المشروع (إذا كانت معروفة).

الوكالة	الموافقة
على المستوى المحلي	
مدينة إيفيريت	• تصاريح ربط الخدمات
مدينة تشيلسي	• تصاريح ربط الخدمات
لجنة المُحافظة على الأراضي في إي	• الأمر الخاص بالأوضاع
لجنة المُحافظة على الأراضي في إيفيريت	• الأمر الخاص بالأوضاع
على مستوى الولاية	
المكتب التنفيذي للطاقة والشؤون البيئية	• شهادة قانون السياسة البيئية لولاية ماساتشوستس الخاصة بالولاية
قسم الحماية البيئية في ولاية ماساتشوستس	• الرخصة الخاصة بالفصل 91 • شهادة جودة المياه (401)
هيئة ولاية ماساتشوستس المعنية بالجوانب التاريخية	• موافقة بعدم وجود تأثيرات سلبية للمشروع

على المستوى الفيدرالي	
فيلق المهندسين التابع للجيش الأمريكي	• رخصة عامة
الوكالة الأمريكية لحماية البيئة	• رخصة عامة للبناء ومقاومة العواصف من النظام الوطني للتخلص من المواد الملوثة

4. يُرجى تحديد الفئات السكانية والخصائص المتعلقة بالعدالة البيئية (الأقليات، والدخل، والعزل الإنجليزي) ضمن مسافة 5 أميال من موقع المشروع (يمكن إرفاق خارطة تحدد المحيط بمسافة 5 أميال من EJ Maps Viewer) عوضا عن السرد)

ضمن دائرة نصف قطرها 5 أميال من موقع المشروع، هناك 623 مجموعة حسب التعداد تشير إلى سبعة معايير تخص العدالة البيئية. وتشمل هذه المعايير :الأقليات، والدخل، والعزل الإنجليزي، والدخل والأقليات، والأقليات والعزل الإنجليزية، والدخل والعزل الإنجليزي، والأقليات، والدخل والعزل الإنجليزي.

5. يُرجى تحديد أي بلدية أو منطقة تعداد سكاني تفي بتعريف "معايير الصحة الضعيفة الخاصة بالعدالة البيئية" في أداة العدالة البيئية التابعة لقسم الصحة العامة الموجودة كليا أو جزئيا في دائرة نصف قطرها ميل واحد من موقع المشروع.

نوبة قلبية

- تشيلسي
- إيفيريت

الربو عند الأطفال:

- بوسطن
- تشيلسي
- إيفيريت
- سومر فل

مادة الرصاص في الدم (حسب تعداد المناطق في 2010)

- 25025160101
- 25017342500
- 25017342101
- 25025160200
- 25025050101
- 25025160502
- 25025050901
- 25025160501
- 25017351403

نقص الوزن عند الولادة (حسب تعداد المناطق في 2010)

- 25017350104
- 25025040600
- 25017342400
- 25025160602
- 25025050101
- 25025160601
- 25017351403

- 25025160200
- 25025040401
- 25025160502
- 25025160400
- 25025050901
- 25025160501

6. يُرجى تحديد التأثيرات البيئية والصحية العامة المحتملة على المدى القصير والطويل والتي قد تؤثر على سكان موضوع العدالة البيئية وأي تخفيف متوقع.

من غير المتوقع أن ينتج عن المشروع تأثيرات بيئية أو صحية عامة دائمة محتملة قد تؤثر على سكان موضوع العدالة البيئية.

تعتبر تأثيرات جودة الهواء في فترة البناء المؤقتة مصدرا محتملا للتأثيرات الصحية السلبية على المجتمع المحلي. ولتجنب أو تقليل آثار الغبار المنتشر وانبعاثات العادم من مركبات البناء، سيتم استخدام تدابير التخفيف المناسبة، مثل استخدام معدات الديزل المعدلة ومناطق ترطيب أثناء البناء. ولتجنب أو تخفيف أو تقليل آثار التلوث الضوضائي لفترة البناء المؤقتة، سيمتثل المشروع لقانون مدينة إيفيريت للضوضاء والعمل. وسيتم بذل الجهود لتقليل تأثير الضوضاء الناتجة عن أنشطة البناء، بما في ذلك كاتمات الصوت المناسبة على جميع المعدات مثل ضواغط الهواء ومعدات اللحام، وصيانة كاتمات السحب والعادم، وإيقاف تشغيل معدات التباطؤ، واستبدال العمليات والتقنيات المحددة بأخرى أقل ضوضاء، وتدابير أخرى مناسبة للحد من الضوضاء. وستعمل الأقسام المعنية بإدارة وجدولة الإنشاءات على تقليل التأثيرات على البيئة المحيطة وسيتضمن ذلك خططا تخص التنقل اليومي لعمال البناء، وخطط تخص الطرق التي تسلكها شاحنات النقل والتسليم، والتحكم في الضوضاء والغبار. وسيتم إنشاء مسارات للشاحنات للتحكم في مكان وصول شاحنات البناء إلى موقع المشروع وخروجه منها لتقليل حركة المرور المرتبطة بالبناء. وسيواصل المتعاقد في استخدام أفضل ممارسات الإدارة، بما في ذلك ستارة العزل لتقليل مستوى الازعاج في منطقة آيلاند ايند ريفر لضمان السلامة العامة داخل وحول المتنزه العام، وسيتم استخدام لافتات مناسبة لإظهار ممرات آمنة للوصول إلى المتنزه وإخطار المجتمع المحلي بالأنشطة المتعلقة بالبناء.

7. يُرجى تحديد فوائد المشروع، بما في ذلك "الفوائد البيئية" على النحو المحدد في (301 CMR 11.02)، التي قد تحسن الظروف البيئية أو الصحة العامة لسكان موضوع العدالة البيئية.

من المتوقع أن يوفر المشروع العديد من الفوائد الاقتصادية والبيئية. وتشمل الفوائد البيئية للمشروع تحسين المجال العام وتحسين ظروف سلامة المشاة والتحسينات البيئية مثل تحسين جودة المياه والحماية من الفيضانات. وسيوفر المشروع مزايا مجتمعية إضافية بما في ذلك، أرصفة مشاة جديدة مع شوارع تحتوي على اشجار، وإطلالات خلابة، ومواقف للدراجات الهوائية ومصاطب للجلوس، ويشمل ذلك متنزها على واجهة النهر بطول 1/5 ميل للوصول إلى الواجهة البحرية وتوفير مساحة مفتوحة عامة موسعة. وستساهم هذه المناظر الطبيعية في تقليل المساحة السطحية الكلية التي لا تصل إلى الماء والتأثير الحراري الحضري للجزيرة على موقع المشروع. وستحمي تدابير الحماية من الفيضانات أكثر من 500 فدان من الأحياء الحضرية المتطورة بكثافة في تشيلسي وإيفيريت.

8. يُرجى وصف كيف يمكن للمجتمع أن يطلب عقد اجتماع لمناقشة المشروع، وكيف يمكن للمجتمع أن يطلب خدمات الترجمة الشفوية في الاجتماع. كما يُرجى تحديد كيفية طلب وسائل الراحة الأخرى، بما في ذلك الاجتماعات بعد ساعات العمل وفي المواقع القريبة من وسائل النقل العام.

يمكن لأعضاء المجتمع المحلي طلب اجتماع أو الحصول على معلومات، بما في ذلك المواد المترجمة، من خلال الاتصال بالسيدة/ بيانكا بومان (Bianca Bowman) على الهاتف (617-466-3076) وثم اضغط الرقم (121)، أو من خلال الإيميل (biancab@greenroots.org).

ستتوفر معلومات حول المشروع باللغات الإنجليزية، والعربية، والاسبانية، والاسبانية الكريول، والصينية، والفرنسية الكريول، والبرتغالية، والبرتغالية الكريول على الموقعين الإلكترونيين أدناه:

مدينة تشيلسي: https://www.chelseama.gov/housing-and-community-development-department

مدينة إيفيريت: https://cityofeverett.com/city-hall/departments/planning-development/conservation-commission/

https://www.islandendriver.com/home :coUrbanize

HAITIAN CREOLE

Fòmilè Depistaj sou Jistis Anviwonnman

Non Pwojè a	Island End River Flood Resilience Project (Pwojè Island End River sou Pwoteksyon kont Inondasyon)
Dat antisipe pou depoze nan MEPA	27/10/2023
Non kote k ap Pwopoze a	Vil Chelsea : City of Everett
Moun pou kontakte (tankou konsiltan an)	**Moun ak Kote k ap Pwopoze yo :** Alexander Train City of Chelsea- Department of Housing and Community Development: 500 Broadway, Chelsea, MA 02150 Erik Swanson City of Everett- Engineering Department: 484 Broadway, Everett, MA 02149 **Konsiltan pou Plànifikasyon ak Pèmisyon** Katie Moniz Fort Point Associates, Inc A Tetra Tech Company 31 State Street, 3rd Floor, Boston, MA 02109 kmoniz@fpa-inc.com (617) 279-4388 **Sèvis Kominotè :** Bianca Bowman GreenRoots 227 Marginal Street, Suite 1, Chelsea, MA 02150 biancab@greenrootschelsea.org 617-466-3076 x121
Sit entènèt piblik pou pwojè, oswa lòt kote fizik yo ka jwenn materyèl pou pwojè (si genyen)	Vil Chelsea : https://www.chelseama.gov/housing-and-community-development-department Vil Everett : https://cityofeverett.com/city-hall/departments/planning-development/conservation-commission/ coUrbanize: https://www.islandendriver.com/home
Minisipalite ak Kòd Postal pou Pwojè a (si ou konnen)	Chelsea, MA 02150 Everett, MA 02149
Ki Kalite Pwojè* (ekri tout sa ki aplikab)	Enfrastrikti Kostal
Èske kote Pwojè a ye nan yon plenn inondab FEMA katografye pou 100 an ? Wi / Non / Pako konnen	Wi
Emisyon GHG ki evalye pou espas kondisyonnen yo, si ou konnen (klike **isit la pou zouti**	Pa Aplikab (N/A)

Estimasyon GHG a)	

Deskripsyon Pwojè a

1. Bay yon deskripsyon kout sou pwojè a, avèk dimansyon jenneral kote pwojè a ap fèt, ak sipèfisi bilding yo pwopoze a, ak estrikti a si ou konnen.

   Vil Chelsea ak Everett (k ap "Pwopoze" yo) ofri pou yo bati yon baryè kont inondasyon sou kòt la, ak yon estrikti pou kontwole sòti, ak lòt akseswa nan Island End River ("IER") nan Vil Chelsea ak Everett (kote pou fè "Pwojè" a). Anplasman Pwojè a mezire anviwon 6.5 kawo tè, li sou IER la, epi kounye a li se yon konbinezon aktivite komèsyal ak endistriyèl, ak wout ki sèvi yo, ak enfrastrikti pou sèvis itilitè. Pwojè pou Defans kont Inondasyon IER yo pwopoze a (n ap rele "Pwojè" a) pral bati yon nouvo baryè kont inondasyon 4,640 pye lineyè ("lf" ki vle di "linear foot"), ak yon estrikti anba tè ki mezire 192 pye kare pou kontwole lè dlo monte, ak fè travay amelyorasyon nan marekaj ak aksè piblik ki kouri bò IER la.

2. Ekri nivo yo antisipe pou revizyon MEPA yo (301.CMR 11.03) (si ou konnen)

   - 301 CMR 11.03(3)(b)1.a : Alterasyon yon zòn kotyè
   - 301 CMR 11.03(3)(b)1.c : Alterasyon omwen 1,000 pye kare ("sf" ki vle di "square foot") marè salan oswa resous dlo ki kapab sèvi
   - 301 CMR 11.03(3)(b)1.d : Alterasyon omwen 5,000 pye kare marekaj arebò dlo oswa marekaj vejetatif izole
   - 301 CMR 11.03(3)(b)1.f : Alterasyon omwen demi kawo tè nan nenpòt ki lòt marekaj
   - 301 CMR 11.03(3)(f)6: Bati, rebati, ak agrandi yon estrikti ranblè solid ki la deja, ki gen yon sifas omwen 1,000 pye kare

3. Ekri tout pèmi ki pral nesesè yo pou Eta a, ak pou nivo lokal ak federal pou pwojè a (si ou konnen)

Ajans	Apwobasyon
Lokal	
Vil Everett	• Pèmi Konneksyon pou Sèvis Itilitè
Vil Chelsea	• Pèmi Konneksyon pou Sèvis Itilitè
Komisyon Konsèvasyon Everett	• Lòd Kondisyon
Komisyon Konsèvasyon Chelsea	• Lòd Kondisyon
Eta	
Ajans Egzekitif pou Ennèji ak Zafè Anviwonnman (Executive Office of Energy and Environmental Affairs)	• Sètifika Sekretè MEPA
Depatman Pwoteksyon Anviwonnman Massachusetts	• Chapit 91 Lisans • Sètifikasyon 401 pou Kalite Dlo
Komisyon Istorik Massachusetts	• Konklizyon ki di Pa gen Move Konsekans

Federal	
Sèvis Enjennyè Lame	• Pèmi Jenneral
Ajans Pwoteksyon Anviwonnman	• Pèmi Jenneral NPDES pou Konstriksyon / Tretman Dlo Lapli

4. Idantifye popilasyon EJ ak karakteristik yo (Minorite, Salè, Izolman poutèt lang angle) nan yon reyon 5 mil avèk kote pwojè a ye a (ou mèt voye kat EJ Maps Viewer pase pou ou voye deskripsyon)

   Nan yon reyon 5 mil avèk Kote pou Pwojè a, genyen 623 gwoup blòk pou resansman ki bay sèt kritè EJ. Men kisa kritè yo ye : Minorite ; Salè ; Izolman poutèt Lang Angle, Salè, ak Minorite ; Minorite ak Izolman poutèt Lang Angle ; Salè ak Izolman poutèt Lang Angle ; ak Izolman poutèt Minorite, Salè, ak Lang Angle.

5. Idantifye nenpòt minisipalite oswa zòn resansman ki satisfè definisyon "kritè vilnerabilite pou sante EJ" nan DPH EJ Tool ki nan tout, oswa nan yon pati pwojè a ki nan yon reyon 1 mil avèk kote pwojè a ye :

   Kriz kè :
   - Chelsea
   - Everett

   Maladi Opresyon Timoun :
   - Boston
   - Chelsea
   - Everett
   - Somerville

   Plon nan San Timoun (Zòn Resansman 2010)
   - 25025160101
   - 25017342500
   - 25017342101
   - 25025160200
   - 25025050101
   - 25025160502
   - 25025050901
   - 25025160501
   - 25017351403

   Pwa Fèb nan Nesans (Zòn Resansman 2010)
   - 25017350104
   - 25025040600
   - 25017342400
   - 25025160602
   - 25025050101
   - 25025160601
   - 25017351403
   - 25025160200
   - 25025040401

- 25025160502
- 25025160400
- 25025050901
- 25025160501

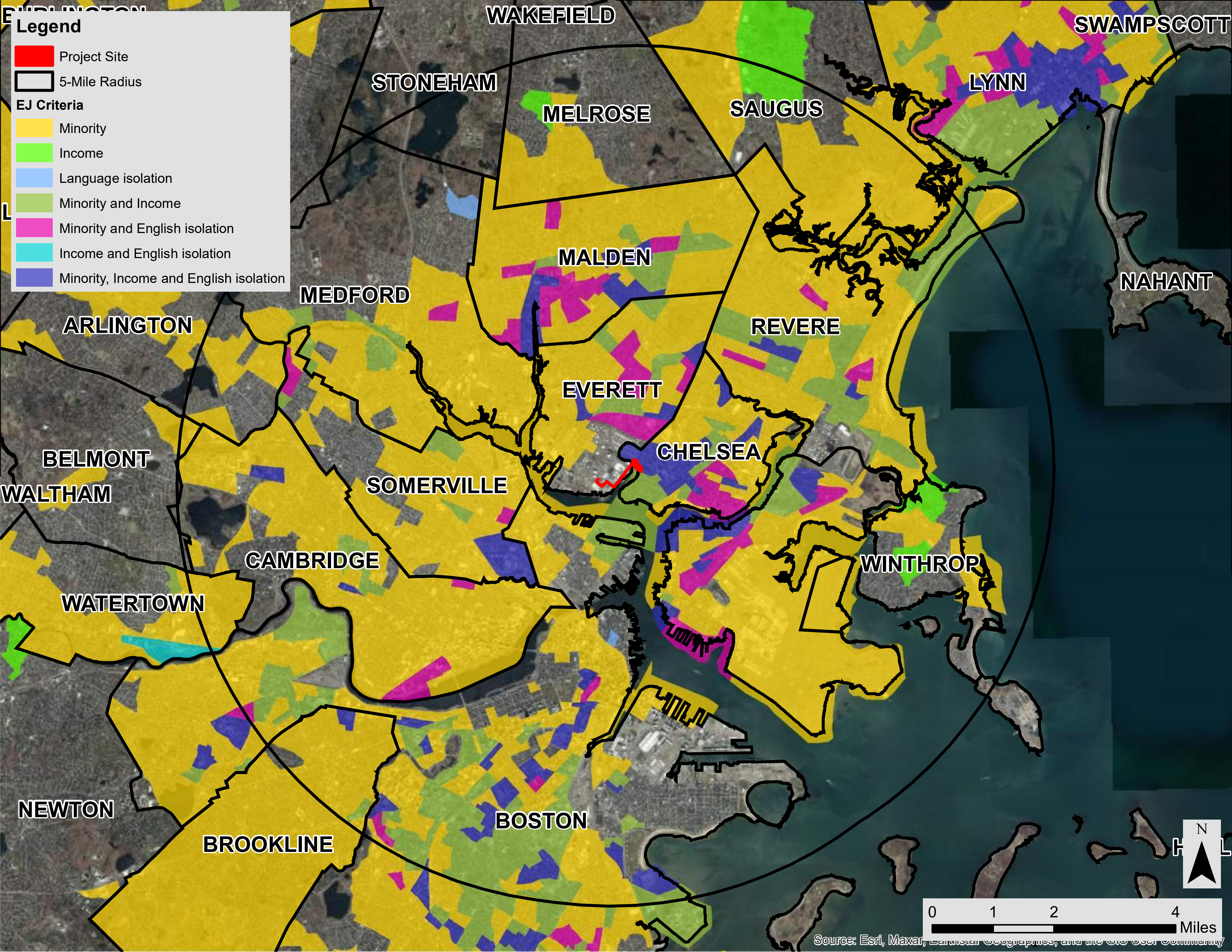
6. Idantifye enpak sou anviwonnman ak sou sante piblik pandan lontan oswa pou yon tan kout, ki kapab gen konsekans sou Popilasyon EJ yo ak nenpòt chanjman yo kapab lakòz. Pwojè a pa sanse lakòz okenn chanjman negatif potansyèl ni okenn konsekans sou sante piblik ki kapab aji sou popilasyon EJ yo. Enpak peryòd konstriksyon tanporè yo sou kalite lè a kapab lakòz yon enpak negatif sou anviwonnman ak sante piblik pou kominote lokal yo. Pou anpeche oswa redwi konsekans pousyè k ap chape ak emisyon ki soti nan veyikil konstriksyon yo, gen mwayen mitigasyon yo pral sèvi, tankou ekipman ki adapte pou dizèl ak mouye atè pandan travay konstriksyon yo. Pou anpeche, oswa modifye, oswa redwi enpak tanporè bwi travay konstriksyon yo, Pwojè a ap respekte Òdonnans pou Travay ak Bwi Vil Everett la. Yo pral pran dispozisyon pou redwi enpak bwi aktivite konstriksyon yo, tankou enstale moflè sou aparèy tankou konpresyon lè ak soudi, antretyen moflè ak aparèy aspirasyon, etenn aparèy ki p ap sèvi, ranplase aktivite ak teknik yo kapab avèk lòt ki fè mwens bwi, epi lòt mwayen ki kapab sèvi pou diminye bwi. Ògànizasyon ak plannifikasyon travay konstriksyon yo pral redwi enpak sou anviwonnman nan zòn lan, epi yo pral gen plan pou transpò travayè konstriksyon yo, ak plan pou wout veyikil ak livrezon yo, ak mwayen kontwòl kont bwi ak pousyè. Yo pral chwazi wout ki kontwole chimen veyikil konstriksyon yo pran pou antre ak soti nan kote Pwojè a ap fèt la, pou redwi trafik k ap patisipe nan konstriksyon an. Kontraktè a ap toujou sèvi avèk bon metòd administrasyon, tankou baryè kont pousyè, pou redwi move konsekans sou IER la. Pou pwoteje sekirite piblik la nan pak la ak ozalantou li, yo pral mete siyal ki montre kote moun ka pase an sekirite pou antre nan pak la, ak pou fè kominote a konnen ki aktivite konstriksyon k ap fèt.
7. Idantifye avantaj pwojè a, sa ki vle di tou "Avantaj pou Anviwonnman" yo, dapre definisyon nan 301 CMR 11.02, ki kapab amelyore kondisyon anviwonnman an oswa sante piblik la nan popilasyon EJ yo. Pwojè a sanse pote plizyè avantaj pou ekonnomi ak anviwonnman an. Nan pami avantaj Pwojè a ap pote, genyen amelyorasyon nan zòn piblik la, pi bon kondisyon sekirite pou pyeton yo, ak amelyorasyon ekolojik tankou pi bon kalite lè ak pwoteksyon kont inondasyon. Pwojè a pral pote plis avantaj ankò pou kominote a, tankou nouvo twotwa avèk pyebwa toupre lari, peyizaj natirèl pou moun gade, chimen pou bisiklèt ak ban pou chita, epi yon pak 1/5 mil arebò larivyè, pou moun antre sou kote larivyè a, ak plis espas louvri pou piblik la. Amennajman sa a pral pèmèt redwi espas kote moun pa kapab antre yo, ak chalè nan vil la nan zòn kote Pwojè a ap fèt la. Travay kont inondasyon yo pral pwoteje 500 kawo tè ki genyen katye anpil moun rete nan Chelsea ak Everett.
8. Esplike kouman kominote a kapab mande yon reyinyon pou pale sou pwojè a, ak kouman kominote a kapab mande sèvis entèprèt pandan reyinyon an. Presize kouman pou mande lòt aranjman, tankou rankont apre lè travay nan kote ki pre transpòt piblik yo. Si manm nan kominote a vle mande yon reyinyon, oswa enfòmasyon, oswa dokiman ki tradwi nan lòt lang, yo mèt kontakte Bianca Bowman nan nimewo 617-466-3076 x121 oubyen nan adrès biancab@greenroots.org. Yo mèt voye mande aranjman, oswa reyinyon apre lè travay nan kote ki gen transpò piblik, nan adrès Bianca Bowman. Pral gen enfòmasyon sou pwojè a nan lang Angle, Arab, Panyòl oswa Kreyòl ki baze sou Panyòl, Chinwa, Kreyòl ki baze sou Franse, Pòtigè, oswa Kreyòl Pòtigè sou sit entènèt pi ba la yo :

Pou Vil Chelsea : https://www.chelseama.gov/housing-and-community-development-department

Pou Vil Everett : https://cityofeverett.com/city-hall/departments/planning-development/conservation-commission/

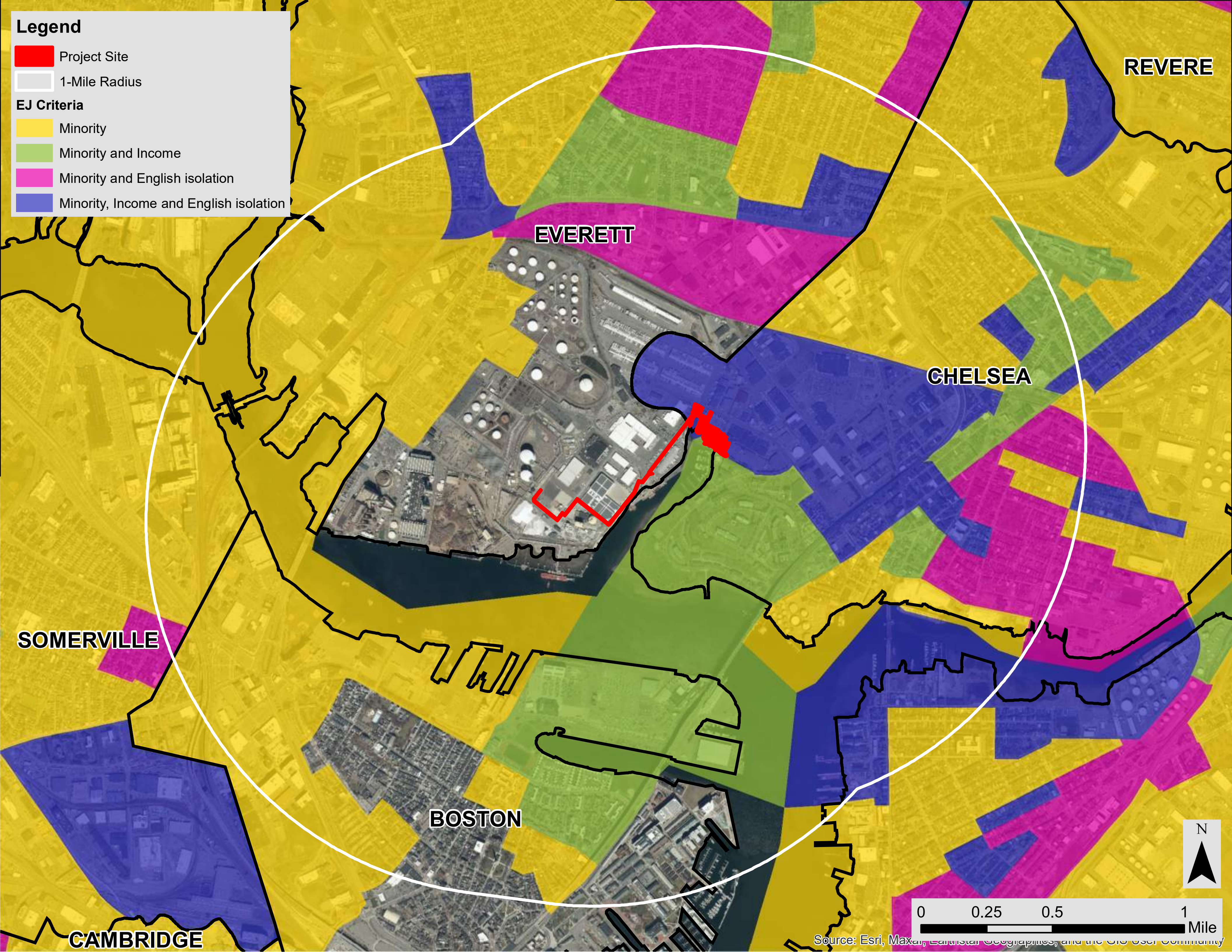
coUrbanize: https://www.islandendriver.com/home

EJ COMMUNITIES WITHIN 5 MILES OF THE PROJECT SITE



Legend
Project Site
5-Mile Radius
EJ Criteria
Minority
Income
Language isolation
Minority and Income
Minority and English isolation
Income and English isolation
Minority, Income and English isolation
WAKEFIELD
SWAMPSCOTT
STONEHAM
MELROSE
SAUGUS
LYNN
MALDEN
NAHANT
MEDFORD
ARLINGTON
REVERE
EVERETT
CHELSEA
BELMONT
WALTHAM
SOMERVILLE
CAMBRIDGE
WINTHROP
WATERTOWN
NEWTON
BOSTON
BROOKLINE
N
0
1
2
4
Miles

EJ COMMUNITIES WITHIN 1 MILE OF THE PROJECT SITE



Legend
Project Site
1-Mile Radius
EJ Criteria
Minority
Minority and Income
Minority and English isolation
Minority, Income and English isolation
REVERE
EVERETT
CHELSEA
SOMERVILLE
BOSTON
CAMBRIDGE
N
0
0.25
0.5
1
Mile

ATTACHMENT D: SUMMARY OF ENVIRONMENTAL JUSTICE CHARACTERISTICS

Block Group	EJ Criteria	% Minority Population	Median Household Income	% of MA Median Income	% Households with Language Isolation
Block Group 2, Census Tract 3424.02, Middlesex County, Massachusetts	Minority	61%	$93,850.00	111%	14%
Block Group 1, Census Tract 3514.03, Middlesex County, Massachusetts	Minority and English Isolation	48%	$66,964.00	79%	32%
Block Group 1, Census Tract 3426, Middlesex County, Massachusetts	Minority	74%	$80,603.00	96%	6%
Block Group 2, Census Tract 3426, Middlesex County, Massachusetts	Minority, income and English isolation	74%	$51,108.00	61%	33%
Block Group 3, Census Tract 3426, Middlesex County, Massachusetts	Minority	68%	$58,849.00	70%	13%
Block Group 1, Census Tract 3398.03, Middlesex County, Massachusetts	Minority	59%	$96,250.00	114%	10%
Block Group 1, Census Tract 3501.06, Middlesex County, Massachusetts	Minority	44%	$109,234.00	129%	9%
Block Group 1, Census Tract 3501.07,	Minority	51%	$107,315.00	127%	1%

Block Group	EJ Criteria	% Minority Population	Median Household Income	% of MA Median Income	% Households with Language Isolation
Middlesex County, Massachusetts					
Block Group 1, Census Tract 3421.01, Middlesex County, Massachusetts	Minority and income	70%	$49,299.00	58%	22%
Block Group 1, Census Tract 3424.01, Middlesex County, Massachusetts	Minority	65%	$71,250.00	84%	1%
Block Group 3, Census Tract 3424.01, Middlesex County, Massachusetts	Minority	70%	$89,387.00	106%	1%
Block Group 2, Census Tract 3425.01, Middlesex County, Massachusetts	Minority and income	69%	$55,182.00	65%	4%
Block Group 2, Census Tract 3424.01, Middlesex County, Massachusetts	Minority, income and English isolation	72%	$33,806.00	40%	31%
Block Group 1, Census Tract 3424.02, Middlesex County, Massachusetts	Minority	58%	$135,500.00	161%	2%
Block Group 3, Census Tract 3424.02, Middlesex County, Massachusetts	Minority and English isolation	58%	$65,852.00	78%	38%
Block Group 1, Census Tract 3425.01, Middlesex County, Massachusetts	Minority and English isolation	69%	$95,515.00	113%	28%

Block Group	EJ Criteria	% Minority Population	Median Household Income	% of MA Median Income	% Households with Language Isolation
Block Group 1, Census Tract 3425.02, Middlesex County, Massachusetts	Minority and English isolation	65%	$94,500.00	112%	28%
Block Group 2, Census Tract 3421.01, Middlesex County, Massachusetts	Minority	62%	$135,781.00	161%	2%
Block Group 4, Census Tract 3421.01, Middlesex County, Massachusetts	Minority and English isolation	61%	$99,181.00	118%	25%
Block Group 3, Census Tract 1605.01, Suffolk County, Massachusetts	Minority	91%	$101,875.00	121%	16%
Block Group 4, Census Tract 1605.01, Suffolk County, Massachusetts	Minority, income and English isolation	81%	$11,630.00	14%	55%
Block Group 5, Census Tract 1605.01, Suffolk County, Massachusetts	Minority and income	87%	$49,464.00	59%	0%
Block Group 1, Census Tract 1605.02, Suffolk County, Massachusetts	Minority, income and English isolation	87%	$28,333.00	34%	31%
Block Group 5, Census Tract 1605.02, Suffolk County, Massachusetts	Minority	78%	$67,818.00	80%	24%
Block Group 4, Census Tract	Minority	75%	$111,932.00	133%	19%

Block Group	EJ Criteria	% Minority Population	Median Household Income	% of MA Median Income	% Households with Language Isolation
1606.01, Suffolk County, Massachusetts					
Block Group 2, Census Tract 1603, Suffolk County, Massachusetts	Minority and income	43%	$51,429.00	61%	18%
Block Group 1, Census Tract 1604, Suffolk County, Massachusetts	Minority, income and English isolation	88%	$47,330.00	56%	37%
Block Group 2, Census Tract 1604, Suffolk County, Massachusetts	Minority, income and English isolation	90%	$35,069.00	42%	53%
Block Group 1, Census Tract 1606.01, Suffolk County, Massachusetts	Minority and income	26%	$53,200.00	63%	0%
Block Group 1, Census Tract 1606.02, Suffolk County, Massachusetts	Minority	79%	$62,708.00	74%	21%
Block Group 1, Census Tract 1601.02, Suffolk County, Massachusetts	Minority and English isolation	80%	$59,201.00	70%	26%
Block Group 2, Census Tract 1601.02, Suffolk County, Massachusetts	Minority and English isolation	96%	$63,469.00	75%	39%
Block Group 3, Census Tract 1601.02, Suffolk County, Massachusetts	Minority	90%	$81,313.00	96%	7%
Block Group 4, Census Tract	Minority, income and	89%	$25,451.00	30%	34%

Block Group	EJ Criteria	% Minority Population	Median Household Income	% of MA Median Income	% Households with Language Isolation
1601.02, Suffolk County, Massachusetts	English isolation				
Block Group 1, Census Tract 1601.03, Suffolk County, Massachusetts	Minority and English isolation	92%	$-	0%	40%
Block Group 2, Census Tract 1601.03, Suffolk County, Massachusetts	Minority and English isolation	93%	$69,713.00	83%	68%
Block Group 3, Census Tract 1601.03, Suffolk County, Massachusetts	Minority	76%	$65,865.00	78%	14%
Block Group 4, Census Tract 1601.03, Suffolk County, Massachusetts	Minority and English isolation	75%	$198,000.00	235%	32%
Block Group 1, Census Tract 1602, Suffolk County, Massachusetts	Minority and English isolation	93%	$61,679.00	73%	46%
Block Group 2, Census Tract 1602, Suffolk County, Massachusetts	Minority, income and English isolation	94%	$40,450.00	48%	59%
Block Group 3, Census Tract 1602, Suffolk County, Massachusetts	Minority and English isolation	91%	$58,688.00	70%	49%
Block Group 4, Census Tract 1602, Suffolk County, Massachusetts	Minority and income	83%	$51,827.00	61%	22%
Block Group 1, Census Tract 1603,	Minority	49%	$78,427.00	93%	21%

Block Group	EJ Criteria	% Minority Population	Median Household Income	% of MA Median Income	% Households with Language Isolation
Suffolk County, Massachusetts					
Block Group 3, Census Tract 1604, Suffolk County, Massachusetts	Minority	45%	$105,880.00	125%	6%
Block Group 4, Census Tract 1604, Suffolk County, Massachusetts	Minority and income	90%	$25,125.00	30%	22%
Block Group 1, Census Tract 1605.01, Suffolk County, Massachusetts	Minority	90%	$75,156.00	89%	14%
Block Group 2, Census Tract 1605.01, Suffolk County, Massachusetts	Minority and income	86%	$47,188.00	56%	8%
Block Group 1, Census Tract 406, Suffolk County, Massachusetts	Minority	28%	$127,344.00	151%	0%
Block Group 2, Census Tract 501.01, Suffolk County, Massachusetts	Minority, income and English isolation	76%	$22,910.00	27%	38%
Block Group 1, Census Tract 408.01, Suffolk County, Massachusetts	Minority and income	87%	$12,116.00	14%	24%
Block Group 1, Census Tract 501.01, Suffolk County, Massachusetts	Minority	77%	$82,583.00	98%	24%
Block Group 3, Census Tract 501.01, Suffolk	Minority	72%	$71,053.00	84%	23%

Block Group	EJ Criteria	% Minority Population	Median Household Income	% of MA Median Income	% Households with Language Isolation
County, Massachusetts					
Block Group 2, Census Tract 408.01, Suffolk County, Massachusetts	Minority and income	83%	$31,151.00	37%	8%
Block Group 1, Census Tract 503, Suffolk County, Massachusetts	Minority	55%	$66,250.00	79%	10%
Block Group 3, Census Tract 509.01, Suffolk County, Massachusetts	Minority, income and English isolation	74%	$37,333.00	44%	43%
Block Group 1, Census Tract 402, Suffolk County, Massachusetts	Minority and income	81%	$16,250.00	19%	12%
Block Group 2, Census Tract 402, Suffolk County, Massachusetts	Minority	25%	$179,266.00	212%	3%
Block Group 1, Census Tract 403, Suffolk County, Massachusetts	Minority	72%	$-	0%	4%
Block Group 1, Census Tract 404.01, Suffolk County, Massachusetts	Minority	29%	$86,734.00	103%	7%

Attachment E

DPA SITE PLANS & STAKEHOLDER COORDINATION TABLE

KEY MAP
SCALE: 1"=500'

LEGEND

- PROPERTY LINE
- MYSTIC RIVER DESIGNATED PORT AREA
- PROPOSED FLOOD BARRIER

PRIOR CHAPTER 91 AUTHORIZATIONS

AUTHORIZATION	DATE
1908	OCTOBER 28, 1937
2990	MAY 7, 1992
3037	JUNE 26, 1992

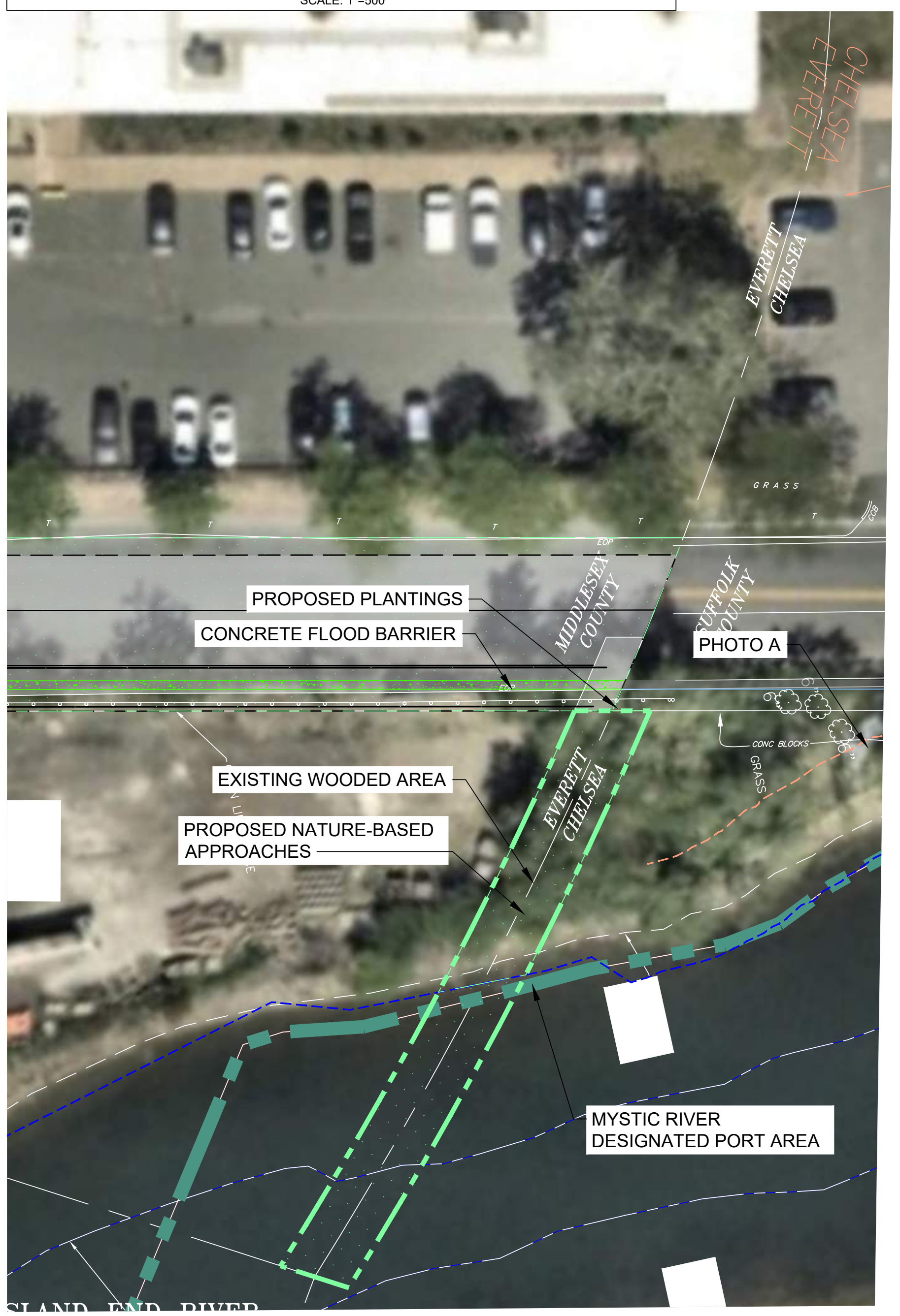
NOTES:

1. EXISTING CONDITIONS SHOWN ARE PROVIDED FROM PLANS TITLED "EXISTING CONDITIONS" PREPARED BY BEALS AND THOMAS, INC, DATED JUNE 28, 2023.
2. HORIZONTAL DATA SHOWN HEREON REFER TO NORTH AMERICAN DATUM OF 1983 (NAD83).
3. CHAPTER 91 JURISDICTIONAL LINE IS DETERMINED BY THE HISTORIC HIGH WATER LINE (SOURCE: MASSGIS).
4. 147 MARKET STREET IS OWNED BY THE COMMONWEALTH OF MASSACHUSETTS. THE PROPERTY IS CURRENTLY VACANT OF APPARENT LAND USE.
5. 145 MARKET STREET, 359 BEACHAM STREET, AND 100 COMMANDANTS WAY ARE OWNED IN COMMON OWNERSHIP BY DEVELOPMENT & MARKET GROUP LLC. THE PROPERTY IS CURRENTLY VACANT OF APPARENT LAND USE.
6. THE 147 MARKET STREET PROPERTY IS LOCATED WITHIN THE DESIGNATED PORT AREA. A PORTION OF THE 145 MARKET STREET PROPERTY IS WITHIN THE DESIGNATED PORT AREA.
7. BOTH 145 & 147 MARKET STREET PROPERTIES ARE LOCATED ENTIRELY BELOW THE HISTORIC HIGH TIDE LINE.
8. 145 AND 147 MARKET STREET ARE NOT CURRENTLY ACCESSED DIRECTLY BY VEHICULAR TRAFFIC.

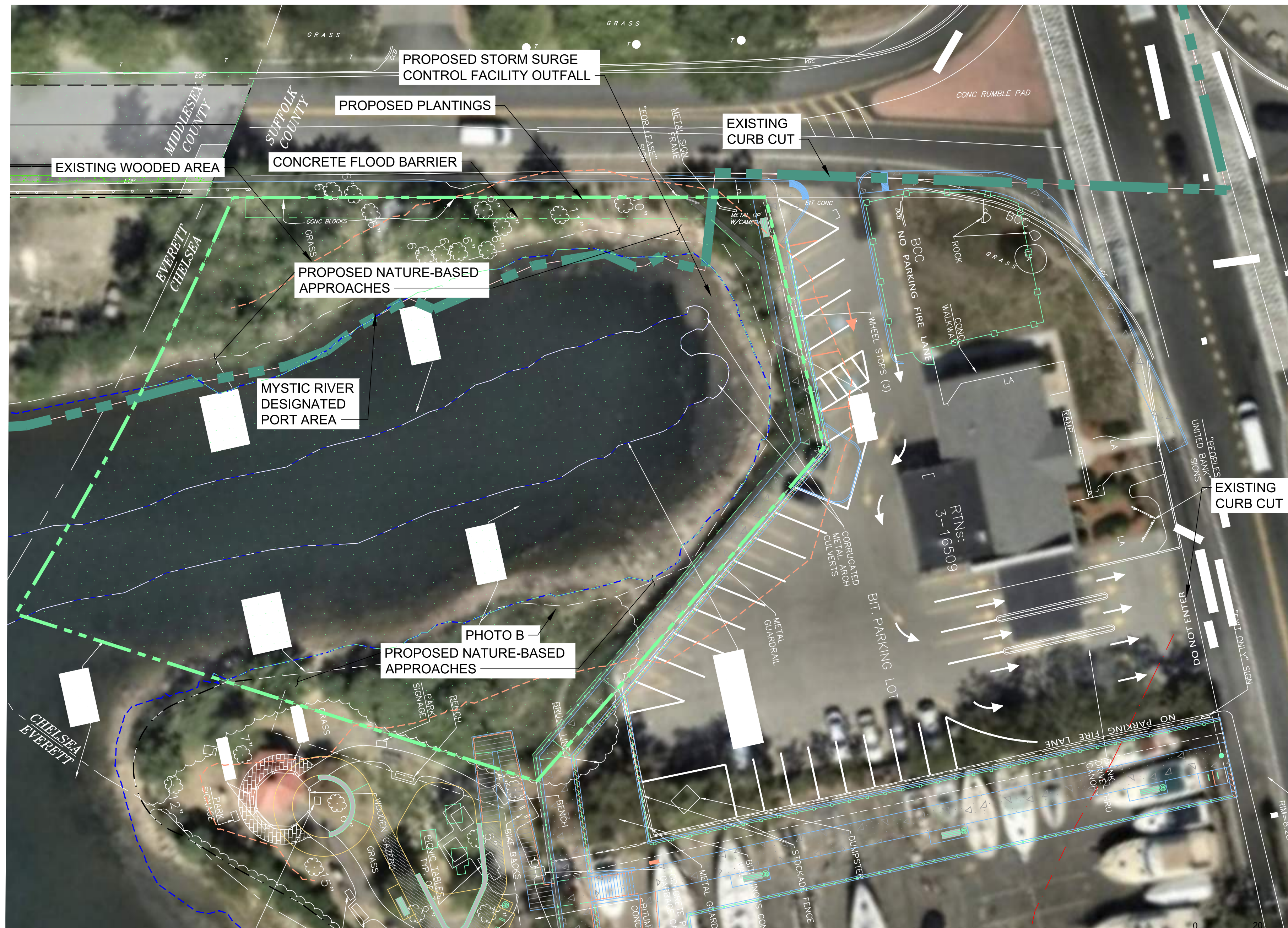
EXISTING CONDITIONS

PHOTO A

PHOTO B



147 MARKET STREET



145 MARKET STREET

SCALE: 1"=20'

TETRA TECH
www.tetratech.com
31 State Street, 3rd Floor
Boston, MA 02109
PHONE: (617) 357-7044

MARK	DATE	DESCRIPTION	BY

Client: Cities of Chelsea & Everett
Proj. Loc.: Chelsea & Everett, Massachusetts

ISLAND END RIVER FLOOD RESILIENCE PROJECT

DESIGNATED PORT AREA SITE PLAN
145 & 147 MARKET STREET

Project No.:	143-12588-23001
Designed By:	BC
Drawn By:	BC
Checked By:	KM

DPA-1

Sheet ## of ###

Bar Measures 1 inch

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KEY MAP
SCALE: 1"=500'

EXISTING CONDITIONS

PHOTO A

PHOTO B

PHOTO C

LEGEND

PROPERTY LINE
HISTORIC HIGH TIDE LINE
APPROX. PARKING AREA
PROPOSED FLOOD BARRIER
PROPOSED FLOOD GATE (AS NOTED)

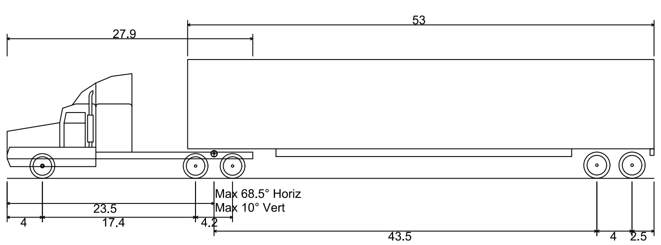
PRIOR CHAPTER 91 AUTHORIZATIONS

AUTHORIZATION	DATE
2083	DECEMBER 10, 1897
2250	JANUARY 19, 1899
434	MAY 29, 1924
11280	MARCH 10, 2006

NOTES:

1. EXISTING CONDITIONS SHOWN ARE PROVIDED FROM PLANS TITLED "EXISTING CONDITIONS" PREPARED BY BEALS AND THOMAS, INC, DATED JUNE 28, 2023.
2. HORIZONTAL DATA SHOWN HEREON REFER TO NORTH AMERICAN DATUM OF 1983 (NAD83).
3. CHAPTER 91 JURISDICTIONAL LINE IS DETERMINED BY THE HISTORIC HIGH WATER LINE (SOURCE: MASSGIS).
4. 95 BEHEN STREET IS OWNED BY SPS NEW ENGLAND, A MARINE CONSTRUCTION STORAGE AND BERTHING FACILITY.
5. THE PROPERTY IN ITS ENTIRETY IS LOCATED WITHIN THE DESIGNATED PORT AREA.
6. VEHICULAR ACCESS TO 95 BEHEN STREET IS PROVIDED FROM BEHEN AND MARKET STREETS.

0 30 60
SCALE: 1"=30'



WB-67 - Interstate Semi-Trailer

Overall Length	73.501ft
Overall Width	8.500ft
Overall Body Height	13.500ft
Min Body Ground Clearance	1.334ft
Max Track Width	8.500ft
Lock-to-lock time	6.00s
Max Steering Angle (Virtual)	28.40°

WB-67 SECTION VIEW DETAIL

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Boston, MA 02109
PHONE (617) 357-7044

MARK	DATE	DESCRIPTION	BY

Client: Cities of Chelsea & Everett
Proj. Loc.: Chelsea & Everett, Massachusetts
ISLAND END RIVER FLOOD RESILIENCE PROJECT

DESIGNATED PORT AREA SITE PLAN
95 BEHEN STREET

Project No.:	143-12588-23001
Designed By:	BC
Drawn By:	BC
Checked By:	KM

DPA-2

Sheet ## of ###

Bar Measures 1 inch

KEY MAP
SCALE: 1"=500'

LEGEND

- PROPERTY LINE
- HISTORIC HIGH TIDE LINE
- APPROX. PARKING AREA
- PROPOSED FLOOD BARRIER
- PROPOSED FLOOD GATE (AS NOTED)

PRIOR CHAPTER 91 AUTHORIZATIONS

AUTHORIZATION	DATE
2083	DECEMBER 10, 1897
2250	JANUARY 19, 1899
434	MAY 29, 1924
11280	MARCH 10, 2006

NOTES:

1. EXISTING CONDITIONS SHOWN ARE PROVIDED FROM PLANS TITLED "EXISTING CONDITIONS" PREPARED BY BEALS AND THOMAS, INC, DATED JUNE 28, 2023.
2. HORIZONTAL DATA SHOWN HEREON REFER TO NORTH AMERICAN DATUM OF 1983 (NAD83).
3. CHAPTER 91 JURISDICTIONAL LINE IS DETERMINED BY THE HISTORIC HIGH WATER LINE (SOURCE: MASSGIS)
4. 87 BEHEN STREET, 8 COMMERCIAL STREET, AND 26 COMMERCIAL STREET ARE OWNED IN COMMON OWNERSHIP BY PAUL W. MARKS COMPANY. PW MARKS CO. INC. IS A FAMILY-OWNED DAIRY DISTRIBUTION FACILITY.
5. THE PROPERTY IN ITS ENTIRETY IS LOCATED WITHIN THE DESIGNATED PORT AREA
6. VEHICULAR ACCESS TO 87 BEHEN STREET IS PROVIDED THROUGH ADJACENT PARCELS AT 8 COMMERCIAL STREET AND RAILROAD RIGHT-OF-WAY.

EXISTING CONDITIONS

PHOTO A

PHOTO B

WB-67 - Interstate Semi-Trailer	
Overall Length	73.501ft
Overall Width	8.500ft
Overall Body Height	13.500ft
Min Body Ground Clearance	1.334ft
Max Track Width	8.500ft
Lock-to-lock time	6.00s
Max Steering Angle (Virtual)	28.40°

WB-67 SECTION VIEW DETAIL

0 30 60
SCALE: 1"=30'

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Boston, MA 02109
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MARK	DATE	DESCRIPTION	BY

Client: Cities of Chelsea & Everett
Proj. Loc.: Chelsea & Everett, Massachusetts
ISLAND END RIVER FLOOD RESILIENCE PROJECT

DESIGNATED PORT AREA SITE PLAN
87 BEHEN STREET

Project No.:	143-12588-23001
Designed By:	BC
Drawn By:	BC
Checked By:	KM

DPA-3

Sheet ## of ###

Bar Measures 1 inch

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KEY MAP
SCALE: 1"=500'

LEGEND

PROPERTY LINE
HISTORIC HIGH TIDE LINE
PROPOSED FLOOD BARRIER
PROPOSED FLOOD GATE (AS NOTED)

PRIOR CHAPTER 91 AUTHORIZATIONS

AUTHORIZATION	DATE
12100	APRIL 1, 2008

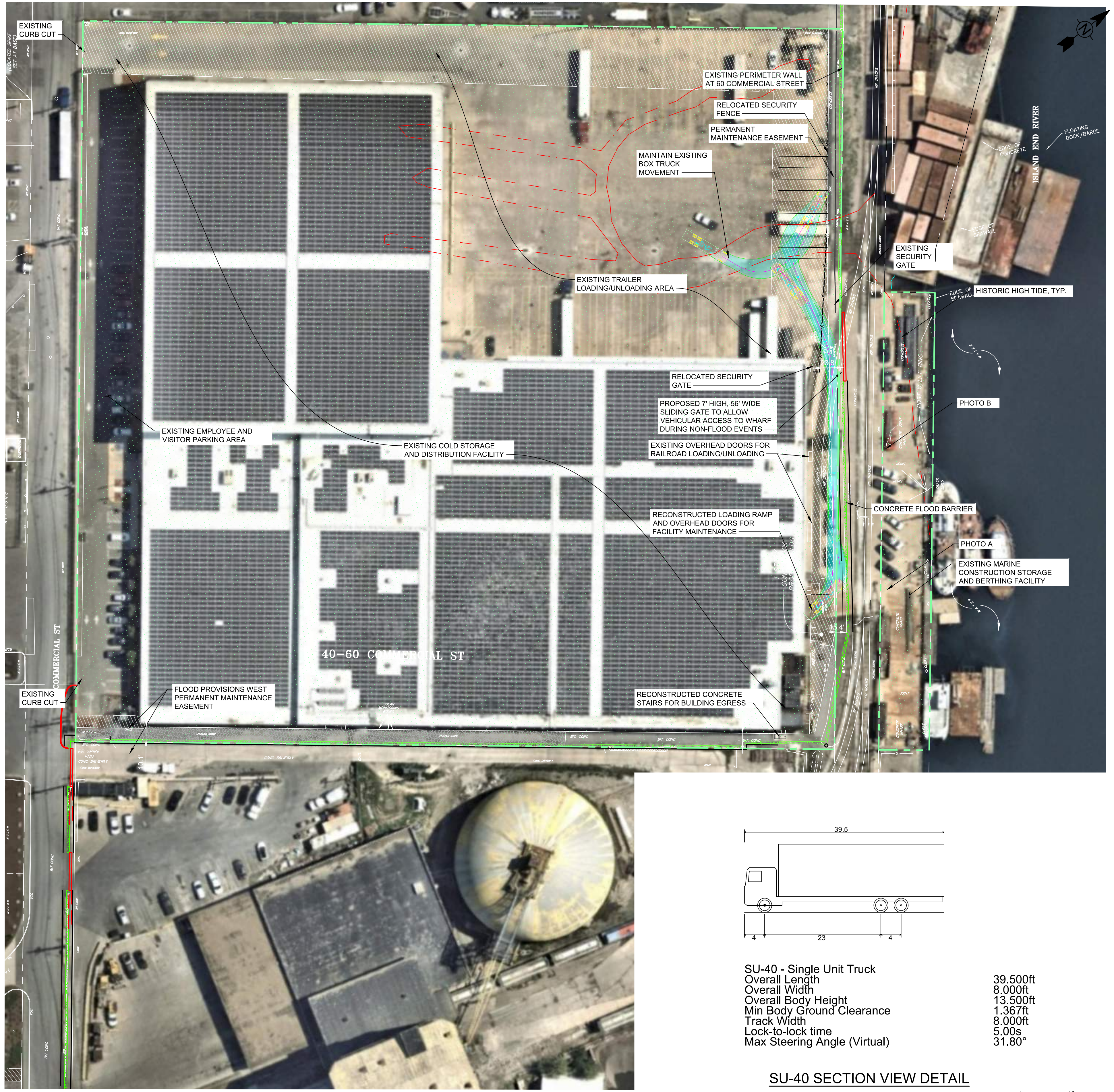
NOTES:

1. EXISTING CONDITIONS SHOWN ARE PROVIDED FROM PLANS TITLED "EXISTING CONDITIONS" PREPARED BY BEALS AND THOMAS, INC, DATED JUNE 28, 2023.
2. HORIZONTAL DATA SHOWN HEREON REFER TO NORTH AMERICAN DATUM OF 1983 (NAD83).
3. CHAPTER 91 JURISDICTIONAL LINE IS DETERMINED BY THE HISTORIC HIGH WATER LINE (SOURCE: MASSGIS)
4. 40-60 COMMERCIAL STREET IS OWNED BY EVERY BEAR INVESTMENTS, LLC, WITH A TENANT OF SMITH MARINE. LINEAGE LOGISTICS OPERATES THE MAJORITY OF THE SITE AS A COLD STORAGE AND DISTRIBUTION FACILITY AND SMITH MARINE OPERATES A MARINE CONSTRUCTION COMPANY ALONG THE PROPERTY'S WHARF.
5. THE PROPERTY IN ITS ENTIRETY IS LOCATED WITHIN THE DESIGNATED PORT AREA.
6. VEHICULAR ACCESS TO 40-60 COMMERCIAL STREET IS PROVIDED FROM COMMERCIAL STREET.

EXISTING CONDITIONS

PHOTO A

PHOTO B



SU-40 - Single Unit Truck	
Overall Length	39.500ft
Overall Width	8.000ft
Overall Body Height	13.500ft
Min Body Ground Clearance	1.367ft
Track Width	8.000ft
Lock-to-lock time	5.00s
Max Steering Angle (Virtual)	31.80°

SU-40 SECTION VIEW DETAIL

0 40 80
SCALE: 1"=40'

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PHONE: (617) 357-7044

MARK	DATE	DESCRIPTION	BY

Client: Cities of Chelsea & Everett
Proj. Loc.: Chelsea & Everett, Massachusetts
ISLAND END RIVER FLOOD RESILIENCE PROJECT

DESIGNATED PORT AREA SITE PLAN
40-60 COMMERCIAL STREET

Project No.:	143-12588-23001
Designed By:	BC
Drawn By:	BC
Checked By:	KM

DPA-4
Sheet ## of ###

Bar Measures 1 inch

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KEY MAP
SCALE: 1"=500'

LEGEND

- PROPERTY LINE
- HISTORIC HIGH TIDE LINE
- PROPOSED FLOOD BARRIER
- PROPOSED FLOOD GATE (AS NOTED)

PRIOR CHAPTER 91 AUTHORIZATIONS

AUTHORIZATION	DATE
12100	APRIL 1, 2008

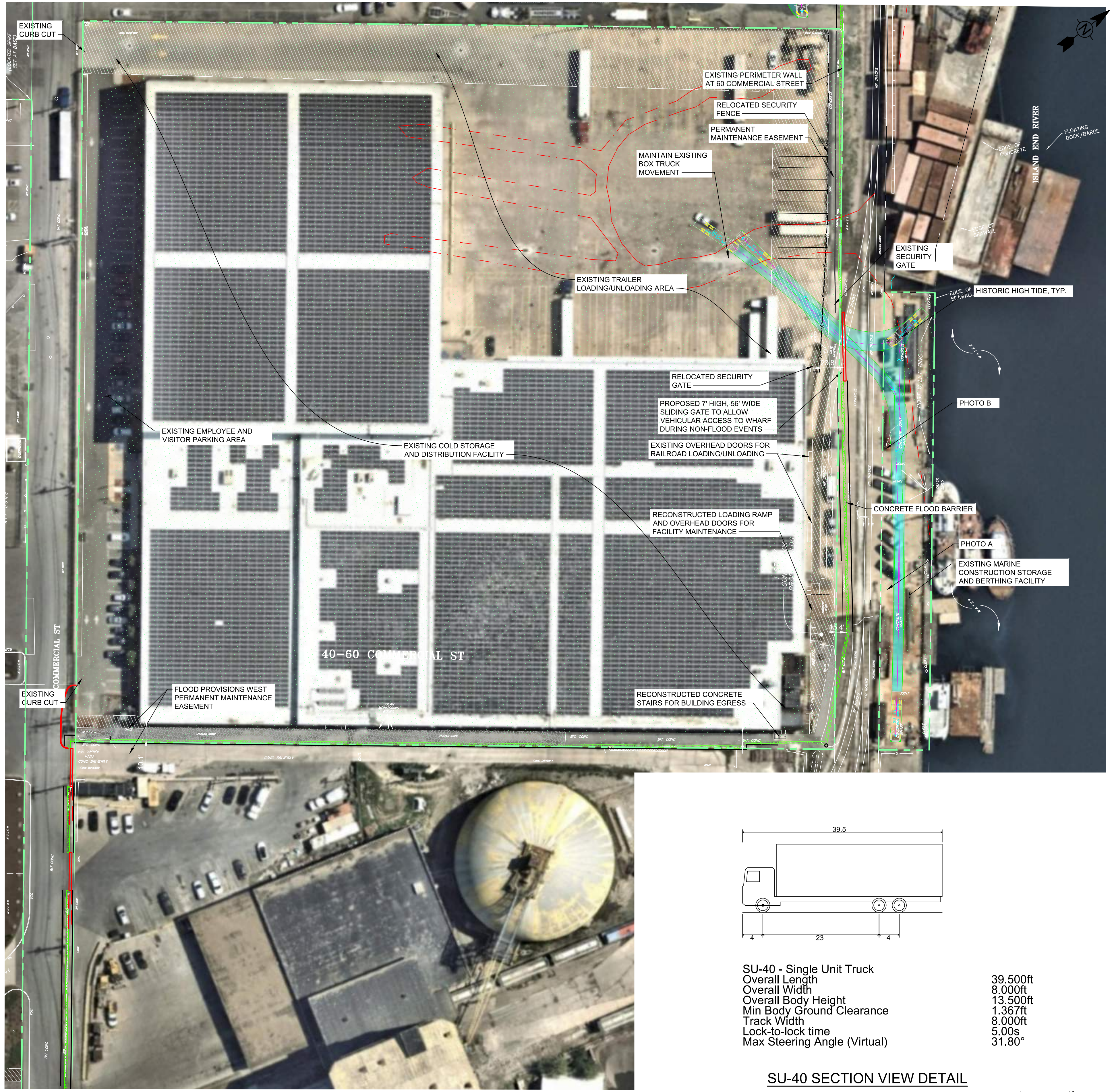
NOTES:

1. EXISTING CONDITIONS SHOWN ARE PROVIDED FROM PLANS TITLED "EXISTING CONDITIONS" PREPARED BY BEALS AND THOMAS, INC, DATED JUNE 28, 2023.
2. HORIZONTAL DATA SHOWN HEREON REFER TO NORTH AMERICAN DATUM OF 1983 (NAD83).
3. CHAPTER 91 JURISDICTIONAL LINE IS DETERMINED BY THE HISTORIC HIGH WATER LINE (SOURCE: MASSGIS).
4. 40-60 COMMERCIAL STREET IS OWNED BY EVERY BEAR INVESTMENTS, LLC, WITH A TENANT OF SMITH MARINE. LINEAGE LOGISTICS OPERATES THE MAJORITY OF THE SITE AS A COLD STORAGE AND DISTRIBUTION FACILITY AND SMITH MARINE OPERATES A MARINE CONSTRUCTION COMPANY ALONG THE PROPERTY'S WHARF.
5. THE PROPERTY IN ITS ENTIRETY IS LOCATED WITHIN THE DESIGNATED PORT AREA.
6. VEHICULAR ACCESS TO 40-60 COMMERCIAL STREET IS PROVIDED FROM COMMERCIAL STREET.

EXISTING CONDITIONS

PHOTO A

PHOTO B



SU-40 - Single Unit Truck

Overall Length	39.500ft
Overall Width	8.000ft
Overall Body Height	13.500ft
Min Body Ground Clearance	1.367ft
Track Width	8.000ft
Lock-to-lock time	5.00s
Max Steering Angle (Virtual)	31.80°

SU-40 SECTION VIEW DETAIL

0 40 80
SCALE: 1"=40'

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MARK	DATE	DESCRIPTION	BY

Client: Cities of Chelsea & Everett
Proj. Loc.: Chelsea & Everett, Massachusetts

ISLAND END RIVER FLOOD RESILIENCE PROJECT

DESIGNATED PORT AREA SITE PLAN 40-60 COMMERCIAL STREET (TENANT)

Project No.:	143-12588-23001
Designed By:	BC
Drawn By:	BC
Checked By:	KM

DPA-5

Sheet ## of ###

Bar Measures 1 inch

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KEY MAP
SCALE: 1"=500'

LEGEND

- PROPERTY LINE
- HISTORIC HIGH TIDE LINE
- PROPOSED FLOOD BARRIER
- PROPOSED FLOOD GATE (AS NOTED)

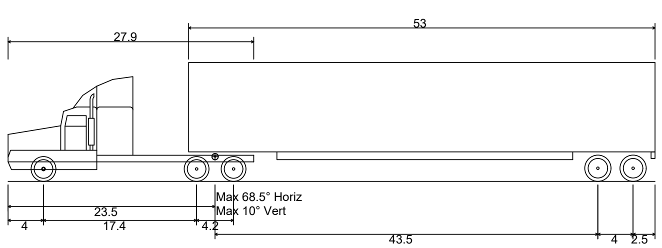
NOTES:

1. EXISTING CONDITIONS SHOWN ARE PROVIDED FROM PLANS TITLED "EXISTING CONDITIONS" PREPARED BY BEALS AND THOMAS, INC, DATED JUNE 28, 2023.
2. HORIZONTAL DATA SHOWN HEREON REFER TO NORTH AMERICAN DATUM OF 1983 (NAD83).
3. CHAPTER 91 JURISDICTIONAL LINE IS DETERMINED BY THE HISTORIC HIGH WATER LINE.
4. 61 COMMERCIAL STREET, 101 COMMERCIAL STREET, AND 18 ROVER STREET ARE OWNED IN COMMON OWNERSHIP BY CONSTELLATION ENERGY. THE FACILITY OPERATED BY CONSTELLATION ENERGY IS A LIQUIFIED NATURAL GAS DISTRIBUTION FACILITY AND THE 101 COMMERCIAL STREET PROPERTY CONTAINS A VISITOR CENTER AND PARKING AREAS.
5. THE PROPERTY IS LOCATED ENTIRELY WITHIN THE DESIGNATED PORT AREA.
6. VEHICULAR ACCESS TO 40-60 COMMERCIAL STREET IS PROVIDED FROM COMMERCIAL STREET.

