

# Swimming in the Charles

**A Feasibility Study for the Establishment  
of a Permanent Swimming Facility in the  
Charles River Basin**



**Stantec**





*Prepared by:*

**Stantec Skills-Based Volunteer Team**

Rich Allen  
 Kevin Beuttell  
 Brent Courchene  
 Audrey Cropp  
 Jennifer Ducey  
 Adam Fearing  
 Erin Garnaas-Holmes  
 Joe Geller  
 Alisa Hajdinaj  
 Jordan Loffredo  
 Thu Ngan Han  
 Alexandra Phillips  
 Ali Ross  
 Joseph Salvetti  
 Jeffrey Simon  
 Alison Smith  
 Bill Ward

*Prepared for:*

**The Charles River Conservancy**

Theresa Doherty  
 Catherine Donaher  
 Jennifer Gilbert  
 Pam Kocher  
 S.J. Port  
 Renata von Tscharner

## Acknowledgments

This report is the result of many hours of time invested by both Stantec volunteers and members of the Charles River Conservancy. The Stantec team is grateful to both the Charles River Conservancy for giving us the opportunity to work together on this project and to Stantec for the company's willingness to explore new ways of investing in our communities.

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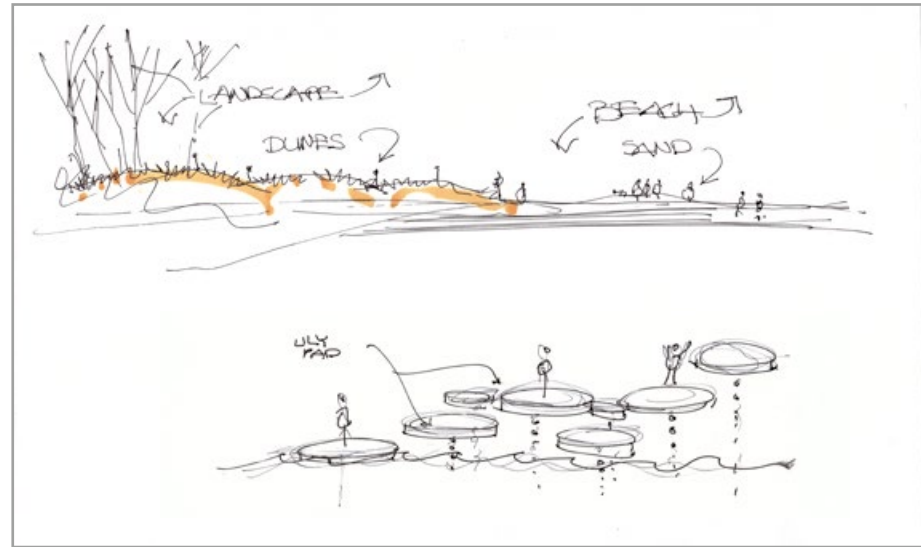
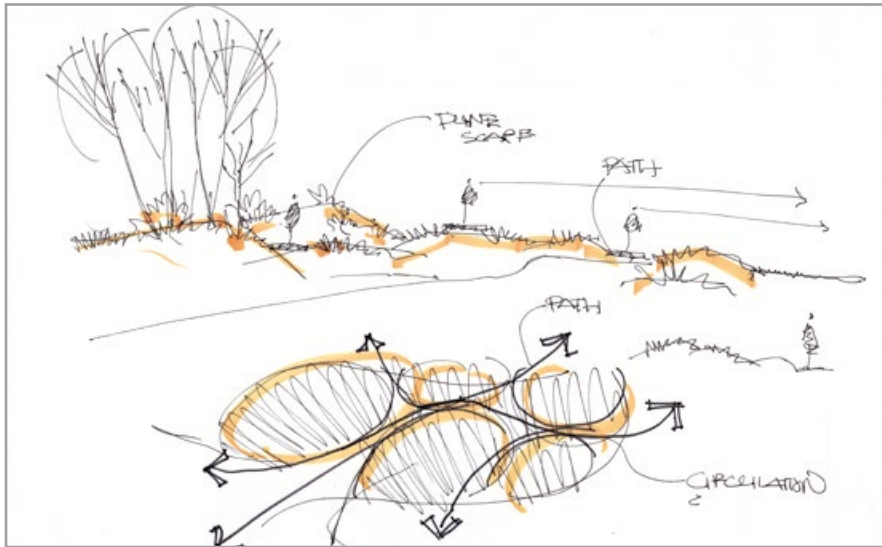


EXECUTIVE SUMMARY

# SWIMMING

IN THE  
CHARLES  
RIVER





The following study explores the initial feasibility of constructing a permanent swimming area along the Charles River in Boston and Cambridge, Massachusetts. This study was completed by a team of volunteer professionals from Stantec, at the request of the Charles River Conservancy (CRC).

This study is an initial step in a new program of community service for Stantec professionals. In addition to traditional methods of volunteering time to help our communities, Stantec's Boston office is piloting a program through which Stantec employees volunteer both their time and their professional skills to assist non-profit organizations on community-based projects.

The Charles River Conservancy has been advocating for more active, attractive and accessible parklands along the Charles River for years, and this advocacy has included the topic of swimming in the Charles. The Conservancy recently identified an area to potentially locate this facility—the "New Charles River Basin," and reached out to the skill-based volunteer program at Stantec for help in assessing the feasibility of building a swimming area in this part of the river.



Stantec's volunteer team approached this feasibility study under several assumptions, based on information and guidance provided by the Charles River Conservancy.

1. The primary assumption is that the water quality in this part of the Charles River has already been confidently established as safe for human use for swimming during most of the year. Data and reports published by the Conservancy, the Environmental Protection Agency (EPA), the Massachusetts Water Resource Authority (MWRA), the Massachusetts Department of Public Health (DPH), and the Charles River Watershed Association all support this assumption.

2. A second assumption is that the Conservancy is responsible for all practical efforts and due diligence related to implementing such a project as a swimming facility, including forming agreements with landowners, applying for permits, raising capital, establishing a maintenance and operation plan, etc. Stantec's analysis did not address these issues.

The focus area of this study is the New Charles River Basin, the stretch of the river between the Museum of Science and the Zakim Bridge. For many years, the area was underdeveloped and used for industrial purposes, but mitigation for the Central Artery project led to new commercial, residential, and open space development in





the area, including North Point Park, North Bank Bridge Park and the Lynch Family Skatepark (designed by Stantec and developed by the Charles River Conservancy). The area is quickly becoming an “18-hour” destination, attracting daytime office and evening residential users. Because of its flexible lawn spaces, direct access to the river, nearby connections to the MBTA, proximity to several Hubway bike rental stations, and proximity to other amenities and new development, North Point Park could be an ideal location for a permanent swimming area on the Charles.

Many cities across the world have renewed their urban waterfronts. Often sites of historical industrial use and neglect, riverfronts are emerging as powerful social, cultural, and economic amenities for urban areas. American cities like Chicago, Minneapolis, Chattanooga, Washington, and Nashville are investing significant resources to create twenty-first century parks and amenities along their riverfronts. European cities like Copenhagen, Berlin, Hamburg, London, Stockholm, and Geneva have not only revitalized their riverfronts, but have also built facilities to allow swimming in their rivers. The Stantec volunteer team looked to these precedents to find inspiration for this study.



The Islands Brygge Harbour Bath in Copenhagen, Denmark, is a prime example of the kind of successful urban swimming facility that could be accomplished on the Charles River. The structure is an extension of the surrounding city and adjacent park, and the open spaces surrounding the swim area allow for users to socialize and lounge. Designed by architects BIG + JDS, the project features different swimming spaces at different depths and a unique diving structure, serving as an icon and attraction. The water quality is checked regularly to provide swimmers with a safe swim environment, and the structure is built on floating pontoons that allow for easy deconstruction if needed.



There are some challenges to designing and operating a safe swimming facility in the river, most prominently keeping people away from sediment at the bottom of the river. While the water itself is safe for swimming, the sediment at the bottom of the river may contain hazards. The design of a swimming facility must be safe, accessible, adaptable, and inviting; it should be a destination that encourages people to swim in the river. There are also requirements for legal permitting of the construction of a facility or use of floating equipment in the river.

The Stantec volunteer team believes that locating a swimming facility at the existing dock in North Point Park could potentially be feasible, given several assumptions, and recommends next steps for the Charles River Conservancy to pursue in order to fully explore the possibility of using the North Point Park dock area as a site.

Given that this study was based on assumptions including water quality, water depth, ownership, operation, implementation, and organizational capacity, it is recommended that the Conservancy:

- » Engage in ongoing conversations with the Massachusetts Department of Conservation and Recreation (DCR), the landowner and manager of the site, to discuss many topics including:
  - Ownership, operation, financing, safety, and liability related to a swimming facility
  - Currently scheduled maintenance of North Point Park and operation schedule of pumps in the area
- » Conduct a bathymetric survey to verify the depth of the river in this area and whether any obstructions/debris are present

# INTRODUCTION





## The Charles River Conservancy has been advocating for more active, attractive and accessible parklands along the Charles River for years, and this advocacy has included the topic of swimming in the Charles.

As part of their “Swimmable Charles Initiative,” started in 2004, the Conservancy has hosted annual “CitySplash” events since 2013, during which participants jump and swim in the Charles River. To date, over 1,000 swimmers have jumped in with CitySplash, with many on a waiting list. The Conservancy is interested in pursuing the possibility of establishing a permanent swimming area to allow this kind of activity during days of the warm seasons that meet swimming water quality standards. The Conservancy identified an area to potentially locate this facility—the “New Charles River Basin,” and established a list of priorities for what activities a potential site would be able to accommodate.

In order to evaluate the feasibility of such a site, Stantec compiled a team of volunteers, drawing on expertise from fields of landscape architecture, civil engineering, environmental science, urban planning, environmental permitting, real estate, and more. Research for this feasibility study included collection of previous studies and data, interviews, and on-site observation.

This research and analysis has shown that, given further study and due diligence, a permanent swimming area may indeed be technically feasible in the study area. Challenges to its

implementation exist, however; these include use and operation agreements with land owners, safety and design challenges, permitting requirements and cost.

Nevertheless, an urban riverfront swimming area would provide great social, cultural, and potentially economic value to Boston and Cambridge, and these challenges could be overcome. Many cities around the country—and the world—are realizing how great an asset their urban waterfront can be and are investing in the protection, revitalization, and redesign of their waterways. Many are focusing on developing opportunities for swimming in these urban rivers. Due to years of work and millions of dollars spent on remediation, the Charles River is now widely considered the cleanest urban river in America. Boston and Cambridge are poised to set an example for other cities and lead the country with the innovative design and careful operation of a swimming facility that is safe, accessible, and beautiful, and that challenges perceptions that the river is filled with dirty water.

## STUDY CONTEXT AREA





## ASSUMPTIONS

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# SAFE TO SWIM

Stantec's volunteer team approached this feasibility study under several assumptions, based on information and guidance provided by the Charles River Conservancy. This study focused specifically on the base feasibility of establishing a swimming area from a general technical, environmental, and legal standpoint. The study assumes that any other requirements to actually fund, design, permit, construct, and operate a permanent swimming facility would be the responsibility of several other parties including the Charles River Conservancy. This is an initial review and analysis of publicly available information, but further analysis and due diligence would be necessary to pursue a specific, individual site for construction.

The primary assumption of this study is that the water quality of the Charles River has already been established as safe for human use while swimming during most of the year in this area. Despite common perception, the Charles River is one of the cleanest urban waterways in the United States. The following text is taken from the Conservancy's website:

"The potential for public swimming in the Charles River exists today as a result of a number of federal and state initiatives, including 1972 amendments to the Clean Water Act, the Massachusetts Water Resource Authority's Boston Harbor Project launched in 1986, and the U.S. Environmental Protection Agency's 1995 Charles River Initiative.





Through these efforts and partnerships with local agencies, nonprofit organizations, private institutions and local residents, tremendous progress has been made toward making the Charles swimmable and fishable; the water quality of the Charles has improved from a grade of 'D' in 1995 to an 'A-' in 2013, and as water quality continues to improve, the lower Charles River is now considered swimmable many days of the year. Because of these significant water quality improvements, the Charles River Swimming Club, with the support of the Charles River Conservancy, began holding an annual one-mile swim race in the Charles in 2007. In 2011, the Charles River won the Thiess International Riverprize, naming it the cleanest urban river in the United States.

Previous studies of the feasibility for swimming in the Charles River, in general, include "A Swimmable Charles: Water quality and public access with examples from Swiss rivers" by the Charles River Conservancy and the Environmental Protection Agency's (EPA's) "Water Quality Report on the Lower Charles River 2007- 2008." The EPA maintains a mooring located upriver of the study area at the Museum of Science which continuously monitors water quality metrics (including temperature, specific conductivity, pH, dissolved oxygen, turbidity, Chlorophyll, as well as Phycocyanin, which is an indicator for the surveillance of bacteria). Additional water quality data is collected by the Massachusetts Water Resource Authority (MWRA) upon request, the Department of Public Health (DPH) in the event of a blue-green algae bloom, and by the Charles River Watershed Association for regular water quality monitoring.

An economic benefit-cost study of restoring regular recreational swimming to the Charles River, conducted in 2011 by Mike Nelson, showed economic benefit to the Greater Boston region if swimming were added as a recreational amenity to the Charles. This study assumes a high probability of a third-party operator seeing the value of restoring swimming in the Charles and taking over operations of a swimming location but does not take into account the upfront capital cost to construct a swimming facility.

It is assumed that the water of the Charles River is of a quality safe enough for human swimming during many days of the year, but a swimming facility may need to be closed during events like E. coli outbreaks or after storms much like many existing Boston-area swimming beaches. The study area is bounded by a downstream impediment to hydraulic connectivity with the Boston Harbor. The Charles River Lock system (also known as the Gridley Dam or the new Charles River Dam), while opened periodically, does limit saltwater intrusion upriver.



## EXISTING SITE INVENTORY AND ANALYSIS

# The Charles River Basin

The study area for this effort encompasses the “lost half mile” of the Charles River Basin. This part of the Charles River occurs between the Museum of Science and the Zakim Bridge. The volunteer team investigated several potential sites (Sites A through E) for a swimming facility within the study area, primarily within North Point Park, the park lining the northern edge of the Charles River in this area, but also within Nashua Street Park on the southern side of the river.

### Site History

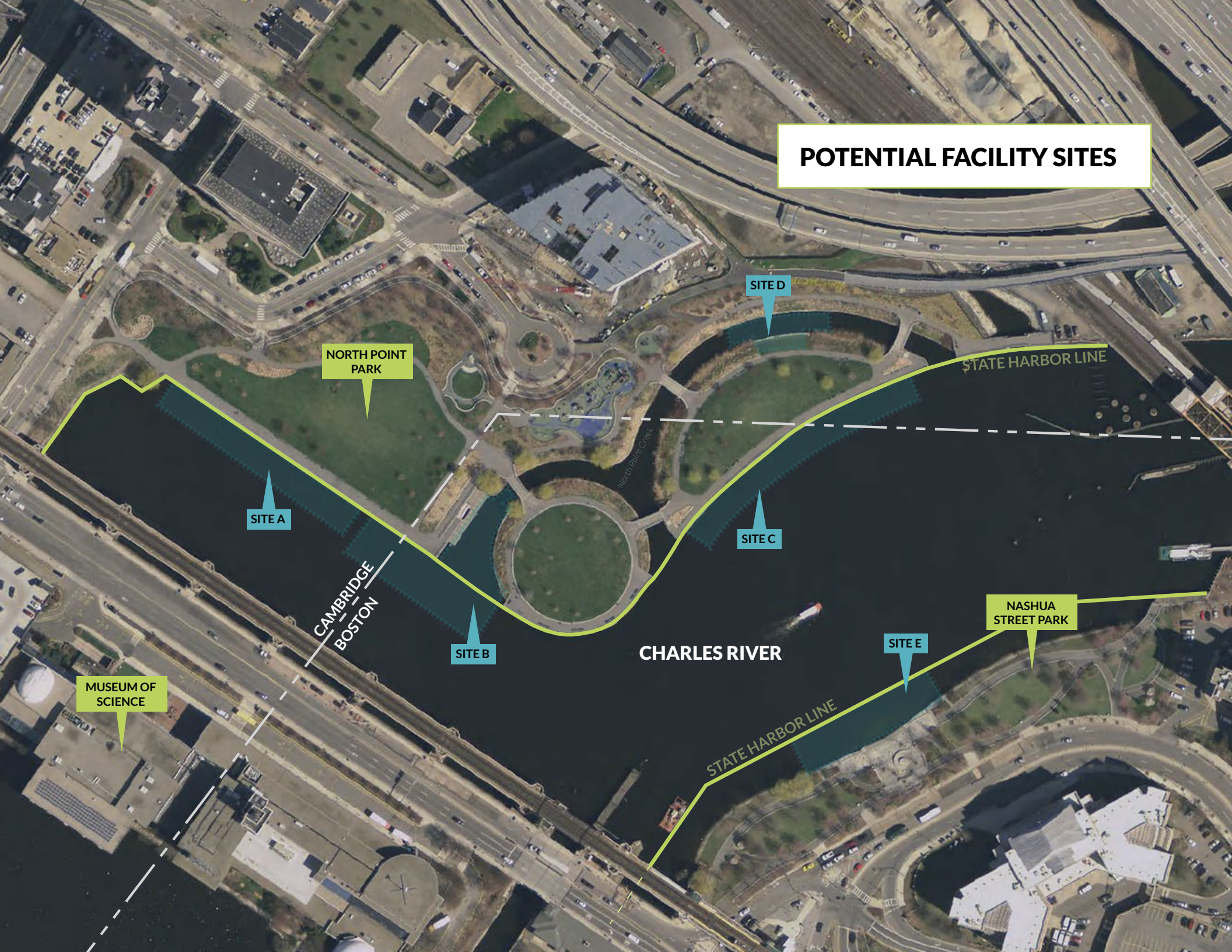
#### **The North Point Park Area**

For many years, the area now known as North Point was underdeveloped and cut off from nearby activity. This area was primarily industrial and did not draw pedestrian traffic. Despite its proximity to the Museum of Science and the TD Garden, it was considered an inaccessible and undesirable section of East Cambridge. However, the mitigation for the Central Artery project led to the concentration of financial resources and planning efforts

in the area. New commercial and residential development has turned the “lost half mile” of the Charles River into a destination. Education First completed their first building in the North Point area in the late 1990s, and added their new headquarters building (“EF II”) in 2014, which boasts exciting architecture and is home to close to 400 employees. New residential development has also sprouted up in the area, including the Avalon Northpoint and Twenty20 Northpoint, both high-rise luxury rental buildings.



## POTENTIAL FACILITY SITES





Next to the site, the Lynch Family Skatepark designed by Stantec and developed by the Charles River Conservancy, opened in late 2015. With such varied development occurring, this area is quickly becoming an “18-hour” destination, attracting daytime office and evening residential users. There is continued room for growth in the North Point neighborhood north of North Point Park, as unused or underutilized land remains as a part of the North Point Master Plan.

North Point Park was completed in 2007, after a controversial and delayed construction process. Originally containing contaminated soils, the creation of the park (and construction of the nearby Education First building) required remediation that cost more than initially anticipated. Fraught with challenges at its onset, the park is now a destination for active and passive recreation. The park features designs by several firms including Carr, Lynch and Sandell; Oehme; van Sweden & Associates; and Michael van Valkenburg Associates and features open lawns, a spray deck, two playgrounds







for children of varying ages, kayak canals, and ornamental plantings. There are two restaurants/bars and one convenience store within walking distance. North Point Park is now also connected to Paul Revere Park and Charlestown by the North Bank Bridge, which opened in 2012 and was paid for with federal stimulus funds.

Because of its flexible lawn spaces, direct access to the river, nearby connections to the MBTA (allowing visitors to travel from the Greater Boston area), proximity to several Hubway bike rental stations, and proximity to other amenities and new development, North Point Park could be an ideal host to a permanent swimming area on the Charles.





**SITE A**



**SITE B**



**SITE C**



**SITE D**



**SITE E**



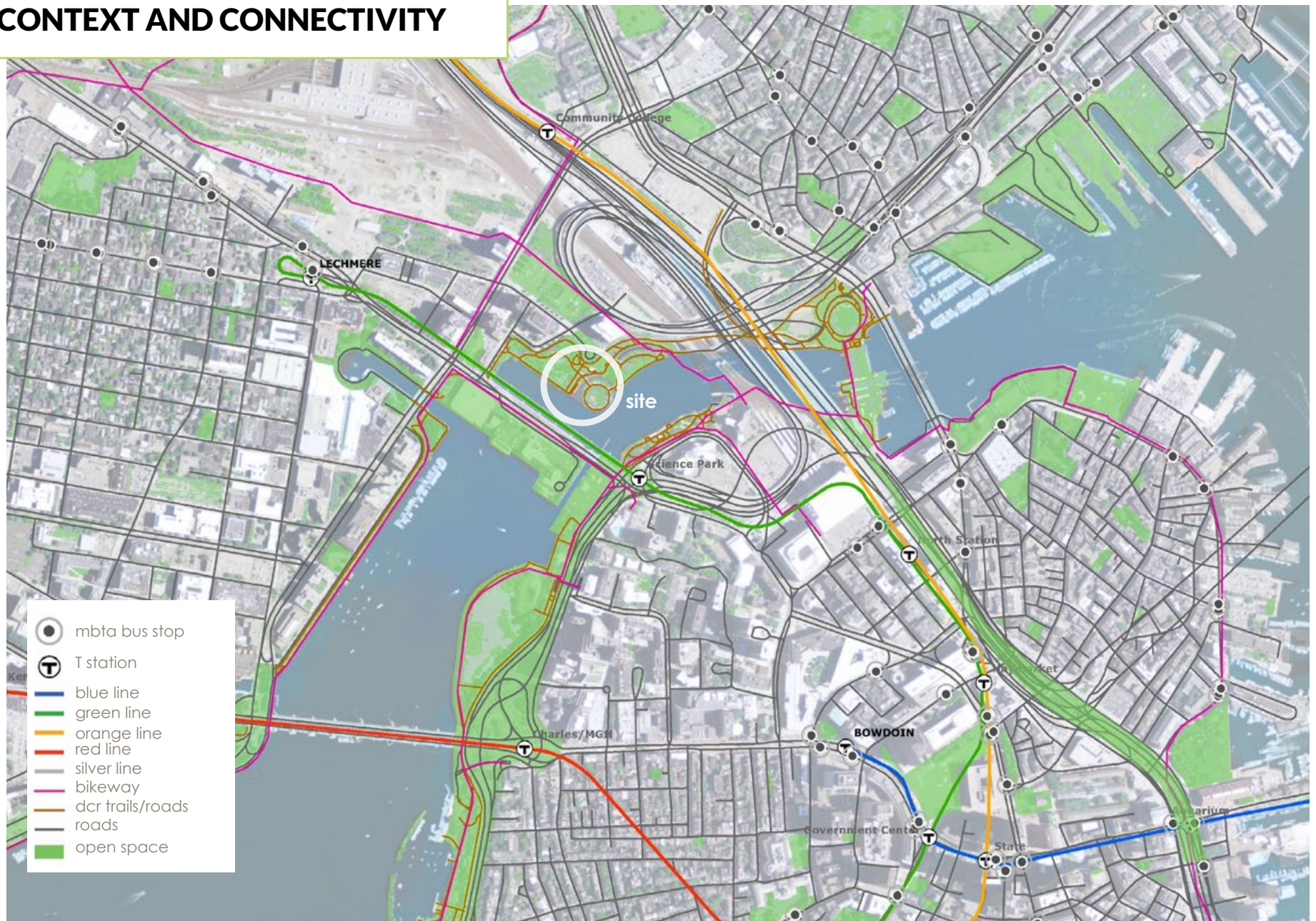
### **Nashua Street Park**

On the other side of the river in the study area, Nashua Street Park is another potential option for a permanent swimming area. This park was also a result of the Central Artery project mitigation, and provides direct access to the river shoreline. Two pathways parallel the river's edge, plus granite steps lead directly into the water. Featuring many steps, walls and undulating topography, this site has been a popular destination for skateboarders (although the Lynch Family Skatepark across the river may now attract those users elsewhere).

Development near this park was slow to occur after the area known as the West End was wiped clear by urban renewal. Today, development projects are occurring throughout the area, including several high-density, mixed-use developments, which are most likely only the tip of the iceberg for this renewed investment in this neighborhood. The area is undergoing a transformation, and it is beginning to bustle with activity. The site is a short walk from Mass General Hospital, as well as the historic North End. The existing Nashua Street Park is dubbed as “tranquil” but has potential to be a location that attracts many more visitors. It is not car accessible,

with no available parking nearby, but it is a very short walk from the MBTA Green Line's Science Park station. Nashua Street Park provides less open, flexible lawn space than North Point Park, and is bordered by a busy road, but otherwise could be an appropriate host for a permanent swimming area.

## CONTEXT AND CONNECTIVITY







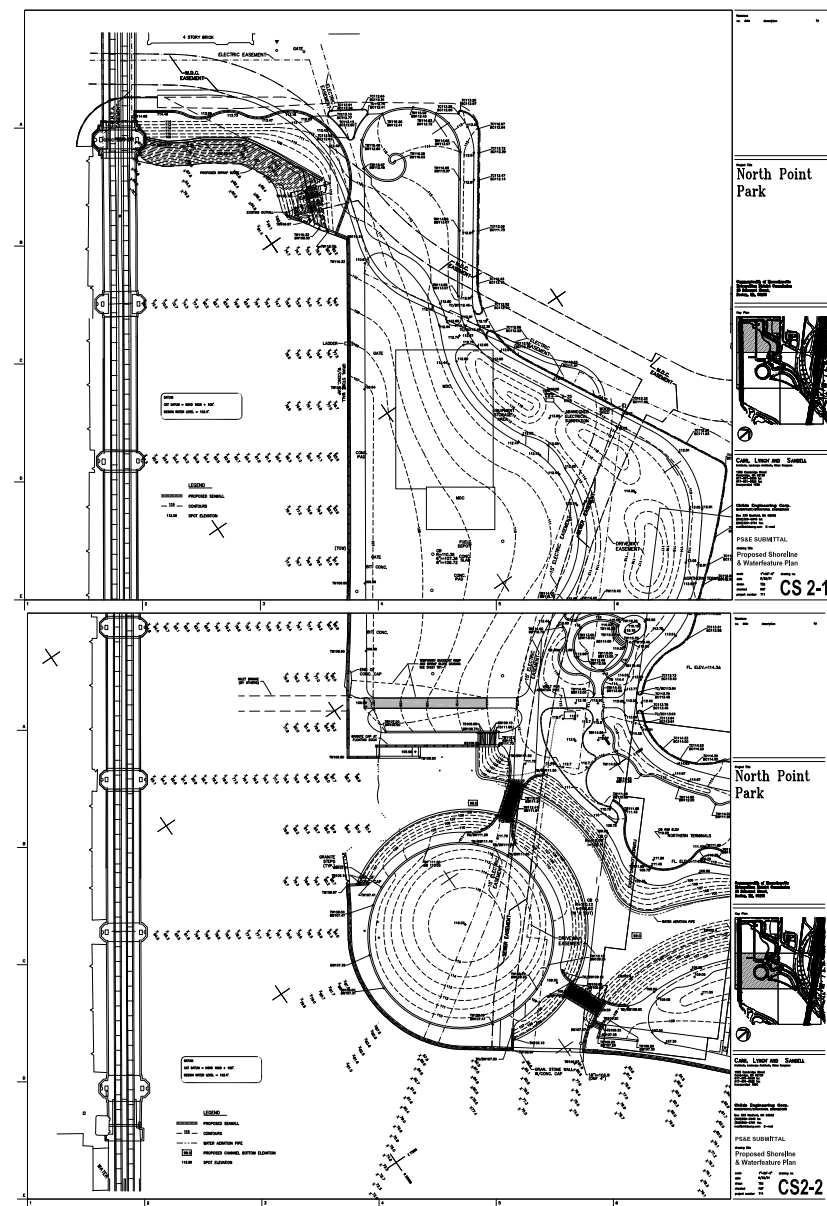
## CONNECTIONS

The study area lies at the crossroads of an extensive multi-modal transportation system. It is highly accessible on foot, by transit, and by bicycle. North Point Park is connected to regional park systems and pathways, including the Boston Harbor Walk and the parklands upriver. Nashua Street Park is easily accessible by transit, and it will soon be connected to the Boston Harbor Walk once the nearby South Bank Bridge project is completed. Hubway bikeshare docks are within short walking distance from the water's edge on both sides of the river in the study area.