EXISTING CONDITIONS

PHOTO A

PHOTO B



WB-67 - Interstate Semi-Trailer	
Overall Length	73.501ft
Overall Width	8.500ft
Overall Body Height	13.500ft
Min Body Ground Clearance	1.334ft
Max Track Width	8.500ft
Lock-to-lock time	6.00s
Max Steering Angle (Virtual)	28.40°

WB-67 SECTION VIEW DETAIL

0 30 60
SCALE: 1"=30'

Bar Measures 1 inch

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MARK	DATE	DESCRIPTION	BY

Client: Cities of Chelsea & Everett
Proj. Loc.: Chelsea & Everett, Massachusetts

ISLAND END RIVER FLOOD RESILIENCE PROJECT

DESIGNATED PORT AREA SITE PLAN
18 ROVER STREET

Project No.:	143-12588-23001
Designed By:	BC
Drawn By:	BC
Checked By:	KM

DPA-6

Sheet ## of ###

STAKEHOLDER COORDINATION SUMMARY TABLE

Date	Description	Property	Organization(s) Represented
September 9, 2020	HMP Kickoff Meeting - SWG	N/A	Tetra Tech
		N/A	Everett Community Growers
		N/A	Eversource
		292 Second Street	Middlesex Gases
		N/A	National Grid
		N/A	Mystic River Watershed Association (MyRWA)
		N/A	Resilient Mystic Collaborative
		69 Rover Street	Schnitzer Steel
		1 Broadway	Wynn Design & Development, Encore Boston Harbor
December 10, 2020	HMP Workshop #1 – LPC & SWG	N/A	Tetra Tech
		N/A	Everett Community Growers
		N/A	Eversource
		292 2nd Street	Middlesex Gases
		N/A	National Grid
		N/A	Mystic River Watershed Association (MyRWA)
		N/A	Resilient Mystic Collaborative
		69 Rover Street	Schnitzer Steel
		1 Broadway	Wynn Design & Development, Encore Boston Harbor
July 8, 2021	HMP Workshop #2 – Everett Community Growers	N/A	Tetra Tech
		N/A	Everett Community Growers
July 13, 2021	HMP Mitigation Working Session - SWG/LPC	N/A	Tetra Tech
		N/A	Everett Community Growers
		N/A	Eversource
		292 2nd Street	Middlesex Gases
		N/A	National Grid
		N/A	Mystic River Watershed Association (MyRWA)
		N/A	Resilient Mystic Collaborative

Date	Description	Property	Organization(s) Represented
		69 Rover Street	Schnitzer Steel
		1 Broadway	Wynn Design & Development, Encore Boston Harbor
July 15, 2021	HMP Public Meeting – Everett Conservation Commission	N/A	Tetra Tech
		N/A	City of Everett
September 8, 2021	SWG Meeting #1 – Kickoff Meeting (Virtual)	N/A	Tetra Tech
		N/A	City of Everett
		Various	Chamber of Commerce
		201 Rover Street	Eastern Salt
		95 Behen Street	SPS New England
		N/A	National Grid
		87 Behen Street	PW Marks
October 7, 2021	SWG Meeting #2 – Site Walk	N/A	Tetra Tech
		N/A	City of Everett
		N/A	EEA
		1 Broadway	Wynn Design & Development, Encore Boston Harbor
		69 Rover Street	Schnitzer Steel
		95 Behen Street	SPS New England
		N/A	National Grid
		87 Behen Street	PW Marks
		40-60 Commercial Street	Lineage Logistics
October 20, 2021	Stakeholder (Quebec Ciment) Meeting	N/A	Tetra Tech
		100 Commercial Street	Quebec Ciment
October 21, 2021	SWG Meeting (Coastal)	N/A	Tetra Tech
		N/A	City of Everett
		1 Broadway	Wynn Development
		69 Rover Street	Schnitzer
October 21, 2021	SWG Meeting (Inland)	N/A	Tetra Tech
		34 Market Street	Davis Companies
		N/A	National Grid
		69 Rover Street	Schnitzer
		40-60 Commercial Street	Lineage Logistics
November 18, 2021	SWG Meeting #3 (Virtual)	N/A	Tetra Tech
		N/A	City of Everett
		Various	Chamber of Commerce
		N/A	National Grid
		69 Rover Street	Schnitzer

Date	Description	Property	Organization(s) Represented
		100 Commercial Street	Quebec Ciment
		201 Rover Street	Eastern Salt
		8 & 26 Commercial Street, 87 Behen Street	PW Marks
		40-60 Commercial Street	Lineage Logistics
		307 Beacham Street, 138 Market Street	USPS
		201 Beacham Street	Sheehan Company/Craft New England
November 30, 2021	Stakeholder (Paul W Marks) Meeting	N/A	Tetra Tech
		8 & 26 Commercial Street, 87 Behen Street	PW Marks
November 30, 2021	Stakeholder (Lineage Logistics) Meeting	N/A	Tetra Tech
		40-60 Commercial Street	Lineage Logistics
January 6, 2022	Stakeholder (Lineage Logistics) Meeting	N/A	Tetra Tech
		40-60 Commercial Street	Lineage Logistics
January 20, 2022	SWG Meeting #4 (Virtual)	N/A	Tetra Tech
		N/A	City of Everett
		18 Rover Street	Constellation Energy
		40-60 Commercial Street	Lineage Logistics
		8 & 26 Commercial Street, 87 Behen Street	PW Marks
		N/A	National Grid
		201 Beacham Street	Sheehan Company/Craft New England
January 28, 2022	Stakeholder (Constellation Energy) Meeting	N/A	Tetra Tech
		18 Rover Street	Constellation Energy
January 31, 2022	Stakeholder (National Grid) Meeting	N/A	Tetra Tech
		N/A	National Grid
February 3, 2022	Stakeholder (Lineage Logistics) Meeting	N/A	Tetra Tech
		40-60 Commercial Street	Lineage Logistics
February 9, 2022	Stakeholder (Lineage Logistics) Meeting	N/A	Tetra Tech
		40-60 Commercial Street	Lineage Logistics
March 24, 2022	Stakeholder (155 Market Street) Meeting	N/A	Tetra Tech
		155 Market Street	155 Market Street Trustee
		155 Market Street	Lyne, Woodworth & Evarts, LLP

Date	Description	Property	Organization(s) Represented
March 25, 2022	Stakeholder (Constellation Energy) Meeting	N/A	Tetra Tech
		18 Rover Street	Constellation Energy
		N/A	Beals + Thomas
April 1, 2022	Stakeholder (SPS New England) Meeting	N/A	Tetra Tech
		95 Behen Street	SPS New England
April 12, 2022	Stakeholder (National Grid) Meeting	N/A	Tetra Tech
		N/A	City of Everett
		N/A	National Grid
April 14, 2022	SWG Meeting #5 – Site Walk	N/A	Tetra Tech
		N/A	City of Everett
		N/A	Weston & Sampson
		12 Justin Drive	City of Chelsea
		8 & 26 Commercial Street, 87 Behen Street	PW Marks
		40-60 Commercial Street	Lineage Logistics
		N/A	National Grid
		FCTPF	de maximis, inc.
		155 Market Street	155 Market Street Trustee
		155 Market Street	Lyne, Woodworth & Evarts, LLP
		201 Beacham Street	Sheehan Company/Craft New England
		34 Market Street	Davis Companies
		95 Behen Street	SPS New England
April 14, 2022	Stakeholder (SPS New England) Meeting	N/A	Tetra Tech
		95 Behen Street	SPS New England
		FCTPF	de maximis, inc.
		N/A	National Grid
May 19, 2022	Stakeholder (Constellation Energy) Meeting	N/A	Tetra Tech
		18 Rover Street	Constellation Energy
June 2, 2022	Stakeholder (KHB Venture LLC) Meeting	N/A	Tetra Tech
		N/A	National Grid
		FCTPF	Honeywell
		FCTPF	Anderson Krieger LLP
		FCTPF	Beazer East
		FCTPF	de maximis, inc.
June 14, 2022	Stakeholder (Lineage Logistics) Meeting	N/A	Tetra Tech
		40-60 Commercial Street	Lineage Logistics
June 20, 2022	Stakeholder (SPS New England) Meeting	N/A	Tetra Tech
		95 Behen Street	SPS New England

Date	Description	Property	Organization(s) Represented
June 21, 2022	SWG Meeting #6 (Virtual)	N/A	Tetra Tech
		40-60 Commercial Street	Lineage Logistics
		1 Broadway	Wynn Development
		8 & 26 Commercial Street, 87 Behen Street	PW Marks
		N/A	National Grid
		95 Behen Street	SPS New England
		69 Rover Street	Schnitzer
		155 Market Street	155 Market Street Trustee
		155 Market Street	Lyne, Woodworth & Evarts, LLP
		FCTPF	de maximis, inc.
		FCTPF	Anderson Krieger LLP
		18 Rover Street	Constellation Energy
February 9, 2023	SWG Meeting #7 (Virtual)	N/A	Tetra Tech
		N/A	Lineage Logistics
		8 & 26 Commercial Street, 87 Behen Street	P.W. Marks
		N/A	National Grid
		155 Market Street	155 Market Street Trustee
		155 Market Street	Lyne, Woodworth & Evarts, LLP
		FCTPF	Beazer East, Inc.
		FCTPF	Anderson Krieger LLP
		18 Rover Street	Constellation Energy
		201 Beacham Street	Sheehan Company/Craft New England
March 9, 2023	SWG Meeting #8 – Field Work Site Walk	N/A	Tetra Tech
		N/A	City of Everett
		N/A	Beals + Thomas
		N/A	Northeast Geotechnical
		N/A	DrilEx Environmental
		95 Behen Street	SPS New England
		18 Rover Street	Constellation Energy
		N/A	National Grid
		FCTPF	de maximis, inc.
March 10, 2023	Stakeholder (SPS New England) Field Work Meeting	N/A	Tetra Tech
		N/A	KP Law
		N/A	City of Everett
		95 Behen Street	SPS New England

Date	Description	Property	Organization(s) Represented
March 13, 2023	Stakeholder (KHB Venture LLC) Field Work Meeting	N/A	Tetra Tech
		N/A	KP Law
		N/A	City of Everett
		N/A	National Grid
		FCTPF	Honeywell
		FCTPF	Anderson Krieger
		FCTPF	Beazer East
		FCTPF	de maximis, inc.
March 14, 2023	Stakeholder (Lineage Logistics) Field Work Meeting	N/A	Tetra Tech
		N/A	KP Law
		N/A	City of Everett
		40-60 Commercial Street	Lineage Logistics
April 13, 2023	SWG Meeting #8 – Site Walk	N/A	Tetra Tech
		N/A	City of Everett
		N/A	Weston & Sampson
		N/A	KP Law
		8 & 36 Commercial Street, 87 Behen Street	PW Marks
		FCTPF	de maximis, inc.
		100 Justin Drive	Westbrook Partners
		155 Market Street	Lyne, Woodworth & Evarts, LLP
		201 Beacham Street	Sheehan Company/Craft New England
		FCTPF	Anderson Krieger LLP
		95 Behen Street	SPS New England
April 19, 2023	Stakeholder (SPS New England) Meeting	N/A	Tetra Tech
		N/A	City of Everett
		95 Behen Street	SPS New England
July 26, 2023	Stakeholder (Constellation Energy) Meeting	N/A	Tetra Tech
		N/A	City of Everett
		18 Rover Street	Constellation Energy
July 26, 2023	Stakeholder (Lineage Logistics) Meeting	N/A	Tetra Tech
		N/A	City of Everett
		40-60 Commercial Street	Lineage Logistics
August 1, 2023	Stakeholder (PW Marks) Meeting	N/A	Tetra Tech
		N/A	City of Everett
		8 & 26 Commercial Street, 87 Behen Street	PW Marks

Date	Description	Property	Organization(s) Represented
September 7, 2023	Stakeholder (Lineage Logistics) Meeting	N/A	Tetra Tech
		N/A	City of Everett
		40-60 Commercial Street	Lineage Logistics
September 7, 2023	Stakeholder (PW Marks) Meeting	N/A	Tetra Tech
		N/A	City of Everett
		8 & 26 Commercial Street, 87 Behen Street	PW Marks
October 17, 2023	SWG Meeting #9 (Virtual)	N/A	Tetra Tech
		N/A	City of Everett
		12 Justin Drive	City of Chelsea
		N/A	Weston & Sampson
		N/A	KP Law
		N/A	Blatman, Bobrowski, Haverty & Silverstein, LLC
		FCTPF	de maximis, inc.
		100 Justin Drive	Westbrook Partners
		155 Market Street	Lyne, Woodworth & Evarts, LLP
		201 Beacham Street	Sheehan Company/Craft New England
		FCTPF	Anderson Krieger LLP
		95 Behen Street	SPS New England
		40-60 Commercial Street	Lineage Logistics
		8 & 26 Commercial Street, 87 Behen Street	P.W. Marks
		N/A	National Grid
		155 Market Street	155 Market Street Trustee
		155 Market Street	Lyne, Woodworth & Evarts, LLP
		FCTPF	Beazer East, Inc.
		18 Rover Street	Constellation Energy
		201 Beacham Street	Sheehan Company/Craft New England
		1 Broadway	Wynn Development
		145 Market Street 359 Beacham Street	Development & Marketing Group LLC
		34 Market Street	Davis Companies
		357 Beacham Street	M&T Bank
		69 Rover Street	Schnitzer

Date	Description	Property	Organization(s) Represented
		40-60 Commercial Street	Smith Marine
October 25, 2023	Stakeholder (PW Marks) Meeting	18 Rover Street	Constellation Energy
		8 & 26 Commercial Street, 87 Behen Street	PW Marks
November 7, 2023	Stakeholder (Constellation Energy) Meeting	N/A	Tetra Tech
		N/A	City of Everett
		18 Rover Street	Constellation Energy

Attachment F

WETLANDS DELINEATION REPORT

westonandsampson.com

55 Walkers Brook Drive, Suite 100
Reading, MA 01867
tel: 978.532.1900

Wetland Delineation Report

May 2022
(Updated September 2023)

Island End River
Chelsea, MA

Wetland Delineation Conducted By:
Devin Batchelder, CWS on 5/2/2022 and 5/10/2022

Delineation Report Reviewed By:
Mel Higgins, PWS

TABLE OF CONTENTS

Page

FIGURES

APPENDICES

\\wse03.local\WSE\Projects\MA\Chelsea MA\MVP Action Grant - Coastal Barrier\Task 5 Permits\Wetland Delineation\2023 Delineation_Update\Wetland Delineation Report\2 Wetlands Report Body_Updated_9.27.2023.docx

1.0 SITE DESCRIPTION

On May 2 and May 10, 2022, the presence of wetland resources was investigated near the Island End River in Chelsea, MA. This investigation area is located in a developed area adjacent to commercial properties and a small public park. Please see Figure 1 (Wetlands Field Map) and Figure 2 (USGS Topographic Map) of this report for the investigation area.

Wetland resource areas including, a salt marsh, coastal beach/tidal flats, coastal bank, land under ocean, a designated port area, riverfront area and land subject to coastal storm flowage, were identified by a Weston & Sampson employee who is trained in the wetland delineation process using the Massachusetts Department of Environmental Protection (MassDEP) and the US Army Corps of Engineers methodology. Further descriptions of these wetland resource areas are presented in the following sections.

2.0 DELINEATION OF WETLAND RESOURCES

2.1 Site Observations

The Weston & Sampson wetland scientist, trained in the ACOE Wetland Delineation Manual and Massachusetts Department of Environmental Protection (MassDEP) Delineating Bordering Vegetated Wetlands Under the Massachusetts Wetland Protection Act guidance document, observed the following protected wetland resources at the site:

- Salt Marsh
- Coastal Beach/Tidal Flats
- Coastal Bank
- Land Under Ocean (LUO)
- Designated Port Area (DPA)
- Riverfront Area
- Land Subject to Coastal Storm Flowage (LSCSF)

Field data were recorded on US Army Corps of Engineers (ACOE) Wetland Determination Data Forms. See Appendix A for completed data forms and Appendix B for site photographs.

2.2 Wetland Delineation Methodology

A wetland delineation assessment was conducted in accordance with the guidance provided in the Coastal Manual otherwise known as "*Applying the Massachusetts Coastal Wetlands Regulations: A Practical Manual for Conservation Commissions to Protect the Storm Damage Prevention and Flood Control Functions of Coastal Resource Areas*". The Coastal Manual was developed by the Massachusetts Office of Coastal Zone Management (CZM) and Massachusetts Department of Environmental Protection (MassDEP) to provide technical guidance on the coastal resource areas under the WPA. These coastal resource areas include land under the ocean, designated port areas, coastal beaches, coastal dunes, barrier beaches, coastal banks, rocky intertidal shores, and salt marshes.

2.3 Salt Marsh (SM)

The Massachusetts Wetland Protection Act defines a salt marsh (SM) as a "coastal wetland that extends landward up to the highest high tide line, that is, the highest spring tide of the year, and is characterized by plants that are well adapted to or prefer living in, saline soils. Dominant plants within salt marshes typically include salt meadow cord grass (*Spartina patens*) and/or salt marsh cord grass (*Spartina alterniflora*), but may also include, without limitation, spike grass (*Distichlis spicata*), high-tide bush (*Iva frutescens*), black grass (*Juncus gerardii*), and common reedgrass (*Phragmites*). A salt marsh may contain tidal creeks, ditches and pools." (310 CMR 10.32).

Per 310 CMR 10.04 Spring Tide is defined as "the tide of the greatest amplitude during the approximately 14-day tidal cycle. It occurs at or near the time when the gravitational forces of the sun and the moon are in phase (new and full moons)." Based on the NOAA Annual Tide Table for Boston the highest high tide of the year (2022) will occur on June 16, 2022 and is 6.5' NAVD88.

Based on elevation, a portion of the salt marsh is located landward of the highest high tide line. This is due to material which has accumulated on top of the salt marsh surface. This accumulated material is composed of phragmites detritus, trash, debris which have accumulated over the years from seasonal and tidal cycles, as well as compacted urban fill material which is located in some areas under the existing boardwalk and is likely the result of years of adjacent roadway uses such as snowplowing. Based on the site conditions it is our opinion that this area should be most appropriately classified as salt marsh due to the conditions that would be present if not for this accumulated material. As such, the landward limit of salt marsh has been determined based on the presence of wetland vegetation and hydrology including sulfur odor, water staining and saturation.

The seaward limit of the SM resource area was determined based on the presence of salt tolerant wetland vegetation and/or the presence of peat which once supported low marsh vegetation.

The SM area observed on site is associated with the tidal Island End River. Dominant vegetation within the salt marsh included *Distichlis spicata, Spartina alterniflora, Spartina patens* and *Phragmites*. Soils within the SM were composed of a thick organic layer. Other indicators of wetland hydrology included sulfur odor, high water table and saturation.

Wetland flags were left along the SM landward boundary and included:

- WET-A1 through WET-A32

A 100-foot buffer zone is associated with the SM resource area based on 310 CMR 10.02 ((2)(b) of the Massachusetts Wetlands Protection Act.

2.4 Coastal Beach/Tidal Flats

The Massachusetts Wetland Protection Act defines a Coastal Beach as "“unconsolidated sediment subject to wave, tidal and coastal storm action which forms the gently sloping shore of a body of salt water and includes tidal flats. Coastal beaches extend from the mean low water line landward to the dune line, coastal bank line or the seaward edge of existing man-made structures, when these structures replace one of the above lines, whichever is closest to the ocean." 310 CMR 10.27(2).

Tidal Flat means "any nearly level part of a coastal beach which usually extends from the mean low water line landward to the more steeply sloping face of the coastal beach or which may be separated from the beach by land under the ocean." 310 CMR 10.27(2).

The seaward limit of a Coastal Beach/Tidal Flat is the mean low water line which is defined as "the line where the arithmetic mean of the low water heights observed over a specific 19-year Metonic Cycle (the National Tidal Datum Epoch) meets the shore and shall be determined using hydrographic survey data of the National Ocean Survey of the U.S. Department of Commerce". The most recent National Tidal Datum Epoch hydrographic survey data is available through National Oceanic and Atmospheric Administration (NOAA) tidal datums. The closest tidal datum to the investigation area is Station 8443970 located in Boston MA. According to the Boston tidal datum the mean low water is located at -5.16 NAVD88. Since mean low water is determined using an elevation it cannot be delineated in the field.

The landward limit of a Coastal Beach is seaward edge of any adjacent Coastal Dune, Coastal Bank, or existing man-made structures. Within the investigation area, the coastal resource areas adjacent to the coastal beach included coastal bank and salt marsh. When the line of demarcation between these resources is unclear, the dominant processes should be observed and utilized in coordination with the highest high tide line or Spring Tide as the landward limit of Coastal Beach as it is the limit of the tidal influence and the intertidal zone.

Coastal Beach/Tidal flat was observed at the site however, wetland flags were not left in the field along the landward limit in order to prevent the flags from entering the river due to the tidal inundation.

A 100-foot buffer zone is associated with the Coastal Beach resource area based on 310 CMR 10.02 (2)(b) of the Massachusetts Wetlands Protection Act.

2.5 Coastal Bank

The Massachusetts Wetland Protection Act defines a Coastal Bank as “the seaward face or side of any elevated landform, other than a coastal dune. Which lies at the landward edge of a coastal beach, land subject to tidal action or other wetland” (310 CMR 10.30).

The seaward edge (or bottom) of the coastal bank begins at the toe of the coastal bank slope, where other coastal wetland resource areas end. Within this investigation area adjacent resources included the landward edge of a coastal beach and the landward edge of a salt marsh. The landward edge of the coastal beach occurs where there an abrupt change in topography to a steep, seaward-facing slope primarily of glacial origin (coastal bank). The landward edge of the salt marsh is the highest high tide line.

The landward edge of the Coastal Bank is generally the top of, or the first major break in, the face of the Coastal Bank however the Coastal Manual Appendix D - Massachusetts Department of Environmental Protection Coastal Banks Policy, has issued the following additional standards for delineation of the “top of coastal bank”:

A. The slope of a coastal bank must be ≥10:1.
B. For a coastal bank with a slope of ≥4:1, the “top of coastal bank” is that point above the 100-year flood elevation where the slope becomes <4:1.
C. For a coastal bank with a slope ≥10:1 but <4:1, the top of coastal bank is the 100-year flood elevation.
D. A “top of coastal bank” will fall below the 100-year flood elevation and is the point where the slope ceases to be ≥10:1.

E. There can be multiple coastal banks within the same site. This can occur where the coastal banks are separated by land subject to coastal storm flowage [an area <10:1].

When a landform, other than a coastal dune, has a slope that is so gentle and continuous that it does not act as a vertical buffer and confine elevated storm waters, that landform does not qualify as a coastal bank. Rather, gently sloping landforms at or below the 100-year flood elevation which have a slope <10:1 shall be regulated as "land subject to coastal storm flowage" and not as coastal bank. Land subject to coastal storm flowage may overlap other wetland resource areas such as coastal beaches and dunes.

Within the investigation area the slope of the Coastal Bank varies from <10:1 to ≥4:1. As such the landward boundary of Coastal Bank varies from no Coastal Bank present to the point above the 100-year flood elevation where the slope becomes <4:1. Per the recommended guidance in the Coastal Manual the following figures from the "Wetlands Program Policy 92-1: Coastal Banks" best represent the Coastal Bank conditions observed on site and were utilized to determine the landward limits of the Coastal Bank:

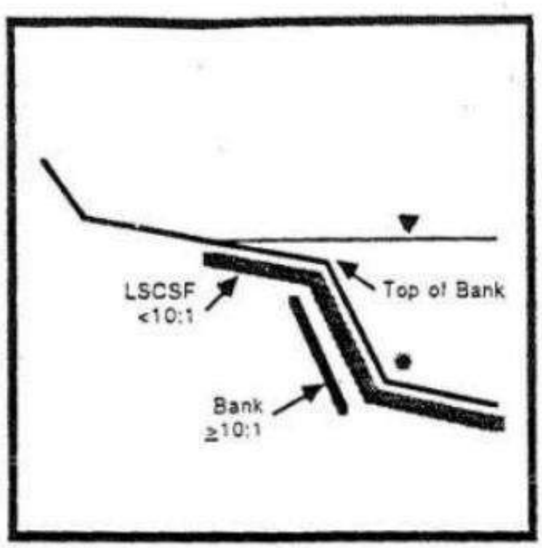

Figure 4

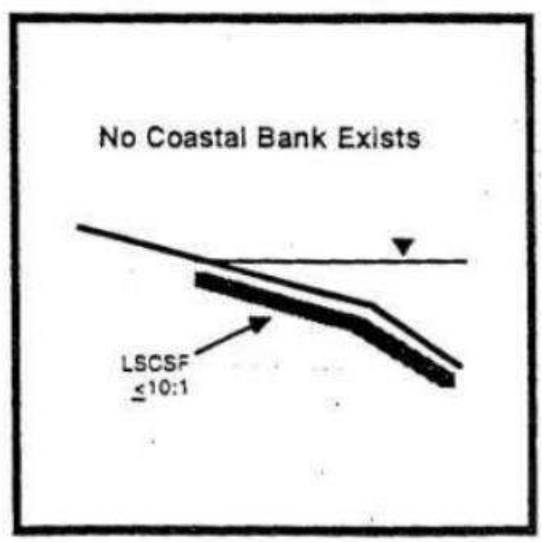

Figure 7

Due to the variable nature of the Coastal Bank slopes observed on site, no flags were left in the field however GPS locations of the flags were marked. The first observed break in slope was GPS located and utilized in combination with the slope requirements described above in order to determine and accurate landward limit of Coastal Bank. GPS locations taken in the field included:

- TOB-A1 through TOB-A42
- TOB-B1 through TOB-B7
- TOB-C1 through TOB-C25

A 100-foot buffer zone is associated with the Coastal Bank resource area based on 310 CMR 10.02 (2)(b) of the Massachusetts Wetlands Protection Act.

2.6 Land Under the Ocean (LUO)

The Massachusetts Wetland Protection Act defines Land Under the Ocean (LUO) as “the land extending from the mean low water line seaward to the boundary of the municipality’s jurisdiction and includes land under estuaries.” (310 CMR 10.25).

The mean low water line is defined as “the line where the arithmetic mean of the low water heights observed over a specific 19-year Metonic Cycle (the National Tidal Datum Epoch) meets the shore and shall be determined using hydrographic survey data of the National Ocean Survey of the U.S. Department of Commerce”. The most recent National Tidal Datum Epoch hydrographic survey data is available through National Oceanic and Atmospheric Administration (NOAA) tidal datums. The closest tidal datum to the investigation area is Station 8443970 located in Boston MA. According to the Boston tidal datum the mean low water is located at -5.16 NAVD88. Since mean low water is determined using an elevation it cannot be delineated in the field.

There is no buffer zone is associated with the LUO resource area based on 310 CMR 10.02 (2)(b) of the Massachusetts Wetlands Protection Act.

2.7 Designated Port Area (DPA)

The Massachusetts Wetland Protection Act defines Designated Port Areas (DPAs) as “those areas designated in 301 CMR 25.00: Designation of Port Areas.” (310 CMR 10.26) and 301 CMR 25.02 further defines a DPA as "an area of contiguous lands and waters in the coastal zone that has been so designated by CZM in accordance with 301 CMR 25.00."

Per the Coastal Manual "official copies of the maps and official descriptions of the most current Designated Port Area boundaries are available from the Massachusetts Office of Coastal Zone Management on their Designated Port Area website (www.mass.gov/service-details/czm-port-and-harbor-planningprogram-designated-port-areas)."

A portion of the investigation area is located within the Mystic River Designated Port Area. Since the limits of the DPA are based on available maps this resource area cannot be delineated in the field.

There is no buffer zone is associated with the DPA resource area based on 310 CMR 10.02 (2)(b) of the Massachusetts Wetlands Protection Act.

2.8 Riverfront Area

The Massachusetts Wetland Protection Act defines Riverfront Area as "the area of land between a river's mean annual high water line and a parallel line measured horizontally." (310 CMR 10.58). Furthermore, per 310 CMR 10.58(2)(c) "In tidal rivers, the mean annual high-water line is coincident with the mean high water line determined under 310 CMR 10.23."

Per 310 CMR 10.23 Mean High Water Line means " the line where the arithmetic mean of the high water heights observed over a specific 19-year metonic cycle (the National Tidal Datum Epoch) meets the shore and shall be determined using hydrographic survey data of the National Ocean Survey of the U.S. Department of Commerce". The most recent National Tidal Datum Epoch hydrographic survey data is available through National Oceanic and Atmospheric Administration (NOAA) tidal datums. The closest tidal datum to the investigation area is Station 8443970 located in Boston MA. According to the Boston tidal datum the mean high water is located at 4.33 NAVD88. As a result, the Riverfront Area shall be a parallel line measured horizontally offset from 4.33 NAVD88.

Perennial streams are normally subject to a 200-foot Riverfront Area under the Massachusetts Wetland Protection Act per 301 CMR 10.58(2)(a)(2)(c) however, the City of Chelsea is a municipality that is identified in 310 CMR 10.58(2)(a)3.a. as having a 25-foot Riverfront Area due to development.

Since the limits of the Riverfront Area are based on elevation this resource area cannot be delineated in the field and was added to the maps based on survey.

2.9 Land Subject to Coastal Storm Flowage (LSCSF)

The Massachusetts Wetland Protection Act defines Land Subject to Coastal Storm Flowage (LSCSF) as "land subject to any inundation caused by coastal storms up to and including that caused by the 100-year storm, surge of record or storm of record, whichever is greater." (310 CMR 10.04).

FEMA Flood Insurance Rate Maps (FIRM) were created online from the FEMA website to determine if there is a 100-year flood zone at the site. See Figure 3 for FIRM map. Based on FEMA flood maps the investigation area is located within the 100-year flood zone at elevation 10.0' NAVD88. The Massachusetts Wetland Protection Act does not place a buffer zone on the 100-year flood zone. This coastal flood zone is referred to as Land Subject to Coastal Storm Flowage (LSCSF) in the WPA. Since the 100-year floodplain is determined using FEMA FIRM maps and/or an elevation it cannot be delineated in the field and may be updated based on survey.

2.10 Other Protected Areas

Weston & Sampson created environmental resources maps (see Figure 4) of the site to determine the presence of other protected areas. The data source of these map layers was the Massachusetts Geographic Information System (MassGIS). These areas included:

- NHESP Priority Habitats of Rare Species
- NHESP Estimated Habitats of Rare Wildlife
- NHESP Certified and Potential Vernal Pools
- Areas of Critical Environmental Concern (ACEC)
- Outstanding Resource Waters (ORW)
- Coldwater Fisheries

- Shellfish Suitability Area
- Article 97 Land

Wetland resources identified in the field were also added to these maps. Based on the MassGIS information, a portion of the investigation area is located within a Shellfish Suitability Area for Soft Shelled Clams and located within Article 97 Land.

3.0 SUMMARY

On May 2 and May 10, 2022, the presence of wetland resources was investigated near the Island End River in Chelsea, MA. A salt marsh, coastal beach/tidal flats, coastal bank, land under ocean, a designated port area, riverfront area and land subject to coastal storm flowage, were identified on site.

Additional environmental mapping was conducted using MassGIS data layers and FEMA FIRM mapping. This additional mapping indicates that a portion of the investigation area is located within a Shellfish Suitability Area for Soft Shelled Clams and Article 97 Land.

4.0 REFERENCES

Jackson, Scott. 1995. "Delineating Bordering Vegetated Wetlands Under the Massachusetts Wetlands Protection Act." Massachusetts Department of Environmental Protection.

Massachusetts Division of Fisheries and Wildlife, Natural Heritage and Endangered Species Program. Massachusetts Natural Heritage Atlas, 13th Edition with 2017 web updates. Accessed on 5/30/2022.

Massachusetts Geographic Information System. January 2009. Outstanding Resource Waters. Massachusetts Department of Environmental Protection. Accessed on 9/27/2023.

Massachusetts Geographic Information System. December 2003. Areas of Critical Environmental Concern. Massachusetts Department of Environmental Protection. Accessed on 9/27/2023.

Newcomb, Lawrence. 1977. Newcomb's Wildflower Guide. Little, Brown and Company.

Web Soil Survey of Suffolk County, Massachusetts. United States Department of Agriculture, Soil Conservation Service, in cooperation with Massachusetts Agricultural Experiment Station

United States Department of Agriculture, Natural Resources Conservation Service. *2018. Field Indicators of Hydric Soils in the United States, Version 8.2.* L. M. Vasilas, G. W. Hurt, and J.F. Berkowitz (eds.). USDA, NRCS, in cooperation with the National Technical Committee for Hydric Soils.

USACOE, January 1987, Corps of Engineers Wetlands Delineation Manuel, Wetlands Research Program Technical Report Y-87-1.

FEMA Flood Map Service Center, online at msc.fema.gov/portal Assessed on 5/30/2022.
Tiner, Jr., Ralph W., 2005, Field Guide to Nontidal Wetland Identification

Tiner, Jr., Ralph W, 2009, Field Guide to Tidal Wetland Plants of the Northeastern United States and Neighboring Canada.

Wojtec, Michael, Bard – A field Guide to Trees of the Northeast.

New England Hydric Soils Technical Committee, 2019, Version 4, *Field Indicator of Identifying Hydric Soils in New England*. New England Interstate Water Pollution Control Commission, Lowell, MA.
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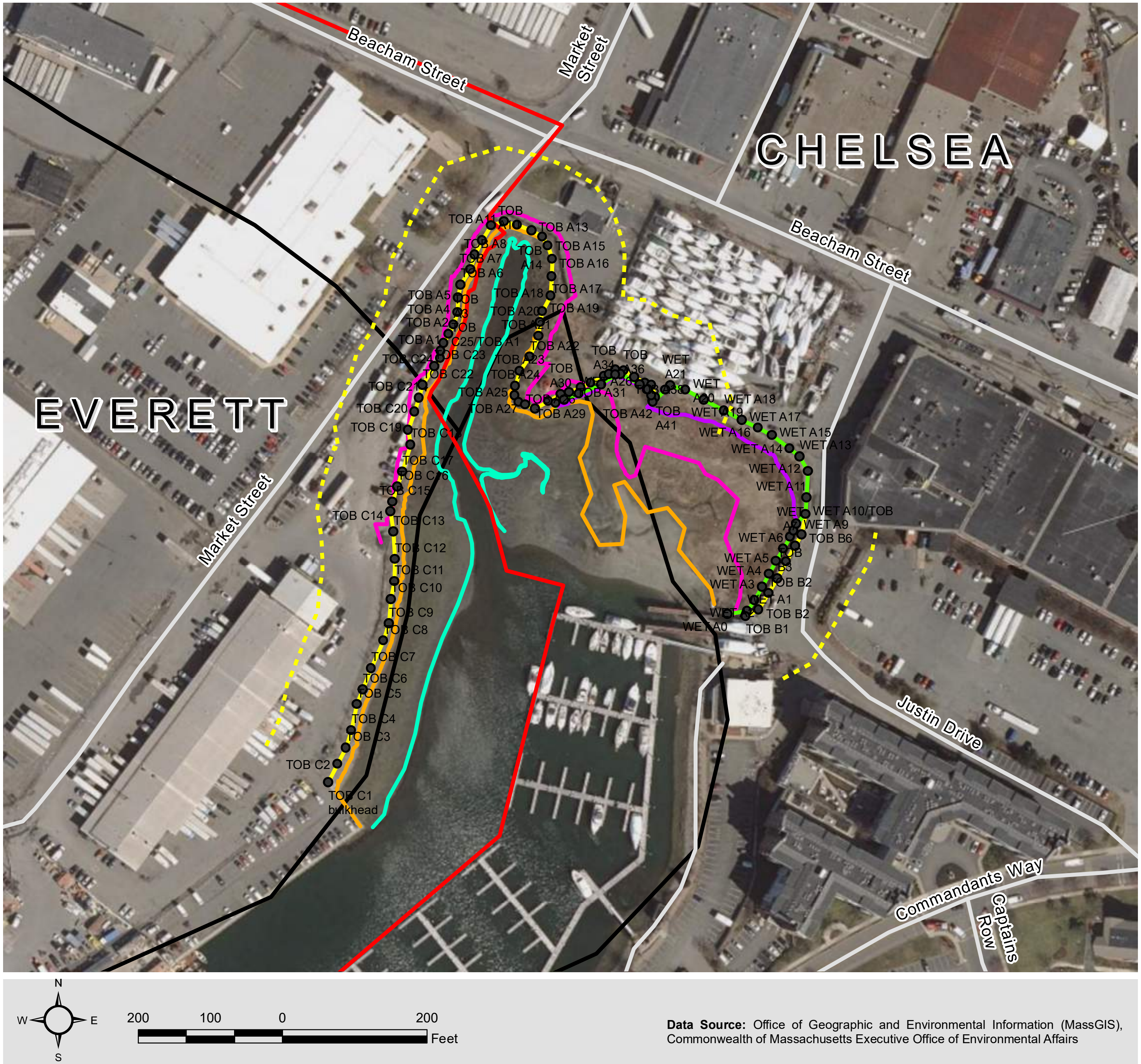

Data Source: Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Environmental Affairs

Legend

- Wetland Flags
- Mystic River Designated Port Area
- Salt Marsh
- Approx Highest High Tide Line
- Approx 100 Foot Buffer to Coastal Bank
- Approx Coastal Bank
- Approx Coastal Beach Tidal Flats
- Approx Land Under Ocean
- Approx 25 Foot Riverfront Area
- MassDOT Roads
- MA Towns

FIGURE 1

ISLAND END RIVER
CHELSEA MA

WETLANDS FIELD MAP

Weston & Sampson

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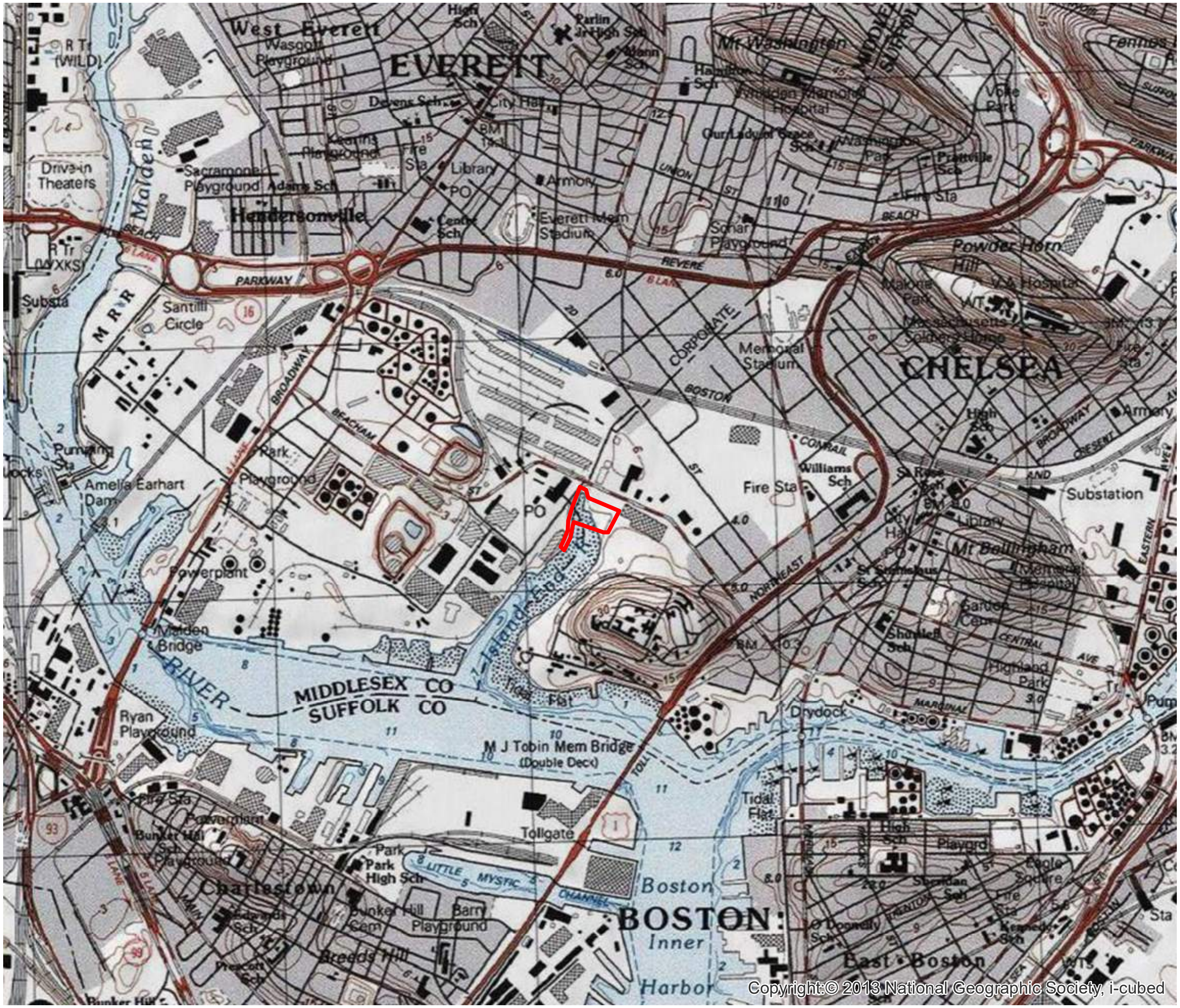

N W E S

1,000 500 0 1,000 Feet

Data Source: Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Environmental Affairs

Legend

Investigation Area

FIGURE 2

ISLAND END RIVER
CHELSEA MA

USGS TOPOGRAPHIC MAP

Weston & Sampson

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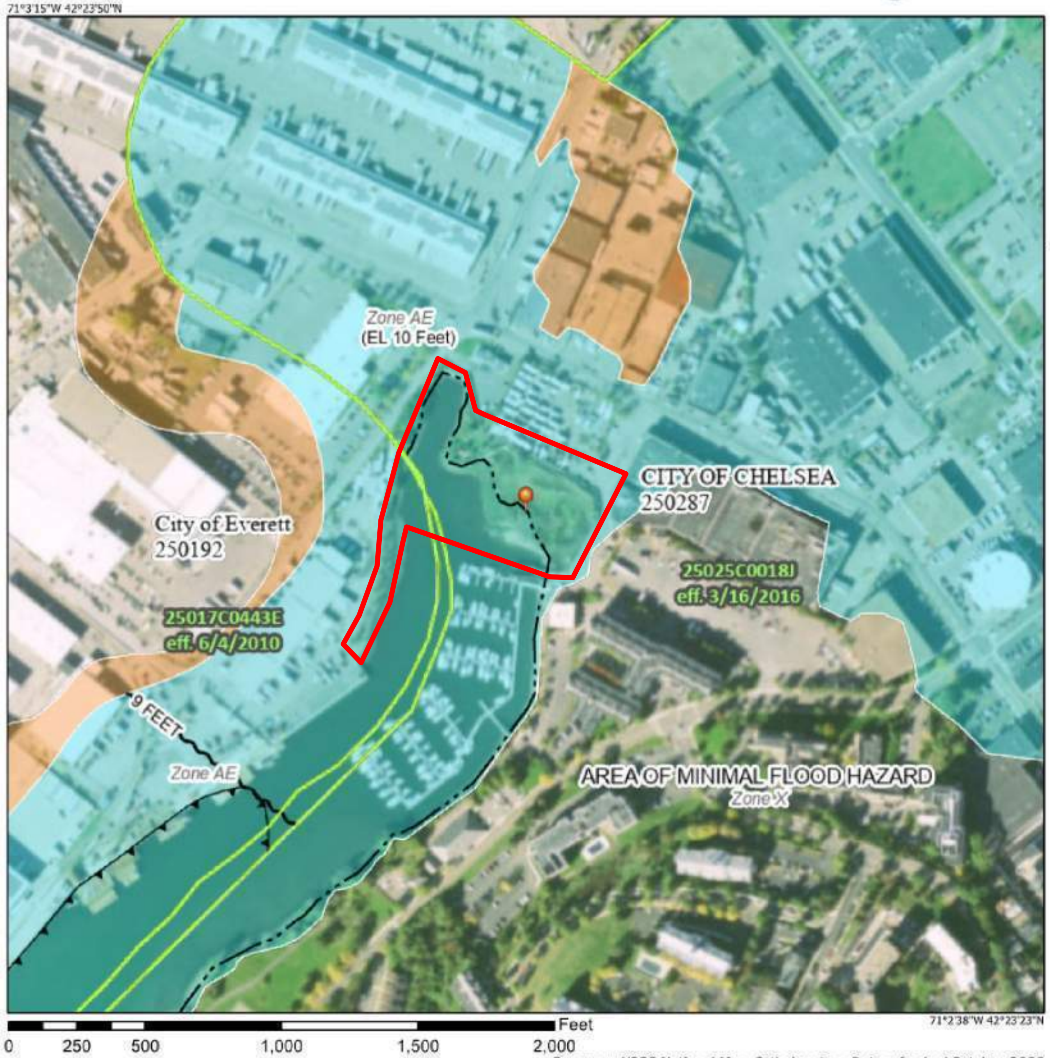
National Flood Hazard Layer FIRMette

FEMA

71°3'15"W 42°23'50"N



Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 5/31/2022 at 12:40 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Legend

Investigation Area

FIGURE 3

ISLAND END RIVER
CHELSEA MA

FEMA MAP

Weston & Sampson

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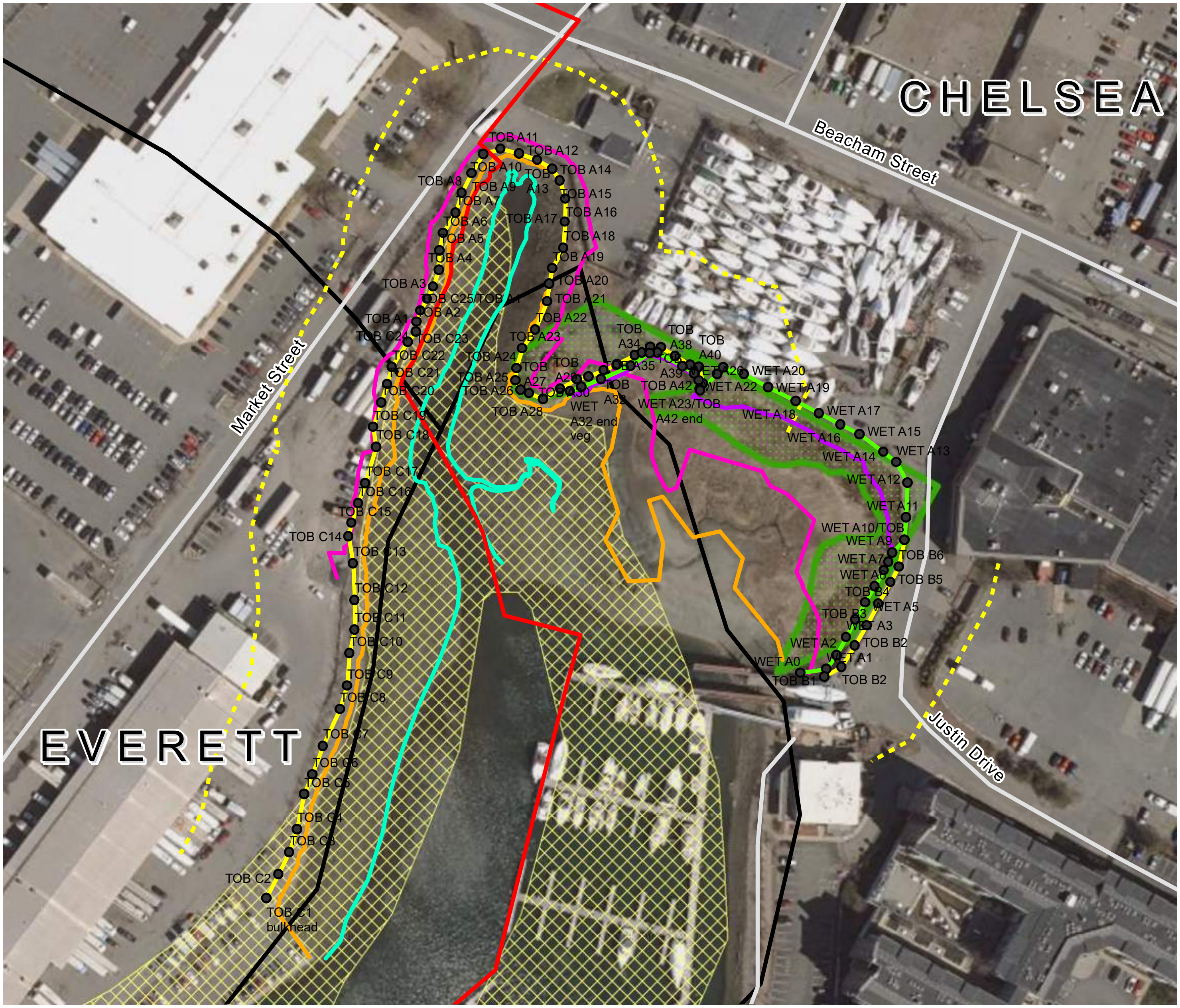
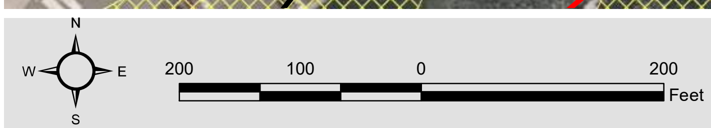




Data Source: Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Environmental Affairs

Legend

- Wetland Flags
- Mystic River Designated Port Area
- Salt Marsh
- Approx Highest High Tide Line
- Approx 100 Foot Buffer to Coastal Bank
- Approx Coastal Bank
- Approx Coastal Beach Tidal Flats
- Approx Land Under Ocean
- Approx 25 Foot Riverfront Area
- MassDOT Roads
- MA Towns

Shellfish Suitability Areas

HABITAT

- American Oyster
- Blue Mussel
- Bay Scallop
- European Oyster
- Ocean Quahog
- Quahog
- Razor Clam
- Surf Clam
- Sea Scallop
- Soft-Shelled Clam
- ACECs
- NHESP Estimated Habitats of Rare Wildlife
- NHESP Priority Habitats of Rare Species
- NHESP Certified Vernal Pools
- NHESP Potential Vernal Pools
- Public Water Supply Contributor
- ORW for ACEC
- ORW for both Water Supply and Other
- Article 97 Land

FIGURE 4

ISLAND END RIVER
CHELSEA MA

ENVIRONMENTAL RESOURCES MAP

Weston & Sampson

APPENDIX A

ACOE Wetland Determination Data Forms

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Justin Drive City/County: Chelsea Sampling Date: 5/2/2022

Applicant/Owner: City of Chelsea State: MA Sampling Point: WET A WET

Investigator(s): Devin Herrick, CWS Section, Township, Range: ______

Landform (hillside, terrace, etc.): ______ Local relief (concave, convex, none): ______ Slope (%): 0-3

Subregion (LRR or MLRA): LRR R Lat: 42°23'36.97"N Long: 71° 2'53.91"W Datum: ______

Soil Map Unit Name: Urban land, wet substratum NWI classification: E2EM5

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil X, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes ___ No X

Are Vegetation X, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ___
Hydric Soil Present?	Yes X	No ___
Wetland Hydrology Present?	Yes X	No ___

Is the Sampled Area within a Wetland? **Yes** X **No** ___

If yes, optional Wetland Site ID: ______

Remarks: (Explain alternative procedures here or in a separate report.)
Upland composed of commerical property and roadway.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)
X High Water Table (A2)
X Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9)
___ Aquatic Fauna (B13)
___ Marl Deposits (B15)
X Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres on Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Thin Muck Surface (C7)
___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

___ Surface Soil Cracks (B6)
___ Drainage Patterns (B10)
___ Moss Trim Lines (B16)
___ Dry-Season Water Table (C2)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Stunted or Stressed Plants (D1)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ Microtopographic Relief (D4)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ___
Water Table Present?	Yes X	No ___	Depth (inches): 6
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches): 2

Wetland Hydrology Present? **Yes** X **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Bordering vegetated wetland adjacent to salt marsh.

VEGETATION – Use scientific names of plants.

Sampling Point: WET A WET

Tree Stratum (Plot size: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
		=Total Cover	

Sapling/Shrub Stratum (Plot size: 15 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
		=Total Cover	

Herb Stratum (Plot size: 5 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Phragmites*	75	Yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	75	=Total Cover	

Woody Vine Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	75	x 2 =	150
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	75 (A)		150 (B)

Prevalence Index = B/A = 2.00

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)
Bordering vegetated wetland adjacent to salt marsh. Invasive species prevalence.

SOIL

Sampling Point: WET A WET

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	2.5Y 2.5/1	100					Mucky Sand	With fill debris
4-12	2.5Y 4/1	95	2.5Y 5/6	5	C	M	Mucky Sand	Prominent redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- X Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- X Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- X Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ? Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: ___

Depth (inches): ___

Hydric Soil Present? **Yes** X **No** ___

Remarks:
Bordering vegetated wetland adjacent to salt marsh. Fill material present in soil profile.

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Justin Drive City/County: Chelsea Sampling Date: 5/2/2022

Applicant/Owner: City of Chelsea State: MA Sampling Point: WET A UP

Investigator(s): Devin Herrick, CWS Section, Township, Range: ____

Landform (hillside, terrace, etc.): ____ Local relief (concave, convex, none): ____ Slope (%): 0-3

Subregion (LRR or MLRA): LRR R Lat: 42°23'36.97"N Long: 71° 2'53.91"W Datum: ____

Soil Map Unit Name: Urban land, wet substratum NWI classification: ____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation X , Soil X , or Hydrology X significantly disturbed? Are "Normal Circumstances" present? Yes ____ No X

Are Vegetation ____ , Soil ____ , or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X
Hydric Soil Present?	Yes ____	No X
Wetland Hydrology Present?	Yes ____	No X

Is the Sampled Area within a Wetland? **Yes** ____ **No** X

If yes, optional Wetland Site ID: ____

Remarks: (Explain alternative procedures here or in a separate report.)
Upland composed of commerical property and roadway.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Upland composed of commerical property and roadway. No evidence of hydology on the surface.

VEGETATION – Use scientific names of plants.

Sampling Point: WET A UP

Tree Stratum (Plot size: 30 ft radius)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	=Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft radius)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	=Total Cover		
Herb Stratum (Plot size: 5 ft radius)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	=Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
	=Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: ______ (A)

Total Number of Dominant Species Across All Strata: ______ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: ______ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:		(A)	(B)

Prevalence Index = B/A = ______

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)
Upland composed of commerical property and roadway. No vegetation present.

SOIL

Sampling Point: WET A UP

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7)
___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
___ High Chroma Sands (S11) (**LRR K, L)**
___ Loamy Mucky Mineral (F1) (**LRR K, L**)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Marl (F10) (**LRR K, L**)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
___ Coast Prairie Redox (A16) (**LRR K, L, R**)
___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
___ Polyvalue Below Surface (S8) (**LRR K, L**)
___ Thin Dark Surface (S9) (**LRR K, L**)
___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
___ Red Parent Material (F21)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Pavement

Depth (inches): 0

Hydric Soil Present? **Yes** ___ **No** X

Remarks:
Upland composed of commerical property and roadway. Pavement prevents soil access.

APPENDIX B

Site Photographs

Photo 1: Public Boardwalk

Photo 2: Island End River Culverts

Photo 3: Island End River Facing South

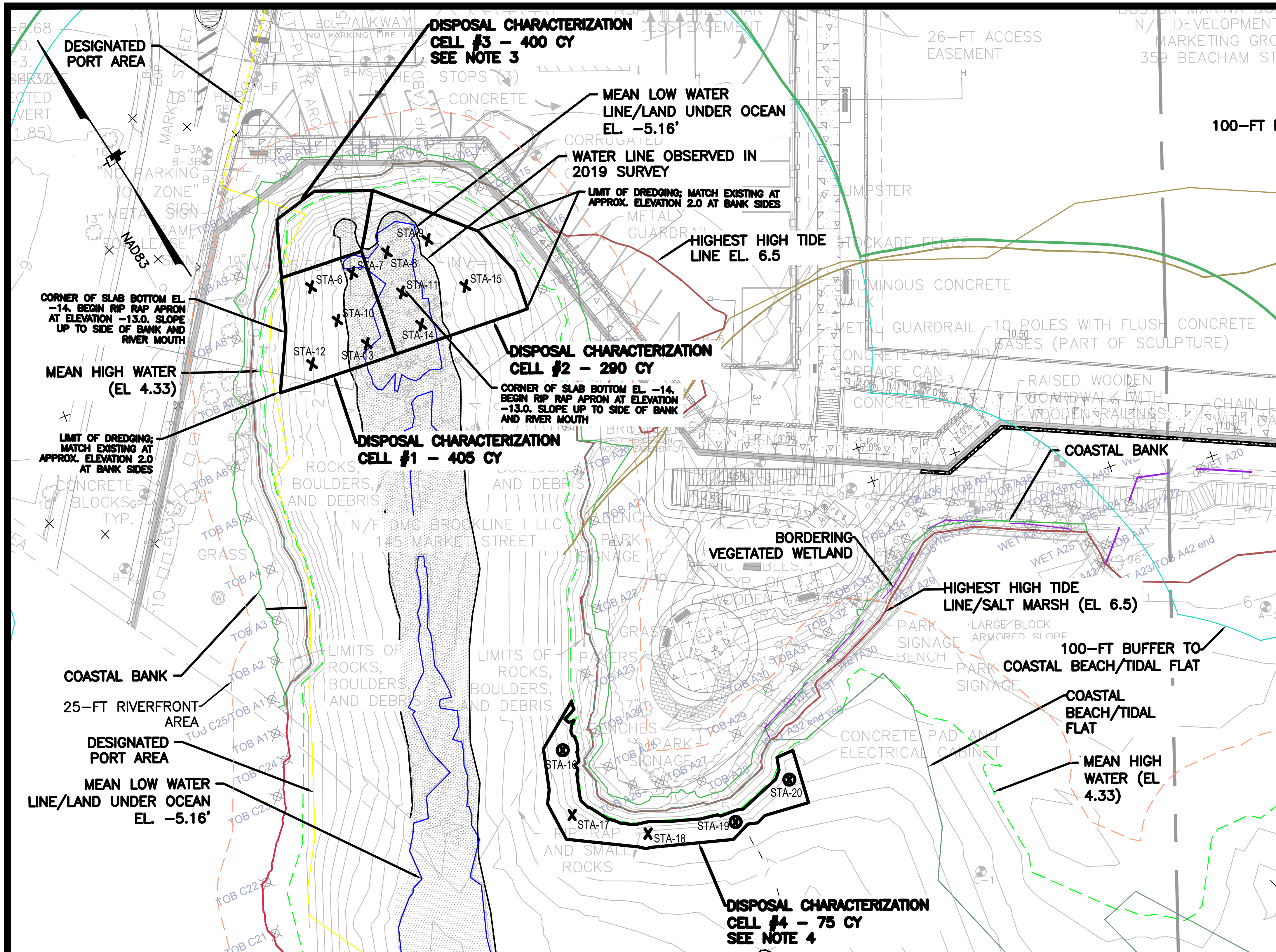
Photo 4: Salt Marsh

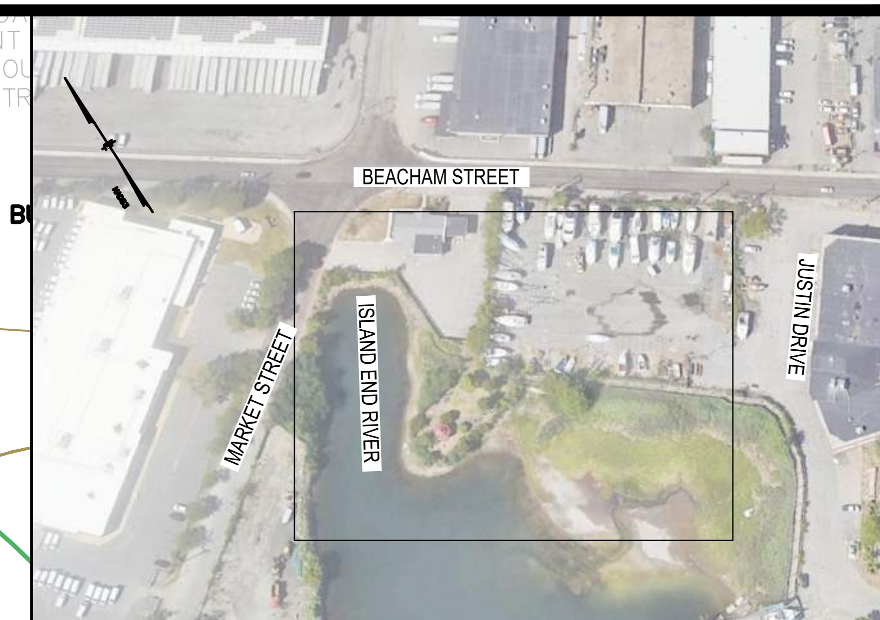
Photo 5: Adjacent Commercial Property

Photo 6: Hydric Soils Observed Within BVW

Attachment G

SEDIMENT SAMPLING PLAN





KEY MAP
SCALE: 1" = 200'

LEGEND:

- MEAN LOW WATER LINE/LAND UNDER OCEAN EL. -5.16'
- BORDERING WETLANDS VEGETATION
- MEAN HIGH WATER EL. 4.33'
- COASTAL BEACH/TIDAL FLATS
- 25-FT RIVERFRONT AREA
- COASTAL BANK
- DESIGNATED PORT AREA
- 100-FT BUFFER TO SALT MARSH/BVW
- 100-FT BUFFER TO COASTAL BEACH/TIDAL FLAT
- 100-FT BUFFER TO COASTAL BANK
- PROJECT LIMITS
- 100-YR FLOOD PLAIN
- HIGHEST HIGH TIDE LINE EL. 6.5'
- SALT MARSH/BVW
- APPROX. MHHW EL. 4.77'
- LIVING SHORELINE
- CHAP. 91 JURISDICTIONAL LIMIT
- SHELLFISH SUITABILITY AREA
- X GRAB SAMPLE LOCATION COLLECTED USING VIBROCORE
- GRAB SAMPLE LOCATION COLLECTED USING HAND AUGER
- DISPOSAL CHARACTERIZATION CELL BOUNDARY

NOTES:

1. ALL ELEVATIONS ARE IN NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).
2. APPROXIMATE TOTAL DREDGING VOLUME OF 1,095 CY.
3. NO SAMPLES COLLECTED DUE TO REFUSAL (RIPRAP/CONCRETE).
4. CELL #4 SUPPLEMENTED WITH 3 HAND AUGER SMAPLES TO APPROX. 3-FT BELOW GRADE FOR 5 TOTAL LOCATIONS.

Weston & Sampson

FIGURE 1
ISLAND END RIVER FLOOD RESILIENCE PROVISIONS EAST
CHELSEA, MASSACHUSETTS

SEDIMENT SAMPLING LOCATIONS

SCALE: 1"=40'

0 40 80

P:\MA\Everett\Island End River Area\CAD\60% DESIGN\PLOT\04 - Resource Limits Impact Plan COLOR and Impact Polygons - ENV Report.dwg

Rev: 1.7 Date: 08/12/2019

Table 1
Summary of Sediment Analytical Results
Island End River
Chelsea, Massachusetts

Analytes	Units	Reportable Concentrations	COMM-94-007 Maximum Allowable Contaminant Levels for Sediment Reuse and Disposal at Massachusetts Landfills	COMM97-001 Reuse and Disposal of Contaminanted Soil at Massachusetts Landfills		Toxicity Characteristic Leaching Procedure (TCLP)	Sampling ID and Date		
		RCS-1	Lined Landfill	Lined Landfill	Unlined Landfill	20x Rule	Disp Cell 1 10/24/23	Disp Cell 2 10/24/23	Disp Cell 4 10/24/23
Volatile Organic Compounds (VOCs)									
Acetone	mg/Kg	6	~	~	~	~	<9.9	<11	<9.8
tert-Amyl Methyl Ether (TAME)	mg/Kg	~	~	~	~	~	<0.099	<0.11	<0.098
Benzene	mg/Kg	2	~	~	~	10	<0.20	<0.22	<0.20
Bromobenzene	mg/Kg	100	~	~	~	~	<0.20	<0.22	<0.20
Bromochloromethane	mg/Kg	~	~	~	~	~	<0.20	<0.22	<0.20
Bromodichloromethane	mg/Kg	0	~	~	~	~	<0.20	<0.22	<0.20
Bromoform	mg/Kg	0	~	~	~	~	<0.20	<0.22	<0.20
Bromomethane	mg/Kg	1	~	~	~	~	<0.39	<0.45	<0.39
2-Butanone (MEK)	mg/Kg	4	~	~	~	4,000	<3.9	<4.5	<3.9
n-Butylbenzene	mg/Kg	~	~	~	~	~	<0.20	<0.22	<0.20
sec-Butylbenzene	mg/Kg	~	~	~	~	~	<0.20	<0.22	<0.20
tert-Butylbenzene	mg/Kg	100	~	~	~	~	<0.20	<0.22	<0.20
tert-Butyl Ethyl Ether (TBEE)	mg/Kg	~	~	~	~	~	<0.099	<0.11	<0.098
Carbon Disulfide	mg/Kg	100	~	~	~	~	<2.0	<2.2	<2.0
Carbon Tetrachloride	mg/Kg	5	~	~	~	10	<0.20	<0.22	<0.20
Chlorobenzene	mg/Kg	1	~	~	~	2,000	<0.20	<0.22	<0.20
Chlorodibromomethane	mg/Kg	0	~	~	~	~	<0.099	<0.11	<0.098
Chloroethane	mg/Kg	100	~	~	~	~	<0.39	<0.45	<0.39
Chloroform	mg/Kg	0	~	~	~	120	<0.39	<0.45	<0.39
Chloromethane	mg/Kg	100	~	~	~	~	<0.39	<0.45	<0.39
2-Chlorotoluene	mg/Kg	100	~	~	~	~	<0.20	<0.22	<0.20
4-Chlorotoluene	mg/Kg	100	~	~	~	~	<0.20	<0.22	<0.20
1,2-Dibromo-3-chloropropane (DBCP)	mg/Kg	10	~	~	~	~	<0.79	<0.89	<0.79
1,2-Dibromoethane (EDB)	mg/Kg	0	~	~	~	~	<0.099	<0.11	<0.098
Dibromomethane	mg/Kg	500	~	~	~	~	<0.20	<0.22	<0.20
1,2-Dichlorobenzene	mg/Kg	9	~	~	~	~	<0.20	<0.22	<0.20
1,3-Dichlorobenzene	mg/Kg	3	~	~	~	~	<0.20	<0.22	<0.20
1,4-Dichlorobenzene	mg/Kg	1	~	~	~	150	<0.20	<0.22	<0.20
Dichlorodifluoromethane (Freon 12)	mg/Kg	1,000	~	~	~	~	<0.39	<0.45	<0.39
1,1-Dichloroethane	mg/Kg	0	~	~	~	~	<0.20	<0.22	<0.20
1,2-Dichloroethane	mg/Kg	0	~	~	~	10	<0.20	<0.22	<0.20
1,1-Dichloroethylene	mg/Kg	3	~	~	~	14	<0.20	<0.22	<0.20
cis-1,2-Dichloroethylene	mg/Kg	0	~	~	~	~	<0.20	<0.22	<0.20
trans-1,2-Dichloroethylene	mg/Kg	1	~	~	~	~	<0.20	<0.22	<0.20
1,2-Dichloropropane	mg/Kg	0	~	~	~	~	<0.20	<0.22	<0.20
1,3-Dichloropropane	mg/Kg	500	~	~	~	~	<0.099	<0.11	<0.098
2,2-Dichloropropane	mg/Kg	0	~	~	~	~	<0.20	<0.22	<0.20
1,1-Dichloropropene	mg/Kg	0	~	~	~	~	<0.39	<0.45	<0.39
cis-1,3-Dichloropropene	mg/Kg	0	~	~	~	~	<0.099	<0.11	<0.098
trans-1,3-Dichloropropene	mg/Kg	0	~	~	~	~	<0.099	<0.11	<0.098
Diethyl Ether	mg/Kg	100	~	~	~	~	<0.39	<0.45	<0.39
Diisopropyl Ether (DIPE)	mg/Kg	100	~	~	~	~	<0.099	<0.11	<0.098
1,4-Dioxane	mg/Kg	0	~	~	~	~	<9.9	<11	<9.8
Ethylbenzene	mg/Kg	40	~	~	~	~	<0.20	<0.22	<0.20
Hexachlorobutadiene	mg/Kg	30	~	~	~	~	<0.20	<0.22	<0.20
2-Hexanone (MBK)	mg/Kg	100	~	~	~	~	<2.0	<2.2	<2.0
Isopropylbenzene (Cumene)	mg/Kg	1,000	~	~	~	~	<0.20	<0.22	<0.20
p-Isopropyltoluene (p-Cymene)	mg/Kg	100	~	~	~	~	<0.20	<0.22	<0.20
Methyl tert-Butyl Ether (MTBE)	mg/Kg	0	~	~	~	~	<0.20	<0.22	<0.20
Methylene Chloride	mg/Kg	0	~	~	~	~	<0.99	<1.1	<0.98
4-Methyl-2-pentanone (MIBK)	mg/Kg	0	~	~	~	~	<2.0	<2.2	<2.0
Naphthalene	mg/Kg	4	~	~	~	~	<0.39	<0.45	<0.39
n-Propylbenzene	mg/Kg	100	~	~	~	~	<0.20	<0.22	<0.20
Styrene	mg/Kg	3	~	~	~	~	<0.20	<0.22	<0.20
1,1,1,2-Tetrachloroethane	mg/Kg	0	~	~	~	~	<0.20	<0.22	<0.20
1,1,2,2-Tetrachloroethane	mg/Kg	0	~	~	~	~	<0.099	<0.11	<0.098
Tetrachloroethylene	mg/Kg	1	~	~	~	14	<0.20	<0.22	<0.20
Tetrahydrofuran	mg/Kg	500	~	~	~	~	<0.79	<0.89	<0.79
Toluene	mg/Kg	30	~	~	~	~	<0.20	<0.22	<0.20
1,2,3-Trichlorobenzene	mg/Kg	~	~	~	~	~	<0.79	<0.89	<0.79
1,2,4-Trichlorobenzene	mg/Kg	2	~	~	~	~	<0.20	<0.22	<0.20
1,1,1-Trichloroethane	mg/Kg	30	~	~	~	~	<0.20	<0.22	<0.20
1,1,2-Trichloroethane	mg/Kg	0	~	~	~	~	<0.20	<0.22	<0.20
Trichloroethylene	mg/Kg	0	~	~	~	10	<0.20	<0.22	<0.20
Trichlorofluoromethane (Freon 11)	mg/Kg	1,000	~	~	~	~	<0.39	<0.45	<0.39
1,2,3-Trichloropropane	mg/Kg	100	~	~	~	~	<0.39	<0.45	<0.39
1,2,4-Trimethylbenzene	mg/Kg	1,000	~	~	~	~	<0.20	<0.22	<0.20
1,3,5-Trimethylbenzene	mg/Kg	10	~	~	~	~	<0.20	<0.22	<0.20
Vinyl Chloride	mg/Kg	1	~	~	~	4	<0.39	<0.45	<0.39
m+p Xylene	mg/Kg	~	~	~	~	~	<0.39	<0.45	<0.39
o-Xylene	mg/Kg	~	~	~	~	~	<0.20	<0.22	<0.20
Total Xylenes	mg/Kg	100	~	~	~	~	ND	ND	ND
Total VOCs	mg/Kg	~	10	10	4	~	ND	ND	ND
Total Petroleum Hydrocarbons (TPH)									
TPH (C9-C36)	mg/Kg	1,000	5,000	5,000	2,500	~	14,000	7,600	22,000
Extractable Petroleum Hydrocarbons (EPH)									
C9-C18 Aliphatics	mg/Kg	1,000	~	~	~		3,900	2,000	7,500
C19-C36 Aliphatics	mg/Kg	3,000	~	~	~		4,500	3,600	12,000
C11-C22 Aromatics	mg/Kg	1,000	~	~	~		3,800	2,600	7,900
Acenaphthene	mg/Kg	4	~	~	~		5.8	1.2	18
Acenaphthylene	mg/Kg	1	~	~	~		1.1	0.84	2.3
Anthracene	mg/Kg	1,000	~	~	~		23	3.8	49
Benzo(a)anthracene	mg/Kg	7	~	~	~		52	11	35
Benzo(a)pyrene	mg/Kg	2	~	~	~		48	13	25
Benzo(b)fluoranthene	mg/Kg	7	~	~	~		57	16	36
Benzo(g,h,i)perylene	mg/Kg	1,000	~	~	~		23	6.4	15
Benzo(k)fluoranthene	mg/Kg	70	~	~	~		22	6.1	15
Chrysene	mg/Kg	70	~	~	~		54	11	43
Dibenz(a,h)anthracene	mg/Kg	1	~	~	~		7.7	1.9	4.9
Fluoranthene	mg/Kg	1,000	~	~	~		100	15	120
Fluorene	mg/Kg	1,000	~	~	~		1.5	<0.13	50
Indeno(1,2,3-cd)pyrene	mg/Kg	7	~	~	~		24	7.0	15
2-Methylnaphthalene	mg/Kg	1	~	~	~		1.3	1.0	3.0
Naphthalene	mg/Kg	4	~	~	~		4.2	2.5	12
Phenanthrene	mg/Kg	10	~	~	~		36	5.3	75
Pyrene	mg/Kg	1,000	~	~	~		92	29	95
Total PAHs	mg/Kg	~	100	~	~		552.60	131.04	613.20
Total PAHs	%	~	~	~	~		0.5526%	0.1310%	0.6132%
Total Metals									
Arsenic	mg/Kg	20	40	40	40	100	12	8.2	8.3
Barium	mg/Kg	1,000	~	~	~	2,000	190	330	71
Cadmium	mg/Kg	70	80	80	30	20	2.6	3.0	0.95
Chromium	mg/Kg	100	1,000	1,000	1,000	100	82	85	33
Copper	mg/Kg	1,000	~	~	~	~	320	420	100
Lead	mg/Kg	200	2,000	2,000	1,000	100	690	800	290
Mercury	mg/Kg	20	10	10	10	4	0.41	0.57	0.65
Selenium	mg/Kg	400	~	~	~	20	<1.5	<1.4	<1.1
Silver	mg/Kg	100	~	~	~	100	<0.30	0.53	<0.23
Zinc	mg/Kg	1,000	~	~	~	~	530	780	190

Table 1
Summary of Sediment Analytical Results
Island End River
Chelsea, Massachusetts

Analytes	Units	Reportable Concentrations	COMM-94-007 Maximum Allowable Contaminant Levels for Sediment Reuse and Disposal at Massachusetts Landfills	COMM97-001 Reuse and Disposal of Contaminated Soil at Massachusetts Landfills		Toxicity Characteristic Leaching Procedure (TCLP)	Sampling ID and Date		
		RCS-1	Lined Landfill	Lined Landfill	Unlined Landfill	20x Rule	Disp Cell 1 10/24/23	Disp Cell 2 10/24/23	Disp Cell 4 10/24/23
Semi-volatile Organic Compounds (SVOCs)									
Biphenyl	mg/Kg	0	~	~	~	~	0.49	<0.19	1.5
Acenaphthene	mg/Kg	4	~	~	~	~	1.9	0.42	5.7
Acenaphthylene	mg/Kg	1	~	~	~	~	2.9	1.4	6.0
Acetophenone	mg/Kg	1,000	~	~	~	~	<0.26	<0.24	<0.20
Aniline	mg/Kg	1,000	~	~	~	~	<0.23	<0.21	<0.17
Anthracene	mg/Kg	1,000	~	~	~	~	8.6	2.4	19
Benzo(a)anthracene	mg/Kg	7	~	~	~	~	15	6.8	23
Benzo(a)pyrene	mg/Kg	2	~	~	~	~	14	7.5	18
Benzo(b)fluoranthene	mg/Kg	7	~	~	~	~	18	10	29
Benzo(g,h,i)perylene	mg/Kg	1,000	~	~	~	~	9.0	4.6	10
Benzo(k)fluoranthene	mg/Kg	70	~	~	~	~	6.5	3.7	11
Bis(2-chloroethoxy)methane	mg/Kg	500	~	~	~	~	<0.26	<0.24	<0.20
Bis(2-chloroethyl)ether	mg/Kg	1	~	~	~	~	<0.28	<0.25	<0.21
Bis(2-chloroisopropyl)ether	mg/Kg	1	~	~	~	~	<0.56	<0.51	<0.43
Bis(2-Ethylhexyl)phthalate	mg/Kg	90	~	~	~	~	28	21	39
4-Bromophenylphenylether	mg/Kg	100	~	~	~	~	<0.28	<0.25	<0.21
Butylbenzylphthalate	mg/Kg	100	~	~	~	~	<0.25	0.27	1.4
4-Chloroaniline	mg/Kg	1	~	~	~	~	<0.24	<0.21	<0.18
2-Chloronaphthalene	mg/Kg	1,000	~	~	~	~	<0.24	<0.21	<0.18
2-Chlorophenol	mg/Kg	1	~	~	~	~	<0.27	<0.24	<0.20
Chrysene	mg/Kg	70	~	~	~	~	12	5.7	25
Dibenz(a,h)anthracene	mg/Kg	1	~	~	~	~	2.4	1.3	2.8
Dibenzofuran	mg/Kg	100	~	~	~	~	1.9	0.49	7.4
Di-n-butylphthalate	mg/Kg	50	~	~	~	~	<0.24	<0.22	<0.18
1,2-Dichlorobenzene	mg/Kg	9	~	~	~	~	<0.25	<0.23	<0.19
1,3-Dichlorobenzene	mg/Kg	3	~	~	~	~	<0.25	<0.22	<0.19
1,4-Dichlorobenzene	mg/Kg	1	~	~	~	~	<0.25	<0.23	<0.19
3,3-Dichlorobenzidine	mg/Kg	3	~	~	~	~	<0.18	<0.16	<0.13
2,4-Dichlorophenol	mg/Kg	1	~	~	~	~	<0.26	<0.23	<0.20
Diethylphthalate	mg/Kg	10	~	~	~	~	<0.26	<0.23	<0.20
2,4-Dimethylphenol	mg/Kg	1	~	~	~	~	<0.35	<0.31	0.27
Dimethylphthalate	mg/Kg	1	~	~	~	~	<0.27	<0.25	<0.21
2,4-Dinitrophenol	mg/Kg	3	~	~	~	~	<1.2	<1.1	<0.89
2,4-Dinitrotoluene	mg/Kg	1	~	~	~	2.6	<0.27	<0.24	<0.20
2,6-Dinitrotoluene	mg/Kg	100	~	~	~	~	<0.30	<0.27	<0.23
Di-n-octylphthalate	mg/Kg	1,000	~	~	~	~	0.88	0.40	1.6
1,2-Diphenylhydrazine (Azobenzene)	mg/Kg	50	~	~	~	~	<0.26	<0.23	<0.20
Fluoranthene	mg/Kg	1,000	~	~	~	~	42	10	82
Fluorene	mg/Kg	1,000	~	~	~	~	2.5	0.56	7.7
Hexachlorobenzene	mg/Kg	1	~	~	~	2.6	<0.28	<0.25	<0.21
Hexachlorobutadiene	mg/Kg	30	~	~	~	10	<0.27	<0.24	<0.20
Hexachloroethane	mg/Kg	1	~	~	~	60	<0.26	<0.24	<0.20
Indeno(1,2,3-cd)pyrene	mg/Kg	7	~	~	~	~	9.8	5.2	17
Isophorone	mg/Kg	100	~	~	~	~	<0.27	<0.25	<0.21
2-Methylnaphthalene	mg/Kg	1	~	~	~	~	1.3	0.56	3.1
2-Methylphenol (O-Cresol)	mg/Kg	500	~	~	~	4,000	<0.27	<0.24	<0.20
3/4-Methylphenol (M/P-Cresol)	mg/Kg	500	~	~	~	4,000	<0.29	<0.26	0.24
Naphthalene	mg/Kg	4	~	~	~	~	3.9	1.6	8.7
Nitrobenzene	mg/Kg	500	~	~	~	40	<0.29	<0.26	<0.22
2-Nitrophenol	mg/Kg	100	~	~	~	~	<0.28	<0.25	<0.21
4-Nitrophenol	mg/Kg	100	~	~	~	~	<0.56	<0.50	<0.42
Pentachlorophenol	mg/Kg	3	~	~	~	2,000	<0.60	<0.54	<0.46
Phenanthrene	mg/Kg	10	~	~	~	~	9.8	3.8	37
Phenol	mg/Kg	1	~	~	~	~	<0.31	<0.28	<0.24
Pyrene	mg/Kg	1,000	~	~	~	~	44	18	69
Pyridine	mg/Kg	500	~	~	~	100	<0.21	<0.19	<0.16
1,2,4-Trichlorobenzene	mg/Kg	2	~	~	~	~	<0.26	<0.23	<0.20
2,4,5-Trichlorophenol	mg/Kg	4	~	~	~	8,000	<0.26	<0.23	<0.20
2,4,6-Trichlorophenol	mg/Kg	1	~	~	~	40	<0.25	<0.23	<0.19
Total SVOCs	mg/Kg	~	~	100	100	~	234.87	105.70	425.41
Total PAHs	mg/Kg	~	100	~	~	~	203.60	83.54	374.00
Total PAHs	%	~	~	~	~	~	0.2036%	0.0835%	0.3740%
Polychlorinated Biphenyl (PCB) Congeners									
Cl1-BZ#1	µg/Kg	~	~	~	~	~	<4.5	<4.3	<3.5
Cl1-BZ#2	µg/Kg	~	~	~	~	~	<3.6	<3.4	<2.8
Cl1-BZ#3	µg/Kg	~	~	~	~	~	<3.7	28	<2.9
Cl2-BZ#4/#10	µg/Kg	~	~	~	~	~	<5.9	25	<4.5
Cl2-BZ#9	µg/Kg	~	~	~	~	~	<9.4	38	<7.2
Cl2-BZ#7	µg/Kg	~	~	~	~	~	<4.0	<3.7	<3.0
Cl2-BZ#6	µg/Kg	~	~	~	~	~	<3.8	19	<2.9
Cl2-BZ#5	µg/Kg	~	~	~	~	~	<4.0	<3.8	<3.1
Cl2-BZ#8	µg/Kg	~	~	~	~	~	96	75	<3.7
Cl3-BZ#19	µg/Kg	~	~	~	~	~	<4.1	<3.8	<3.1
Cl2-BZ#14	µg/Kg	~	~	~	~	~	<3.5	13	<2.7
Cl3-BZ#30	µg/Kg	~	~	~	~	~	<3.3	<3.1	<2.6
Cl3-BZ#18	µg/Kg	~	~	~	~	~	160	140	<3.8
Cl2-BZ#11	µg/Kg	~	~	~	~	~	<8.6	<8.0	<6.5
Cl3-BZ#17	µg/Kg	~	~	~	~	~	67	55	<3.3
Cl2-BZ#12	µg/Kg	~	~	~	~	~	<2.7	<2.6	<2.1
Cl3-BZ#27	µg/Kg	~	~	~	~	~	<3.5	<3.3	<2.7
Cl2-BZ#13	µg/Kg	~	~	~	~	~	<2.9	<2.7	<2.2
Cl3-BZ#24	µg/Kg	~	~	~	~	~	<3.3	<3.1	<2.5
Cl3-BZ#16	µg/Kg	~	~	~	~	~	<4.0	59	<3.0
Cl3-BZ#32	µg/Kg	~	~	~	~	~	<3.0	36	<2.3
Cl2-BZ#15	µg/Kg	~	~	~	~	~	<3.8	47	<2.9
Cl3-BZ#34	µg/Kg	~	~	~	~	~	<3.5	<3.3	<2.7
Cl4-BZ#54	µg/Kg	~	~	~	~	~	<5.5	<5.2	<4.2
Cl3-BZ#23	µg/Kg	~	~	~	~	~	<2.8	<2.6	<2.1
Cl3-BZ#29	µg/Kg	~	~	~	~	~	<3.1	<2.9	<2.4
Cl4-BZ#50	µg/Kg	~	~	~	~	~	<5.6	<5.3	<4.3
Cl3-BZ#26	µg/Kg	~	~	~	~	~	<4.4	<4.2	<3.4
Cl3-BZ#25	µg/Kg	~	~	~	~	~	<3.2	<3.0	<2.5
Cl4-BZ#53	µg/Kg	~	~	~	~	~	29	29	<4.5
Cl3-BZ#31	µg/Kg	~	~	~	~	~	160	130	<3.8
Cl3-BZ#28	µg/Kg	~	~	~	~	~	160	160	<3.7
Cl3-BZ#33/#21/#20	µg/Kg	~	~	~	~	~	<11	66	<8.7
Cl4-BZ#51	µg/Kg	~	~	~	~	~	<5.9	8	<4.5
Cl4-BZ#45	µg/Kg	~	~	~	~	~	<5.3	25	<4.0
Cl3-BZ#22	µg/Kg	~	~	~	~	~	75	59	<2.8
Cl4-BZ#46	µg/Kg	~	~	~	~	~	35	25	<4.7
Cl4-BZ#73	µg/Kg	~	~	~	~	~	<4.7	<4.4	<3.6
Cl4-BZ#69	µg/Kg	~	~	~	~	~	<6.0	<5.6	<4.6
Cl4-BZ#43	µg/Kg	~	~	~	~	~	<6.8	28	<5.2
Cl3-BZ#36	µg/Kg	~	~	~	~	~	<3.4	<3.2	<2.6
Cl4-BZ#52	µg/Kg	~	~	~	~	~	210	240	<5.1
Cl4-BZ#48	µg/Kg	~	~	~	~	~	34	26	<4.4
Cl4-BZ#49	µg/Kg	~	~	~	~	~	110	110	<4.3
Cl5-BZ#104	µg/Kg	~	~	~	~	~	<4.5	<4.3	<3.5
Cl4-BZ#47/#65/#62	µg/Kg	~	~	~	~	~	35	37	<13
Cl4-BZ#75	µg/Kg	~	~	~	~	~	<5.3	7.6	<4.1
Cl3-BZ#39	µg/Kg	~	~	~	~	~	<3.6	<3.4	<2.8
Cl3-BZ#38	µg/Kg	~	~	~	~	~	<5.1	<4.8	<3.9
Cl4-BZ#44	µg/Kg	~	~	~	~	~	150	150	<4.6
Cl4-BZ#59	µg/Kg	~	~	~	~	~	<5.6	<5.2	<4.3
Cl4-BZ#42	µg/Kg	~	~	~	~	~	36	36	<6.0
Cl4-BZ#71	µg/Kg	~	~	~	~	~	33	33	170
Cl3-BZ#35	µg/Kg	~	~	~	~	~	<3.1	<2.9	<2.3
Cl4-BZ#41	µg/Kg	~	~	~	~	~	19	16	<4.1
Cl5-BZ#96	µg/Kg	~	~	~	~	~	<5.6	<5.2	<4.3
Cl4-BZ#72	µg/Kg	~	~	~	~	~	<6.4	<6.0	<4.9
Cl5-BZ#103	µg/Kg	~	~	~	~	~	<5.9	<5.5	<4.5
Cl4-BZ#64	µg/Kg	~	~	~	~	~	58	57	<4.3
Cl4-BZ#40/#68	µg/Kg	~	~	~	~	~	<13	<13	<10
Cl3-BZ#37	µg/Kg	~	~	~	~	~	<18	<17	<14
Cl5-BZ#100	µg/Kg	~	~	~	~	~	<5.8	<5.5	<4.4
Cl5-BZ#94	µg/Kg	~	~	~	~	~	<5.4	<5.1	<4.1
Cl4-BZ#57	µg/Kg	~	~	~	~	~	<5.6	<5.2	<4.3
Cl4-BZ#67/#58	µg/Kg	~	~	~	~	~	<11	<11	<8.7
Cl5-BZ#102	µg/Kg	~	~	~	~	~	5.4	9.9	<3.9
Cl4-BZ#61	µg/Kg	~	~	~	~	~	<6.2	<5.8	<4.7
Cl5-BZ#98	µg/Kg	~	~	~	~	~	13	14	<4.2
Cl5-BZ#93	µg/Kg	~	~	~	~	~	<14	<13	<11
Cl4-BZ#76	µg/Kg	~	~	~	~	~	<6.3	<5.9	<4.8
Cl4-BZ#63	µg/Kg	~	~	~	~	~	<5.7	<5.4	<4.4
Cl5-BZ#88/#95	µg/Kg	~	~	~	~	~	160	220	<9.0
Cl5-BZ#121	µg/Kg	~	~	~	~	~	<5.0	<4.7	68
Cl4-BZ#74	µg/Kg	~	~	~	~	~	45	51	<4.9
Cl6-BZ#155	µg/Kg	~	~	~	~	~	<5.4	<5.1	<4.1
Cl4-BZ#70	µg/Kg	~	~	~	~	~	92	130	<4.8

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Island End River
Chelsea, Massachusetts

Analytes	Units	Reportable Concentrations	COMM-94-007 Maximum Allowable Contaminant Levels for Sediment Reuse and Disposal at Massachusetts Landfills	COMM97-001 Reuse and Disposal of Contaminanted Soil at Massachusetts Landfills		Toxicity Characteristic Leaching Procedure (TCLP)	Sampling ID and Date		
		RCS-1	Lined Landfill	Lined Landfill	Unlined Landfill	20x Rule	Disp Cell 1 10/24/23	Disp Cell 2 10/24/23	Disp Cell 4 10/24/23
Polychlorinated Biphenyl (PCB) Congeners continued…									
Cl5-BZ#91	µg/Kg	~	~	~	~	~	24	33	<4.1
Cl4-BZ#66	µg/Kg	~	~	~	~	~	70	100	<4.8
Cl4-BZ#80/#55	µg/Kg	~	~	~	~	~	<10	<9.7	<7.9
Cl5-BZ#92	µg/Kg	~	~	~	~	~	28	41	<4.2
Cl5-BZ#89/#84	µg/Kg	~	~	~	~	~	44	65	23
Cl4-BZ#56	µg/Kg	~	~	~	~	~	26	38	<5.0
Cl5-BZ#90/#101	µg/Kg	~	~	~	~	~	150	210	<10
Cl5-BZ#113	µg/Kg	~	~	~	~	~	<4.8	<4.5	99
Cl4-BZ#60	µg/Kg	~	~	~	~	~	13	20	<4.1
Cl5-BZ#99	µg/Kg	~	~	~	~	~	56	83	39
Cl6-BZ#150	µg/Kg	~	~	~	~	~	<5.8	<5.5	<4.5
Cl6-BZ#152	µg/Kg	~	~	~	~	~	<5.3	<5.0	<4.1
Cl5-BZ#119/#83	µg/Kg	~	~	~	~	~	<11	<10	<8.3
Cl5-BZ#125/#112/#86	µg/Kg	~	~	~	~	~	<17	<16	<13
Cl5-BZ#109	µg/Kg	~	~	~	~	~	<5.7	<5.3	<4.3
Cl6-BZ#145	µg/Kg	~	~	~	~	~	<5.3	<4.9	<4.0
Cl5-BZ#97	µg/Kg	~	~	~	~	~	50	71	<4.5
Cl6-BZ#148	µg/Kg	~	~	~	~	~	<5.5	<5.2	<4.2
Cl4-BZ#79	µg/Kg	~	~	~	~	~	<5.4	<5.1	<4.2
Cl5-BZ#116	µg/Kg	~	~	~	~	~	<12	<11	<9.1
Cl5-BZ#87	µg/Kg	~	~	~	~	~	73	100	55
Cl4-BZ#78	µg/Kg	~	~	~	~	~	<5.6	<5.2	<4.3
Cl6-BZ#154/#136	µg/Kg	~	~	~	~	~	22	30	13
Cl5-BZ#111/#117/#115	µg/Kg	~	~	~	~	~	<16	<15	<12
Cl5-BZ#85	µg/Kg	~	~	~	~	~	24	37	<5.6
Cl5-BZ#120/#110	µg/Kg	~	~	~	~	~	160	240	110
Cl4-BZ#81	µg/Kg	~	~	~	~	~	<6.5	<6.1	<5.0
Cl6-BZ#151	µg/Kg	~	~	~	~	~	29	42	17
Cl6-BZ#135	µg/Kg	~	~	~	~	~	17	22	<5.0
Cl5-BZ#82	µg/Kg	~	~	~	~	~	19	25	<4.4
Cl6-BZ#144	µg/Kg	~	~	~	~	~	8.1	11	<4.6
Cl6-BZ#147/#149	µg/Kg	~	~	~	~	~	110	150	<9.3
Cl4-BZ#77	µg/Kg	~	~	~	~	~	<6.4	<6.0	<4.9
Cl6-BZ#143/#139	µg/Kg	~	~	~	~	~	<11	<11	<8.8
Cl6-BZ#140	µg/Kg	~	~	~	~	~	<5.2	<4.9	<4.0
Cl5-BZ#124	µg/Kg	~	~	~	~	~	<5.4	9.8	<4.1
Cl5-BZ#108	µg/Kg	~	~	~	~	~	<4.8	<4.5	<3.7
Cl5-BZ#123/#107	µg/Kg	~	~	~	~	~	<13	14	<10
Cl7-BZ#188	µg/Kg	~	~	~	~	~	<5.2	<4.9	<4.0
Cl6-BZ#134	µg/Kg	~	~	~	~	~	10	14	<4.5
Cl5-BZ#106	µg/Kg	~	~	~	~	~	<8.2	<7.7	<6.3
Cl6-BZ#142	µg/Kg	~	~	~	~	~	<5.6	<5.3	<4.3
Cl6-BZ#133/#131	µg/Kg	~	~	~	~	~	<13	<12	<9.9
Cl5-BZ#118	µg/Kg	~	~	~	~	~	150	210	99
Cl7-BZ#184	µg/Kg	~	~	~	~	~	<5.8	<5.4	<4.4
Cl6-BZ#165	µg/Kg	~	~	~	~	~	<6.1	<5.7	<4.6
Cl6-BZ#146	µg/Kg	~	~	~	~	~	20	26	14
Cl5-BZ#122	µg/Kg	~	~	~	~	~	<5.8	<5.4	<4.4
Cl6-BZ#161	µg/Kg	~	~	~	~	~	<6.5	<6.1	<5.0
Cl5-BZ#114	µg/Kg	~	~	~	~	~	<6.1	<5.7	<4.7
Cl6-BZ#168	µg/Kg	~	~	~	~	~	<5.9	<5.5	<4.5
Cl6-BZ#153	µg/Kg	~	~	~	~	~	120	170	72
Cl6-BZ#132	µg/Kg	~	~	~	~	~	52	75	31
Cl7-BZ#179	µg/Kg	~	~	~	~	~	16	21	<4.4
Cl6-BZ#141	µg/Kg	~	~	~	~	~	28	39	<5.7
Cl7-BZ#176	µg/Kg	~	~	~	~	~	<6.2	6.9	<4.7
Cl5-BZ#105	µg/Kg	~	~	~	~	~	48	71	<4.5
Cl6-BZ#137	µg/Kg	~	~	~	~	~	10	13	<4.6
Cl7-BZ#186	µg/Kg	~	~	~	~	~	<6.8	<6.4	<5.2
Cl5-BZ#127	µg/Kg	~	~	~	~	~	<5.8	<5.5	<4.5
Cl6-BZ#130/#164	µg/Kg	~	~	~	~	~	20	30	<10
Cl7-BZ#178	µg/Kg	~	~	~	~	~	8.6	10	<4.8
Cl6-BZ#138	µg/Kg	~	~	~	~	~	120	160	81
Cl6-BZ#160/#129/#163	µg/Kg	~	~	~	~	~	30	44	25
Cl6-BZ#158	µg/Kg	~	~	~	~	~	19	23	<4.9
Cl7-BZ#182/#175	µg/Kg	~	~	~	~	~	<12	<11	<8.8
Cl7-BZ#187	µg/Kg	~	~	~	~	~	45	57	28
Cl7-BZ#183	µg/Kg	~	~	~	~	~	22	27	13
Cl6-BZ#166	µg/Kg	~	~	~	~	~	<6.9	<6.4	<5.2
Cl6-BZ#159	µg/Kg	~	~	~	~	~	<7.0	<6.6	<5.4
Cl5-BZ#126	µg/Kg	~	~	~	~	~	<6.5	<6.1	<4.9
Cl7-BZ#185	µg/Kg	~	~	~	~	~	<7.6	<7.2	<5.8
Cl6-BZ#128/#162	µg/Kg	~	~	~	~	~	27	37	<11
Cl7-BZ#174	µg/Kg	~	~	~	~	~	37	47	18
Cl8-BZ#202	µg/Kg	~	~	~	~	~	<9.6	<9.0	<7.3
Cl6-BZ#167	µg/Kg	~	~	~	~	~	7.5	10	<5.4
Cl7-BZ#181	µg/Kg	~	~	~	~	~	<7.5	<7.0	<5.7
Cl7-BZ#177	µg/Kg	~	~	~	~	~	19	28	<5.4
Cl8-BZ#200/#204	µg/Kg	~	~	~	~	~	<19	<17	<14
Cl7-BZ#171	µg/Kg	~	~	~	~	~	11	14	<4.9
Cl7-BZ#173	µg/Kg	~	~	~	~	~	<7.5	<7.1	<5.8
Cl8-BZ#197	µg/Kg	~	~	~	~	~	<8.9	<8.4	<6.8
Cl7-BZ#172	µg/Kg	~	~	~	~	~	<32	<30	<24
Cl6-BZ#156	µg/Kg	~	~	~	~	~	23	30	<5.1
Cl7-BZ#192	µg/Kg	~	~	~	~	~	<25	<23	<19
Cl6-BZ#157	µg/Kg	~	~	~	~	~	<6.3	<5.9	<4.8
Cl7-BZ#180	µg/Kg	~	~	~	~	~	88	110	54
Cl7-BZ#193	µg/Kg	~	~	~	~	~	<6.9	<6.4	<5.2
Cl8-BZ#199	µg/Kg	~	~	~	~	~	<9.8	<9.2	<7.5
Cl7-BZ#191	µg/Kg	~	~	~	~	~	<6.2	<5.8	<4.7
Cl8-BZ#198	µg/Kg	~	~	~	~	~	<11	<10	<8.5
Cl8-BZ#201	µg/Kg	~	~	~	~	~	<12	<11	<8.9
Cl7-BZ#170	µg/Kg	~	~	~	~	~	33	44	<5.7
Cl7-BZ#190	µg/Kg	~	~	~	~	~	8.2	<6.7	<5.4
Cl8-BZ#196	µg/Kg	~	~	~	~	~	<11	<11	<8.7
Cl8-BZ#203	µg/Kg	~	~	~	~	~	<13	<12	<10
Cl6-BZ#169	µg/Kg	~	~	~	~	~	<7.3	<6.9	<5.6
Cl9-BZ#208	µg/Kg	~	~	~	~	~	<7.8	<7.3	<6.0
Cl9-BZ#207	µg/Kg	~	~	~	~	~	<5.3	<5.0	<4.1
Cl7-BZ#189	µg/Kg	~	~	~	~	~	<5.3	<4.9	<4.0
Cl8-BZ#195	µg/Kg	~	~	~	~	~	130	120	<5.9
Cl8-BZ#194	µg/Kg	~	~	~	~	~	31	39	<5.6
Cl8-BZ#205	µg/Kg	~	~	~	~	~	<6.5	<6.1	<5.0
Cl9-BZ#206	µg/Kg	~	~	~	~	~	<7.8	21	<5.9
Cl10-BZ#209	µg/Kg	~	~	~	~	~	<8.6	11	<6.6
Total PCBs	µg/Kg	1000	<2000	<2000	<2000	~	3838.8	5052.2	1029.0
General Chemistry Parameters									
% Solids	% Weight	~	~	~	~	~	51	55	67
Specific Conductance	µmhos/cm	~	~	8,000	4,000	~	350	430	220
Reactive Cyanide	mg/Kg	~	~	~	~	~	92	83	43
Reactive Sulfide	mg/Kg	~	~	~	~	~	120	140	66
Total Organic Carbon	mg/Kg	~	~	~	~	~	150,000	100,000	92,000
Ignitability	present/absent	~	~	~	~	~	Absent	Absent	Absent

QC by LMK 11.6.2023

Notes:
1. Analytical results are screened against Massachusetts Contingency Plan Reportable Concentrations S-1 (RCS-1) Standards for comparison purposes only; last revised in March 2020.
2. Analytical results are compared to Interim Policy for Sampling, Analysis, Handling and Tracking Requimrents for Dredged Sediment Reused or Disposed as Massachusetts Permitted Landfill (Interim Polcy # COMM-94-007) Maximum Allowable Contaminant Levels (last revised in for Sediment Reuse and Disposal at Lined Landfills; last revised in July 2000.
3. Analytical results are compared to Reuse and Disposal of Contaminated Soil at Massachusetts Landfills (Policy # COMM-97-001); last revised in August 1997.

<VALUE	= Analyte detected below laboratory detection limits.
VALUE	= Analyte detected equals or exceeds laboratory detection limits.
VALUE	= Analyte detected exceeds RCS-1 Standards.
VALUE	= Analyte detected exceeds RCS-1 Standards and TCLP 20x Rule.
VALUE	= Analyte detected exceeds COMM-94-007 Standards.
VALUE	= Analyte detected exceeds RCS-1, COMM-94-007, and COMM-97-001 Standards.

Abbreviations:
µmhos/cm = microSiemens per centimeter
mg/Kg = milligrams per kilogram

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November 6, 2023

Lee Koska
Weston & Sampson Engineers MA
55 Walkers Brook Drive
Reading, MA 01867

Project Location: Chelsea, MA
Client Job Number:
Project Number: ENG23-0300
Laboratory Work Order Number: 23J3373

Enclosed are results of analyses for samples as received by the laboratory on October 25, 2023. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

DRAFT REPORT
Project Manager

Table of Contents

Table of Contents (continued)

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Weston & Sampson Engineers MA
55 Walkers Brook Drive
Reading, MA 01867
ATTN: Lee Koska

REPORT DATE: 11/6/2023

PURCHASE ORDER NUMBER:

PROJECT NUMBER: ENG23-0300

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 23J3373

The results of analyses performed on the following samples submitted to CON-TEST, a Pace Analytical Laboratory, are found in this report.

PROJECT LOCATION: Chelsea, MA

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
Disp Cell 1	23J3373-01	Soil		MADEP EPH rev 2.1	
				SM 2540G	
				SM D 422-63	GAI-LAP-20-1996/AASHTO
				SM21-23 2510B Modified	
				SW 846 9060A	
				SW-846 1030	
				SW-846 6010D	
				SW-846 7471B	
				SW-846 8100 Modified	
				SW-846 8260D	
				SW-846 8270E	
				SW-846 9014	
				SW-846 9030A	
				SW-846-8270M	
Disp Cell 2	23J3373-02	Soil		MADEP EPH rev 2.1	
				SM 2540G	
				SM D 422-63	GAI-LAP-20-1996/AASHTO
				SM21-23 2510B Modified	
				SW 846 9060A	
				SW-846 1030	
				SW-846 6010D	
				SW-846 7471B	
				SW-846 8100 Modified	
				SW-846 8260D	
				SW-846 8270E	
				SW-846 9014	
				SW-846 9030A	
				SW-846-8270M	

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Weston & Sampson Engineers MA
55 Walkers Brook Drive
Reading, MA 01867
ATTN: Lee Koska

REPORT DATE: 11/6/2023

PURCHASE ORDER NUMBER:

PROJECT NUMBER: ENG23-0300

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 23J3373

The results of analyses performed on the following samples submitted to CON-TEST, a Pace Analytical Laboratory, are found in this report.

PROJECT LOCATION: Chelsea, MA

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
Disp Cell 4	23J3373-03	Soil		MADEP EPH rev 2.1	
				SM 2540G	
				SM D 422-63	GAI-LAP-20-1996/AASHTO
				SM21-23 2510B Modified	
				SW 846 9060A	
				SW-846 1030	
				SW-846 6010D	
				SW-846 7471B	
				SW-846 8100 Modified	
				SW-846 8260D	
				SW-846 8270E	
				SW-846 9014	
				SW-846 9030A	
				SW-846-8270M	

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CASE NARRATIVE SUMMARY

All reported results are within defined laboratory quality control objectives unless listed below or otherwise qualified in this report.

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

MADEP EPH rev 2.1

Qualifications:

R-05

Laboratory fortified blank duplicate RPD is outside of control limits. Reduced precision is anticipated for any reported value for this compound.

Analyte & Samples(s) Qualified:

Benzo(g,h,i)perylene
B356430-BLK1, B356430-BS1, B356430-BSD1

Dibenz(a,h)anthracene
B356430-BLK1, B356430-BS1, B356430-BSD1

S-01

The surrogate recovery for this sample is not available due to sample dilution below the surrogate reporting limit required from high analyte concentration and/or matrix interferences.

Analyte & Samples(s) Qualified:

Chlorooctadecane (COD)
23J3373-03RE1[Disp Cell 4]

o-Terphenyl (OTP)
23J3373-03RE1[Disp Cell 4]

S-15

Surrogate recovery outside of control limits due to suspected sample matrix interference. Chromatogram(s) is attached.

Analyte & Samples(s) Qualified:

o-Terphenyl (OTP)
23J3373-03[Disp Cell 4]

V-06

Continuing calibration verification (CCV) did not meet method specifications and was biased on the high side for this compound.

Analyte & Samples(s) Qualified:

Acenaphthylene
S095557-CCV2

SW-846 6010D

Qualifications:

B-07

Data is not affected by elevated level in laboratory blank since sample result is >10x level found in the blank.

Analyte & Samples(s) Qualified:

Copper
23J3373-01[Disp Cell 1], 23J3373-02[Disp Cell 2], 23J3373-03[Disp Cell 4]

M-10

The reporting limit verification for the AIHA lead program is outside of control limits for this element. Any reported result at or near the detection limit may be biased on the high side.

Analyte & Samples(s) Qualified:

Lead
23J3373-01[Disp Cell 1], 23J3373-02[Disp Cell 2], 23J3373-03[Disp Cell 4], B356399-SRM2

SW-846 8100 Modified

Qualifications:

MS-19

Sample to spike ratio is greater than or equal to 4:1. Spiked amount is not representative of the native amount in the sample. Appropriate or meaningful recoveries cannot be calculated.

Analyte & Samples(s) Qualified:

TPH (C9-C36)
B356432-MS1, B356432-MSD1

S-01

The surrogate recovery for this sample is not available due to sample dilution below the surrogate reporting limit required from high analyte concentration and/or matrix interferences.

Analyte & Samples(s) Qualified:

2-Fluorobiphenyl
23J3373-01[Disp Cell 1], 23J3373-02[Disp Cell 2], 23J3373-03[Disp Cell 4], B356432-MS1, B356432-MSD1

SW-846 8260D

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Qualifications:

L-04

Laboratory fortified blank/laboratory control sample recovery and duplicate recovery are outside of control limits. Reported value for this compound is likely to be biased on the low side.

Analyte & Samples(s) Qualified:

Vinyl Chloride
23J3373-01[Disp Cell 1], 23J3373-02[Disp Cell 2], 23J3373-03[Disp Cell 4], B356331-BLK1, B356331-BS1, B356331-BSD1, S095491-CCV1

RL-14

Elevated reporting limit due to foaming sample matrix. MA CAM reporting limit not met.

Analyte & Samples(s) Qualified:

23J3373-01[Disp Cell 1], 23J3373-02[Disp Cell 2], 23J3373-03[Disp Cell 4]

V-05

Continuing calibration verification (CCV) did not meet method specifications and was biased on the low side for this compound.

Analyte & Samples(s) Qualified:

Acetone
23J3373-01[Disp Cell 1], 23J3373-02[Disp Cell 2], 23J3373-03[Disp Cell 4], B356331-BLK1, B356331-BS1, B356331-BSD1, S095491-CCV1

Bromomethane
23J3373-01[Disp Cell 1], 23J3373-02[Disp Cell 2], 23J3373-03[Disp Cell 4], B356331-BLK1, B356331-BS1, B356331-BSD1, S095491-CCV1

Chloromethane
23J3373-01[Disp Cell 1], 23J3373-02[Disp Cell 2], 23J3373-03[Disp Cell 4], B356331-BLK1, B356331-BS1, B356331-BSD1, S095491-CCV1

Vinyl Chloride
23J3373-01[Disp Cell 1], 23J3373-02[Disp Cell 2], 23J3373-03[Disp Cell 4], B356331-BLK1, B356331-BS1, B356331-BSD1, S095491-CCV1

V-16

Response factor is less than method specified minimum acceptable value. Reduced precision and accuracy may be associated with reported result.

Analyte & Samples(s) Qualified:

1,4-Dioxane
S095491-CCV1

V-34

Initial calibration verification (ICV) did not meet method specifications and was biased on the low side for this compound. Reported result is estimated.

Analyte & Samples(s) Qualified:

Bromomethane
23J3373-01[Disp Cell 1], 23J3373-02[Disp Cell 2], 23J3373-03[Disp Cell 4], B356331-BLK1, B356331-BS1, B356331-BSD1, S095491-CCV1

Chloromethane
23J3373-01[Disp Cell 1], 23J3373-02[Disp Cell 2], 23J3373-03[Disp Cell 4], B356331-BLK1, B356331-BS1, B356331-BSD1, S095491-CCV1

V-35

Initial calibration verification (ICV) did not meet method specifications and was biased on the high side for this compound. Reported result is estimated.

Analyte & Samples(s) Qualified:

Acetone
B356331-BS1, B356331-BSD1, S095491-CCV1

Carbon Disulfide
B356331-BS1, B356331-BSD1, S095491-CCV1

SW-846 8270E

Qualifications:

MS-07A

Matrix spike and spike duplicate recovery is outside of control limits. Analysis is in control based on laboratory fortified blank recovery. Possibility of matrix effects that lead to low bias or non-homogeneous sample aliquot cannot be eliminated.

Analyte & Samples(s) Qualified:

2,4-Dinitrophenol
B356433-MS1, B356433-MSD1

Aniline
B356433-MS1, B356433-MSD1

Fluoranthene
B356433-MS1, B356433-MSD1

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MS-22

Either matrix spike or MS duplicate is outside of control limits, but the other is within limits. RPD between the two MS/MSD results is within method specified criteria.

Analyte & Samples(s) Qualified:

Benzo(a)anthracene
B356433-MS1

Benzo(b)fluoranthene
B356433-MS1

Chrysene
B356433-MS1

Indeno(1,2,3-cd)pyrene
B356433-MS1

Pyrene
B356433-MS1

MS-23

Either matrix spike or MS duplicate is outside of control limits, but the other is within limits. RPD between the two MS/MSD results is outside of the method specified criteria. Reduced precision anticipated for any reported result for this compound.

Analyte & Samples(s) Qualified:

Hexachloroethane
B356433-MSD1

R-06

Matrix spike duplicate RPD is outside of control limits. Reduced precision is anticipated for reported result for this compound in this sample.

Analyte & Samples(s) Qualified:

Hexachloroethane
B356433-MS1

Pentachlorophenol
B356433-MS1, B356433-MSD1

V-05

Continuing calibration verification (CCV) did not meet method specifications and was biased on the low side for this compound.

Analyte & Samples(s) Qualified:

Aniline
S095827-CCV1

Di-n-octylphthalate
23J3373-01[Disp Cell 1], 23J3373-02[Disp Cell 2], 23J3373-03[Disp Cell 4], B356433-BLK1, B356433-BS1, B356433-BSD1, B356433-MS1, B356433-MSD1, S095822-CCV1

V-06

Continuing calibration verification (CCV) did not meet method specifications and was biased on the high side for this compound.

Analyte & Samples(s) Qualified:

Indeno(1,2,3-cd)pyrene
23J3373-03RE1[Disp Cell 4], S095827-CCV1

V-34

Initial calibration verification (ICV) did not meet method specifications and was biased on the low side for this compound. Reported result is estimated.

Analyte & Samples(s) Qualified:

Aniline
S095827-CCV1

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SW-846 8100 Modified

TPH (C9-C36) is quantitated against a calibration made with a diesel standard.

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Chelsea, MA　　Sample Description:　　Work Order: 23J3373

Date Received: 10/25/2023

Field Sample #: Disp Cell 1　　Sampled: 10/24/2023 11:30

Sample ID: 23J3373-01

Sample Matrix: Soil

Sample Flags: RL-14

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acetone	ND	9.9	mg/Kg dry	2	V-05	SW-846 8260D	10/26/23	10/26/23 17:43	EEH
tert-Amyl Methyl Ether (TAME)	ND	0.099	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
Benzene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
Bromobenzene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
Bromochloromethane	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
Bromodichloromethane	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
Bromoform	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
Bromomethane	ND	0.39	mg/Kg dry	2	V-05, V-34	SW-846 8260D	10/26/23	10/26/23 17:43	EEH
2-Butanone (MEK)	ND	3.9	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
n-Butylbenzene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
sec-Butylbenzene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
tert-Butylbenzene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
tert-Butyl Ethyl Ether (TBEE)	ND	0.099	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
Carbon Disulfide	ND	2.0	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
Carbon Tetrachloride	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
Chlorobenzene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
Chlorodibromomethane	ND	0.099	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
Chloroethane	ND	0.39	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
Chloroform	ND	0.39	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
Chloromethane	ND	0.39	mg/Kg dry	2	V-05, V-34	SW-846 8260D	10/26/23	10/26/23 17:43	EEH
2-Chlorotoluene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
4-Chlorotoluene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.79	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
1,2-Dibromoethane (EDB)	ND	0.099	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
Dibromomethane	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
1,2-Dichlorobenzene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
1,3-Dichlorobenzene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
1,4-Dichlorobenzene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
Dichlorodifluoromethane (Freon 12)	ND	0.39	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
1,1-Dichloroethane	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
1,2-Dichloroethane	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
1,1-Dichloroethylene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
cis-1,2-Dichloroethylene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
trans-1,2-Dichloroethylene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
1,2-Dichloropropane	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
1,3-Dichloropropane	ND	0.099	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
2,2-Dichloropropane	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
1,1-Dichloropropene	ND	0.39	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
cis-1,3-Dichloropropene	ND	0.099	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
trans-1,3-Dichloropropene	ND	0.099	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
Diethyl Ether	ND	0.39	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
Diisopropyl Ether (DIPE)	ND	0.099	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
1,4-Dioxane	ND	9.9	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
Ethylbenzene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Chelsea, MA Sample Description: Work Order: 23J3373

Date Received: 10/25/2023

Field Sample #: Disp Cell 1 Sampled: 10/24/2023 11:30

Sample ID: 23J3373-01

Sample Matrix: Soil

Sample Flags: RL-14

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Hexachlorobutadiene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
2-Hexanone (MBK)	ND	2.0	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
Isopropylbenzene (Cumene)	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
p-Isopropyltoluene (p-Cymene)	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
Methyl tert-Butyl Ether (MTBE)	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
Methylene Chloride	ND	0.99	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
4-Methyl-2-pentanone (MIBK)	ND	2.0	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
Naphthalene	ND	0.39	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
n-Propylbenzene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
Styrene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
1,1,1,2-Tetrachloroethane	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
1,1,2,2-Tetrachloroethane	ND	0.099	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
Tetrachloroethylene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
Tetrahydrofuran	ND	0.79	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
Toluene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
1,2,3-Trichlorobenzene	ND	0.79	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
1,2,4-Trichlorobenzene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
1,1,1-Trichloroethane	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
1,1,2-Trichloroethane	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
Trichloroethylene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
Trichlorofluoromethane (Freon 11)	ND	0.39	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
1,2,3-Trichloropropane	ND	0.39	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
1,2,4-Trimethylbenzene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
1,3,5-Trimethylbenzene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
Vinyl Chloride	ND	0.39	mg/Kg dry	2	L-04, V-05	SW-846 8260D	10/26/23	10/26/23 17:43	EEH
m+p Xylene	ND	0.39	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH
o-Xylene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:43	EEH

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
1,2-Dichloroethane-d4	91.4	70-130		10/26/23 17:43
Toluene-d8	105	70-130		10/26/23 17:43
4-Bromofluorobenzene	112	70-130		10/26/23 17:43

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Project Location: Chelsea, MA | Sample Description: | Work Order: 23J3373

Date Received: 10/25/2023

Field Sample #: Disp Cell 1 | Sampled: 10/24/2023 11:30

Sample ID: 23J3373-01

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Biphenyl	0.49	0.26	0.21	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
Acenaphthene	1.9	0.67	0.26	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
Acenaphthylene	2.9	0.67	0.26	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
Acetophenone	ND	1.3	0.26	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
Aniline	ND	1.3	0.23	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
Anthracene	8.6	0.67	0.26	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
Benzo(a)anthracene	15	0.67	0.24	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
Benzo(a)pyrene	14	0.67	0.22	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
Benzo(b)fluoranthene	18	0.67	0.22	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
Benzo(g,h,i)perylene	9.0	0.67	0.28	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
Benzo(k)fluoranthene	6.5	0.67	0.24	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
Bis(2-chloroethoxy)methane	ND	1.3	0.26	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
Bis(2-chloroethyl)ether	ND	1.3	0.28	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
Bis(2-chloroisopropyl)ether	ND	1.3	0.56	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
Bis(2-Ethylhexyl)phthalate	28	6.7	1.4	mg/Kg dry	5		SW-846 8270E	10/26/23	11/2/23 10:47	BGL
4-Bromophenylphenylether	ND	1.3	0.28	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
Butylbenzylphthalate	ND	1.3	0.25	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
4-Chloroaniline	ND	2.6	0.24	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
2-Chloronaphthalene	ND	1.3	0.24	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
2-Chlorophenol	ND	1.3	0.27	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
Chrysene	12	0.67	0.24	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
Dibenz(a,h)anthracene	2.4	0.67	0.26	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
Dibenzofuran	1.9	1.3	0.26	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
Di-n-butylphthalate	ND	1.3	0.24	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
1,2-Dichlorobenzene	ND	1.3	0.25	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
1,3-Dichlorobenzene	ND	1.3	0.25	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
1,4-Dichlorobenzene	ND	1.3	0.25	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
3,3-Dichlorobenzidine	ND	0.67	0.18	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
2,4-Dichlorophenol	ND	1.3	0.26	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
Diethylphthalate	ND	1.3	0.26	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
2,4-Dimethylphenol	ND	1.3	0.35	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
Dimethylphthalate	ND	1.3	0.27	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
2,4-Dinitrophenol	ND	2.6	1.2	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
2,4-Dinitrotoluene	ND	1.3	0.27	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
2,6-Dinitrotoluene	ND	1.3	0.30	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
Di-n-octylphthalate	0.88	1.3	0.26	mg/Kg dry	1	V-05, J	SW-846 8270E	10/26/23	11/1/23 18:08	AR2
1,2-Diphenylhydrazine/Azobenzene	ND	1.3	0.26	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
Fluoranthene	42	3.3	1.2	mg/Kg dry	5		SW-846 8270E	10/26/23	11/2/23 10:47	BGL
Fluorene	2.5	0.67	0.26	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
Hexachlorobenzene	ND	1.3	0.28	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
Hexachlorobutadiene	ND	1.3	0.27	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
Hexachloroethane	ND	1.3	0.26	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
Indeno(1,2,3-cd)pyrene	9.8	0.67	0.29	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
Isophorone	ND	1.3	0.27	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Chelsea, MA   Sample Description: Work Order: 23J3373

Date Received: 10/25/2023

Field Sample #: Disp Cell 1   Sampled: 10/24/2023 11:30

Sample ID: 23J3373-01

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
2-Methylnaphthalene	1.3	0.67	0.26	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
2-Methylphenol	ND	1.3	0.27	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
3/4-Methylphenol	ND	1.3	0.29	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
Naphthalene	3.9	0.67	0.27	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
Nitrobenzene	ND	1.3	0.29	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
2-Nitrophenol	ND	1.3	0.28	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
4-Nitrophenol	ND	2.6	0.56	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
Pentachlorophenol	ND	1.3	0.60	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
Phenanthrene	9.8	0.67	0.26	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
Phenol	ND	1.3	0.31	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
Pyrene	44	3.3	1.3	mg/Kg dry	5		SW-846 8270E	10/26/23	11/2/23 10:47	BGL
Pyridine	ND	1.3	0.21	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
1,2,4-Trichlorobenzene	ND	1.3	0.26	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
2,4,5-Trichlorophenol	ND	1.3	0.26	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2
2,4,6-Trichlorophenol	ND	1.3	0.25	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:08	AR2

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2-Fluorophenol	65.2	30-130		11/1/23 18:08
2-Fluorophenol	79.6	30-130		11/2/23 10:47
Phenol-d6	66.8	30-130		11/1/23 18:08
Phenol-d6	76.2	30-130		11/2/23 10:47
Nitrobenzene-d5	63.8	30-130		11/1/23 18:08
Nitrobenzene-d5	75.2	30-130		11/2/23 10:47
2-Fluorobiphenyl	56.4	30-130		11/1/23 18:08
2-Fluorobiphenyl	77.0	30-130		11/2/23 10:47
2,4,6-Tribromophenol	75.7	30-130		11/1/23 18:08
2,4,6-Tribromophenol	67.1	30-130		11/2/23 10:47
p-Terphenyl-d14	50.6	30-130		11/1/23 18:08
p-Terphenyl-d14	53.4	30-130		11/2/23 10:47

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Chelsea, MA   Sample Description: Work Order: 23J3373

Date Received: 10/25/2023

Field Sample #: Disp Cell 1   Sampled: 10/24/2023 11:30

Sample ID: 23J3373-01

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
TPH (C9-C36)	14000	1600	1500	mg/Kg dry	50		SW-846 8100 Modified	10/26/23	11/1/23 18:11	GJB

Surrogates	% Recovery	Recovery Limits	Flag/Qual	Date/Time Analyzed
2-Fluorobiphenyl	*	40-140	S-01	11/1/23 18:11

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Project Location: Chelsea, MA Sample Description: Work Order: 23J3373

Date Received: 10/25/2023

Field Sample #: Disp Cell 1 Sampled: 10/24/2023 11:30

Sample ID: 23J3373-01

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	3900	390	390	mg/Kg dry	10		MADEP EPH rev 2.1	10/26/23	11/1/23 12:53	RDD
C19-C36 Aliphatics	4500	390	390	mg/Kg dry	10		MADEP EPH rev 2.1	10/26/23	11/1/23 12:53	RDD
Unadjusted C11-C22 Aromatics	4400	390	390	mg/Kg dry	10		MADEP EPH rev 2.1	10/26/23	11/1/23 12:53	RDD
C11-C22 Aromatics	3800	390	390	mg/Kg dry	10		MADEP EPH rev 2.1	10/26/23	11/1/23 12:53	RDD
Acenaphthene	5.8	0.39	0.12	mg/Kg dry	1		MADEP EPH rev 2.1	10/26/23	10/31/23 17:48	GJB
Acenaphthylene	1.1	0.39	0.23	mg/Kg dry	1		MADEP EPH rev 2.1	10/26/23	10/31/23 17:48	GJB
Anthracene	23	0.39	0.14	mg/Kg dry	1		MADEP EPH rev 2.1	10/26/23	10/31/23 17:48	GJB
Benzo(a)anthracene	52	0.39	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	10/26/23	10/31/23 17:48	GJB
Benzo(a)pyrene	48	0.39	0.13	mg/Kg dry	1		MADEP EPH rev 2.1	10/26/23	10/31/23 17:48	GJB
Benzo(b)fluoranthene	57	0.39	0.12	mg/Kg dry	1		MADEP EPH rev 2.1	10/26/23	10/31/23 17:48	GJB
Benzo(g,h,i)perylene	23	0.39	0.10	mg/Kg dry	1		MADEP EPH rev 2.1	10/26/23	10/31/23 17:48	GJB
Benzo(k)fluoranthene	22	0.39	0.13	mg/Kg dry	1		MADEP EPH rev 2.1	10/26/23	10/31/23 17:48	GJB
Chrysene	54	0.39	0.14	mg/Kg dry	1		MADEP EPH rev 2.1	10/26/23	10/31/23 17:48	GJB
Dibenz(a,h)anthracene	7.7	0.39	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	10/26/23	10/31/23 17:48	GJB
Fluoranthene	100	3.9	1.0	mg/Kg dry	10		MADEP EPH rev 2.1	10/26/23	11/1/23 12:53	RDD
Fluorene	1.5	0.39	0.15	mg/Kg dry	1		MADEP EPH rev 2.1	10/26/23	10/31/23 17:48	GJB
Indeno(1,2,3-cd)pyrene	24	0.39	0.12	mg/Kg dry	1		MADEP EPH rev 2.1	10/26/23	10/31/23 17:48	GJB
2-Methylnaphthalene	1.3	0.39	0.14	mg/Kg dry	1		MADEP EPH rev 2.1	10/26/23	10/31/23 17:48	GJB
Naphthalene	4.2	0.39	0.22	mg/Kg dry	1		MADEP EPH rev 2.1	10/26/23	10/31/23 17:48	GJB
Phenanthrene	36	0.39	0.12	mg/Kg dry	1		MADEP EPH rev 2.1	10/26/23	10/31/23 17:48	GJB
Pyrene	92	3.9	1.4	mg/Kg dry	10		MADEP EPH rev 2.1	10/26/23	11/1/23 12:53	RDD

Surrogates	% Recovery	Recovery Limits	Flag/Qual	Date/Time Analyzed
Chlorooctadecane (COD)	60.7	40-140		10/31/23 17:48
Chlorooctadecane (COD)	57.7	40-140		11/1/23 12:53
o-Terphenyl (OTP)	101	40-140		10/31/23 17:48
o-Terphenyl (OTP)	99.6	40-140		11/1/23 12:53
2-Bromonaphthalene	51.7	40-140		10/31/23 17:48
2-Fluorobiphenyl	67.6	40-140		10/31/23 17:48

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Chelsea, MA   Sample Description: Work Order: 23J3373

Date Received: 10/25/2023

Field Sample #: Disp Cell 1   Sampled: 10/24/2023 11:30

Sample ID: 23J3373-01

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Arsenic	12	6.2	0.91	mg/Kg dry	1		SW-846 6010D	10/26/23	10/30/23 12:48	HNN
Barium	190	3.1	0.40	mg/Kg dry	1		SW-846 6010D	10/26/23	10/30/23 12:48	HNN
Cadmium	2.6	0.62	0.25	mg/Kg dry	1		SW-846 6010D	10/26/23	10/30/23 12:48	HNN
Chromium	82	1.2	0.20	mg/Kg dry	1		SW-846 6010D	10/26/23	10/30/23 12:48	HNN
Copper	320	1.2	0.27	mg/Kg dry	1	B-07	SW-846 6010D	10/26/23	10/31/23 15:17	ATP
Lead	690	0.94	0.54	mg/Kg dry	1	M-10	SW-846 6010D	10/26/23	10/30/23 12:48	HNN
Mercury	0.41	0.042	0.018	mg/Kg dry	1		SW-846 7471B	10/31/23	11/1/23 11:23	AV
Selenium	ND	6.2	1.5	mg/Kg dry	1		SW-846 6010D	10/26/23	10/30/23 12:48	HNN
Silver	ND	0.62	0.30	mg/Kg dry	1		SW-846 6010D	10/26/23	10/31/23 15:17	ATP
Zinc	530	1.2	0.77	mg/Kg dry	1		SW-846 6010D	10/26/23	10/30/23 12:48	HNN

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Project Location: Chelsea, MA Sample Description: Work Order: 23J3373

Date Received: 10/25/2023

Field Sample #: Disp Cell 1 Sampled: 10/24/2023 11:30

Sample ID: 23J3373-01

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	50.8			% Wt	1		SM 2540G	10/26/23	10/26/23 9:20	DV
Ignitability	Absent			present/absent	1		SW-846 1030	10/27/23	10/27/23 14:54	JEC
Reactive Cyanide	92	3.9	3.9	mg/Kg	1		SW-846 9014	10/26/23	10/26/23 15:15	EC
Reactive Sulfide	120	20	20	mg/Kg	1		SW-846 9030A	10/26/23	10/26/23 15:15	EC
Specific conductance @20.6°C	350	2.0		µmhos/cm	1		SM21-23 2510B Modified	10/30/23	10/30/23 19:32	JEC
Total Organic Carbon	150000	200	130	mg/Kg dry	1		SW 846 9060A	11/1/23	11/1/23 13:15	NRH

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Chelsea, MA Sample Description: Work Order: 23J3373

Date Received: 10/25/2023

Field Sample #: Disp Cell 2 Sampled: 10/24/2023 12:30

Sample ID: 23J3373-02

Sample Matrix: Soil

Sample Flags: RL-14

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acetone	ND	11	mg/Kg dry	2	V-05	SW-846 8260D	10/26/23	10/26/23 16:48	EEH
tert-Amyl Methyl Ether (TAME)	ND	0.11	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
Benzene	ND	0.22	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
Bromobenzene	ND	0.22	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
Bromochloromethane	ND	0.22	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
Bromodichloromethane	ND	0.22	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
Bromoform	ND	0.22	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
Bromomethane	ND	0.45	mg/Kg dry	2	V-05, V-34	SW-846 8260D	10/26/23	10/26/23 16:48	EEH
2-Butanone (MEK)	ND	4.5	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
n-Butylbenzene	ND	0.22	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
sec-Butylbenzene	ND	0.22	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
tert-Butylbenzene	ND	0.22	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
tert-Butyl Ethyl Ether (TBEE)	ND	0.11	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
Carbon Disulfide	ND	2.2	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
Carbon Tetrachloride	ND	0.22	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
Chlorobenzene	ND	0.22	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
Chlorodibromomethane	ND	0.11	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
Chloroethane	ND	0.45	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
Chloroform	ND	0.45	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
Chloromethane	ND	0.45	mg/Kg dry	2	V-05, V-34	SW-846 8260D	10/26/23	10/26/23 16:48	EEH
2-Chlorotoluene	ND	0.22	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
4-Chlorotoluene	ND	0.22	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.89	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
1,2-Dibromoethane (EDB)	ND	0.11	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
Dibromomethane	ND	0.22	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
1,2-Dichlorobenzene	ND	0.22	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
1,3-Dichlorobenzene	ND	0.22	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
1,4-Dichlorobenzene	ND	0.22	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
Dichlorodifluoromethane (Freon 12)	ND	0.45	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
1,1-Dichloroethane	ND	0.22	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
1,2-Dichloroethane	ND	0.22	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
1,1-Dichloroethylene	ND	0.22	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
cis-1,2-Dichloroethylene	ND	0.22	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
trans-1,2-Dichloroethylene	ND	0.22	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
1,2-Dichloropropane	ND	0.22	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
1,3-Dichloropropane	ND	0.11	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
2,2-Dichloropropane	ND	0.22	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
1,1-Dichloropropene	ND	0.45	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
cis-1,3-Dichloropropene	ND	0.11	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
trans-1,3-Dichloropropene	ND	0.11	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
Diethyl Ether	ND	0.45	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
Diisopropyl Ether (DIPE)	ND	0.11	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
1,4-Dioxane	ND	11	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
Ethylbenzene	ND	0.22	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Chelsea, MA   Sample Description: Work Order: 23J3373

Date Received: 10/25/2023

Field Sample #: Disp Cell 2   Sampled: 10/24/2023 12:30

Sample ID: 23J3373-02

Sample Matrix: Soil

Sample Flags: RL-14

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Hexachlorobutadiene	ND	0.22	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
2-Hexanone (MBK)	ND	2.2	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
Isopropylbenzene (Cumene)	ND	0.22	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
p-Isopropyltoluene (p-Cymene)	ND	0.22	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
Methyl tert-Butyl Ether (MTBE)	ND	0.22	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
Methylene Chloride	ND	1.1	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
4-Methyl-2-pentanone (MIBK)	ND	2.2	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
Naphthalene	ND	0.45	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
n-Propylbenzene	ND	0.22	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
Styrene	ND	0.22	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
1,1,1,2-Tetrachloroethane	ND	0.22	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
1,1,2,2-Tetrachloroethane	ND	0.11	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
Tetrachloroethylene	ND	0.22	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
Tetrahydrofuran	ND	0.89	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
Toluene	ND	0.22	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
1,2,3-Trichlorobenzene	ND	0.89	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
1,2,4-Trichlorobenzene	ND	0.22	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
1,1,1-Trichloroethane	ND	0.22	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
1,1,2-Trichloroethane	ND	0.22	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
Trichloroethylene	ND	0.22	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
Trichlorofluoromethane (Freon 11)	ND	0.45	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
1,2,3-Trichloropropane	ND	0.45	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
1,2,4-Trimethylbenzene	ND	0.22	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
1,3,5-Trimethylbenzene	ND	0.22	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
Vinyl Chloride	ND	0.45	mg/Kg dry	2	L-04, V-05	SW-846 8260D	10/26/23	10/26/23 16:48	EEH
m+p Xylene	ND	0.45	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH
o-Xylene	ND	0.22	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 16:48	EEH

Surrogates	% Recovery	Recovery Limits	Flag/Qual	Analyzed
1,2-Dichloroethane-d4	91.7	70-130		10/26/23 16:48
Toluene-d8	106	70-130		10/26/23 16:48
4-Bromofluorobenzene	109	70-130		10/26/23 16:48

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Chelsea, MA | Sample Description: | Work Order: 23J3373

Date Received: 10/25/2023

Field Sample #: Disp Cell 2 | Sampled: 10/24/2023 12:30

Sample ID: 23J3373-02

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Biphenyl	ND	0.24	0.19	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2
Acenaphthene	0.42	0.60	0.23	mg/Kg dry	1	J	SW-846 8270E	10/26/23	11/1/23 18:31	AR2
Acenaphthylene	1.4	0.60	0.24	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2
Acetophenone	ND	1.2	0.24	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2
Aniline	ND	1.2	0.21	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2
Anthracene	2.4	0.60	0.23	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2
Benzo(a)anthracene	6.8	0.60	0.22	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2
Benzo(a)pyrene	7.5	0.60	0.20	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2
Benzo(b)fluoranthene	10	0.60	0.20	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2
Benzo(g,h,i)perylene	4.6	0.60	0.25	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2
Benzo(k)fluoranthene	3.7	0.60	0.22	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2
Bis(2-chloroethoxy)methane	ND	1.2	0.24	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2
Bis(2-chloroethyl)ether	ND	1.2	0.25	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2
Bis(2-chloroisopropyl)ether	ND	1.2	0.51	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2
Bis(2-Ethylhexyl)phthalate	21	6.0	1.2	mg/Kg dry	5		SW-846 8270E	10/26/23	11/2/23 11:11	BGL
4-Bromophenylphenylether	ND	1.2	0.25	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2
Butylbenzylphthalate	0.27	1.2	0.23	mg/Kg dry	1	J	SW-846 8270E	10/26/23	11/1/23 18:31	AR2
4-Chloroaniline	ND	2.3	0.21	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2
2-Chloronaphthalene	ND	1.2	0.21	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2
2-Chlorophenol	ND	1.2	0.24	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2
Chrysene	5.7	0.60	0.22	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2
Dibenz(a,h)anthracene	1.3	0.60	0.23	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2
Dibenzofuran	0.49	1.2	0.24	mg/Kg dry	1	J	SW-846 8270E	10/26/23	11/1/23 18:31	AR2
Di-n-butylphthalate	ND	1.2	0.22	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2
1,2-Dichlorobenzene	ND	1.2	0.23	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2
1,3-Dichlorobenzene	ND	1.2	0.22	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2
1,4-Dichlorobenzene	ND	1.2	0.23	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2
3,3-Dichlorobenzidine	ND	0.60	0.16	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2
2,4-Dichlorophenol	ND	1.2	0.23	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2
Diethylphthalate	ND	1.2	0.23	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2
2,4-Dimethylphenol	ND	1.2	0.31	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2
Dimethylphthalate	ND	1.2	0.25	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2
2,4-Dinitrophenol	ND	2.3	1.1	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2
2,4-Dinitrotoluene	ND	1.2	0.24	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2
2,6-Dinitrotoluene	ND	1.2	0.27	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2
Di-n-octylphthalate	0.40	1.2	0.24	mg/Kg dry	1	V-05, J	SW-846 8270E	10/26/23	11/1/23 18:31	AR2
1,2-Diphenylhydrazine/Azobenzene	ND	1.2	0.23	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2
Fluoranthene	10	0.60	0.21	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2
Fluorene	0.56	0.60	0.24	mg/Kg dry	1	J	SW-846 8270E	10/26/23	11/1/23 18:31	AR2
Hexachlorobenzene	ND	1.2	0.25	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2
Hexachlorobutadiene	ND	1.2	0.24	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2
Hexachloroethane	ND	1.2	0.24	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2
Indeno(1,2,3-cd)pyrene	5.2	0.60	0.26	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2
Isophorone	ND	1.2	0.25	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Chelsea, MA   Sample Description: Work Order: 23J3373