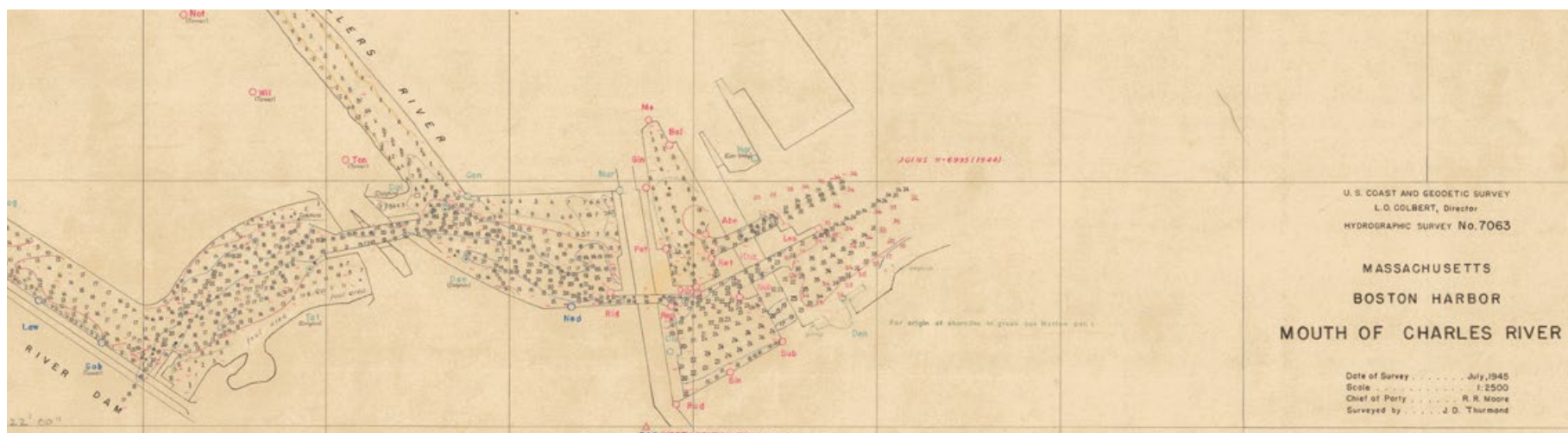


## Topography

When North Point Park was redeveloped and opened to the public in December of 2007, the land mass of the park was reformed and excavated to create islands and a canal, also known as North Point Creek, that functions as a kayak/canoe passageway. Childs Engineering Corporation's "Modification to Seawall, Construction of Water Feature and Shore Protection" plans show a combination of retaining walls, sea walls, and sloped mounds that separate land and water in the park. Adjacent to the kayak/canoe passageway, the land gradually slopes to flat areas, whereas along the river's boat traffic zone, sea walls delineate land and river.







## Bathymetry

Bathymetry (the “topography” underwater) within the vicinity of North Point Park is generally shallow and uniform near the constructed bulkheads and walls, but gradually increases in depth toward the middle of the Charles River. While the National Oceanographic and Atmospheric Administration (NOAA) maintains updated bathymetry for the majority of the Charles River, its available data does not include the study area portion of the Charles River. Bathymetric information for the North Point Park area presented in this feasibility study is based on the low resolution transect surveys completed by Childs Engineering. These transect surveys provide a general understanding of the bathymetry in the area; however, the conditions have likely

changed since the surveys were conducted. The plans reflect the 1999 pre-construction condition of the channel bottom, and it is likely there were construction impacts in the project area. Further, over the ensuing 17 years of use, it is safe to assume some mud and sediment has shifted, changing the bathymetry. Bathymetric data from Massachusetts Geographical Information System (MassGIS) is not available within the vicinity of North Point Park.

Bathymetry information in the main channel of the Charles, including in the area of Nashua Street Park, was not readily available for this study. Obtaining additional and current information on the bathymetry of the study area should be a priority as a next step.