Date Received: 10/25/2023

Field Sample #: Disp Cell 2   Sampled: 10/24/2023 12:30

Sample ID: 23J3373-02

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
2-Methylnaphthalene	0.56	0.60	0.24	mg/Kg dry	1	J	SW-846 8270E	10/26/23	11/1/23 18:31	AR2
2-Methylphenol	ND	1.2	0.24	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2
3/4-Methylphenol	ND	1.2	0.26	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2
Naphthalene	1.6	0.60	0.24	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2
Nitrobenzene	ND	1.2	0.26	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2
2-Nitrophenol	ND	1.2	0.25	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2
4-Nitrophenol	ND	2.3	0.50	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2
Pentachlorophenol	ND	1.2	0.54	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2
Phenanthrene	3.8	0.60	0.24	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2
Phenol	ND	1.2	0.28	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2
Pyrene	18	3.0	1.2	mg/Kg dry	5		SW-846 8270E	10/26/23	11/2/23 11:11	BGL
Pyridine	ND	1.2	0.19	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2
1,2,4-Trichlorobenzene	ND	1.2	0.23	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2
2,4,5-Trichlorophenol	ND	1.2	0.23	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2
2,4,6-Trichlorophenol	ND	1.2	0.23	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:31	AR2

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2-Fluorophenol	51.5	30-130		11/1/23 18:31
2-Fluorophenol	53.2	30-130		11/2/23 11:11
Phenol-d6	54.6	30-130		11/1/23 18:31
Phenol-d6	50.4	30-130		11/2/23 11:11
Nitrobenzene-d5	45.9	30-130		11/1/23 18:31
Nitrobenzene-d5	49.6	30-130		11/2/23 11:11
2-Fluorobiphenyl	44.8	30-130		11/1/23 18:31
2-Fluorobiphenyl	52.1	30-130		11/2/23 11:11
2,4,6-Tribromophenol	54.7	30-130		11/1/23 18:31
2,4,6-Tribromophenol	44.0	30-130		11/2/23 11:11
p-Terphenyl-d14	49.4	30-130		11/1/23 18:31
p-Terphenyl-d14	42.8	30-130		11/2/23 11:11

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Chelsea, MA
Sample Description:
Work Order: 23J3373

Date Received: 10/25/2023

Field Sample #: Disp Cell 2
Sampled: 10/24/2023 12:30

Sample ID: 23J3373-02

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
TPH (C9-C36)	7600	1500	1400	mg/Kg dry	50		SW-846 8100 Modified	10/26/23	11/1/23 18:43	GJB

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2-Fluorobiphenyl	*	40-140	S-01	11/1/23 18:43

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Chelsea, MA | Sample Description: | Work Order: 23J3373

Date Received: 10/25/2023

Field Sample #: Disp Cell 2 | Sampled: 10/24/2023 12:30

Sample ID: 23J3373-02

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	2000	350	350	mg/Kg dry	10		MADEP EPH rev 2.1	10/26/23	11/1/23 13:11	RDD
C19-C36 Aliphatics	3600	350	350	mg/Kg dry	10		MADEP EPH rev 2.1	10/26/23	11/1/23 13:11	RDD
Unadjusted C11-C22 Aromatics	2800	240	240	mg/Kg dry	7		MADEP EPH rev 2.1	10/26/23	11/1/23 13:11	RDD
C11-C22 Aromatics	2600	240	240	mg/Kg dry	7		MADEP EPH rev 2.1	10/26/23	11/1/23 13:11	RDD
Acenaphthene	1.2	0.35	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	10/26/23	10/31/23 18:07	GJB
Acenaphthylene	0.84	0.35	0.21	mg/Kg dry	1		MADEP EPH rev 2.1	10/26/23	10/31/23 18:07	GJB
Anthracene	3.8	0.35	0.13	mg/Kg dry	1		MADEP EPH rev 2.1	10/26/23	10/31/23 18:07	GJB
Benzo(a)anthracene	11	0.35	0.10	mg/Kg dry	1		MADEP EPH rev 2.1	10/26/23	10/31/23 18:07	GJB
Benzo(a)pyrene	13	0.35	0.12	mg/Kg dry	1		MADEP EPH rev 2.1	10/26/23	10/31/23 18:07	GJB
Benzo(b)fluoranthene	16	0.35	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	10/26/23	10/31/23 18:07	GJB
Benzo(g,h,i)perylene	6.4	0.35	0.090	mg/Kg dry	1		MADEP EPH rev 2.1	10/26/23	10/31/23 18:07	GJB
Benzo(k)fluoranthene	6.1	0.35	0.12	mg/Kg dry	1		MADEP EPH rev 2.1	10/26/23	10/31/23 18:07	GJB
Chrysene	11	0.35	0.12	mg/Kg dry	1		MADEP EPH rev 2.1	10/26/23	10/31/23 18:07	GJB
Dibenz(a,h)anthracene	1.9	0.35	0.10	mg/Kg dry	1		MADEP EPH rev 2.1	10/26/23	10/31/23 18:07	GJB
Fluoranthene	15	0.35	0.094	mg/Kg dry	1		MADEP EPH rev 2.1	10/26/23	10/31/23 18:07	GJB
Fluorene	ND	0.35	0.13	mg/Kg dry	1		MADEP EPH rev 2.1	10/26/23	10/31/23 18:07	GJB
Indeno(1,2,3-cd)pyrene	7.0	0.35	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	10/26/23	10/31/23 18:07	GJB
2-Methylnaphthalene	1.0	0.35	0.12	mg/Kg dry	1		MADEP EPH rev 2.1	10/26/23	10/31/23 18:07	GJB
Naphthalene	2.5	0.35	0.20	mg/Kg dry	1		MADEP EPH rev 2.1	10/26/23	10/31/23 18:07	GJB
Phenanthrene	5.3	0.35	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	10/26/23	10/31/23 18:07	GJB
Pyrene	29	0.35	0.12	mg/Kg dry	1		MADEP EPH rev 2.1	10/26/23	10/31/23 18:07	GJB

Surrogates	% Recovery	Recovery Limits	Flag/Qual	Date/Time Analyzed
Chlorooctadecane (COD)	61.8	40-140		10/31/23 18:07
Chlorooctadecane (COD)	61.5	40-140		11/1/23 13:11
o-Terphenyl (OTP)	94.1	40-140		10/31/23 18:07
o-Terphenyl (OTP)	103	40-140		11/1/23 13:11
2-Bromonaphthalene	101	40-140		10/31/23 18:07
2-Fluorobiphenyl	103	40-140		10/31/23 18:07

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Chelsea, MA   Sample Description: Work Order: 23J3373

Date Received: 10/25/2023

Field Sample #: Disp Cell 2   Sampled: 10/24/2023 12:30

Sample ID: 23J3373-02

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Arsenic	8.2	5.9	0.86	mg/Kg dry	1		SW-846 6010D	10/26/23	10/30/23 12:54	HNN
Barium	330	2.9	0.38	mg/Kg dry	1		SW-846 6010D	10/26/23	10/30/23 12:54	HNN
Cadmium	3.0	0.59	0.23	mg/Kg dry	1		SW-846 6010D	10/26/23	10/30/23 12:54	HNN
Chromium	85	1.2	0.19	mg/Kg dry	1		SW-846 6010D	10/26/23	10/30/23 12:54	HNN
Copper	420	1.2	0.26	mg/Kg dry	1	B-07	SW-846 6010D	10/26/23	10/31/23 15:24	ATP
Lead	800	0.88	0.51	mg/Kg dry	1	M-10	SW-846 6010D	10/26/23	10/30/23 12:54	HNN
Mercury	0.57	0.044	0.019	mg/Kg dry	1		SW-846 7471B	10/31/23	11/1/23 11:25	AV
Selenium	ND	5.9	1.4	mg/Kg dry	1		SW-846 6010D	10/26/23	10/30/23 12:54	HNN
Silver	0.53	0.59	0.28	mg/Kg dry	1	J	SW-846 6010D	10/26/23	10/31/23 15:24	ATP
Zinc	780	2.4	1.5	mg/Kg dry	2		SW-846 6010D	10/26/23	11/1/23 17:10	ATP

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Chelsea, MA | Sample Description: | Work Order: 23J3373

Date Received: 10/25/2023

Field Sample #: Disp Cell 2 | Sampled: 10/24/2023 12:30

Sample ID: 23J3373-02

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	55.2			% Wt	1		SM 2540G	10/26/23	10/26/23 9:20	DV
Ignitability	Absent			present/absent	1		SW-846 1030	10/27/23	10/27/23 14:54	JEC
Reactive Cyanide	83	3.9	3.9	mg/Kg	1		SW-846 9014	10/26/23	10/26/23 15:15	EC
Reactive Sulfide	140	20	20	mg/Kg	1		SW-846 9030A	10/26/23	10/26/23 15:15	EC
Specific conductance @21.1°C	430	2.0		µmhos/cm	1		SM21-23 2510B Modified	10/30/23	10/30/23 19:32	JEC
Total Organic Carbon	100000	180	120	mg/Kg dry	1		SW 846 9060A	11/1/23	11/1/23 14:26	NRH

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Chelsea, MA   Sample Description: Work Order: 23J3373

Date Received: 10/25/2023

Field Sample #: Disp Cell 4   Sampled: 10/24/2023 13:30

Sample ID: 23J3373-03

Sample Matrix: Soil

Sample Flags: RL-14

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acetone	ND	9.8	mg/Kg dry	2	V-05	SW-846 8260D	10/26/23	10/26/23 17:15	EEH
tert-Amyl Methyl Ether (TAME)	ND	0.098	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
Benzene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
Bromobenzene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
Bromochloromethane	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
Bromodichloromethane	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
Bromoform	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
Bromomethane	ND	0.39	mg/Kg dry	2	V-05, V-34	SW-846 8260D	10/26/23	10/26/23 17:15	EEH
2-Butanone (MEK)	ND	3.9	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
n-Butylbenzene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
sec-Butylbenzene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
tert-Butylbenzene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
tert-Butyl Ethyl Ether (TBEE)	ND	0.098	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
Carbon Disulfide	ND	2.0	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
Carbon Tetrachloride	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
Chlorobenzene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
Chlorodibromomethane	ND	0.098	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
Chloroethane	ND	0.39	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
Chloroform	ND	0.39	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
Chloromethane	ND	0.39	mg/Kg dry	2	V-05, V-34	SW-846 8260D	10/26/23	10/26/23 17:15	EEH
2-Chlorotoluene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
4-Chlorotoluene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.79	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
1,2-Dibromoethane (EDB)	ND	0.098	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
Dibromomethane	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
1,2-Dichlorobenzene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
1,3-Dichlorobenzene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
1,4-Dichlorobenzene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
Dichlorodifluoromethane (Freon 12)	ND	0.39	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
1,1-Dichloroethane	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
1,2-Dichloroethane	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
1,1-Dichloroethylene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
cis-1,2-Dichloroethylene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
trans-1,2-Dichloroethylene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
1,2-Dichloropropane	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
1,3-Dichloropropane	ND	0.098	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
2,2-Dichloropropane	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
1,1-Dichloropropene	ND	0.39	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
cis-1,3-Dichloropropene	ND	0.098	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
trans-1,3-Dichloropropene	ND	0.098	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
Diethyl Ether	ND	0.39	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
Diisopropyl Ether (DIPE)	ND	0.098	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
1,4-Dioxane	ND	9.8	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
Ethylbenzene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Chelsea, MA   Sample Description: Work Order: 23J3373

Date Received: 10/25/2023

Field Sample #: Disp Cell 4   Sampled: 10/24/2023 13:30

Sample ID: 23J3373-03

Sample Matrix: Soil

Sample Flags: RL-14

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Hexachlorobutadiene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
2-Hexanone (MBK)	ND	2.0	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
Isopropylbenzene (Cumene)	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
p-Isopropyltoluene (p-Cymene)	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
Methyl tert-Butyl Ether (MTBE)	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
Methylene Chloride	ND	0.98	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
4-Methyl-2-pentanone (MIBK)	ND	2.0	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
Naphthalene	ND	0.39	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
n-Propylbenzene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
Styrene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
1,1,1,2-Tetrachloroethane	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
1,1,2,2-Tetrachloroethane	ND	0.098	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
Tetrachloroethylene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
Tetrahydrofuran	ND	0.79	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
Toluene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
1,2,3-Trichlorobenzene	ND	0.79	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
1,2,4-Trichlorobenzene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
1,1,1-Trichloroethane	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
1,1,2-Trichloroethane	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
Trichloroethylene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
Trichlorofluoromethane (Freon 11)	ND	0.39	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
1,2,3-Trichloropropane	ND	0.39	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
1,2,4-Trimethylbenzene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
1,3,5-Trimethylbenzene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
Vinyl Chloride	ND	0.39	mg/Kg dry	2	L-04, V-05	SW-846 8260D	10/26/23	10/26/23 17:15	EEH
m+p Xylene	ND	0.39	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH
o-Xylene	ND	0.20	mg/Kg dry	2		SW-846 8260D	10/26/23	10/26/23 17:15	EEH

Surrogates	% Recovery	Recovery Limits	Flag/Qual	Date/Time Analyzed
1,2-Dichloroethane-d4	91.4	70-130		10/26/23 17:15
Toluene-d8	104	70-130		10/26/23 17:15
4-Bromofluorobenzene	111	70-130		10/26/23 17:15

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Project Location: Chelsea, MA   Sample Description: Work Order: 23J3373

Date Received: 10/25/2023

Field Sample #: Disp Cell 4   Sampled: 10/24/2023 13:30

Sample ID: 23J3373-03

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Biphenyl	1.5	0.20	0.16	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:55	AR2
Acenaphthene	5.7	0.51	0.19	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:55	AR2
Acenaphthylene	6.0	0.51	0.20	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:55	AR2
Acetophenone	ND	1.0	0.20	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:55	AR2
Aniline	ND	1.0	0.17	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:55	AR2
Anthracene	19	5.1	2.0	mg/Kg dry	10		SW-846 8270E	10/26/23	11/2/23 11:34	BGL
Benzo(a)anthracene	23	5.1	1.8	mg/Kg dry	10		SW-846 8270E	10/26/23	11/2/23 11:34	BGL
Benzo(a)pyrene	18	5.1	1.7	mg/Kg dry	10		SW-846 8270E	10/26/23	11/2/23 11:34	BGL
Benzo(b)fluoranthene	29	5.1	1.7	mg/Kg dry	10		SW-846 8270E	10/26/23	11/2/23 11:34	BGL
Benzo(g,h,i)perylene	10	0.51	0.21	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:55	AR2
Benzo(k)fluoranthene	11	0.51	0.18	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:55	AR2
Bis(2-chloroethoxy)methane	ND	1.0	0.20	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:55	AR2
Bis(2-chloroethyl)ether	ND	1.0	0.21	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:55	AR2
Bis(2-chloroisopropyl)ether	ND	1.0	0.43	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:55	AR2
Bis(2-Ethylhexyl)phthalate	39	10	2.1	mg/Kg dry	10		SW-846 8270E	10/26/23	11/2/23 11:34	BGL
4-Bromophenylphenylether	ND	1.0	0.21	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:55	AR2
Butylbenzylphthalate	1.4	1.0	0.19	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:55	AR2
4-Chloroaniline	ND	2.0	0.18	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:55	AR2
2-Chloronaphthalene	ND	1.0	0.18	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:55	AR2
2-Chlorophenol	ND	1.0	0.20	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:55	AR2
Chrysene	25	5.1	1.8	mg/Kg dry	10		SW-846 8270E	10/26/23	11/2/23 11:34	BGL
Dibenz(a,h)anthracene	2.8	0.51	0.20	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:55	AR2
Dibenzofuran	7.4	1.0	0.20	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:55	AR2
Di-n-butylphthalate	ND	1.0	0.18	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:55	AR2
1,2-Dichlorobenzene	ND	1.0	0.19	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:55	AR2
1,3-Dichlorobenzene	ND	1.0	0.19	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:55	AR2
1,4-Dichlorobenzene	ND	1.0	0.19	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:55	AR2
3,3-Dichlorobenzidine	ND	0.51	0.13	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:55	AR2
2,4-Dichlorophenol	ND	1.0	0.20	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:55	AR2
Diethylphthalate	ND	1.0	0.20	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:55	AR2
2,4-Dimethylphenol	0.27	1.0	0.26	mg/Kg dry	1	J	SW-846 8270E	10/26/23	11/1/23 18:55	AR2
Dimethylphthalate	ND	1.0	0.21	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:55	AR2
2,4-Dinitrophenol	ND	2.0	0.89	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:55	AR2
2,4-Dinitrotoluene	ND	1.0	0.20	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:55	AR2
2,6-Dinitrotoluene	ND	1.0	0.23	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:55	AR2
Di-n-octylphthalate	1.6	1.0	0.20	mg/Kg dry	1	V-05	SW-846 8270E	10/26/23	11/1/23 18:55	AR2
1,2-Diphenylhydrazine/Azobenzene	ND	1.0	0.20	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:55	AR2
Fluoranthene	82	5.1	1.8	mg/Kg dry	10		SW-846 8270E	10/26/23	11/2/23 11:34	BGL
Fluorene	7.7	0.51	0.20	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:55	AR2
Hexachlorobenzene	ND	1.0	0.21	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:55	AR2
Hexachlorobutadiene	ND	1.0	0.20	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:55	AR2
Hexachloroethane	ND	1.0	0.20	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:55	AR2
Indeno(1,2,3-cd)pyrene	17	5.1	2.2	mg/Kg dry	10	V-06	SW-846 8270E	10/26/23	11/2/23 11:34	BGL
Isophorone	ND	1.0	0.21	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:55	AR2

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Project Location: Chelsea, MA   Sample Description: Work Order: 23J3373

Date Received: 10/25/2023

Field Sample #: Disp Cell 4   Sampled: 10/24/2023 13:30

Sample ID: 23J3373-03

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
2-Methylnaphthalene	3.1	0.51	0.20	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:55	AR2
2-Methylphenol	ND	1.0	0.20	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:55	AR2
3/4-Methylphenol	0.24	1.0	0.22	mg/Kg dry	1	J	SW-846 8270E	10/26/23	11/1/23 18:55	AR2
Naphthalene	8.7	0.51	0.20	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:55	AR2
Nitrobenzene	ND	1.0	0.22	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:55	AR2
2-Nitrophenol	ND	1.0	0.21	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:55	AR2
4-Nitrophenol	ND	2.0	0.42	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:55	AR2
Pentachlorophenol	ND	1.0	0.46	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:55	AR2
Phenanthrene	37	5.1	2.0	mg/Kg dry	10		SW-846 8270E	10/26/23	11/2/23 11:34	BGL
Phenol	ND	1.0	0.24	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:55	AR2
Pyrene	69	5.1	2.0	mg/Kg dry	10		SW-846 8270E	10/26/23	11/2/23 11:34	BGL
Pyridine	ND	1.0	0.16	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:55	AR2
1,2,4-Trichlorobenzene	ND	1.0	0.20	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:55	AR2
2,4,5-Trichlorophenol	ND	1.0	0.20	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:55	AR2
2,4,6-Trichlorophenol	ND	1.0	0.19	mg/Kg dry	1		SW-846 8270E	10/26/23	11/1/23 18:55	AR2

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2-Fluorophenol	56.8	30-130		11/1/23 18:55
2-Fluorophenol	56.2	30-130		11/2/23 11:34
Phenol-d6	58.1	30-130		11/1/23 18:55
Phenol-d6	52.9	30-130		11/2/23 11:34
Nitrobenzene-d5	52.9	30-130		11/1/23 18:55
Nitrobenzene-d5	53.8	30-130		11/2/23 11:34
2-Fluorobiphenyl	54.1	30-130		11/1/23 18:55
2-Fluorobiphenyl	55.4	30-130		11/2/23 11:34
2,4,6-Tribromophenol	53.4	30-130		11/1/23 18:55
2,4,6-Tribromophenol	49.7	30-130		11/2/23 11:34
p-Terphenyl-d14	45.8	30-130		11/1/23 18:55
p-Terphenyl-d14	50.0	30-130		11/2/23 11:34

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Chelsea, MA   Sample Description: Work Order: 23J3373

Date Received: 10/25/2023

Field Sample #: Disp Cell 4   Sampled: 10/24/2023 13:30

Sample ID: 23J3373-03

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
TPH (C9-C36)	22000	1200	1100	mg/Kg dry	50		SW-846 8100 Modified	10/26/23	11/1/23 18:11	GJB

Surrogates	% Recovery	Recovery Limits	Flag/Qual	Date/Time Analyzed
2-Fluorobiphenyl	*	40-140	S-01	11/1/23 18:11

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Project Location: Chelsea, MA | Sample Description: | Work Order: 23J3373

Date Received: 10/25/2023

Field Sample #: Disp Cell 4 | Sampled: 10/24/2023 13:30

Sample ID: 23J3373-03

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	7500	880	880	mg/Kg dry	30		MADEP EPH rev 2.1	10/26/23	11/1/23 14:30	RDD
C19-C36 Aliphatics	12000	880	880	mg/Kg dry	30		MADEP EPH rev 2.1	10/26/23	11/1/23 14:30	RDD
Unadjusted C11-C22 Aromatics	8500	880	880	mg/Kg dry	30		MADEP EPH rev 2.1	10/26/23	11/1/23 14:30	RDD
C11-C22 Aromatics	7900	880	880	mg/Kg dry	30		MADEP EPH rev 2.1	10/26/23	11/1/23 14:30	RDD
Acenaphthene	18	0.29	0.093	mg/Kg dry	1		MADEP EPH rev 2.1	10/26/23	10/31/23 18:25	GJB
Acenaphthylene	2.3	0.29	0.17	mg/Kg dry	1		MADEP EPH rev 2.1	10/26/23	10/31/23 18:25	GJB
Anthracene	49	0.29	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	10/26/23	10/31/23 18:25	GJB
Benzo(a)anthracene	35	0.29	0.086	mg/Kg dry	1		MADEP EPH rev 2.1	10/26/23	10/31/23 18:25	GJB
Benzo(a)pyrene	25	0.29	0.10	mg/Kg dry	1		MADEP EPH rev 2.1	10/26/23	10/31/23 18:25	GJB
Benzo(b)fluoranthene	36	0.29	0.092	mg/Kg dry	1		MADEP EPH rev 2.1	10/26/23	10/31/23 18:25	GJB
Benzo(g,h,i)perylene	15	0.29	0.076	mg/Kg dry	1		MADEP EPH rev 2.1	10/26/23	10/31/23 18:25	GJB
Benzo(k)fluoranthene	15	0.29	0.10	mg/Kg dry	1		MADEP EPH rev 2.1	10/26/23	10/31/23 18:25	GJB
Chrysene	43	0.29	0.10	mg/Kg dry	1		MADEP EPH rev 2.1	10/26/23	10/31/23 18:25	GJB
Dibenz(a,h)anthracene	4.9	0.29	0.085	mg/Kg dry	1		MADEP EPH rev 2.1	10/26/23	10/31/23 18:25	GJB
Fluoranthene	120	8.8	2.4	mg/Kg dry	30		MADEP EPH rev 2.1	10/26/23	11/1/23 14:30	RDD
Fluorene	50	0.29	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	10/26/23	10/31/23 18:25	GJB
Indeno(1,2,3-cd)pyrene	15	0.29	0.089	mg/Kg dry	1		MADEP EPH rev 2.1	10/26/23	10/31/23 18:25	GJB
2-Methylnaphthalene	3.0	0.29	0.10	mg/Kg dry	1		MADEP EPH rev 2.1	10/26/23	10/31/23 18:25	GJB
Naphthalene	12	0.29	0.16	mg/Kg dry	1		MADEP EPH rev 2.1	10/26/23	10/31/23 18:25	GJB
Phenanthrene	75	8.8	2.8	mg/Kg dry	30		MADEP EPH rev 2.1	10/26/23	11/1/23 14:30	RDD
Pyrene	95	8.8	3.1	mg/Kg dry	30		MADEP EPH rev 2.1	10/26/23	11/1/23 14:30	RDD

Surrogates	% Recovery		Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	92.0		40-140		10/31/23 18:25
Chlorooctadecane (COD)		*	40-140	S-01	11/1/23 14:30
o-Terphenyl (OTP)	**311**	*	40-140	S-15	10/31/23 18:25
o-Terphenyl (OTP)		*	40-140	S-01	11/1/23 14:30
2-Bromonaphthalene	80.4		40-140		10/31/23 18:25
2-Fluorobiphenyl	113		40-140		10/31/23 18:25

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Project Location: Chelsea, MA | Sample Description: | Work Order: 23J3373

Date Received: 10/25/2023

Field Sample #: Disp Cell 4 | Sampled: 10/24/2023 13:30

Sample ID: 23J3373-03

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Arsenic	8.3	4.7	0.69	mg/Kg dry	1		SW-846 6010D	10/26/23	10/30/23 13:01	HNN
Barium	71	2.4	0.31	mg/Kg dry	1		SW-846 6010D	10/26/23	10/30/23 13:01	HNN
Cadmium	0.95	0.47	0.19	mg/Kg dry	1		SW-846 6010D	10/26/23	10/30/23 13:01	HNN
Chromium	33	0.95	0.15	mg/Kg dry	1		SW-846 6010D	10/26/23	10/30/23 13:01	HNN
Copper	100	0.95	0.21	mg/Kg dry	1	B-07	SW-846 6010D	10/26/23	10/31/23 15:44	ATP
Lead	290	0.71	0.41	mg/Kg dry	1	M-10	SW-846 6010D	10/26/23	10/30/23 13:01	HNN
Mercury	0.65	0.037	0.016	mg/Kg dry	1		SW-846 7471B	10/31/23	11/1/23 11:27	AV
Selenium	ND	4.7	1.1	mg/Kg dry	1		SW-846 6010D	10/26/23	10/30/23 13:01	HNN
Silver	ND	0.47	0.23	mg/Kg dry	1		SW-846 6010D	10/26/23	10/31/23 15:44	ATP
Zinc	190	0.95	0.58	mg/Kg dry	1		SW-846 6010D	10/26/23	10/30/23 13:01	HNN

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Chelsea, MA   Sample Description: Work Order: 23J3373

Date Received: 10/25/2023

Field Sample #: Disp Cell 4   Sampled: 10/24/2023 13:30

Sample ID: 23J3373-03

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	66.5			% Wt	1		SM 2540G	10/26/23	10/26/23 9:20	DV
Ignitability	Absent			present/absent	1		SW-846 1030	10/27/23	10/27/23 14:54	JEC
Reactive Cyanide	43	3.9	3.9	mg/Kg	1		SW-846 9014	10/26/23	10/26/23 15:15	EC
Reactive Sulfide	66	19	19	mg/Kg	1		SW-846 9030A	10/26/23	10/26/23 15:15	EC
Specific conductance @20.4°C	220	2.0		µmhos/cm	1		SM21-23 2510B Modified	10/30/23	10/30/23 19:32	JEC
Total Organic Carbon	92000	150	98	mg/Kg dry	1		SW 846 9060A	11/1/23	11/1/23 15:33	NRH

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Sample Extraction Data

Prep Method:SW-846 3546 Analytical Method:MADEP EPH rev 2.1

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
23J3373-01 [Disp Cell 1]	B356430	10.2	2.00	10/26/23
23J3373-01RE1 [Disp Cell 1]	B356430	10.2	2.00	10/26/23
23J3373-02 [Disp Cell 2]	B356430	10.4	2.00	10/26/23
23J3373-02RE1 [Disp Cell 2]	B356430	10.4	2.00	10/26/23
23J3373-03 [Disp Cell 4]	B356430	10.3	2.00	10/26/23
23J3373-03RE1 [Disp Cell 4]	B356430	10.3	2.00	10/26/23

Prep Method:% Solids Analytical Method:SM 2540G

Lab Number [Field ID]	Batch	Date
23J3373-01 [Disp Cell 1]	B356376	10/26/23
23J3373-02 [Disp Cell 2]	B356376	10/26/23
23J3373-03 [Disp Cell 4]	B356376	10/26/23

SM21-23 2510B Modified

Lab Number [Field ID]	Batch	Initial [g]	Date
23J3373-01 [Disp Cell 1]	B356706	1.00	10/30/23
23J3373-02 [Disp Cell 2]	B356706	1.00	10/30/23
23J3373-03 [Disp Cell 4]	B356706	1.00	10/30/23

SW 846 9060A

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
23J3373-01 [Disp Cell 1]	B356690	1.00	1.00	11/01/23
23J3373-02 [Disp Cell 2]	B356690	1.00	1.00	11/01/23
23J3373-03 [Disp Cell 4]	B356690	1.00	1.00	11/01/23

SW-846 1030

Lab Number [Field ID]	Batch	Initial [g]	Date
23J3373-01 [Disp Cell 1]	B356545	50.0	10/27/23
23J3373-02 [Disp Cell 2]	B356545	50.0	10/27/23
23J3373-03 [Disp Cell 4]	B356545	50.0	10/27/23

Prep Method:SW-846 3050B Analytical Method:SW-846 6010D

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
23J3373-01 [Disp Cell 1]	B356399	1.57	50.0	10/26/23
23J3373-02 [Disp Cell 2]	B356399	1.54	50.0	10/26/23
23J3373-03 [Disp Cell 4]	B356399	1.59	50.0	10/26/23

Prep Method:SW-846 7471 Analytical Method:SW-846 7471B

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
23J3373-01 [Disp Cell 1]	B356832	0.698	50.0	10/31/23
23J3373-02 [Disp Cell 2]	B356832	0.618	50.0	10/31/23

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Sample Extraction Data

Prep Method:SW-846 7471 **Analytical Method:SW-846 7471B**

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
23J3373-03 [Disp Cell 4]	B356832	0.611	50.0	10/31/23

Prep Method:SW-846 3546 **Analytical Method:SW-846 8100 Modified**

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
23J3373-01 [Disp Cell 1]	B356432	15.0	1.00	10/26/23
23J3373-02 [Disp Cell 2]	B356432	15.3	1.00	10/26/23
23J3373-03 [Disp Cell 4]	B356432	15.1	1.00	10/26/23

Prep Method:SW-846 5035 **Analytical Method:SW-846 8260D**

Lab Number [Field ID]	Batch	Sample Amount(g)	Methanol Volume(mL)	Methanol Aliquot(mL)	Final Volume(mL)	Date
23J3373-01 [Disp Cell 1]	B356331	9.79	9.82	0.5	50	10/26/23
23J3373-02 [Disp Cell 2]	B356331	6.36	7.85	0.5	50	10/26/23
23J3373-03 [Disp Cell 4]	B356331	5.16	6.73	0.5	50	10/26/23

Prep Method:SW-846 3546 **Analytical Method:SW-846 8270E**

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
23J3373-01 [Disp Cell 1]	B356433	15.0	1.00	10/26/23
23J3373-01RE1 [Disp Cell 1]	B356433	15.0	1.00	10/26/23
23J3373-02 [Disp Cell 2]	B356433	15.3	1.00	10/26/23
23J3373-02RE1 [Disp Cell 2]	B356433	15.3	1.00	10/26/23
23J3373-03 [Disp Cell 4]	B356433	15.1	1.00	10/26/23
23J3373-03RE1 [Disp Cell 4]	B356433	15.1	1.00	10/26/23

Prep Method:SW-846 7.3 **Analytical Method:SW-846 9014**

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
23J3373-01 [Disp Cell 1]	B356372	25.6	250	10/26/23
23J3373-02 [Disp Cell 2]	B356372	25.5	250	10/26/23
23J3373-03 [Disp Cell 4]	B356372	25.7	250	10/26/23

Prep Method:SW-846 7.3 **Analytical Method:SW-846 9030A**

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
23J3373-01 [Disp Cell 1]	B356374	25.6	250	10/26/23
23J3373-02 [Disp Cell 2]	B356374	25.5	250	10/26/23
23J3373-03 [Disp Cell 4]	B356374	25.7	250	10/26/23

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QUALITY CONTROL

Volatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B356331 - SW-846 5035										
Blank (B356331-BLK1)				Prepared & Analyzed: 10/26/23						
Acetone	ND	2.5	mg/Kg wet							V-05
tert-Amyl Methyl Ether (TAME)	ND	0.025	mg/Kg wet							
Benzene	ND	0.050	mg/Kg wet							
Bromobenzene	ND	0.050	mg/Kg wet							
Bromochloromethane	ND	0.050	mg/Kg wet							
Bromodichloromethane	ND	0.050	mg/Kg wet							
Bromoform	ND	0.050	mg/Kg wet							
Bromomethane	ND	0.10	mg/Kg wet							V-05, V-34
2-Butanone (MEK)	ND	1.0	mg/Kg wet							
n-Butylbenzene	ND	0.050	mg/Kg wet							
sec-Butylbenzene	ND	0.050	mg/Kg wet							
tert-Butylbenzene	ND	0.050	mg/Kg wet							
tert-Butyl Ethyl Ether (TBEE)	ND	0.025	mg/Kg wet							
Carbon Disulfide	ND	0.50	mg/Kg wet							
Carbon Tetrachloride	ND	0.050	mg/Kg wet							
Chlorobenzene	ND	0.050	mg/Kg wet							
Chlorodibromomethane	ND	0.025	mg/Kg wet							
Chloroethane	ND	0.10	mg/Kg wet							
Chloroform	ND	0.10	mg/Kg wet							
Chloromethane	ND	0.10	mg/Kg wet							V-05, V-34
2-Chlorotoluene	ND	0.050	mg/Kg wet							
4-Chlorotoluene	ND	0.050	mg/Kg wet							
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.20	mg/Kg wet							
1,2-Dibromoethane (EDB)	ND	0.025	mg/Kg wet							
Dibromomethane	ND	0.050	mg/Kg wet							
1,2-Dichlorobenzene	ND	0.050	mg/Kg wet							
1,3-Dichlorobenzene	ND	0.050	mg/Kg wet							
1,4-Dichlorobenzene	ND	0.050	mg/Kg wet							
Dichlorodifluoromethane (Freon 12)	ND	0.10	mg/Kg wet							
1,1-Dichloroethane	ND	0.050	mg/Kg wet							
1,2-Dichloroethane	ND	0.050	mg/Kg wet							
1,1-Dichloroethylene	ND	0.050	mg/Kg wet							
cis-1,2-Dichloroethylene	ND	0.050	mg/Kg wet							
trans-1,2-Dichloroethylene	ND	0.050	mg/Kg wet							
1,2-Dichloropropane	ND	0.050	mg/Kg wet							
1,3-Dichloropropane	ND	0.025	mg/Kg wet							
2,2-Dichloropropane	ND	0.050	mg/Kg wet							
1,1-Dichloropropene	ND	0.10	mg/Kg wet							
cis-1,3-Dichloropropene	ND	0.025	mg/Kg wet							
trans-1,3-Dichloropropene	ND	0.025	mg/Kg wet							
Diethyl Ether	ND	0.10	mg/Kg wet							
Diisopropyl Ether (DIPE)	ND	0.025	mg/Kg wet							
1,4-Dioxane	ND	2.5	mg/Kg wet							
Ethylbenzene	ND	0.050	mg/Kg wet							
Hexachlorobutadiene	ND	0.050	mg/Kg wet							
2-Hexanone (MBK)	ND	0.50	mg/Kg wet							
Isopropylbenzene (Cumene)	ND	0.050	mg/Kg wet							
p-Isopropyltoluene (p-Cymene)	ND	0.050	mg/Kg wet							
Methyl tert-Butyl Ether (MTBE)	ND	0.050	mg/Kg wet							
Methylene Chloride	ND	0.25	mg/Kg wet							
4-Methyl-2-pentanone (MIBK)	ND	0.50	mg/Kg wet							
Naphthalene	ND	0.10	mg/Kg wet							

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QUALITY CONTROL

Volatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B356331 - SW-846 5035										
Blank (B356331-BLK1)				Prepared & Analyzed: 10/26/23						
n-Propylbenzene	ND	0.050	mg/Kg wet							
Styrene	ND	0.050	mg/Kg wet							
1,1,1,2-Tetrachloroethane	ND	0.050	mg/Kg wet							
1,1,2,2-Tetrachloroethane	ND	0.025	mg/Kg wet							
Tetrachloroethylene	ND	0.050	mg/Kg wet							
Tetrahydrofuran	ND	0.20	mg/Kg wet							
Toluene	ND	0.050	mg/Kg wet							
1,2,3-Trichlorobenzene	ND	0.20	mg/Kg wet							
1,2,4-Trichlorobenzene	ND	0.050	mg/Kg wet							
1,1,1-Trichloroethane	ND	0.050	mg/Kg wet							
1,1,2-Trichloroethane	ND	0.050	mg/Kg wet							
Trichloroethylene	ND	0.050	mg/Kg wet							
Trichlorofluoromethane (Freon 11)	ND	0.10	mg/Kg wet							
1,2,3-Trichloropropane	ND	0.10	mg/Kg wet							
1,2,4-Trimethylbenzene	ND	0.050	mg/Kg wet							
1,3,5-Trimethylbenzene	ND	0.050	mg/Kg wet							
Vinyl Chloride	ND	0.10	mg/Kg wet							L-04, V-05
m+p Xylene	ND	0.10	mg/Kg wet							
o-Xylene	ND	0.050	mg/Kg wet							
Surrogate: 1,2-Dichloroethane-d4	*0.0226*		mg/Kg wet	0.0250		90.6	70-130			
Surrogate: Toluene-d8	*0.0260*		mg/Kg wet	0.0250		104	70-130			
Surrogate: 4-Bromofluorobenzene	*0.0267*		mg/Kg wet	0.0250		107	70-130			
LCS (B356331-BS1)				Prepared & Analyzed: 10/26/23						
Acetone	4.07	2.5	mg/Kg wet	5.00		81.3	40-160			V-05, V-35 †
tert-Amyl Methyl Ether (TAME)	0.560	0.025	mg/Kg wet	0.500		112	70-130			
Benzene	0.545	0.050	mg/Kg wet	0.500		109	70-130			
Bromobenzene	0.534	0.050	mg/Kg wet	0.500		107	70-130			
Bromochloromethane	0.580	0.050	mg/Kg wet	0.500		116	70-130			
Bromodichloromethane	0.510	0.050	mg/Kg wet	0.500		102	70-130			
Bromoform	0.464	0.050	mg/Kg wet	0.500		92.8	70-130			
Bromomethane	0.440	0.10	mg/Kg wet	0.500		88.1	40-160			V-05, V-34 †
2-Butanone (MEK)	5.47	1.0	mg/Kg wet	5.00		109	40-160			†
n-Butylbenzene	0.486	0.050	mg/Kg wet	0.500		97.3	70-130			
sec-Butylbenzene	0.466	0.050	mg/Kg wet	0.500		93.2	70-130			
tert-Butylbenzene	0.454	0.050	mg/Kg wet	0.500		90.9	70-130			
tert-Butyl Ethyl Ether (TBEE)	0.558	0.025	mg/Kg wet	0.500		112	70-130			
Carbon Disulfide	5.13	0.50	mg/Kg wet	5.00		103	70-130			V-35
Carbon Tetrachloride	0.554	0.050	mg/Kg wet	0.500		111	70-130			
Chlorobenzene	0.514	0.050	mg/Kg wet	0.500		103	70-130			
Chlorodibromomethane	0.502	0.025	mg/Kg wet	0.500		100	70-130			
Chloroethane	0.567	0.10	mg/Kg wet	0.500		113	70-130			
Chloroform	0.501	0.10	mg/Kg wet	0.500		100	70-130			
Chloromethane	0.262	0.10	mg/Kg wet	0.500		52.5	40-160			L-14, V-05, V-34 †
2-Chlorotoluene	0.471	0.050	mg/Kg wet	0.500		94.2	70-130			
4-Chlorotoluene	0.536	0.050	mg/Kg wet	0.500		107	70-130			
1,2-Dibromo-3-chloropropane (DBCP)	0.430	0.20	mg/Kg wet	0.500		85.9	70-130			
1,2-Dibromoethane (EDB)	0.545	0.025	mg/Kg wet	0.500		109	70-130			
Dibromomethane	0.506	0.050	mg/Kg wet	0.500		101	70-130			
1,2-Dichlorobenzene	0.450	0.050	mg/Kg wet	0.500		90.1	70-130			
1,3-Dichlorobenzene	0.468	0.050	mg/Kg wet	0.500		93.5	70-130			
1,4-Dichlorobenzene	0.456	0.050	mg/Kg wet	0.500		91.1	70-130			

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QUALITY CONTROL

Volatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes
Batch B356331 - SW-846 5035											
LCS (B356331-BS1)				Prepared & Analyzed: 10/26/23							
Dichlorodifluoromethane (Freon 12)	0.482	0.10	mg/Kg wet	0.500		96.3		40-160			†
1,1-Dichloroethane	0.528	0.050	mg/Kg wet	0.500		106		70-130			
1,2-Dichloroethane	0.456	0.050	mg/Kg wet	0.500		91.3		70-130			
1,1-Dichloroethylene	0.402	0.050	mg/Kg wet	0.500		80.3		70-130			
cis-1,2-Dichloroethylene	0.519	0.050	mg/Kg wet	0.500		104		70-130			
trans-1,2-Dichloroethylene	0.514	0.050	mg/Kg wet	0.500		103		70-130			
1,2-Dichloropropane	0.546	0.050	mg/Kg wet	0.500		109		70-130			
1,3-Dichloropropane	0.551	0.025	mg/Kg wet	0.500		110		70-130			
2,2-Dichloropropane	0.566	0.050	mg/Kg wet	0.500		113		70-130			
1,1-Dichloropropene	0.520	0.10	mg/Kg wet	0.500		104		70-130			
cis-1,3-Dichloropropene	0.544	0.025	mg/Kg wet	0.500		109		70-130			
trans-1,3-Dichloropropene	0.517	0.025	mg/Kg wet	0.500		103		70-130			
Diethyl Ether	0.460	0.10	mg/Kg wet	0.500		91.9		70-130			
Diisopropyl Ether (DIPE)	0.542	0.025	mg/Kg wet	0.500		108		70-130			
1,4-Dioxane	5.53	2.5	mg/Kg wet	5.00		111		40-160			†
Ethylbenzene	0.506	0.050	mg/Kg wet	0.500		101		70-130			
Hexachlorobutadiene	0.530	0.050	mg/Kg wet	0.500		106		70-130			
2-Hexanone (MBK)	5.67	0.50	mg/Kg wet	5.00		113		40-160			†
Isopropylbenzene (Cumene)	0.519	0.050	mg/Kg wet	0.500		104		70-130			
p-Isopropyltoluene (p-Cymene)	0.477	0.050	mg/Kg wet	0.500		95.4		70-130			
Methyl tert-Butyl Ether (MTBE)	0.554	0.050	mg/Kg wet	0.500		111		70-130			
Methylene Chloride	0.420	0.25	mg/Kg wet	0.500		84.0		70-130			
4-Methyl-2-pentanone (MIBK)	5.70	0.50	mg/Kg wet	5.00		114		40-160			†
Naphthalene	0.492	0.10	mg/Kg wet	0.500		98.3		70-130			
n-Propylbenzene	0.530	0.050	mg/Kg wet	0.500		106		70-130			
Styrene	0.522	0.050	mg/Kg wet	0.500		104		70-130			
1,1,1,2-Tetrachloroethane	0.494	0.050	mg/Kg wet	0.500		98.9		70-130			
1,1,2,2-Tetrachloroethane	0.521	0.025	mg/Kg wet	0.500		104		70-130			
Tetrachloroethylene	0.516	0.050	mg/Kg wet	0.500		103		70-130			
Tetrahydrofuran	0.528	0.20	mg/Kg wet	0.500		106		70-130			
Toluene	0.516	0.050	mg/Kg wet	0.500		103		70-130			
1,2,3-Trichlorobenzene	0.466	0.20	mg/Kg wet	0.500		93.3		70-130			
1,2,4-Trichlorobenzene	0.472	0.050	mg/Kg wet	0.500		94.5		70-130			
1,1,1-Trichloroethane	0.494	0.050	mg/Kg wet	0.500		98.8		70-130			
1,1,2-Trichloroethane	0.547	0.050	mg/Kg wet	0.500		109		70-130			
Trichloroethylene	0.528	0.050	mg/Kg wet	0.500		106		70-130			
Trichlorofluoromethane (Freon 11)	0.440	0.10	mg/Kg wet	0.500		88.0		70-130			
1,2,3-Trichloropropane	0.517	0.10	mg/Kg wet	0.500		103		70-130			
1,2,4-Trimethylbenzene	0.467	0.050	mg/Kg wet	0.500		93.4		70-130			
1,3,5-Trimethylbenzene	0.529	0.050	mg/Kg wet	0.500		106		70-130			
Vinyl Chloride	0.309	0.10	mg/Kg wet	0.500		**61.8**	*	70-130			L-04, V-05
m+p Xylene	1.01	0.10	mg/Kg wet	1.00		101		70-130			
o-Xylene	0.518	0.050	mg/Kg wet	0.500		104		70-130			
Surrogate: 1,2-Dichloroethane-d4	*0.0224*		mg/Kg wet	0.0250		89.7		70-130			
Surrogate: Toluene-d8	*0.0257*		mg/Kg wet	0.0250		103		70-130			
Surrogate: 4-Bromofluorobenzene	*0.0283*		mg/Kg wet	0.0250		113		70-130			

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QUALITY CONTROL

Volatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD		RPD Limit	Notes	
Batch B356331 - SW-846 5035												
LCS Dup (B356331-BSD1)				Prepared & Analyzed: 10/26/23								
Acetone	3.98	2.5	mg/Kg wet	5.00		79.6	40-160	2.16		20	V-05, V-35	†
tert-Amyl Methyl Ether (TAME)	0.547	0.025	mg/Kg wet	0.500		109	70-130	2.44		20		
Benzene	0.550	0.050	mg/Kg wet	0.500		110	70-130	0.822		20		
Bromobenzene	0.512	0.050	mg/Kg wet	0.500		102	70-130	4.30		20		
Bromochloromethane	0.582	0.050	mg/Kg wet	0.500		116	70-130	0.258		20		
Bromodichloromethane	0.518	0.050	mg/Kg wet	0.500		104	70-130	1.75		20		
Bromoform	0.444	0.050	mg/Kg wet	0.500		88.9	70-130	4.29		20		
Bromomethane	0.504	0.10	mg/Kg wet	0.500		101	40-160	13.4		20	V-05, V-34	†
2-Butanone (MEK)	6.78	1.0	mg/Kg wet	5.00		136	40-160	**21.3**	*	20		†
n-Butylbenzene	0.482	0.050	mg/Kg wet	0.500		96.5	70-130	0.826		20		
sec-Butylbenzene	0.470	0.050	mg/Kg wet	0.500		94.1	70-130	0.961		20		
tert-Butylbenzene	0.455	0.050	mg/Kg wet	0.500		91.0	70-130	0.110		20		
tert-Butyl Ethyl Ether (TBEE)	0.550	0.025	mg/Kg wet	0.500		110	70-130	1.45		20		
Carbon Disulfide	5.09	0.50	mg/Kg wet	5.00		102	70-130	0.783		20	V-35	
Carbon Tetrachloride	0.574	0.050	mg/Kg wet	0.500		115	70-130	3.72		20		
Chlorobenzene	0.490	0.050	mg/Kg wet	0.500		98.0	70-130	4.88		20		
Chlorodibromomethane	0.508	0.025	mg/Kg wet	0.500		102	70-130	1.29		20		
Chloroethane	0.546	0.10	mg/Kg wet	0.500		109	70-130	3.77		20		
Chloroform	0.512	0.10	mg/Kg wet	0.500		102	70-130	2.07		20		
Chloromethane	0.272	0.10	mg/Kg wet	0.500		54.5	40-160	3.74		20	L-14, V-05, V-34	†
2-Chlorotoluene	0.470	0.050	mg/Kg wet	0.500		94.1	70-130	0.106		20		
4-Chlorotoluene	0.514	0.050	mg/Kg wet	0.500		103	70-130	4.19		20		
1,2-Dibromo-3-chloropropane (DBCP)	0.399	0.20	mg/Kg wet	0.500		79.8	70-130	7.36		20		
1,2-Dibromoethane (EDB)	0.547	0.025	mg/Kg wet	0.500		109	70-130	0.366		20		
Dibromomethane	0.520	0.050	mg/Kg wet	0.500		104	70-130	2.63		20		
1,2-Dichlorobenzene	0.450	0.050	mg/Kg wet	0.500		90.1	70-130	0.00		20		
1,3-Dichlorobenzene	0.458	0.050	mg/Kg wet	0.500		91.7	70-130	1.94		20		
1,4-Dichlorobenzene	0.447	0.050	mg/Kg wet	0.500		89.4	70-130	1.88		20		
Dichlorodifluoromethane (Freon 12)	0.488	0.10	mg/Kg wet	0.500		97.6	40-160	1.34		20		†
1,1-Dichloroethane	0.541	0.050	mg/Kg wet	0.500		108	70-130	2.43		20		
1,2-Dichloroethane	0.454	0.050	mg/Kg wet	0.500		90.8	70-130	0.549		20		
1,1-Dichloroethylene	0.421	0.050	mg/Kg wet	0.500		84.2	70-130	4.74		20		
cis-1,2-Dichloroethylene	0.533	0.050	mg/Kg wet	0.500		107	70-130	2.66		20		
trans-1,2-Dichloroethylene	0.518	0.050	mg/Kg wet	0.500		104	70-130	0.776		20		
1,2-Dichloropropane	0.540	0.050	mg/Kg wet	0.500		108	70-130	1.10		20		
1,3-Dichloropropane	0.556	0.025	mg/Kg wet	0.500		111	70-130	0.813		20		
2,2-Dichloropropane	0.564	0.050	mg/Kg wet	0.500		113	70-130	0.442		20		
1,1-Dichloropropene	0.532	0.10	mg/Kg wet	0.500		106	70-130	2.28		20		
cis-1,3-Dichloropropene	0.538	0.025	mg/Kg wet	0.500		108	70-130	1.02		20		
trans-1,3-Dichloropropene	0.522	0.025	mg/Kg wet	0.500		104	70-130	0.867		20		
Diethyl Ether	0.452	0.10	mg/Kg wet	0.500		90.3	70-130	1.76		20		
Diisopropyl Ether (DIPE)	0.546	0.025	mg/Kg wet	0.500		109	70-130	0.735		20		
1,4-Dioxane	5.34	2.5	mg/Kg wet	5.00		107	40-160	3.44		20		†
Ethylbenzene	0.488	0.050	mg/Kg wet	0.500		97.7	70-130	3.62		20		
Hexachlorobutadiene	0.516	0.050	mg/Kg wet	0.500		103	70-130	2.68		20		
2-Hexanone (MBK)	5.56	0.50	mg/Kg wet	5.00		111	40-160	2.07		20		†
Isopropylbenzene (Cumene)	0.504	0.050	mg/Kg wet	0.500		101	70-130	3.03		20		
p-Isopropyltoluene (p-Cymene)	0.466	0.050	mg/Kg wet	0.500		93.3	70-130	2.23		20		
Methyl tert-Butyl Ether (MTBE)	0.548	0.050	mg/Kg wet	0.500		110	70-130	1.18		20		
Methylene Chloride	0.416	0.25	mg/Kg wet	0.500		83.3	70-130	0.837		20		
4-Methyl-2-pentanone (MIBK)	5.58	0.50	mg/Kg wet	5.00		112	40-160	2.28		20		†
Naphthalene	0.450	0.10	mg/Kg wet	0.500		90.0	70-130	8.82		20		

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QUALITY CONTROL

Volatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes
Batch B356331 - SW-846 5035											
LCS Dup (B356331-BSD1)				Prepared & Analyzed: 10/26/23							
n-Propylbenzene	0.510	0.050	mg/Kg wet	0.500		102		70-130	3.94	20	
Styrene	0.498	0.050	mg/Kg wet	0.500		99.7		70-130	4.51	20	
1,1,1,2-Tetrachloroethane	0.486	0.050	mg/Kg wet	0.500		97.2		70-130	1.73	20	
1,1,2,2-Tetrachloroethane	0.488	0.025	mg/Kg wet	0.500		97.5		70-130	6.64	20	
Tetrachloroethylene	0.524	0.050	mg/Kg wet	0.500		105		70-130	1.73	20	
Tetrahydrofuran	0.499	0.20	mg/Kg wet	0.500		99.8		70-130	5.55	20	
Toluene	0.530	0.050	mg/Kg wet	0.500		106		70-130	2.58	20	
1,2,3-Trichlorobenzene	0.450	0.20	mg/Kg wet	0.500		90.0		70-130	3.60	20	
1,2,4-Trichlorobenzene	0.440	0.050	mg/Kg wet	0.500		87.9		70-130	7.24	20	
1,1,1-Trichloroethane	0.502	0.050	mg/Kg wet	0.500		100		70-130	1.51	20	
1,1,2-Trichloroethane	0.549	0.050	mg/Kg wet	0.500		110		70-130	0.365	20	
Trichloroethylene	0.530	0.050	mg/Kg wet	0.500		106		70-130	0.378	20	
Trichlorofluoromethane (Freon 11)	0.459	0.10	mg/Kg wet	0.500		91.8		70-130	4.23	20	
1,2,3-Trichloropropane	0.500	0.10	mg/Kg wet	0.500		100		70-130	3.24	20	
1,2,4-Trimethylbenzene	0.460	0.050	mg/Kg wet	0.500		91.9		70-130	1.62	20	
1,3,5-Trimethylbenzene	0.510	0.050	mg/Kg wet	0.500		102		70-130	3.66	20	
Vinyl Chloride	0.299	0.10	mg/Kg wet	0.500		**59.8**	*	70-130	3.29	20	L-04, V-05
m+p Xylene	0.998	0.10	mg/Kg wet	1.00		99.8		70-130	1.44	20	
o-Xylene	0.509	0.050	mg/Kg wet	0.500		102		70-130	1.75	20	
Surrogate: 1,2-Dichloroethane-d4	*0.0224*		mg/Kg wet	0.0250		89.6		70-130			
Surrogate: Toluene-d8	*0.0258*		mg/Kg wet	0.0250		103		70-130			
Surrogate: 4-Bromofluorobenzene	*0.0272*		mg/Kg wet	0.0250		109		70-130			

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QUALITY CONTROL

Semivolatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B356433 - SW-846 3546										
Blank (B356433-BLK1)				Prepared: 10/26/23 Analyzed: 11/01/23						
Biphenyl	ND	0.067	mg/Kg wet							
Acenaphthene	ND	0.17	mg/Kg wet							
Acenaphthylene	ND	0.17	mg/Kg wet							
Acetophenone	ND	0.34	mg/Kg wet							
Aniline	ND	0.34	mg/Kg wet							
Anthracene	ND	0.17	mg/Kg wet							
Benzo(a)anthracene	ND	0.17	mg/Kg wet							
Benzo(a)pyrene	ND	0.17	mg/Kg wet							
Benzo(b)fluoranthene	ND	0.17	mg/Kg wet							
Benzo(g,h,i)perylene	ND	0.17	mg/Kg wet							
Benzo(k)fluoranthene	ND	0.17	mg/Kg wet							
Bis(2-chloroethoxy)methane	ND	0.34	mg/Kg wet							
Bis(2-chloroethyl)ether	ND	0.34	mg/Kg wet							
Bis(2-chloroisopropyl)ether	ND	0.34	mg/Kg wet							
Bis(2-Ethylhexyl)phthalate	ND	0.34	mg/Kg wet							
4-Bromophenylphenylether	ND	0.34	mg/Kg wet							
Butylbenzylphthalate	ND	0.34	mg/Kg wet							
4-Chloroaniline	ND	0.66	mg/Kg wet							
2-Chloronaphthalene	ND	0.34	mg/Kg wet							
2-Chlorophenol	ND	0.34	mg/Kg wet							
Chrysene	ND	0.17	mg/Kg wet							
Dibenz(a,h)anthracene	ND	0.17	mg/Kg wet							
Dibenzofuran	ND	0.34	mg/Kg wet							
Di-n-butylphthalate	ND	0.34	mg/Kg wet							
1,2-Dichlorobenzene	ND	0.34	mg/Kg wet							
1,3-Dichlorobenzene	ND	0.34	mg/Kg wet							
1,4-Dichlorobenzene	ND	0.34	mg/Kg wet							
3,3-Dichlorobenzidine	ND	0.17	mg/Kg wet							
2,4-Dichlorophenol	ND	0.34	mg/Kg wet							
Diethylphthalate	ND	0.34	mg/Kg wet							
2,4-Dimethylphenol	ND	0.34	mg/Kg wet							
Dimethylphthalate	ND	0.34	mg/Kg wet							
2,4-Dinitrophenol	ND	0.66	mg/Kg wet							
2,4-Dinitrotoluene	ND	0.34	mg/Kg wet							
2,6-Dinitrotoluene	ND	0.34	mg/Kg wet							
Di-n-octylphthalate	ND	0.34	mg/Kg wet							V-05
1,2-Diphenylhydrazine/Azobenzene	ND	0.34	mg/Kg wet							
Fluoranthene	ND	0.17	mg/Kg wet							
Fluorene	ND	0.17	mg/Kg wet							
Hexachlorobenzene	ND	0.34	mg/Kg wet							
Hexachlorobutadiene	ND	0.34	mg/Kg wet							
Hexachloroethane	ND	0.34	mg/Kg wet							
Indeno(1,2,3-cd)pyrene	ND	0.17	mg/Kg wet							
Isophorone	ND	0.34	mg/Kg wet							
2-Methylnaphthalene	ND	0.17	mg/Kg wet							
2-Methylphenol	ND	0.34	mg/Kg wet							
3/4-Methylphenol	ND	0.34	mg/Kg wet							
Naphthalene	ND	0.17	mg/Kg wet							
Nitrobenzene	ND	0.34	mg/Kg wet							
2-Nitrophenol	ND	0.34	mg/Kg wet							
4-Nitrophenol	ND	0.66	mg/Kg wet							
Pentachlorophenol	ND	0.34	mg/Kg wet							

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QUALITY CONTROL

Semivolatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B356433 - SW-846 3546										
Blank (B356433-BLK1)				Prepared: 10/26/23 Analyzed: 11/01/23						
Phenanthrene	ND	0.17	mg/Kg wet							
Phenol	ND	0.34	mg/Kg wet							
Pyrene	ND	0.17	mg/Kg wet							
Pyridine	ND	0.34	mg/Kg wet							
1,2,4-Trichlorobenzene	ND	0.34	mg/Kg wet							
2,4,5-Trichlorophenol	ND	0.34	mg/Kg wet							
2,4,6-Trichlorophenol	ND	0.34	mg/Kg wet							
Surrogate: 2-Fluorophenol	*4.40*		mg/Kg wet	6.67		66.1	30-130			
Surrogate: Phenol-d6	*4.57*		mg/Kg wet	6.67		68.6	30-130			
Surrogate: Nitrobenzene-d5	*1.94*		mg/Kg wet	3.33		58.2	30-130			
Surrogate: 2-Fluorobiphenyl	*2.01*		mg/Kg wet	3.33		60.2	30-130			
Surrogate: 2,4,6-Tribromophenol	*4.51*		mg/Kg wet	6.67		67.6	30-130			
Surrogate: p-Terphenyl-d14	*2.53*		mg/Kg wet	3.33		75.8	30-130			
LCS (B356433-BS1)				Prepared: 10/26/23 Analyzed: 11/01/23						
Biphenyl	1.04	0.067	mg/Kg wet	1.67		62.7	40-140			
Acenaphthene	1.03	0.17	mg/Kg wet	1.67		61.9	40-140			
Acenaphthylene	1.17	0.17	mg/Kg wet	1.67		70.4	40-140			
Acetophenone	1.17	0.34	mg/Kg wet	1.67		70.3	40-140			
Aniline	0.890	0.34	mg/Kg wet	1.67		53.4	40-140			
Anthracene	1.19	0.17	mg/Kg wet	1.67		71.1	40-140			
Benzo(a)anthracene	1.15	0.17	mg/Kg wet	1.67		69.0	40-140			
Benzo(a)pyrene	1.19	0.17	mg/Kg wet	1.67		71.4	40-140			
Benzo(b)fluoranthene	1.16	0.17	mg/Kg wet	1.67		69.8	40-140			
Benzo(g,h,i)perylene	1.38	0.17	mg/Kg wet	1.67		83.0	40-140			
Benzo(k)fluoranthene	1.26	0.17	mg/Kg wet	1.67		75.4	40-140			
Bis(2-chloroethoxy)methane	1.07	0.34	mg/Kg wet	1.67		64.5	40-140			
Bis(2-chloroethyl)ether	1.23	0.34	mg/Kg wet	1.67		73.5	40-140			
Bis(2-chloroisopropyl)ether	1.58	0.34	mg/Kg wet	1.67		94.6	40-140			
Bis(2-Ethylhexyl)phthalate	0.905	0.34	mg/Kg wet	1.67		54.3	40-140			
4-Bromophenylphenylether	1.08	0.34	mg/Kg wet	1.67		65.1	40-140			
Butylbenzylphthalate	1.01	0.34	mg/Kg wet	1.67		60.5	40-140			
4-Chloroaniline	0.756	0.66	mg/Kg wet	1.67		45.4	15-140			†
2-Chloronaphthalene	0.962	0.34	mg/Kg wet	1.67		57.7	40-140			
2-Chlorophenol	1.20	0.34	mg/Kg wet	1.67		72.1	30-130			
Chrysene	1.18	0.17	mg/Kg wet	1.67		70.9	40-140			
Dibenz(a,h)anthracene	1.38	0.17	mg/Kg wet	1.67		82.7	40-140			
Dibenzofuran	1.19	0.34	mg/Kg wet	1.67		71.4	40-140			
Di-n-butylphthalate	1.03	0.34	mg/Kg wet	1.67		62.1	40-140			
1,2-Dichlorobenzene	1.09	0.34	mg/Kg wet	1.67		65.3	40-140			
1,3-Dichlorobenzene	1.06	0.34	mg/Kg wet	1.67		63.9	40-140			
1,4-Dichlorobenzene	1.07	0.34	mg/Kg wet	1.67		63.9	40-140			
3,3-Dichlorobenzidine	1.00	0.17	mg/Kg wet	1.67		60.2	40-140			
2,4-Dichlorophenol	1.16	0.34	mg/Kg wet	1.67		69.4	30-130			
Diethylphthalate	1.20	0.34	mg/Kg wet	1.67		71.7	40-140			
2,4-Dimethylphenol	0.972	0.34	mg/Kg wet	1.67		58.3	30-130			
Dimethylphthalate	1.20	0.34	mg/Kg wet	1.67		72.0	40-140			
2,4-Dinitrophenol	1.05	0.66	mg/Kg wet	1.67		62.9	15-140			†
2,4-Dinitrotoluene	1.33	0.34	mg/Kg wet	1.67		79.9	40-140			
2,6-Dinitrotoluene	1.28	0.34	mg/Kg wet	1.67		76.7	40-140			
Di-n-octylphthalate	0.838	0.34	mg/Kg wet	1.67		50.3	40-140			V-05
1,2-Diphenylhydrazine/Azobenzene	1.11	0.34	mg/Kg wet	1.67		66.6	40-140			

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QUALITY CONTROL

Semivolatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B356433 - SW-846 3546										
LCS (B356433-BS1)				Prepared: 10/26/23 Analyzed: 11/01/23						
Fluoranthene	1.16	0.17	mg/Kg wet	1.67		69.4	40-140			
Fluorene	1.18	0.17	mg/Kg wet	1.67		71.1	40-140			
Hexachlorobenzene	1.17	0.34	mg/Kg wet	1.67		70.0	40-140			
Hexachlorobutadiene	0.992	0.34	mg/Kg wet	1.67		59.5	40-140			
Hexachloroethane	1.03	0.34	mg/Kg wet	1.67		62.1	40-140			
Indeno(1,2,3-cd)pyrene	1.34	0.17	mg/Kg wet	1.67		80.4	40-140			
Isophorone	1.15	0.34	mg/Kg wet	1.67		68.9	40-140			
2-Methylnaphthalene	1.14	0.17	mg/Kg wet	1.67		68.2	40-140			
2-Methylphenol	1.19	0.34	mg/Kg wet	1.67		71.3	30-130			
3/4-Methylphenol	1.32	0.34	mg/Kg wet	1.67		79.1	30-130			
Naphthalene	1.09	0.17	mg/Kg wet	1.67		65.3	40-140			
Nitrobenzene	1.09	0.34	mg/Kg wet	1.67		65.3	40-140			
2-Nitrophenol	1.15	0.34	mg/Kg wet	1.67		69.1	30-130			
4-Nitrophenol	1.40	0.66	mg/Kg wet	1.67		83.9	15-140			†
Pentachlorophenol	0.953	0.34	mg/Kg wet	1.67		57.2	30-130			
Phenanthrene	1.22	0.17	mg/Kg wet	1.67		73.4	40-140			
Phenol	1.19	0.34	mg/Kg wet	1.67		71.4	15-140			†
Pyrene	1.19	0.17	mg/Kg wet	1.67		71.2	40-140			
Pyridine	0.776	0.34	mg/Kg wet	1.67		46.5	30-140			†
1,2,4-Trichlorobenzene	1.05	0.34	mg/Kg wet	1.67		62.7	40-140			
2,4,5-Trichlorophenol	1.24	0.34	mg/Kg wet	1.67		74.5	30-130			
2,4,6-Trichlorophenol	1.13	0.34	mg/Kg wet	1.67		67.7	30-130			
Surrogate: 2-Fluorophenol	*5.18*		mg/Kg wet	6.67		77.7	30-130			
Surrogate: Phenol-d6	*5.35*		mg/Kg wet	6.67		80.2	30-130			
Surrogate: Nitrobenzene-d5	*2.23*		mg/Kg wet	3.33		66.9	30-130			
Surrogate: 2-Fluorobiphenyl	*2.10*		mg/Kg wet	3.33		63.0	30-130			
Surrogate: 2,4,6-Tribromophenol	*5.45*		mg/Kg wet	6.67		81.8	30-130			
Surrogate: p-Terphenyl-d14	*2.15*		mg/Kg wet	3.33		64.5	30-130			
LCS Dup (B356433-BSD1)				Prepared: 10/26/23 Analyzed: 11/01/23						
Biphenyl	1.09	0.067	mg/Kg wet	1.66		65.8	40-140	4.19	20	
Acenaphthene	1.08	0.17	mg/Kg wet	1.66		65.5	40-140	5.02	30	
Acenaphthylene	1.22	0.17	mg/Kg wet	1.66		73.8	40-140	4.08	30	
Acetophenone	1.24	0.34	mg/Kg wet	1.66		75.2	40-140	5.96	30	
Aniline	0.915	0.34	mg/Kg wet	1.66		55.2	40-140	2.72	30	
Anthracene	1.16	0.17	mg/Kg wet	1.66		70.3	40-140	1.80	30	
Benzo(a)anthracene	1.13	0.17	mg/Kg wet	1.66		68.2	40-140	1.92	30	
Benzo(a)pyrene	1.15	0.17	mg/Kg wet	1.66		69.5	40-140	3.42	30	
Benzo(b)fluoranthene	1.13	0.17	mg/Kg wet	1.66		68.3	40-140	2.95	30	
Benzo(g,h,i)perylene	1.36	0.17	mg/Kg wet	1.66		82.4	40-140	1.39	30	
Benzo(k)fluoranthene	1.22	0.17	mg/Kg wet	1.66		73.9	40-140	2.70	30	
Bis(2-chloroethoxy)methane	1.16	0.34	mg/Kg wet	1.66		70.1	40-140	7.66	30	
Bis(2-chloroethyl)ether	1.28	0.34	mg/Kg wet	1.66		77.3	40-140	4.40	30	
Bis(2-chloroisopropyl)ether	1.71	0.34	mg/Kg wet	1.66		103	40-140	7.90	30	
Bis(2-Ethylhexyl)phthalate	0.901	0.34	mg/Kg wet	1.66		54.4	40-140	0.481	30	
4-Bromophenylphenylether	1.10	0.34	mg/Kg wet	1.66		66.3	40-140	1.19	30	
Butylbenzylphthalate	1.03	0.34	mg/Kg wet	1.66		62.0	40-140	1.75	30	
4-Chloroaniline	0.854	0.66	mg/Kg wet	1.66		51.6	15-140	12.2	30	†
2-Chloronaphthalene	1.02	0.34	mg/Kg wet	1.66		61.7	40-140	5.94	30	
2-Chlorophenol	1.31	0.34	mg/Kg wet	1.66		79.3	30-130	8.80	30	
Chrysene	1.17	0.17	mg/Kg wet	1.66		70.6	40-140	1.17	30	
Dibenz(a,h)anthracene	1.38	0.17	mg/Kg wet	1.66		83.1	40-140	0.158	30	

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QUALITY CONTROL

Semivolatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes	
Batch B356433 - SW-846 3546											
LCS Dup (B356433-BSD1)				Prepared: 10/26/23 Analyzed: 11/01/23							
Dibenzofuran	1.24	0.34	mg/Kg wet	1.66		74.9	40-140	4.10	30		
Di-n-butylphthalate	1.03	0.34	mg/Kg wet	1.66		62.5	40-140	0.00976	30		
1,2-Dichlorobenzene	1.14	0.34	mg/Kg wet	1.66		68.6	40-140	4.32	30		
1,3-Dichlorobenzene	1.10	0.34	mg/Kg wet	1.66		66.7	40-140	3.65	30		
1,4-Dichlorobenzene	1.09	0.34	mg/Kg wet	1.66		66.0	40-140	2.57	30		
3,3-Dichlorobenzidine	0.994	0.17	mg/Kg wet	1.66		60.0	40-140	0.964	30		
2,4-Dichlorophenol	1.24	0.34	mg/Kg wet	1.66		75.2	30-130	7.36	30		
Diethylphthalate	1.22	0.34	mg/Kg wet	1.66		73.5	40-140	1.81	30		
2,4-Dimethylphenol	1.10	0.34	mg/Kg wet	1.66		66.2	30-130	12.0	30		
Dimethylphthalate	1.23	0.34	mg/Kg wet	1.66		74.1	40-140	2.21	30		
2,4-Dinitrophenol	1.01	0.66	mg/Kg wet	1.66		61.2	15-140	3.40	30		†
2,4-Dinitrotoluene	1.34	0.34	mg/Kg wet	1.66		81.1	40-140	0.852	30		
2,6-Dinitrotoluene	1.31	0.34	mg/Kg wet	1.66		78.9	40-140	2.22	30		
Di-n-octylphthalate	0.828	0.34	mg/Kg wet	1.66		50.0	40-140	1.14	30	V-05	
1,2-Diphenylhydrazine/Azobenzene	1.13	0.34	mg/Kg wet	1.66		68.0	40-140	1.48	30		
Fluoranthene	1.12	0.17	mg/Kg wet	1.66		67.5	40-140	3.38	30		
Fluorene	1.20	0.17	mg/Kg wet	1.66		72.6	40-140	1.42	30		
Hexachlorobenzene	1.17	0.34	mg/Kg wet	1.66		70.6	40-140	0.189	30		
Hexachlorobutadiene	1.04	0.34	mg/Kg wet	1.66		62.7	40-140	4.54	30		
Hexachloroethane	1.06	0.34	mg/Kg wet	1.66		64.3	40-140	2.88	30		
Indeno(1,2,3-cd)pyrene	1.30	0.17	mg/Kg wet	1.66		78.8	40-140	2.62	30		
Isophorone	1.22	0.34	mg/Kg wet	1.66		73.7	40-140	6.06	30		
2-Methylnaphthalene	1.21	0.17	mg/Kg wet	1.66		73.4	40-140	6.63	30		
2-Methylphenol	1.31	0.34	mg/Kg wet	1.66		79.1	30-130	9.60	30		
3/4-Methylphenol	1.42	0.34	mg/Kg wet	1.66		85.6	30-130	7.16	30		
Naphthalene	1.15	0.17	mg/Kg wet	1.66		69.3	40-140	5.28	30		
Nitrobenzene	1.16	0.34	mg/Kg wet	1.66		70.2	40-140	6.57	30		
2-Nitrophenol	1.24	0.34	mg/Kg wet	1.66		74.7	30-130	7.21	30		
4-Nitrophenol	1.39	0.66	mg/Kg wet	1.66		84.0	15-140	0.569	30		†
Pentachlorophenol	1.03	0.34	mg/Kg wet	1.66		62.1	30-130	7.62	30		
Phenanthrene	1.20	0.17	mg/Kg wet	1.66		72.2	40-140	2.20	30		
Phenol	1.29	0.34	mg/Kg wet	1.66		77.8	15-140	7.84	30		†
Pyrene	1.19	0.17	mg/Kg wet	1.66		71.8	40-140	0.231	30		
Pyridine	0.822	0.34	mg/Kg wet	1.66		49.6	30-140	5.78	30		†
1,2,4-Trichlorobenzene	1.13	0.34	mg/Kg wet	1.66		68.3	40-140	7.85	30		
2,4,5-Trichlorophenol	1.25	0.34	mg/Kg wet	1.66		75.4	30-130	0.563	30		
2,4,6-Trichlorophenol	1.21	0.34	mg/Kg wet	1.66		73.3	30-130	7.31	30		
Surrogate: 2-Fluorophenol	*5.41*		mg/Kg wet	6.62		81.7	30-130				
Surrogate: Phenol-d6	*5.78*		mg/Kg wet	6.62		87.2	30-130				
Surrogate: Nitrobenzene-d5	*2.37*		mg/Kg wet	3.31		71.6	30-130				
Surrogate: 2-Fluorobiphenyl	*2.16*		mg/Kg wet	3.31		65.3	30-130				
Surrogate: 2,4,6-Tribromophenol	*5.74*		mg/Kg wet	6.62		86.6	30-130				
Surrogate: p-Terphenyl-d14	*2.20*		mg/Kg wet	3.31		66.5	30-130				

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QUALITY CONTROL

Semivolatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes
Batch B356433 - SW-846 3546											
Matrix Spike (B356433-MS1)	**Source: 23J3373-01**			Prepared: 10/26/23 Analyzed: 11/01/23							
Biphenyl	4.63	0.26	mg/Kg dry	6.56	0.491	63.2		40-140			
Acenaphthene	6.19	0.67	mg/Kg dry	6.56	1.93	65.0		40-140			
Acenaphthylene	7.30	0.67	mg/Kg dry	6.56	2.94	66.5		40-140			
Acetophenone	4.70	1.3	mg/Kg dry	6.56	ND	71.6		40-140			
Aniline	2.49	1.3	mg/Kg dry	6.56	ND	**37.9**	*	40-140			MS-07A
Anthracene	13.0	0.67	mg/Kg dry	6.56	8.64	66.7		40-140			
Benzo(a)anthracene	24.3	0.67	mg/Kg dry	6.56	14.5	**148**	*	40-140			MS-22
Benzo(a)pyrene	23.2	0.67	mg/Kg dry	6.56	14.1	139		40-140			
Benzo(b)fluoranthene	29.9	0.67	mg/Kg dry	6.56	18.0	**181**	*	40-140			MS-22
Benzo(g,h,i)perylene	17.8	0.67	mg/Kg dry	6.56	9.00	135		40-140			
Benzo(k)fluoranthene	15.2	0.67	mg/Kg dry	6.56	6.51	132		40-140			
Bis(2-chloroethoxy)methane	4.39	1.3	mg/Kg dry	6.56	ND	66.9		40-140			
Bis(2-chloroethyl)ether	4.98	1.3	mg/Kg dry	6.56	ND	76.0		40-140			
Bis(2-chloroisopropyl)ether	5.50	1.3	mg/Kg dry	6.56	ND	83.8		40-140			
Bis(2-Ethylhexyl)phthalate	23.3	1.3	mg/Kg dry	6.56	19.1	63.8		40-140			
4-Bromophenylphenylether	5.69	1.3	mg/Kg dry	6.56	ND	86.7		40-140			
Butylbenzylphthalate	4.91	1.3	mg/Kg dry	6.56	ND	74.9		40-140			
4-Chloroaniline	3.79	2.6	mg/Kg dry	6.56	ND	57.7		40-140			
2-Chloronaphthalene	4.14	1.3	mg/Kg dry	6.56	ND	63.2		40-140			
2-Chlorophenol	4.77	1.3	mg/Kg dry	6.56	ND	72.8		30-130			
Chrysene	21.5	0.67	mg/Kg dry	6.56	12.0	**145**	*	40-140			MS-22
Dibenz(a,h)anthracene	8.28	0.67	mg/Kg dry	6.56	2.40	89.6		40-140			
Dibenzofuran	6.79	1.3	mg/Kg dry	6.56	1.94	73.9		40-140			
Di-n-butylphthalate	4.17	1.3	mg/Kg dry	6.56	ND	63.6		40-140			
1,2-Dichlorobenzene	4.40	1.3	mg/Kg dry	6.56	ND	67.1		40-140			
1,3-Dichlorobenzene	4.33	1.3	mg/Kg dry	6.56	ND	66.0		40-140			
1,4-Dichlorobenzene	4.30	1.3	mg/Kg dry	6.56	ND	65.5		40-140			
3,3-Dichlorobenzidine	3.54	0.67	mg/Kg dry	6.56	ND	53.9		40-140			
2,4-Dichlorophenol	4.70	1.3	mg/Kg dry	6.56	ND	71.6		30-130			
Diethylphthalate	4.50	1.3	mg/Kg dry	6.56	ND	68.6		40-140			
2,4-Dimethylphenol	4.54	1.3	mg/Kg dry	6.56	ND	69.2		30-130			
Dimethylphthalate	4.64	1.3	mg/Kg dry	6.56	ND	70.8		40-140			
2,4-Dinitrophenol	ND	0.0	mg/Kg dry	6.56	ND		*	30-130			MS-07A
2,4-Dinitrotoluene	5.35	1.3	mg/Kg dry	6.56	ND	81.5		40-140			
2,6-Dinitrotoluene	4.80	1.3	mg/Kg dry	6.56	ND	73.3		40-140			
Di-n-octylphthalate	5.77	1.3	mg/Kg dry	6.56	0.879	74.6		40-140			V-05
1,2-Diphenylhydrazine/Azobenzene	4.08	1.3	mg/Kg dry	6.56	ND	62.2		40-140			
Fluoranthene	37.5	0.67	mg/Kg dry	6.56	27.6	**151**	*	40-140			MS-07A
Fluorene	7.12	0.67	mg/Kg dry	6.56	2.47	71.0		40-140			
Hexachlorobenzene	5.40	1.3	mg/Kg dry	6.56	ND	82.3		40-140			
Hexachlorobutadiene	4.49	1.3	mg/Kg dry	6.56	ND	68.4		40-140			
Hexachloroethane	3.36	1.3	mg/Kg dry	6.56	ND	51.2		40-140			R-06
Indeno(1,2,3-cd)pyrene	19.7	0.67	mg/Kg dry	6.56	9.79	**152**	*	40-140			MS-22
Isophorone	5.35	1.3	mg/Kg dry	6.56	ND	81.6		40-140			
2-Methylnaphthalene	6.50	0.67	mg/Kg dry	6.56	1.32	78.9		40-140			
2-Methylphenol	4.65	1.3	mg/Kg dry	6.56	ND	70.9		30-130			
3/4-Methylphenol	5.09	1.3	mg/Kg dry	6.56	ND	77.6		30-130			
Naphthalene	8.59	0.67	mg/Kg dry	6.56	3.93	71.1		40-140			
Nitrobenzene	4.56	1.3	mg/Kg dry	6.56	ND	69.5		40-140			
2-Nitrophenol	3.77	1.3	mg/Kg dry	6.56	ND	57.4		30-130			
4-Nitrophenol	6.11	2.6	mg/Kg dry	6.56	ND	93.1		30-130			
Pentachlorophenol	2.20	1.3	mg/Kg dry	6.56	ND	33.6		30-130			R-06

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QUALITY CONTROL

Semivolatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B356433 - SW-846 3546										
Matrix Spike (B356433-MS1)	**Source: 23J3373-01**		Prepared: 10/26/23 Analyzed: 11/01/23							
Phenanthrene	14.6	0.67	mg/Kg dry	6.56	9.80	73.5	40-140			
Phenol	4.69	1.3	mg/Kg dry	6.56	ND	71.4	30-130			
Pyrene	44.0	0.67	mg/Kg dry	6.56	44.1	**-1.60** *	40-140			MS-22
Pyridine	3.15	1.3	mg/Kg dry	6.56	ND	48.0	40-140			
1,2,4-Trichlorobenzene	4.73	1.3	mg/Kg dry	6.56	ND	72.2	40-140			
2,4,5-Trichlorophenol	4.33	1.3	mg/Kg dry	6.56	ND	66.0	30-130			
2,4,6-Trichlorophenol	4.33	1.3	mg/Kg dry	6.56	ND	66.0	30-130			
Surrogate: 2-Fluorophenol	*19.7*		mg/Kg dry	26.2		75.3	30-130			
Surrogate: Phenol-d6	*19.9*		mg/Kg dry	26.2		75.8	30-130			
Surrogate: Nitrobenzene-d5	*9.85*		mg/Kg dry	13.1		75.1	30-130			
Surrogate: 2-Fluorobiphenyl	*8.23*		mg/Kg dry	13.1		62.8	30-130			
Surrogate: 2,4,6-Tribromophenol	*23.9*		mg/Kg dry	26.2		91.0	30-130			
Surrogate: p-Terphenyl-d14	*6.82*		mg/Kg dry	13.1		52.0	30-130			
Matrix Spike Dup (B356433-MSD1)	**Source: 23J3373-01**		Prepared: 10/26/23 Analyzed: 11/01/23							
Biphenyl	4.98	0.26	mg/Kg dry	6.56	0.491	68.4	40-140	7.15	30	
Acenaphthene	6.15	0.67	mg/Kg dry	6.56	1.93	64.4	40-140	0.574	30	
Acenaphthylene	7.85	0.67	mg/Kg dry	6.56	2.94	74.9	40-140	7.25	30	
Acetophenone	4.80	1.3	mg/Kg dry	6.56	ND	73.2	40-140	2.13	30	
Aniline	2.34	1.3	mg/Kg dry	6.56	ND	**35.7** *	40-140	6.08	30	MS-07A
Anthracene	14.1	0.67	mg/Kg dry	6.56	8.64	83.1	40-140	7.95	30	
Benzo(a)anthracene	21.8	0.67	mg/Kg dry	6.56	14.5	110	40-140	10.8	30	
Benzo(a)pyrene	21.3	0.67	mg/Kg dry	6.56	14.1	110	40-140	8.77	30	
Benzo(b)fluoranthene	25.8	0.67	mg/Kg dry	6.56	18.0	119	40-140	14.7	30	
Benzo(g,h,i)perylene	16.1	0.67	mg/Kg dry	6.56	9.00	108	40-140	10.3	30	
Benzo(k)fluoranthene	12.7	0.67	mg/Kg dry	6.56	6.51	94.7	40-140	17.6	30	
Bis(2-chloroethoxy)methane	4.35	1.3	mg/Kg dry	6.56	ND	66.3	40-140	0.841	30	
Bis(2-chloroethyl)ether	4.96	1.3	mg/Kg dry	6.56	ND	75.6	40-140	0.501	30	
Bis(2-chloroisopropyl)ether	5.63	1.3	mg/Kg dry	6.56	ND	85.9	40-140	2.40	30	
Bis(2-Ethylhexyl)phthalate	24.8	1.3	mg/Kg dry	6.56	19.1	86.3	40-140	6.14	30	
4-Bromophenylphenylether	5.50	1.3	mg/Kg dry	6.56	ND	83.8	40-140	3.38	30	
Butylbenzylphthalate	5.34	1.3	mg/Kg dry	6.56	ND	81.4	40-140	8.31	30	
4-Chloroaniline	3.41	2.6	mg/Kg dry	6.56	ND	52.0	40-140	10.5	30	
2-Chloronaphthalene	4.34	1.3	mg/Kg dry	6.56	ND	66.1	40-140	4.58	30	
2-Chlorophenol	4.75	1.3	mg/Kg dry	6.56	ND	72.4	30-130	0.523	30	
Chrysene	20.5	0.67	mg/Kg dry	6.56	12.0	129	40-140	5.07	30	
Dibenz(a,h)anthracene	8.10	0.67	mg/Kg dry	6.56	2.40	86.9	40-140	2.18	30	
Dibenzofuran	6.73	1.3	mg/Kg dry	6.56	1.94	73.0	40-140	0.874	30	
Di-n-butylphthalate	4.19	1.3	mg/Kg dry	6.56	ND	64.0	40-140	0.596	30	
1,2-Dichlorobenzene	4.51	1.3	mg/Kg dry	6.56	ND	68.7	40-140	2.42	30	
1,3-Dichlorobenzene	4.36	1.3	mg/Kg dry	6.56	ND	66.4	40-140	0.574	30	
1,4-Dichlorobenzene	4.40	1.3	mg/Kg dry	6.56	ND	67.1	40-140	2.41	30	
3,3-Dichlorobenzidine	3.66	0.67	mg/Kg dry	6.56	ND	55.8	40-140	3.39	30	
2,4-Dichlorophenol	4.98	1.3	mg/Kg dry	6.56	ND	75.9	30-130	5.75	30	
Diethylphthalate	4.56	1.3	mg/Kg dry	6.56	ND	69.5	40-140	1.36	30	
2,4-Dimethylphenol	4.63	1.3	mg/Kg dry	6.56	ND	70.6	30-130	1.95	30	
Dimethylphthalate	4.90	1.3	mg/Kg dry	6.56	ND	74.7	40-140	5.36	30	
2,4-Dinitrophenol	ND	0.0	mg/Kg dry	6.56	ND	*	30-130	NC	30	MS-07A
2,4-Dinitrotoluene	5.71	1.3	mg/Kg dry	6.56	ND	87.1	40-140	6.55	30	
2,6-Dinitrotoluene	5.09	1.3	mg/Kg dry	6.56	ND	77.6	40-140	5.75	30	
Di-n-octylphthalate	4.98	1.3	mg/Kg dry	6.56	0.879	62.6	40-140	14.7	30	V-05
1,2-Diphenylhydrazine/Azobenzene	4.12	1.3	mg/Kg dry	6.56	ND	62.9	40-140	1.06	30	

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QUALITY CONTROL

Semivolatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD		RPD Limit	Notes
Batch B356433 - SW-846 3546												
Matrix Spike Dup (B356433-MSD1)	**Source: 23J3373-01**		Prepared: 10/26/23 Analyzed: 11/01/23									
Fluoranthene	37.1	0.67	mg/Kg dry	6.56	27.6	**144**	*	40-140	1.10		30	MS-07A
Fluorene	6.92	0.67	mg/Kg dry	6.56	2.47	67.9		40-140	2.86		30	
Hexachlorobenzene	5.57	1.3	mg/Kg dry	6.56	ND	85.0		40-140	3.20		30	
Hexachlorobutadiene	4.61	1.3	mg/Kg dry	6.56	ND	70.3		40-140	2.74		30	
Hexachloroethane	1.91	1.3	mg/Kg dry	6.56	ND	**29.1**	*	40-140	**55.1**	*	30	MS-23
Indeno(1,2,3-cd)pyrene	18.6	0.67	mg/Kg dry	6.56	9.79	134		40-140	5.92		30	
Isophorone	5.37	1.3	mg/Kg dry	6.56	ND	81.8		40-140	0.294		30	
2-Methylnaphthalene	6.72	0.67	mg/Kg dry	6.56	1.32	82.2		40-140	3.26		30	
2-Methylphenol	4.83	1.3	mg/Kg dry	6.56	ND	73.7		30-130	3.76		30	
3/4-Methylphenol	5.25	1.3	mg/Kg dry	6.56	ND	80.1		30-130	3.12		30	
Naphthalene	9.08	0.67	mg/Kg dry	6.56	3.93	78.5		40-140	5.54		30	
Nitrobenzene	4.54	1.3	mg/Kg dry	6.56	ND	69.2		40-140	0.375		30	
2-Nitrophenol	3.60	1.3	mg/Kg dry	6.56	ND	54.8		30-130	4.63		30	
4-Nitrophenol	6.95	2.6	mg/Kg dry	6.56	ND	106		30-130	12.9		30	
Pentachlorophenol	3.15	1.3	mg/Kg dry	6.56	ND	48.0		30-130	**35.4**	*	30	R-06
Phenanthrene	14.2	0.67	mg/Kg dry	6.56	9.80	67.7		40-140	2.62		30	
Phenol	4.74	1.3	mg/Kg dry	6.56	ND	72.3		30-130	1.22		30	
Pyrene	50.3	0.67	mg/Kg dry	6.56	44.1	93.6		40-140	13.2		30	
Pyridine	2.81	1.3	mg/Kg dry	6.56	ND	42.9		40-140	11.2		30	
1,2,4-Trichlorobenzene	4.73	1.3	mg/Kg dry	6.56	ND	72.2		40-140	0.0277		30	
2,4,5-Trichlorophenol	4.72	1.3	mg/Kg dry	6.56	ND	72.0		30-130	8.75		30	
2,4,6-Trichlorophenol	4.95	1.3	mg/Kg dry	6.56	ND	75.5		30-130	13.5		30	
Surrogate: 2-Fluorophenol	*20.1*		mg/Kg dry	26.2		76.5		30-130				
Surrogate: Phenol-d6	*20.6*		mg/Kg dry	26.2		78.6		30-130				
Surrogate: Nitrobenzene-d5	*10.1*		mg/Kg dry	13.1		77.2		30-130				
Surrogate: 2-Fluorobiphenyl	*9.15*		mg/Kg dry	13.1		69.8		30-130				
Surrogate: 2,4,6-Tribromophenol	*23.6*		mg/Kg dry	26.2		90.0		30-130				
Surrogate: p-Terphenyl-d14	*7.87*		mg/Kg dry	13.1		60.0		30-130				

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes
Batch B356432 - SW-846 3546											
Blank (B356432-BLK1)				Prepared: 10/26/23 Analyzed: 11/01/23							
TPH (C9-C36)	ND	8.3	mg/Kg wet								
Surrogate: 2-Fluorobiphenyl	*2.26*		mg/Kg wet	3.33		67.8		40-140			
LCS (B356432-BS1)				Prepared: 10/26/23 Analyzed: 11/01/23							
TPH (C9-C36)	24.0	8.3	mg/Kg wet	33.2		72.2		40-140			
Surrogate: 2-Fluorobiphenyl	*3.67*		mg/Kg wet	3.32		110		40-140			
LCS Dup (B356432-BSD1)				Prepared: 10/26/23 Analyzed: 11/01/23							
TPH (C9-C36)	24.0	8.3	mg/Kg wet	33.3		72.0		40-140	0.0957	30	
Surrogate: 2-Fluorobiphenyl	*3.64*		mg/Kg wet	3.33		109		40-140			
Matrix Spike (B356432-MS1)	**Source: 23J3373-03**			Prepared: 10/26/23 Analyzed: 11/01/23							
TPH (C9-C36)	18500	1200	mg/Kg dry	99.7	21600	**-3140**	*	40-140			MS-19
Surrogate: 2-Fluorobiphenyl	*0.00*		mg/Kg dry	9.97			*	40-140			S-01
Matrix Spike Dup (B356432-MSD1)	**Source: 23J3373-03**			Prepared: 10/26/23 Analyzed: 11/01/23							
TPH (C9-C36)	24100	1200	mg/Kg dry	97.7	21600	**2550**	*	40-140	26.4	30	MS-19
Surrogate: 2-Fluorobiphenyl	*0.00*		mg/Kg dry	9.77			*	40-140			S-01

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - EPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B356430 - SW-846 3546										
Blank (B356430-BLK1)				Prepared: 10/26/23 Analyzed: 10/27/23						
C9-C18 Aliphatics	ND	10	mg/Kg wet							
C19-C36 Aliphatics	ND	10	mg/Kg wet							
Unadjusted C11-C22 Aromatics	ND	10	mg/Kg wet							
C11-C22 Aromatics	ND	10	mg/Kg wet							
Acenaphthene	ND	0.10	mg/Kg wet							
Acenaphthylene	ND	0.10	mg/Kg wet							
Anthracene	ND	0.10	mg/Kg wet							
Benzo(a)anthracene	ND	0.10	mg/Kg wet							
Benzo(a)pyrene	ND	0.10	mg/Kg wet							
Benzo(b)fluoranthene	ND	0.10	mg/Kg wet							
Benzo(g,h,i)perylene	ND	0.10	mg/Kg wet							R-05
Benzo(k)fluoranthene	ND	0.10	mg/Kg wet							
Chrysene	ND	0.10	mg/Kg wet							
Dibenz(a,h)anthracene	ND	0.10	mg/Kg wet							R-05
Fluoranthene	ND	0.10	mg/Kg wet							
Fluorene	ND	0.10	mg/Kg wet							
Indeno(1,2,3-cd)pyrene	ND	0.10	mg/Kg wet							
2-Methylnaphthalene	ND	0.10	mg/Kg wet							
Naphthalene	ND	0.10	mg/Kg wet							
Phenanthrene	ND	0.10	mg/Kg wet							
Pyrene	ND	0.10	mg/Kg wet							
Naphthalene-aliphatic fraction	ND	0.10	mg/Kg wet							
2-Methylnaphthalene-aliphatic fraction	ND	0.10	mg/Kg wet							
Surrogate: Chlorooctadecane (COD)	*4.28*		mg/Kg wet	5.00		85.6	40-140			
Surrogate: o-Terphenyl (OTP)	*4.72*		mg/Kg wet	5.00		94.3	40-140			
Surrogate: 2-Bromonaphthalene	*3.95*		mg/Kg wet	5.00		79.0	40-140			
Surrogate: 2-Fluorobiphenyl	*3.86*		mg/Kg wet	5.00		77.2	40-140			
LCS (B356430-BS1)				Prepared: 10/26/23 Analyzed: 10/27/23						
C9-C18 Aliphatics	22.4	10	mg/Kg wet	29.9		75.2	40-140			
C19-C36 Aliphatics	33.7	10	mg/Kg wet	39.8		84.8	40-140			
Unadjusted C11-C22 Aromatics	85.8	10	mg/Kg wet	84.6		101	40-140			
Acenaphthene	4.76	0.10	mg/Kg wet	4.98		95.7	40-140			
Acenaphthylene	4.42	0.10	mg/Kg wet	4.98		88.9	40-140			
Anthracene	4.94	0.10	mg/Kg wet	4.98		99.3	40-140			
Benzo(a)anthracene	4.82	0.10	mg/Kg wet	4.98		96.9	40-140			
Benzo(a)pyrene	4.95	0.10	mg/Kg wet	4.98		99.4	40-140			
Benzo(b)fluoranthene	4.63	0.10	mg/Kg wet	4.98		93.1	40-140			
Benzo(g,h,i)perylene	4.61	0.10	mg/Kg wet	4.98		92.6	40-140			R-05
Benzo(k)fluoranthene	4.47	0.10	mg/Kg wet	4.98		89.8	40-140			
Chrysene	5.12	0.10	mg/Kg wet	4.98		103	40-140			
Dibenz(a,h)anthracene	4.74	0.10	mg/Kg wet	4.98		95.3	40-140			R-05
Fluoranthene	4.88	0.10	mg/Kg wet	4.98		98.1	40-140			
Fluorene	4.98	0.10	mg/Kg wet	4.98		100	40-140			
Indeno(1,2,3-cd)pyrene	4.66	0.10	mg/Kg wet	4.98		93.6	40-140			
2-Methylnaphthalene	4.41	0.10	mg/Kg wet	4.98		88.6	40-140			
Naphthalene	4.02	0.10	mg/Kg wet	4.98		80.8	40-140			
Phenanthrene	4.98	0.10	mg/Kg wet	4.98		100	40-140			
Pyrene	5.00	0.10	mg/Kg wet	4.98		101	40-140			
Naphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	4.98			0-5			
2-Methylnaphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	4.98			0-5			
Surrogate: Chlorooctadecane (COD)	*3.67*		mg/Kg wet	4.98		73.8	40-140			

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - EPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD		RPD Limit	Notes
Batch B356430 - SW-846 3546											
LCS (B356430-BS1)				Prepared: 10/26/23 Analyzed: 10/27/23							
Surrogate: o-Terphenyl (OTP)	*4.73*		mg/Kg wet	4.98		95.1	40-140				
Surrogate: 2-Bromonaphthalene	*5.16*		mg/Kg wet	4.98		104	40-140				
Surrogate: 2-Fluorobiphenyl	*5.15*		mg/Kg wet	4.98		104	40-140				
LCS Dup (B356430-BSD1)				Prepared: 10/26/23 Analyzed: 10/27/23							
C9-C18 Aliphatics	22.5	10	mg/Kg wet	30.0		75.0	40-140	0.161		25	
C19-C36 Aliphatics	34.5	10	mg/Kg wet	40.0		86.3	40-140	2.27		25	
Unadjusted C11-C22 Aromatics	71.2	10	mg/Kg wet	85.0		83.8	40-140	18.5		25	
Acenaphthene	3.91	0.10	mg/Kg wet	5.00		78.1	40-140	19.7		25	
Acenaphthylene	3.62	0.10	mg/Kg wet	5.00		72.4	40-140	19.9		25	
Anthracene	4.22	0.10	mg/Kg wet	5.00		84.4	40-140	15.7		25	
Benzo(a)anthracene	4.04	0.10	mg/Kg wet	5.00		80.9	40-140	17.5		25	
Benzo(a)pyrene	4.13	0.10	mg/Kg wet	5.00		82.5	40-140	18.1		25	
Benzo(b)fluoranthene	4.00	0.10	mg/Kg wet	5.00		80.0	40-140	14.6		25	
Benzo(g,h,i)perylene	3.40	0.10	mg/Kg wet	5.00		68.0	40-140	**30.1**	*	25	R-05
Benzo(k)fluoranthene	3.63	0.10	mg/Kg wet	5.00		72.7	40-140	20.6		25	
Chrysene	4.04	0.10	mg/Kg wet	5.00		80.9	40-140	23.5		25	
Dibenz(a,h)anthracene	3.33	0.10	mg/Kg wet	5.00		66.6	40-140	**35.0**	*	25	R-05
Fluoranthene	4.23	0.10	mg/Kg wet	5.00		84.7	40-140	14.2		25	
Fluorene	4.09	0.10	mg/Kg wet	5.00		81.8	40-140	19.6		25	
Indeno(1,2,3-cd)pyrene	3.96	0.10	mg/Kg wet	5.00		79.2	40-140	16.1		25	
2-Methylnaphthalene	3.77	0.10	mg/Kg wet	5.00		75.3	40-140	15.7		25	
Naphthalene	3.54	0.10	mg/Kg wet	5.00		70.8	40-140	12.7		25	
Phenanthrene	4.22	0.10	mg/Kg wet	5.00		84.5	40-140	16.4		25	
Pyrene	4.34	0.10	mg/Kg wet	5.00		86.8	40-140	14.2		25	
Naphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00			0-5				
2-Methylnaphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00			0-5				
Surrogate: Chlorooctadecane (COD)	*3.86*		mg/Kg wet	5.00		77.2	40-140				
Surrogate: o-Terphenyl (OTP)	*4.21*		mg/Kg wet	5.00		84.2	40-140				
Surrogate: 2-Bromonaphthalene	*4.49*		mg/Kg wet	5.00		89.9	40-140				
Surrogate: 2-Fluorobiphenyl	*4.45*		mg/Kg wet	5.00		89.1	40-140				

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QUALITY CONTROL

Metals Analyses (Total) - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B356399 - SW-846 3050B										
Blank (B356399-BLK1)				Prepared: 10/26/23 Analyzed: 10/30/23						
Arsenic	ND	3.3	mg/Kg wet							
Barium	ND	1.7	mg/Kg wet							
Cadmium	ND	0.33	mg/Kg wet							
Chromium	0.15	0.66	mg/Kg wet							J
Lead	ND	0.50	mg/Kg wet							
Selenium	ND	3.3	mg/Kg wet							
Blank (B356399-BLK2)				Prepared: 10/26/23 Analyzed: 10/31/23						
Copper	0.44	0.66	mg/Kg wet							J
Silver	ND	0.33	mg/Kg wet							
Zinc	ND	0.66	mg/Kg wet							
LCS (B356399-BS1)				Prepared: 10/26/23 Analyzed: 10/30/23						
Arsenic	156	9.8	mg/Kg wet	180		86.7	81.1-119.4			
Barium	330	4.9	mg/Kg wet	354		93.3	81.6-118.1			
Cadmium	98.1	0.98	mg/Kg wet	105		93.4	82.8-118.1			
Chromium	218	2.0	mg/Kg wet	232		93.8	81.5-118.5			
Lead	133	1.5	mg/Kg wet	145		92.0	82.1-117.9			
Selenium	83.4	9.8	mg/Kg wet	96.3		86.6	78.8-121.5			
Zinc	339	2.0	mg/Kg wet	369		91.9	80.2-120.1			
LCS (B356399-BS2)				Prepared: 10/26/23 Analyzed: 10/31/23						
Silver	45.1	0.98	mg/Kg wet	47.3		95.3	79.5-120.5			
LCS Dup (B356399-BSD1)				Prepared: 10/26/23 Analyzed: 10/30/23						
Arsenic	158	9.9	mg/Kg wet	180		87.6	81.1-119.4	1.03	30	
Barium	333	4.9	mg/Kg wet	354		94.2	81.6-118.1	0.940	20	
Cadmium	99.4	0.99	mg/Kg wet	105		94.6	82.8-118.1	1.31	20	
Chromium	221	2.0	mg/Kg wet	232		95.3	81.5-118.5	1.54	30	
Lead	134	1.5	mg/Kg wet	145		92.4	82.1-117.9	0.397	30	
Selenium	85.2	9.9	mg/Kg wet	96.3		88.4	78.8-121.5	2.10	30	
Zinc	342	2.0	mg/Kg wet	369		92.8	80.2-120.1	0.945	30	
LCS Dup (B356399-BSD2)				Prepared: 10/26/23 Analyzed: 10/31/23						
Silver	45.9	0.99	mg/Kg wet	47.3		97.0	79.5-120.5	1.69	30	
Reference (B356399-SRM2) MRL CHECK				Prepared: 10/26/23 Analyzed: 10/31/23						
Lead	0.646	0.50	mg/Kg wet	0.495		**130** *	80-120			M-10
Batch B356832 - SW-846 7471										
Blank (B356832-BLK1)				Prepared: 10/31/23 Analyzed: 11/01/23						
Mercury	ND	0.021	mg/Kg wet							

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QUALITY CONTROL

Metals Analyses (Total) - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B356832 - SW-846 7471										
LCS (B356832-BS1)				Prepared: 10/31/23 Analyzed: 11/01/23						
Mercury	11.8	1.6	mg/Kg wet	10.3		114	55-143.7			
LCS Dup (B356832-BSD1)				Prepared: 10/31/23 Analyzed: 11/01/23						
Mercury	9.71	1.9	mg/Kg wet	10.3		94.3	55-143.7	19.1	20	

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QUALITY CONTROL

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total) - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B356372 - SW-846 7.3										
Blank (B356372-BLK1)				Prepared & Analyzed: 10/26/23						
Reactive Cyanide	ND	0.40	mg/Kg							
LCS (B356372-BS1)				Prepared & Analyzed: 10/26/23						
Reactive Cyanide	9.4	0.40	mg/Kg	10.0		94.4	81.9-116			
Batch B356374 - SW-846 7.3										
Blank (B356374-BLK1)				Prepared & Analyzed: 10/26/23						
Reactive Sulfide	ND	2.0	mg/Kg							
LCS (B356374-BS1)				Prepared & Analyzed: 10/26/23						
Reactive Sulfide	10	2.0	mg/Kg	10.0		102	78.9-130			
Batch B356690 - SW 846 9060A										
Blank (B356690-BLK1)				Prepared & Analyzed: 11/01/23						
Total Organic Carbon	ND	100	mg/Kg wet							
LCS (B356690-BS1)				Prepared & Analyzed: 11/01/23						
Total Organic Carbon	558	100	mg/Kg wet	750		74.4	67.3-125			
LCS Dup (B356690-BSD1)				Prepared & Analyzed: 11/01/23						
Total Organic Carbon	521	100	mg/Kg wet	750		69.5	67.3-125	6.87	26.4	
Batch B356706 - SM21-23 2510B Modified										
Blank (B356706-BLK1)				Prepared & Analyzed: 10/30/23						
Specific conductance	ND	2.0	µmhos/cm							
LCS (B356706-BS1)				Prepared & Analyzed: 10/30/23						
Specific conductance	310		µmhos/cm	306		102	90-116			
Duplicate (B356706-DUP1)	**Source: 23J3373-03**			Prepared & Analyzed: 10/30/23						
Specific conductance	200	2.0	µmhos/cm		220			10.8	35.9	

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FLAG/QUALIFIER SUMMARY

*	QC result is outside of established limits.
†	Wide recovery limits established for difficult compound.
‡	Wide RPD limits established for difficult compound.
#	Data exceeded client recommended or regulatory level
ND	Not Detected
RL	Reporting Limit is at the level of quantitation (LOQ)
DL	Detection Limit is the lower limit of detection determined by the MDL study
MCL	Maximum Contaminant Level
	Percent recoveries and relative percent differences (RPDs) are determined by the software using values in the calculation which have not been rounded.
	No results have been blank subtracted unless specified in the case narrative section.
B-07	Data is not affected by elevated level in laboratory blank since sample result is >10x level found in the blank.
J	Detected but below the Reporting Limit (lowest calibration standard); therefore, result is an estimated concentration (CLP J-Flag).
L-04	Laboratory fortified blank/laboratory control sample recovery and duplicate recovery are outside of control limits. Reported value for this compound is likely to be biased on the low side.
L-14	Compound classified by MA CAM as difficult with acceptable recoveries of 40-160%. Recovery does not meet 70-130% criteria but does meet difficult compound criteria.
M-10	The reporting limit verification for the AIHA lead program is outside of control limits for this element. Any reported result at or near the detection limit may be biased on the high side.
MS-07A	Matrix spike and spike duplicate recovery is outside of control limits. Analysis is in control based on laboratory fortified blank recovery. Possibility of matrix effects that lead to low bias or non-homogeneous sample aliquot cannot be eliminated.
MS-19	Sample to spike ratio is greater than or equal to 4:1. Spiked amount is not representative of the native amount in the sample. Appropriate or meaningful recoveries cannot be calculated.
MS-22	Either matrix spike or MS duplicate is outside of control limits, but the other is within limits. RPD between the two MS/MSD results is within method specified criteria.
MS-23	Either matrix spike or MS duplicate is outside of control limits, but the other is within limits. RPD between the two MS/MSD results is outside of the method specified criteria. Reduced precision anticipated for any reported result for this compound.
R-05	Laboratory fortified blank duplicate RPD is outside of control limits. Reduced precision is anticipated for any reported value for this compound.
R-06	Matrix spike duplicate RPD is outside of control limits. Reduced precision is anticipated for reported result for this compound in this sample.
RL-14	Elevated reporting limit due to foaming sample matrix. MA CAM reporting limit not met.
S-01	The surrogate recovery for this sample is not available due to sample dilution below the surrogate reporting limit required from high analyte concentration and/or matrix interferences.
S-15	Surrogate recovery outside of control limits due to suspected sample matrix interference. Chromatogram(s) is attached.
V-05	Continuing calibration verification (CCV) did not meet method specifications and was biased on the low side for this compound.
V-06	Continuing calibration verification (CCV) did not meet method specifications and was biased on the high side for this compound.
V-16	Response factor is less than method specified minimum acceptable value. Reduced precision and accuracy may be associated with reported result.
V-34	Initial calibration verification (ICV) did not meet method specifications and was biased on the low side for this compound. Reported result is estimated.
V-35	Initial calibration verification (ICV) did not meet method specifications and was biased on the high side for this compound. Reported result is estimated.

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
MADEP EPH rev 2.1 in Soil	
C9-C18 Aliphatics	CT,NC,ME,NH-P
C19-C36 Aliphatics	CT,NC,ME,NH-P
Unadjusted C11-C22 Aromatics	CT,NC,ME,NH-P
C11-C22 Aromatics	CT,NC,ME,NH-P
Acenaphthene	CT,NC,ME,NH-P
Acenaphthylene	CT,NC,ME,NH-P
Anthracene	CT,NC,ME,NH-P
Benzo(a)anthracene	CT,NC,ME,NH-P
Benzo(a)pyrene	CT,NC,ME,NH-P
Benzo(b)fluoranthene	CT,NC,ME,NH-P
Benzo(g,h,i)perylene	CT,NC,ME,NH-P
Benzo(k)fluoranthene	CT,NC,ME,NH-P
Chrysene	CT,NC,ME,NH-P
Dibenz(a,h)anthracene	CT,NC,ME,NH-P
Fluoranthene	CT,NC,ME,NH-P
Fluorene	CT,NC,ME
Indeno(1,2,3-cd)pyrene	CT,NC,ME,NH-P
2-Methylnaphthalene	CT,NC
Naphthalene	CT,NC,ME,NH-P
Phenanthrene	CT,NC,ME,NH-P
Pyrene	CT,NC,ME,NH-P
MADEP EPH rev 2.1 in Water	
C9-C18 Aliphatics	CT,NC,ME,NH-P
C19-C36 Aliphatics	CT,NC,ME,NH-P
Unadjusted C11-C22 Aromatics	CT,NC,ME,NH-P
C11-C22 Aromatics	CT,NC,ME,NH-P
Acenaphthene	CT,NC,ME,NH-P
Acenaphthylene	CT,NC,ME,NH-P
Anthracene	CT,NC,ME,NH-P
Benzo(a)anthracene	CT,NC,ME,NH-P
Benzo(a)pyrene	CT,NC,ME,NH-P
Benzo(b)fluoranthene	CT,NC,ME,NH-P
Benzo(g,h,i)perylene	CT,NC,ME,NH-P
Benzo(k)fluoranthene	CT,NC,ME,NH-P
Chrysene	CT,NC,ME,NH-P
Dibenz(a,h)anthracene	CT,NC,ME,NH-P
Fluoranthene	CT,NC,ME,NH-P
Fluorene	CT,NC,ME
Indeno(1,2,3-cd)pyrene	CT,NC,ME,NH-P
2-Methylnaphthalene	CT,NC
Naphthalene	CT,NC,ME,NH-P
Phenanthrene	CT,NC,ME,NH-P
Pyrene	CT,NC,ME,NH-P
SW 846 9060A in Soil	
Total Organic Carbon	ME,NY,NH,VA
SW-846 1030 in Soil	

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SW-846 1030 in Soil	
Ignitability	NY,NH,CT,NC,ME,VA
SW-846 6010D in Soil	
Arsenic	CT,NH,NY,ME,VA,NC
Barium	CT,NH,NY,ME,VA,NC
Cadmium	CT,NH,NY,ME,VA,NC
Chromium	CT,NH,NY,ME,VA,NC
Copper	CT,NH,NY,ME,VA,NC
Lead	CT,NH,NY,ME,VA,NC
Selenium	CT,NH,NY,ME,VA,NC
Silver	CT,NH,NY,ME,VA,NC
Zinc	CT,NH,NY,ME,VA,NC
SW-846 6010D in Water	
Arsenic	CT,NH,NY,ME,VA,RI,NC
Barium	CT,NH,NY,ME,VA,NC
Cadmium	CT,NH,NY,ME,VA,NC
Chromium	CT,NH,NY,ME,VA,NC
Copper	CT,NH,NY,ME,VA,NC
Lead	CT,NH,NY,ME,VA,NC
Selenium	CT,NH,NY,ME,VA,NC
Silver	CT,NH,NY,ME,VA,NC
Zinc	CT,NH,NY,ME,VA,NC
SW-846 7471B in Soil	
Mercury	CT,NH,NY,NC,ME,VA
SW-846 8260D in Soil	
Acetone	CT,NH,NY,ME
Benzene	CT,NH,NY,ME
Bromobenzene	NH,NY,ME
Bromochloromethane	NH,NY,ME
Bromodichloromethane	CT,NH,NY,ME
Bromoform	CT,NH,NY,ME
Bromomethane	CT,NH,NY,ME
2-Butanone (MEK)	CT,NH,NY,ME
n-Butylbenzene	CT,NH,NY,ME
sec-Butylbenzene	CT,NH,NY,ME
tert-Butylbenzene	CT,NH,NY,ME
Carbon Disulfide	CT,NH,NY,ME
Carbon Tetrachloride	CT,NH,NY,ME
Chlorobenzene	CT,NH,NY,ME
Chlorodibromomethane	CT,NH,NY,ME
Chloroethane	CT,NH,NY,ME
Chloroform	CT,NH,NY,ME
Chloromethane	CT,NH,NY,ME
2-Chlorotoluene	CT,NH,NY,ME
4-Chlorotoluene	CT,NH,NY,ME
1,2-Dibromo-3-chloropropane (DBCP)	NY

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SW-846 8260D in Soil	
1,2-Dibromoethane (EDB)	NY
Dibromomethane	NH,NY,ME
1,2-Dichlorobenzene	CT,NH,NY,ME
1,3-Dichlorobenzene	CT,NH,NY,ME
1,4-Dichlorobenzene	CT,NH,NY,ME
Dichlorodifluoromethane (Freon 12)	NY,ME
1,1-Dichloroethane	CT,NH,NY,ME
1,2-Dichloroethane	CT,NH,NY,ME
1,1-Dichloroethylene	CT,NH,NY,ME
cis-1,2-Dichloroethylene	CT,NH,NY,ME
trans-1,2-Dichloroethylene	CT,NH,NY,ME
1,2-Dichloropropane	CT,NH,NY,ME
1,3-Dichloropropane	NH,NY,ME
2,2-Dichloropropane	NH,NY,ME
1,1-Dichloropropene	NH,NY,ME
cis-1,3-Dichloropropene	CT,NH,NY,ME
trans-1,3-Dichloropropene	CT,NH,NY,ME
Ethylbenzene	CT,NH,NY,ME
Hexachlorobutadiene	NH,NY,ME
2-Hexanone (MBK)	CT,NH,NY,ME
Isopropylbenzene (Cumene)	CT,NH,NY,ME
p-Isopropyltoluene (p-Cymene)	NH,NY
Methyl tert-Butyl Ether (MTBE)	NY
Methylene Chloride	CT,NH,NY,ME
4-Methyl-2-pentanone (MIBK)	CT,NH,NY
Naphthalene	NH,NY,ME
n-Propylbenzene	NH,NY
Styrene	CT,NH,NY,ME
1,1,1,2-Tetrachloroethane	CT,NH,NY,ME
1,1,2,2-Tetrachloroethane	CT,NH,NY,ME
Tetrachloroethylene	CT,NH,NY,ME
Toluene	CT,NH,NY,ME
1,2,3-Trichlorobenzene	ME
1,2,4-Trichlorobenzene	NH,NY,ME
1,1,1-Trichloroethane	CT,NH,NY,ME
1,1,2-Trichloroethane	CT,NH,NY,ME
Trichloroethylene	CT,NH,NY,ME
Trichlorofluoromethane (Freon 11)	CT,NH,NY,ME
1,2,3-Trichloropropane	NH,NY,ME
1,2,4-Trimethylbenzene	CT,NH,NY,ME
1,3,5-Trimethylbenzene	CT,NH,NY,ME
Vinyl Chloride	CT,NH,NY,ME
m+p Xylene	CT,NH,NY,ME
o-Xylene	CT,NH,NY,ME
SW-846 8270E in Soil	
Acenaphthene	CT,NY,NH

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SW-846 8270E in Soil	
Acenaphthylene	CT,NY,NH
Acetophenone	NY,NH
Aniline	NY,NH
Anthracene	CT,NY,NH
Benzo(a)anthracene	CT,NY,NH
Benzo(a)pyrene	CT,NY,NH
Benzo(b)fluoranthene	CT,NY,NH
Benzo(g,h,i)perylene	CT,NY,NH
Benzo(k)fluoranthene	CT,NY,NH
Bis(2-chloroethoxy)methane	CT,NY,NH
Bis(2-chloroethyl)ether	CT,NY,NH
Bis(2-chloroisopropyl)ether	CT,NY,NH
Bis(2-Ethylhexyl)phthalate	CT,NY,NH
4-Bromophenylphenylether	CT,NY,NH
Butylbenzylphthalate	CT,NY,NH
4-Chloroaniline	CT,NY,NH
2-Chloronaphthalene	CT,NY,NH
2-Chlorophenol	CT,NY,NH
Chrysene	CT,NY,NH
Dibenz(a,h)anthracene	CT,NY,NH
Dibenzofuran	CT,NY,NH
Di-n-butylphthalate	CT,NY,NH
1,2-Dichlorobenzene	NY,NH
1,3-Dichlorobenzene	NY,NH
1,4-Dichlorobenzene	NY,NH
3,3-Dichlorobenzidine	CT,NY,NH
2,4-Dichlorophenol	CT,NY,NH
Diethylphthalate	CT,NY,NH
2,4-Dimethylphenol	CT,NY,NH
Dimethylphthalate	CT,NY,NH
2,4-Dinitrophenol	CT,NY,NH
2,4-Dinitrotoluene	CT,NY,NH
2,6-Dinitrotoluene	CT,NY,NH
Di-n-octylphthalate	CT,NY,NH
1,2-Diphenylhydrazine/Azobenzene	NY,NH
Fluoranthene	CT,NY,NH
Fluorene	NY,NH
Hexachlorobenzene	CT,NY,NH
Hexachlorobutadiene	CT,NY,NH
Hexachloroethane	CT,NY,NH
Indeno(1,2,3-cd)pyrene	CT,NY,NH
Isophorone	CT,NY,NH
2-Methylnaphthalene	CT,NY,NH
2-Methylphenol	CT,NY,NH
3/4-Methylphenol	CT,NY,NH
Naphthalene	CT,NY,NH
Nitrobenzene	CT,NY,NH

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SW-846 8270E in Soil	
2-Nitrophenol	CT,NY,NH
4-Nitrophenol	CT,NY,NH
Pentachlorophenol	CT,NY,NH
Phenanthrene	CT,NY,NH
Phenol	CT,NY,NH
Pyrene	CT,NY,NH
1,2,4-Trichlorobenzene	CT,NY,NH
2,4,5-Trichlorophenol	CT,NY,NH
2,4,6-Trichlorophenol	CT,NY,NH

Con-Test, a Pace Environmental Laboratory, operates under the following certifications and accreditations:

Code	Description	Number	Expires
CT	Connecticut Department of Public Health	PH-0821	12/31/2024
NY	New York State Department of Health	10899 NELAP	04/1/2024
NH	New Hampshire Environmental Lab	2516 NELAP	02/5/2024
RI	Rhode Island Department of Health	LAO00373	12/30/2023
NC	North Carolina Div. of Water Quality	652	12/31/2023
ME	State of Maine	MA00100	06/9/2025
VA	Commonwealth of Virginia	460217	12/14/2023
NH-P	New Hampshire Environmental Lab	2557 NELAP	09/6/2024

2353373 RF

Pace Analytical®

Phone: 612-607-6400
Fax: 612-607-6344
https://www.pacelabs.com/
1800 Elm Street SE
Minneapolis, MN 55414

CHAIN OF CUSTODY RECORD

Doc # 381 Rev 4_01/08/2020

Page ____ of ____

Contact: https://www.pacelabs.com/contact-us/contact-environmental-sciences/

Company Name:	Weston & Sampson
Address:	55 Walkers Brook Drive Reading MA
Phone:	978 818 9212
Project Name:	Island End River
Project Location:	Chelsea, MA
Project Number:	ENG23-0300
Project Manager:	L. Koska
Pace Analytical Quote Name/Number	
Invoice Recipient:	L. Koska
Sampled By:	N. Belinowiz

Requested Turnaround Time: 7-Day ☐ 10-Day ☐ PFAS 10-Day (std) ☐ Due Date 5 Day

Rush-Approval Required: 1-Day ☐ 3-Day ☐ 2-Day ☐ 4-Day ☐

Data Delivery: Format: PDF ☑ EXCEL ☑ Other: CLP Like Data Pkg Required: ☐ Email To: koskal@wseinc.com Fax To #:

Dissolved Metals Samples: ○ Field Filtered ○ Lab to Filter

Orthophosphate Samples: ○ Field Filtered ○ Lab to Filter

PCB ONLY
SOXHLET ☑
NON SOXHLET ☐

ANALYSIS REQUESTED

Pace Analytical Work Order#	Client Sample ID / Description	Beginning Date/Time	Ending Date/Time	COMP/GRAB	[1]Matrix Code	Conc Code	VIALS	GLASS	PLASTIC	BACTERIA	ENCORE	TPH (8100)	EPH	SVOCs (8270)	As, Ba, Cd, Cr, Cu, Pb, Hg, Se, Ag, Zi	PCBs Congeners	VOCs (8260)	Conductivity, pH, Reactive CN/S, Ignitability	Total Organic Carbon	% Solids	Grain Size Distribution	TCLP (as needed - 20x Rule)
1	Disp Cell 1	11:30	10/24/2023	Comp	Sed.	U	✓	✓				X	X	X	X	X	X	X	X	X	X	X
2	Disp Cell 2	12:30	10/24/2023	Comp	Sed.	U	✓	✓				X	X	X	X	X	X	X	X	X	X	X
X	Disp Cell 3	——	10/24/2023	Comp	Sed.	U						X	X	X	X	X	X	X	X	X	X	X
3	Disp Cell 4	1:30	10/24/2023	Comp	Sed.	U	✓	✓				X	X	X	X	X	X	X	X	X	X	X

[2] Preservation Code

Courier Use Only

Total Number Of:
VIALS____
GLASS____
PLASTIC____
BACTERIA____
ENCORE____

Glassware in the fridge? Y / N
Glassware in freezer? Y / N
Prepackaged Cooler? Y / N
*Pace Analytical is not responsible for missing samples from prepacked coolers

Relinquished by: (signature) [signature]	Date/Time: 10/24/23 14:30
Received by: (signature) [signature] Pace	Date/Time: 10/25/23 1055
Relinquished by: (signature) [signature] Pace	Date/Time: 10/27/23 1730
Received by: (signature) [signature] 3.0 5.0	Date/Time: 10/27/23 1737
Relinquished by: (signature)	Date/Time:
Received by: (signature)	Date/Time:
Relinquished by: (signature)	Date/Time:
Received by: (signature)	Date/Time:

Client Comments:

Detection Limit Requirements
MA: < RCS-1
CT:
Other:

Special Requirements
☑ MA MCP Required
MCP Certification Form Required
☐ CT RCP Required
RCP Certification Form Required
☐ MA State DW Required
PWSID #

Please use the following codes to indicate possible sample concentration within the Conc Code column above:
H - High; M - Medium; L - Low; C - Clean; U - Unknown

NELAC and AIHA-LAP, LLC Accredited

Project Entity
Government ☐ Federal ☐ City ☑
Municipality ☐ 21 J ☐ Brownfield ☐
MWRA ☐ School ☐ MBTA ☐
WRTA ☐

Other
☐ Chromatogram
☐ AIHA-LAP,LLC

[1] **Matrix Codes:**
GW = Ground Water
WW = Waste Water
DW = Drinking Water
A = Air
S = Soil
SL = Sludge
SOL = Solid
O = Other (please define)

[2] **Preservation Codes:**
I = Iced
H = HCL
M = Methanol
N = Nitric Acid
S = Sulfuric Acid
B = Sodium Bisulfate
X = Sodium Hydroxide
T = Sodium Thiosulfate
O = Other (please define)

Lab Comments:

Disclaimer: Pace Analytical is not responsible for any omitted information on the Chain of Custody. The Chain of Custody is a legal document that must be complete and accurate and is used to determine what analyses the laboratory will perform. Any missing information is not the laboratory's responsibility. Pace Analytical values your partnership on each project and will try to assist with missing information, but will not be held accountable.

Pace Analytical Services	DC#_Title: ENV-FRM-ELON-0001 v07_Sample Receiving Checklist
	Effective Date: 07/13/2023

Log In Back-Sheet

Client Weston and Sampson

Project Island End River

MCP/RCP Required MA MCP

Deliverable Package Requirement RCS -1

Location Chelsea, MA

PWSID# (When Applicable) N/A

Arrival Method:

Courier ☒ Fed Ex ☐ Walk In ☐ Other ☐

Received By / Date / Time MEM 10/25/23 1737

Back-Sheet By / Date / Time STM 10/25/23 2013

Temperature Method Gun # 4

Temp X < 6° C Actual Temperature 3.0, 5.0

Rush Samples: Yes / No Notify

Short Hold: Yes / ~~No~~ Notify Javier STM

Notes regarding Samples/COC outside of SOP:

Disp Cell 3 not received, past hold for pH

Login Sample Receipt Checklist – (Rejection Criteria Listing – Using Acceptance Policy) Any False statement will be brought to the attention of the Client – True or False

	True	False
Received on Ice	☒	☐
Received in Cooler	☒	☐
Custody Seal: DATE TIME	☐	☒
COC Relinquished	☒	☐
COC/Samples Labels Agree	☒	☐
All Samples in Good Condition	☒	☐
Samples Received within Holding Time	~~☒~~ STM	☒
Is there enough Volume	☒	☐
Proper Media/Container Used	☒	☐
Splitting Samples Required	~~☒~~ STM	☒
MS/MSD	☐	☒
Trip Blanks	☐	☒
Lab to Filters	☐	☒
COC Legible	☒	☐

COC Included: (Check all included)

Client ☒ Analysis ☒ Sampler Name ☒

Project ☒ IDs ☒ Collection Date/Time ☒

All Samples Proper pH: N/A ☐ ☐

Additional Container Notes

Note: West Virginia requires all samples to have their temperature taken. Note any outliers.