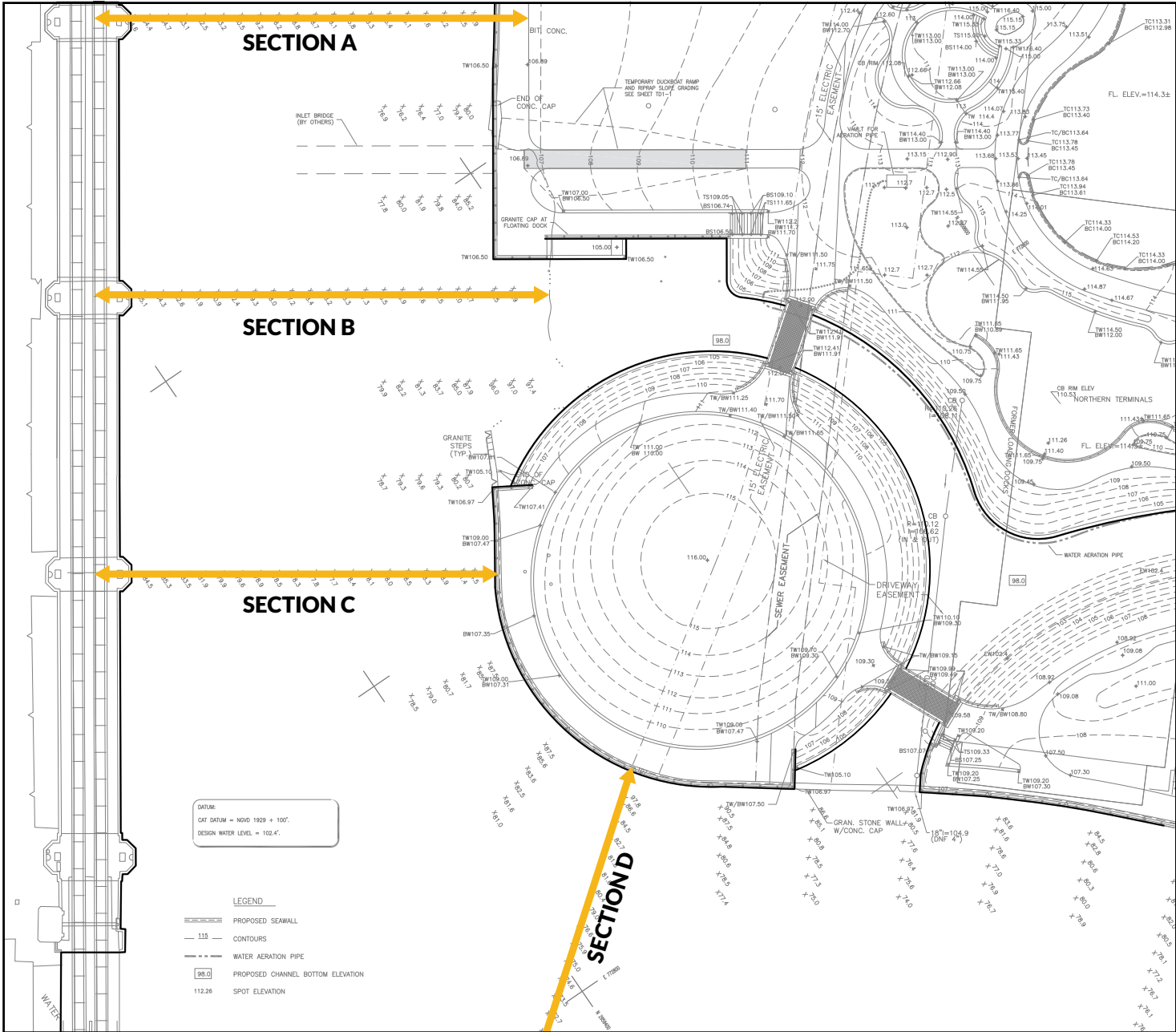


**DESIGNED WATER LEVEL**

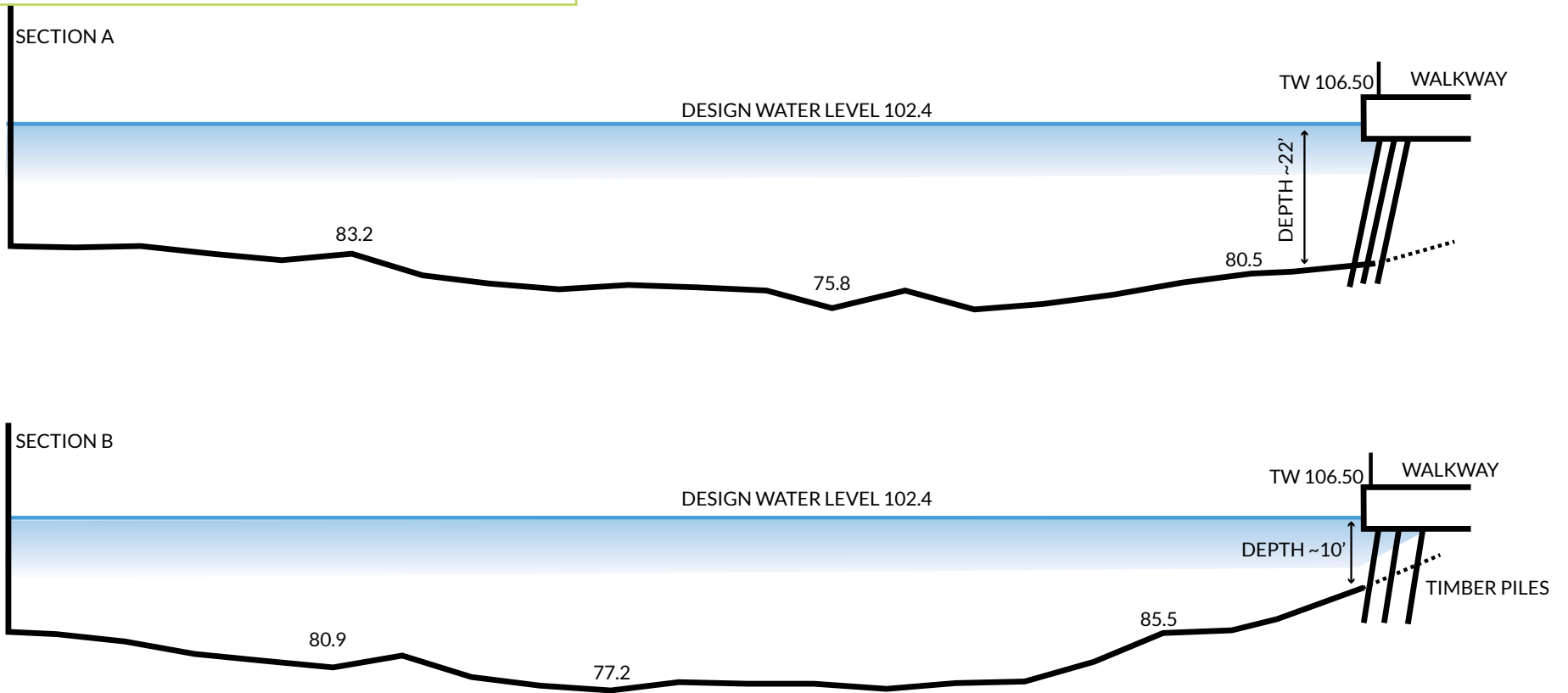
**DEPTH ~10'**

**TIMBER PILES**



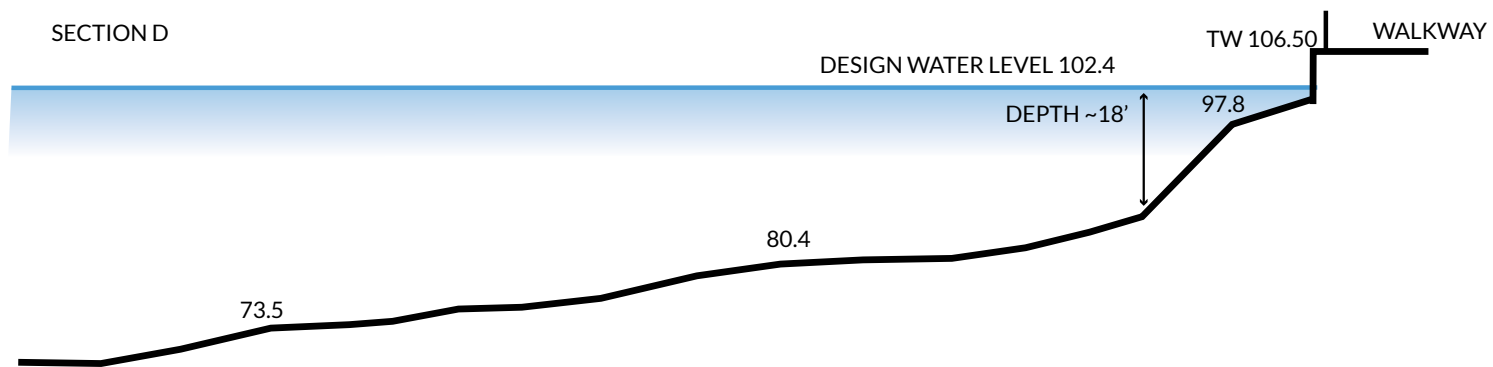
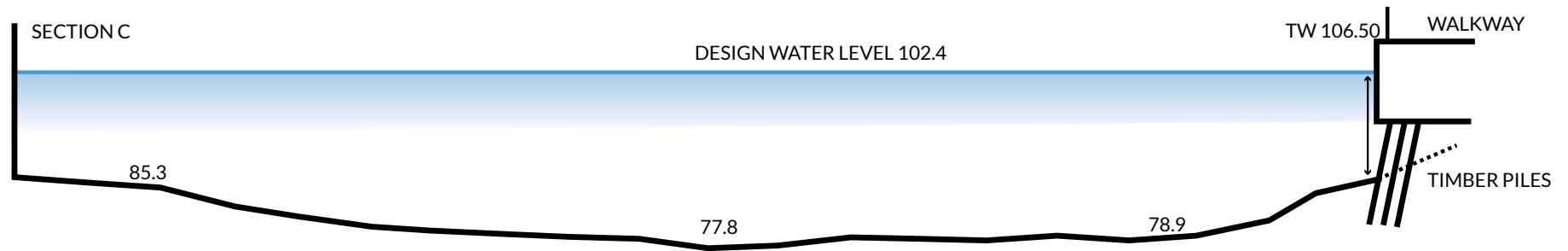


## BATHYMETRY INTERPRETATION



CAT DATUM = NGVD 1929 + 100'





## Existing Utilities

The standard electrical utilities in the study area would not preclude any new construction near the water's edge. "As-built" drawings of an existing sewer line in the area show that an 84-inch pipe runs beneath the Charles River at least 4-feet below the river's bottom. This pipe is part of the Massachusetts Water Resources Authority network and does not present any constraints to developing a permanent swimming area in the river since it runs below the riverbottom.





## Plans for an “Inlet” Pedestrian Bridge

The addition of a pedestrian bridge linking the Craigie Bridge (across from the main entrance to the Museum of Science) and North Point Park has been discussed by advocates and community groups for many years. While no plans are in place to construct this bridge to date, it should be considered as a possible future amenity in the area.



## Geotechnical Conditions

### Shoreline/Terrestrial

Before the development of North Point Park, stone retaining walls atop timber piles supported the land. During development, some of the retaining walls and timber piles were maintained along the river edge. Locations where land was excavated for the passageway, steel piles and concrete pile caps were used to support stone sea wall. Within the kayak/canoe passageway, however, stockpiled stones were reused with concrete pile and bedding stone to create slopes and planting beds. Riprap stone was used for duck boats' entry/exit from the Charles River.

Any structural attachments to the sea walls will need further investigation to avoid jeopardizing wall integrity. The existing dock in North Point Park is secured using 10-inch diameter steel pipe piles, but the depth of the steel pipes into the river bed is still unclear.

### Submerged

Geotechnical information about submerged habitats in the study area is limited. While a dive study was recently completed by the CRC, results were limited to visual observations and only conducted within the proposed site B and portions of site A locations. These observations indicated anthropogenic debris ranging in size and aggregation, with substrates composed of fine grain silts and sands intermingled with organic constituents. To the knowledge of the Stantec volunteer team, there are no recent visual habitat observations from sites C through E and no recent subsurface geotechnical information for submerged portions of any of the sites under consideration.





## Water Pumps

Gates and underwater pumps, located at the Gridley Dam, control the level of water in the river basin of the study area. These gates and pumps are used to keep the level of the basin constant and to lower the water level in anticipation of a water influx due to a storm. These pumps may have implications for scheduling public swimming events, and it is recommended that the operation of a swimming facility be closely coordinated with the operation of the underwater pumps. Determining the frequency and schedule for pump operation, as well as the area affected, should be a priority next step.

## Historic and Archaeological Resources

The Charles River Basin Historic District is listed on the National Park Service's National Register (NR) of Historic Places. The NR-listed district extends along both banks of the Charles River from the Eliot Bridge to the original Charles River Dam at the Museum of Science. The New Charles River Basin, the study area, is located outside of the NR-listed historic district.

DCR's Office of Cultural Resources confirmed that there are no inventoried historic properties within North Point Park or Nashua Street Park. The DCR does consider the seawall remnants along the north side of the Charles River to be a historic resource. The seawall was constructed between 1928 and 1931 by the Boston & Maine Railroad. It was altered by the construction of North Point Park, including the removal of the top two layers of granite stones.

The DCR indicated that multiple archaeological surveys have been conducted in, adjacent to, and around the study area since the 1970s. There is one documented archaeological site fairly close to North Point Park, Shell Midden. However, no in-water archaeological remote sensing surveys have been conducted in the study area to the knowledge of the DCR or the Massachusetts Board of Underwater Archaeological Resources (BUAR). All submerged cultural resources in Commonwealth waters (and

tidelands) are subject to BUAR jurisdiction. Generally, BUAR considers the areas around Boston Harbor and tributary waters to be archaeologically sensitive unless shown to be extensively disturbed. Any documentation on the extent of past disturbance, particularly dredging, may provide sufficient information to determine the extent of disturbance or preservation.

As part of the project development process, it is recommended that the existing archaeological reports<sup>1</sup> on file at the Massachusetts Historical Commission be reviewed to gain a more detailed understanding of the site-specific land-use histories. In addition, further coordination with DCR, BUAR, Massachusetts Historical Commission, and the Tribal Historic Preservation Officers is needed to verify the absence/presence of any other known historical or archaeological resources in the study area.

<sup>1</sup>Refer to reports: # 25-216 (1978), #25-2833 (2007), #25-3009 (2008), #25-3003 (1996) and #25-2974 (2008).



## Wetland Resource Areas

The water of the Charles River is controlled by the Gridley Dam so the river is not tidally influenced. As such, the Massachusetts Coastal Zone boundary also ends at the downstream face of the dam. Therefore, the study area only contains inland wetland resource areas.

### Wetlands and Waterways

The study area includes the Charles River and North Point Creek channels. More than 3,000 square feet of bordering vegetated wetlands along the eastern edge of North Point Creek were created as part of the mitigation for the North Point Park improvements. Further improvements to the North Point Park area should not compromise these wetlands.

### Riverfront Area and Buffer Zone

The Charles River and North Point Creek have a 25-foot riverfront area and 100-foot buffer zone to bank. These areas set standards for and/or limitations on development. In addition, there is a 100-foot buffer zone to the bordering vegetated wetlands along North Point Creek. All of the sites considered are within these zones.

## Bordering Land Subject to Flooding

The water elevation in the Charles River is controlled by the Gridley Dam located at the lower reach of the New Charles River Basin. Pumps are used to regulate water heights in the Charles River channel under flood conditions. The 100-year floodplain is at elevation 4 (North American Vertical Datum (NAVD) 88) in the study area based on a review of the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps for Boston (Map No. 25025C0077G, effective 09/25/2009) and Cambridge (Map No. 25017C0577E, effective 06/04/2010). Based on our review, the floodplain appears to be entirely contained within the existing seawalls; no new upland facility would be within the floodplain.



## Filled Tidlands

Although not subject to tidal influence, areas landward of the Charles River seawalls in the study area are still considered filled tidlands and subject to licensing and permitting by Massachusetts Department of Environmental Protection (MassDEP). MassDEP issued Chapter 91 licenses dated July 25, 2000 for the improvements to North Point Park (License No. 7760) and Nashua Street Park (License No. 7764).

## Fisheries

According to a Massachusetts Division of Marine Fisheries (MADMF) Technical Report (TR-47), alewife and blueback herring (collectively referred to as river herring), American shad, rainbow smelt, American eel, white perch, and Atlantic tomcod use both freshwater and estuarine Charles River habitats at some point throughout their life history. Temporal and spatial trends for the presence of these organisms in the Charles River vary according to species and are typically dictated by annual migratory and spawning behavior. Additional details regarding the construction sequence, methodology, and timing associated with the project are needed to determine whether potential time of year in-water work restrictions and/or mitigation measures to minimize fisheries interactions would be required by MADMF.



## State and Federal Harbor Lines

The Charles River is a federally-designated, navigable waterway from its confluence with the Boston Harbor upriver to the Watertown Dam. Accordingly, the state and federal harbor lines:

- » follow the existing stone seawall/shoreline in the New Charles River Basin;
- » generally follow the existing stone seawall/shoreline at North Point Park (sites A, B, C, D); and
- » deviate from the current shoreline at Nashua Street Park (site E).

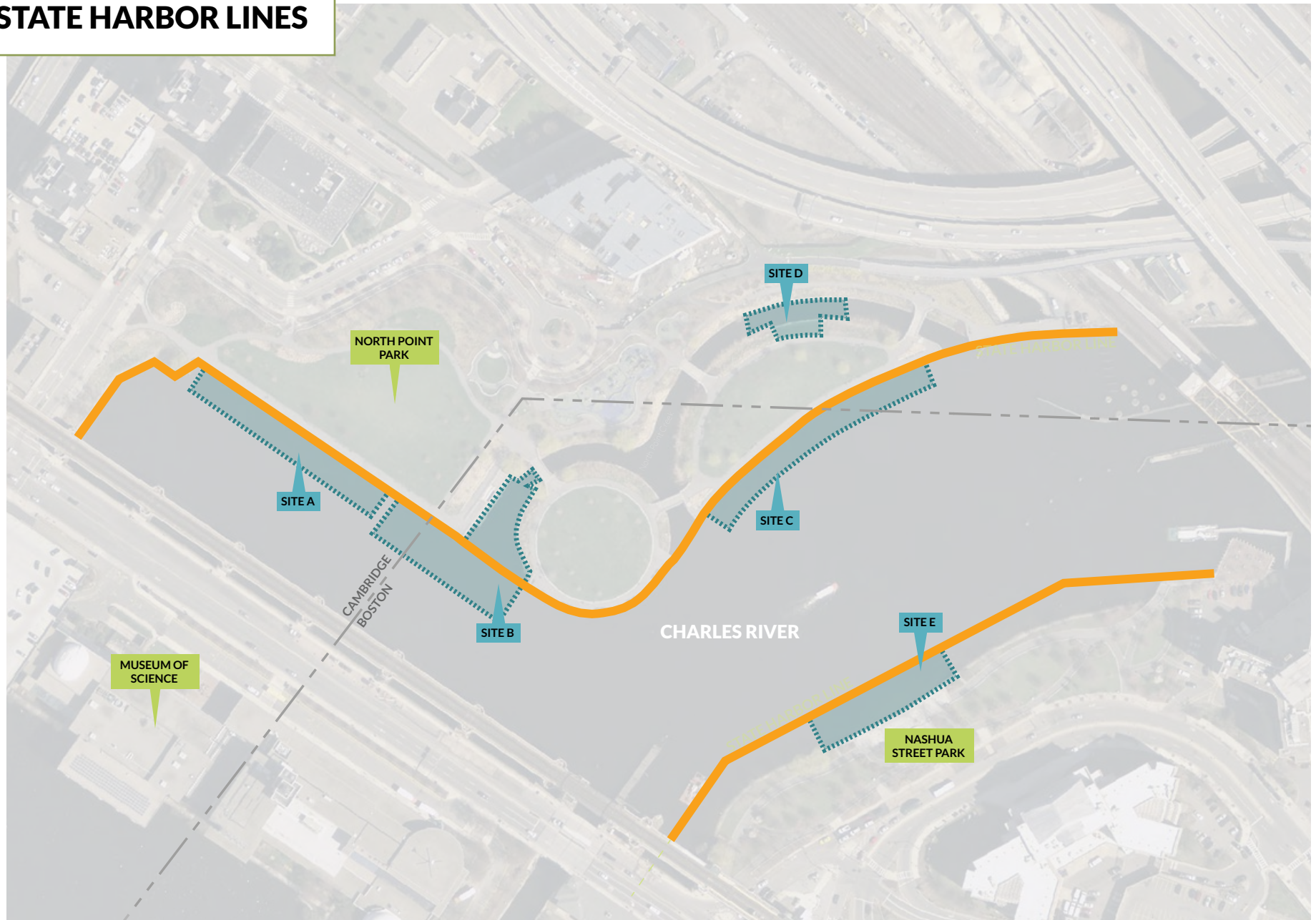
The improvements previously made at each of these parks did not extend riverward of the harbor lines.