Pace Analytical Services

DC#_Title: ENV-FRM-ELON-0001 v07_Sample Receiving Checklist

Effective Date: 07/13/2023

Sample	Soils Jars (Circle Amb/Clear)				Ambers							Plastics											VOA Vials					Other / Fill in					
					1 Liter			250mL			100mL	1 Liter		500mL		250mL																	
	16oz Amb/Clear	8oz Amb/Clear	4oz Amb/Clear	2oz Amb/Clear	Unpreserved	HCL	Sulfuric	Sulfuric	Phosphoric	HCl	Unpreserved	Unpreserved	Sulfuric	Unpreserved	Sulfuric	Unpreserved	Trizma	Sulfuric	Nitric	NaOH	Ammonium Acetate	NaOH/Zinc	Unpreserved	HCl	MeOH	D.I. Water	BiSulfate	Col/Bact					
1	1	3	1																						2	~~2~~	4						
2	1	3	1																						2	~~2~~	4						
3	1	3	1																						1	~~1~~	2						
4																										ST	M						
5																																	
6																																	
7																																	
8																																	
9																																	
10																																	
11																																	
12																																	
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14																																	
15																																	
16																																	
17																																	
18																																	
19																																	
20																																	

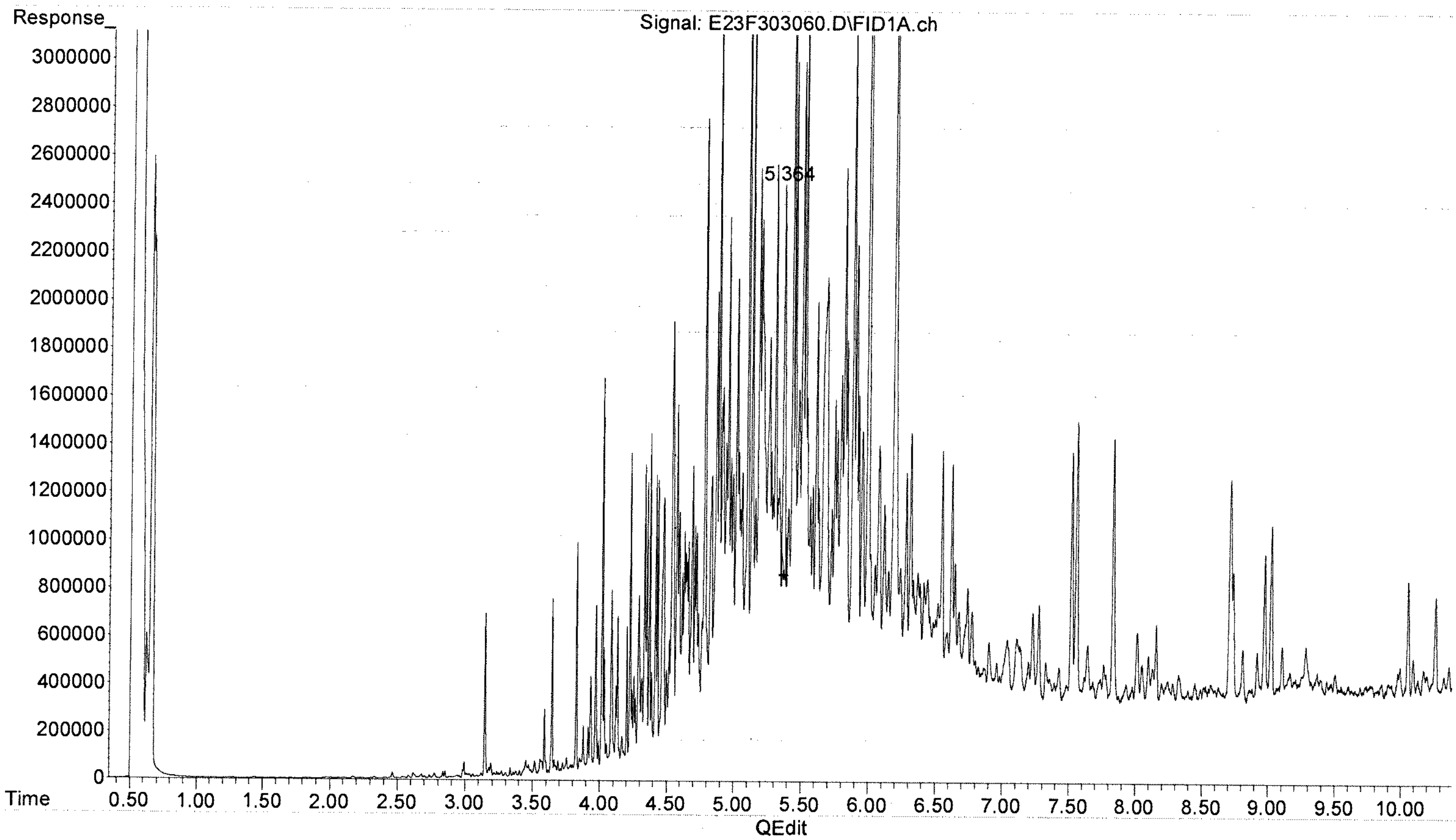
Qualtrax ID: 120836

Quantitation Report (Qedit)

```
Data Path : C:\msdchem\1\data\E103023\
Data File : E23F303060.D
Signal(s) : Signal #1: FID1A.ch  Signal #2: FID2B.ch
Acq On    : 31 Oct 2023   6:25 pm
Operator  : PJG
Sample    : 23J3373-03                         Inst     : GCFID5
Misc      :
ALS Vial  : 44   Sample Multiplier: 1

Integration File signal 1: events.e
Integration File signal 2: events2.e
Quant Time: Nov 01 09:56:53 2023
Quant Method : C:\msdchem\1\methods\EPH030723.M
Quant Title  : EPH 12/14/21
QLast Update : Wed Mar 08 12:05:32 2023
Response via : Initial Calibration
Integrator: ChemStation

Volume Inj.     :
Signal #1 Phase :                    Signal #2 Phase:
Signal #1 Info  :                    Signal #2 Info :
```



(10) o-Terphenyl (OTP) (S)

5.364min 155.605 ug/mL

response 15048569

matrix interference

(+) = Expected Retention Time

EPH030723.M Wed Nov 01 10:32:52 2023

Attachment H

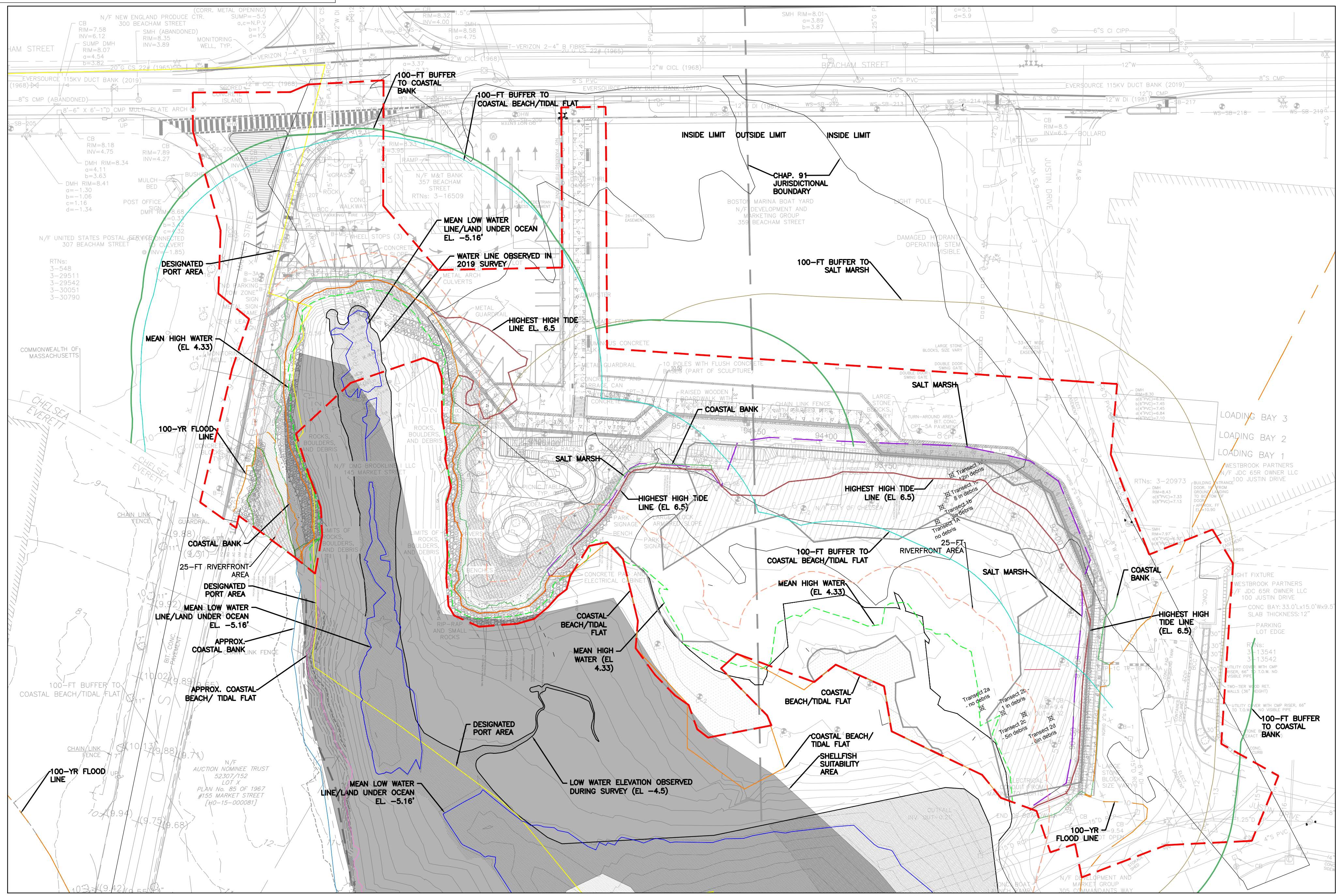
WETLAND RESOURCE AREA IMPACT EXHIBITS

Appendix H: Wetland Resource Area Impact Exhibits

KEY MAP
SCALE: 1"=150'

LEGEND:

- = MEAN LOW WATER LINE/LAND UNDER OCEAN EL. -5.16
- = SALT MARSH
- = MEAN HIGH WATER EL. 4.33'
- = COASTAL BEACH/TIDAL FLATS
- = 25-FT RIVERFRONT AREA
- = COASTAL BANK
- = DESIGNATED PORT AREA
- = 100-FT BUFFER TO SALT MARSH
- = 100-FT BUFFER TO COASTAL BEACH/TIDAL FLAT
- = 100-FT BUFFER TO COASTAL BANK
- = 100-YR FLOOD PLAIN
- = APPROXIMATE COASTAL BEACH TIDAL FLATS
- = APPROXIMATE COASTAL BANK
- = PROJECT LIMITS FPE
- = HIGHEST HIGH TIDE LINE EL. 6.5'
- = CHAP. 91 JURISDICTIONAL LIMIT
- = SHELLFISH SUITABILITY AREA
- = PLANTING OF NATIVE SALT MARSH SPECIES AND SEEDING WITH NATIVE SALT TOLERANT SEED MIX
- = SPARTINA ALTERNIFLORA PLUGS



SCALE: 1"=40'

NOTE: ALL ELEVATIONS NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88)

Project:
ISLAND END RIVER FLOOD RESILIENCE PROVISIONS EAST

Weston & Sampson
Weston & Sampson Engineers, Inc.
55 Walkers Brook Drive, Suite 100
Reading, MA 01867
978.532.1900 800.SAMPSON
www.westonandsampson.com

Consultants:

Revisions:

No.	Date	Description

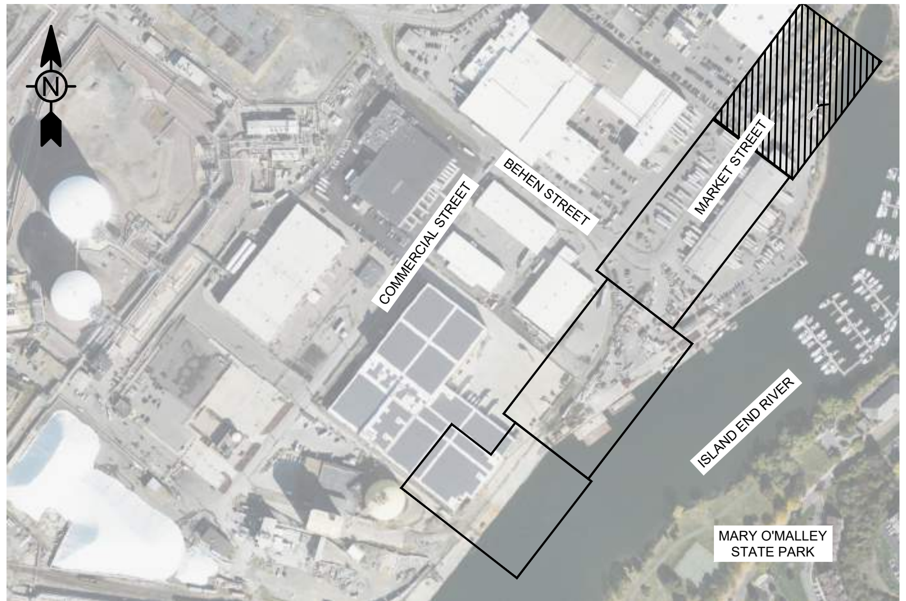
Seal:

Issued For:
PROGRESS PRINT

Scale: AS NOTED
Date: NOVEMBER 2023
Drawn By: CFW
Reviewed By: TPC
Approved By: BWA
W&S Project No.: -
W&S File No.:

Drawing Title:
RESOURCE AREA IMPACT PLAN

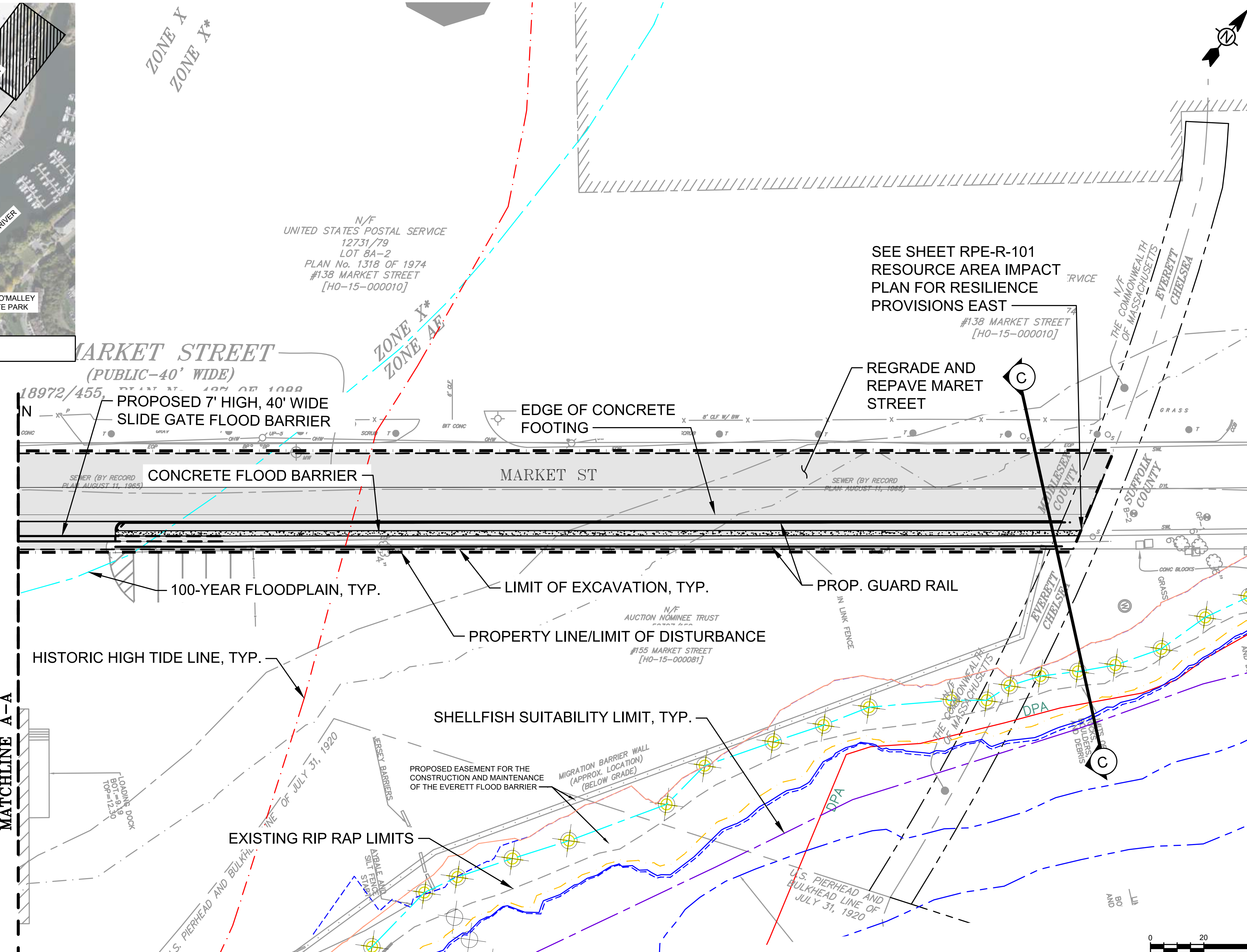
Sheet Number:
RPE-R-101



KEY MAP
SCALE: 1"=300'

LEGEND

- Mystic River Designated Port Area
- Salt Marsh
- Approx. Coastal Bank
- Approx. Coastal Beach Tidal Flats
- 25' Riverfront Offset
- Shellfish Suitability Area
- Historic High Tide Line
- Bordering Vegetated Wetlands
- Asphalt Pavement
- Gravel
- Concrete
- Mean High Water (4.33 NAVD88)
- Mean Highest High Water (4.77 NAVD88)
- Mean Low Water (-5.16 NAVD88)
- Scope of Work Limits



MARK	DATE	DESCRIPTION	BY

TETRA TECH
www.tetratech.com
498 7TH AVENUE, 15TH FLOOR
NEW YORK, NY 10018
PHONE: (646) 576-4034

CITY OF EVERETT
ISLAND END RIVER FLOOD PROVISIONS WEST

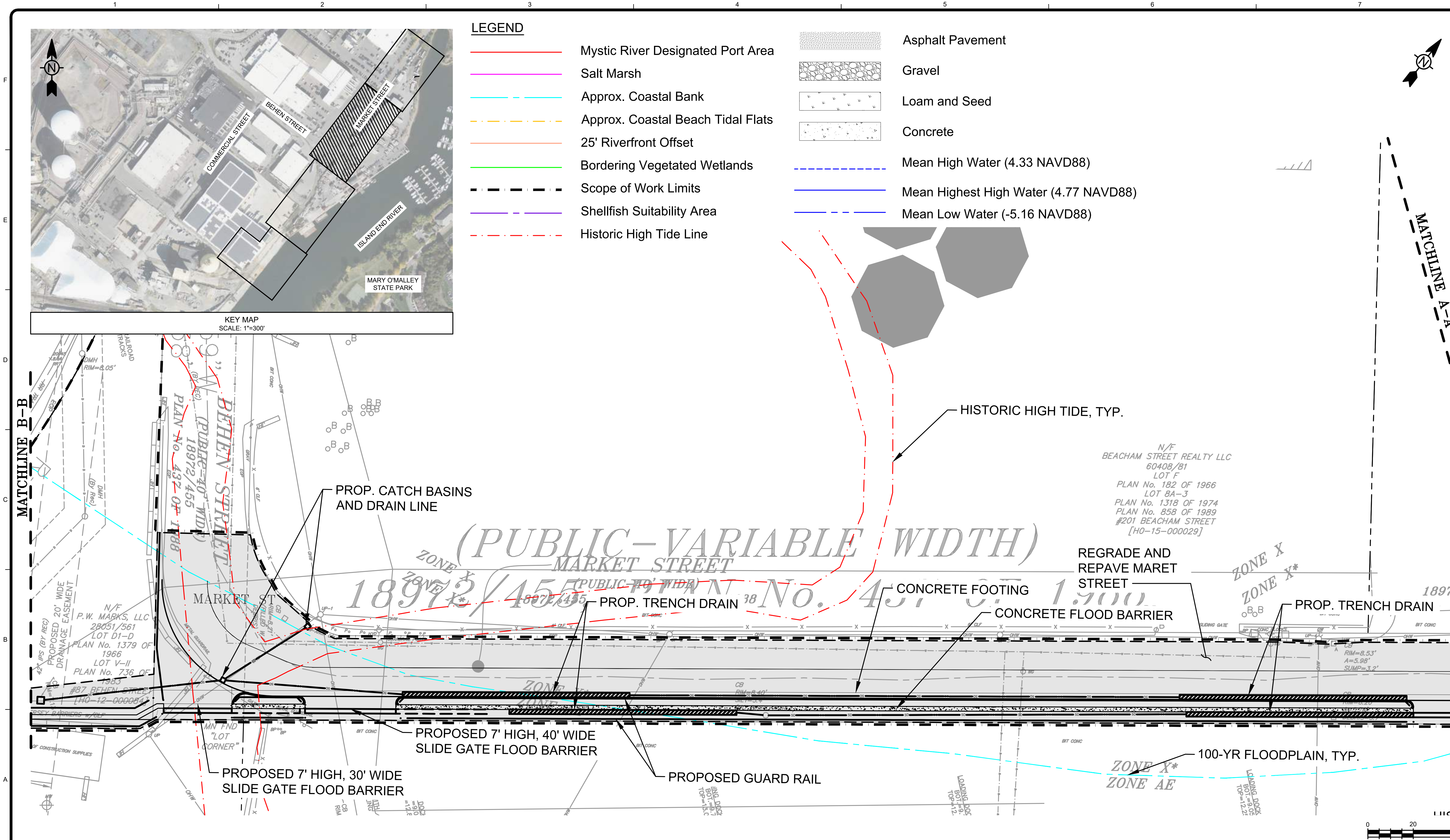
RESOURCE AREA IMPACT PLAN - 1

PROJ: 200-01291-22002
DESN: TBD
DRWN: TBD
CHKD: JO

RPW-R-101

Bar measures 1 inch, otherwise drawing not to scale

11/6/2023 5:38:28 PM - \\TT.LOCAL\IER\PROJECTS\NEW YORK\01291\200-01291-22002\CAD\SUPPORTFILES\RESOURCE AREA CALCS\C-101 LAYOUT AND MATERIALS PLAN_REV.DWG - RETTA, AMANDA



NOTE:
COASTAL BANK LINE IS THE 100-YEAR FLOODPLAIN WHERE THE COASTAL BANK TERMINATES IN THE EXISTING BULKHEAD.

TETRA TECH
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498 7TH AVENUE, 15TH FLOOR
NEW YORK, NY 10018
PHONE: (646) 576-4034

MARK	DATE	DESCRIPTION	BY

CITY OF EVERETT
ISLAND END RIVER FLOOD PROVISIONS WEST

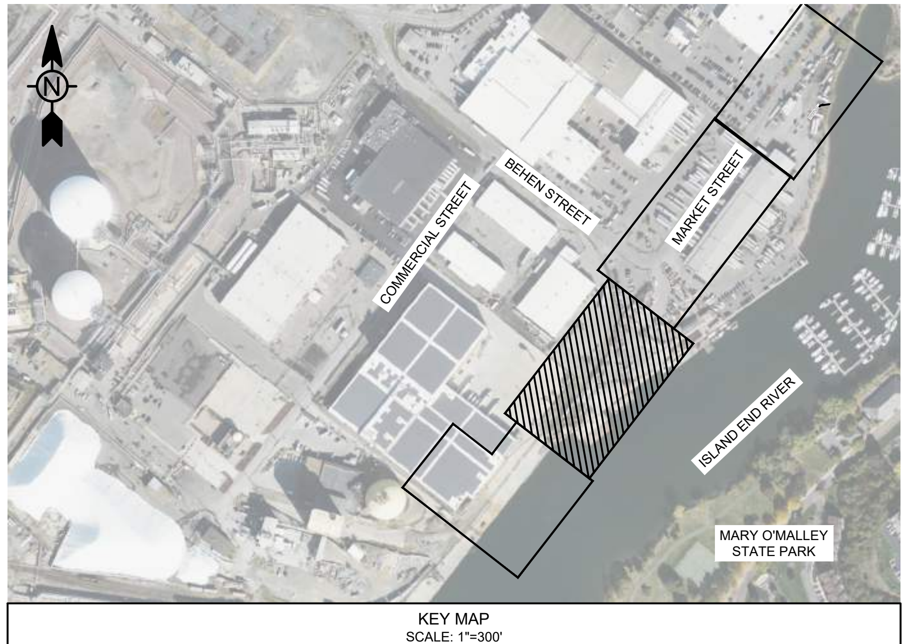
RESOURCE AREA IMPACT PLAN - 2

PROJ: 200-01291-22002
DESN: TBD
DRWN: TBD
CHKD: JO

RPW-R-102

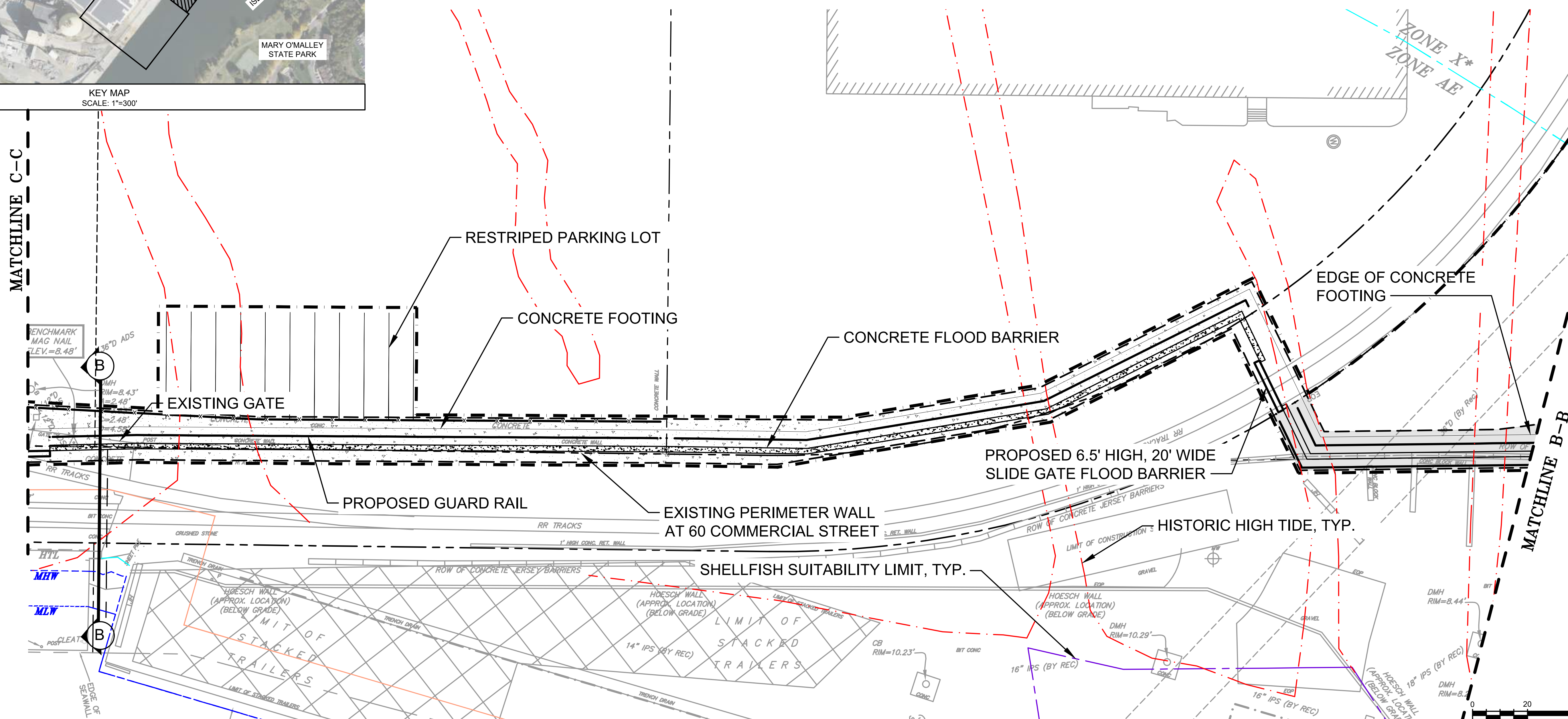
Bar measures 1 inch, otherwise drawing not to scale

11/6/2023 5:39:01 PM - \\TT.LOCAL\IER\PROJECTS\NEW YORK\01291\200-01291-22002\CAD\SUPPORTFILES\RESOURCE AREA CALCS\C-101 LAYOUT AND MATERIALS PLAN_REV.DWG - RETTA, AMANDA



LEGEND

- Mystic River Designated Port Area
- Salt Marsh
- Approx. Coastal Bank
- Approx. Coastal Beach Tidal Flats
- 25' Riverfront Offset
- Bordering Vegetated Wetlands
- Scope of Work Limits
- Shellfish Suitability Area
- Historic High Tide Line
- Asphalt Pavement
- Gravel
- Concrete
- Confined Disposal Facility
- Mean High Water (4.33 NAVD88)
- Mean Highest High Water (4.77 NAVD88)
- Mean Low Water (-5.16 NAVD88)



NOTE:
ENTIRE PLAN IS LOCATED WITHIN THE FEMA 100-YEAR FLOODPLAIN AND COASTAL BANK LINES, EXCEPT WEST OF THE 95 BEHAN STREET BULKHEAD, WHERE THE COASTAL BANK IS DELINEATED.

TETRA TECH
www.tetratech.com
498 7TH AVENUE, 15TH FLOOR
NEW YORK, NY 10018
PHONE: (646) 576-4034

MARK	DATE	DESCRIPTION	BY

CITY OF EVERETT
ISLAND END RIVER FLOOD PROVISIONS WEST

RESOURCE AREA IMPACT PLAN - 3

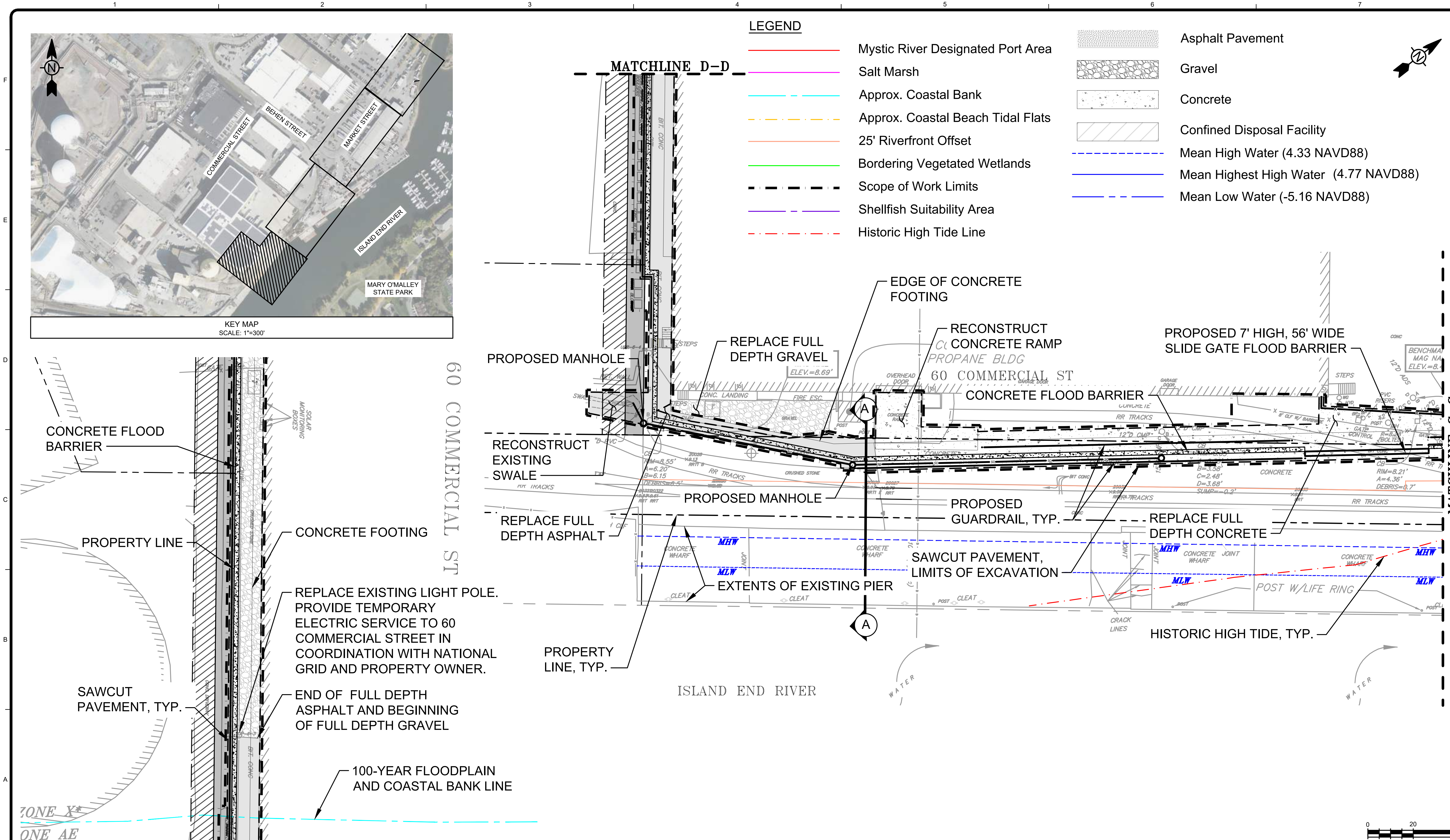
PROJ:	200-01291-22002
DESN:	TBD
DRWN:	TBD
CHKD:	JO

RPW-R-103

Copyright: Tetra Tech

11/6/2023 5:39:31 PM - \\TT.LOCAL\IER\PROJECTS\NEW YORK\01291\200-01291-22002\CAD\SUPPORTFILES\RESOURCE AREA CALCS\C-101 LAYOUT AND MATERIALS PLAN_REV.DWG - RETTA, AMANDA

Bar measures 1 inch, otherwise drawing not to scale



MARK	DATE	DESCRIPTION	BY

TETRA TECH
www.tetratech.com
498 7TH AVENUE, 15TH FLOOR
NEW YORK, NY 10018
PHONE: (646) 576-4034

CITY OF EVERETT
ISLAND END RIVER FLOOD PROVISIONS WEST
RESOURCE AREA IMPACT PLAN - 4

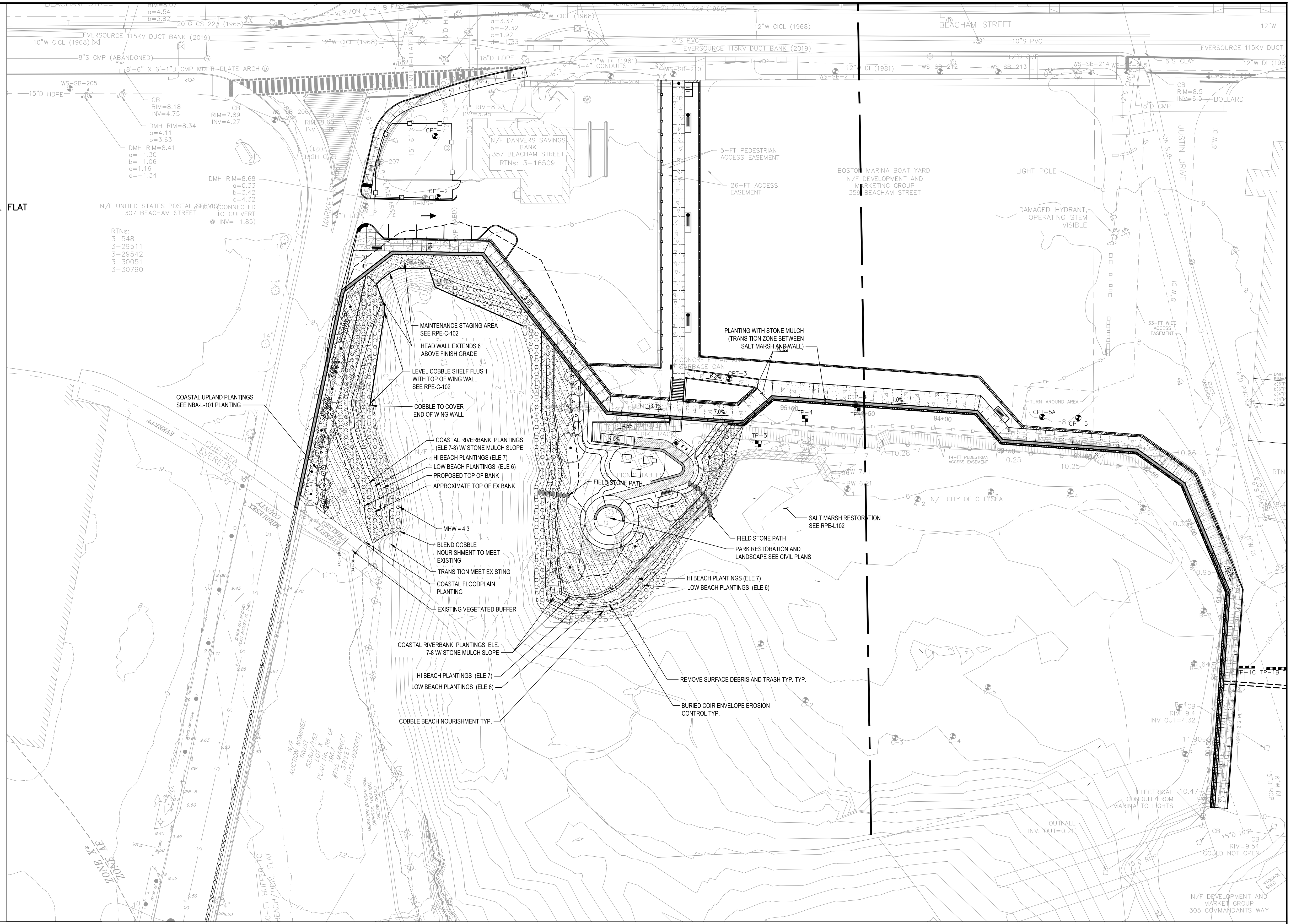
PROJ:	200-01291-22002
DESN:	TBD
DRWN:	TBD
CHKD:	JO

RPW-R-104

Bar measures 1 inch, otherwise drawing not to scale
11/6/2023 5:40:14 PM - \\TT.LOCAL\IER\PROJECTS\NEW YORK\01291\200-01291-22002\CAD\SUPPORTFILES\RESOURCE AREA CALCS\C-101 LAYOUT AND MATERIALS PLAN_REV.DWG - RETTA, AMANDA

LEGEND:

- = MEAN LOW WATER LINE/LAND UNDER OCEAN EL. -5.16
- = SALT MARSH
- = MEAN HIGH WATER EL. 4.33'
- = COASTAL BEACH/TIDAL FLATS
- = 25-FT RIVERFRONT AREA
- = COASTAL BANK
- = DESIGNATED PORT AREA
- = 100-FT BUFFER TO SALT MARSH/BVW
- = 100-FT BUFFER TO COASTAL BEACH/TIDAL FLAT
- = 100-FT BUFFER TO COASTAL BANK
- = PROJECT LIMITS
- = 100-YR FLOOD PLAIN
- = HIGHEST HIGH TIDE LINE EL. 6.5'
- = APPROX. MHHW EL. 4.77'
- = CHAP. 91 JURISDICTIONAL LIMIT
- = NATIVE SALT TOLERANT SEED MIX
- = SPARTINA ALTERNIFLORA PLUGS



Legend

- COBBLE BEACH NOURISHMENT/ STABILIZATION
- COASTAL RIVERBANK PLANTED WITH COBBLE MULCH
- COSTAL BEACH (LOW, HI) PLANTING
- COSTAL FLOODPLAIN PLANTING SALT FLOOD TOLERANT UPLAND PLANTINGS

Mass EOEA

Island End River

RESOURCE AREA IMPACT PLAN

Everett & Chelsea, MA

SHEET - NBA-R-101
DEIR

SCALE: 1" = 30'
0 15 30 60 FEET

BSC GROUP
803 Summer Street
Boston, Massachusetts
02127
617 896 4300

DATE: 10 / 26 / 2023

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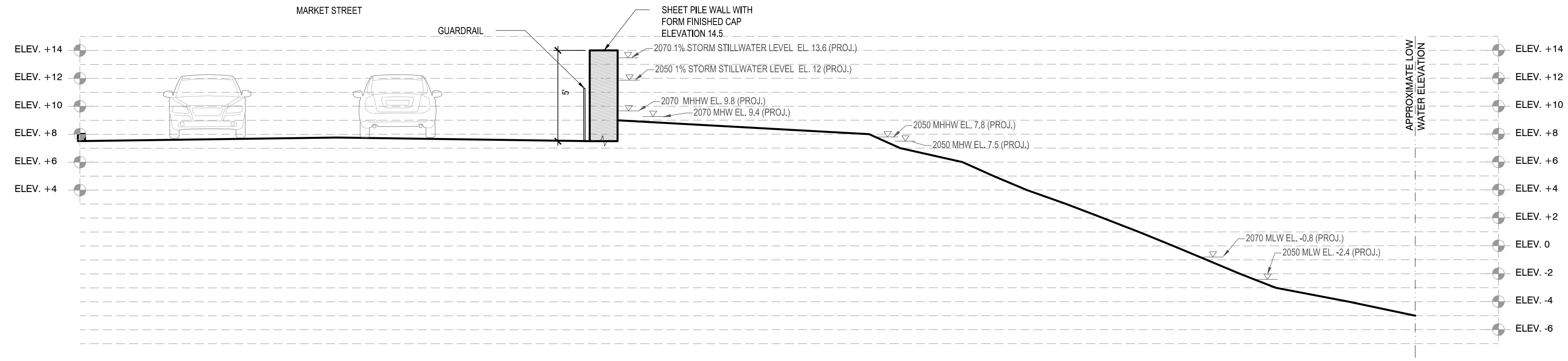

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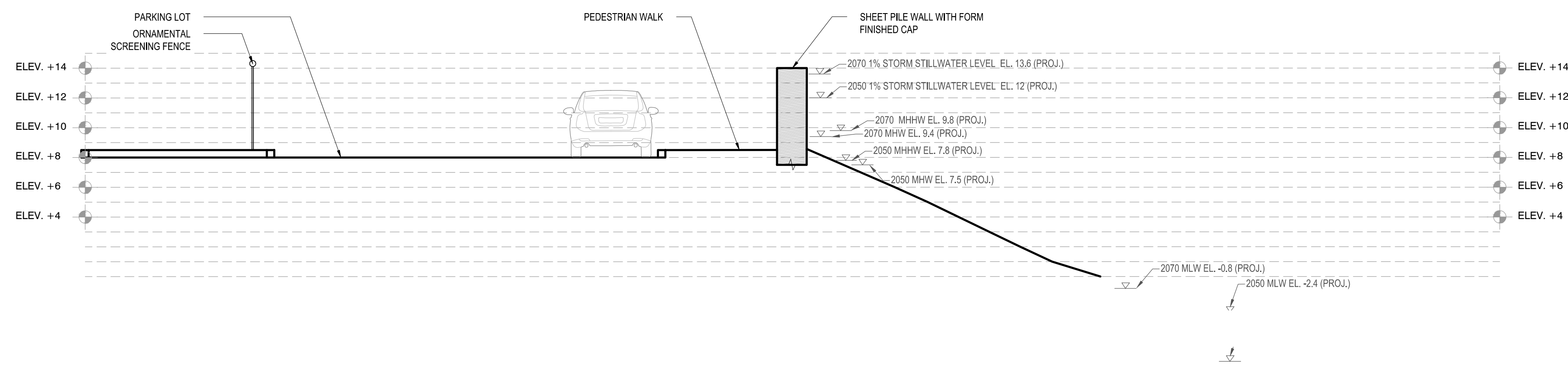

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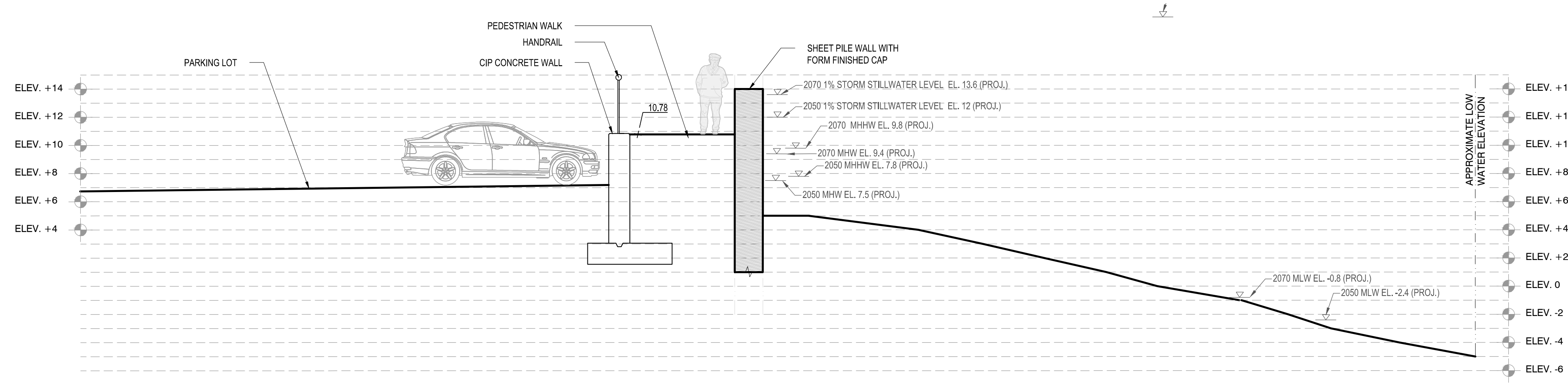

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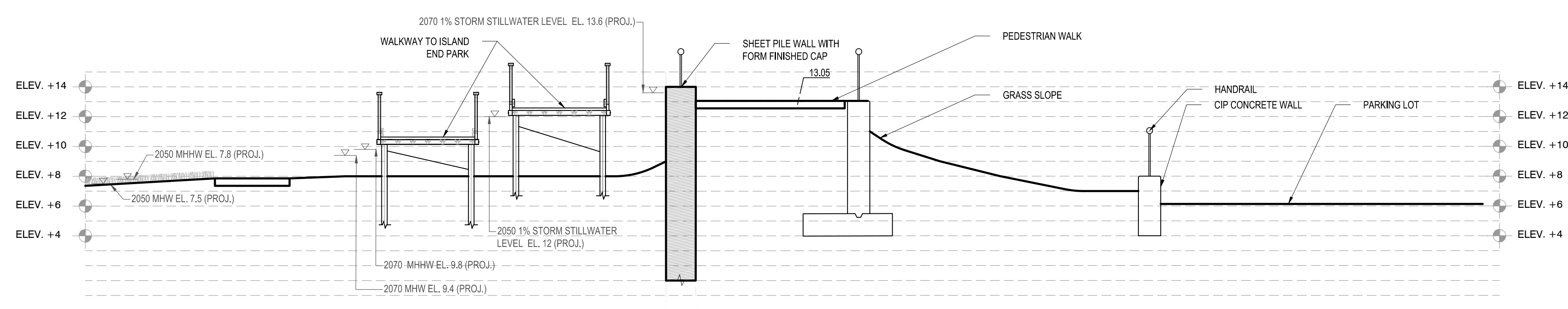

VERTICAL AND HORIZONTAL
SCALE: 1"=5'

Project:

ISLAND END RIVER FLOOD RESILIENCE PROVISIONS EAST

Weston & Sampson

Weston & Sampson Engineers, Inc.
55 Walkers Brook Drive, Suite 100
Reading, MA 01867
978.532.1900 800.SAMPSON
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Revisions:

No.	Date	Description

Seal:

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Scale:	AS NOTED
Date:	NOVEMBER 2023
Drawn By:	LC, FD
Reviewed By:	BK
Approved By:	BWA
W&S Project No.:	-
W&S File No.:	

Drawing Title:

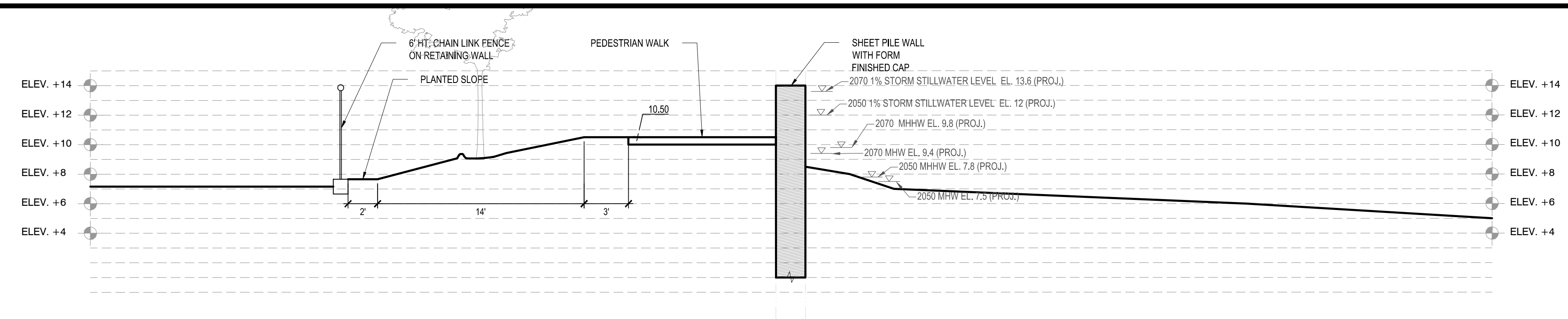
RESOURCE AREA IMPACT SECTION - 1

Sheet Number:

RPE-R-201

Rev. 1.6 Date: 11/2023

SECTION E



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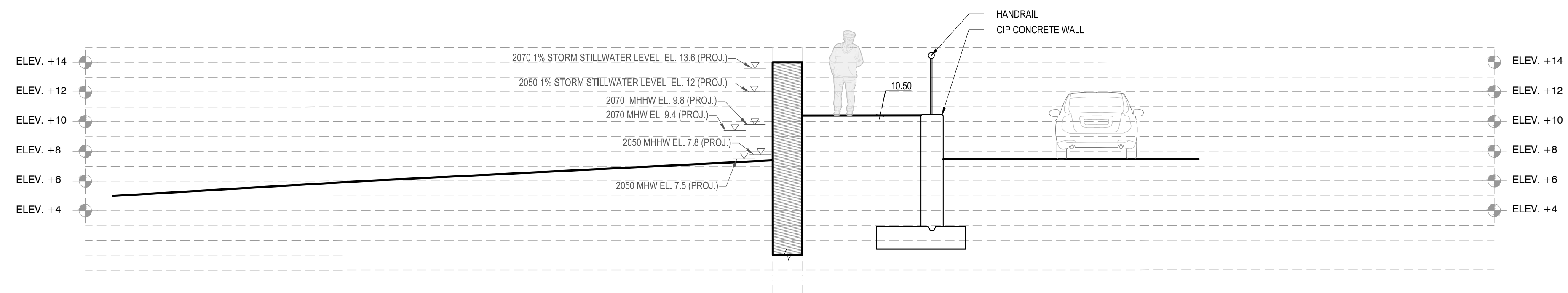

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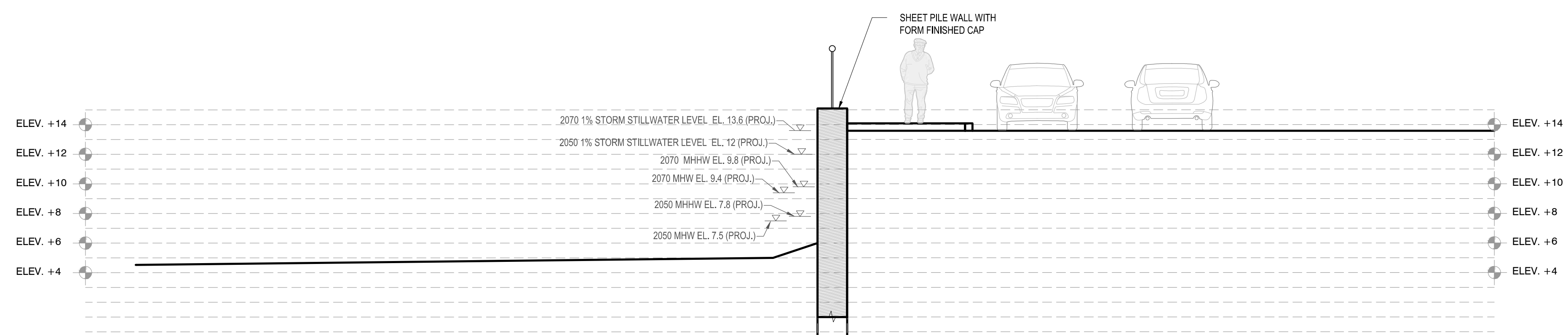

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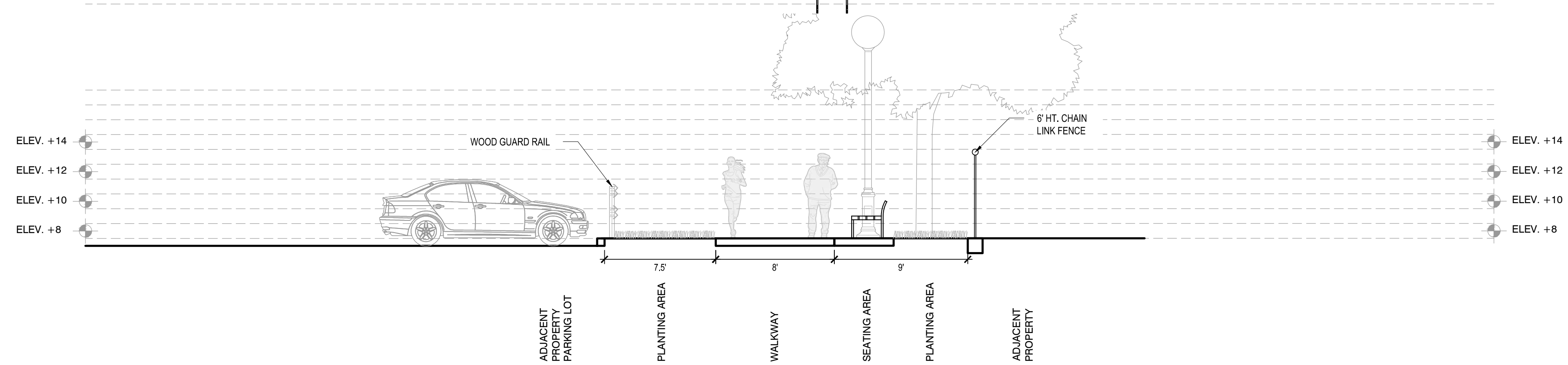

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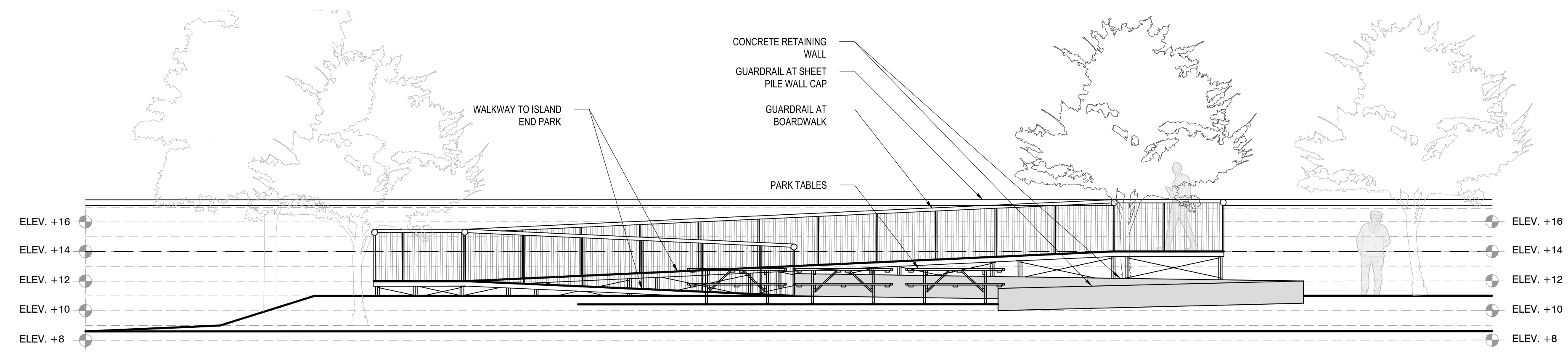

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ISLAND END RIVER FLOOD RESILIENCE PROVISIONS EAST

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Reviewed By:	BK
Approved By:	BWA
W&S Project No.:	-
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Drawing Title:

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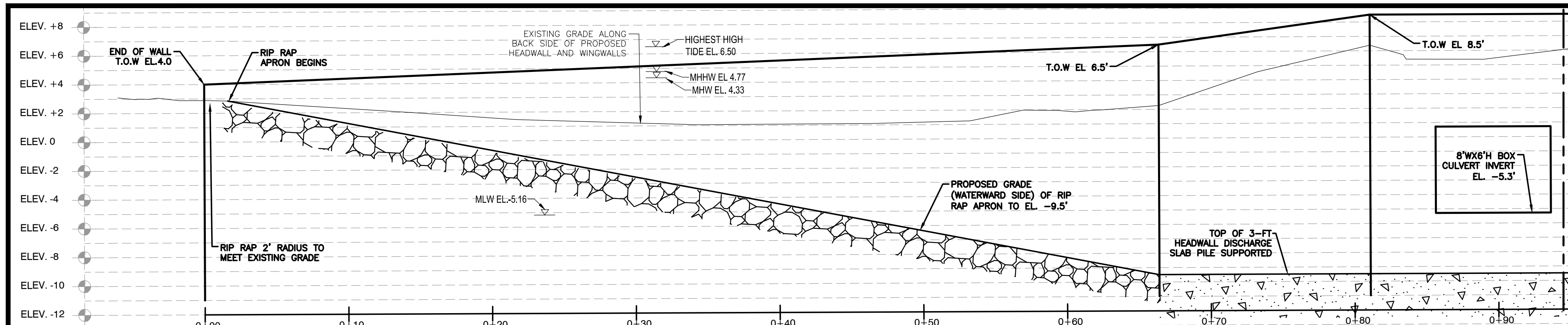
Sheet Number:

RPE-R-202

Rev. 1.6 Date: 11/2023



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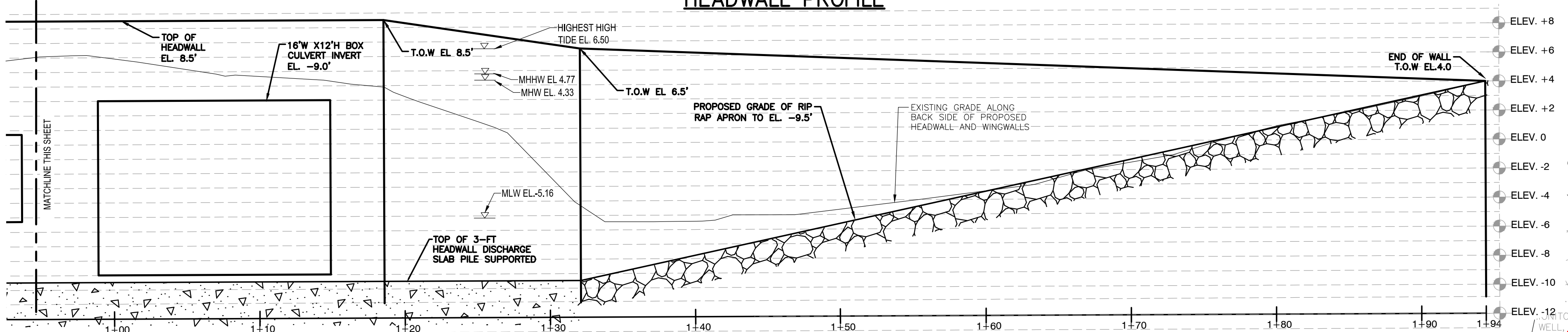

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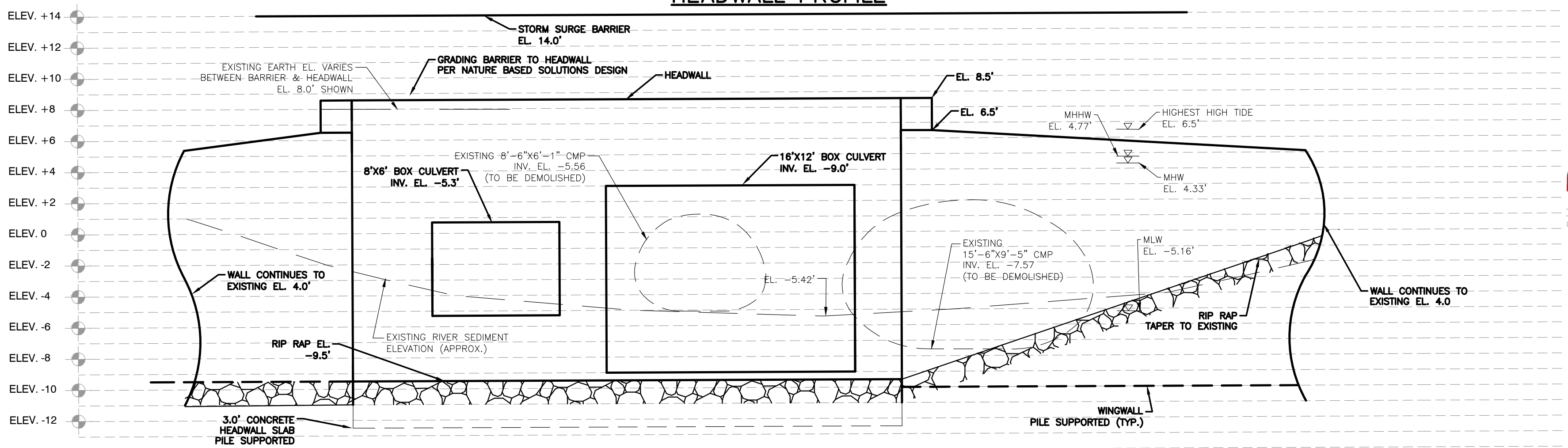

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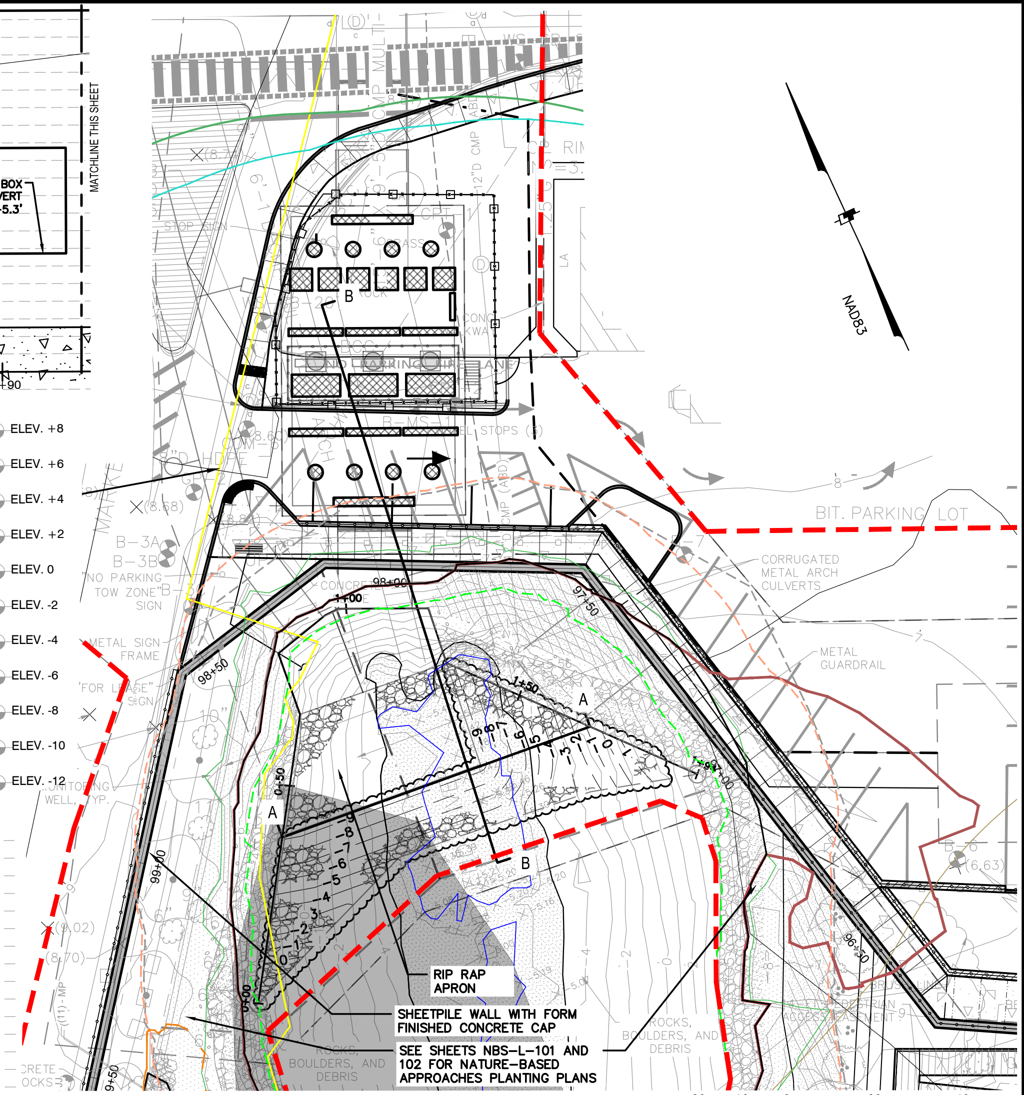
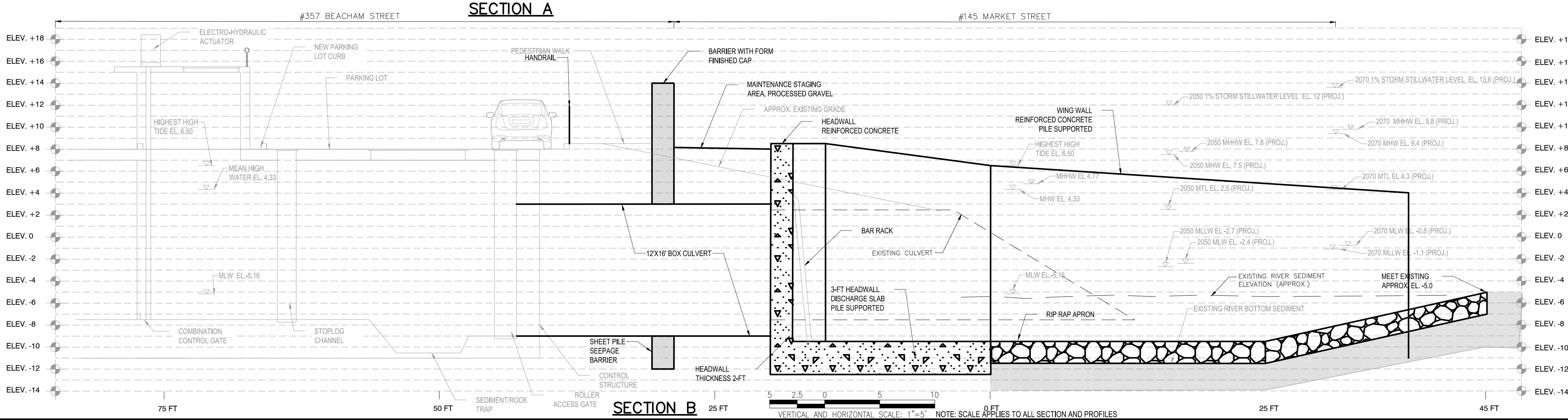


PLAN

LEGEND:

- MEAN LOW WATER LINE/LAND UNDER OCEAN EL. -5.16
- SALT MARSH
- MEAN HIGH WATER EL. 4.33'
- COASTAL BEACH/TIDAL FLATS
- 25-FT RIVERFRONT AREA
- COASTAL BANK
- DESIGNATED PORT AREA
- CHAP. 91 JURISDICTIONAL LIMIT
- 100-FT BUFFER TO SALT MARSH
- 100-FT BUFFER TO COASTAL BEACH/TIDAL FLAT
- 100-FT BUFFER TO COASTAL BANK
- 100-YR FLOOD PLAIN
- APPROXIMATE COASTAL BEACH TIDAL FLATS
- APPROXIMATE COASTAL BANK
- PROJECT LIMITS
- HIGHEST HIGH TIDE LINE EL. 6.5'



SECTION B

NOTE: SCALE APPLIES TO ALL SECTION AND PROFILES

Project:
ISLAND END RIVER FLOOD RESILIENCE PROVISIONS EAST

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No.	Date	Description

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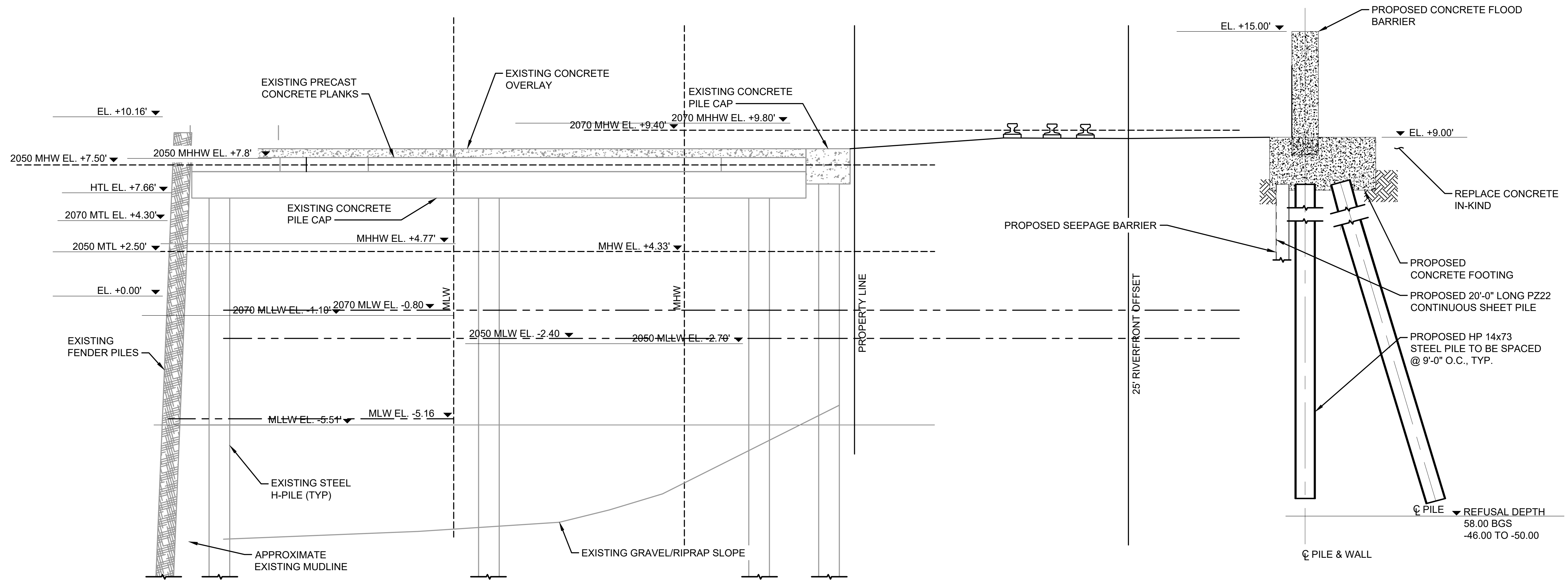
Scale:	AS NOTED
Date:	NOVEMBER 2023
Drawn By:	CFW
Reviewed By:	TPC
Approved By:	BWA
W&S Project No.:	-
W&S File No.:	

Drawing Title:
HEADWALL SECTIONS

Sheet Number:
SSCF-R-201

Rev. 1.6 Date: 11/2023



1
SECTION A-A

NOTE:

ALL ELEVATIONS REFERENCE VERTICAL DATUM NAVD88

0 2 4
SCALE: 1"=2'

TETRA TECH
www.tetratech.com
498 7TH AVENUE, 15TH FLOOR
NEW YORK, NY 10018
PHONE: (646) 576-4034

MARK	DATE	DESCRIPTION	BY

CITY OF EVERETT
ISLAND END RIVER FLOOD PROVISIONS WEST

RESOURCE AREA
IMPACT SECTION - 1

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DESN:	TBD
DRWN:	TBD
CHKD:	JO

RPW-R-201

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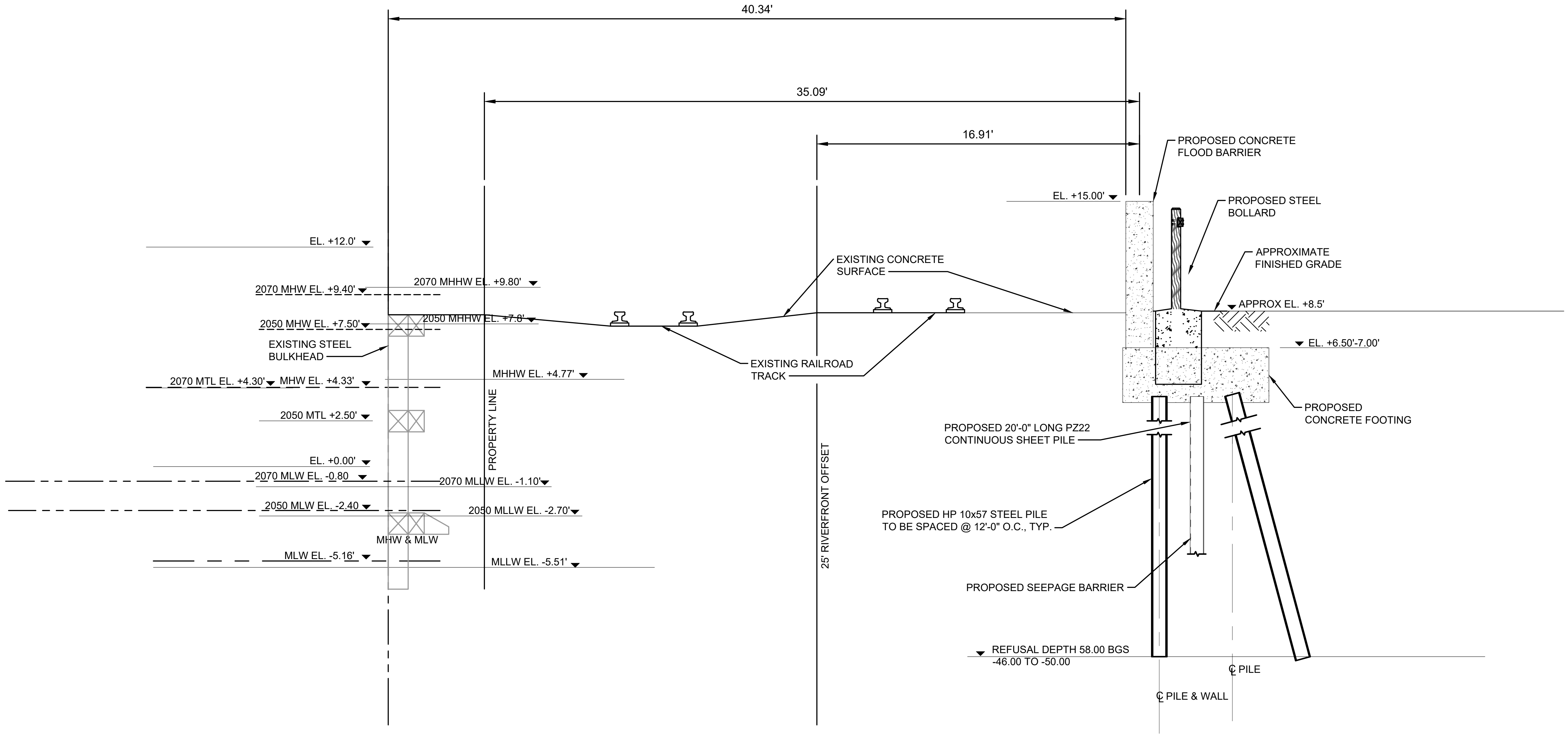