The state harbor line was established by the Legislature as early as 1837 to guide water-dependent development and preserve the essential navigational and flood control functions of an applicable waterway. The MassDEP Waterways Regulation Program is responsible for administering the Public Waterfront Act (MA General Laws Chapter 91) relating to requests to install structures beyond the state harbor line. MassDEP is not authorized to approve construction of a structure beyond the state harbor line without legislative action. Structures as referred to in the

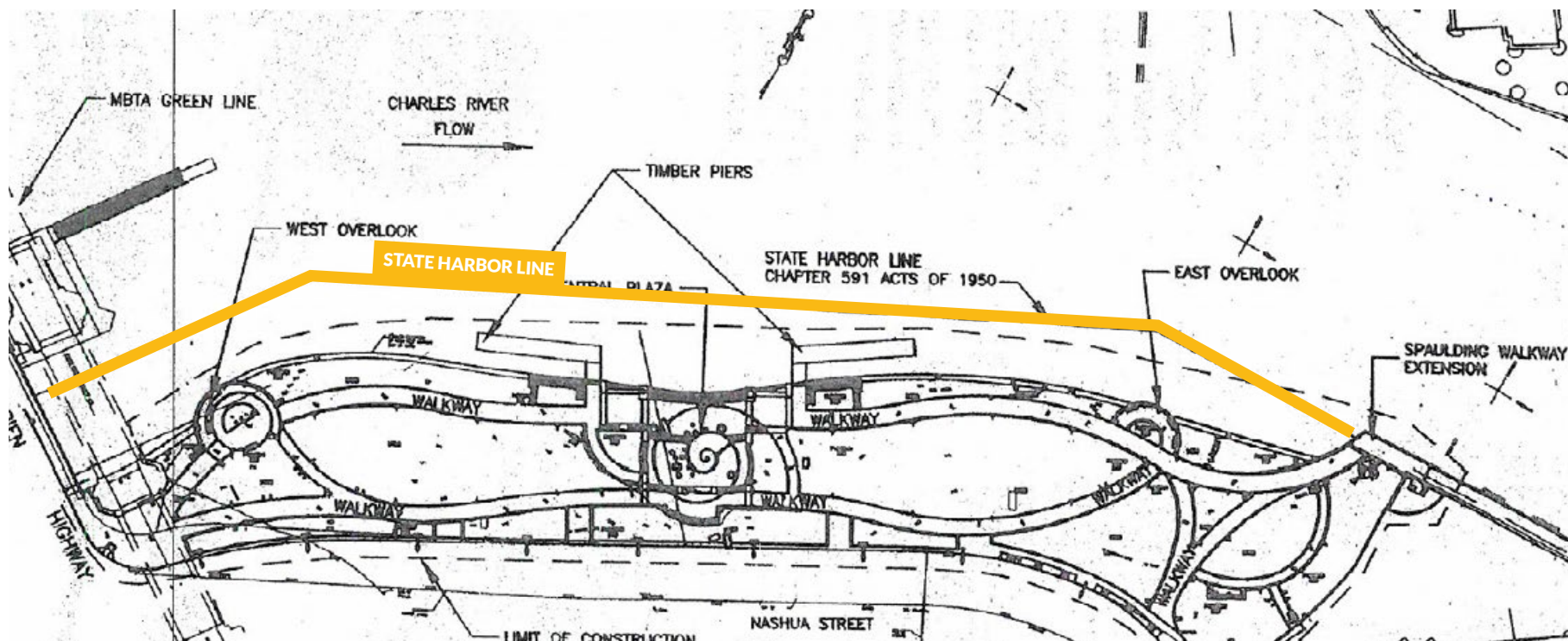
Public Waterfront Act are pile-supported structures and/or those structures physically attached to the shoreline. Bottom-anchored moorings, floats, or rafts that are placed on a temporary basis (seasonal) and not permanently pile-supported may be authorized by the local harbormaster or other authorized municipal official through an annual Section 10A permit and do not require Chapter 91 authorization from MassDEP.

The federal harbor line was authorized by Section 11 of the Rivers and Harbors Act of 1899 by the Secretary of the Army in order to preserve and protect navigation in a harbor. The U.S. Army Corps of Engineers (USACE) is responsible for reviewing requests to install structures beyond the federal harbor line. Structures regulated by the USACE include bottom-anchored structures, pole-supported or pile-supported structures, floats and lifts, and temporary recreational structures such as buoys and markers that are placed seasonally. Per the USACE guidance, structures should not extend more than 25% of the waterway width from either shoreline to maintain 50% of the width as open water.

## STATE HARBOR LINES







Interestingly, the Street Park, Chapter 91 License No. 7764 issued on July 25, 2000 included the construction of two timber-pile-supported boat docks in the Charles River, landward of the state harbor line. These two structures have yet to be constructed due to funding constraints. Therefore, a full Certificate of Compliance has not been issued for the site. The MassDEP Waterways Regulation Program may consider allowing the pile-supported boat docks to be constructed within the same watershed reach to satisfy the conditions of the license condition. However, the pile-supported docks would need to be located landward of the state harbor line, unless legislative action was pursued.

## Potential Areas of Concern for Contamination

Prior to the recent development of North Point Park, the area was primarily a series of parcels with a history of contamination, warranting MassDEP regulatory oversight. The site was originally filled in the 1800s with approximately 5 to 20 feet of fill material from multiple sources. The material included fine to coarse sand and sandy gravel with some silt as well as brick, cobbles, ash, cinders, timbers, and other building-related materials. Underlying the fill are organic silts, sands, and marine clays. The fill was originally placed to allow for railroad operations and use. The more recent history of the site includes the following former uses:

- » Massachusetts Department of Conservation and Recreation (DCR) facility with fuel storage/vehicle staging
- » Cold storage/office buildings owned by North Shore Realty Trust
- » Boston & Maine Corporation property with loading dock access for cold storage

Historical contaminants of concern (COC) have been identified as polynuclear aromatic hydrocarbons (PAHs), heavy metals, petroleum hydrocarbons from former underground storage tanks, and asbestos in soils.

Redevelopment of the site has been completed under the oversight of a Licensed Site Professional (LSP) from Comprehensive Environmental Inc., regulatory submittals of several Release Abatement Measure Plans. This work has included excavating significant amounts of soil and creating a greenspace cover layer made of 3 feet of clean planting material. Considering the remediation and subsequent improvements to the site were targeted at terrestrial areas and/or shoreline stabilization structures, the potential for direct exposure to underlying terrestrial soils is extremely limited. The Stantec volunteer team is not aware of any risk assessment specific to the use of the water feature by swimmers other than the same contamination concerns in the sediments at the bottom of the river. An ideal swimming facility in this location would be built in such a manner as to avoid direct contact with these sediments.



According to the LSP, regulatory closure with MassDEP will be achieved once the impacted soil stockpiles have been removed and the related closure documents have been filed. This will include filing a deed restriction or Activity and Use Limitation, which will contain requirements for future soil management of subsurface impacted soils. Future soil excavation with the potential to encounter residual impacted subsurface soils will require LSP oversight, preparation of a health and safety plan, and implementation of a soil management plan appropriate for the planned activity.

A review of an August 31, 2000 401 Water Quality certification for the nearby Nashua Street Park confirms the presence of sediment impacts in the Charles River with similar COCs present at the site. Although not directly related to a disposal site where releases of oil and/or hazardous material have occurred, they are indicative of the impacts due to runoff from urbanized areas.

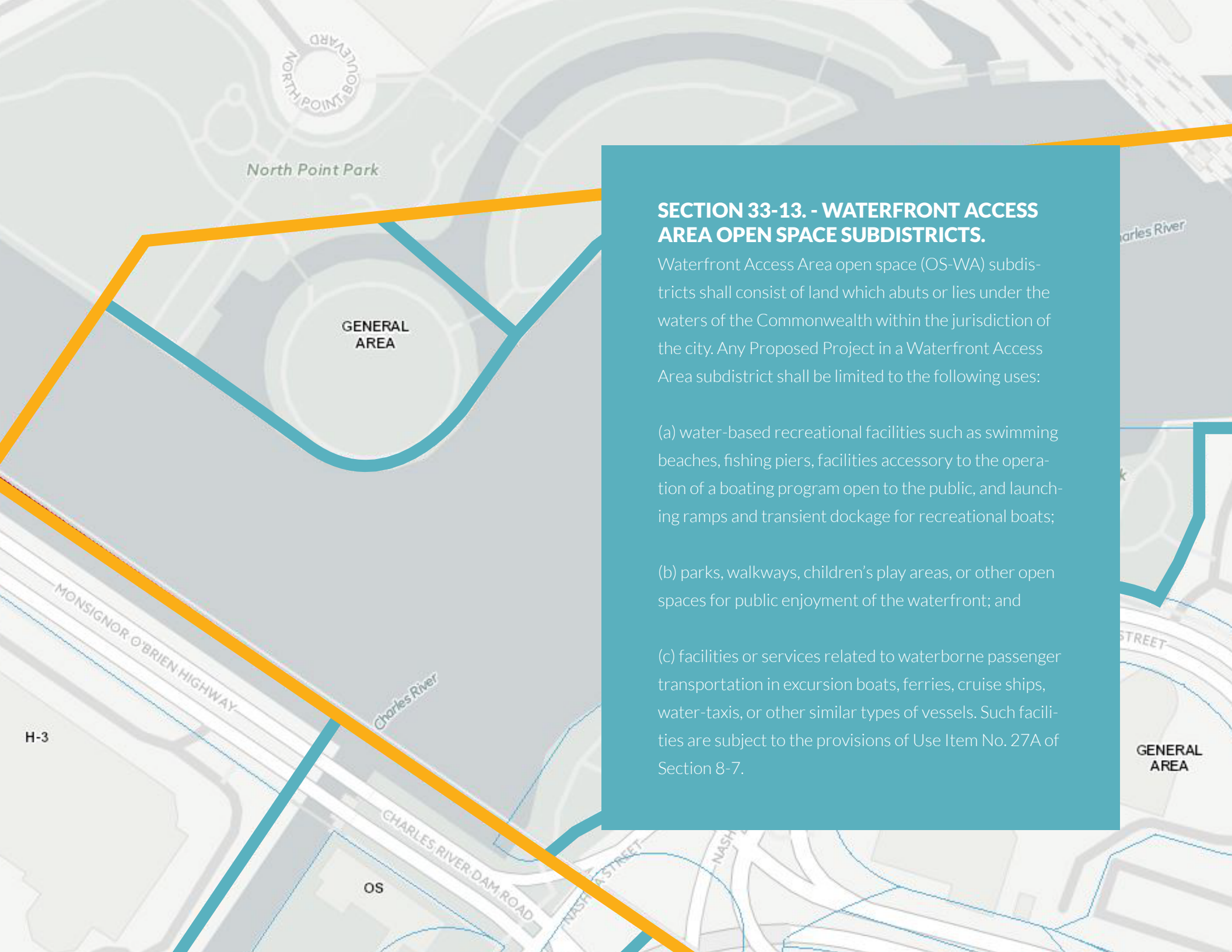
## Zoning

Most of the study area is located within the City of Boston municipal boundaries. The parcels are considered part of the North Station Economic Development Area and the Open Space subdistrict, also known as the Air-Right Open Space (OS-A) subdistrict, Section 33-16. According to the City of Boston, this subdistrict “shall consist of land used as Transit Corridors owned by a Public Agency; Air-Right open space subdistrict regulations shall apply only to the development of spaces over such Transit Corridors.” Any open space planning within this subdistrict will be subject to the approval of the Boston Conservation Commission (BCC). The BCC requires the provision of a perpetual conservation restriction for the following uses: conservation, garden, recreation, and parkland. This subsection of the zoning code does not explicitly reference swimming. A separate zoning designation, known as Waterfront Access Area Open Space (OS-WA) Subdistrict, does permit swimming as an allowable use. This district “shall consist of land which abuts or lies under the waters of the Commonwealth within the jurisdiction of the city.”

The information would imply that publicly-owned property is subject to local zoning regulations. To understand the extent to which the DCR falls within this jurisdiction, a conversation will be required between the DCR, BCC, and Boston Redevelopment Authority.

Should the development be subject to City of Cambridge zoning, the project would fall within the North Point Residence, Office and Business District, and under the North Point Resident District Planned Unit Development Overlay. Neither recreation nor swimming is explicitly mentioned within the permitted uses in these districts. Any such development would be required to undergo a Special Permit process.





**SECTION 33-13. - WATERFRONT ACCESS  
AREA OPEN SPACE SUBDISTRICTS.**

Waterfront Access Area open space (OS-WA) subdistricts shall consist of land which abuts or lies under the waters of the Commonwealth within the jurisdiction of the city. Any Proposed Project in a Waterfront Access Area subdistrict shall be limited to the following uses:

- (a) water-based recreational facilities such as swimming beaches, fishing piers, facilities accessory to the operation of a boating program open to the public, and launching ramps and transient dockage for recreational boats;
- (b) parks, walkways, children’s play areas, or other open spaces for public enjoyment of the waterfront; and
- (c) facilities or services related to waterborne passenger transportation in excursion boats, ferries, cruise ships, water-taxis, or other similar types of vessels. Such facilities are subject to the provisions of Use Item No. 27A of Section 8-7.

## Permitting Needs Assessment

The potential local, state, and federal environmental permits/ approvals and actions subject to jurisdiction are listed in the following table. The level of required permitting will depend on the scope of the proposed work in the Charles River, along the stone seawall/shoreline, and in adjacent upland areas. The requirements

do not vary significantly between the five potential swimming sites under consideration (sites A – E). During the project development process, it may be determined that some permits listed may not be necessary or that additional approvals are required.

Environmental Permit or Approval (Agency)	Project Activities					Action	Process
	Pile Supported Structure	Floating Structures	Seawall Modifications	In-Water Fill or Dredging	Landside Improvements		
Local							
Notice of Intent/ Order (NOI) of Conditions (Conservation Commission)	●	●	●	●	●	Temporary or permanent alteration of wetland resource areas and/or work in the Riverfront Area or Buffer Zone	Submit NOI application to local conservation commission(s). Copy mailed to the MassDEP Northeast Region Office and MADMF. Requires abutter mailings, legal notice, site visit (optional), and public hearing.
Section 10A Permit (Local Harbormaster or Other Authorized Municipal Official)		●				Temporary placement of bottom-anchored moorings, floats, or rafts on a seasonal basis (< 1 year) and not permanently pile-supported	Additional research is needed

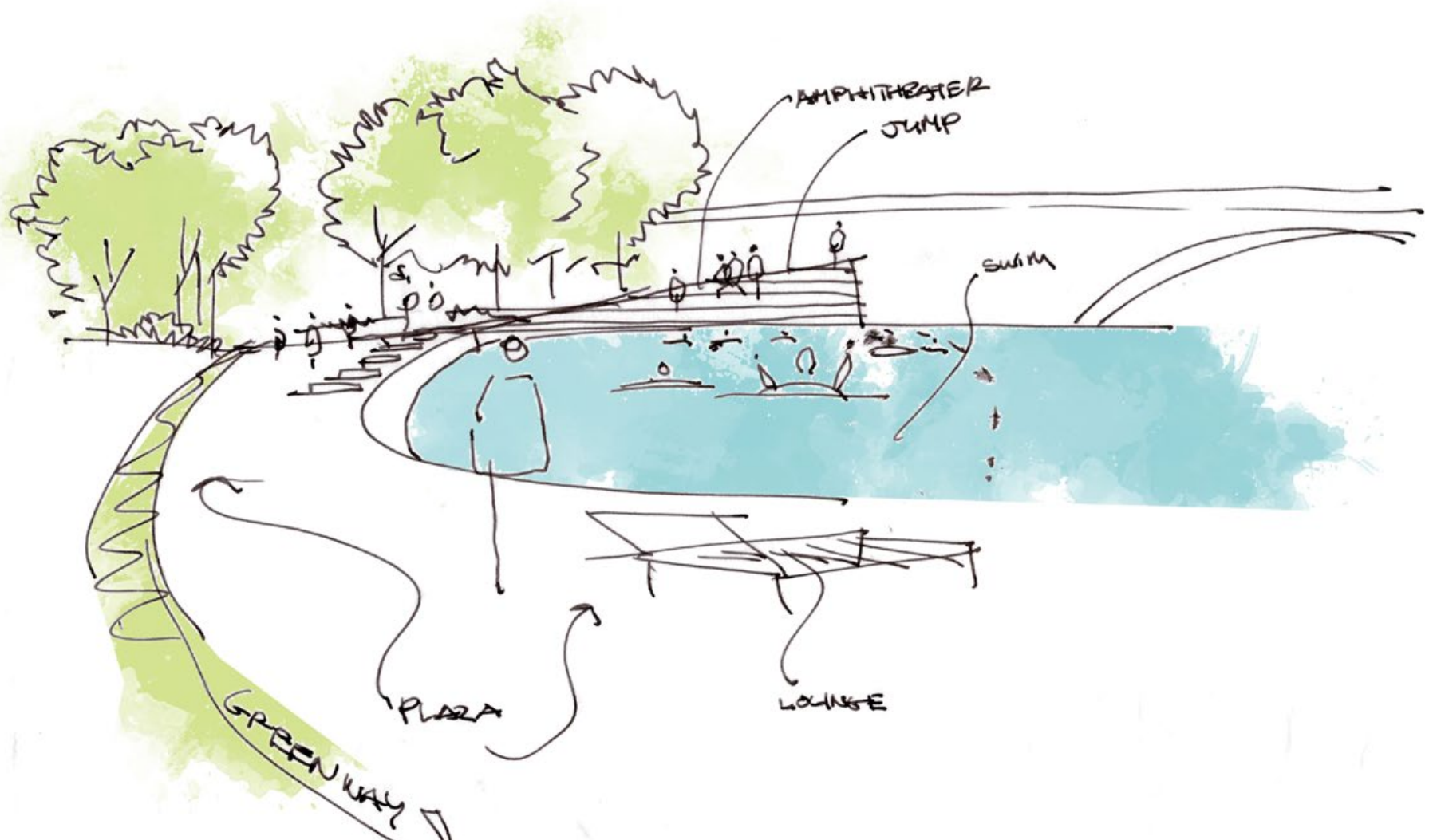


Environmental Permit or Approval (Agency)	Project Activities					Action	Process
	Pile Supported Structure	Floating Structures	Seawall Modifications	In-Water Fill or Dredging	Landside Improvements		
State							
Water Dependent Chapter 91 License or Permit (MassDEP)	<div></div>		<div></div>	<div></div>	<div></div>	Fill/excavation or placement of permanent structures in a navigable waterway.  Work in filled tidelands.	Submit new or amended Chapter 91 license or permit application to MassDEP with required municipal zoning and planning boards signoffs. Public Notices mailed to abutters and state agency and published in local newspaper. A complete application includes the following approvals: Final Order of Conditions, WQC, and MEPA Certificate.
Section 401 Water Quality Certification (WQC) (MassDEP)				<div></div>		Over 5,000-square feet of temporary and/or permanent wetlands or waterway impacts or over 100-cubic yards of dredging.	Submit WQC application to MassDEP with sediment analysis (for dredging). Public Notice published in local newspaper. A complete application includes the following approvals: Final Order of Conditions and Massachusetts Environmental Protection Act (MEPA) Certificate.

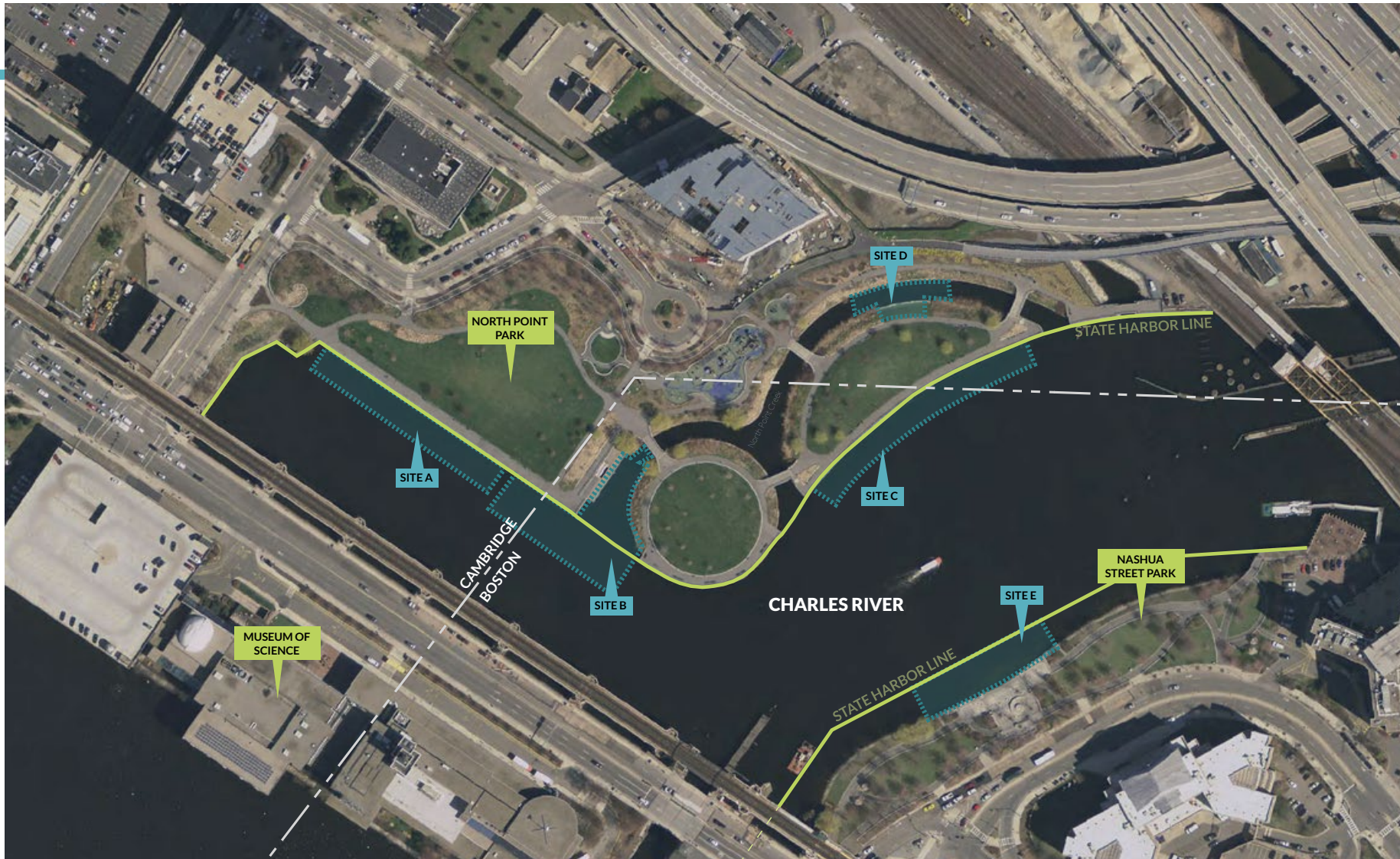
Environmental Permit or Approval (Agency)	Project Activities					Action	Process
	Pile Supported Structure	Floating Structures	Seawall Modifications	In-Water Fill or Dredging	Landside Improvements		
Historic Review - Project Notification Form (Massachusetts Historical Commission (MHC))	•	•	•	•	•	Require funding, licenses, or permits from any state or federal governmental agency.	Submit Project Notification Form (PNF) to MHC. Copies mailed to BUAR, Tribal Historic Preservation Officers, and local historic commissions.
Massachusetts Environmental Policy Act - Environmental Notification Form (MA Executive Office of Energy and Environmental Affairs (EOEAA))	•		•	•	•	Exceed MEPA review thresholds and require a Permit from a State agency, department, board, commission, or authority. Potential thresholds include alteration of more than 500 linear feet of bank, alteration of more than ½ acre of wetland resource area (including riverfront), or placement of a pile-supported or bottom anchored structure of 2,000 or more square feet in base area (not seasonal).	Submit Environmental Notification Form (ENF) to EOEAA. Copies mailed to MEPA directed distribution list. Published in environmental Monitor and local newspaper. A site visit is optional.



Environmental Permit or Approval (Agency)	Project Activities					Action	Process
	Pile Supported Structure	Floating Structures	Seawall Modifications	In-Water Fill or Dredging	Landside Improvements		
Federal							
Section 404 or Section 10 Massachusetts General Permit - Pre-construction Notification (PCN) (U.S. Army Corps of Engineers)	•	•	•	•		Fill/excavation in wetlands or waterways (Section 404). Placement of structures in a navigable waterway including bottom-anchored structures, pole-supported or pile-supported structures, floats and lifts, and temporary recreational structures such as buoys and markers that are placed seasonally (Section 10).	Submit PCN to Corps New England District. Corps publishes Public Notice. A complete application includes the following approvals: Final Order of Conditions, Chapter 91 Waterways license or permit, WQC, historic clearance. Corps will coordinate review with MA Division of Marine Fisheries and MA Office of Coastal Zone Management related to the anadromous fish run.
(U.S Coast Guard)							Additional research is needed



# COMPARISON OF POTENTIAL SITES



## Comparison of Potential Sites

Based on the research described in the previous sections, the primary difference between sites A through E within the study area relate to use and access more so than environmental conditions or permitting requirements. All of the sites are currently ADA-accessible on land, but none provide accessible routes directly to the water's edge except for site B. Site E also stands out as it contains surface water area behind the state harbor line and, therefore, may provide the easiest political route to pursue future improvement. Each site, however, features its own opportunities and challenges.