2 SECTION B-B

NOTE:

ALL ELEVATIONS REFERENCE VERTICAL DATUM NAVD88

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SCALE: 1"=2'

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NEW YORK, NY 10018
PHONE: (646) 576-4034

MARK	DATE	DESCRIPTION	BY

CITY OF EVERETT

ISLAND END RIVER FLOOD PROVISIONS WEST

RESOURCE AREA
IMPACT SECTION - 2

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DESN:	TBD
DRWN:	TBD
CHKD:	JO

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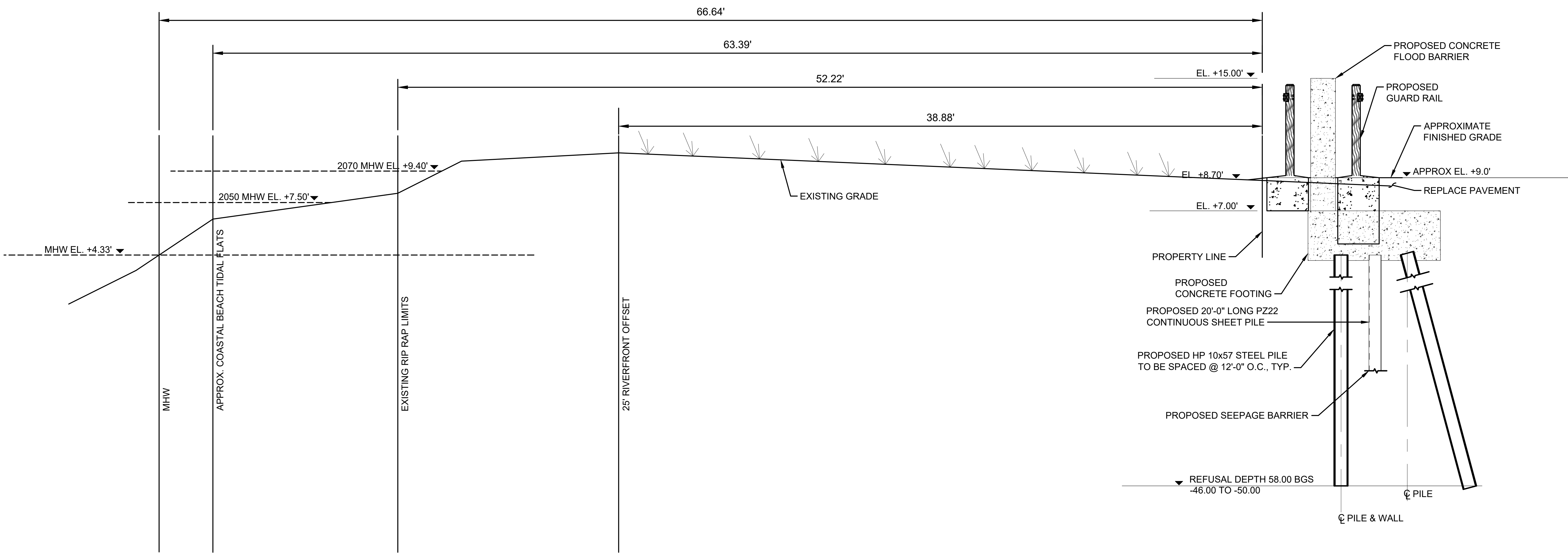

3 SECTION C-C

NOTE:

ALL ELEVATIONS REFERENCE VERTICAL DATUM NAVD88

TETRA TECH
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MARK	DATE	DESCRIPTION	BY

CITY OF EVERETT
ISLAND END RIVER FLOOD PROVISIONS WEST

RESOURCE AREA
IMPACT SECTION - 3

PROJ:	200-01291-22002
DESN:	TBD
DRWN:	TBD
CHKD:	JO

RPW-R-203

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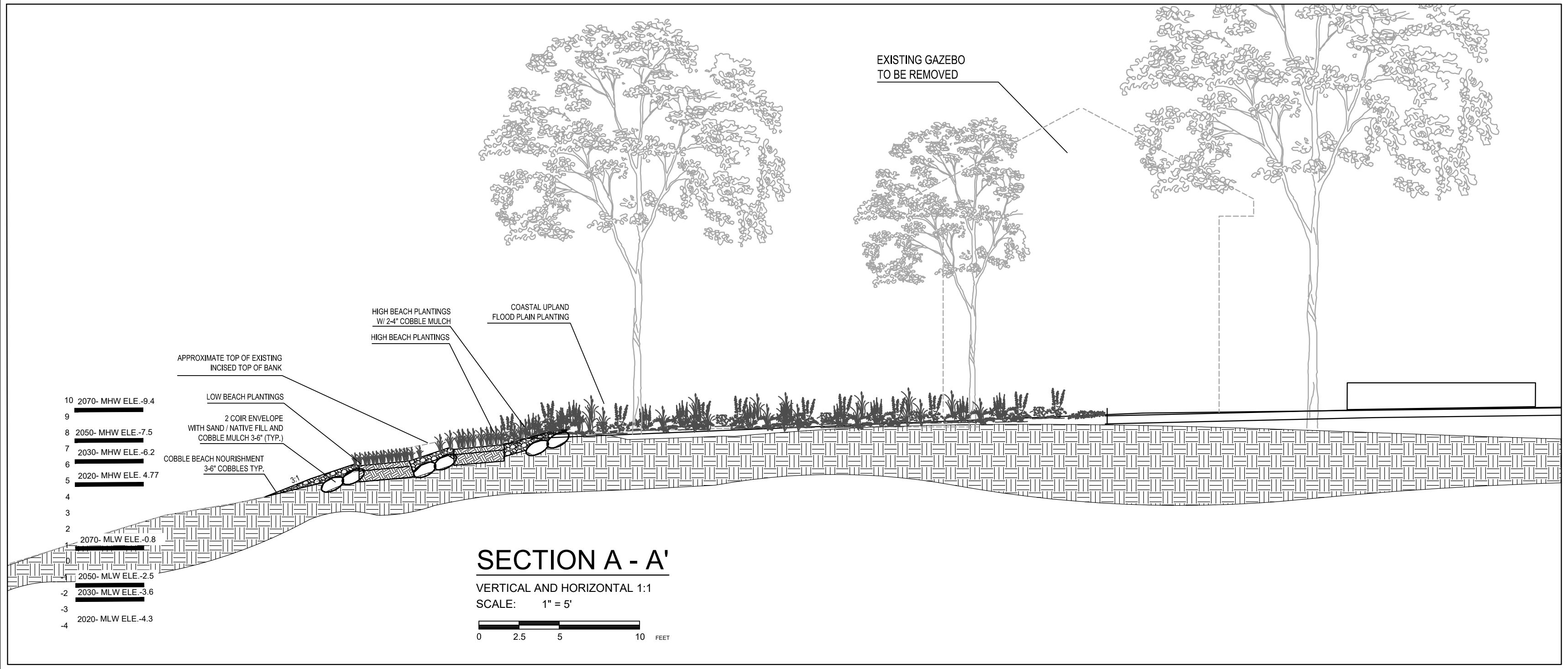

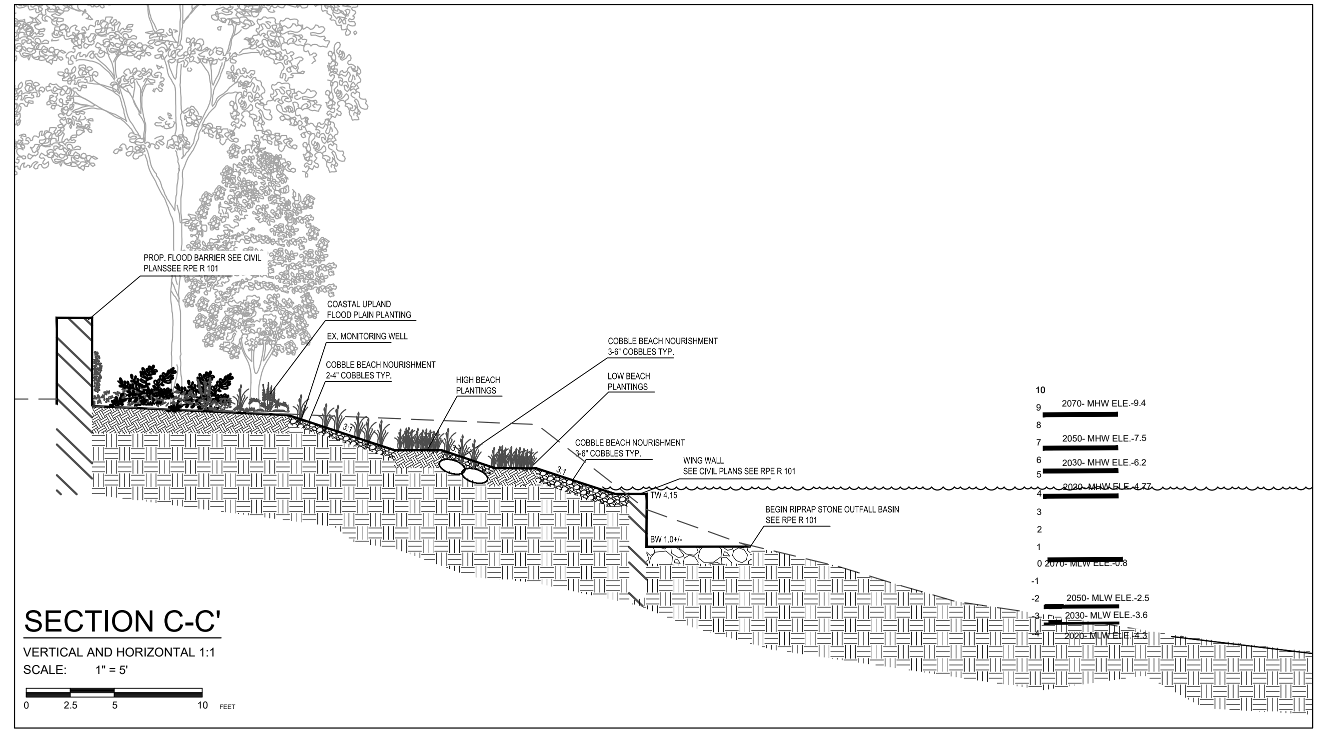

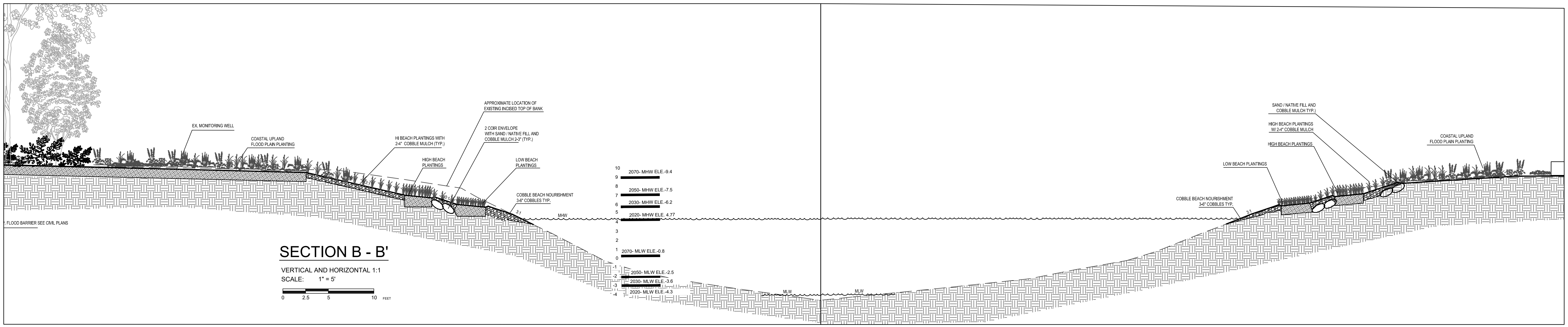

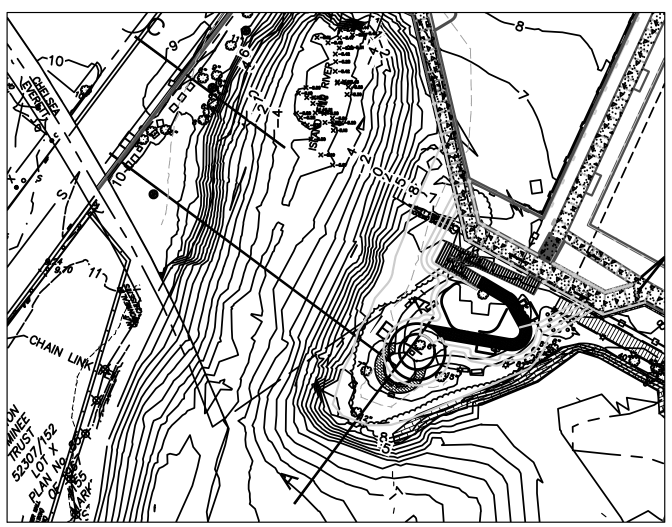

KEY PLAN
SCALE : 1" = 50'

SHEET - NBA-R-201

Mass EOEA

Island End River

RESOURCE AREA IMPACT SECTION - (PLANTING SECTIONS)

Everett & Chelsea, MA

BSC GROUP
803 Summer Street
Boston, Massachusetts
02127
617 896 4300

DATE: 10 / 26 / 2023

Attachment I

SALT MARSH RESTORATION PLAN

westonandsampson.com

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Reading, MA 01867
tel: 978.532.1900

Salt Marsh Wetland Replication Plan

Island End River Flood
Resilience Provisions East

City of Chelsea

Island End Park
Chelsea, MA

TABLE OF CONTENTS

Page

1.0 INTRODUCTION

The area surrounding Island End Park is dominated by commercial properties and has been heavily developed. This has resulted in a number of unavoidable site constraints which have been used to determine the ultimate alignment of the proposed flood barrier. Although this barrier has been located as far landward as is physically possible, a small amount of Salt Marsh impact is unavoidable due to the location of the existing boardwalk. Based on the proposed barrier alignment 1,856 SF of salt marsh will be permanently impacted. In order to provide mitigation for these impacts a new salt marsh replication area has been developed on site. This salt marsh replication area is 2,745 SF in size in order to provide more than the required 1:1 mitigation.

Additionally, the existing salt marsh contains bare spots which provide lower value habitat and minimizes public enjoyment of this natural resource area. Smooth cordgrass *(Spartina alterniflora*) supplemental planting is proposed in these devoid areas to restore vegetation cover.

Proposed improvements to the salt marsh located at the Island End River Flood Resilience project area are broken down into two categories:

A. Enhancement of Existing Salt Marsh

B. Salt Marsh Replication

The strategies for each of these proposed improvements are elaborated below. This proposed work will occur between elevations 2.0 NAVD88 and 7.0 NAVD88.

2.0 ENHANCEMENT OF EXISTING SALT MARSH

2.1 Smooth Cordgrass (Spartina alterniflora) Planting

Based on a review of vegetation composition, substrate materials, and elevation two areas within the low marsh have been identified as having the appropriate conditions for salt marsh vegetation that are currently devoid of vegetation. These two areas have exposed wetland substrate (peat) above elevation 2.0 NAVD88 which is over two feet above the mid-tide line (EL -0.42 NAVD88). The cause for a lack of vegetation in these areas is unknown and could be due to a number of factors including animal predation. In an attempt to restore vegetation to these two areas, this project proposes to plant smooth cordgrass (*Spartina alterniflora*) plugs at 2-foot on center intervals across the two devoid areas.

2.2 Monitoring

Monitoring of these two supplemental planting areas should be done concurrently with the bi-annual monitoring efforts described below for the wetland replication area. Monitoring will occur two times per year (spring and fall) for a minimum of two years following planting. A general assessment of re-growth and overall vegetative coverage within these two devoid areas should be detailed in the monitoring reports.

After the initial installation and/or during the monitoring events if it is determined that additional planting is necessary than supplemental plugs may be added to the restoration areas at the direction of a wetland scientist.

After each monitoring event, proper documentation will be kept for reference and to be used for future monitoring and control of each site. The information gathered during the monitoring events will be submitted to the Conservation Commission and other reviewing agencies as required.

3.0 SALT MARSH REPLICATION

Based on historical mapping of the area, much of the development that has historically taken place around Island End Park was on top of areas that at one time were salt marsh. A series of soil borings were completed on site as part of the design efforts for the flood barrier. These soil borings suggest that the substrate located below the proposed replication area is composed of urban fill material and will not be suitable for plating without some soil amendment. In order to create a suitable substrate the salt marsh replication area will be over excavated to allow for 12 inches of amended soil to be brought in prior to planting..

3.1 Construction Sequence

Construction of the wetland replication area has been designed to minimize erosion, prevent sediment from entering adjacent wetlands, and to minimize the establishment of planted vegetation. The areas will be constructed per the following:

1. A survey crew shall stake out the limits of the proposed 2,745 SF wetland replication area.
2. Prior to all earthwork activities, erosion control barriers shall be installed along the downgradient edge of the wetland replication area.
3. Once erosion control measures are in place heavy equipment situated in the uplands will be utilized to bring the proposed replication area down to 12 inches below final grade by removing the upper layer of asphalt, gravel and fill. Removal of material will continue until the replication area matches the grade of the adjacent, existing salt marsh, at which point an additional 12 inches of material will be removed to allow for the addition of planting substrate. The excavated sediment will be removed from the site or used on site within the upland project area as fill. minor modification to this grading plan may be made in the field by the wetland scientist in response to subsurface hydrologic conditions. the supervising wetland scientist will inspect the sub-grade of the replication area to ensure that the proper hydrology has been established.
4. Planting substrate. The amended soils will be composed of four parts coarse-

sand and one part compost.

5. Once final grade has been achieved and erosion control barrier will be placed along the upgradient edge of the wetland replication area.

3.2 Planting

Once the planting substrate is in place, the salt marsh replication area will be planted with the following salt tolerant species:

SPECIES	SIZE (height)	SPACING	NUMBER
Saltgrass (*Distichlis spicata*)	Plugs	2-foot on center	155
Saltmarsh Hay (*Spartina patens*)	Plugs	2-foot on center	155
Smooth Cordgrass (*Spartina alterniflora)*	Plugs	2-foot on center	155
		Total	465

The planting season within the restoration area will extend from only after the last frost in the spring through mid-May, and from September 1 until October 15 in the fall. Planting season periods may be extended if weather and soil conditions permit only with the written approval of the Engineer and Owner. Extended or out-of-season planting requirements would include application of antitranspirant and extra water as needed. Planting will not be permitted in frozen ground. The Contractor will be responsible for all plant maintenance, which will begin immediately after each plant is planted and shall continue until completion of the guarantee period and final acceptance of the project.

3.3 Monitoring

Monitoring of the salt marsh replication area will be included in the same monitoring plan that will encompass the salt marsh enhancements. In order to track the progress of new native plant growth and coverage within the salt marsh restoration area, after planting is completed three 1 meter x 1 meter wetland monitoring plots will be located at the site within the salt marsh replication area. Wooden stakes will be driven into the ground at each corner of the monitoring plots and spray painted orange for easy identification.

Monitoring will occur two times per year (spring and fall) for a minimum of two years following planting. The vegetation data plots will be used to determine percent dominance and percent cover of each species identified within the plot. This evaluation will determine the overall health of the replication area. During each monitoring event, the data plots will be photographed from fixed points so that visual comparisons can be made during future monitoring events. After the initial installation and/or during the monitoring events if it is determined that additional planting is necessary than supplemental plugs may be added to the restoration areas at the direction of a wetland scientist.

After each monitoring event, proper documentation will be kept for reference and to be used for future monitoring and control of each site. The information gathered during the monitoring events will be submitted to the Conservation Commission and other reviewing agencies as required.

Attachment J

INVASIVE SPECIES ADAPTIVE MANAGEMENT PLAN

westonandsampson.com

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Reading, MA 01867
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Draft Adaptive Management Plan

Adaptive Management Plan for the Control of Invasive Species – *Phragmites austrailis*

Island End Park
Chelsea, MA

TABLE OF CONTENTS

APPENDICES

1.0 INTRODUCTION

A critical component of the proposed work around Island End Park in Chelsea MA is the presence of the existing infestation of non-native *Phragmites australis* (Common Reed). The City of Chelsea is seeking to treat this species as part of the overall strategy at Island End Park. The purpose of this Adaptive Management Strategy is to:

1. Identify the current extents of the *Phragmites australis* infestation
2. Identify short and long term control goals
3. Recommend control practices to meet the goals
4. Evaluate the control practices to determine if the goals have been achieved

The intent of this plan is to establish and adaptive management strategy for the control of the target invasive species (*Phragmites australis*).

2.0 INVASIVE SPECIES OBSERVATIONS

The existing salt marsh located at Island End Park is partially covered by an infestation of the invasive species common reed (Phragmites australis) aka Phragmites which covers 19,134 SF (0.43 acres). Invasive species pose a threat to native plant communities because the introduction of these non-native species can often dominate native counterparts, causing a loss of diversity and habitat degradation. Additionally, this dense stand of Phragmites is causing trash and other vegetative debris to become trapped within the stand. As the tide borne trash settles at the toe of the Phragmites, the buildup raises the surface elevation causing more Phragmites grow and further displacing native species creating a progressing take of salt marsh. The depth of this trash/debris layer was investigated in the field using two transects that measured the distance from the top of the trash/debris to the sediment surface. Based on these probes, estimated material to be removed is approximately 1 FT in depth and totals 708 CY of trash/debris that needs to be removed from below the High Tide Line.

3.0 SHORT AND LONG TERM GOALS

The goals for the proposed control of Common Reed at Island End Park can be broken down into Short Term and Long Term timeframes:

Short Term Goal – Remove Existing Invasive Phragmites

2 Years Post Construction – In the first few treatment cycles the goal of the project is to remove the existing invasive species growth that is present on site, remove accumulated debris, and prevent new growth from occurring. This will occur through bi-annual monitoring efforts. Additionally, the short term goal will be to monitor initial establishment of native salt marsh species.

Long Term Goal – Prevent Future Infestation

>2 Years Post Construction – Long term goals extend beyond the initial two years post construction, and seek to have an ongoing maintenance program and community involvement to continue monitoring the site for any potential invasive species which can then be treated. In the long term the project seeks to have establishment of native salt marsh species.

4.0 REMOVAL/MANAGEMENT METHODOLOGIES

Overview

Per the USDA National Invasive Species Information Center, Common Reed is an herbaceous perennial with widespread origins that was likely introduced to the US in the 1800's likely through ships' ballast (USDA, National Invasive Species Information Center. *Common Reed*. 2021). It is one of the most widely distributed flowering plants, it occurs on every continent except Antarctica and is cosmopolitan in temperate zones. Common Reed is widely distributed in North America and occurs in all US states except Alaska. The NRCS indicates that the four methods for control of this species are mechanical control, black plastic, burning, and chemical control (USDA, NRCS. 2018. *Phalaris arundinacea, 2021)*. Mechanical control (hand removal/pulling) is appropriate for small infestations which can be removed by hand. This method will likely require annual treatment because re-sprouting will occur if the entire root is not removed. Removal of rhizomes is difficult due to the rapid growth rate. Black plastic covering can be used in small areas to produce high temperatures and block out sunlight. This methodology is challenging because the sharp nature of Common Reed re-growth can pierce the plastic and make the treatment ineffective. Additionally, black plastic covering can have adverse impacts on the soil microorganisms and may alter soil chemistry (Avers, 2007). Burning is only an effective solution when the desired treatment area can be immediately flooded or following an herbicide application. Other burning treatments can actually increase the amount of Common Reed present (USDA, NRCS. 2018. *Phalaris arundinacea, 2021)*. Burning as a technique has obvious dangers, including with respect to the natural gas pipeline located adjacent to the wetland restoration area, and the technique requires significant training. Chemical control (herbicides) can be applied utilizing foliar treatment and cut stem treatment. The most effective systematic herbicide for treatment of Common Reed is glyphosate (i.e., Accord, Glypro, Rodeo, Roundup and others) and/or imazapyr (Avers, 2007). These are nonselective herbicides which kills both grasses and broad-leaved plants. According to the National Pesticide Information Center, "Glyphosate is not likely to get into groundwater because it binds tightly to soil."

Manual Controls – Hand Pulling

Manual controls such as hand pulling can be effective at controlling isolated stems and small populations of certain invasive species. This option is preferable, when possible, as it reduces the amount of chemicals utilized near wetland areas. Caution should be utilized to limit soil disturbance and compaction to the maximum extent practicable. When utilizing this methodology, it is essential to remove the entire root/rhizome to prevent regeneration from remaining pieces. Broken stems can also often resprout, so care must be taken to minimize disturbance to the soil and native vegetation in the area. This type of treatment methodology often requires periodic maintenance in order to be effective. Once the plant material is removed it should be bagged and disposed of offsite. Depending on the species it also may be beneficial to treat the cut material with herbicide before disposal to prevent further spread. The determination of how to treat the remnant plant material shall be made by the qualified invasive species removal professional. This methodology is challenging with Common Reed as the roots often break resulting in regrowth, and it only appropriate for immature single stems.

Chemical Controls

Non-organic chemical controls (herbicides) are extremely effective at treating invasive species, but large-scale spraying of herbicides can pose an environmental risk due to the proximity of the adjacent Island End River. As a result, chemical control via large-scale spraying is not recommended and is not proposed at this site. Instead, chemical treatments should be conducted through localized applications. Herbicides that are least impactful to waterbodies will be utilized. Timing is paramount to any successful chemical treatment to interrupt the lifecycle of the plant. Precautions should be taken to avoid chemical runoff or drift and impacts to pollinators and other nontarget species. Herbicides should only be applied on dry days with minimal to no wind to prevent impacting other species in the area. All applications should comply with local laws, licensing requirements, and manufacturer recommendations. The contractor doing the herbicide application will be properly licensed and will be responsible for submitting any paperwork required for herbicide use.

Two non-organic chemical treatment methods that have proven effective are highlighted below. The use of these methodologies should be used interchangeably at the discretion of the licensed herbicide applicator depending on the conditions observed at the time of treatment.

Based on our review of literature and consultation with an industry expert, organic herbicides are not effective at eradicating invasive plant species, especially in a wetland setting, since they are unable to translocate systemically to the root systems like chemical treatments do. As a result, the use of non-organic herbicides are not proposed for use at this site.

4.1.1 Foliar Application

Foliar application utilizes spraying equipment to apply the desired herbicide to the leaves of the target species. This can be done utilizing a targeted treatment or a broadcast treatment. Targeted treatment is recommended for small stands and individual plants where the herbicide is directed specifically at individual plants. Broadcast treatment is recommended for larger mono-culture areas where herbicide is applied non-selectively over the desired area at a consistent rate. Generally foliar applications utilize a lower concentration of herbicides that are applied at moderate volumes. Caution should be utilized with this herbicide application technique to ensure no unintended vegetation is impacted. Treatment timing will depend on each individual species present, for further details see the species-specific details below. Chemicals should be applied during dry conditions to reduce the chance of point-source pollution. Equipment will be limited to handheld or backpack sprayers in order to reduce impact to the wetland area. This equipment will not be washed down on site to prevent any unwanted transport of chemicals. Although public entry of these wetland areas is prohibited, upon completion of any herbicide applications signs will be posted at the closest public access indicating that recent spraying has occurred. According to "A Guide to the Control and Management of Invasive Phragmites", there has been some evidence that in dense growth stands of Phragmites, mowing/cutting prior to herbicide application can improve success (Avers, 2007). To utilize this approach cutting should be conducted a minimum of 4 weeks prior to herbicide application. This allows for re-growth of leaf and seed heads prior to herbicide application. It is recommended that this cutting occur after July 15 so as to limit any impacts to nesting birds. Phragmites stems should be cut to a stem height of 4-12 inches. If possible and recommended by the licensed herbicide applicator, then pre-herbicide cutting would be preferred.

MDAR reviews and registers aquatic herbicide products which have been approved for use in lakes and ponds in Massachusetts. The proposed herbicide utilized will come from this approved list. MDAR also makes publicly available a "fact sheet" for each active ingredient (i.e. Glyphosate and Imazapyr) which outlines details such as the uses, chemical mechanisms, and health effects. The MDAR active ingredient "fact sheets" for Glyphosate and Imazapyr can be found in Appendix A.

4.1.2 Cut and Wipe

The cut-and-wipe method combines mechanical and chemical treatments. The goal is to avoid large ground disturbances caused by digging up roots. Instead, a chemical treatment is applied to cut stems and/or roots, which require a higher concentration of the herbicide than is used in small scale spray applications but only a very small amount is applied. Stems should be cut as close to the ground as possible, and herbicide should be applied directly to the cut surface. This application should be done as soon as possible after the plant is cut to ensure effectiveness of the herbicide. The herbicide should be applied manually with a rag or sponge. The idea is to thoroughly wet the cut surface so that the herbicide absorbs into the plant tissues. Treatment timing will depend on each individual species present, for further details see the species-specific details below. Chemicals should be applied during dry conditions to reduce the chance of point-source pollution. This methodology is appropriate for small stands that are less dense.

5.0 PROPOSED MANAGEMENT STRATEGY

Based on a review of the scientific literature, the proposed treatment for the control of Common Reed is is an initial cutting followed by foliar spray further treatments can utilize cut and wipe.

Treatment

Due to the height of this Phragmites stand, the first step in this management plan will be to cut the existing phragmites down around mid-summer. The cut vegetative material should be removed from the site and allowed to dry out before disposal. Once the plant material is dead it can be composted. Several weeks later (once new sprouts are approximately two (2) feet in height) an herbicide application should take place using foliar spray. After herbicide has taken affect (3 – 4 weeks after application), the remaining above ground plant material should be removed along with the accumulated trash/debris until the native substrate surface is exposed. At this point a fall planting of native salt marsh species and seeding with a native salt tolerant seed mix can take place.

Care should be utilized when applying herbicides near wetland resources. Rodeo contains a nonionic surfactant and has been approved for use over water. Avoid a dosage that is too concentrated, or breaking the stems during treatment, as these both will prevent the herbicide from reaching the rhizomes. Utilizing herbicides requires caution as application can also kill surrounding non-target vegetation. Herbicide applications should only be undertaken by a qualified professional.

Follow up herbicide treatments should use a cut and wipe methodology. The cut-and-wipe method combines mechanical and chemical treatments. The goal is to avoid large ground disturbances caused by digging up roots. Instead, a chemical treatment is applied to cut stems and/or roots, which require a higher concentration of the herbicide than is used in small scale spray applications but only a very small amount is applied. Stems should be cut as close to the ground as possible, and herbicide should be applied directly to the cut surface. This application should be done as soon as possible after the plant is cut to ensure effectiveness of the herbicide. The herbicide should be applied manually with a rag or sponge. The idea is to thoroughly wet the cut surface so that the herbicide absorbs into the plant tissues. Treatment timing will depend on each individual species present, for further details see the species-specific details below. Chemicals should be applied during dry conditions to reduce the chance of point-source pollution.

Debris Removal

An accumulated layer of debris has built up within the dense Common Reed stand up to 1 foot in thickness. The removal of this debris layer will allow for the planting of native vegetation and improved tidal flow.

Based on the debris thickness measurements taken on site, upon removal of the debris the surface elevation will be consistent with the adjacent salt marsh. It is not the intention of this proposed debris removal effort to result in a reduction in elevation lower than the surrounding salt marsh environment, to reduce resiliency or cause subsidence. Upon removal of the debris, the area will be plated with native salt marsh plugs for the fastest colonization.

Planting & Seeding

Once the native substrate surface is exposed, new plantings and seed mix will be applied to the area to allow for native plant colonization. The native vegetation composition in the adjacent salt marsh was identified as a mix of saltgrass (Distichlis spicata) and saltmarsh hay (Spartina patens) which are common high marsh species. As prolonged colonization of Phragmites can lead to marsh subsidence, it is also a good strategy to include low marsh species, such as smooth cordgrass (Spartina alterniflora), in order to provide a diverse palette of plantings. The project proposes to plant a mix of plugs with the above-mentioned species at 2 foot on center intervals across the phragmites treatment area. Additionally, any area above the highest high tide line should also be seeded with a salt tolerant seed mix in order to promote additional diversity in areas that are less frequently inundated. The salt tolerant seed mix should be comparable to the following:

New England Coastal Salt Tolerant Grass Mix

Botanical Name	Common Name	Indicator
Elymus canadensis	Canada Wild Rye	FACU+
Festuca rubra	Red Fescue	FACU
Panicum amarum	Atlantic Coastal Panic Grass	FACU-
Andropogon gerardii	Big Bluestem	FAC
Sorghastrum nutans	Indian Grass	UPL
Panicum virgatum	Switch Grass	FAC
Juncus tenuis	Path Rush	FAC

PRICE PER LB. $26.00 MIN. QUANITY 4 LBS. **TOTAL:** $104.00 APPLY: 35 LBS/ACRE :1250 sq ft/lb

The New England Coastal Salt Tolerant Seed Mix contains a selection of native grasses that tolerate salty conditions. This mix is appropriate for drier coastal areas that receive salt spray or mist. Always apply on clean bare soil. The mix may be applied by hydro-seeding, by mechanical spreader, or on small sites it can be spread by hand. Lightly rake, or roll to ensure proper seed to soil contact. Best results are obtained with a Spring seeding. Late Spring and early Summer seeding will benefit with a light mulching of weed-free straw to conserve moisture. If conditions are drier than usual, watering may be required. Late Fall and Winter dormant seeding require an increase in the seeding rate. Fertilization is not required unless the soils are particularly infertile. Preparation of a clean weed free soil surface is necessary for optimal results.

The planting season within the restoration area will extend from only after the last frost in the spring through mid-May, and from September 1 until October 15 in the fall. Planting season periods may be extended if weather and soil conditions permit only with the written approval of the Engineer and Owner. Extended or out-of-season planting requirements would include application of antitranspirant and extra water as needed. Planting will not be permitted in frozen ground.

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6.0 PROPOSED MONITORING

In order to track the progress of new native plant growth and coverage after planting, the treatment area will be subject to monitoring. Monitoring will occur two times per year (spring and fall) for a minimum of two years following planting. Four permanent data plots, 1 meter by 1 meter in size will be, established and utilized as a representative sample for the treatment area. Wooden stakes will be driven into the ground at each corner of the monitoring plots and spray painted orange for easy identification.

The vegetation data plots will be used to determine percent dominance and percent cover of each species identified within the plot. This evaluation will determine the overall health of the restored area. During each monitoring event, the data plots will be photographed from fixed points so that visual comparisons can be made during future monitoring events.

After each monitoring event, proper documentation will be kept for reference and to be used for future monitoring and control of each site. The information gathered during the monitoring events will be submitted to the Conservation Commission and other reviewing agencies as required.

If the presence of invasive species is in excess of 10% coverage within any of the data plots than additional herbicide treatment will be required. If the need for treatment exceeds the time period set forth in the applicable Order of Conditions issued by the Chelsea Conservation Commission, the City will go before the Commission with a remedial plan to address the need for continued intervention.

The Contractor will be responsible for continued maintenance of the restoration area for a year following the completion of the restoration. During this initial one-year period the City will also monitor the restoration area to determine if/when the contractor needs to provide maintenance and/or additional seeding as needed. After the first year, the continued operation and maintenance of this restoration area will be turned over to the City of Chelsea.

7.0 REFERENCES

Avers Barbara et al. *A Guide to the Control and Management of Invasive Phragmites*. Michigan Department of Environmental Quality 2007.

Commonwealth of Massachusetts. 2021. Acts of 2021. Chapter 24: An Act Making Appropriations for the Fiscal Year 2022 for the Maintenance of the Departments, Boards, Commissions, Institutions and Certain Activities of the Commonwealth, for Interest, Sinking Fund and Serial Bond Requirements and for Certain Permanent Improvements. July 16, 2021. https://malegislature.gov/Laws/SessionLaws/ Acts/2021/Chapter24.

MDAR Active Ingredient Fact Sheets: https://www.mass.gov/lists/aquatic-herbicide-active-ingredients#adjuvants-

National Pesticide Information Center, Glyphosate General Fact Sheet, Glyphosate General Fact Sheet (orst.edu)

US Fish and Wildlife Service. *A Guide to the Control and Management of Invasive Phragmites*. Available: https://www.invasive.org/publications/PhragBook.pdf. (November 2021).

USDA, National Invasive Species Information Center. *Common Reed*. Available: https://www.invasivespeciesinfo.gov/aquatic/plants/common-reed. (November 2021).

USDA, NRCS. *Pest Management – Invasive Plant Control. Common Reed – Phragmites australis. Conservation Practice Job Sheet NH-595*. Available:https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1081651 .pdf. (November 2021).

USFS. 2011. US Forest Service. Glyphosate, Human Health and Ecological Risk Assessment, Final Report. https://www.fs.usda.gov/foresthealth/pesticide/pdfs/Glyphosate_SERA_TR-052-22-03b.pdf

USFS. 2011. US Forest Service. Imazapyr, Human Health and Ecological Risk Assessment, Final Report. https://www.fs.usda.gov/foresthealth/pesticide/pdfs/Imazapyr_TR-052-29-03a.pdf

APPENDIX A

MDAR Active Ingredient Fact Sheets

Attachment K

NBA ADAPTIVE MANAGEMENT PLAN

Operation and Maintenance Plan
Island End River Beach and Riverbanks
Everett, Chelsea, MA
October 2023

Prepared For:
Conservation and Planning
Cities of Everett & Chelsea, Massachusetts

Chapter 1: Project Description

1.01 Project Description

The intent of the Project is to improve ecological function at the Island End River and the Island End Park and to improve connections between the park, and the neighborhood, as well as to increase climate resiliency and awareness in the community. This includes soil stabilization and plantings to addressing climate habitat and water quality. Vulnerability on the site includes storm surge, invasive species, and flooding. Although the Project requires work within the resource areas, the Project has been designed to avoid, minimize, and mitigate the potential impacts to these resource areas and buffers to the greatest extent practicable, while still achieving the overall project purpose.

Throughout the Project construction, Best Management Practices (BMPs), including sediment and erosion controls, construction phasing, and site stabilization measures, will be implemented to avoid adverse impacts to resource areas and buffers.

1.02 Adaptive Management

Chapter Two of the Operation and Maintenance plan describe in detail materials, approved actions and leadership responsibilities. Any or all of these may be necessary but in the context of climate change, population and development pressure there is a need to respond quickly to changing conditions and a need for integration of habitat stewardship by the community at large.

Adaptive landscape management is a structured, iterative approach to environmental assessment that aims to sustain natural systems and their native biodiversity. It involves learning by doing and acknowledges uncertainty about how systems may respond to changing conditions and changing management actions. To be successful it requires regular assessments to inform future management and guides for adjustments based on learning. The process will include monitoring, evaluation, and periodic adjustments within allowed parameters.

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Project leaders are responsible for educating and empowering maintenance staff to observe understand and adapt to current conditions instead of following standard operating procedures.

Because of the scale and intensity of pressure on this site maintenance leaders and staff will benefit from educating organizing empowering and leading community volunteers in stewardship activities ranging from monitoring and reporting conditions to assisting in cleanup, maintenance and restoration planting at Island End Park. Their observations will inform management response for maintenance of areas with limited access exclusive to professional maintenance.

Community Mobilization: Gathering training and directing volunteers to assist safely and effectively requires some planning and coordination See appendix A for notes on how to mobilize volunteers.

Citizen Science Methodology: To better understand and track physical and biological conditions on site a monitoring protocol and data collection work sheet are See appendix B for these tools.

Invasive Species Management: Species management is essential to maintaining biodiversity at Island End River. See Appendix C for a guide and visual key to support this effort.
Habitat Management: With Island End Park restored and converted to an ecological resource park there is an opportunity to maximize its effectiveness as an urban habitat See appendix D Features/ Habitat Build Notes for guidance on community driven elements that can be included in the park for this purpose.

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As required by Standard 4 and Standard 9 of the Massachusetts Stormwater Handbook, this Long-Term Pollution Prevention Plan has been developed for source control and pollution prevention at the site after construction and ensure that the stormwater management systems function as designed.

2.01 MAINTENANCE RESPONSIBILITY

The enforcement of the Long-Term Operation and Maintenance Plan will be the responsibility of the Municipal authority of Everett, and the Chelsea DPW for this property.

2.02 GOOD HOUSEKEEPING PRACTICES

The site is to be kept clean of trash and debris. Trash, junk, etc. is not to be left outside and will be subject to removal per the ongoing litter management practices.

2.03 NBA NATURE-BASED APPROACH COASTAL BANK

VEGETATED BUFFER FILTER STRIP

Vegetated Buffer/ Filter strips should be maintained as natural areas once the new vegetation is established. The filter strip should be protected from damage by traffic and dense weed growth. Soil adjustment needs should be determined by on-site inspections. Supplemental planting and soil preparation is necessary to complete the establishment of the filter strip most species take 2 to 3 years to become fully established with standard maintenance.

The filter strip should be inspected periodically and after every major rainstorm to determine if the conditions are still uniform and level, and to see if rills have formed. Any problem areas should be repaired promptly to prevent further deterioration.

These Vegetated Filter Strips include invasive species management and should be closely monitored for regrowth of invasive plant species.

The most common threat to new, intertidal vegetation is excessive browsing by geese. Prevention measures include wire lines that make it difficult to take off and land near the planting, and distractor reflective strips attached to these lines. Other prevention measures include predator statues, egg removal, or net and surface stakes.

2.04 PROVISIONS FOR MAINTENANCE OF LAWNS, GARDENS AND OTHER LANDSCAPE AREAS

LEVEL OF MAINTENANCE REQUIRED

All site areas are to be well maintained at all times. The tidal riverbank areas requiring naturalized landscape maintenance specifically designed and intended to acquire an un-kept appearance inherent to riparian habitat. Removal of trash, debris, and invasive species are the primary activities for this area.

Dead, woody debris must be retained and made safe for maintenance access and drainage structures. Vegetation management shall be minimally intensive due to the type of plant materials, the informal planting concept, the level of visibility, and/or the environmental conditions this includes cutting of invasive species and nuisance species thorns and poison ivy.

MAINTENANCE OPERATIONS & SCHEDULES

More specific information regarding the Maintenance Operations is organized by landscape feature. There is a section for Trees & Shrubs; Naturalized Grassland; and Coastal Beach Vegetation. These sections explain the Landscape Maintenance Operation for the specific landscape features throughout all the Landscape Maintenance Zones.

QUALIFICATIONS OF THE LANDSCAPE MAINTENANCE CONTRACTOR

The Landscape Maintenance Contractor shall be experienced in all aspects of coastal landscape installation and maintenance. A minimum of five (5) years' experience in Landscape Maintenance is required. The Landscape Maintenance Contractor shall furnish the names of at least five current or previous Landscape Maintenance Clients along with a description of the size of the site and the nature and duration of the services provided.

The Landscape Maintenance Contractor shall have on staff or list current qualified sub consultants (sub consultant shall be a person or firm the contractor has worked with within the last five years, sub consultant references must be supplied) in the following fields:

1. a licensed Arborist,
2. a Coastal Zone Specialist, and
3. a Pesticide Applicator.

All Landscape Maintenance personnel shall be qualified and able to perform to the standards stated in this guideline. All applicable licenses required for the performance of the maintenance activities shall be current.

PERFORMANCE STANDARDS

A Landscape Maintenance Supervisor (Supervisor) with overall responsibility for all daily operations shall be designated. This Supervisor shall be on site at all times during Landscape Maintenance operations and shall remain on site until all Landscape Maintenance crewmembers have left the site. The Supervisor is responsible for any necessary coordination with the Municipal authority. The Municipal authority shall be immediately informed if a new Landscape Maintenance Supervisor is designated on a permanent or temporary basis.

All work outlined in this Guideline shall be performed under the appropriate environmental conditions for the specific work task.

Work requiring a license shall be directly supervised or actually performed by the individual holding the applicable license.

The contractor shall perform any incidental work which constitutes good Landscape Maintenance (example: planting of replacement plant material) that will contribute to the health and the appearance of the landscape. This work is to be included even if not specifically stated in these guidelines.

Plant material inspections shall be performed **monthly** by the Landscape Maintenance Contractor. In particular an inspection shall be performed immediately following severe wind, rain, or ice conditions. Plant materials severely damaged in a winter storm shall be scheduled for spring replacement, soils or cobble beach nourishment shall be restored to the extent practical as soon as the site is safe to access.

SAFETY ISSUES

Safety of people and protection of property is critical. The landscape maintenance work shall be performed in such a manner as to not jeopardize either.

The use of pesticides within the riverfront area is strictly prohibited. It will be the responsibility of the Landscape Maintenance Contractor to approve any weed or pest control procedures.

2.05 Maintenance Operations

Trees and Shrubs

1. Disease and Pest Management – Prevention of disease or infestation is the first step of pest management. A plant that is in overall good health is far less susceptible to disease. Good general landscape maintenance can reduce the potential and severity of problems from disease.

   Inspections of plant materials for signs of disease or infestation are to be performed annually by the Landscape Maintenance Contractor's Certified Arborist. This is a critical step for early diagnosis. Trees and shrubs that have been diagnosed to have a plant disease or an infestation of insect pests are to be treated promptly with appropriate cultural controls.

2. Fertilization – The use of fertilizer is not included in this work and is prohibited from use on the project site. However individual specimens may—at the discretion of the arborist be treated with supplemental soil, pH modifies, humic acid or other bio-stimulants.

3. Watering – Trees and shrubs will need supplemental watering to remain in vigorous health until established. All new plants will need to be watered once a week, receiving a minimum of 10 gallons per tree, 5 gallons per shrub in cool weather. All new plants will need to be watered twice a week during warm weather, and up to three times in a week during periods of extreme heat and drought.

   Trees and shrubs should be watered in such a manner as to totally saturate the soil in the root zone area. Over-watering or constant saturation of the soil must be avoided as this could lead to instability, or root rot and other disease problems. The use of a soil moisture meter can help you monitor the soil's water intake.

4. Plant Replacement – Unhealthy plants that may cause widespread infestation of other nearby plants shall be immediately removed from the site. Any vegetation removed from the site must be recorded and submitted with the daily maintenance log. The area shall be treated to prevent further disease or infestation. The plant shall then be replaced with a healthy specimen of the same species and size.

   A spring inspection of all plant materials shall be performed to identify those plant materials that are not in vigorously healthy condition. Unhealthy plant materials shall be evaluated. If the problem is determined to be minor the plant material shall be given appropriate restorative care in accordance with this maintenance guideline until it is restored to a vigorously healthy condition. Unhealthy plant materials that do not respond to restorative care or are determined to be beyond saving, shall be replaced with a healthy specimen of the same species and size. In the case of the necessity of replacing extremely large plant materials the Landscape Architect and the Municipal authority shall determine the size of the replacement plant.

5. Pruning – Proper pruning is the selective removal of branches without changing the plant's natural appearance, or habit of growth. All tree pruning is to be performed by a licensed Arborist. All branches that are structurally unsound should be removed. All cuts should be made at the collar and not cut flush with the base. Pruning shall be done for the following purposes:

a. To maintain or reduce the size of a tree or shrub for utility maintenance access.

b. To prevent damage and reduce hazards to people and property.

Pruning shall only be performed on an "as needed" basis, as determined by the Landscape Manager and approved by the Conservation Agent's Representative. Hand snips should be used to maintain a more natural form.

6. Seasonal Clean Up – A thorough spring cleanup is to be performed. This includes trash cleanup, the removal and replacement of dead or unhealthy plant materials, and the cleanup/ reincorporation of plant debris in habitat features and any general debris that has accumulated over the winter season.
7. Mulching (Duff layer) – Coastal heath, meadow and savannah shall be mulched with native leaflitter, salt-straw, or if needed, weed free compost. Maintain a two (2) inch maximum depth. After the establishment period natural growth should provide sufficient litter to prevent soil exposure. Assess and manage plant density throughout the establishment to achieve this.

Groundcover and Perennials

1. Disease and Pest Management – The use of pesticides and herbicides are prohibited from the riverfront area. Plants should be monitored, and problem areas should be addressed through cultural controls.
2. Water – Groundcovers and Perennials will need supplemental watering in order to become established, healthy plants. All new plants need to be watered once a week in cool weather, twice a week during warm weather, and up to three times in a week during periods of extreme heat and drought. Until established, groundcovers and perennials should be watered in such a manner as to totally saturate the soil in the root zone area, to a depth of 6-inches.

   Once established, perennials shall continue to be watered as necessary to maintain them in a vigorous healthy condition. Over-watering or constant saturation of the soil must be avoided as this could lead to root rot and other disease problems. The use of a soil moisture meter can help you monitor the soil's water intake.

   On-site water shall be furnished by the General contractor. Hose and other watering equipment shall be furnished by the Landscape Maintenance Contractor for the duration of establishment and as needed to prevent systemic damage.

3. Replacement – Any unhealthy plant/s that may cause widespread infestation of other nearby plants shall be immediately removed from the site. Any vegetation removed from the site must be recorded and submitted with the landscape maintenance log. Assess conditions and change plant selection or type to prevent further infestation. The plant/s shall then be replaced with healthy specimen/s of the approved species and size.
4. Seed Head Maintenance – Remove invasive annual weed seed heads and dispose per IPM. Do not dead head conservation plants. Allow seeds to mature fully and provide ecosystem services. Spent stems can be folded down where visual interest of companion plantings are to be highlighted. It may become advantageous to remove the seed heads of annual ruderals. This determination shall be made by the Landscape Manager.
5. Staking – Temporary Staking of new trees during the first two growing seasons will be necessary. Trees shall be staked with hardwood stakes and arbor-tape. Staking shall be removed as soon as it is determined the root system has achieved stable support.
6. Weeding – Inspect for invasive or aggressive species to control. Weed only by hand. Invasive weed seeds and root stocks are to be pulled and removed from the site. Vegetative material and native weeds should be retained to the extent feasible/ practical to support habitat plantings.

   Herbicide and/ or use of pre-emergent is prohibited in the resource and riverfront area.

7. **Winterizing** – Perennial groundcover and shrub areas should **not** be cleaned-up when growth ceases in the fall (only trash and debris are to be removed). They should be inspected for disease, damage, or infestation and treated per the best method outlined in the Integrated Pest Management Plan. Retain and protect foliage of plants that normally die down to the ground as these contain vital saprophytic and macroinvertebrate species essential to soil and ecological health. For aesthetic reasons it may be appropriate to push these materials into the center of beds and mulch edges to maintain defined borders. Divide and replant over-grown clumps.

8. **Organic matter Management and Macro-invertebrate support** – In order to maintain plant health, vigor and color, nutrients and organic matter must *not* be removed from the site but must be mulched into planting areas to the extent feasible through mulching with the exclusion of invasive weed seeds and root stocks.

Maintenance Schedules

1. **MARCH** (Weather permitting)
   a. Clean up winter debris, trash etc.
   b. Apply supplemental planting of coastal beach grasses.
2. **APRIL**
   a. Reseed restore all areas needing attention.
   b. Weed control (manual)
3. **MAY**
   a. Weed and trash control (manual)
   b. Check for disease and pest problems in both turf and plants.
   c. Begin watering protocol
4. **JUNE - OCTOBER**
   a. Weed and trash control (manual)
   b. Check for disease and pest problems in both turf and plants, treat as necessary.
   c. End watering protocol

Emergency Contacts

1. The Owner will be required to maintain an updated list of Emergency Contacts for the site, for contractors, and for volunteer events.

POST CONSTRUCTION PHASE INSPECTION SCHEDULE AND EVALUATION CHECKLIST

Inspection Date	Inspector	BMP Inspected	Inspection Frequency Requirements	Comments	Recommendation	Follow-up Inspection Required (yes/no)
Varies	Municipal Staff	Slope Stabilizations				

			Four Times Year and After Major Storm Events during construction (24” of Sediment)			
Seasonal	Environmental monitor	Vegetated Filter Strips	Three times per growing season, and once in the off season			

POST CONSTRUCTION PHASE INSPECTION SCHEDULE AND EVALUATION CHECKLIST

Inspection Date	Inspector	BMP Inspected	Inspection Frequency Requirements	Comments	Recommendation	Follow-up Inspection Required (yes/no)
Seasonal	Municipal Staff	Vegetated Filter Strips	Three times per growing season, and once in the off season			
Varies	Municipal Staff	Slope Stabilizations	Seasonally (and after major storm events)			
Varies	Municipal Staff	Pedestrian Access	Annually			

NOTES:

1. *Refer to the Massachusetts Stormwater Handbook Volume Two: Stormwater Technical Handbook (February 2008) for recommendations regarding frequency for inspections and maintenance of specific BMP’s.*
2. *Inspections to be conducted by a qualified professional such as an environmental scientist or civil engineer.*
3. *No use of sodium chloride salts, fertilizers or pesticides recommended.*

Adaptive Management Appendix A

COASTAL RESILIENCE COMMUNITY MOBILIZATION NOTES

Scoping Leadership:

While it is possible to lead large groups, we find a ratio of 1 leader to 10 volunteers is ideal. Above this, and there is a tendency toward loss of direction, motivation, and mistakes.

One way to manage technical leader limits is by breaking up a task into different sessions so volunteers aren't all mobilized at once. Include preparation events and follow-up events.

Organize parallel tasks and sections where the same task is underway with multiple groups.

Public safety in a marine environment is essential. While no volunteer work within water is planned, review access restrictions and the limits of activity at the start of each maintenance session. Review water hazard risks and safety measures, first aid and, personal flotation devices (PFDs). Review potential exposure hazards to avoid and who/how to notify if these are observed.

Training the Leaders:

Preparing community leaders in advance is a way to limit the need for professional and technical staff during an event. Solicit these in advance and train them with the understanding they will train and lead groups later. (Teaching is one of the best ways to learn and retain new skills).

Managing a coastal planting once built is the most important part of the project. Recruit this team early, have a backup team and recruit during events when the idea is most tangible.

Volunteer Tasks:

Have a diverse set of tasks for all ages and abilities to keep people engaged and so it is clear they are part of something big, not just a donation of their effort, but an act of creation and community.

Professional and Staff Tasks:

Get heavy bulk work and deliveries done in advance by contractors or professional city staff. Avoid fatigue and injury to volunteers.

Follow Up:

Plan for a leadership team to follow up and finish details and corrections at the end of the day and again on a follow up day.

Plans for Managing Invasive Plants	
Introduction	• The purpose of the Invasive plant/pest management plan is to organize safe and effective means of managing harmful or nuisance plants and pests.
Background information	• The coastal bank and coastal plain buffer is recently disturbed and susceptible to incursion by aggressive species from adjacent land use and human activity.
Land management goals	• The goal of this invasive plant/pest management plan it to safely minimize potential threats to biodiversity and key habitat species; • And to prevent the spread of invasive species. (Not to look clean)
Assessment of existing conditions	• Due to surrounding influences the existing site is in a poorly balanced condition and requires regular monitoring and maintenance to keep problem species in check
Management strategies and control options	• Our strategy for plant/pest management is to closely monitor the site, remove problem species to the extent practical as soon as they are identified, and to establish strong ecological systems to resist infestation.
Invasive plant management objectives	• Maintenance staff/ volunteers are to Identify potential problems and if resolution is unclear, to submit to the Municipal representative for review. Where directed, maintenance staff/ volunteers to take actions to remove or destroy invasive species to the extent practical without causing unmanageable damage to other landscape elements. • Chemical controls are allowed when applied with caution, but all methods must be approved by the Municipal representative and Site manager to remain consistent with land management goals. Any chemical control shall be by a licensed and permitted practitioner.
Management methods	• Invasive plant species are to be managed by mechanical removal of seeds and roots preferably see weeding guide for most common weeds and their best management. • Invasive pests are to be mitigated through cultural controls washing or removal of affected host. Or host specific pheromone traps where these conflict with human activity.
Monitoring	• Each maintenance team should be familiar with the maintenance manual and have a laminated copy of the weed/ invasive plant ID to allow monitoring to be an aspect of each maintenance session. • This is separate from any scientific monitoring program.
Implementation	• Maintenance manual outlines removal process for outbreak control.

	• Invasive removal activities beyond basic maintenance program may require professional support and should be directed to the Municipal representative.
Evaluation of management plan	• Environmental Scientist has reviewed this IMP for proposed site control and maintenance activities to determine if the objectives stated here are met and may issue amendments to this IMP as needed to support changing field conditions.

1. See attached visual key for common invasive species identified in the area.
2. To Identify perennials for specific seasonal treatments listed below or weeds for management use the following references Cultivated Perennials & Shrubs:
   https://extension.umass.edu/floriculture/plant-identification
   http://hort.uconn.edu/list.php
3. Weeds:
   https://extension.umass.edu/landscape/weed-herbarium

Noxious Invasive plants

Remove root and seed entirely and imediately, dispose by fully contained digestion/ desication

Black Swallow-wort (Cynanchum louiseae)
European Swallow-wort (Cynanchum rossicumi)
flag outbreak areas for treatment

Black Swallow-wort seed pods Ensure disposal of seeds.

Ailanthus altisima (Tree of Heaven)
smoothe stem, rancid peanutbutter smell

Ailanthus altisima sprout get the whole root when possible,

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Invasive plants

Remove root and seed entirely and imediately, dispose by fully contained digestion/ desication

Rhamnus - (Buckthorn, common or glossy) Cut at root and treat with approved herbicide. Dispose of seeds.

Mugwart - (Artemesia vulgaris) Pull roots, drop stems and foliage, dispose of seeds

Quick silver - (Eliagnus angustifolia) Cut at root and treat with approved herbicide. Dispose of seeds.

Garlic Mustard (Alliaria petiolata) invasive annual. Ensure disposal of seeds, drop stems and foliage.

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Noxious Invasive plants

Remove root and seed entirely and imediately, dispose by fully contained digestion/ desication

Knottweed (Polygonum cuspidatum)
Previously known as: Fallopia japonica

Knottweed - Closeup of seed and branch

Phragmities australlis
Cut all stems upto to end of June, where applicable allow regrowth for treatment in late summer

Phragmities australlis

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Noxious Invasive plants

Remove root and seed entirely and imediately, dispose by fully contained digestion/ desication

Porcelain berry (Ampelopsis glandulosa)
Similar to grape vine and virginia creeper. Carefully identify the deep five lobes on a single leaf before pulling, or request assistance.

Oriental bittersweet vine (Celatrus orbiculatus)
Vines, Cut at root and above browsing height do not pull down vines this may do more damage than allowing it to rot in place

Oriental bittersweet vine (Celatrus orbiculatus)
Dispose of seeds.

Oriental bittersweet vine (Celatrus orbiculatus)
Bright orange roots long and shallow, pull as far as possible

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Invasive plants

Remove root and seed entirely and imediately, dispose by fully contained digestion/ desication

Mugwart - (Artemesia vulgaris) Pull roots, drop stems and foliage, dispose of seeds

WEEDS

Limit the spread of weeds , pull and lay down in place on top of soil to dry, dispose of seeds

Shepherd's Puse (Capsella bursa pastoris)
Annual, Remove seeds

Horse weed (Erigeron canadensis) - Annual, ensure removal seedafter flower/ before seed set

Mullien - ensure removal of root
After flowering/ before seed set

Plaintain - ensure removal of root

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WEEDS
2022 Landscape Maintenance

Annual Winter Rye
Remove seed heads

Secale Winter Rye
Remove seed heads

Persicaria lapathifolia
Remove seed head after flowering/ before seed set

Lollium
Remove seed heads

Dock, Green Dock Yellow Dock Curly Dock, (Rumex, crispus-altissimus-obtusifolia) Dispose of seeds, Pull deep tap roots.

Plan for Managing Plants	
Introduction	• The purpose of the plant/pest management plan is to organize safe and effective means of managing harmful or nuisance plants. And strengthening high habitat value plants.
Background information	• The site is currently affected by multiple identified invasive species and subject to adjacent seed bank of the same. It is recently disturbed by restoration/ construction and susceptible to incursion by aggressive species from adjacent sources. • Buildup of trash drifting in from the channel result in conversion of salt marsh to phragmites fresh marsh. Regular debris removal is essential to maintaining salt marsh function.
Land management goals	• The goal of this plant/pest management plan it to safely minimize potential threats to biodiversity and key habitat species. • And to prevent the spread of invasive species.
Assessment of existing conditions	• Isolation and tidal flushing minimize the potential and speed of incursion outside plants either beneficial or problematic. These conditions mean that plantings require regular monitoring, supplemental seeding and maintenance to keep problem species in check until beneficial plantings are well established.
Management strategies and control options	• The City's strategy for plant/pest management is to closely monitor the site, remove problem species and synthetic litter by hand to the extent practical as soon as they are identified. • Areas where invasive species are removed will be flagged for future monitoring as root or seed sources may remain. • Long term management control is to be achieved through establishment of strong ecological systems that resist infestation by occupying space and resources.
Invasive plant management objectives	• Maintenance staff/ volunteers are to Identify potential problems and submit them to project staff or the Conservation Agent for assessment. • For identified invasive species staff are directed to take immediate action to remove or destroy invasive species to the extent practical without causing unmanageable damage to other landscape elements. • All control methods must be approved by the Conservation Agent to remain consistent with land management goals.
Management methods	• Invasive plant species are to be managed by mechanical removal of seeds and roots only. Non-viable biomass is to be retained. • Invasive pests are to be mitigated through cultural controls washing or removal of affected host. Or host specific pheromone traps where these conflict with human activity.

Monitoring	• Each maintenance team member must be familiar with the maintenance manual and shall have laminated copy of the weed/ invasive plant ID to allow monitoring to be an aspect of each maintenance session. • Environmental scientist and Landscape Architect will inspect all zones at seasonal maintenance review meetings and installation review sessions.
Implementation	• Invasive species monitoring and control shall be implemented immediately upon notice to proceed. • Maintenance must be a sustained effort monthly during the growing season for 3 years and seasonally for a minimum of 5 years. • Management methods and monitoring protocol outline notifications and removal process for outbreak control. • Invasive removal activities beyond basic maintenance program (Large Scale removals) are outside of this project scope and will be detailed in an approved Schedule Of Work.
Evaluation of management plan	• Environmental Scientist shall review site control and maintenance activities annually to determine if the objectives stated here are met and shall issue amendments to this IMP as needed to support changing field conditions. • Proposed updates are to be reviewed and approved by the Conservation Agent.

Contacts:

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Project Manager – Caseylee Bastien cbastien@bscgroup.com 617-896-4523

Wetland Scientist– Hannah Raddatz. hraddatz@bscgroup.com

Adaptive Management Appendix D

FEATURES/ HABITAT BUILD NOTES

Bio-Mimicry:

Coastal bank qualities include lots of places for birds and insects to make their home. These include, open sand, pitted soil, leaf and brush litter, rotting logs and standing stumps and hollow stems. The 'clean ness' of the urban environment is one of the things that makes it unhealthy and unstable. One of the goals of the project is to achieve healthy coastal bank qualities in the urban environment. We will do this until those qualities become emergent properties of our home. Until we have the collection of mature plants and the cultural shift in aesthetics needed to achieve this it means there will be a need for building these features in and maintaining them.

We are building in aspects of a natural coastal bank into disturbed urban landscapes to support diverse species while natural systems heal and return to a state where they can grow and provide stability and structures and systems of its own in a new urban environment.

1. Nest Building/ Habitat Building:

We will not provide detailed instructions for bird and bat boxes here as these plans are readily available from multiple sources online and should be tailored to your target species. Here are some online resources that can help you.

Projects include:

A. Nest Build

- **Bird House:** These are nests designed to protect small songbirds against predation and nest-parasitic species such as the cowbird. More information can be found here: https://www.birds.cornell.edu/k12/educators-guide-to-nest-boxes/
- **Raptor perch**: Mimicking the tops of large dead trees for easy nesting. More information can be found online here: https://efotg.sc.egov.usda.gov/references/public/WY/RaptorPerches.pdf
- **Bat Box:** These structures mimicking the crevices that would naturally be available in ancient trees if we had them More information can be found here: https://www.nwf.org/garden-for-wildlife/cover/build-a-bat-house
- **Owl box, Wood duck box:** More information can be found here: https://www.audubon.org/news/how-build-screech-owl-nest-box
- **Bee Box:** These are Bumblebee nests protected from predators, weather, and wasps. More information can be found here: newsletter@beekeepclub.com
- **Swallow Shelf:** These create **a** safer home for cliff dwelling swallows. More information can be found here: https://www.rspb.org.uk/birds-and-wildlife/wildlife-guides/bird-a-z/swallow/attracting-swallows-to-nest/

B. Habitat Build: Ground Level

- **Thicket:** Home for reptiles, rodents, amphibians, and invertebrates. To create, pile straw brush and rocks loosely to create a matrix of homes; add some standing branches to support spider webs). See Habitat Details for more information.
- **Snag holes**: Leafcutter plasterer, cellophane, and mason bee nests. Drill 3/8"-6" deep holes in dead trees or logs max 3 per tree or log and spread out, roll brown paper onto a straw, and insert it in the hole for a smooth surface mimicking beetle bore.
- **Sand bank:** Nesting for turtles and birds, such as Killdeer. Recommend you install in a sunny, south facing site, and place 12" deep 3' wide pockets of sand at the toe of slopes. See Habitat Details for more information.
- **Nurse Log**: Mushroom inoculant for soil building. Also creates homes for reptiles, rodents, amphibians, and invertebrates. Place these parallel the toe of a slope. That's where they can do the most protection.

2. Coastal bank Planting and stabilization

In most urban sites and in freshly turned soils there is poor soil structure and very little biodiversity. Here we are mimicking and expediting the process of succession by planting native pioneer species which will colonize and dominate the landscape, and help to minimize invasives, while the soil heals.