## Site A

- Features no direct access to the water without alterations to the existing seawall and railing
- It was observed on site visits that the tourist “duck boats” occasionally use this area as a turnaround location, but this site is otherwise separated from major boat traffic
- Adjacent to the large open lawn of North Point Park, providing space for gathering of people and small facilities
- Less visible than others and does not feel like it is directly “on” the Charles River. It feels visually constrained by the height of the Green Line above the western edge



## Site B

- Features an existing ADA-accessible dock structure that provides direct access to the water
- Already used by boaters (frequency is unknown)
- Provides refuge from the main boating channels
- Has existing upland areas with space for programming



## Site C

- Features no direct access to the water without alterations to the existing seawall and railing
- Compared to other sites, would place swimmers closest to existing boat traffic lanes
- Features ideal views of the Zakim Bridge and downtown Boston
- Features ample upland area for programming
- Feels like it is directly “on” the Charles River
- Most visible from other areas



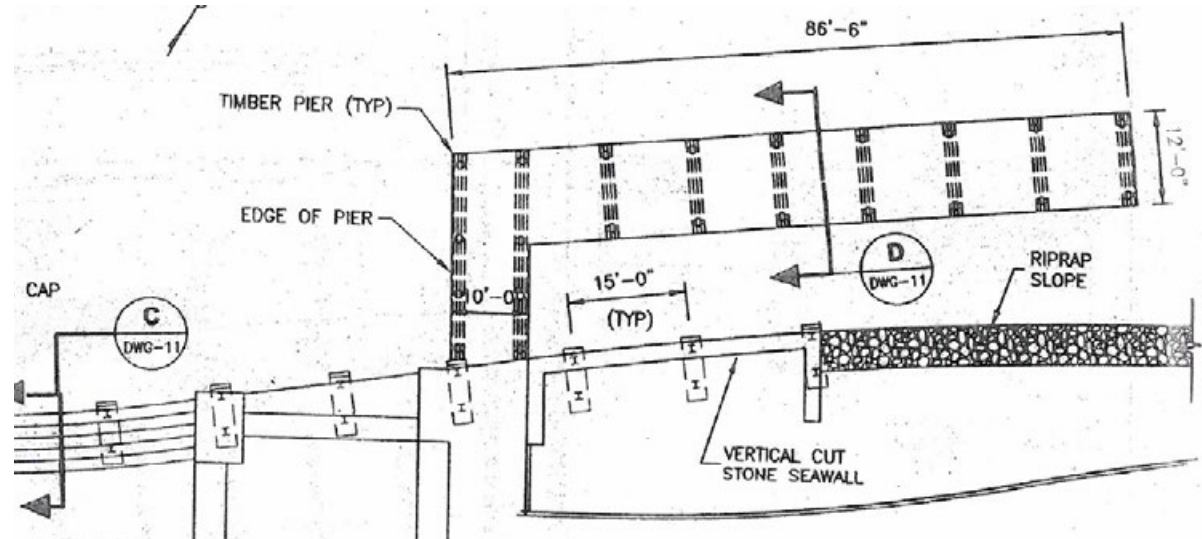
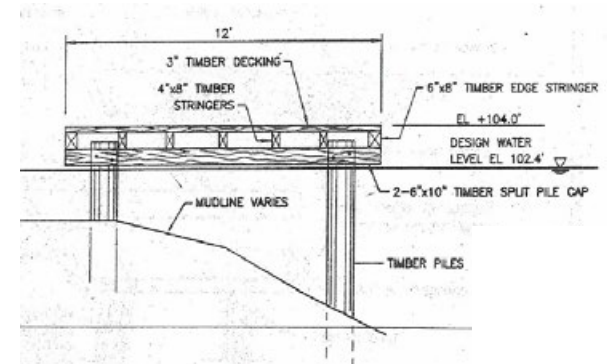
## Site D

- The canals of North Point Park contain the shallowest portion of the study area, potentially friendly for inexperienced swimmers
- Swimmers within the canal (North Point Creek) could conflict with kayaks/canoes who use the canals
- Shallower water may require a platform to limit interaction between swimmers and bottom sediments
- Does not feel like it is directly “on” the Charles River



## Site E

- Features existing granite steps that provide direct access to the river's water
- Would place swimmers closer to boat traffic than sites A or B
- Contains significant surface water area outside of the state harbor line
- Docks are already permitted, but were never constructed, increasing potential for access to the water
- Further investigation into water depth could inform whether this site should be considered appropriate for swimming



After discussion with the Stantec team, the CRC designated site B as its preferred location. The Stantec volunteer team agrees with this designation and recommends that the Charles River Conservancy further pursue investigation of the possibility of a swimming facility at site B.

Site B already features existing infrastructure that provides direct access to the water and is adjacent to a high-quality “upland” park that could provide a vibrant social and visual backdrop to

the swimming facility. Improvements made to site B could take advantage of, and relate to, the existing dock structure present there. While improvements to site E could pursue the construction of the dock structures permitted but never previously built, and while site C provides the best views to downtown Boston, site B provides a safe zone for swimming away from the main boating channel, contains existing ADA access to the water’s edge, has visibility from the Museum of Science, and room for potential future expansion.





CONCEPTUAL DESIGN APPROACHES

# Designing a Place to Swim

Given the opportunities and constraints to the design, construction, and operation of a permanent swimming facility in the study area, the following concept designs demonstrate different approaches to establishing such a facility. These concepts are inspired by projects that have already been completed around the world. The intent of these designs is to create a space that is not only safe for swimming, but that is also fun and inviting, and that challenges perceptions about the water quality of the Charles River.



## Swimming Area Program

Prior to designing any facility, a program must be developed that reflects the intended use, which the Charles River Conservancy has already developed. In order to consider a site for a permanent swimming facility, the Conservancy requires the following criteria:

### **The site must be safe and accessible**

- » The water must be 9 to 15-feet deep to avoid contact with the river bottom
- » The site must be able to be overseen by a single pair of lifeguards
- » Ideally direct access to the water's edge will surpass the accessibility requirements of the Americans with Disabilities Act and be accessible by individuals limited by mobility.

- » The site must be a safe distance from boat traffic, located outside of main navigational routes, and protected from irregular boat traffic, such as a docking or launching boats

### **The site must have space for temporary or permanent land-side amenities**

- » Space for ticketing agents and entrance area(s) for future use by potential third-party operators
- » Space for lifeguard facilities
- » Pop-up changing facilities for up to two people at a time
- » Temporary removable shower facilities for up to two people at a time
- » An information booth, kiosk, sign, or other similar feature
- » A lawn area for flexible use, including sun-bathing, food trucks, picnics, etc.

- » Access to existing restrooms or space for temporary restrooms
- » Space for food trucks or other temporary vendors

**The site must be adaptable**

- » Able to be used by a variety of user groups, from experienced swimmers to families with children
- » Able to close for winter months, water quality events, dam management activities, and other times required for safety
- » Able to make use of existing infrastructure

**The site should be a destination**

- » The site should be part of a larger destination or network of destinations that people are attracted to
- » There should be views or vistas of the river and surrounding area
- » There should be multiple transportation options, including taking the MBTA, biking, walking, and some parking



## Precedents



### Islands Brygge Harbour Bath - Copenhagen

- » Extension of the surrounding city and park into the water for recreational use.
- » Open spaces surrounding the swim area allow for swimmers to socialize and lounge.
- » Uniquely designed diving towers serve as an attraction feature to Harbour Bath.
- » The water quality is checked regularly to provide swimmers with a safe swim environment.
- » Built on floating pontoons that allow for easy deconstruction of the structure.



### Thames Baths - London [Proposed]

- » Currently in planning phases, Thames Baths incorporates vegetation into the design of the swimming area to provide swimmers with a natural feel while in an urban environment
- » A floating pontoon will provide three different swim settings that allow for both sport and recreational use.



### **Bains des Pâquis - Geneva**

- » The artificial peninsula provides beach-goers an easily accessible entrance to the water and views of the surrounding lake.
- » Vast area of space for recreational use along the water.





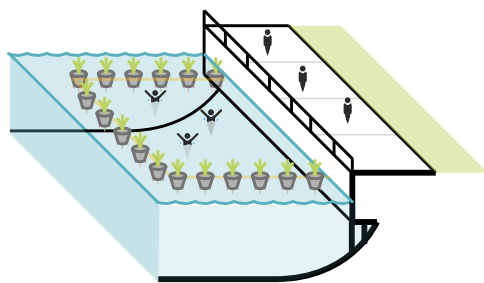
### Flussbad - Berlin [Proposed]

- » Staircase along the riverfront provides an easily accessible entrance to the swim area.
- » Connection between urban environment and the adjacent river.
- » A sandy bottom and new vegetation provide natural filtration of the water.

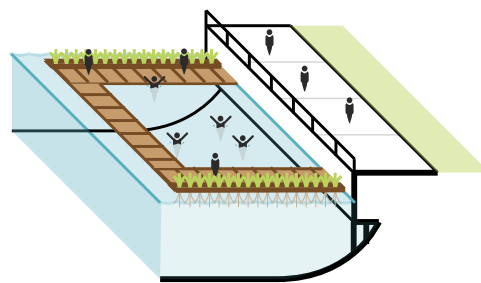
## Phasing

The following concepts are presented as potential phases of one project. The first phase is completely temporary; the facility is able to be removed at any given notice, and could be placed in the water for temporary events. The second is a more complex, yet

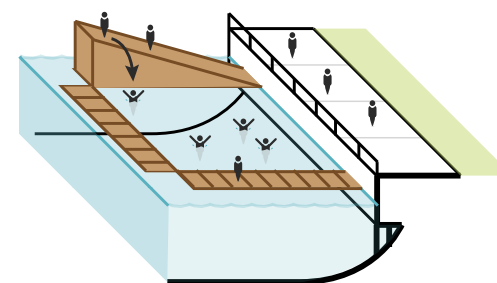
still temporary facility. This facility could be installed and removed seasonally, and is not permanently attached to the wall or river floor. The final phase is a permanent facility built on piles in the river and attached permanently to the edge of the river.



**temporary**



**seasonal**



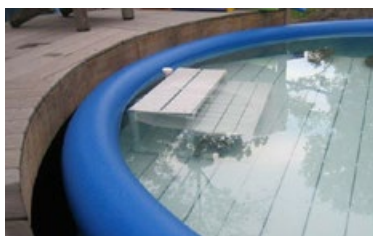
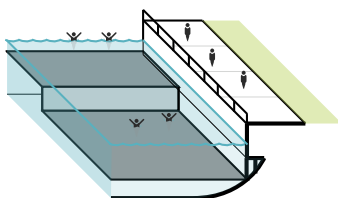
**permanent**

## Approaches to Swimming Area Barriers and Avoiding Contact with the River Bottom

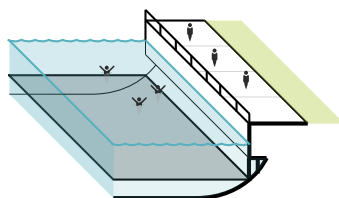
There are many possible ways to prevent swimmers from coming in contact with the river bottom and methods for separating swimmers from hazards outside of an assigned swimming area.

These include but are not limited to underwater platforms, poured concrete, concrete pillow fabric, metal mesh and nets. Any combination of these methods could be used with the design concepts presented on the following pages to create the effect of a floating “basket” in which swimmers were contained.

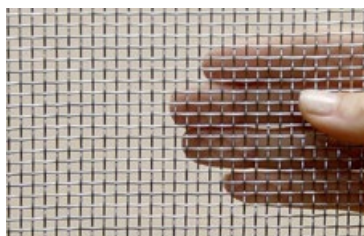
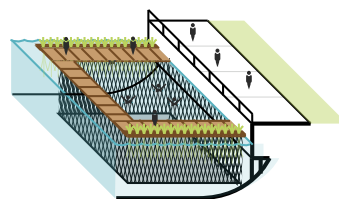
**UNDERWATER PLATFORM**



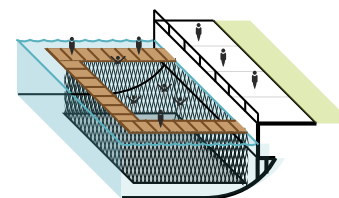
**CONCRETE PILLOW FABRIC**



**MESH**



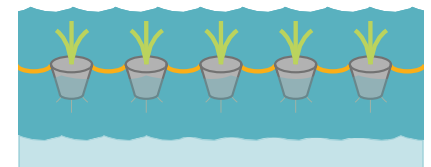
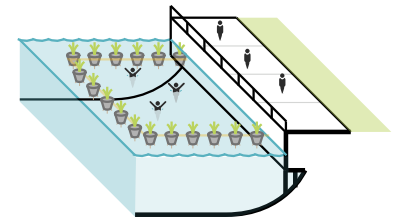
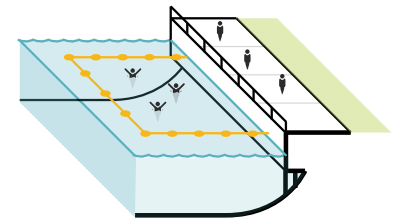
**NETS**





### Concept 1: Floating, Temporary

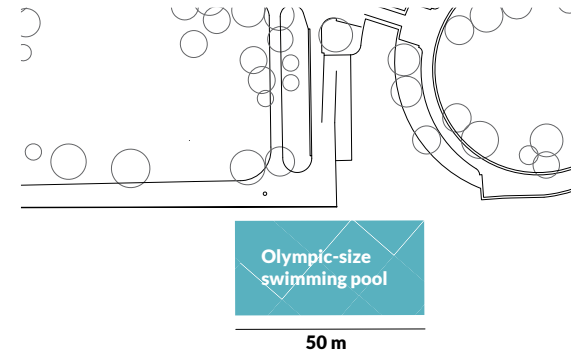
This temporary installation connects to, and modestly expands upon, the existing dock. This improves access to the deeper areas of the river at a minimal expense and effort. The swimming area is defined by a combination of buoys and floating ornamental wetland plant islands that recall the wilderness of marshes that once thrived along Boston's tidal rivers. The natural approach to the swimming barrier emphasizes the river as a clean public amenity.



## LOCATION



## POOL SIZE



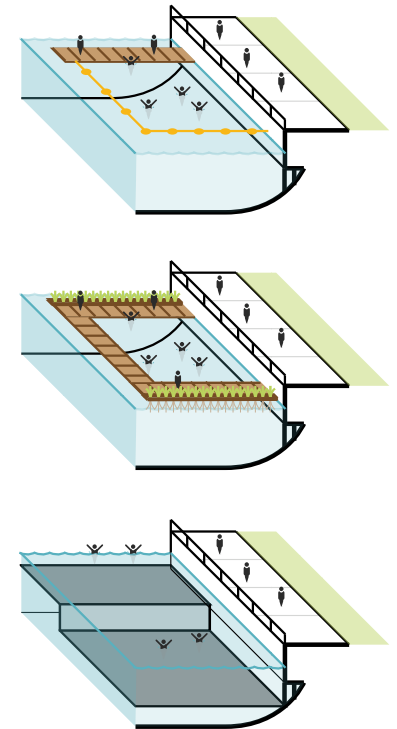
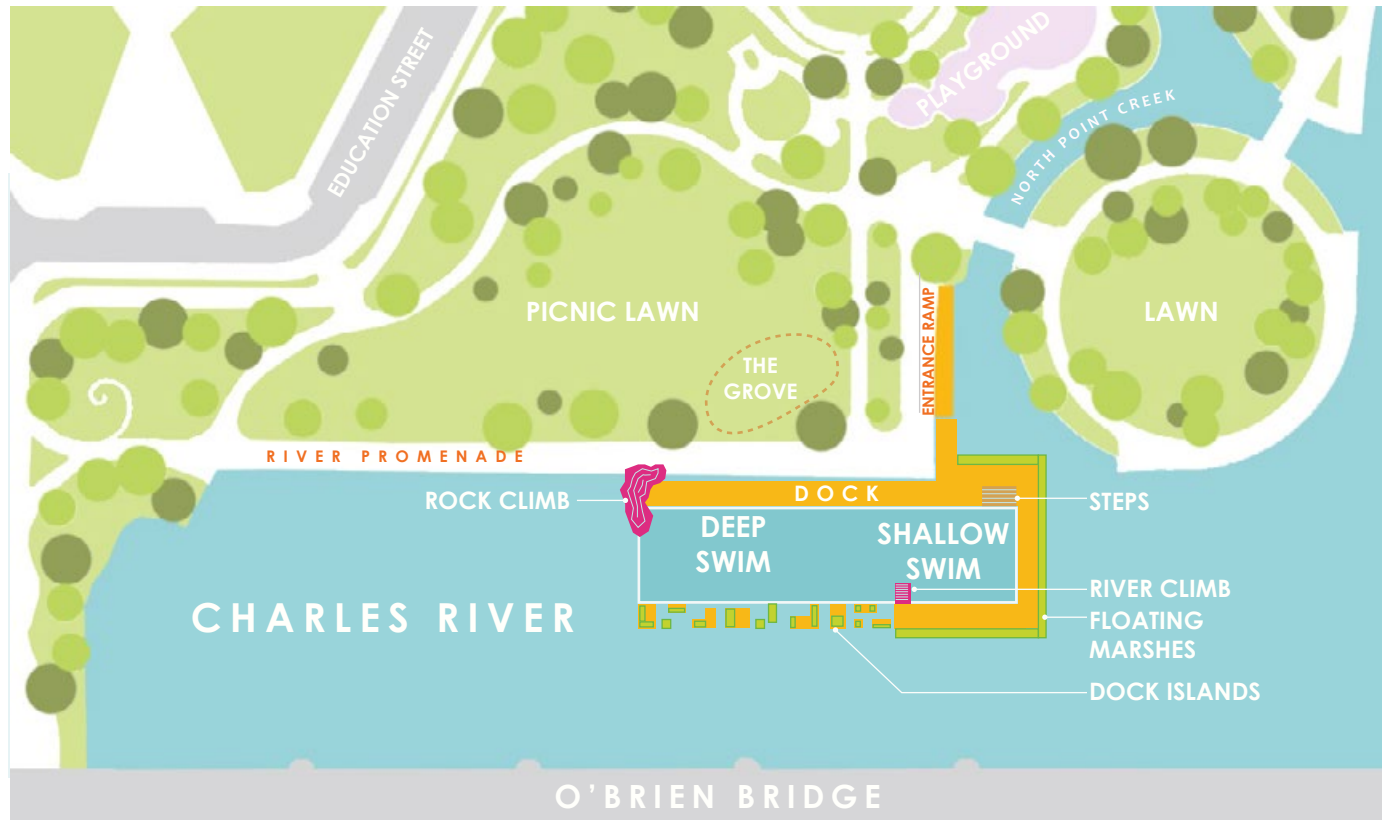
## PARK-SIDE PROGRAMMING



## Concept 2: Floating, Seasonal

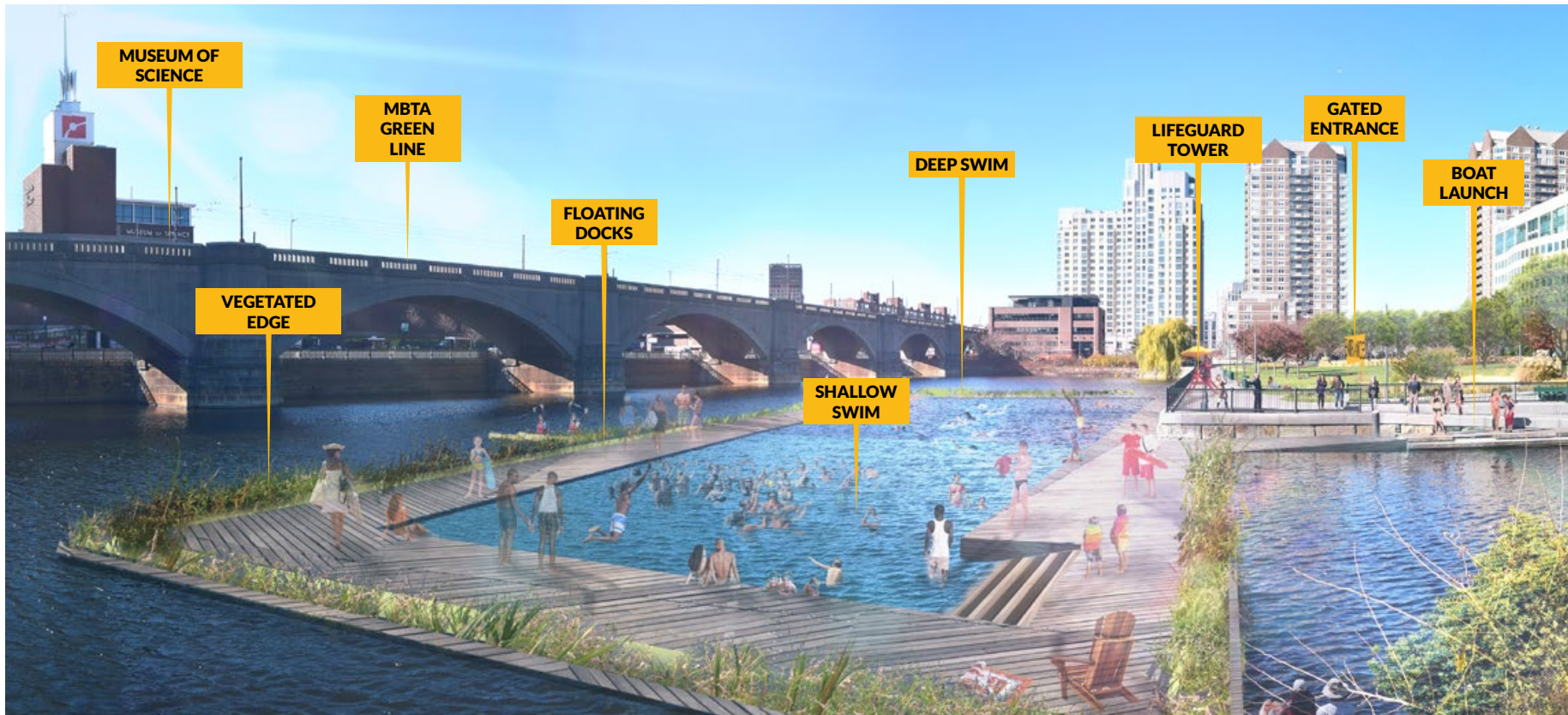
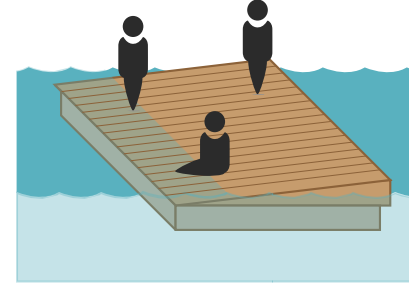
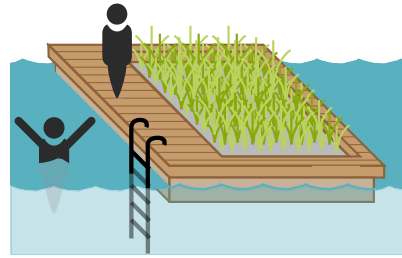
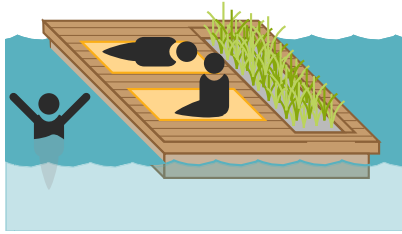
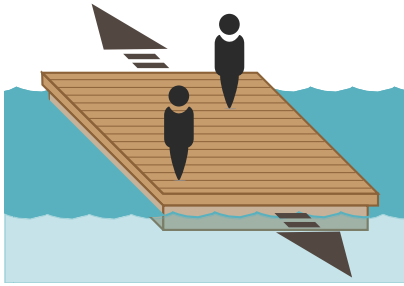
This seasonal installation approach significantly expands the existing dock along the river promenade into Cambridge, as well as extending it into the river. The configuration of the dock loosely defines two zones for experienced and beginning swimmers. Wooden dock and wetland islands delineate the rest of the

swim area, and provide flexible spaces that can be occupied by individuals or small groups. Modest climbing structures are attached to the docks to provide playful ways to jump and fall into the water.





## MODULAR FLOATING UNITS



### Concept 3: Permanent

The permanent installation creates a new recreational zone with sculptural wooden boardwalks and wetland plantings that wind through the river. A tiered amphitheater provides a central gathering space that can accommodate large groups.



*Amphitheater steps to water*



*Sunbathing and events on the lawn*







## CONCLUSION AND NEXT STEPS

# Is it Feasible?

**In conclusion, the Stantec volunteer team believes that locating a swimming facility at the existing dock, located at site B in North Point Park could be feasible, given several assumptions, and recommends the following next steps for the Charles River Conservancy to pursue in order to fully explore this concept.**

Given that this study was based on assumptions including water quality, water depth, ownership, operation, implementation, and organizational capacity, it is recommended that the Conservancy:

- » Engage in ongoing conversations with the Department of Conservation and Recreation, the landowner and manager of the site, to discuss many topics including:
  - Ownership, operation, financing, safety, and liability related to a swimming facility
  - Currently scheduled maintenance of North Point Park and operation schedule of pumps in the area
- » Pursue finer testing of the depth of the river in this area, including scanning for debris at the bottom of the river
- » Pursue frequent and fine-grain testing of water quality over time in this area
- » Seek ongoing consulting advice from legal, environmental, engineering, and design professionals

## Images

- » <http://www.visitcopenhagen.com/copenhagen/harbour-bath-islands-brygge-gdk482346>
- » <http://jdsa.eu/bad/>
- » <https://www.kickstarter.com/projects/thamesbaths/thames-baths-a-new-beautiful-lido-for-the-river-th/description>
- » <http://www.myswitzerland.com/en-us/bains-des-paquis-geneve.html>
- » [http://www.nytimes.com/2015/10/12/arts/design/the-flussbad-plan-in-berlin-reimagines-a-canal-for-the-people.html?\\_r=0](http://www.nytimes.com/2015/10/12/arts/design/the-flussbad-plan-in-berlin-reimagines-a-canal-for-the-people.html?_r=0)
- » <http://rwinters.com/images/northpointpark.jpg>
- » [https://en.wikipedia.org/wiki/Shark\\_net#/media/File:Coogee\\_Beach\\_gnangarra-203.jpg](https://en.wikipedia.org/wiki/Shark_net#/media/File:Coogee_Beach_gnangarra-203.jpg)
- » By ArnoldReinhold - Own work, CC BY-SA 3.0, <https://commons.wikimedia.org/w/index.php?curid=4122345>
- » [http://wirednewyork.com/parks/central\\_park/sheep\\_meadow/sheep\\_meadow\\_4july05.jpg](http://wirednewyork.com/parks/central_park/sheep_meadow/sheep_meadow_4july05.jpg)
- » <http://www.seattleartmuseum.org/ProgramsLearning/summer-at-sam/2015/osp-summer-31jul14-235.jpg>

## Resources

- » Record Documents from Boston Water and Sewer Commission: Charles River Marginal Conduit Project, Interceptor Sewer Phase 2, Lowell Street Interceptor and River Crossing Plan and Profile, Sta 0+00 to Sta 12+31.23 Plan
- » Boston Water and Sewer GIS Map
- » <http://www.thecharles.org/projects-and-programs/swimmable-charles/>
- » [https://en.wikipedia.org/wiki/North\\_Point\\_Park\\_\(Cambridge,\\_Massachusetts\)](https://en.wikipedia.org/wiki/North_Point_Park_(Cambridge,_Massachusetts))
- » Massachusetts Department of Environmental Protection (MassDEP) Wetlands and Waterways Office permit files
- » Office of Geographic and Environmental Information (MassGIS), Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs, 2016
- » FEMA Map Service Center, 2016
- » Massachusetts Department of Conservation Office of Cultural Resources and Massachusetts Board of Underwater Archeological Resources, email correspondence, 2016
- » Correspondence with Childs Engineering
- » Correspondence with Comprehensive Environmental Inc.
- » Correspondence with Bill Gode, Director of Flood Control, New Charles River Dam, DCR