Projects include:

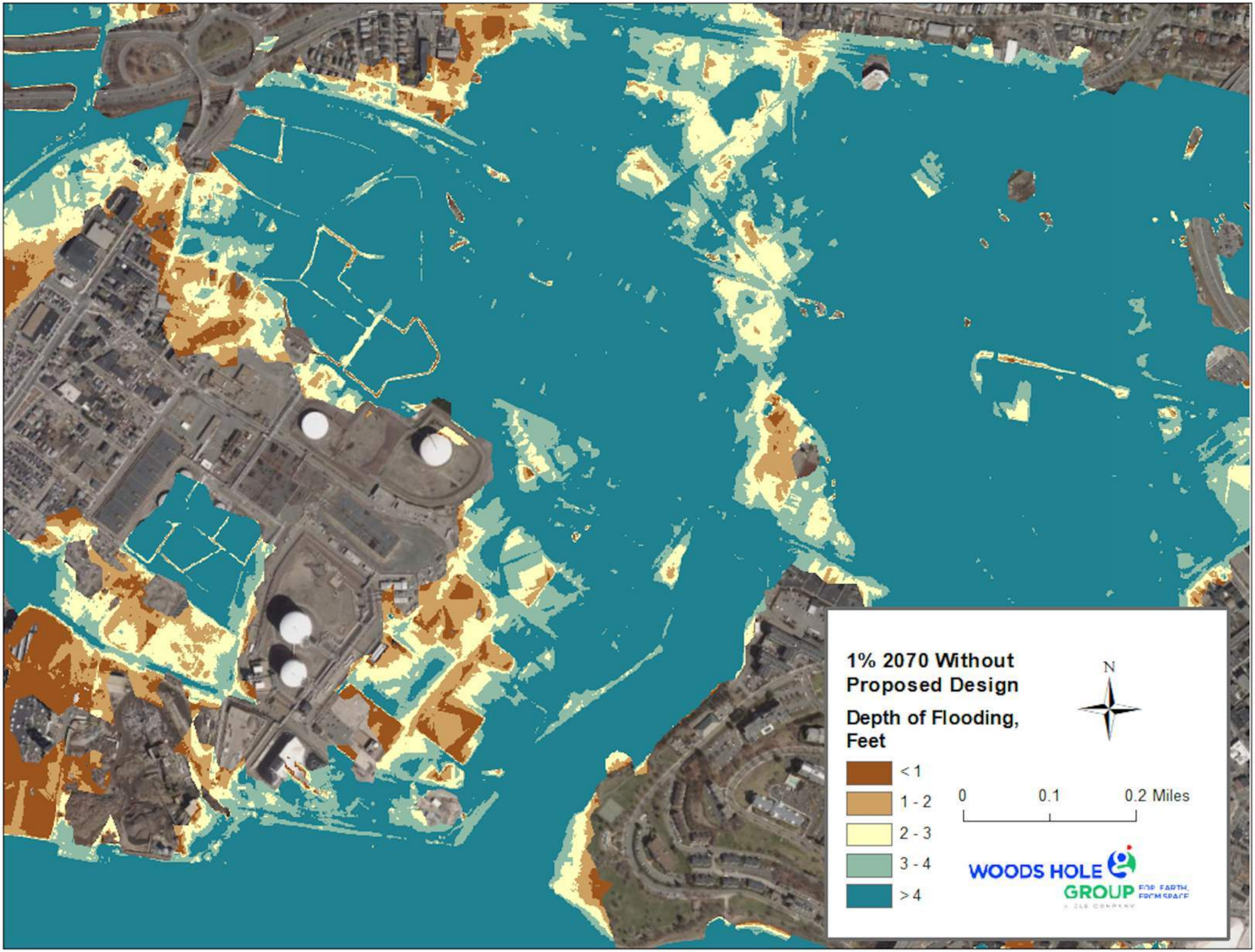
- **Cobble/ shingle banks:** Any excess or displaced cobble can be added to cobble slopes and micro-dunes. These stabilize soil and will become habitat for rock wart and sea creatures as sea level absorbs the site. Storms and humans may disturb these. Observe and adjust as needed. Consider access controls if problems persist.
- **Pit & Mound upland:** When placing soil in the upland or re-planting be sloppy! Create surfaces equivalent to those that have had time for falling trees to create and uneven, natural surface with pits and mounds which create microclimates and spaces for plants and creatures to thrive.
- **Planting/ replanting:** Trees and upland plantings are unlikely to survive sea level rise outside the sea wall, but in the intervening decades they provide shade and habitat. We wany diverse plants for nectar, foliage, and seed forage. We will regularly supplement these original plantings with new plantings of bare-root and some container seedlings. The roots must be spread over soil, layered in, and pressed tight for good soil contact by the root hairs. Any large air pockets can kill off a patch of roots. Common nursery stock is usually grown in a loose matrix—which is not real soil—it lacks the density of micropores and tends to dry out and die, if the new plantings are not watered until the potted roots can reach real soil. Mulch plantings as specified, stake as needed, and provide establishment period watering and monitoring. Intertidal planting should be mulched with clean sand to hold down fine soil particles.

  Upland Soil amendments for individual plantings
- **Place Hydrogel:** This captures short rains and holds moisture slowly releasing it during short droughts. Gel crystals should be pre-mixed with water at a ratio of 5 cups to gel crystals, per 30 gallons of water. It should be mixed into soil and not exceed 1 gallon per the gallon size of the plant or one gallon per bare root.
- **Place Compost:** Compost builds beneficial micro-organism colonies, feeds trees, and supports groundcover plantings. Spread 1-2 inches of compost over the ram board and then seed.

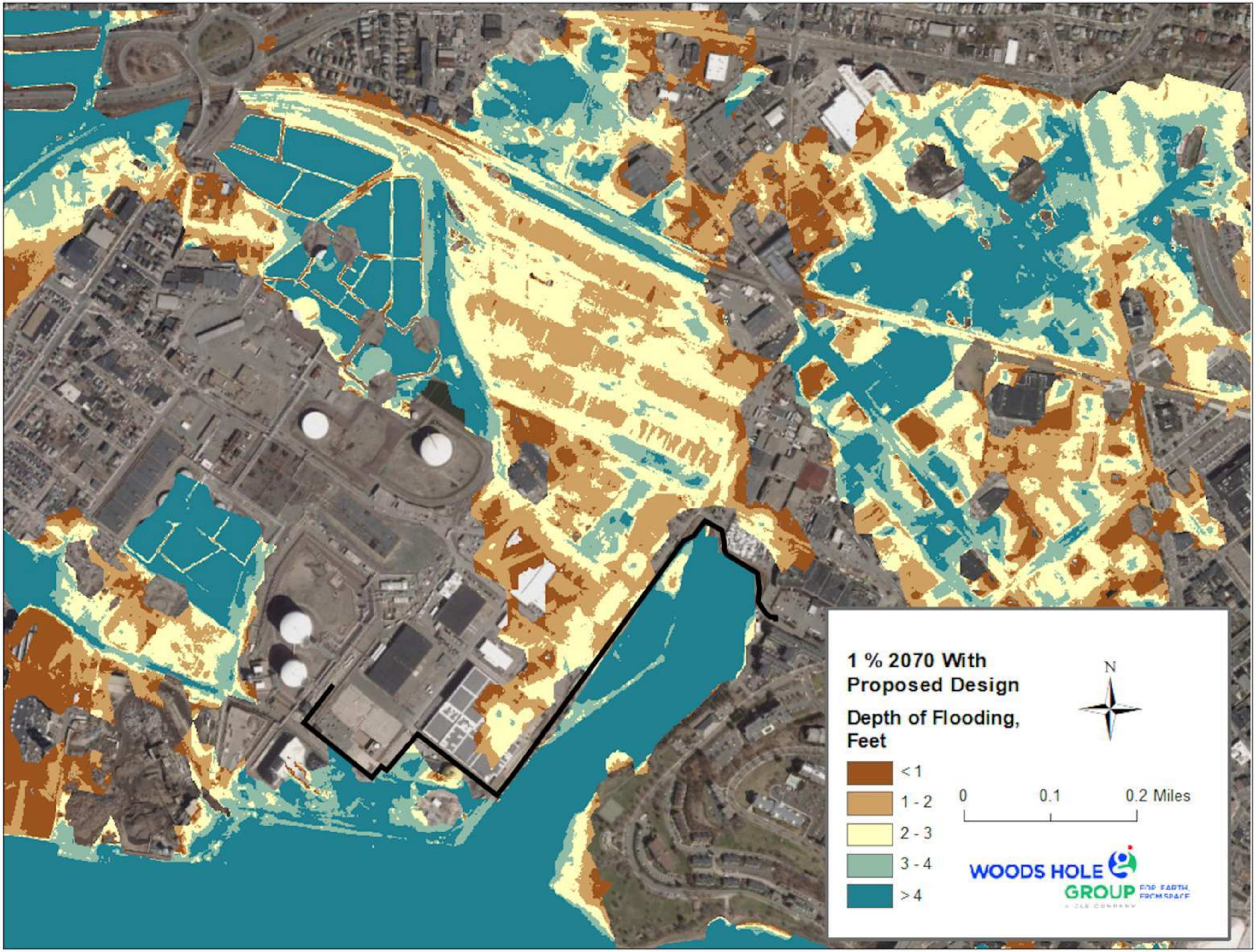
- **Plant Groundcover Nurse Seed:** Nurse seeds capture moisture, block invasives, and builds soil, giving the coastal bank time to develop in a natural setting. There would be a seed bank—including rapid annual seeds—sleeping in the soil, ready to fill in fast after a flood or fire lets in more light.
- **Wrap & Stake Trees:** A lack of diversity in the coastal bank puts excess pressure on wildlife who in turn must eat anything that is available. To get from where we are now to a future where the coastal bank provides balanced food sources, our trees need to survive to maturity. So, we need to protect them while they are young.
- **Inoculate & supplement:** Degraded urban soils, or those recently cleared of invasives, have some imbalances that we can buffer at the time of planting. We don't want to introduce synthetic fertilizers that can cause bacterial blooms, and which can affect water quality. We want to buffer with nitrogen fixing plants and inoculate the soil with fungi, macro-invertebrates, humates/ humic acid and protozoa, these can release nutrients in the right way making, healthier plants and better carbon sequestration. With this we may also apply basalt powder and volcanic ash these provide the minerals that are hard for new plants to get from the damaged soils.
- **Mix Seed, Sand and Supplements for Spreading:** By pre-mixing seed with sand and supplements, this helps us to spread it uniformly and get equal coverage. It also helps the seed stick. A sample mix includes 10 part of sand, 3 part of seed, 1 part of wood ash, 1 part of volcanic ash.

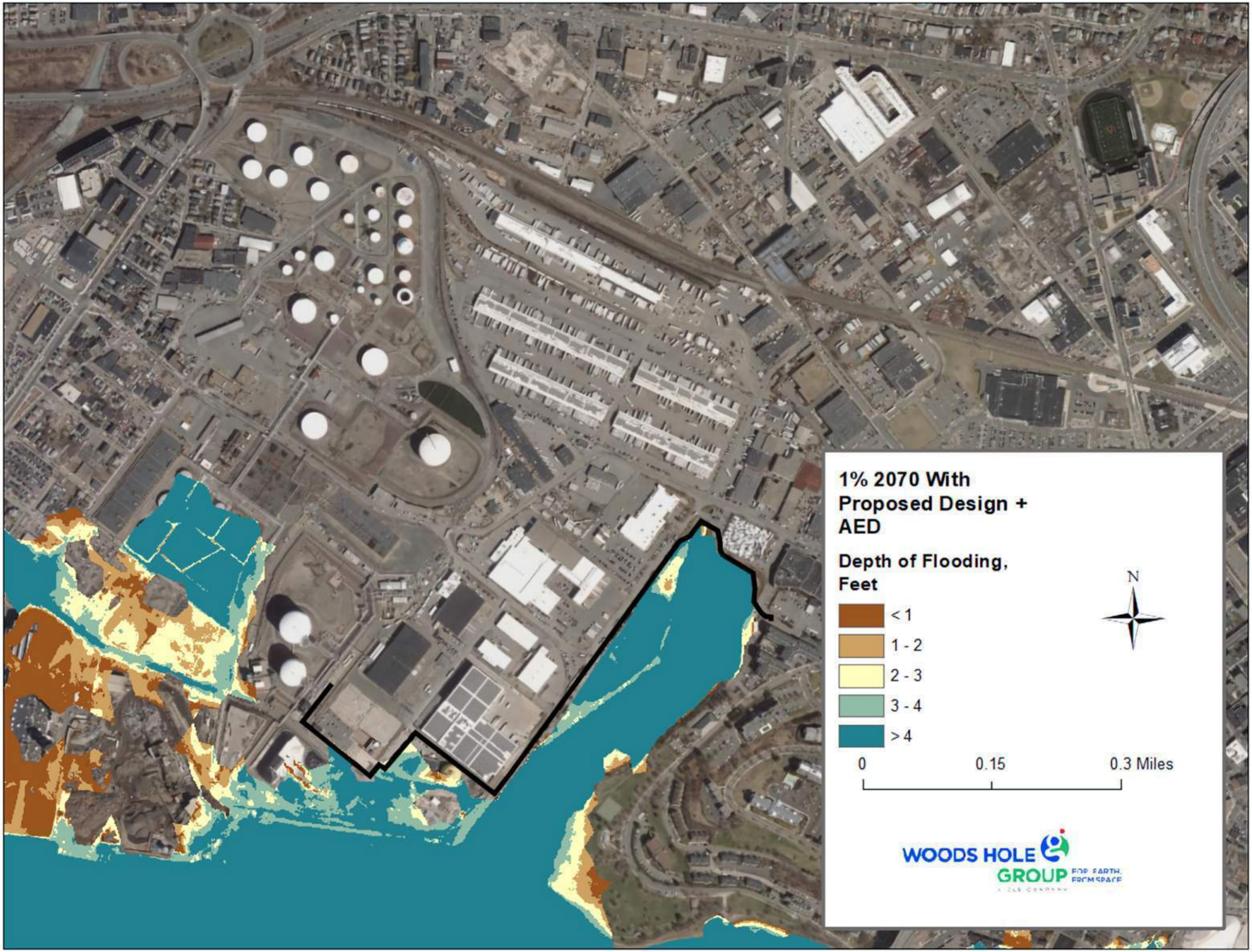
Attachment L

PROJECTED COASTAL FLOOD MAPS & RMAT



1% 2070 Without Proposed Design
Depth of Flooding, Feet
< 1
1 - 2
2 - 3
3 - 4
> 4
N
0
0.1
0.2 Miles
WOODS HOLE GROUP


1 % 2070 With Proposed Design
Depth of Flooding, Feet
< 1
1 - 2
2 - 3
3 - 4
> 4
N
0
0.1
0.2 Miles
WOODS HOLE GROUP



1% 2070 With Proposed Design + AED
Depth of Flooding, Feet
< 1
1 - 2
2 - 3
3 - 4
> 4
N
0
0.15
0.3 Miles
WOODS HOLE GROUP

RMAT Climate Resilience Design Standards Tool Project Report

Island End River Flood Resilience Project

Date Created: 4/23/2021 2:56:30 PM Created By: katie.moniz Download

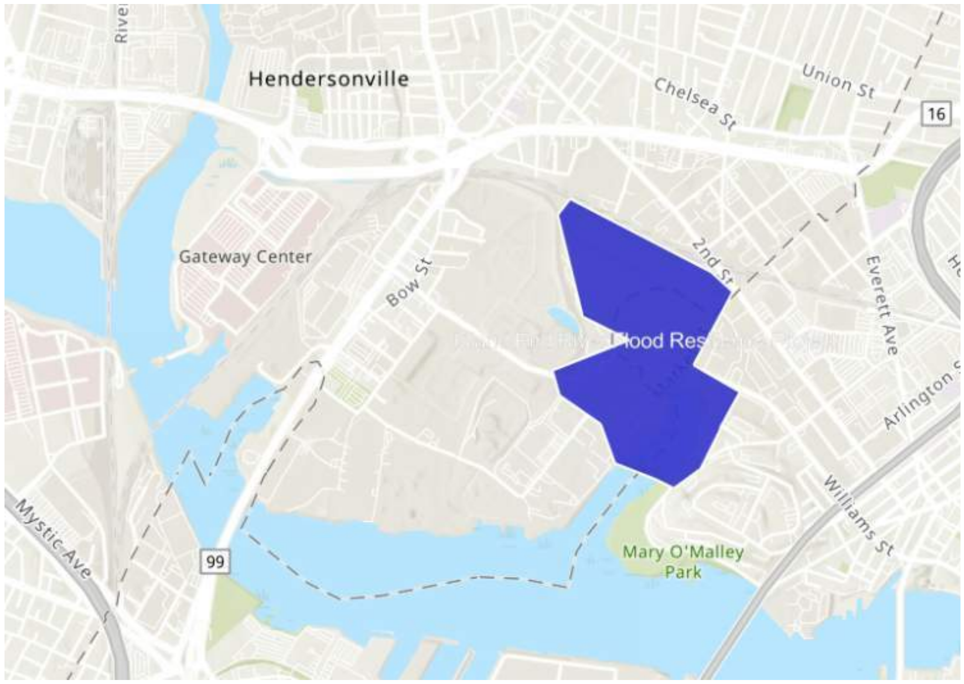
Date Updated: 10/2023 for Draft Environmental Impact Report

Project Summary

Link to Project

Estimated Construction Cost: $67000000.00
End of Life Year: 2073
Project within mapped Environmental Justice neighborhood: Yes

Ecosystem Benefits	Scores
Project Score	Moderate
Exposure	**Scores**
Sea Level Rise/Storm Surge	High Exposure
Extreme Precipitation - Urban Flooding	High Exposure
Extreme Precipitation - Riverine Flooding	Moderate Exposure
Extreme Heat	High Exposure



Asset Summary

Number of Assets: 23

Asset Risk	Sea Level Rise/Storm Surge	Extreme Precipitation - Urban Flooding	Extreme Precipitation - Riverine Flooding	Extreme Heat
Boston Market Terminal	High Risk	High Risk	High Risk	High Risk
New England Produce Center	High Risk	High Risk	High Risk	High Risk
155 Market Street	High Risk	High Risk	Moderate Risk	High Risk
US Post Office	High Risk	High Risk	High Risk	High Risk
Marina at Admirals Hill	High Risk	High Risk	Moderate Risk	High Risk
SPS New England	High Risk	High Risk	Moderate Risk	High Risk
Craft Brewers Guild	High Risk	High Risk	Moderate Risk	High Risk
Amazon Fresh	High Risk	High Risk	Moderate Risk	High Risk
Axis Admiral's Hill Apartments	High Risk	High Risk	Moderate Risk	High Risk
Seaport Academy	High Risk	High Risk	Moderate Risk	High Risk
Signature Breads	High Risk	High Risk	Moderate Risk	High Risk
People's United Bank	High Risk	High Risk	Moderate Risk	High Risk
Lineage Logistics	High Risk	High Risk	Moderate Risk	High Risk
Island End Park	—— Natural Resource project assets do not receive a preliminary climate risk rating. ——			
Mary O'Malley State Park	—— Natural Resource project assets do not receive a preliminary climate risk rating. ——			
Island End River	—— Natural Resource project assets do not receive a preliminary climate risk rating. ——			
Salt Marsh	—— Natural Resource project assets do not receive a preliminary climate risk rating. ——			
Market Street	High Risk	High Risk	Moderate Risk	High Risk

Beacham Street	High Risk	High Risk	High Risk	High Risk
Behen Street	High Risk	High Risk	Moderate Risk	High Risk
MBTA Commuter Rail	High Risk	High Risk	High Risk	High Risk
Private Rail	High Risk	High Risk	Moderate Risk	High Risk
Island End River Flood Resilience Barrier	High Risk	High Risk	High Risk	High Risk

Project Outputs

	Target Planning Horizon	Intermediate Planning Horizon	Percentile	Return Period	Tier
Sea Level Rise/Storm Surge					
Boston Market Terminal	2070	2050		200-yr (0.5%)	Tier 3
New England Produce Center	2070	2050		200-yr (0.5%)	Tier 3
155 Market Street	2070	2050		100-yr (1%)	Tier 3
US Post Office	2070	2050		200-yr (0.5%)	Tier 3
Marina at Admirals Hill	2070	2050		50-yr (2%)	Tier 2
SPS New England	2070	2050		50-yr (2%)	Tier 2
Craft Brewers Guild	2070	2050		100-yr (1%)	Tier 3
Amazon Fresh	2070	2050		100-yr (1%)	Tier 3
Axis Admiral's Hill Apartments	2070	2050		100-yr (1%)	Tier 3
Seaport Academy	2070	2050		50-yr (2%)	Tier 2
Signature Breads	2070	2050		50-yr (2%)	Tier 2
People's United Bank	2070	2050		50-yr (2%)	Tier 2
Lineage Logistics	2070	2050		100-yr (1%)	Tier 3
Island End Park	2030				Tier 1
Mary O'Malley State Park	2030				Tier 1
Island End River	2030				Tier 1
Salt Marsh	2030				Tier 1
Market Street	2050			200-yr (0.5%)	Tier 2
Beacham Street	2050			500-yr (0.2%)	Tier 3
Behen Street	2050			200-yr (0.5%)	Tier 2
MBTA Commuter Rail	2050			500-yr (0.2%)	Tier 3
Private Rail	2050			200-yr (0.5%)	Tier 2
Island End River Flood Resilience Barrier	2070	2050		200-yr (0.5%)	Tier 3
Extreme Precipitation					
Boston Market Terminal	2070			50-yr (2%)	Tier 3
New England Produce Center	2070			50-yr (2%)	Tier 3
155 Market Street	2070			25-yr (4%)	Tier 3
US Post Office	2070			50-yr (2%)	Tier 3
Marina at Admirals Hill	2070			10-yr (10%)	Tier 2
SPS New England	2070			10-yr (10%)	Tier 2
Craft Brewers Guild	2070			25-yr (4%)	Tier 3
Amazon Fresh	2070			25-yr (4%)	Tier 3
Axis Admiral's Hill Apartments	2070			25-yr (4%)	Tier 3
Seaport Academy	2070			10-yr (10%)	Tier 2
Signature Breads	2070			10-yr (10%)	Tier 2
People's United Bank	2070			10-yr (10%)	Tier 2
Lineage Logistics	2070			25-yr (4%)	Tier 3
Island End Park	2030				Tier 1
Mary O'Malley State Park	2030				Tier 1
Island End River	2030				Tier 1
Salt Marsh	2030				Tier 1
Market Street	2050			25-yr (4%)	Tier 2
Beacham Street	2050			50-yr (2%)	Tier 3
Behen Street	2050			25-yr (4%)	Tier 2
MBTA Commuter Rail	2050			50-yr (2%)	Tier 3
Private Rail	2050			25-yr (4%)	Tier 2
Island End River Flood Resilience Barrier	2070			100-yr (1%)	Tier 3

Extreme Heat			
Boston Market Terminal	2070	90th	Tier 3
New England Produce Center	2070	90th	Tier 3
155 Market Street	2070	50th	Tier 3
US Post Office	2070	90th	Tier 3
Marina at Admirals Hill	2070	50th	Tier 2
SPS New England	2070	50th	Tier 2
Craft Brewers Guild	2070	50th	Tier 3
Amazon Fresh	2070	50th	Tier 3
Axis Admiral's Hill Apartments	2070	50th	Tier 3
Seaport Academy	2070	50th	Tier 2
Signature Breads	2070	50th	Tier 2
People's United Bank	2070	50th	Tier 2
Lineage Logistics	2070	50th	Tier 3
Island End Park	2030	50th	Tier 1
Mary O'Malley State Park	2030	50th	Tier 1
Island End River	2030	50th	Tier 1
Salt Marsh	2030	50th	Tier 1
Market Street	2050	50th	Tier 2
Beacham Street	2050	90th	Tier 3
Behen Street	2050	50th	Tier 2
MBTA Commuter Rail	2050	50th	Tier 3
Private Rail	2050	50th	Tier 2
Island End River Flood Resilience Barrier	2070	90th	Tier 3

Scoring Rationale - Exposure

Sea Level Rise/Storm Surge

This project received a "High Exposure" because of the following:

- Located within the predicted mean high water shoreline by 2030
- Exposed to the 1% annual coastal flood event as early as 2030
- Historic coastal flooding at project site

Extreme Precipitation - Urban Flooding

This project received a "High Exposure" because of the following:

- Historic flooding at the project site
- Maximum annual daily rainfall exceeds 10 inches within the overall project's useful life
- Existing impervious area of the project site is greater than 50%
- No increase to impervious area

Extreme Precipitation - Riverine Flooding

This project received a "Moderate Exposure" because of the following:

- Project site has a history of riverine flooding
- The project is not within a mapped FEMA floodplain [outside of the Massachusetts Coast Flood Risk Model (MC-FRM)]
- Project is more than 500ft from a waterbody
- Project is not likely susceptible to riverine erosion

Extreme Heat

This project received a "High Exposure" because of the following:

- 30+ days increase in days over 90 deg. F within project's useful life
- Existing impervious area of the project site is greater than 50%
- Located within 100 ft of existing water body
- No increase to the impervious area of the project site
- No tree removal

Scoring Rationale - Asset Risk Scoring

Asset - Boston Market Terminal
Primary asset criticality factors influencing risk ratings for this asset:

- Asset must be operable at all times, even during natural hazard event
- Loss/inoperability of the asset would have state-wide or greater impacts
- The building/facility provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
- Inoperability of the asset would not be expected to result in injuries
- Cost to replace is between $30 million and $100 million
- Spills and/or releases of hazardous materials would be relatively easy to clean up

Asset - New England Produce Center
Primary asset criticality factors influencing risk ratings for this asset:

- Asset may inaccessible/inoperable during natural hazard event, but must be accessible/operable within one day after natural hazard event
- Loss/inoperability of the asset would have state-wide or greater impacts
- The building/facility provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
- Some alternative programs and/or services are available to support the community
- Cost to replace is between $30 million and $100 million
- There are no hazardous materials in the asset

Asset - 155 Market Street
Primary asset criticality factors influencing risk ratings for this asset:

- Asset may inaccessible/inoperable for more than a day but less than a week after natural hazard event
- Loss/inoperability of the asset would have state-wide or greater impacts
- The building/facility provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
- Some alternative programs and/or services are available to support the community
- Inoperability may moderately impact other facilities, assets, or buildings, but is not expected to affect their ability to operate
- There are no hazardous materials in the asset

Asset - US Post Office
Primary asset criticality factors influencing risk ratings for this asset:

- Asset may inaccessible/inoperable during natural hazard event, but must be accessible/operable within one day after natural hazard event
- Loss/inoperability of the asset would have state-wide or greater impacts
- The building/facility provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
- Few alternative programs and/or services are available to support the community
- Cost to replace is between $10 million and $30 million
- There are no hazardous materials in the asset

Asset - Marina at Admirals Hill
Primary asset criticality factors influencing risk ratings for this asset:

- Asset can be inaccessible/inoperable more than a week after natural hazard event without consequences
- Less than 1,000 people would be directly affected by the loss/inoperability of the asset
- The building/facility provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
- Some alternative programs and/or services are available to support the community
- Cost to replace is less than $10 million
- Spills and/or releases of hazardous materials would be moderately difficult to clean up

Asset - SPS New England
Primary asset criticality factors influencing risk ratings for this asset:

- Asset may inaccessible/inoperable for more than a day but less than a week after natural hazard event
- Loss/inoperability of the asset would have impacts limited to local area and/or municipality
- The building/facility provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
- Some alternative programs and/or services are available to support the community
- Inoperability is likely to significantly impact other facilities, assets, or buildings and will likely affect their ability to operate
- There are no hazardous materials in the asset

Asset - Craft Brewers Guild
Primary asset criticality factors influencing risk ratings for this asset:

- Asset can be inaccessible/inoperable more than a week after natural hazard event without consequences
- Loss/inoperability of the asset would have state-wide or greater impacts
- The building/facility provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
- Inoperability of the asset would not be expected to result in injuries
- Inoperability may moderately impact other facilities, assets, or buildings, but is not expected to affect their ability to operate
- There are no hazardous materials in the asset

Asset - Amazon Fresh
Primary asset criticality factors influencing risk ratings for this asset:

- Asset may inaccessible/inoperable for more than a day but less than a week after natural hazard event
- Greater than 10,000 people would be directly affected by the loss/inoperability of the asset

- The building/facility provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
- Some alternative programs and/or services are available to support the community
- Cost to replace is between $10 million and $30 million
- There are no hazardous materials in the asset

Asset - Axis Admiral's Hill Apartments
Primary asset criticality factors influencing risk ratings for this asset:

- Asset may inaccessible/inoperable for more than a day but less than a week after natural hazard event
- Loss/inoperability of the asset would have impacts limited to local area and/or municipality
- The building/facility provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
- Inoperability of the asset would be expected to result in minor impacts to people’s health, including minor injuries or minor impacts to chronic illnesses
- Cost to replace is between $30 million and $100 million
- Impact on natural resources can be mitigated naturally with the inoperability of the asset

Asset - Seaport Academy
Primary asset criticality factors influencing risk ratings for this asset:

- Asset may inaccessible/inoperable for more than a day but less than a week after natural hazard event
- Less than 1,000 people would be directly affected by the loss/inoperability of the asset
- The building/facility provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
- Few alternative programs and/or services are available to support the community
- Cost to replace is less than $10 million
- There are no hazardous materials in the asset

Asset - Signature Breads
Primary asset criticality factors influencing risk ratings for this asset:

- Asset can be inaccessible/inoperable more than a week after natural hazard event without consequences
- Less than 1,000 people would be directly affected by the loss/inoperability of the asset
- The building/facility provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
- Some alternative programs and/or services are available to support the community
- Cost to replace is between $10 million and $30 million
- There are no hazardous materials in the asset

Asset - People's United Bank
Primary asset criticality factors influencing risk ratings for this asset:

- Asset may inaccessible/inoperable for more than a day but less than a week after natural hazard event
- Less than 10,000 people would be directly affected by the loss/inoperability of the asset
- The building/facility provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
- Some alternative programs and/or services are available to support the community
- Cost to replace is less than $10 million
- There are no hazardous materials in the asset

Asset - Lineage Logistics
Primary asset criticality factors influencing risk ratings for this asset:

- Asset may inaccessible/inoperable for more than a day but less than a week after natural hazard event
- Loss/inoperability of the asset would have regional impacts
- The building/facility provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
- Some alternative programs and/or services are available to support the community
- Cost to replace is between $10 million and $30 million
- Spills and/or releases of hazardous materials would be relatively easy to clean up

Asset - Island End Park
Primary asset criticality factors influencing risk ratings for this asset:

No score available

Asset - Mary O'Malley State Park
Primary asset criticality factors influencing risk ratings for this asset:

No score available

Asset - Island End River
Primary asset criticality factors influencing risk ratings for this asset:

No score available

Asset - Salt Marsh
Primary asset criticality factors influencing risk ratings for this asset:

No score available

Asset - Market Street

Primary asset criticality factors influencing risk ratings for this asset:

- Asset may inaccessible/inoperable during natural hazard event, but must be accessible/operable within one day after natural hazard event
- Loss/inoperability of the asset would have state-wide or greater impacts
- The infrastructure provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
- Inoperability of the asset would not be expected to result in injuries
- Inoperability is likely to significantly impact other facilities, assets, or buildings and will likely affect their ability to operate
- There are no hazardous materials in the asset

Asset - Beacham Street
Primary asset criticality factors influencing risk ratings for this asset:

- Asset may inaccessible/inoperable for more than a day but less than a week after natural hazard event
- Loss/inoperability of the asset would have state-wide or greater impacts
- The infrastructure provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
- Infrastructure functions as an evacuation route during emergencies
- Inoperability is likely to significantly impact other facilities, assets, or buildings and will likely affect their ability to operate
- There are no hazardous materials in the asset

Asset - Behen Street
Primary asset criticality factors influencing risk ratings for this asset:

- Asset may inaccessible/inoperable for more than a day but less than a week after natural hazard event
- Loss/inoperability of the asset would have state-wide or greater impacts
- The infrastructure provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
- Inoperability of the asset would not be expected to result in injuries
- Inoperability is likely to significantly impact other facilities, assets, or buildings and will likely affect their ability to operate
- There are no hazardous materials in the asset

Asset - MBTA Commuter Rail
Primary asset criticality factors influencing risk ratings for this asset:

- Asset may inaccessible/inoperable during natural hazard event, but must be accessible/operable within one day after natural hazard event
- Loss/inoperability of the asset would have state-wide or greater impacts
- The infrastructure provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
- Inoperability of the asset would be expected to cause a loss of confidence in government agency
- Cost to replace is greater than $100 million
- There are no hazardous materials in the asset

Asset - Private Rail
Primary asset criticality factors influencing risk ratings for this asset:

- Asset may inaccessible/inoperable for more than a day but less than a week after natural hazard event
- Loss/inoperability of the asset would have state-wide or greater impacts
- The infrastructure provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
- Inoperability of the asset would not be expected to result in injuries
- Cost to replace is between $30 million and $100 million
- Spills and/or releases of hazardous materials would be relatively easy to clean up

Asset - Island End River Flood Resilience Barrier
Primary asset criticality factors influencing risk ratings for this asset:

- Asset must be operable at all times, even during natural hazard event
- Greater than 100,000 people would be directly affected by the loss/inoperability of the asset
- The infrastructure provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
- Inoperability of the asset would be expected to result in possible loss of life
- Inoperability will result in debilitating cascading impacts that will render other facilities, assets, or buildings inoperable and/or prevent the functionality of major regional or statewide facilities and/or delivery of critical services
- Spills and/or releases of hazardous materials are expected with difficult remediation and pose a severe threat to public health or safety

Project Design Standards Output

Asset: Boston Market Terminal — Building/Facility

Sea Level Rise/Storm Surge — High Risk

Target Planning Horizon: 2070
Intermediate Planning Horizon: 2050
Return Period: 200-yr (0.5%)

Applicable Design Criteria

Tiered Methodology: Tier 3

Projected Tidal Datums: Yes

Planning Horizon	MHHW	MHW	MTL	MLW	MLLW
	(ft-NAVD88)				
2050	7.8	7.5	2.5	-2.4	-2.7
2070	9.8	9.4	4.3	-0.8	-1.1

Limitations: Tidal datums are recommended based on the user drawn polygon, user responses to the useful life of the selected asset, and intersection of the project polygon with the mean high water (MHW) polygon for 2030. Tidal datum values provided are based on the MC-FRM, developed by Woods Hole Group in coordination with UMass Boston. For additional information on how these values were generated, review the link here. The values provided within should be used to inform design, but they do not provide guarantees for resilience. The guidance provided within is general and people are encouraged to do their own due diligence as part of planning and design.

Projected Water Surface Elevation: Yes

Asset Name	Recommmended Planning Horizon	Recommmended Return Period	Max	Min	Area Weighted Average
			(ft - NAVD88)		
Boston Market Terminal	2050	0.5% (200-Year)	12.7	12.2	12.2
	2070		14.3	14	14

Limitations: Projected water surface elevations are recommended based on the user drawn polygon, and user responses to the useful life of the selected asset. The projected water surface elevation values provided are based on the MC-FRM, developed by Woods Hole Group in coordination with UMass Boston. For additional information on how these values were generated, review the link here. The values provided within should be used to inform design, but they do not provide guarantees for resilience. The guidance provided within is general and people are encouraged to do their own due diligence as part of planning and design.

Projected Wave Action Water Elevation: Yes

Asset Name	Recommmended Planning Horizon	Recommmended Return Period	Max	Min	Area Weighted Average
			(ft - NAVD88)		
Boston Market Terminal	2050	0.5% (200-Year)	15.8	12.2	13.3
	2070		17.4	14	15.2

Limitations: Projected dynamic flood elevations are recommended based on the user drawn polygon, and user responses to the useful life of the selected asset. The projected dynamic flood elevation values provided are based on the MC-FRM, developed by Woods Hole Group in coordination with UMass Boston. For additional information on how these values were generated, review the link here. The values provided within should be used to inform design, but they do not provide guarantees for resilience. The guidance provided within is general and people are encouraged to do their own due diligence as part of planning and design.

Projected Wave Heights: Yes

Asset Name	Recommmended Planning Horizon	Recommmended Return Period	Max	Min	Area Weighted Average
			(Feet)		
Boston Market Terminal	2050	0.5% (200-Year)	4.5	0	1.7
	2070		4.5	0	1.9

Limitations: Projected wave heights are recommended based on the user drawn polygon, and user responses to the useful life of the selected asset. The projected wave height values provided are based on the MC-FRM, developed by Woods Hole Group in coordination with UMass Boston. For additional information on how these values were generated, review the link here. The values provided within should be used to inform design, but they do not provide guarantees for resilience. The guidance provided within is general and people are encouraged to do their own due diligence as part of planning and design.

Projected Duration of Flooding: Yes
Projected Design Flood Velocity: Yes
Projected Scour & Erosion: No

Extreme Precipitation High Risk

Target Planning Horizon: 2070
Return Period: 50-yr (2%)

Applicable Design Criteria

Tiered Methodology: Tier 3

Projected Total Precipitation Depth & Peak Intensity for 24-hr Design Storms: Yes

Asset Name	Recommended Planning Horizon	Recommended Return Period (Design Storm)	Projected 24-hr Total Precipitation Depth (inches)	Step-by-Step Methodology for Peak Intensity
Boston Market Terminal	2070	50-Year (2%)	9.7	Downloadable Methodology PDF

Limitations: While precipitation depth is useful for project planning and design, rainfall distribution and peak intensity of the design storm is recommended to also be considered. Lower-intensity, longer-duration storms allow time for infiltration and reduce the load on the infrastructure system over the duration of the storm. Higher-intensity, shorter-duration storms often have higher runoff volumes because the water does not have enough time to infiltrate and infrastructure systems (e.g., catch basins) and may overflow or back up during such storms. In the Northeast, short -duration high intensity rain events are becoming more frequent, and there is often little early warning for these events, making it difficult to plan operationally. These events can result in the rapid inundation of the asset project location. Design should consider both short- and long-duration precipitation events and how they may impact the asset.

The precipitation values provided by this Tool (version 1) are recommended to inform planning and design, but they do not guarantee that the asset will be protected from or be able to withstand an extreme precipitation event. The planning, design, and review guidance accompanying these values is general and projects are encouraged to do their own due diligence to understand the vulnerability of their asset.

Projected Riverine Peak Discharge & Peak Flood Elevation: Yes

Extreme Heat High Risk

Target Planning Horizon: 2070
Percentile: 90th Percentile

Applicable Design Criteria

Tiered Methodology: Tier 3

Projected Annual/Summer/Winter Average Temperatures: Yes
Projected Heat Index: Yes
Projected Growing Degree Days: No
Projected Days Per Year With Max Temp > 95°F, >90°F, <32°F: Yes
Projected Number of Heat Waves Per Year & Average Heat Wave Duration: Yes
Projected Cooling Degree Days & Heating Degree Days (base = 65°F): Yes

Asset: New England Produce Center Building/Facility

Sea Level Rise/Storm Surge High Risk

Target Planning Horizon: 2070
Intermediate Planning Horizon: 2050
Return Period: 200-yr (0.5%)

Applicable Design Criteria

Tiered Methodology: Tier 3

Projected Tidal Datums: Yes

Planning Horizon	MHHW	MHW	MTL	MLW	MLLW
	(ft-NAVD88)				
2050	7.8	7.5	2.5	-2.4	-2.7
2070	9.8	9.4	4.3	-0.8	-1.1

Limitations: Tidal datums are recommended based on the user drawn polygon, user responses to the useful life of the selected asset, and intersection of the project polygon with the mean high water (MHW) polygon for 2030. Tidal datum values provided are based on the MC-FRM, developed by Woods Hole Group in coordination with UMass Boston. For additional information on how these values were generated, review the link here. The values provided within should be used to inform design, but they do not provide guarantees for resilience. The guidance provided within is general and people are encouraged to do their own due diligence as part of planning and design.

Projected Water Surface Elevation: Yes

Asset Name	Recommmended Planning Horizon	Recommmended Return Period	Max	Min	Area Weighted Average
			(ft - NAVD88)		
New England Produce Center	2050	0.5% (200-Year)	12.7	12.2	12.2
	2070		14.3	14	14

Limitations: Projected water surface elevations are recommended based on the user drawn polygon, and user responses to the useful life of the selected asset. The projected water surface elevation values provided are based on the MC-FRM, developed by Woods Hole Group in coordination with UMass Boston. For additional information on how these values were generated, review the link here. The values provided within should be used to inform design, but they do not provide guarantees for resilience. The guidance provided within is general and people are encouraged to do their own due diligence as part of planning and design.

Projected Wave Action Water Elevation: Yes

Asset Name	Recommmended Planning Horizon	Recommmended Return Period	Max	Min	Area Weighted Average
			(ft - NAVD88)		
New England Produce Center	2050	0.5% (200-Year)	15.8	12.2	13.3
	2070		17.4	14	15.2

Limitations: Projected dynamic flood elevations are recommended based on the user drawn polygon, and user responses to the useful life of the selected asset. The projected dynamic flood elevation values provided are based on the MC-FRM, developed by Woods Hole Group in coordination with UMass Boston. For additional information on how these values were generated, review the link here. The values provided within should be used to inform design, but they do not provide guarantees for resilience. The guidance provided within is general and people are encouraged to do their own due diligence as part of planning and design.

Projected Wave Heights: Yes

Asset Name	Recommmended Planning Horizon	Recommmended Return Period	Max	Min	Area Weighted Average
			(Feet)		
New England Produce Center	2050	0.5% (200-Year)	4.5	0	1.7
	2070		4.5	0	1.9

Limitations: Projected wave heights are recommended based on the user drawn polygon, and user responses to the useful life of the selected asset. The projected wave height values provided are based on the MC-FRM, developed by Woods Hole Group in coordination with UMass Boston. For additional information on how these values were generated, review the link here. The values provided within should be used to inform design, but they do not provide guarantees for resilience. The guidance provided within is general and people are encouraged to do their own due diligence as part of planning and design.

Projected Duration of Flooding: Yes
Projected Design Flood Velocity: Yes
Projected Scour & Erosion: No

Extreme Precipitation High Risk

Target Planning Horizon: 2070
Return Period: 50-yr (2%)

Applicable Design Criteria

Tiered Methodology: Tier 3

Projected Total Precipitation Depth & Peak Intensity for 24-hr Design Storms: Yes

Asset Name	Recommended Planning Horizon	Recommended Return Period (Design Storm)	Projected 24-hr Total Precipitation Depth (inches)	Step-by-Step Methodology for Peak Intensity
New England Produce Center	2070	50-Year (2%)	9.7	Downloadable Methodology PDF

Limitations: While precipitation depth is useful for project planning and design, rainfall distribution and peak intensity of the design storm is recommended to also be considered. Lower-intensity, longer-duration storms allow time for infiltration and reduce the load on the infrastructure system over the duration of the storm. Higher-intensity, shorter-duration storms often have higher runoff volumes because the water does not have enough time to infiltrate and infrastructure systems (e.g., catch basins) and may overflow or back up during such storms. In the Northeast, short -duration high intensity rain events are becoming more frequent, and there is often little early warning for these events, making it difficult to plan operationally. These events can result in the rapid inundation of the asset project location. Design should consider both short- and long-duration precipitation events and how they may impact the asset.

The precipitation values provided by this Tool (version 1) are recommended to inform planning and design, but they do not guarantee that the asset will be protected from or be able to withstand an extreme precipitation event. The planning, design, and review guidance accompanying these values is general and projects are encouraged to do their own due diligence to understand the vulnerability of their asset.

Projected Riverine Peak Discharge & Peak Flood Elevation: Yes

Extreme Heat High Risk

Target Planning Horizon: 2070
Percentile: 90th Percentile

Applicable Design Criteria

Tiered Methodology: Tier 3

Projected Annual/Summer/Winter Average Temperatures: Yes
Projected Heat Index: Yes
Projected Growing Degree Days: No
Projected Days Per Year With Max Temp > 95°F, >90°F, <32°F: Yes
Projected Number of Heat Waves Per Year & Average Heat Wave Duration: Yes
Projected Cooling Degree Days & Heating Degree Days (base = 65°F): Yes

Asset: 155 Market Street Building/Facility

Sea Level Rise/Storm Surge High Risk

Target Planning Horizon: 2070
Intermediate Planning Horizon: 2050
Return Period: 100-yr (1%)

Applicable Design Criteria

Tiered Methodology: Tier 3

Projected Tidal Datums: Yes

Planning Horizon	MHHW	MHW	MTL	MLW	MLLW
	(ft-NAVD88)				
2050	7.8	7.5	2.5	-2.4	-2.7
2070	9.8	9.4	4.3	-0.8	-1.1

Limitations: Tidal datums are recommended based on the user drawn polygon, user responses to the useful life of the selected asset, and intersection of the project polygon with the mean high water (MHW) polygon for 2030. Tidal datum values provided are based on the MC-FRM, developed by Woods Hole Group in coordination with UMass Boston. For additional information on how these values were generated, review the link here. The values provided within should be used to inform design, but they do not provide guarantees for resilience. The guidance provided within is general and people are encouraged to do their own due diligence as part of planning and design.

Projected Water Surface Elevation: Yes

Asset Name	Recommmended Planning Horizon	Recommmended Return Period	Max	Min	Area Weighted Average
			(ft - NAVD88)		
155 Market Street	2050	1% (100-Year)	12.3	11.7	11.7
	2070		13.9	13.6	13.6

Limitations: Projected water surface elevations are recommended based on the user drawn polygon, and user responses to the useful life of the selected asset. The projected water surface elevation values provided are based on the MC-FRM, developed by Woods Hole Group in coordination with UMass Boston. For additional information on how these values were generated, review the link here. The values provided within should be used to inform design, but they do not provide guarantees for resilience. The guidance provided within is general and people are encouraged to do their own due diligence as part of planning and design.

Projected Wave Action Water Elevation: Yes

Asset Name	Recommmended Planning Horizon	Recommmended Return Period	Max	Min	Area Weighted Average
			(ft - NAVD88)		
155 Market Street	2050	1% (100-Year)	15	11.7	12.7
	2070		16.7	13.6	14.7

Limitations: Projected dynamic flood elevations are recommended based on the user drawn polygon, and user responses to the useful life of the selected asset. The projected dynamic flood elevation values provided are based on the MC-FRM, developed by Woods Hole Group in coordination with UMass Boston. For additional information on how these values were generated, review the link here. The values provided within should be used to inform design, but they do not provide guarantees for resilience. The guidance provided within is general and people are encouraged to do their own due diligence as part of planning and design.

Projected Wave Heights: Yes

Asset Name	Recommmended Planning Horizon	Recommmended Return Period	Max	Min	Area Weighted Average
			(Feet)		
155 Market Street	2050	1% (100-Year)	4	0	1.5
	2070		4	0	1.7

Limitations: Projected wave heights are recommended based on the user drawn polygon, and user responses to the useful life of the selected asset. The projected wave height values provided are based on the MC-FRM, developed by Woods Hole Group in coordination with UMass Boston. For additional information on how these values were generated, review the link here. The values provided within should be used to inform design, but they do not provide guarantees for resilience. The guidance provided within is general and people are encouraged to do their own due diligence as part of planning and design.

Projected Duration of Flooding: Yes
Projected Design Flood Velocity: Yes
Projected Scour & Erosion: No

Extreme Precipitation High Risk

Target Planning Horizon: 2070
Return Period: 25-yr (4%)

Applicable Design Criteria

Tiered Methodology: Tier 3

Projected Total Precipitation Depth & Peak Intensity for 24-hr Design Storms: Yes

Asset Name	Recommended Planning Horizon	Recommended Return Period (Design Storm)	Projected 24-hr Total Precipitation Depth (inches)	Step-by-Step Methodology for Peak Intensity
155 Market Street	2070	25-Year (4%)	8.5	Downloadable Methodology PDF

Limitations: While precipitation depth is useful for project planning and design, rainfall distribution and peak intensity of the design storm is recommended to also be considered. Lower-intensity, longer-duration storms allow time for infiltration and reduce the load on the infrastructure system over the duration of the storm. Higher-intensity, shorter-duration storms often have higher runoff volumes because the water does not have enough

Attachment M

SSCF O&M PLAN

STORM SURGE CONTROL FACILITY

OPERATION & MAINTENANCE PLAN - DRAFT

ISLAND END FLOOD RESILIENCE PROJECT

CITY OF CHELSEA / CITY OF EVERETT

DRAFT OCTOBER 2023

1.0 INTRODUCTION

The Island End River Storm Surge Control Facility (SSCF) a piece of regional stormwater and flood control infrastructure proposed by the City of Chelsea and Everett to prevent impactful and damaging coastal storm flowage in the Island End River (IER) district via backwater flow through the existing storm drainage network during extreme coastal events. The SSCF is part of a multi-faceted regional flood resilience program that includes barriers at-grade in Chelsea and Everett, nature-based approaches to shoreline restoration, and salt marsh improvements. The proposed barriers consist of free standing reinforced concrete walls, adapted waterfront bulkheads, sheet pile walls with architectural form finished concrete cap, earthen berms, and flood gates at road and rail crossings.

The SSCF is located at the head of the Island End River in Chelsea. The Island End River is a tributary to the Mystic River, near its mouth at Boston Harbor, and is tidally influenced. The SSCF is proposed to be located on the southeast corner of the intersection of Market Street and Beacham Street. The facility is proposed to be installed in public and private lands including in the public right-of-way in Beacham Street, private property #357 Beacham Street (M&T Bank), and private property #145 Market Street (marine parcel). Where in private properties, easements for land rights will be secured.

The structure will be operated “normally open” to allow regular tidal flushing of brackish water from the IER through the Market Street culvert to the upstream open channel. During impactful coastal storm surge events, gates will be closed to prevent backwater through the storm drain infrastructure.

2.0 FACILITY COMPONENTS

The following is a summary of SSCF components relevant to operation and maintenance. Refer to Preliminary Design Report Section 4, Basis of Design, and Preliminary Design Plans for further details.

Combination flap gates – Gates will be raised when the water surface level is below the trigger elevation to allow bi-directional flow. When closed, the gates act as normal flap gates, allowing the storm drain system to drain when hydraulically feasible to do so, but prevent backwater flow that could cause flooding and damage. The three combination flap gates are proposed to be 96 inches by 96 inches. Combining the three openings, the total cross-sectional area is 192 square feet, equivalent to the nominal cross-sectional area of the proposed 16’ wide by 12’ high Market Street

Culvert and significantly greater than the cross-sectional area of the existing 15’6” wide by 9’6” tall arch culvert. The benefit of combination flap gates are that if impounded stormwater runoff ever exceeds coastal storm surge water levels, the pressure head differential will automatically regulate to relieve impounded waters even in a gate closed condition

Self-contained electro-hydraulic actuators – These actuators provide failsafe operation for the combination flap gates in the event of a power outage, as they can maintain enough charge to open and close for a number of cycles. They can also be designed to fail closed. Since they are able to operate for a time after loss of primary power, no permanent backup generator is required and less complex electrical equipment can be supplied, such as a receptacle for a portable generator and manual transfer switches.

Stop logs – Stop logs provide isolation around the combination flap gates during inspection or maintenance periods. Brackets for the stop logs are permanently installed but the stop log sections are normally stored off-site.

Bar racks – Bar racks (trash racks) are provided on both sides of the gates to help reduce the likelihood of gate failure to close or seat due to debris in the gate openings. Inland of the gates the bar rack is located within the structure. The goal of this rack is to prevent large debris from progressing to the gates and river beyond, especially any debris introduced in the open channel section of the storm drain system. On the river side of the gates, the bar rack is located at the outfall of the storm surge control structure discharge culvert.

Inlet and outlet culverts – The storm surge control facility is proposed to be connected to the Market Street culvert and the Island End River via a 16’ wide by 12’ tall box culvert. This proposed inlet and outlet culvert is sized equal to the proposed replacement culvert spanning between the open channel and the SSCF. Dewberry Engineers performed hydraulic modeling 2018 to 2020 to inform size of proposed culvert, which they determined optimally sized as a 16’ wide by 12’ tall box given site constraints and design flow requirements. In 2021 the section of the culvert in private property adjacent to the open-air channel was replaced with this recommended size. Chelsea and Everett plan to replace the remainder of the culvert with same sized pipe in Market Street. As the SSCF will be constructed prior to the right-of-way culvert segment, the SSCF inlet pipe will transition to the inside diameter of the smaller arch culvert via custom fabricated fiberglass reinforced pipe slip connection and reinforced concrete collar. The outlet culvert will tie into the headwall of the outfall structure.

Roller gates – In case of major maintenance or desire for double isolation during manned entry of the facility, roller gates are provided at the inlet and outlet culverts. These gates are provided with lifters and are stored off-site, similar to stop logs.

Outfall structure – The outfall structure is used to transition flow between the culverts and the Island End River. It consists of a headwall, slab, wing walls, and transitional rip rap area between the concrete and natural river bottom. The outfall structure will also support the river side bar rack for the Market Street culvert as well as the Beacham Street storm drain flap gate.

Flap gate – The Beacham Street storm drain is not directly attached to the storm surge control facility as it does not require bi-directional flow to upgradient resource areas. To prevent damaging flooding via the Beacham Street storm drain, a flap gate valve is proposed to be located at the outfall structure.

Facility access – Access will be via 36" diameter manhole frames and covers and removable access plates as shown in the drawings. The access points below the design flood elevation and on the river side of the control gates will be bolted and watertight to prevent flooding through those access points. All other access points will be bolted for security purposes but not watertight.

Sediment control – Rock traps are provided on both sides of the gates to facilitate maintenance of sediment and heavy debris. These low points in the facility floor are designed to allow vactor truck operations or mechanical lifting of larger debris. Inland of the gates the rock trap receives debris that has been caught on the bar rack and pushed down. On the river side of the gates, the rock trap is the bottom of a sloped floor and will likely see more sediment than larger debris due to relative elevations of the outfall structure and assumed river bottom. To help reduce maintenance requirements, the openings for the combination flap gates are proposed to be raised above the facility floor in case there is sediment build-up from the river on that side of the structure at the time of gate closure and re-opening.

Connection to potential future pump station – The regional stormwater systems that find confluence proximate the SCCF will likely require stormwater pumping added to supplement capacity during periods of high coastal tailwater. The SSCF design includes knockout panels to allow for a 60" stormwater pipe connection to a potential future pump station. The Cities of Chelsea and Everett are committed to further developing concept for regional stormwater collection hydraulics improvements in calendar year 2024.

Electrical equipment – An enclosure will be provided onsite that will house the programmable logic controller (PLC), manual transfer switch for backup power, communications equipment, portable generator receptacle, and other required electrical components. Actuators will also have local control stations at the site.

Instrumentation – Beyond the instrumentation required for the actuators, ultrasonic level transducers will be used on both sides of the gate and inland of the bar rack for control of the gates and monitoring the status of the bar rack. The river side level transducer will be used to trigger the gates to close and open. The two level transducers on either side of the bar rack will be used to evaluate differential head across the screen to indicate blinding and the need for maintenance to clear the screen. Float switches will also be used for backup.

3.0 OPERATION

The SSCF will operate as a sluice gate under normal operating conditions, allowing the free flow of tide waters in both directions, but close on incoming storm surge at a predetermined set point, as described herein, to prevent flooding of lands through surcharge of the upgradient channel and stormwater collection system. Points subject to surcharge include manholes, catch basins, and open-air channel segment upgradient of the storm surge control facility. The combination gates will operate as a conventional top hinged drainage flap gate in the down or closed position under trigger conditions.

Operation of the storm surge control facility will be controlled based on the water surface elevation on the river side of the structure. Water levels will be measured by a series of ultrasonic level transducers with backup float switches. The level control system will consist of a Programmable Logic Controller (PLC), which will determine the sequence of operation of the gate actuators. The PLC will control the gate operation, indicate water levels, and activate alarms. The PLC will contain switches and relays for indication of alarm conditions and interfacing with a remote terminal unit to signal operations personnel.

The level control panel will respond to a rising and falling water level on the ocean side of the control structure, as follows:

- As the water level rises to the GATE CLOSE elevation, the activator energizes and closes the gate.
- When the water level drops to the GATE OPEN elevation, the activator energizes and opens the gate.

The control structure operation will be based on the water surface elevation on the river side of the gate. The storm surge control facility is not proposed to be manually closed to create capacity in advance of weather events. Partial closures will not be part of the operational scheme. The initial operational set points are shown in Table 1.

Table 1: Operational Set Points

Operational Condition	Elevation (NAVD 88)
Gate Close	7.0 feet
Gate Open	4.0 feet

The goal of gate operation is to maximize elevation of salt water into the upgradient habitat without causing flooding to abutting properties. The set points described here are starting points and future adjustments will likely be required to achieve the goal. An Advisory Committee for the SSCF, discussed later in this plan, will monitor operation and assess the need for future adjustments. No changes shall be made to the set points without review and approval by the Advisory Committee.

The gate will not be continuously manned and will use a passive alarm system, or it will activate only when an alarm occurs. The Remote Terminal Unit (RTU) will be programmed to initiate the dialing sequence upon sensing a power failure. Each alarm is annunciated on the gate control panel and transmitted to a RTU with cellular modem. The RTU will transmit the alarm to browser accessed user interface and will auto-dial pre-set telephone numbers and emails for individual contact of operators. The RTU will contain an online interface for configuration and data acquisition.

4.0 MAINTENANCE

The Cities of Chelsea and Everett are committed to performing long-term maintenance of the systems.

General Inspection & Maintenance

The SSCF should be visited monthly for general inspection of condition and system performance. Maintenance activities should be scheduled on an annual and semiannual basis, as described herein, by qualified technicians. The numbered list below describes general inspection and maintenance practices.

1. Visit the SSCF monthly or after significant storms to systematically check and operate all electrical, control, and mechanical equipment. Perform inspection using a recorded log tailored to SSCF configuration. This system will be used to document operator's inspection and maintenance and other aspects of the SSCF operation which have been evaluated.
2. Maintain and service equipment in accordance with manufacturer recommendations and requirements. Maintenance at the SSCF should be performed on a scheduled basis during regular inspection. Maintenance shall include exercise and testing of gate equipment and controls at a minimum semiannually.
3. Conduct preventive maintenance semiannually including the following:
    a. Control and instrumentation inspection of relay, contact, and level transducer equipment involved with the controls/instrumentation.
    b. Inspection of the gates and service equipment within the SSCF. Motors will be checked for amperage draw and connections.
    c. Alarm functions will be tested to minimize or eliminate possible failure during emergency conditions.
4. Prepare a report following semiannual maintenance recommending changes in the operation and/or maintenance practices followed by the personnel responsible for the operation.
5. Prepare for 24-hour on-call service for the SSCF with on-call service providers.

Recommended maintenance practices and required equipment are summarized in Table 2.

Table 2: Maintenance and Inspection Task Checklist

Task	# of Staff	Equipment	Events per Year
Regular Inspection	2	Tool Truck	12*
Bar Rack Cleaning	2	Tool Truck, Rake	12*
Rock Trap Cleaning	3	Tool Truck, Vactor Truck	12*
Gate & Actuator Maintenance	2	Tool Truck	2
Electrical Maintenance	2	Tool Truck	2
Comprehensive Inspection	4	Tool Truck, Crane	1

** Inspection and cleaning should occur post storm event and as needed to keep grates clear and facility operational*

Roller Gates & Stop Logs

Installation and removal of stop logs will be required for most gate maintenance as well as any activity requiring personnel access. Table 3 below is a summary of required stop logs for this facility.

Table 3: Isolation Equipment Summary

Type / Purpose	Unit Size	# Units
Roller Gate / Inland Culvert Isolation	16 feet long by 5 feet high	3
Roller Gate / River Culvert Isolation	16 feet long by 4.17 feet high	4
Stop Log / Gate Isolation	11 feet long by 1.5 feet high	10
	Total:	17

The City will need to designate a covered space to store the roller gates and stop logs. It is estimated that a storage space of minimum dimensions 30 feet by 30 feet will be required. It is currently envisioned that this space would be identified within an existing City facility such as the nearby City of Chelsea Public Works Yard. Equipment such as a forklift or loader and truck will be needed to load, unload, and transport the stop logs. A portable crane will be needed for installing/removing the stop logs and gates. Equipment such as a knuckle boom truck may be an option to satisfy several requirements. It is recommended that the portable crane be sized to lift approximately 1,600 pounds, which should be adequate for gate or stop log removal.

Gates, Actuators, and Motors

Gates, actuators, and motors should be inspected at least once a year, when issues are noted, and per manufacturer's recommendations. Lubrication of moving parts will be required for the gates and actuators.

Bar Racks and Rock Traps

The bar racks and associated rock traps will need occasional inspection and cleaning. Initially, the bar racks should be inspected and rock traps should be cleaned once a month, however, this time frame may need to be adjusted based on how much material is collected. Differential water levels across the rack may also be an indicator of screen blockage. The rock traps and bar racks will be accessible for cleaning from above ground. At the inland rock trap, equipment can be inserted through an opening in the top slab of the structure. A vactor truck is anticipated to be needed for the majority of the cleaning but a clam shell bucket may be needed for debris that cannot be removed with the vactor truck. A specialized rake will be used for cleaning the bar rack, also from above ground. The bar rack on the river side of the Market Street culvert will need to be cleaned in a similar manner. Access to this bar rack will be at the surface from beyond the headwall structure.

Structure

The City should expect to replace electrical and mechanical equipment at least once during the first 50 years of operation of the storm surge control facility. Concrete spall repair within the structure should also be anticipated once during the first 50 years of operation.

Maintenance of SSCF in Context of Island End River Flood Resilience Program

Annual and periodic maintenance of the SSCF is presented coordinated with the broader suite of components comprising the Island End River Flood Resilience Program in Appendix A, *Preliminary Operation and Maintenance Schedule.* Table A-1 identifies annual maintenance activities including estimated duration to fulfill and required resource allocation. Table A-2 identifies periodic, larger, capital improvements tasks required to maintain the system through lifecycle. The tables identify whether tasks are estimated to be performed by municipal staff or by contract services or construction partners.

5.0 OPERATION AND MAINTENANCE MANUAL

An operation and maintenance manual for the storm surge control facility will be kept on file, in paper and digital formats, with system operators. The manual shall be updated when applicable to reflect replacements or modifications to the components throughout the life of the unit. The manual will include the following components:

- Table of contents and Index
- Brief description of each system and components
- Manual and programmed operational procedures
- Special operating instructions
- Routine maintenance procedures
- Manufacturers printed operating and maintenance instructions, parts list, illustrations, and diagrams
- Wiring diagram
- Approved shop drawings and layout drawing
- List of spare parts, manufacturer's price, and recommended quantity,
- Name, address, and telephone number of local service representatives

6.0 ADVISORY COMMITTEE

An Advisory Committee for the storm surge control facility will be established to monitor system operation and assess the need for future adjustments. The Advisory Committee will assess and update the monitoring and operations plan periodically, review monitoring data, review environmental and operational conditions, prescribe modifications to SSCF operation as needed, and consult with the U.S. Army Corps of Engineers to ensure that any major modifications are consistent with the Army Corps permit.

The Advisory Committee may consist of the following members, subject to their approval:

- City of Chelsea Commissioner of Public Works
- City of Chelsea Director of Housing and Community Development
- City of Everett Conservation Agent
- City of Everett City Engineer
- Massachusetts Department of Environmental Protection

- United States Environmental Protection Agency (US EPA) Region 1, Office of Ecosystem Protection

No changes shall be made to the set points without review and approval by the Advisory Committee. The Advisory Committee will have 30 days to review and comment on the proposed changes. The established set points shall be achieved not later than 60 days following modification. Should the set points not be able to be reached within this period, written explanation shall be provided to the Advisory Committee.

7.0 OPERATIONS RESPONSIBILITY

The City of Chelsea Department of Public Works will be responsible for the operation, maintenance and adjustment of the storm surge control facility under the direction of the Advisory Committee. Should immediate response to conditions adversely affecting the control structure or surrounding properties become necessary, the local component of the Advisory Committee will discuss and authorize appropriate actions with notification to agency representatives to follow immediately thereafter.

APPENDIX A

PRELIMINARY OPERATION AND MAINTENANCE SCHEDULE

ISLAND END RIVER FLOOD RESILIENCE PROGRAM

APPENDIX A

City of Chelsea, City of Everett — **PRELIMINARY OPERATION AND MAINTENANCE SCHEDULE** — by Weston & Sampson

ISLAND END RIVER FLOOD RESILIENCE PROGRAM — with support from AECOM and Tetra Tech

TABLE A-1: Annual Operation and Maintenance Expense Estimate

#	Task Description	Staff (#)	*Note*	Equipment (desc.)	Event Duration (hr/event)	Annual Incidents (events)	Frequency (desc.)
1	Regular Inspection	2	(1)	Tool Truck	8	12	monthly
2	Gate, Actuator, Motor Maintenance	2	(2)	Tool Truck	16	2	semiannual
3	Generator and Electrical Maintenance	2	(2)	Tool Truck	4	2	semiannual
4	Comprehensive Inspection Control Structure	4	(3)	Tool Truck, Crane	24	1	annual
5	Bar Rack Cleaning	2	(1)	Tool Truck, Rake	6	12	monthly
6	Rock Trap Cleaning	3	(3)	Tool Truck, Clamshell Bucket	4	12	monthly
7	Landscaping	4	(2)	Tool Truck	16	12	monthly
8	Irrigation and lighting system maintenance	2	(2)	Tool Truck	16	2	semiannual
9	Utility service (power, water, telecommunications)						
10	Trash Removal (receptacles, tide borne trash)	2	(1)	Tool Truck	4	52	weekly(4)
11	Engineering Support of O&M	2	(1)		20	12	monthly
12	Administrative Support of O&M	2	(1)		4	12	monthly
13	Maintenance of Security Provisions	1	(1)	Cameras	2	12	monthly

TABLE A-2: Periodic Operation & Maintenance Expense Estimate

#	Task Description	Year	Current Cost Estimate: Construction(5)	Current Cost Estimate: Engineering & Administr.(6)	Current Cost Estimate: Total	Future Value(7)
1	Refurbishment of SSCF Gates, Screens, & Mechanical	15	$500,000	$150,000	$650,000	$1,012,679
2	Refurbishment or Replacement of Above-Grade Flood Gates	20	$900,000	$270,000	$1,170,000	$2,113,150
3	Refurbishment or Replacement of SSCF Gates, Screens, & Mechanical	25	$3,600,000	$1,080,000	$4,680,000	$9,798,881
4	Refurbishment or Replacement of Above-Grade Flood Gates	40	$900,000	$270,000	$1,170,000	$3,816,584
5	Refurbishment of Gates, Screens, & Mechanical	40	$500,000	$150,000	$650,000	$2,120,325
6	Coating and Surface Maintenance	10	$1,000,000	$300,000	$1,300,000	$1,747,091
7	Coating and Surface Maintenance	20	$1,000,000	$300,000	$1,300,000	$2,347,945
8	Coating and Surface Maintenance	30	$2,000,000	$600,000	$2,600,000	$6,310,882
9	Coating and Surface Maintenance	40	$1,000,000	$300,000	$1,300,000	$4,240,649
10	Upgrade Electrical and Control Systems	10	$100,000	$30,000	$130,000	$174,709
11	Upgrade Electrical and Control Systems	20	$200,000	$60,000	$260,000	$469,589
12	Upgrade Electrical and Control Systems	30	$100,000	$30,000	$130,000	$315,544
13	Upgrade Electrical and Control Systems	40	$200,000	$60,000	$260,000	$848,130
14	Refurbishment or Replacement of Deck, Walkways, Rails, Bollards, Fences	20	$1,500,000	$450,000	$1,950,000	$3,521,917
15	Refurbishment or Replacement of Deck, Walkways, Rails, Bollards, Fences	40	$1,500,000	$450,000	$1,950,000	$6,360,974
16	Lighting System Replacement	25	$500,000	$150,000	$650,000	$1,360,956
17	Irrigation System Replacement	25	$50,000	$15,000	$65,000	$136,096
		Subtotal:	$15,550,000	$4,665,000	$20,215,000	$46,696,100

Notes:

1) Assumes performed by municipal staff
2) Assumes contract maintenance services
3) Assumes wage rate construction contract
4) Tasks performed regularly at frequency noted, additionally as needed following storm events, and adjusted seasonally where relevant
5) Estimate assumes work performed by construction contractor secured via competitive bid
6) Assumed 30% of construction cost for engineering assessment, design, bid, construction administration, and inspection
7) Future value assumes average 3% inflation from basis cost through lifecycle
8) Annual O&M costs basis is November 2021
9) Note does not include maintenance of wetlands improvements and nature based approaches at shoreline.